Public Services

128 North Second Street · Fourth Floor Courthouse · Yakima, Washington 98901

(509) 574-2300 · 1-800-572-7354 · FAX (509) 574-2301 · www.co.yakima.wa.us

VERN M. REDIFER, P.E., Director

January 15, 2015

Charles McKinney
Department of Ecology, Central Region Office
15 W. Yakima Ave. Suite 200
Yakima, WA 98902-3452

Re: **Lower Yakima Valley GWMA - 2014 Fourth-Quarter Report (IAA No. C 1200235)**

Dear Charlie:

Enclosed please find one (1) copy of Yakima County's fourth-quarter report as required under Attachment A, Statement of Work, Agreement No. C 1200235 between the State of Washington Department of Ecology and Yakima County.

This report addresses deliverables 1.1, 1.4 and 2.2 as required under the agreement.

Deliverable 2.1, invoices, to be sent under separate cover.

If you have any questions, please let me know.

Thank you.

Lisa H. Freund, Administrative Manager
Yakima County Public Services

enclosure

IAA No. C 1200235 – Fourth Quarter 2014 Report
Lower Yakima Valley GWMA
December 31, 2014

TASK 1 - ADMINISTRATIVE FUNCTIONS
DELIVERABLES

1.1 Meeting Records

For each meeting of the GWAC, submit a copy of the agenda, minutes, attendance and public meeting notice at the end of each quarter.

Attachment (A) includes the final GWAC meeting summaries of August 21, September 18, and October 16, 2014, and the draft meeting summary of December 18, 2014; the Education and Public Outreach (EPO) Working Group summaries of November 5 and December 10, 2014; the Residential, Commercial, Industrial, and Municipal (RCIM) Working Group summary of October 23, 2014; the Data Collection, Characterization and Monitoring Working Group summaries of November 20 and December 3, 2014; and the Regulatory Framework Working Group summaries of November 12 and December 16, 2014. Note: the Livestock/CAFO, Irrigated Ag (IAWG) and Funding Working Groups did not hold meetings in the fourth quarter.

1.4 2015 Meeting Schedule

At its December 2014 meeting, the GWAC agreed to continue its bimonthly meeting schedule in 2015. Beginning in February, bimonthly meetings will be held the third Thursday of each month from 5:00 p.m. - 7:00 p.m. at *Radio KDNA, 121 Sunnyside Avenue in Granger. Meeting dates for 2015 are February 19, April 16, June 18, August 20, October 15, and December 17 (as needed).

*The February 2015 meeting will be held in Sunnyside at the Denny Blaine Board Room.

TASK 2 - PROGRAM FUNCTIONS
DELIVERABLES

2.2 Status Report

Submit written quarterly status reports summarizing GWAC plans, activities and work products, and describing any interlocal agreements or other contracts by the end of each quarter.

Work Plans and Products

The GWAC approved a two-year budget, the Interim Final Groundwater Monitoring Plan-Version 7, and the Comprehensive Nitrogen Loading Assessment Scope of Work Version 1.2a in the fourth quarter. The first round of Deep Soil Sampling was also completed.

Presentations: In December the EPA presented data on its Dairy Consent Order to the GWAC.

Budget

Background: On August 21, the GWAC reviewed 17 budget proposals submitted by the working groups and preliminarily ranked each one. Because the total budget requests exceeded the

available funds, the working groups were advised to review their priority projects, and to consider reducing or withdrawing budget requests before the next meeting. The GWAC agreed to a special meeting on September 18 to review the revised budget and continue the budget discussion; however, the meeting lacked a quorum and the budget work was carried over into the fourth quarter.

At its October 16 meeting the GWAC reviewed and approved a revised $2.03 million two-year budget—$1.09 million less than the previous total of $3.12 million. The budget reflected 16 working group proposals, several of which had been combined or reduced in scope following the August meeting. The budget also included funds spent and/or obligated. $200,000 was placed in a reserve fund for additional deep soil sampling and decommissioning abandoned wells. A $325,000 placeholder for a mobile lab for on-farm evaluation of irrigation water management was also included.

The line item budget, as presented and approved by the GWAC on October 16, 2014, is included as Attachment (B)

Interim Final Groundwater Monitoring Plan Version 7

The Interim Final Groundwater Monitoring Plan Version 7 was approved by the GWAC on October 16, 2014. The plan established the Standard Operating Procedures, provided the quality assurance and quality control on how the samples would be collected and analyzed. It was noted that this plan was not a scope of work; it was the quality assurance and quality control parameters that would be followed. The Interim Final Groundwater Monitoring Plan Version 7 is included as Attachment (C)

Deep Soil Sampling Program – Status

The first round of sampling (33 deep soil sampling surveys) was completed in the fourth quarter. The data is summarized in Attachment (D) - Deep Soil Sampling Combined Report and Deep Soil Sampling Soil Sample Report

Comprehensive Nitrogen Loading Assessment Scope of Work and Budget Version 1.2a Dated December 3, 2014

Background: The intent of the assessment was to better understand the sources of nitrogen in the GWMA and provide a foundation on which the GWAC could make future recommendations about Best Management Practices and other actions to address groundwater contamination. The SOW underwent review by the working group, with the biggest issue being how the assessment with agriculture would be conducted. Modifications were made to the SOW as the working group was aware that there was not a population big enough to sample based on the deep soil sampling plan. It was noted that the Washington State Department of Agriculture (WSDA) had acquired additional information to supplement the data. It was suggested that the assessment might have to utilize peer-reviewed published reports.

Following discussion, the Scope of Work (SOW) was approved by the GWAC at its December meeting.

The Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area Scope of Work and Budget Version 1.2a is included as Attachment (E)

Enviroissues Contract
In December the GWAC agreed not to renew Enviroissues' contract for meeting facilitation services. It was further agreed that Yakima County consultant Jim Davenport would henceforth serve in that capacity.

Working Group Activities:

Education and Public Outreach (Lisa Freund, Chair)
The EPO met on November 5 and December 10, 2014 to discuss the Abandoned Wells campaign and to begin assigning leads, timeframes and milestones for other projects in its two-year work program.

At the November meeting RCIM member Dan DeGroot described RCIM's concept for the Abandoned Wells and Septic System campaign. He noted that RCIM had tasked EPO with both identifying the location of abandoned wells and conducting education on the importance of decommissioning these wells. Jim Davenport concurred, explaining that the GWAC had approved a $76,000 budget for EPO to accomplish both tasks.

Several members questioned the expectation that EPO would develop and oversee the process of identifying abandoned wells in the GWMA, noting that this task would be more appropriately conducted by another working group.

At its December meeting the working group heard a proposal from a University of Washington graduate class instructor that would partner the class with the EPO to develop messaging for the Abandoned Wells outreach campaign.

Following discussion on what would be useful class products for the EPO and the campaign, the instructor agreed to resend the proposal with the more informed perspective she heard at the meeting.

The proposal was brought before the GWAC at the December meeting; however, after discussion, the GWAC agreed not to pursue the partnership in part because there wasn't time to fully shape the proposal before the start of the project; the proposal lacked detail regarding the purpose of the proposed tour and its relationship to abandoned wells, and concerns about GWAC oversight of the products produced by the class.

Livestock/CAFO (Charlie McKinney, Chair)
Did not meet.

Irrigated Ag (Jim Trull, Chair)
Did not meet.

Residential, Commercial, Industrial, and Municipal (RCIM) (Robert Farrell, Chair)
The group met on October 23, 2014 to discuss the types of permit data available to measure net loading of nitrates to groundwater, and the usefulness of that data if it is acquired. It was determined that Ecology knows who the permit holders are but doesn't know what the loadings are. Ecology staff will help identify how to acquire this information. The group also discussed a

proposed addendum to Deep Soil Sampling on RCIM sites, and its educational strategy with EPO to address risks associated with abandoned/improperly decommissioned wells.

After discussion, the RCIM determined that the task of determining net loading of nitrate from permit sources was the purview of the Data Working Group, not RCIM. The data working group will be advised of that decision.

Data Collection, Characterization and Monitoring (Kirk Cook, Chair)
The group met on November 20 and December 3, 2014 to finalize the draft Nitrogen Loading Assessment Scope of Work. The group also heard presentations by the South Yakima Conservation District on Deep Soil Sampling progress, by Livestock/CAFO on the progress of developing a data collection plan within animal feeding operation boundaries, and held a discussion on Stuart Turner's alternative data sets that he proposed to present to the GWAC.

After review and discussion, the draft Nitrogen Loading Assessment was approved by consensus and forwarded to the GWAC for its consideration. No action was taken on Mr. Turner's proposed presentation.

Regulatory Framework (Tom Eaton Chair)
The group held two meetings on November 12 and December 16, 2014 to develop, review and approve a list of questions for its proposed study sessions on existing regulations that are applicable within the Lower Yakima Valley Groundwater Management Area.

Study sessions: Representatives of the regulatory agencies responsible for administration of existing regulations will be invited to a study session conducted by the Working Group in order to learn more about how the existing regulations address potential sources of nitrates to groundwater: what is working, what isn't working and how the regulations or implementation might be improved.

The group concluded that a minimum of three study sessions should be held, including:

Study Session 1: will address those regulations applicable generally, or to all sources within the GWMA, including: Groundwater Management Areas, Safe Drinking Water Act, State Water Pollution Control Act, Washington State Drinking Water Standards, Class A and Class B Water Systems, Clean Water, Act State Water Pollution Control Act, State Waste Discharge Permits

Study Session 2: will address solid waste in Washington, biosolids, domestic and industrial wastewater facilities, large on-site sewage systems (LOSS), sewer systems, septic tanks, on-site sewer systems (OSS), Aquifer Recharge Areas, Critical Aquifer Recharge Areas, growth management and land use planning

Study Session 3: will address those regulations applicable specifically to irrigated agricultural sources and those applicable to CAFO/livestock (including dairy) sources

The group agreed to schedule the study sessions on the second Wednesday of each month, beginning in early 2015. Additional sessions might be scheduled as needed. Agency participation would be coordinated by Jim Davenport.

GWMA Website
The website and calendar continued to be updated in real time.

Contracts and Interlocal Agreements:
No contracts or agreements were executed during the fourth quarter.

Attachment A

- GWAC Attendance Records for October 16 and December 18, 2014
- Final GWAC Summaries of August 21 and September 18; Public Meeting Notice, Agenda and Meeting Summary of October 16; Public Meeting Notice, Agenda and Draft Meeting Summary of December 18, 2014
- Education and Public Outreach (EPO) Working Group Summaries of November 5 and December 10, 2014
- Residential, Commercial, Industrial and Municipal (RCIM) Working Group Summary of October 23, 2014
- Data Collection, Characterization and Monitoring (Data) Working Group Summaries of November 20 and December 3, 2014
- Regulatory Framework (Reg) Working Group Summaries of November 12 and December 16, 2014

Lower Yakima Valley GWAC Meetings
Attendance

Member	16-Oct-2014	18-Dec-2014				
Stuart Turner	Present	Present				
Chelsea Durfey	Absent	Present				
~~Helen Reddout~~						
~~Wendell Hannigan~~						
Kathleen Rogers	Absent	Absent				
Bud Rogers	Present	Absent				
Patricia Newhouse	Absent	Present				
Sue Wedam	Present	Present				
Doug Simpson	Present	Present				
Jean Mendoza	Present	Present				
Eric Anderson	Absent	Absent				
Jan Whitefoot	Absent	Absent				
Jim Dyjak	Present	Absent				
Steve George	Present	Present				
Frank Lyall	Present	Present				
~~Justin Waddington~~						
Jason Sheehan	Present	Present				
Dan DeGroot	Present	Present				
Jim Trull	Absent	Present				
Ron Cowin	Absent	Absent				
Laurie Crowe	Present	Present				
Jim Newhouse	Absent	Absent				
Robert Farrell	Present	Present				
John Van Wingerden	Absent	Present				
Rand Elliott	Present	Present				
Vern Redifer	Present	Present				
Gordon Kelly	Absent	Present				
~~Dr. Kefy Desta~~						
Dr. Troy Peters	Present	Present				
Tom Eaton	Present	Present				
Marie Jennings	Absent	Absent				
Elizabeth Sanchey	Absent	Present				
Tom Ring	Absent	Absent				
~~Lonna Frans~~						
~~Matt Bachmann~~						
Kirk Cook	Present	Present				
Virginia "Ginny" Prest	Absent	Absent				
Andy Cervantes	Present	Absent				
Ginny Stern	Present	Present				
Charlie McKinney	Present	Present				
Tom Tebb	Absent	Absent				
Lino Guerra	Present	Absent				
Rick Perez	Absent	Absent				

LOWER YAKIMA VALLEY GROUNDWATER MANAGEMENT AREA ADVISORY COMMITTEE (GWAC)

MEETING SUMMARY

Thursday, August 21, 2014

Radio KDNA
121 Sunnyside Ave, Granger, WA 98932

Note: This document is only a summary of issues and actions in this meeting. It is not intended to be a transcription of the meeting, but an overview of points raised and responses from Yakima County and Groundwater Advisory Committee members. It may not fully represent the ideas discussed or opinions given. Examination of this document cannot equal or replace attendance.

I. Call to Order

Roll Call: The meeting was called to order at 5:03 pm by Angie Thomson, Facilitator.

Member	Seat	Present	Absent
Stuart Turner	Agronomist, Turner and Co.	✓	
Chelsey Durfey	Agronomist, Turner and Co. (alternate)	✓	
Helen Reddout	Community Association for Restoration of the Environment		✓
Wendell Hannigan	Community Association for Restoration of the Environment (alternate)		✓
Kathleen Rogers	Lower Valley Community Representative Position 1	✓	
Bud Rogers	Lower Valley Community Representative Position 1 (alternate)		✓
Patricia Newhouse	Lower Valley Community Representative Position 2	✓	
Sue Wedam	Lower Valley Community Representative Position 2 (alternate)		✓
Doug Simpson	Irrigated Crop Producer	✓	
Jean Mendoza	Friends of Toppenish Creek	✓	
Eric Anderson	Friends of Toppenish Creek (alternate)		✓
Jan Whitefoot	Concerned Citizens of the Yakama Reservation		✓
Jim Dyjak	Concerned Citizens of the Yakama Reservation (alternate)	✓	

Steve George	Yakima County Farm Bureau	✓	
Justin Waddington	Yakima County Farm Bureau (alternate)		✓
Jason Sheehan	Yakima Dairy Federation	✓	
Dan DeGroot	Yakima Dairy Federation (alternate)	✓	
Jim Trull	Roza-Sunnyside Joint Board of Control	✓	
Ron Cowin	Roza-Sunnyside Joint Board of Control (alternate)		✓
Laurie Crowe	South Yakima Conservation District	✓	
Jim Newhouse	South Yakima Conservation District (alternate)		✓
Robert Farrell	Port of Sunnyside	✓	
John Van Wingerden	Port of Sunnyside (alternate)		✓
Rand Elliott	Yakima County Board of Commissioners	✓	
Vern Redifer	Yakima County Board of Commissioners (alternate)	✓	
Gordon Kelly	Yakima County Health District	✓	
Dr. Kefy Desta	WSU Irrigated Agriculture Research and Extension Center		✓
Dr. Troy Peters	WSU Irrigated Agriculture Research and Extension Center (alternate)	✓	
Tom Eaton	U.S. EPA	✓	
Marie Jennings	U.S. EPA (alternate)		✓
Elizabeth Sanchey	Yakama Nation		✓
Tom Ring	Yakama Nation (alternate)	✓	
Lonna Frans	U.S. Geological Survey		✓
Matt Bachmann	U.S. Geologic Survey (alternate)		✓
Kirk Cook	WA Department of Agriculture	✓	
Virginia "Ginny" Prest	WA Department of Agriculture (alternate)	✓	
Andy Cervantes	WA Department of Health	✓	
Ginny Stern	WA Department of Health (alternate)	✓	
Charlie McKinney	WA Department of Ecology	✓	
Tom Tebb	WA Department of Ecology (alternate)		✓
Lino Guerra	Hispanic Community Representative	✓	
Rick Perez	Hispanic Community Representative (alternate)		✓

*by phone

II. Welcome & Meeting Overview

Moment of silence.

Introductions.

Due to the amount of budget information to be reviewed it was decided to adjourn the meeting at 7:30 pm instead of 7:00 pm.

III. Committee Business: Angie Thomson

The June 19 meeting summary was approved, pending changes that were submitted to Penny by a GWAC member prior to this meeting and discussed at this meeting. A request was made for a mechanism to address factual inaccuracies in summaries. The member further requested timely distribution of draft meeting summaries, noting it is difficult to remember meeting discussions that took place almost two months before the minutes are distributed.

Member Absences and Path Forward

A statement was read aloud by a committee member announcing the resignation of Helen Reddout of Community Association for Restoration of the Environment (CARE). Helen indicated that neither she nor any member of CARE will attend future GWAC meetings.

A member asked if it is possible to recruit another environmental group to sit at the table. It was noted that this is an Ecology decision, but one that can be discussed with the GWAC at the September or October meeting.

Charlie McKinney announced that USGS no longer plans to participate as a member of the GWAC but will be available as needed by the group.

Recommendation: In the future a formal letter should be sent asking the inactive member what his/her intentions are regarding meeting attendance. The member will be given a deadline to respond; if no response is received then the seat would be vacated or offered to another representative of that interest group.

IV. GWMA Budget: Vern Redifer

Vern stated that 17 budget proposals have been submitted for the committee's consideration. He compiled all the proposals, plus a placeholder for the Groundwater Monitoring Plan, and organized them in a one-page spreadsheet for ease of reference. Each working group will have three minutes to present each proposal. This will allow time for all proposals to be broadly presented. Following the presentations, he advised that he will go back through the list and ask the committee members to rank each proposal as high, medium or low priority. This is a first cut to get an idea of the GWAC's priorities; ideally he would like to get two or three projects started.

V. Budget Requests

CAFO/Livestock - 1: Dairy Pens and Manure Storage Sampling

Determine the extent of nitrate movement in the subsurface soil profile by investigating dairy pens and manure storage areas for nitrate contamination. **Cost: $60,000.** Ranking by

committee members: High 9, Medium 6, Low 2. Scalable? Yes, data from fewer than 10 dairies would still be valuable.

CAFO/Livestock – 2: Lagoon Assessment Based on EPA Data
Analyze and interpret data from dairy lagoon assessment that will be obtained from dairy cluster/EPA project. **Cost: $10,000.** Ranking by committee members: High 6, Medium 5, Low 6. Scalable? No, unless data comes to us already largely analyzed and interpreted.

DATA - 1: Nutrient Loading all Sources – Database, Analysis, Reporting
Develop a GWMA nitrogen loading assessment. **Cost: $57,000.** Ranking by committee members: High 13, Medium 2, Low 1. Scalable? Depends on the amount of grower surveys but the estimate is pretty accurate.

EPO – 1: Educational Outreach Campaigns
Promotional ad campaigns that will include outreach to at-risk populations, promotion of community surveys, the RCIM resource hotline, the abandoned well outreach, the GWMA website and other GWAC-approved initiatives. **Cost: $54,000.** Ranking by committee members: High 6, Medium 12, Low 1. Scalable? Yes. Projects can be eliminated or downscaled as determined by the GWAC.

EPO – 2: Community Outreach Surveys
Community outreach survey effort focused on getting information out to the general public and at-risk populations about their shared or private wells, water quality, general information or concerns with nitrate levels in the groundwater, resources available, and the GWMA. **Cost: $40,000.** Ranking by committee members: High 0, Medium 9, Low 10. Scalable? Yes. The total number of surveys or attempts to complete the surveys can be reduced based on feedback from the original work completed by Heritage University in 2013.

EPO – RCIM – 3: RCIM Resource Hotline (Pilot Project) and RCIM Resource Hotline (Full Resource Project) Addition to Pilot Project
This is a pilot project to provide a bilingual, RCIM telephone referral hotline to serve the public within the LYV GWMA. This could be scaled up for other working groups. Pilot Project: **Cost: $10,000.** Ranking by committee members: High 0, Medium 2, Low 17. Full Resource Project: **Cost: $40,000.** High 0, Medium 3, Low 16. Scalable? Yes, we can gauge the success of the first year pilot project to determine if a second attempt is warranted.

EPO-RCIM – 4: Abandoned Wells and Septic System Maintenance Outreach
This project is a community outreach and education program targeting Lower Yakima Valley GWMA property owners to obtain information on abandoned wells and provide information on proper septic system maintenance. **Cost: $5,000.** Ranking by committee members: High 11, Medium 6, Low 3. Scalable? Unknown. Still under discussion.

EPO – 5: Redesign and Maintain GWMA Website
This website is a central clearing house for information exchange. This proposal would contract with a third party to create a user-friendly, bilingual site. **Cost: $10,500.** Ranking by committee members: High 5, Medium 10, Low 3. Scalable? No. It is the lowest cost option. Assumes Yakima County will be responsible for administrative web postings (GWAC and working group meeting calendars, meeting records; presentations and reports).

EPO – 6: Wellhead Risk Assessment Surveys – Phase 2
This is a community outreach and data collection effort focused on getting information out to and from the public about their shared or private well. Water quality samples are being included to get information on nitrate levels in the groundwater. **Cost: $150,000.** Ranking by committee members: High 6, Medium 10, Low 2. Scalable? Yes. The total number of surveys or attempts to complete the surveys can be reduced based on feedback from the original work completed by the Yakima Health District. *Note: a summary of the 2014 High Risk Well Assessment results was distributed to the group.*

EPO – 7: Bilingual Outreach Coordinator Position (Pilot)
The first year is a pilot program, partnering with Heritage University (or similar) to identify the demand for—and information garnered from—a pilot coordinator position. Based on evaluation outcomes, position could be expanded to full-time in the second year. **Cost $89,151 (FY 2014-15 - $10,000 one year pilot program; FY 2015-16 – up to $79,151 for an FTE)** Ranking by committee members: High 3, Medium 7, Low 10. Scalable? Yes. The pilot program allows the GWAC to evaluate the effectiveness of the position for one year on a test basis. The professional level position includes salary and benefits. Twenty percent of cost is startup and recruiting.

IRRIG – 1: Deep Soil Sampling (Proposed Additional 100 Samples)
This proposal adds 100 samples to the DSS program, and takes sampling to growers instead of expeecting growers to come to agencies. **Cost: $150,000.** Ranking by committee members: High 9, Medium 8, Low 1.

IRRIG – 2: Irrigation Water Management Workshops
Presentations on nutrient and irrigation water management. **Cost: $14,000.** Ranking by committee members: High 10, Medium 9, Low 0.

IRRIG – 3: Mobile Lab – On Farm Evaluation of Irrigation Water Management
GWMA will send an employee to evaluate for efficiency and/or uniformity and give the grower a report of their system operation and suggestions for improvement. This would be conducted in conjunction with deep soil sampling. **Cost: $396,000.** Ranking by committee members: High 4, Medium 10, Low 6. Scalable? Yes. The Irrigated Ag Committee has scaled the original price back to **$350,000**.

RCIM – 1: Abandoned and/or Improperly Constructed Wells
This is a two-phase effort. The first phase will involve public outreach and education to identify and locate abandoned and improperly constructed wells. The second phase will require properly decommissioning the identified wells. **Cost: $150,000.** Ranking by committee members: High 8, Medium 8, Low 2. Scalable? It may be possible to begin development of this program with a slightly reduced budget. The second phase may be reduced if additional, non-GWAC sources of funding can be developed.

REG – 1: Comprehensive Regulatory Review for the Lower Yakima Valley Groundwater Management Area
Phase one is to review current regulations under federal, state, county and local jurisdictions with respect to groundwater protection. Phase two is to evaluate information in the "catalog of regulatory and non-regulatory strategies" from other areas of the six western states concerning agriculture and contamination of groundwater. **Cost: $264,000.** Ranking by committee

members: High 2, Medium 2, Low 15. **Scalable?** The group suggested phase one could be completed without moving into phase two.

Yakima County – 1: Database Maintenance, Analysis, and GIS (Monitoring, Wellhead, etc.) Maintain, update and analyze GWAC databases including GIS analysis and reporting. Link GWAC databases to other pertinent data sources and overlay GWAC data. This effort will keep the database up to date. **Cost: $60,000.** Ranking by committee members: High 12, Medium 6, Low 0.

Placeholder: Groundwater Monitoring Plan – Planning, Analysis, and Implementation No money was originally set aside for the plan. This placeholder will allow the County to write the actual implementation of the plan as well as establish the methodology. **Cost: $604,000.** Ranking by committee members: High 16, Medium 2, Low 0.

Vern suggested the GWAC should begin the nutrient loading database, analysis and reporting because most committee members ranked this a high or medium. Committee members generally agreed although no decision was reached about funding the nutrient loading database before the full budget has been developed. The group asked for a straw budget to be developed and brought back to the next meeting. It was further suggested that the committee continue the budget discussion at a September meeting instead of waiting until the scheduled October meeting. A member added that he would like to see the working groups develop and bring back more detailed scopes of work and budget justifications for each proposal.

VI. Groundwater Monitoring Plan: Kirk Cook

In the interest of time, the plan was not discussed.

VII. Public Comment:

There was no public comment.

VIII. Next Steps:

Action items:

- Based on tonight's discussion, Vern will develop and present a straw budget at the September 18, 2014 meeting.
- Working groups will develop more detailed scopes of work and budget justifications for the September meeting.
    - EnviroIssues will develop a scope of work template and distribute it to the working groups.
- The Groundwater Monitoring Plan will be presented at a future meeting.

IX. 2014 Meeting Calendar:

- January 16, 2014
- February 20, 2014
- April 17, 2014
- June 19, 2014
- August 21, 2014
- September 18, 2014

- October 16, 2014
- December 18, 2014 (as needed)

The meeting was adjourned at 8:00 pm.

Meeting summary approved by the GWAC on October 16, 2014.

LOWER YAKIMA VALLEY GROUNDWATER MANAGEMENT AREA ADVISORY COMMITTEE (GWAC)

MEETING SUMMARY

Thursday, September 18, 2014

Radio KDNA
121 Sunnyside Ave, Granger, WA 98932

I. Call to Order

Roll Call: The meeting was called to order at 5:05 pm by Penny Mabie, Facilitator.

Member	*Seat*	*Present*	*Absent*
Stuart Turner	Agronomist, Turner and Co.		✓
Chelsea Durfey	Agronomist, Turner and Co. (alternate)	✓	
Kathleen Rogers	Lower Valley Community Representative Position 1	✓	
Bud Rogers	Lower Valley Community Representative Position 1 (alternate)		✓
Patricia Newhouse	Lower Valley Community Representative Position 2	✓	
Sue Wedam	Lower Valley Community Representative Position 2 (alternate)	✓	
Doug Simpson	Irrigated Crop Producer		✓
Jean Mendoza	Friends of Toppenish Creek	✓	
Eric Anderson	Friends of Toppenish Creek (alternate)		✓
Jan Whitefoot	Concerned Citizens of the Yakama Reservation		✓
Jim Dyjak	Concerned Citizens of the Yakama Reservation (alternate)	✓	
Steve George	Yakima County Farm Bureau		✓
Justin Waddington	Yakima County Farm Bureau (alternate)		✓
Jason Sheehan	Yakima Dairy Federation	✓	
Dan DeGroot	Yakima Dairy Federation (alternate)		✓
Jim Trull	Roza-Sunnyside Joint Board of Control	✓	
Ron Cowin	Roza-Sunnyside Joint Board of Control (alternate)		✓
Laurie Crowe	South Yakima Conservation District		✓
Jim Newhouse	*South Yakima Conservation District* (alternate)		✓

Robert Farrell	Port of Sunnyside	✓	
John Van Wingerden	Port of Sunnyside (alternate)	✓	
Rand Elliott	Yakima County Board of Commissioners	✓	
Vern Redifer	Yakima County Board of Commissioners (alternate)	✓	
Gordon Kelly	Yakima County Health District	✓	
Dr. Kefy Desta	WSU Irrigated Agriculture Research and Extension Center		✓
Dr. Troy Peters	WSU Irrigated Agriculture Research and Extension Center (alternate)		✓
Tom Eaton	U.S. EPA		✓
Marie Jennings	U.S. EPA (alternate)		✓
Elizabeth Sanchey	Yakama Nation		✓
Tom Ring	Yakama Nation (alternate)		✓
Kirk Cook	WA Department of Agriculture		✓
Virginia "Ginny" Prest	WA Department of Agriculture (alternate)		✓
Andy Cervantes	WA Department of Health	✓	
Ginny Stern	WA Department of Health (alternate)	✓	
Charlie McKinney	WA Department of Ecology	✓	
Tom Tebb	WA Department of Ecology (alternate)		✓
Lino Guerra	Hispanic Community Representative		✓
Rick Perez	Hispanic Community Representative (alternate)		✓

II. Welcome & Meeting Overview

Moment of silence.

Introductions.

III. Committee Business: Penny Mabie

Discussion on the Draft Meeting Minutes

A member believes there are inconsistencies and a lack of detail in the meeting summaries. A discussion followed regarding meeting summaries – the intent, consistency, and format. Penny clarified that meeting summaries should not include the names of those making comments; however, presenters will be identified by name. She reminded the group that the meeting minutes are *not* a transcript but a summary of agreement.

The written summary is the only official documentation of the group's meetings. Penny observed meetings were being recorded by members of the audience. She noted that in

accordance with the committee's operating guidelines, the electronic recording of this meeting should not be construed or represented as an official record of the meeting by any member. Penny proposed that the following statement be added at the beginning of future meeting summaries: *"Note: This document is only a summary of issues and actions in this meeting. It is not intended to be a transcription of the meeting, but an overview of points raised and responses from Yakima County and Groundwater Advisory Committee members. It may not fully represent the ideas discussed or opinions given. Examination of this document cannot equal or replace attendance."* She will provide the language to the committee and ask for concurrence via email.

Membership List

Matt Bachmann with USGS will no longer be a member of the committee but will serve as a resource for the group. A member asked for Matt's statement in writing. Charlie McKinney stated that he would contact him, that there is a letter going to USGS affirming that they were no longer participants, but he also reminded everyone that USGS might be called back.

Elizabeth Sanchey is still on the committee.

A question was raised regarding Vern Redifer's position on the committee. It was clarified that Vern provides the technical support for the County and serves as Rand's alternate.

Speakers at Meetings

The group discussed who—member or alternate—should be allowed to speak at the meetings. It was decided that the member would sit at the table and speak. If the alternate had something to contribute, it was suggested that they inform the member prior to the meeting. The alternates should sit with the public unless the member is absent or yields their seat to the alternate.

Member Handouts

A member asked that meeting summaries should reflect when documents are provided to the committee by a committee member. The committee discussed it. It was agreed that when a member asked to distribute a document, the committee would make a determination whether the action should be part of the public record via the summary. The committee agreed the document itself would not be attached to the summary, but that it would be noted as having been distributed.

IV. GWMA Budget: Penny Mabie

Penny observed that a quorum of members was not present. Per the operating guidelines, the group needs 16 members to constitute a quorum, but only 12 members were present. Therefore, no decisions can be made at this meeting.

Penny suggested to the group that the lack of attendance was not due to lack of interest but might be an artifact of the meeting not appearing on the regular schedule, but being requested at the August meeting. She suggested that it should be made more obvious when a special meeting is scheduled.

Penny suggested that the group could discuss the budget proposals tonight and she could send out the proposals after the meeting asking for feedback from members who are not present. The committee discussed and concluded that it was necessary for members to hear the context of the budget presentation and be part of discussions before decisions could be reached.

Penny reminded the group that they had discussed and approved the Deep Soil Sampling plan over the past year. An incorrect assumption was made that approval of the plan included approval of the budget for the plan. Therefore, the DSS budget needs to be approved. The group decided that this would be discussed at October's meeting. Vern thanked Jean Mendoza for noting the inconsistency.

Vern introduced Lee Murdock. She is a new senior data analyst with the county and will support the working group chairs and analyze the data that the group is gathering.

V. Public Comment:

A member of the public stated that he felt the committee was not in compliance with the Open Public Meetings Act. The agenda is not published, there is no meeting roll call or motions as required under Roberts Rules of Order, nor are committee rules posted on the website. He opined that the group's budget would not pass State or Federal standards and that the committee should consult with its legal and finance departments to ensure compliance. He added that the signature line on the meeting's Public Sign In Sheet is illegal.

VI. Committee Discussion:

Jean Mendoza distributed to the group a list of steps she compiled that she felt reflected the Washington Administrative Code regarding the GWMA and what the committee should be doing.

Penny suggested that Charlie McKinney, Ecology, provide a refresher on the committee rules at a future meeting. Charlie concurred.

A group member stated that the committee's charge was to look at the laws and adjust them to fit with GWMA's needs – not make new laws. Penny added that the Regulatory working group is charged with that work and to look at gaps then make recommendations. Vern agreed and added that the committee needs to figure out what works and what doesn't. He will speak with Tom Eaton, chair of the Regulatory working group, so that a plan can be made to focus on that. A member suggested that the last agreement made by the committee was to have agencies with regulatory jurisdiction provide a summary and analysis of their regulations to the committee to begin to identify what is working and where possible gaps may be.

VII. Next Steps:

Next Meeting:

- Based on tonight's discussion, Charlie will develop a refresher course on the GWAC meeting rules for a future meeting.
- Discuss the GWMA Proposed Budget and Groundwater Monitoring Plan
- Discuss the Deep Soil Sampling Budget
- Finalize the August meeting summary

VIII. 2014 Meeting Calendar:

- January 16, 2014
- February 20, 2014
- April 17, 2014
- June 19, 2014
- August 21, 2014
- September 18, 2014
- October 16, 2014
- December 18, 2014 (as needed)

The meeting was adjourned at 5:45 pm.

Meeting summary was approved by the GWAC on October 16, 2014.

Yakima County

Notice of Public Meeting
Lower Yakima Valley Groundwater Advisory Committee

NOTICE IS HEREBY GIVEN that Yakima County is holding a public meeting of the Lower Yakima Valley Groundwater Advisory Committee on **Thursday, October 16, 2014 at 5:00 PM at Radio KDNA Conference Rooms 1 & 2, 121 Sunnyside Ave. in Granger WA** pursuant to Chapter 173-100-080 WAC Ground Water Management Areas and Programs.

For Additional Information
To learn more about the Lower Yakima Valley Groundwater Management Area, the Groundwater Advisory Committee, and its goals and objectives, please see the Lower Yakima Valley Groundwater Management Area on the County webpage at:
http://www.yakimacounty.us/gwma/

For more information about the meeting, please contact Lisa Freund, Yakima County Public Services Administrative Manager at 574-2300.
Dated this **Wednesday, October 8, 2014**

Publish: **Thursday, October 9, 2014**
Bill: **FC3463-100-120**

YAKIMA HERALD-REPUBLIC

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Telephone:	(509) 574-2343

Ad ID:	480842
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Yakima County

Notice of Public Meeting Lower Yakima Valley Groundwater Advisory Committee

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For more information about the meeting, please contact Lisa Freund, Yakima County Public Services Administrative Manager at 574-2300.
Dated this **Wednesday, October 8, 2014**

(480842) October 9, 2014

Affidavit of Publication

STATE OF WASHINGTON
COUNTY OF YAKIMA SS

Timothy J. Graff, being first duly sworn on oath deposes and says that he is the Publisher of the DAILY SUN NEWS, a daily newspaper.

That said newspaper is a legal newspaper and it is now and has been for more than six months prior to the date of publications hereinafter referred to, published in the English language continually as a daily newspaper in the city of Sunnyside, YAKIMA County, Washington, and it is now and during all of said time printed in an office maintained at the aforesaid place of publication of said newspaper, and that the said Daily Sun News was on the 4th Day of April, 1969 approved as a legal newspaper by the Superior Court of said Yakima County.

That the annexed is a true copy of a LEGAL PUBLICATION -
Yakima County Public Services
Groundwater Mtg 10-16-14
published in regular issues (and not in supplemental forms) of said newspaper once each week for a period of 1 consecutive issue(s) commencing 10/09/14 and ending on 10/09/14, both dates inclusive, and that such newspaper was regularly distributed to its subscribers during all of said period. That the full amount of the fee charged for the foregoing publication is the sum of $ 33.75, amount has been paid in full, at the rate of $7.50 per column inch per insertion.

Tim Graff

Subscribed and sworn to before me 10/09/14

Marnie C. Gibbs

Notary Public in and for
the State of Washington
030110-00000

MARNIE C GIBBS
NOTARY PUBLIC
STATE OF WASHINGTON
COMMISSION EXPIRES
NOVEMBER 15, 2017

Notice of Public Meeting
Lower Yakima Valley Groundwater Advisory Committee

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Dated this Wednesday, October 08, 2014

PUBLISH: DAILY SUN NEWS
October 9, 2014

LOWER YAKIMA VALLEY

GROUNDWATER ADVISORY COMMITTEE

Groundwater Management Area (GWMA):
The purpose of the GWMA is to reduce nitrate contamination concentrations in groundwater below state drinking water standards

Meeting Time and Location

Thursday, October 16, 2014, 5:00 - 7:00 p.m.

Radio KDNA in Granger
121 Sunnyside Ave
Conference rooms 1 & 2
Granger, Washington

Purpose of the Meeting:

- Consider and finalize revised GWMA budget proposal
- Review and approve Ground Water Monitoring Plan

Agenda

Time	Topic	Purpose	Lead
5:00 – 5:10 p.m.	Welcome & Meeting Overview	Introduction, meeting overview, confirm agenda	Penny Mabie, facilitator
5:10 – 5:20 p.m.	Committee Business	• Approve August 21 and September 18 meeting summaries • Membership updates • Working Group membership	Penny Mabie Charlie McKinney, Ecology
5:20 – 6:30 p.m.	GWMA Budget	*Review proposed budget* • Consider and approve priority budget requests • Hear additional detail / refinements to lower priority budget requests • Identify additional budget items to include in budget as appropriate	Vern Redifer, Yakima County *Working Group Chairs*
6:30 - 6:45 p.m.	Groundwater Monitoring Plan	Discuss and consider approving Interim Final Groundwater Monitoring Plan	Kirk Cook
6:45 – 6:55 p.m.	Public Comment	Opportunity for members of the public to make comments to the committee	
6:55 – 7:00 p.m.	Next Steps	Review action items, next steps, and next meeting topics	Penny Mabie
7:00 p.m.	Adjourn		

Next Meeting: December 18, 2014 (tbd)

Committee Members

Stuart Turner, agronomist, Chelsea Durfey (alternate)	Turner and Co.
Kathleen Rogers, Bud Rogers (alternate)	Lower Valley Community Representative Position 1
Patricia Newhouse, Sue Wedam (alternate)	Lower Valley Community Representative Position 2
Doug Simpson	Irrigated Crop Producer
Jean Mendoza, Eric Anderson (alternate)	Friends of Toppenish Creek
Jan Whitefoot, Jim Dyjak (alternate)	Concerned Citizens of the Yakama Reservation
Steve George, Justin Waddington (alternate)	Yakima County Farm Bureau
Jason Sheehan, Dan DeGroot (alternate)	Yakima Dairy Federation
Jim Trull, Ron Cowin (alternate)	Sunnyside-Roza Joint Board of Control
Laurie Crowe, Jim Newhouse (alternate)	South Yakima Conservation District
Robert Farrell, John Van Wingerden (alternate)	Port of Sunnyside
Rand Elliott, Vern Redifer (alternate)	Yakima County Commission
Gordon Kelly	Yakima County Health District
Dr. Kefyalew Desta, Dr. Troy Peters (alternate)	WSU Irrigated Agriculture Research and Extension Center
Tom Eaton, Marie Jennings (alternate)	U.S. Environmental Protection Agency
Elizabeth Sanchey, Tom Ring (alternate)	Yakama Nation
Kirk Cook, Virginia "Ginny" Prest (alternate)	Washington Department of Agriculture
Andy Cervantes, Ginny Stern (alternate)	Washington Department of Health
Charlie McKinney, Tom Tebb (alternate)	Washington Department of Ecology
Lino Guerra, Rick Perez (alternate)	Hispanic Community Representative

Committee Ground Rules:

- Come to committee meetings prepared
- Treat one another with civility
- Respect each other's perspectives

- *Listen actively*
- Participate actively
- Honor time frames
- Silence electronic devices during meetings
- Speak from interests, not positions.

2014 Meeting Dates:

January 16	~~May 15~~	September 18
February 20	June 19	October 16
March 20	~~July 17~~	~~November 20~~
April 17	August 21	December 18 *(TBD based on need)*

Meeting Materials

Name	Date Provided	From
2014_0619_Mtg4_DraftMeetingSummary_v2	September 19, 10:54 a.m.	pmabie@enviroissues.com
2014_0918_Mtg6_DraftMeetingSummary	October 9, 11:30 p.m.	pmabie@enviroissues.com
2014_1016_Mtg7_Agenda	October 9, 11:30 p.m.	pmabie@enviroissues.com
2014_0924_DataWorkingGroupSummary_Final	October 9, 11:30 p.m.	pmabie@enviroissues.com
Livestock_CAFO_Minutes_8-17-14_FINAL	October 9, 11:30 p.m.	pmabie@enviroissues.com
2014_0925_RCIM_WorkingGroupReportFINAL	October 9, 11:30 p.m.	pmabie@enviroissues.com
DataWorkingGroup_September4_2014 MeetingNotesFinal	October 9, 11:30 p.m.	pmabie@enviroissues.com

LOWER YAKIMA VALLEY GROUNDWATER MANAGEMENT AREA ADVISORY COMMITTEE (GWAC)

MEETING SUMMARY

Thursday, October 16, 2014

Radio KDNA
121 Sunnyside Ave, Granger, WA 98932

Note: This document is only a summary of issues and actions in this meeting. It is not intended to be a transcription of the meeting, but an overview of points raised and responses from Yakima County and Groundwater Advisory Committee members. It may not fully represent the ideas discussed or opinions given. Examination of this document cannot equal or replace attendance.

I. Call to Order

Roll Call: The meeting was called to order at 5:02 pm by Penny Mabie, Facilitator.

Member	Seat	Present	Absent
Stuart Turner	Agronomist, Turner and Co.	✓	
Chelsea Durfey	Agronomist, Turner and Co. (alternate)		✓
Bud Rogers	Lower Valley Community Representative Position 1	✓	
Kathleen Rogers	Lower Valley Community Representative Position 1 (alternate)		✓
Patricia Newhouse	Lower Valley Community Representative Position 2		✓
Sue Wedam	Lower Valley Community Representative Position 2 (alternate)	✓	
Doug Simpson	Irrigated Crop Producer	✓	
Jean Mendoza	Friends of Toppenish Creek	✓	
Eric Anderson	Friends of Toppenish Creek (alternate)		✓
Jan Whitefoot	Concerned Citizens of the Yakama Reservation		✓
Jim Dyjak	Concerned Citizens of the Yakama Reservation (alternate)	✓	
Steve George	Yakima County Farm Bureau	✓	
Frank Lyall	Yakima County Farm Bureau (alternate)	✓	
Jason Sheehan	Yakima Dairy Federation	✓	
Dan DeGroot	Yakima Dairy Federation (alternate)	✓	
Jim Trull	Roza-Sunnyside Joint Board of Control		✓

Ron Cowin	Roza-Sunnyside Joint Board of Control (alternate)		✓
Laurie Crowe	South Yakima Conservation District	✓	
Jim Newhouse	South Yakima Conservation District (alternate)		✓
Robert Farrell	Port of Sunnyside	✓	
John Van Wingerden	Port of Sunnyside (alternate)		✓
Rand Elliott	Yakima County Board of Commissioners	✓	
Vern Redifer	Yakima County Board of Commissioners (alternate)	✓	
Gordon Kelly	Yakima County Health District		✓
Dr. Troy Peters	WSU Irrigated Agriculture Research and Extension Center	✓	
Tom Eaton	U.S. EPA	✓	
Marie Jennings	U.S. EPA (alternate)		✓
Elizabeth Sanchey	Yakama Nation		✓
Tom Ring	Yakama Nation (alternate)		✓
Kirk Cook	WA Department of Agriculture	✓	
Virginia "Ginny" Prest	WA Department of Agriculture (alternate)		✓
Andy Cervantes	WA Department of Health	✓	
Ginny Stern	WA Department of Health (alternate)	✓	
Charlie McKinney	WA Department of Ecology	✓	
Tom Tebb	WA Department of Ecology (alternate)		✓
Lino Guerra	Hispanic Community Representative	✓	
Rick Perez	Hispanic Community Representative (alternate)		✓

II. Welcome & Meeting Overview

Moment of silence

Introductions

III. Committee Business: Penny Mabie

The August 21, 2014 meeting summary was approved as presented.

The September 18, 2014 meeting summary was approved with proviso. Charlie McKinney sent in comments but they were not included in the draft. Penny will add his edits.

Membership Updates:

Charlie McKinney announced several membership changes. Kathleen Rogers, Lower Valley Community Representative Position 1, is now an alternate; Bud Rogers will serve as the primary. Justin Waddington, Yakima County Farm Bureau alternate, has withdrawn and been replaced by Frank Lyall. Dr. Kefy Desta, WSU Irrigated Ag Research and Extension Center has withdrawn. Dr. Troy Peters is now primary and searching for an alternate.

Working Group Membership:

Recently a member was inadvertently omitted from a working group distribution list and missed a meeting. Consequently Penny reached out to the Chairs to update their working group membership lists. She requested that the group let her know if any names are missing from any of the working group lists. Distribution lists will be updated accordingly.

IV. GWMA Budget: Vern Redifer

Consider and Approve Priority Budget Requests:

Vern reviewed the budget progress with the group. In August the group reviewed and ranked each budget proposal as high, medium, or low. Working groups were given time to revise their proposals before the September meeting. Vern then calculated the GWAC's August rankings in a percentage format, which is in the spreadsheet provided for discussion. He further noted the status of each proposal, reflected in the budget spreadsheet as either: No Change (NC), Revised, or Withdrawn. He noted the intent was for the committee to review each proposal and be asked to approve or reject it.

Deep Soil Sampling (Under Existing SYCD Contract – 200 Samples) $395,000:
Approved with one member abstaining and one objecting

Discussion: Two members questioned the amount of the DSS contract as it was significantly higher than the original estimate. Vern explained that as with a County project (e.g. road construction) staff tries to accurately estimate the cost of the work, but the county has no control over the bid amounts that are submitted. Under contracting law the county accepts the lowest responsible bid.

When asked what had changed in the contract, Vern replied that the scope of work was exactly the same; it is the cost to do the work that came in higher than expected. When a member stated that this body had no say in the contract, Penny stated that it was never the expectation that the committee would review contracts. The committee defines projects and their scopes of work. The fiduciary responsibility lies with the lead agency. Charlie concurred, emphasizing that Yakima County is the lead agency and has the experience and responsibility to execute the program contracts—it's not the GWAC's job. He added that the DSS project will provide some field data to validate the Nitrogen Loading Study.

In response to a request to delay the contract, Vern replied that the committee has had two months to review the contract and scope of work. If the contract was delayed, the project would be set back another year. He also noted, in response to contract availability that the contract is posted on the website.

Penny asked the two members if there was any way they could come to agreement to approve the DSS budget. The response was "no." Penny reminded the group that in accordance with their Operating Guidelines, in instances where consensus could not be reached, a vote would be taken and the majority decision would rule. A vote was taken, and a clear majority was in favor, with one member opposing and one abstaining. The project was approved.

Vern noted that any criticism of the contract being let for the larger budget can be directed at him. The GWAC had been enthusiastic about the project and he believed from their comments that they did not want to lose another year. He believed it was the best way to move the GWAC forward and therefore moved the contract forward to the County commissioners for execution.

Penny noted that it may be appropriate for the committee to have a further discussion about adopting a policy requiring additional committee discussion if a cost for a committee-approved scope of work far exceeds the estimated cost. Vern noted that had it not been for the timeliness issue with the DSS scope of work, he would have come back to the committee for a budget discussion, and said he would do that if the same type of situation occurs in the future.

Groundwater Monitoring Plan – Planning, Analysis, Reporting $380,000:
Approved

A discussion took place regarding a contingency budget (for cost overrides, or other reasons). Vern noted that contingencies are built into the current budget.

Penny stated that the group is setting the budget for the program so when a scope of work is developed there will be a budget allocated for it. She asked the group if they were okay with this approach and they responded "yes."

Nutrient Loading All Sources – Database, Analysis, Reporting $57,000:
Approved

Discussion: A member stated they were not informed of the working group meeting where this item was discussed. The member expressed concern about the scope of work and budget (too small). Penny asked the member if they were concerned about the budget amount and they responded "no." Penny asked if the scope of work concerns were addressed would they approve the budget. The member replied "yes." Penny asked Kirk if he would dedicate time to review the member's concerns. He agreed.

Database Maintenance, Analysis and GIS (Monitoring, Wellhead, Etc.) $30,000:
Approved

Irrigation Water Management Workshops $7,000:
Approved

Deep Soil Sampling (Proposed Additional 100 Samples) $150,000:
Budget item was placed in Reserve. The committee will evaluate the results of DSS Phase 1 before making a decision on additional samples.

A member asked if the $150,000 reserve (DSS Phase II) could be moved into either the groundwater monitoring or well sampling projects. Vern responded that there has been no decision regarding where reserve funds will be allocated yet. Placing this $150,000 in reserve does not mean it is being committed to DSS.

Dairy Pens and Manure Storage Sampling $60,000:
Approved

Abandoned Wells and Septic System Maintenance Education and Outreach $76,000:
Approved

Abandoned and/or Improperly Constructed Wells (Decommission Wells) $50,000:
The budget item was placed in Reserve. Vern explained that the project seemed more appropriate to come after the Groundwater Management Area (GWMA) program is developed, as part of program implementation. More importantly, he expressed concern about whether the GWAC could legally use GWMA funds for this purpose. He noted that it could be considered gifting of public funds (an illegal action) if program funds are used to decommission private wells and suggested that legal interpretation should be sought before expending budget on this item.

Educational Outreach Campaigns $54,000:
Approved

Wellhead Risk Assessment Surveys – Phase II $100,000:
Approved

A member asked if any of the participating wells would be used as long-term monitoring wells. Vern replied that the information collected will be available for consideration of wells when the monitoring network is developed. He also noted there are multiple uses for the surveying: ongoing well testing, identification, data collection, educational outreach. The surveying will build on the initial surveys done by the Yakima Health District and will include cross referencing with the Department of Ecology's well logs. A member asked if the County's database is cross referenced now into Ecology's well log. Vern replied not yet, but will be.

Redesign and Maintain GWMA Website $12,000:
Approved

Lagoon Assessment Based on EPA Data $10,000:
Approved

Concerns were expressed that the data may be cherry picked. Tom Eaton replied that the data has not yet been collected but when it is, the data will be processed as it has always been and will be posted on the web site.

Mobile Lab-On Farm Evaluation of Irrigation Water Management:
Yakima County recommended a delay until plan implementation.

Community Outreach Surveys $25,000:
Approved

Regulatory Review $25,000:
Approved with one objection

Yakima County proposed $25,000 to identify how effective government agency regulations are in relation to addressing nitrates. Facilitated workshops will be conducted with agencies around structured questions. A member asked if the GWAC is essentially paying for the same information twice – all the agency information is already publicly available.

V. Interim Final Groundwater Monitoring Plan:

Kirk stated that the plan has been reviewed three times by the data committee. Comments have been addressed and the working group feels confident about the document. It is requesting the GWAC's approval. He noted that the Groundwater Monitoring Plan establishes the Standard Operating Procedures, providing the quality assurance and quality control on how the samples will be collected and analyzed. This plan is not a scope of work (that's the next phase) it's just the quality assurance and quality control parameters that will be followed.

A member objected to the plan because it does not provide a sampling schedule, a sampling network, or a reporting schedule. Kirk repeated that the Interim Plan addresses the quality assurance and quality control for how the samples will be collected and how lab analysis will be performed. The member's concerns will be addressed in the forthcoming comprehensive well monitoring network document.

Following this discussion, the GWAC approved the Interim Final Groundwater Monitoring Plan Version 7 as presented. Jean Mendoza submitted a minority opinion and asked it to be included with the meeting summary (attached).

VI. Public Comment:

Robert Jackson of Wapato stated that the committee has not followed General Accounting Principles (i.e., no scope of work, no identified best practices from other areas, etc.). There has been no formal consultation with the Yakama Nation.

Jim Davenport, speaking as a citizen, urged the committee to continue its work and complete the plan. He noted that he lives in the valley and cares about the health of its people. He commended the committee for the work they have done and their level of commitment to the project.

VII. Next Steps:

Penny asked the group if they wanted to hold a November meeting. The group declined. She asked if they wanted to hold their placeholder December meeting and they assented.

December presentation:

- EPA will present the data collected pursuant to the Dairy Cluster Consent Order (December 18, 3:00 – 5:00 pm, prior to the GWAC meeting)
- Additional data may be presented by Stuart Turner at this meeting.

GWAC Meeting Agenda

- Review the Nutrient Loading Scope of Work
- Review the progress timeline, currently under development by Yakima County.

VIII. 2014 Meeting Calendar:

- January 16, 2014
- February 20, 2014
- April 17, 2014
- June 19, 2014
- August 21, 2014
- September 18, 2014
- October 16, 2014
- December 18, 2014

The meeting was adjourned at 7:05 pm.

Meeting summary approved by the GWAC on December 18, 2014

Second Opinion re the *INTERIM FINAL GROUNDWATER MONITORING PLAN LOWER YAKIMA VALLEY GWMA INITIAL CHARACTERIZATION*

August, 2013

This document, as currently written, is a blank check. There is no mechanism for accountability to the GWAC or the tax paying public. The document is not an area characterization[1]. Valid recommendations from the Data Work Group were ignored.

Accountability

Section 1.0 of the document states,

> *This interim final Groundwater Monitoring Plan addresses:*
> • *Sampling Procedures*
> • *Sampling Schedule (developed following identification of the sampling network)*
> • *Sampling Network (sampling network has not been established as of the date of issue for the interim final Groundwater Monitoring Plan)*
> • *Quality Assurance/Quality Control*
> • *Reporting (frequency developed following identification of the sampling network and schedule)*
>
> *While this Monitoring Plan is intended to be comprehensive, revisions and/or amendments may be required as the project evolves.*

The document does not provide a sampling schedule, a sampling network, or a reporting schedule. If the GWAC signs off on this document we have lost any control over where the monitoring wells will be located, when sampling will be done and how often reports are made.

The document does not talk about how many wells will be located in shallow aquifers, how many at middle levels and how many in deep aquifers. It does not guarantee that all areas in the GWMA will be monitored. It does not talk about groundwater flow. It does not address critical aquifers. It does not talk about soil characteristics. It does not talk about farming practices or cropping patterns.

Area Characterization

WAC 173 – 100 – 100 (1) requires:

> *The program for each groundwater management area will be tailored to the specific conditions of the area. The following guidelines on program content are intended to serve as a general framework for the program, to be adapted to the particular needs of each area. Each program shall include, as appropriate, the following:*

[1] "Characterization includes the measurement, description, and interpretation of the hydrogeologic setting that groundwater occurs in; monitoring is the point measurement of water quality or water-level conditions of the groundwater present in such a setting." WA State Dept. of Ecology *Strategic Recommendations for Groundwater Assessment Efforts of the Environmental Assessment Program. 2003*

(1) An area characterization section comprised of:

(a) A delineation of the groundwater area, subarea or depth zone boundaries and the rationale for those boundaries;

(b) A map showing the jurisdictional boundaries of all state, local, tribal, and federal governments within the groundwater management area;

(c) Land and water use management authorities, policies, goals and responsibilities of state, local, tribal, and federal governments that may affect the area's groundwater quality and quantity;

(d) A general description of the locale, including a brief description of the topography, geology, climate, population, land use, water use and water resources;

(e) A description of the area's hydrogeology, including the delineation of aquifers, aquitards, hydrogeologic cross-sections, porosity and horizontal and vertical permeability estimates, direction and quantity of groundwater flow, water-table contour and potentiometric maps by aquifer, locations of wells, perennial streams and springs, the locations of aquifer recharge and discharge areas, and the distribution and quantity of natural and man-induced aquifer recharge and discharge;

(f) Characterization of the historical and existing groundwater quality;

(g) Estimates of the historical and current rates of groundwater use and purposes of such use within the area;

(h) Projections of groundwater supply needs and rates of withdrawal based upon alternative population and land use projections;

(i) References including sources of data, methods and accuracy of measurements, quality control used in data collection and measurement programs, and documentation for and construction details of any computer models used.

These are criteria for Area Characterization. We have contracted with PgG to do an area characterization and I do not see one. Just calling a monitoring plan a characterization does not make it so. The characterization should have been done prior to development of a monitoring plan.

The meeting summary for the May 8, 2014 meeting of the Data Work Group says, "As of now, the topic of who will be leading the characterization report is under discussion between the County and others. The scope and level of detail of the characterization report still needs to be decided."

Data Work Group Input

The Data Work Group has only met once in 2014. It is inaccurate to say that the work group has approved any actions because there has been only one meeting this year. The chair appears to be acting independently from the work group.

There is evidence of consultation with some members of the group. An e-mail from Kirk Cook to Don Gatchalian on April 14, 2014 (obtained through the Freedom of Information Act) says "Document has been forwarded to key working group members for review, with a deadline of April 30th." This does not constitute work group input and shows that information has been withheld from some members of the group.

A paid consultant and hydrogeologist from the Pacific Groundwater Group (PgG) suggested adding chloride to the list of contaminants tested. Chloride has been part of the sampling and analysis for nitrates in groundwater in most other studies. Chloride has been used as a marker for lagoon leakage and manure over application. The addition was not made. We do not know who made that decision.

However, Stuart Turner, a paid consultant for the dairy industry who has never participated in a Data Work group meeting, did review and critique comments that other work group members made and his recommendation was to not include chloride testing.

More supportive information is available on request.

Respectfully submitted.
Jean Mendoza

Yakima County

Notice of Public Meeting
Lower Yakima Valley Groundwater Advisory Committee

NOTICE IS HEREBY GIVEN that Yakima County is holding a public meeting of the Lower Yakima Valley Groundwater Advisory Committee on **Thursday, December 18, 2014 at 5:00 PM at Radio KDNA Conference Rooms 1 & 2, 121 Sunnyside Ave. in Granger WA** pursuant to Chapter 173-100-080 WAC Ground Water Management Areas and Programs.

For Additional Information
To learn more about the Lower Yakima Valley Groundwater Management Area, the Groundwater Advisory Committee, and its goals and objectives, please see the Lower Yakima Valley Groundwater Management Area on the County webpage at:
http://www.yakimacounty.us/gwma/

For more information about the meeting, please contact Lisa Freund, Yakima County Public Services Administrative Manager at 574-2300.
Dated this **Wednesday, December 10, 2014**

Publish: **Thursday, December 11, 2014**
Bill: **FC3463-100-120**

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Yakima County

Notice of Public Meeting Lower Yakima Valley Groundwater Advisory Committee

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Dated this **Wednesday, December 10, 2014**

(499498) December 11, 2014

Affidavit of Publication

STATE OF WASHINGTON
COUNTY OF YAKIMA SS

Timothy J. Graff, being first duly sworn on oath deposes and says that he is the Publisher of the DAILY SUN NEWS, a daily newspaper.

That said newspaper is a legal newspaper and it is now and has been for more than six months prior to the date of publications hereinafter referred to, published in the English language continually as a daily newspaper in the city of Sunnyside, YAKIMA County, Washington, and it is now and during all of said time printed in an office maintained at the aforesaid place of publication of said newspaper, and that the said Daily Sun News was on the 4th Day of April, 1969 approved as a legal newspaper by the Superior Court of said Yakima County.

That the annexed is a true copy of a LEGAL PUBLICATION -
Yakima County Public Services
Groundwater Mtg 12-18-14
published in regular issues (and not in supplemental forms) of said newspaper once each week for a period of 1 consecutive issue(s) commencing 12/11/14 and ending on 12/11/14, both dates inclusive, and that such newspaper was regularly distributed to its subscribers during all of said period. That the full amount of the fee charged for the foregoing publication is the sum of $ 33.75, amount has been paid in full, at the rate of $7.50 per column inch per insertion.

Subscribed and sworn to before me 12/11/14

Notary Public in and for
the State of Washington
030110-00000

MARNIE C GIBBS
NOTARY PUBLIC
STATE OF WASHINGTON
COMMISSION EXPIRES
NOVEMBER 15, 2017

Notice of Public Meeting
Lower Yakima Valley Groundwater Advisory Committee

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Dated this Wednesday, December 10, 2014

PUBLISH: DAILY SUN NEWS
December 11, 2014

LOWER YAKIMA VALLEY

GROUNDWATER ADVISORY COMMITTEE

Groundwater Management Area (GWMA):
The purpose of the GWMA is to reduce nitrate contamination concentrations in groundwater below state drinking water standards

Meeting Time and Location

Thursday, December 18, 2014, 5:00 - 7:00 p.m.

Radio KDNA in Granger
121 Sunnyside Ave
Conference rooms 1 & 2
Granger, Washington

Optional GWAC Information Session:

- Hear from the Environmental Protection Agency on data collected associated with dairies

Agenda

Time	Topic	Purpose	Lead
3:00 – 4:45 p.m.	Sampling Data	Presentation on data collected regarding dairies	Tom Eaton, EPA

Regular GWAC Meeting

- Determine facilitation needs for 2015
- Discuss and consider approving the Nutrient Loading Assessment scope of work
- Hear from working groups on progress made on 2014 work plans
- Determine 2015 meeting schedule

Agenda

Time	Topic	Purpose	Lead
5:00 – 5:10 p.m.	Welcome & Meeting Overview	Introduction, meeting overview, confirm agenda	Penny Mabie, facilitator
5:10 – 5:20 p.m.	Committee Business	• Approve October 16 meeting summary • Facilitation support for 2015	Penny Mabie Vern Redifer, Yakima County
5:20 – 5:40 p.m.	Nutrient Loading Assessment scope of work	Discuss and consider approving scope of work and budget • Purpose of assessment • Proposed scope of work and schedule • Proposed budget	Kirk Cook
5:40 - 6:40 p.m.	Working group reports	Overview of 2014 activities • What was planned in the 2014 Task List	Working group chairs

Time	Topic	Purpose	Lead
		• What has been accomplished • Results of recent meetings	
6:40 – 6:50 p.m.	Public Comment	Opportunity for members of the public to make comments to the committee	
6:50 – 7:00 p.m.	Next Steps	• Discuss 2015 meeting needs • Review action items, next steps, and next meeting topics	Penny Mabie
7:00 p.m.	Adjourn		

Next Meeting: 2015 *tbd*

Committee Members

Stuart Turner, agronomist, Chelsea Durfey (alternate)	Turner and Co.
Bud Rogers, Kathleen Rogers (alternate)	Lower Valley Community Representative Position 1
Patricia Newhouse, Sue Wedam (alternate)	Lower Valley Community Representative Position 2
Doug Simpson	Irrigated Crop Producer
Jean Mendoza, Eric Anderson (alternate)	Friends of Toppenish Creek
Jan Whitefoot, Jim Dyjak (alternate)	Concerned Citizens of the Yakama Reservation
Steve George, Frank Lyall (alternate)	Yakima County Farm Bureau
Jason Sheehan, Dan DeGroot (alternate)	Yakima Dairy Federation
Jim Trull, Ron Cowin (alternate)	Sunnyside-Roza Joint Board of Control
Laurie Crowe, Jim Newhouse (alternate)	South Yakima Conservation District
Robert Farrell, John Van Wingerden (alternate)	Port of Sunnyside
Rand Elliott, Vern Redifer (alternate)	Yakima County Commission
Gordon Kelly	Yakima County Health District
Dr. Troy Peters	WSU Irrigated Agriculture Research and Extension Center
Tom Eaton, Marie Jennings (alternate)	U.S. Environmental Protection Agency
Elizabeth Sanchey, Tom Ring (alternate)	Yakama Nation
Kirk Cook, Virginia "Ginny" Prest (alternate)	Washington Department of Agriculture

Andy Cervantes, Ginny Stern (alternate)	Washington Department of Health
Charlie McKinney, Tom Tebb (alternate)	Washington Department of Ecology
Lino Guerra, Rick Perez (alternate)	Hispanic Community Representative

Committee Ground Rules:

- Come to committee meetings prepared
- Treat one another with civility
- Respect each other's perspectives
- Listen actively
- Participate actively
- Honor time frames
- Silence electronic devices during meetings
- Speak from interests, not positions.

2015 Meeting Dates to Choose from:

January 15	May 21	September 17
February 19	June 18	October 15
March 19	July 16	November 19
April 16	August 20	December 17

Meeting Materials:

Name	Date Provided	From
2014_1016_mtg 7_DraftMtgSummary_v1.doc	10/27/14	jpan@enviroissues.com
2014_1023_RCIMWorkingGroupReport_FINAL	11/26/14	pmabie@enviroissues.com
EPO meeting summary_2014_1105_FINAL	11/26/14	pmabie@enviroissues.com
Regulatory Framework 11-12-14 Meeting Notes_FINAL	12/3/14	pmabie@enviroissues.com

Data WorkingGroupReport 11-20-14 FINAL v3	12/3/14	pmabie@enviroissues.com

YAKIMA VALLEY GROUNDWATER MANAGEMENT AREA ADVISORY COMMITTEE (GWAC)

MEETING SUMMARY

Thursday, December 18, 2014 – 5:00 p.m. – 7:00 p.m.

Radio KDNA
121 Sunnyside Ave, Granger WA 98932

Note: This document is only a summary of issues and actions of this meeting. It is not intended to be a transcription of the meeting, but an overview of points raised and responses from Yakima County and Groundwater Advisory Committee members. It may not fully represent the ideas discussed or opinions given. Examination of this document cannot equal or replace attendance.

I. Call to Order

Roll Call: This meeting was called to order at 5:10 p.m. by Penny Mabie, Facilitator.

Member	Seat	Present	Absent
Stuart Turner	Agronomist, Turner and Co.,	✓	
Chelsea Durfey		✓	
Bud Rogers	Lower Valley Community Representative Position 1		✓
Kathleen Rogers	Lower Valley Community Representative Position 1 (alternate)		✓
Patricia Newhouse	Lower Valley Community Representative Position 2	✓	
Sue Wedam	Lower Valley Community Representative Position 2 (alternate)	✓	
Doug Simpson	Irrigated Crop Producer	✓	
Jean Mendoza	Friends of Toppenish Creek	✓	
Eric Anderson	Friends of Toppenish Creek (alternate)		✓
Jan Whitefoot	Concerned Citizens of the Yakama Reservation		✓
Jim Dyjak	Concerned Citizens of the Yakama Reservation (alternate)		✓
Steve George	Yakima County Farm Bureau	✓	
Frank Lyall	Yakima County Farm Bureau (alternate)	✓	
Jason Sheehan	Yakima Dairy Federation	✓	
Dan DeGroot	Yakima Dairy Federation (alternate)	✓	
Jim Trull	Roza-Sunnyside Joint Board of Control	✓	

Ron Cowin	Roza-Sunnyside Joint Board of Control (alternate)		✓
Laurie Crowe	South Yakima Conservation District	✓	
Jim Newhouse	South Yakima Conservation District (alternate)		✓
Robert Farrell	Port of Sunnyside	✓	
John Van Wingerden	Port of Sunnyside (alternate)	✓	
Rand Elliott	Yakima County Board of Commissioners	✓	
Vern Redifer	Yakima County Board of Commissioners (alternate)	✓	
Gordon Kelly	Yakima County Health District	✓	
Dr. Troy Peters	WSU Irrigated Agriculture Research and Extension Center	✓	
Tom Eaton	U.S. EPA	✓	
Marie Jennings	U.S. EPA (alternate)		✓
Elizabeth Sanchey	Yakama Nation	✓	
Tom Ring	Yakama Nation (alternate)		✓
Kirk Cook	WA Department of Agriculture	✓	
Virginia "Ginny" Prest	WA Department of Agriculture (alternate)		✓
Andy Cervantes	WA Department of Health		✓
Ginny Stern	WA Department of Health (alternate)	✓	
Charlie McKinney	WA Department of Ecology	✓	
Tom Tebb	WA Department of Ecology (alternate)		✓
Lino Guerra	Hispanic Community Representative		✓
Rick Perez	Hispanic Community Representative (alternate)		✓

II. Welcome & Meeting Overview

Moment of Silence

Introductions

III. Committee Business: Penny Mabie

The October 16, 2014 meeting summary was approved as presented.

Jean Mendoza noted she disagreed with an opinion expressed in the October 16, 2014 meeting that Yakima County has the experience necessary to effectively manage contracts. The GWAC approved Jean's request to distribute information to the committee supporting her concerns and note her concerns in the meeting record.

Facilitation Support for 2015 – Vern Redifer

Vern announced that the contract with EnviroIssues expires at the end of December. Penny excused herself so the GWAC could discuss EnviroIssues' contract and facilitation services. Members felt that it was critical to have a facilitator at the outset and Penny was very instrumental in getting the group where it is today; however, members felt that the group is now established and no longer needs an outside facilitator. The money could be better spent on GWMA program efforts. Vern noted that he and Penny had discussed the contract and she feels that she is no longer needed on a day-by-day basis.

A member suggested that Jim Davenport act as the facilitator as he was already facilitating several of the working groups. Vern agreed, noting that Jim had volunteered to serve in this capacity. The group affirmed the decision to have Jim serve as the GWAC facilitator. It was further noted that the contract with EnviroIssues will not be renewed.

Actions: Yakima County will not renew Enviroissues's contract. Jim Davenport will serve as the GWAC meeting facilitator.

IV. Nutrient Loading Assessment Scope of Work (SOW) Version 1.2a dated December 3, 2014 – Kirk Cook

Kirk reviewed a Scope of Work that had been distributed to the committee. The intent of the assessment is to better understand the sources of nitrogen in the GWMA and provide a foundation on which the GWAC can make future recommendations about Best Management Practices and other actions to address groundwater contamination. He said the data working group discussed the SOW, he received many comments and made adjustments to the proposed SOW and there is still one dissenting opinion on the work group. Kirk explained that the biggest issue is how the assessment with agriculture will be conducted. Modifications were made to the SOW as the working group is aware that there is not a population big enough to sample based on the deep soil sampling plan. Kirk noted that the Washington State Department of Agriculture (WSDA) had acquired additional information to supplement the data. He suggested that the assessment may have to utilize peer-reviewed published reports. He reminded the group that the SOW is a living document and can be modified. There will be a lot more work done on the nutrient loading assessment this spring.

A member asked if agricultural growers could be surveyed to get additional data for the assessment. Kirk noted that he assumed those who were sent the announcement about the Deep Soil Sampling (DSS) received the accompanying survey, which may yield information for the Nutrient Loading Assessment, but that it appeared few surveys had been submitted. Kirk suggested that perhaps it was not clear that participating in the survey did not obligate residents to participate in the sampling. Jim Trull pointed out that only those who agreed to participate in deep soil sampling were provided the survey; it did not go out with the letters inviting farmers to participate.

A member noted there was probably concern that with the multitude of data being used and some incomplete data, it might end up with skewed results from either under-estimating or over-estimating by one industry or another. This assessment is not easy to do since there isn't direct data; it will have to use other sources of data.

Kirk explained that this is only an approach; there will not be a lot of Deep Soil Sampling data; and the data needs to be as transparent as possible. He noted the SOW is iterative and discusses the kinds of data that can be used for the assessment. The data exists and just needs to be carefully collected and used. Kirk said the GWAC should expect an update at each meeting from Data Collection.

A member expressed concern that the assessment could be used to set an arbitrary standard based on averages of what soil needs are that might be inflexible.

Another concern was that the study was not being set up to be reliable if someone questions the data and the funding allocated to the effort was inadequate to produce more than superficial results.

Kirk noted that WSDA and Yakima County were putting more staff time into the project than what was called out in the GWAC budget. The budget for the proposed scope of work was designed to stay within the GWAC budget parameters; he agreed that a lot more investment will be needed and will be made outside of the GWAC budget.

Kirk discussed plans for peer review of the loading assessment. Kirk noted that Ginny Stern (DOH) would provide peer review assistance. Ecology offered Melanie Redding to assist with data collection and validity. Kirk noted he has also contacted the WSU Center for Sustainable Agriculture staff, and intends to have up to five peer reviewers from different agencies participate. He noted the Data Working Group could help be accountable to the GWAC for adaptive management of the scope; could help advise and inform the GWAC about how data gaps are filled; and act as a steering body for the assessment. Other working groups will also need to be involved as the assessment moves into different parts of data collection.

A member expressed concern with the GWAC relying on this effort, noting that no actual testing for groundwater data was being planned or discussed in the GWAC and that was a serious oversight in fully understanding the extent of the groundwater contamination issue. Kirk concurred with the need and added that the working group was beginning to discuss groundwater monitoring and needs to queue the issue up for the full committee to discuss, particularly regarding what a plan should include. This could inform discussions with Pacific Groundwater Group (PGG) on the Groundwater Monitoring Plan and how to direct their work.

At the conclusion of the discussion, the GWAC agreed to approve the SOW in a consensus agreement.

Action: Jim Davenport will schedule a meeting date with the Data Working group soon: probably after Christmas. PGG is onboard and he suggested that perhaps Pony could come to the next meeting.

Recommendation: The Data Working Group should act as the steering committee for the Nutrient Loading Assessment SOW and provide updates to the GWAC.

Action: Scope of Work approved.

V. Working Groups - 2014 Status Reports

Each working group chair reported on the progress their group has made on their task lists over 2014.

Funding Working Group – Vern Redifer

Nothing to report.

Data Working Group – Kirk Cook

Originally this working group was set up to be technical consultants to the other working groups; however, during the process, they met and dealt with topics such as the scope and need for a USGS proposal for a groundwater model. The Data Working Group made a recommendation to the GWAC that the USGS effort was more than needed at the time and it was decided that this would be revisited in the future.

The working group brought an interim final grounwater monitoring plan to the GWAC and it was approved. The group also worked with the Irrigated Agriculture working group (Irrigated AG) to develop a questionnaire with the Deep Soil Sampling. With Jim Davenport's participation, the group now has productive meetings.

The group will be very active with the groundwater monitoring plan development in 2015 and will be working a lot on the Nutrient Loading Assessment into the spring.

Education and Public Outreach (EPO) Working Group – Lisa Freund

High Risk Well Assessment Surveys – Completed

EPO evaluations of the public questionnaire and high risk well assessment surveys were not completed as the working group could not come to agreement on an evaluation methodology.

Education Outreach Campaign – EPO/EPA New Mom campaign is ongoing with a flyer completed, printed and hand delivered by a working group member.

GWMA Educational Slides were approved and uploaded to the GWAC website to serve as a reference for GWAC members.

Abandoned Wells campaign – met with the Residential, Commercial, Industrial and Municipal (RCIM) working group to discuss the issue; GWAC approved the budget. It will be ongoing in 2015

GWMA Website update is in process.

No other requests received from the working groups.

Irrigated Ag Working Group – Jim Trull

Deep Soil Sampling is underway – The Scope of Work was completed in 2013; in the first half of 2014, the group resolved the confidentiality issue. 33 DSS surveys were completed in 2014.

Significant change was made due to concerns about data and they doubled the number of samples from 100 to 200 to be collected and extended the time of the sampling to cover four sampling periods. The first round of sampling is complete and the results have been sent to Vern Redifer. Vern will try to get the raw results out to the group.

They plan to encourage growers to fill out surveys even if they are not participating in the Deep Soil Sampling – Early 2015

Livestock/CAFO Working Group – Charlie McKinney

Their charge was to address all nitrogen sources related to dairies.

Manure field application – Irrigated Ag working group is addressing this issue through the deep soil sampling.

Corrals/Pens – Originally the working group thought to include this in the deep soil sampling; but since they have decided DSS is not the best place to do it because of the methodology being used. This effort is on hold as there is a need to develop a study design with PGG and the 2015 studies.

Plan and schedule presentation on Compost Regulations/Policy – An Ecology employee is currently working on this.

Seepage from Lagoons – They are waiting on lagoon data from EPA. The data has been collected; they are now waiting on the data to be available. Once they have acquired the data they will begin evaluating it.

Develop CAFO/Livestock education through the EPO – This task is on hold until after the study is complete.

RCIM Working Group – Robert Farrell

Three of the RCIM working group's four tasks were about gathering data about potential nitrate sources.

Residential Septic Systems – Information was received from Yakima County.
NPDES point source permit holders – Department of Ecology supplied this information.
Undergound Injection Control Wells – List of UIC wells received from Ecology.

The fourth task was to develop an education strategy with EPO to address risks associated with abandoned/improperly decommissioned wells – That effort is ongoing.

There was also concern expressed about known nitrate plumes within the GWMA boundary – Ecology is compiling a list of major nitrogen clean up sites.

The working group is also discussing deep soil sampling on RCIM sites. This may result in an addendum to the DSS scope. The working group will develop a proposal and then bring to the GWAC

There is also concern regarding loading – Ecology knows who the permit holders are but don't know what the loadings are. Department of Ecology staff are helping identify how to acquire this information and then RCIM will discuss with the Data Working Group.

Regulatory Framework Working Group – Tom Eaton

The group is about 90% done gathering information on statutes, rules and ordinances related to existing regulations. This information will be provided to agencies as a guide for upcoming study sessions. The working group developed a list of questions for regulatory agencies to use as a guide to help them develop presentations for the upcoming study sessions.

Study Sessions: The purpose of the study sessions is to learn more about regulatory agencies with existing authorities regarding nitrates. What they are authorized to do and how effectively the existing regulations address potential sources of nitrates in groundwater: what is working, what is not working and how the regulations or implementation might be improved.

The working group originally scheduled two study sessions on Existing Regulatory Infrastructure within the GWMA. The first session, on January 14, 2015, will address regulations specific to the RCIM sources. A second session is scheduled for February 11,

2015 and will address regulations specific to irrigated ag sources and those applicable to CAFO/livestock. It was determined that the proposed agenda was too ambitious for two sessions and a third study session will be scheduled, likely at the end of January.

The working group suggests that a similar look at agencies using incentive programs and their funding should occur. However, the working group's plate is full, so Tom suggested some other working group take on that work – finding agencies that are using incentive programs and explore how well they are working. The funding working group was suggested a good place for this activity.

VI. Proposal presented to the EPO Working Group by Health Sciences Service Learning Group with the University of Washington – Health Sciences Schools

Lisa described a proposal, which would partner a UW graduate class with the EPO to develop messaging for the Abandoned Wells outreach campaign. Following discussion, the GWAC agreed not to pursue the partnership in part because there wasn't time enough to fully shape the proposal before the start of the project; the proposal was lacking in detail regarding the purpose of the proposed tour and its relationship to abandoned wells, and concerns about GWAC oversight of the products produced by the class.

VII. Public Comment:

Commentor expressed concerns with assigning an objective amount on nitrogen depending on the crop and using it as a basis for regulation or standards. Under or over application will impact the production of nitrates. The commentor believes the amount of nitrogen applied should be left up to the farmer.

VIII. Next Steps:

Future agenda items: Groundwater testing discussions and providing input on committee expectations for PGG

The Data Working Group will act as the steering committee for the Nitrogen Loading Assessment and report back to the GWAC

Work planning for the upcoming year:

- Vern and Jim will meet with the working groups and identify a date to report back to the GWAC (February/March 2015)

Next Meeting

Thursday, February 19, 2015

2015 Meeting Calendar – The GWAC approved the 2015 bimonthly meeting calendar:

- February 19, 2015
- April 16, 2015
- June 18, 2015
- August 20, 2015
- October 15, 2015
- December 17, 2015 (tentative, if needed)

The meeting was adjourned at 7:05 p.m.

Meeting summary approved by the GWAC on _____.

Education and Public Outreach Working Group

Charge from Groundwater Management Area Advisory Committee

Working Group Members

Andres Cervantes (GWAC-DOH), Jean Mendoza (GWAC-Friends of Toppenish Creek), Tom Tebb (GWAC-Ecology), Elizabeth Torres (Citizen), Gretchen Stewart (EPA), Nieves Negrete (Citizen), Patricia Newhouse (GWAC-Citizen Rep Position #2), Tom Eaton (GWAC-EPA), Dean Effler (Citizen), Joye Redfield-Wilder (Ecology), Wendell Hannigan (GWAC-Alternate), Stuart Turner (GWAC-Turner & Co), Ignacio Marquez (AGR)

Meetings/Calls Dates

Meeting: Wednesday, November 5, 2014 1:30 PM – 3:45 PM

Participants

Lisa Freund (EPO Chair -Yakima County), Gretchen Stewart (EPA), Nieves Negrete (Citizen), Dan DeGroot (Yakima Dairy Federation), Jim Davenport (Yakima County), Lee Murdock (Yakima County), Elizabeth Torres (Citizen), Jim Dyjak (GWAC Alternate), Larry Fendell (Citizen), Jean Mendoza (GWAC-Friends of Toppenish Creek), Karri Espinoza (Yakima County staff) *Andres Cervantes (GWAC-DOH, *Joye Redfield-Wilder (Ecology)

*via phone

Key Discussion Points

Welcome & Meeting Overview: Lisa Freund welcomed the group and reviewed the meeting agenda: Discuss and develop a two-year EPO project timeline, hear from the RCIM on the Abandoned Well Scope of Work, and hear from Gretchen Stewart on the PEHSU clinician training. She noted that the GWAC had approved a $267,000 budget for five EPO projects. Today's meeting would focus primarily on developing a timeline for the projects.

RCIM Abandoned Well Scope of Work and Septic System Outreach (Dan DeGroot, RCIM) -

Dan DeGroot, representing the Residential, Commercial, Industrial Municipal Working Group (RCIM), spoke to the group about the education and outreach the RCIM wants the EPO to provide:

- Outreach and education to property owners regarding the importance of locating and testing abandon wells on their property.
- Conduct a property records search to locate abandon wells.

Joye Redfield-Wilder suggested that Avery Richardson from Department of Ecology attend the next RCIM meeting to provide relevant Ecology information on abandoned wells. She noted that Ecology has issued news releases on abandoned wells to help inform people of what to look for on their property. Ecology has also developed outreach materials. She will work with her office to identify outreach materials that could be tailored to this campaign.

A participant asked for clarification regarding the EPO's role in the project. Given the EPO's mission, she noted, the EPO's role would be to produce and distribute the messages regarding how and what the community should do relative to abandon wells.

Jim Davenport noted that the $76,000 the GWAC approved for the project was predicated on the assumption that EPO would conduct (or contract out) the work needed to identify abandoned wells in the GWMA. He added that the group should first identify how much of the budget should be dedicated to outreach materials and distribution. That number should then be subtracted from the $76,000 to determine the available budget for locating abandoned wells in the GWMA.

A member summarized what he believed the EPO's role and actions should be: identify the campaign messages (why there are abandoned wells, why they are a threat); create a simple survey to identify what each site looks like; collect anecdotal information via the Web; clearly state that the purpose of the campaign is to collect information, not to enforce compliance. Discussion followed regarding what a "simple survey" is.

ACTION: Lisa F. will forward Joye the next RCIM meeting announcement so she can pass it along to Avery Richardson.

ACTION: Joye will speak to Avery Richardson about attending the next RCIM meeting.

ACTION: Joye will contact the Water Resources office in Olympia to ask what methods they use to reach people who may have abandoned wells on their properties.

New Mom's Brochure: PEHSU clinicians, led by Dr. Catherine Karr, have held five clinical trainings recently in the Yakima Valley. The training sessions are two hours; all Yakima Valley Farmworkers Clinic branches have been included.

- Gretchen is working on producing seven sound-bites to post on the EPA website, the GWMA website and the PEHSU website.

These will be short video clips that give information about nitrates in the drinking water and the health risks.

- Gretchen is working with PEHSU to simplify the fact sheet that is given to new moms at the hospitals. She noted that the clinics had observed that their clients would need simpler text and more graphics.
- Dean Effler has delivered the fact sheet to a number of local hospitals.

EPO Project Timeline: The group discussed the five approved projects and began assigning team leads and members and milestones to each project. The group agreed that there are not enough EPO members carry out all the projects. It was observed that the EPO needs to look at ways to recruit additional members.

- Redesign and maintain GWMA website
- Lead: Lisa Freund - Team Members: Andy Cervantes & Gretchen Stewart
- Abandoned Wells & Septic Systems Maintenance Education and Outreach
  Lead for UW Common Book Communications and Proposal: Nieves Negrete – Team Members: Elizabeth Torres, Jim Davenport & Andy Cervantes
- Educational Outreach Campaign
  Lead: Gretchen Stewart - Team Members: Lisa Freund, Lee Murdock

ACTION: The teams will communicate and plan the next steps for each of the projects.

DOH Grant Funding for Water Treatment Systems - Next Steps

Vern Redifer stopped in to ask the group if they had any suggestions regarding offering the additional, free Treatment Systems in light of recent press that suggested that the 2011 treatment program was "a failure." He observed that there is not much point in offering additional treatment systems if the ones in use have not been maintained. He asked the group to send their suggestions for the current program.

A member suggested that the 2011 program outcomes be viewed as lessons learned, and to modify the upcoming program accordingly.

ACTION: The members will send their ideas to Vern.

Proposed Next Steps – December Meeting Topics

- Complete the project timeline (assignments, milestones)

Next meeting: Wednesday, December 3, 2014 at 1:30 PM, Yakima County Courthouse Room 419 (phone: 509-574-2353 [PIN# 2353#])

Education and Public Outreach Working Group

Charge from Groundwater Management Area Advisory Committee

Working Group Members

Andres Cervantes (GWAC-DOH), Jean Mendoza (GWAC-Friends of Toppenish Creek), Tom Tebb (GWAC-Ecology), Elizabeth Torres (Citizen), Gretchen Stewart (EPA), Nieves Negrete (Citizen), Patricia Newhouse (GWAC-Citizen Rep Position #2), Tom Eaton (GWAC-EPA), Dean Effler (Citizen), Joye Redfield-Wilder (Ecology), Stuart Turner (GWAC-Turner & Co), Ignacio Marquez (AGR)

Meetings/Calls Dates

Meeting: Wednesday, December 10, 2014 1:30 PM – 3:45 PM

Participants

Lisa Freund (EPO Chair -Yakima County), Jim Davenport (Yakima County), Elizabeth Torres (Citizen), Andres Cervantes (GWAC-DOH), Joye Redfield-Wilder (Ecology), Avery Richardson (Ecology), Ignacio Marquez (WSDA), Karri Espinoza (Yakima County staff) *Jean Mendoza (GWAC-Friends of Toppenish Creek), *Gretchen Stewart (EPA), *Kelsen Caldwell (UW)

*via phone

Key Discussion Points

Welcome & Meeting Overview: Lisa Freund welcomed the group, introduced guests Avery Richardson and Kelsen Caldwell, and reviewed the meeting agenda: to discuss the campaign to identify abandoned or improperly decommissioned wells in the LYV GWMA and septic system outreach. Avery will speak to Ecology's experience identifying abandoned wells, conducting outreach and decommissioning wells. Kelsen will introduce the UW's Common Book course and proposed partnership with the EPO. Based on the presentations and discussions, the EPO will determine its abandon wells outreach next steps and identify time frames to complete the work.

Abandoned Well Outreach - Lessons Learned -

Avery Richardson, Ecology hydro-geologist, spoke to the group about experiences Ecology has had identifying abandoned wells, conducting outreach and decommissioning wells:

Avery provided the definitions of abandon wells vs. decommissioned wells

- Abandoned well – a well that is no longer in use; property owners have simply walked away from the well.
- Decommissioned well – a well that is no longer in use and has been shut down/capped off by a licensed well driller and reported to the Department of Ecology (See WAC 173-160-261).

Challenges

Definitions: Avery noted that challenges to outreach include defining for the public the legal definitions of "abandoned" and "decommissioned" wells, and the property owners' legal requirement to decommission unused wells. He observed that Ecology's well log database would not be helpful for EPO's purposes. It is a snapshot in time that does not reflect change of use or change of ownership over time.

Costs: Decommissioning a well can cost between $1,000 and $20,000. All wells are different and the cost is determined by the size, age and type of the well. Generally, older wells (pre-1972) that were not constructed by a well driller are at a higher risk. Wells with no cap, no surface seal and/or old dug wells pose a higher risk.

Partners: Because of the high costs of decommissioning a well most property owners are not willing to self-identify abandoned wells on their properties because they will be on the hook to decommission the well at their expense. The most effective way Ecology has identified abandoned wells is from bank-owned properties (foreclosures) following the 2008 recession. Land-use decisions at the County level are another means to bring property owners into compliance. For example, counties could require well decommissioning as a condition for short plat approvals. Well drillers are strong supporters of decommissioning wells properly.

Wells and Risks: There are an estimated 45,000 wells on record with Ecology dating back to 1972. Hand dug wells and wells with ground level openings tend to have a higher risk of contamination and be a danger to the public. Wells dug by well drillers and have higher level openings with proper covers and seals tend to have a lower risk of contamination to the ground water and less danger to the public.

Funding Options: Jim Davenport observed that the question before the GWAC is, can we identify a general public benefit to decommissioned wells that might allow us to use public funds to decommission wells? Avery replied that that was a legal question he could not answer. He added that a new "Notice of Intent" fee has been discussed at Ecology but would require legislative action to implement.

Currently, for Ecology to require property owners to decommission an abandoned well, there must be an administrative order, which is an appealable action. Other expenses

could include attorney, court fees and penalties. Ecology has not had much success with the courts issuing judgments to the property owners.

News releases, PSA's and social media have been the most effective way to educate the public on the hazards and dangers of abandoned wells.

Avery observed that another selling point [to the campaign] would be an increase to a property's value. He concluded that wells are not consistently risky – some are (as discussed above) but many are not high risk.

> **ACTION:** EPO has agreed to begin the education and outreach on abandoned wells as well as strategize on how to identify them.

Audiences:	**Constraints:**
Local Well Drillers	Cost
Banks	Reluctance to self-identify
County- Planning (Short Plats)	Legal liabilities
Landowners/farmers	
Yakima Health District	
Department of Health	
Ecology	

Abandoned Well and Septic System Outreach – UW Partnership Proposal:

Background: Kelsen Caldwell, a co-instructor in the Health Science Division at the University of Washington, is teaching a one credit graduate course winter quarter (January 5-March 2, 2015). The curriculum will be designed around the book *"Fresh Fruit, Broken Bodies,"* an anthology of the social suffering of farmworkers in the United States. The class is comprised of future healthcare providers; the intent is to engage them in the communities they will serve through a project-based assignment. Kelsen has had preliminary conversations with Nieves Negrete, Elizabeth Torres and Jean Mendoza about class collaboration with the EPO on the Abandoned Well campaign.

Because it is only a one credit course, students will have limited opportunities to engage on a local level. They will take one field trip to the Yakima Valley early in the course to get a better feel and visual of the environment they will be studying. Kelsen asked the EPO to consider a class white paper proposal that would provide an outreach implementation strategy for the EPO. In exchange, she will need assistance connecting students with the appropriate community partners and with field trip coordination.

Jim Davenport observed that although the white paper has good ideas, it does not address the primary need of the group: the need for bodies to go out and find abandoned wells.

Discussion followed on what would be useful class products for the EPO and the campaign. Ideas included a written request to legislators to promote legislation for

funding to decommission wells, targeted messaging to specific audiences (banks, well drillers, property owners); messaging and content for news releases, brochures, billboards and accompanying layout/design work.

Kelsen was asked if there are any Spanish speakers taking the course. She replied that a few are, but not the majority. A member observed that the strength of the UW is its community-based participatory research, a strength the group should take advantage of.

The group agreed that given proposal's limited timeframe, the students will not have time to address septic system outreach. Accordingly, that component will be dropped from the UW proposal.

Kelsen agreed to resend the proposal with the more informed perspective she has heard today. She will resubmit it to Lisa Freund by close of business Friday, December 12. Lisa will share it with the EPO and request their comments early in the week of the 15th so Kelsen can finalize the class syllabus.

> **ACTION:** Kelsen will submit an updated proposal along with a list of potential dates for the field trip to Lisa by Friday December 12, 2014.
>
> **ACTION:** EPO members will give their feedback on the proposal early next week to insure Kelsen has enough time to prepare for her class that begins Jan 5.
>
> **ACTION:** Lisa, Elizabeth and others will provide Kelsen with contacts of community liaisons that can assist her during the class.

Proposed Next Steps – January Meeting Topics

- **ACTION:** Monday, January 5, 2015, 6:20 PM: Andy Cervantes (others-to be determined) will give a Skype or in-person presentation to the class using a power point presentation and Q&A session.
- Begin Education and Outreach for abandoned wells.
- Strategize the most effective way to identify abandon wells.

Next meeting: Wednesday, January 7, 2015 at 1:30 PM, Yakima County Courthouse Room 419 (phone: 509-574-2353 [PIN# 2353#])

Residential, Commercial, Industrial, Municipal (RCIM) Work Group

Charge from Groundwater Management Area Advisory Committee

Working Group Members

Robert Farrell, Chair (Port of Sunnyside), Elizabeth Sanchey (Yakama Nation), Gordon Kelly (Yakima Health District,) Jan Whitefoot (Concerned Citizens of Yakama Reservation,) John Van Wingerden (Port of Sunnyside,) Stuart Turner (Turner & Co.), Tom Ring (Yakima Nation), Kathleen Rogers (Citizen Rep), Sanjay Barik (Ecology,) Dan DeGroot (Yakima Dairy Federation)

Meetings/Calls Dates

Meeting: Thursday, October 23, 2014 from 10:00 a.m. to 12:20 p.m.

Conference Call: 509-574-2353 PIN# 2353

Participants

Present: Robert Farrell; Gordon Kelly; Sanjay Barik; Dan DeGroot; Yakima County staff support – Mary Wurtz, and Lee Murdock

Present via Conference call: Kathleen Rogers

Key Discussion Points

- Information Request to Ecology
- Addendum to Deep Soil Sampling
- Abandoned Wells and EPO Work Group

Information Request to Ecology

Background: At the last meeting Bob answered questions from the group regarding Ecology data that had been distributed in April regarding permitted facilities. The group agreed that they should refine their request to Ecology to include loading information. A member proposed making a separate request to Tom Eaton for information on federal facilities that might be permitted under EPA: facilities on the reservation, BLM lands, the Yakima Training Center, Kittitas County. The purpose would be to obtain accurate information on total loading originating both outside and inside the GWMA.

Discussion: Sanjay clarified that facilities that discharge to Surface Water hold National Pollutant Discharge Elimination System (NPDES) Permits; if they discharge to Land they hold State Waste Permits; and if they discharge to both they hold Hybrid Permits. He also clarified that permits are

legal documents, but that the Fact Sheets explain limits, acreage, addresses, maps, the basis where it is coming from, and controls. Sanjay stated that releasing the fact sheets should be fine.

Bob stated that the RCIM was interested in nitrogen loadings to groundwater. He also stated that the permitted discharge of nitrogen to a land treatment system may not provide the information the workgroup is seeking. The actual loading by the permitted facility may be significantly less than the loading allowed by the permit. He suggested that, based upon a conversation with Ecology personnel, while Discharge Monitoring reports (DMRs) can provide the gross loading to the land, they will not provide net loading of Nitrates to groundwater, because the mass of nitrogen recovered with the harvest of vegetation is not reported on the DMR. He stated that while this net mass of nitrogen to groundwater may be reported to the Department of Ecology in other documentation, it would be onerous for Ecology to recover that information.

Sanjay responded that while the specificity may not be there, the work has been done by EPA and USGS with SPARROW - SPAtially Referenced Regressions On Watershed attributes (SPARROW) which uses a nonlinear statistical method that defines relations among upstream nutrient-sources, downstream nutrient loads, and the land-surface characteristics that potentially affect nutrient delivery to streams. The SPARROW methodology provides a statistical basis for estimating stream-nutrient loads (predictions) as well as additional spatial detail on environmental factors and transport processes included in the regression models.

There was discussion that the job of RCIM was to determine Nitrate from each source and discussion if SPARROW was predictive or actual – Sanjay responded that this was a mathematical model containing 20 years of data in addition to potential nutrient sources, land-surface characteristics, and nutrient predictions. Additionally, atmospheric deposition, septic systems, point-sources, land use, land cover, and agricultural sources such as applied commercial fertilizer and manure are all potential nutrient sources and have been examined by SPARROW.

The issue was moved to the Data Work Group for discussion as it was considered to be outside the scope of the RCIM Work Group and needed more discussion before presentation to the GWAC.

Addendum to Deep Soil Sampling

Background: The RCIM work group had been notified by the South Yakima Conservation District that the SYCD had received inquiries for deep soil sampling on residential property. .At a previous meeting, the RCIM had agreed that current resources should be reallocated for this purpose if the current DSS falls short of its sampling goals. The group will also produce addenda to the DSS Plan that will address sampling sites and methods (e.g., sampling in the proximity of drain fields and composite sampling from other residential uses).

Discussion: The group today discussed their concern over the estimated cost of $1,300 per borehole for incremental testing down to six feet. After much discussion it was determined that

the addendum to the Deep Soil Sampling Plan would propose sampling in the vicinity of the Septic/Drain Fields of rural residential properties at one foot below the known depth of the drain field. Furthermore, it was decided that the addendum would recommend four-foot boreholes, with a single soil sample recovered from this depth, for each 'use area' such as lawns, barns, orchards. It will be noted that the purpose of this soil sampling is to determine if nitrogen loadings from rural residential properties are a potential source of elevated nitrate in the groundwater. The data collected would be viewed as informative and not be used to draw scientific conclusions due to the small sample size.

Abandoned Wells and EPO Work Group

*Bob announced that he was reminded that RCIM had agreed to be the lead on directing outreach to owners of Abandoned Wells, and the EPO working group would carry out the work. Bob said the group was tasked with providing a Statement of Work for the next EPO Meeting on November 5th.

There was discussion that outreach could be targeted with analysis done on the likely locations of abandoned wells. Suggestions included using well records by DOE, analysis of age of housing, sites that have had NEPAs or SEPAs conducted, etc. to identify potential hotspots. Lee will write up those suggestions and send to Bob for review.

**Editorial Note:* at its August meeting, the RCIM discussed the Abandoned Well project and agreed that "...The EPO will take direction from the RCIM Working Group. RCIM and EPO to identify exactly what the outcomes will be. EPO and RCIM will work jointly while the RCIM oversees the project." (page 2, paragraph 8 - *RCIM Working Group Summary August 28, 2014*)

Resources Requested

- None at this time

Recommendations for GWAC

- None at this time

Deliverables/Products Status

- None at this time

Proposed Next Steps

- Draft Statement of Work for Abandoned Wells outreach will be discussed at the next EPO Working Group meeting.
- Recommend to the Data Work Group that the USGS SPARROW model be evaluated as a source of data for nitrogen loadings in the GWMA.

Next meeting: to be determined by Robert Farrell and Jim Davenport.

Data Collection, Characterization, Monitoring Work Group

Charge from Groundwater Management Area Advisory Committee

Compile and Manage Data

Working Group Members

Kirk Cook (Chair); Andres Cervantes; Jan Whitefoot; Jim Trull; Kevin Lindsey; Laurie Crowe; Steve Swope; Stuart Turner; Thomas Tebb; Melanie Redding

Meetings/Calls Dates

Meeting: Thursday, November 20, 2014 from 10:00 a.m. to 12:00 p.m.

Conference Call: 509-574-2353 PIN 2353#

Participants

Present: Kirk Cook (Chair); Steve Swope; Charlie McKinney; Jaclyn Hancock; Jean Mendoza; Yakima County staff support – Vern Redifer; Jim Davenport; Lee Murdock and Kelly Rae

Present via Conference call: Stuart Turner; Melanie Redding; Ginny Stern; Laurie Crowe; Ralph Fischer

Agenda

1. Review changes to Nitrogen Loading Assessment Scope of Work and approval from Data Committee to submit to GWAC (previously sent out via email)
2. Presentation by the South Yakima Conservation District on Deep Soil Sampling progress and discuss moving out of the survey portion of the project
3. Review of recently released USGS soil ranking methodology and how it may or may not factor into the GWMA process
4. Presentation by the Livestock/CAFO workgroup on the progress of developing a data collection plan within animal operation boundaries
5. Presentation of alternative data sets (together with quality assurance protocols) proposed to be presented at the December 2014 GWAC meeting

Jim Davenport facilitated the meeting and reviewed the key discussion points to be accomplished.

Scope of Work Changes. Kirk Cook presented the latest version of the Nitrogen Loading Assessment Scope of Work looking for final approval to submit the Scope of Work to the GWAC so the Washington State Department of Agriculture and Yakima County could

commence with the needed work as many additional tasks are dependent on the completion of the Nitrogen Loading Assessment. The Scope of Work was modified in response to comments received by the Data Committee. Jean Mendoza listed a variety of concerns related to the previous version. Jim Davenport polled the group regarding if they were ready to approve the draft that was sent out. All but one indicated approval. Jean asked for responses to her earlier submitted comments. Kirk agreed to provide those. The next Data Working Group meeting will be held on December 3, 2014, 10:00 a.m.

ACTION: Kirk will respond to Jean's earlier-submitted comments

ACTION: Tentative Data Working Group meeting on Wednesday, December 3, 2014 at 10 a.m. to further discuss plan to be submitted to GWMA two weeks prior to December GWAC meeting.

South Yakima Conservation District (SYCD) Presentation on Deep Soil Sampling Progress. Laurie Crowe sent out a spreadsheet to the group prior to the meeting and commented that the process went smoothly. The sampling started on October 23, 2014 and was finished on November 7, 2014. A staff member was on hand at each sample site and each site was staked prior to the sampling. The barcode worked well and the landowners all received a copy of their barcode. Laurie said they are still waiting for the last two questionnaires from growers. Once they receive the questionnaires and the sampling logs, Laurie will send the information to Yakima County so that it can be put into a database. She says there will be more sampling in the spring via the same process and she's hopeful that once the landowners see how confidential it is, they'll get more samples.

ACTION: Laurie will send survey and soil results to Vern who will then enter into the database he has developed. Next steps will include developing a method to put the results online so the growers can see their results.

Laurie then discussed the recently released USGS soil ranking methodology and how it may or may not factor into the GWMA process. She stated that SYCD is performing a soil ranking similar to the USGS but they don't have a numerical system and instead the NCRS leaching index is being utilized. Kirk said that he will forward the vulnerability/soil analysis to everyone in the group in PDF form. It was noted that that would be something the farmers could also use for future planning.

ACTION: Laurie will distribute the website address for the NRCS to the group.

Presentation by the Livestock/CAFO Workshop. Charlie McKinney informed the group that there is a need to get to a protocol. He would like help from a consultant. Vern reminded the group that the contract was complete with the past consultant, PGG. Group discussed approaching PGG to develop three plans as one of the products they will want is scalability. Vern noted that there was already a placeholder and the need to implement

a groundwater monitoring plan. Group recommended getting PGG back on board to ensure continuity.

ACTION: Vern will consider contracting with consultant.

Presentation of Alternative Data Sets. Stuart Turner provided an update on the groundwater study he is doing from a Dairy Wastewater Storage Basin. While a sample Quality Assurance Project Plan (QAPP) was submitted, the group had many questions regarding whether there would be access to the specific data and the actual QAPP. Stuart stated that there was still some work that needed to be done to ensure the confidentiality of the participants. Jim asked whether the alternate data sets needed to be presented at the December 2014 GWAC Meeting. It was decided that alternate data sets could be presented at any time and that it would be better to wait until the Turner presentation was ready.

Groundwater Monitoring Plan. Vern stated that the group needs to implement a groundwater monitoring plan so there is a need to hire a consultant to do that. The group recommended that Vern get PGG back on board and Vern concurred. He will approach PGG to develop a scope of work and budget proposal and present to the Data Group and then decide.

Deep soil samplings are indicators but the water should be tested too. A member added that this needs to be refined and synthesized for the characterization. There is a need to have a detailed assessment prior to putting in holes.

Vern noted that Jim and Lee are working on bringing all the information together in the area characterization report component of the draft GWM Program. Jim and Vern will discuss how the group can share this report.

Jim added that WAC has a requirement to identify/define the program recommended by the GWAC is getting accomplished. Vern stated that if there is funding available, there is need to create a long term monitoring plan. Jim replied that the Program should identify the funding source. Vern reminded everyone that there is a need to identify how the Program will be passed off as the program will still be costly (frequency, etc.). A member commented that a monitoring plan is important as well as a follow up on the deep soil sampling in 5 to 10 years. A member added that the deep soil monitoring is complimentary but the water monitoring should be a stand-alone.

Jim asked Ecology if they were working on a statewide monitoring plan for nitrates and if that would impact the GWAC. Charlie answered that the work is for doing more groundwater monitoring and that he'd double check but he didn't think this would impact the group. Kirk added that the Governor's office has requested the Department of Agriculture and other agencies to develop a manure applicators bill for consideration by

the state legislature next year. It was recommended that this issue in its entirety be moved to the Regulatory Work group for consideration.

> **ACTION:** Ginny Prest will present the manure legislation to the Regulatory Work Group meeting on December 16, 2014.

Resources Requested

- None at this time

Recommendations for GWAC

- None at this time

Deliverables/Products Status

- None at this time

Proposed Next Steps

- None at this time

Next meeting: December 3, 2014, 11 a.m. – 1 p.m.

Data Collection, Characterization, Monitoring Work Group

Charge from Groundwater Management Area Advisory Committee

Compile and Manage Data

Working Group Members

Kirk Cook (Chair); Andres Cervantes; Jan Whitefoot; Jim Trull; Kevin Lindsey; Laurie Crowe; Steve Swope; Stuart Turner; Thomas Tebb; Melanie Redding

Meetings/Calls Dates

Meeting: Wednesday, December 3, 2014 from 11:00 a.m. to 12:45 p.m.

Conference Call: 509-574-2353 PIN 2353#

Participants

Present: Jim Dyjak; Larry Fendell; Jean Mendoza; and Kate Prengaman with the Yakima-Herald Republic; Yakima County staff support – Jim Davenport and Kelly Rae

Present via Conference call: Kirk Cook (Chair); Melanie Redding; Laurie Crowe

Agenda

1. Approval of the DRAFT Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area - Scope of Work and Budget to be presented at the December GWAC Meeting.

Jim Davenport facilitated the meeting.

"Second Opinion and Critique of the Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area - Scope of Work" by Jean Mendoza. Jim stated that he'd spoken with Jean Mendoza since the November meeting and asked if her concerns had been addressed regarding presenting the above-referenced report in Kirk Cook's letter dated November 21, 2014. She responded that she still had questions and handed out a 7 page document titled *"Second Opinion and Critique of the Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area - Scope of Work"* that she had written.

The group went over Jean Mendoza's concerns.

Jean felt that "consistently" on page three of the Draft Assessment should be removed.

ACTION: Kirk will remove the word "consistently" on page three of the DRAFT Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area - Scope of Work and Budget.

It was decided that if there were any lagoons being decommissioned during the study, they would be included in the assessment. Kirk Cook added that the assessment cannot look at every particle as that would be very costly.

It was stated that climate should be considered in the assessment. Kirk replied that the climate is outside the scope of work.

A member stated more money needs to be put into the budget. Jim replied that the project budget has been approved. A member didn't believe the budget for reviewing literature was realistic and needed to be increased. The member handed Jim three pages of references and abstracts from when the member studied lagoons. The member further stated that there was no funding for a number of other activities. Kirk replied that all of her concerns were noted.

A member brought up that the dairymen on CAFO said that no one would be stepping on their property so does that mean it would be a literature review. Kirk replied yes as there will be instances where we have to defer to published data. There will be a mixture but the Scope of Work will be more refined than the EPA's assessment. Kirk added that when necessary, we will check with the experts.

A member stated that the Deep Soil Sampling would not be complete until 2016. If the group compares the projections to samplings, there won't be results until late 2016. Kirk responded that he intends to have it done by October/November 2015. He explained that this is a living document and that there is no reason to stall. He's reluctant to hold this up for the Deep Soil Sampling and stated the group can make revisions as more data becomes available.

The same member mentioned Rules of Sunnyside Water Irrigation: 1997-2008 that they had. Another member commented that there is new data and that contact with Jim Trull should be made to get the more current.

This member stated that they do not want to see the Draft Comprehensive Nitrogen Loading Assessment just one week before it's to be presented to the GWAC. Jim asked if we could get the reviewed literature listed and identified for the project. Kirk answered that the project will have a bibliography in it.

A member suggested that the nitrogen loading assessment may need to be enhanced and wondered if that will lead to other work that will need to be done and if it will impact the cost. Kirk answered that it was a fairly minimal amount of money and that the Department of Agriculture would commit.

Jim added that Vern budgeted for long term (specific wells) $395k which is protected. We want to know the nitrogen loading and then refine with a higher level of specificity and how to improve water quality. Jean agreed and added that there would be a need to be onsite for testing. Jim responded that once the model exists, we can then ask questions to hypothesize in a model-predicative way and that will be a broad determination.

Jim polled the group regarding if they felt DRAFT Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area - Scope of Work and Budget was ready to be presented at the December GWAC Meeting. All but one indicated approval.

> **ACTION:** DRAFT Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area - Scope of Work and Budget will be presented at the December GWAC meeting on December 18, 2014.

Resources Requested

- None at this time

Recommendations for GWAC

- None at this time

Deliverables/Products Status

- None at this time

Proposed Next Steps

- Presentation of the DRAFT Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area - Scope of Work and Budget

Next Meeting:

- To be determined.

Regulatory Framework Working Group

Charge from Groundwater Management Area Advisory Committee

Develop and approve questions that Vern Redifer, Tom Eaton and Jim Davenport created for two study sessions to take place in January and February 2015.

Working Group Members

Tom Eaton – Chair (Environmental Protection Agency), Andres Cervantes (Department of Health), Charlie McKinney (Department of Ecology), Chelsea Durfey (Turner and Co.), Dan DeGroot (Yakima Dairy Federation), Jason Sheehan (Yakima Dairy Federation), Jean Mendoza (Friends of Toppenish Creek), Laurie Crowe (South Yakima Conservation District) Nick Peak (Environmental Protection Agency), Vern Redifer (Yakima County Public Services), Ginny Prest (AGR), Jim Dyjak (Concerned Citizens of the Yakama Reservation), Larry Fendell (citizen) and Steve George (Yakima County Farm Bureau)

Meetings/Calls Dates

Meeting: 1:00p.m. To 2:33p.m., Wednesday, November 12, 2014

Call Number: 509.574.2353 pin: 2353#

Participants

Present: Andy Cervantes, Jason Sheehan, Jean Mendoza, Jim Davenport, Dan DeGroot, Jim Dyjak, Larry Fendell, Steve George and Vern Redifer

Via Phone: Tom Eaton (Chair), and Ginny Prest

Absent: Chelsea Durfey, Laurie Crowe, Charlie McKinney and Nick Peak

Other Attendees: Kelly Rae (Yakima County support staff)

Key Discussion Points

Welcome & Meeting Overview

Jim Davenport welcomed the working group. He passed around a group member list that Lisa Freund had compiled so that the working group could add to or edit. Jim also let the group know that a member was recording the meeting.

Chair Tom Eaton requested Jim to conduct the meeting. Tom wants Jim to facilitate all the Regulatory Framework working group meetings in the future as Tom is a part of the EPA and then he can participate as a working group member.

A question arose as to how one becomes a member of the group. Jim answered that any GWAC member, or alternate member, who attends the meetings can be a member of the

work group. Any person is welcome to attend the work group meeting, as the meetings are open to the public. A group member asked that this be put in writing.

Discussion on BMPs. Conversation took place regarding how regulators work. If there is change needed, would it be policy or change? A suggestion was made that the group consult with WSU (Dr. Troy Peters).

Yakama Reservation. A recommendation was made to get the Nation involved and/or get their input as to what they are doing as the aquifer extends under the reservation boundary. It was noted that the Nation is on a similar process to the GWMA, and was provided a startup grant by EPA. EPA committed to meet with the Nation in the next two months to get a status report of their efforts.

Discussion on Study Sessions. These sessions are scheduled for January 14 and February 11, 2015 (regular dates of the Working Group meetings) and are open to the public. It was suggested that these sessions would start with the RCIM at the first meeting and then the AG/CAFO at the second. Department of Health stated that they would be present at the study session with RCIM.

A four-page list of questions that Vern, Tom and Jim compiled for the future Study Sessions was discussed. The group was tasked with striking and/or editing questions. Jim asked that they return feedback/edits to him by the end of this week (November14th).

> **ACTION:** Jim will revise questions taking into account comments made at this meeting, with numbers, and email the questions out so that the working group can edit with reference to particular question.

A member would like to see the end result of the questions and wondered if we should allow public input. Another member suggested that we move the study sessions back a month so the group could go over the questions. It was also suggested that perhaps the study sessions would be moved back if the agencies cannot commit. It was decided that the study sessions would be scheduled for January 14 and February 11, 2015.

A group member asked if we were going to notify the GWMA on the work being done. The answer was "yes."

It was noted that the charge for this working group is to determine which programs work well and which need improvement.

Jim suggested that the work group meet again on Tuesday, December 16th from 2p.m. to 4p.m. to go over the questions again prior to the study sessions. He also stated that he will assume the responsibility of lining up the representatives of the agencies for the study sessions. The next meeting was confirmed for this date/time.

Resources Requested

None at this time

Recommendations for GWAC

None at this time

Deliverables/Products Status

None at this time

Proposed Next Steps

Jim Davenport will distribute amended list of questions and will begin contacting agencies for January workshop (i.e. Department of Health, County Departments, Cities, etc.). Work group will meet next on December 16, 2:00 p.m.-4:00 p.m.

Regulatory Framework Working Group

Charge from Groundwater Management Area Advisory Committee

Develop and approve agenda for two study sessions to take place in January and February 2015.

Working Group Members

Tom Eaton – Chair (Environmental Protection Agency), Andres Cervantes (Department of Health), Charlie McKinney (Department of Ecology), Chelsea Durfey (Turner and Co.), Dan DeGroot (Yakima Dairy Federation), Jason Sheehan (Yakima Dairy Federation), Jean Mendoza (Friends of Toppenish Creek), Laurie Crowe (South Yakima Conservation District) Nick Peak (Environmental Protection Agency), Vern Redifer (Yakima County Public Services), Ginny Prest (AGR), Jim Dyjak (Concerned Citizens of the Yakama Reservation), Larry Fendell (citizen) and Steve George (Yakima County Farm Bureau)

Meetings/Calls Dates

Meeting: 1:00p.m. To 2:00p.m., Tuesday, December 16, 2014

Call Number: 509.574.2353 pin: 2353#

Participants

Present: Charlie McKinney, Dan DeGroot, Jason Sheehan, Jean Mendoza, Jim Davenport, Jim Dyjak, Steve George and Vern Redifer

Via Phone: Tom Eaton (Chair) and Laurie Crowe

Absent: Andy Cervantes, Chelsea Durfey, Ginny Prest, Larry Fendell and Nick Peak

Other Attendees: Kelly Rae (Yakima County support staff)

Key Discussion Points

Welcome & Meeting Overview

Jim Davenport welcomed the working group.

Questions to be submitted to Presenters at Two Study Sessions. These sessions are scheduled for January 14 and February 11, 2015 (regular dates of the Working Group meetings) and are open to the public.

Tom Eaton asked if the questions were going to be presented to all of the speakers as that would make for some very long meetings. Jim Davenport replied that not all of the presenters would be expected to answer every question. It was suggested that the presenters review and provide remarks prior to the Study Sessions and at the end of the

session, the public could ask questions. Charlie McKinney stated that the participants need enough time to get familiar with the questions and Jim D. responded that the document could be distributed to the speakers now and that if there were any edits, he'd send those out to them.

> **ACTION:** Jim Davenport asked the group if there were any additions/edits to be made to the questions, to submit to him by Christmas.

Group discussed how much time each panel would take as well as public questions/remarks. It was suggested that there be more than two Study Sessions as each 4 hour block would not be enough time to cover the Panels and questions as scheduled on the Agenda.

Tom E. stated that he would get different EPA people to talk about drinking water and suggested maybe 15 minutes per panel. He commented that getting through to Panel 3 is ambitious. Vern agreed that time-wise it was and added that Panel 4 is Yakima County's Land Use and Approval Process which has to do with the Irr/AG and Livestock in the Valley. Tom suggested that Panel 4 be expanded and focused on land use and have Gordon with the Health Department move to Panel 2. Vern agreed with this.

Another member suggested that the speakers from out of town present first. Jim D. disagreed stating that the Sessions need to start at the top and then work down to regulatory structures and that's why it's organized in a descending pattern.

> **ACTION:** Jim will revise the Agenda to divide the Study Sessions into three, four or perhaps five different meetings. The first Study Session will include Panels 1 and 2 with Vern Redifer presenting at Panel 1: Groundwater Management Areas Presentation to include addressing questions on whether the GWMA is mandatory and if the group produces or makes recommendations. This first Session could be the group's trial run to see if enough time is allotted.

A discussion about Section 319 Clean Water Act began. A member suggested that perhaps the GWMA could do a paper on this. Another member added that the paper could include input from other entities (N.C.R.S., Farm Service Agency, 319 People, etc.). Jim D. said that there could be a fifth Study Session added for funding. One of the members stated that some of the people he has spoken to think that money is the power mover for the group. Another member suggested combining the Funding and Regulatory Working Groups as California did.

A suggestion was made that perhaps an interpreter might be needed for the Study Sessions as there might be some in the audience that don't speak English.

> **ACTION:** Jim Davenport will check into the availability of an interpreter for the Study Sessions.

A member asked if someone was going to be taking notes during the Study Sessions. Jim D. responded that the County administrative support would bring audio recording equipment

to the Sessions so that nothing was missed and then the admin would transcribe and distribute the minutes.

Resources Requested

None at this time

Recommendations for GWAC

None at this time

Deliverables/Products Status

None at this time

Proposed Next Steps

None at this time

Attachment B

- Lower Yakima Valley GWMA Program Development – Estimated Costs for Budget Discussion

Lower Yakima Valley GWMA Program Development Budget - As approved by the GWAC on October 16, 2014

Update Status	Budget Request Reference	Work Description	Spent and/or obligated To Date	Budget Request - 1st Year	Budget Request - 2nd Year	Total Budget Request	Total	"Rank"	Yakima County Proposed	Yakima County "Reserved"
NC	IRRIG	Deep Soil Sampling (Under Existing SYCD Contract - 200 Samples)	$ -	$ 395,000	$ -	$ 395,000	$ 395,000		$ 395,000	
NC	Placeholder	Groundwater Monitoring Plan - Planning, Analysis, and Implementation		$ 190,000	$ 190,000	$ 380,000	$ 380,000	2.89	$ 380,000	
NC	DATA - 1	Nutrient Loading All Sources - Database, Analysis, Reporting	$ -	$ 40,000	$ 17,000	$ 57,000	$ 57,000	2.75	$ 57,000	
NC	YC - 1	Database Maintenance, Analysis, and GIS (Monitoring, Wellhead, etc.)	$ -	$ 15,000	$ 15,000	$ 30,000	$ 30,000	2.67	$ 30,000	
NC	IRRIG - 2	Irrigation Water Management Workshops	$ -	$ 4,000	$ 3,000	$ 7,000	$ 7,000	2.53	$ 7,000	
NC	IRRIG - 1	Deep Soil Sampling (Proposed Additional 100 Samples)	$ -	$ -	$ 150,000	$ 150,000	$ 150,000	2.44	$ -	$ 150,000
NC	CAFO - 1	Dairy Pens and Manure Storage Sampling	$ -	$ 60,000	$ -	$ 60,000	$ 60,000	2.41	$ 60,000	
Revised	EPO-RCIM - 4	Abandoned Wells and Septic System Maintenance Education and Outreach	$ -	$ 56,000	$ 20,000	$ 76,000	$ 76,000	2.40	$ 76,000	
Revised	RCIM - 1	Abandoned and /or Improperly Constructed Wells (Decommission Wells)	$ -		$ 50,000	$ 50,000	$ 50,000	2.33	$ -	$ 50,000
NC	EPO - 1	Educational Outreach Campaigns	$ -	$ 34,000	$ 20,000	$ 54,000	$ 54,000	2.26	$ 54,000	
Revised	EPO - 6	Wellhead Risk Assessment Surveys - Phase 2	$ -	$ 50,000	$ 50,000	$ 100,000	$ 100,000	2.22	$ 100,000	
NC	EPO - 5	Redesign and Maintain GWMA Website	$ -	$ 8,000	$ 4,000	$ 12,000	$ 12,000	2.11	$ 12,000	
NC	CAFO - 2	Lagoon Assessment Based on EPA Data	$ -	$ 10,000	$ -	$ 10,000	$ 10,000	2.00	$ 10,000	
NC	IRRIG - 3	Mobile Lab--On Farm Evaluation of Irrigation Water Management	$ -	$ 175,000	$ 175,000	$ 350,000	$ 350,000	1.90		
Revised	EPO - 2	Community Outreach Surveys	$ -	$ 13,000	$ 12,000	$ 25,000	$ 25,000	1.47	$ 25,000	
NC	REG - 1	Regulatory Review--consider $25,000 placeholder	$ -	$ 250,000	$ -	$ 250,000	$ 250,000	1.32	$ 25,000	
Withdrawn	EPO - 7	Bilingual Outreach Coordinator Position (WITHDRAWN)	$ -	$ -	$ -	$ -	$ -	1.65		
Withdrawn	EPO-RCIM - 3	RCIM Resource Hotline (Full Resource Project)- (WITHDRAWN)	$ -	$ -	$ -	$ -	$ -	1.16		
Withdrawn	EPO-RCIM - 3	RCIM Resource Hotline (Pilot Project) - (WITHDRAWN)	$ -	$ -	$ -	$ -	$ -	1.11		
NC	Existing	Groundwater Monitoring Plan - Planning, Analysis, and Implementation	$ 224,000			$ -	$ 224,000		$ 224,000	
NC	Existing	Yakima County: Administration, Plan Writing, Plan Coordination, etc.	$ 221,000	$ -	$ -	$ -	$ 221,000		$ 221,000	
NC	Existing	Regulatory Review--consider $25,000 placeholder	$ 14,000	$ -	$ -	$ -	$ 14,000		$ 14,000	
NC	Existing	Facilitation	$ 135,000	$ -	$ -	$ -	$ 135,000		$ 135,000	
NC	Existing	Deep Soil Sampling (Plan Preparation)	$ 48,000	$ -	$ -	$ -	$ 48,000		$ 48,000	
NC	Existing	Education, Outreach, and Survey (Past Activities)	$ 26,000	$ -	$ -	$ -	$ 26,000		$ 26,000	
NC	Existing	Wellhead Risk Assessment Surveys - Phase 1	$ 54,000	$ -	$ -	$ -	$ 54,000		$ 54,000	
NC	Existing	Best Management Practices	$ 79,000	$ -	$ -	$ -	$ 79,000		$ 79,000	
		Column Totals	$ 801,000	$ 905,000	$ 706,000	$ 1,611,000	$ 2,412,000		$ 2,032,000	$ 200,000
		Current Funding Limit					$ 2,364,000		$ 2,364,000	$ 332,000
		(Over Budget) or Under Budget					$ (48,000)		$ 332,000	$ 132,000

Attachment C

- Interim Final Groundwater Monitoring Plan Version 7

PACIFIC groundwater GROUP

INTERIM FINAL GROUNDWATER MONITORING PLAN
LOWER YAKIMA VALLEY GWMA
INITIAL CHARACTERIZATION

August 15, 2014

INTERIM FINAL GROUNDWATER MONITORING PLAN
LOWER YAKIMA VALLEY GWMA
INITIAL CHARACTERIZATION

Prepared for:

Lower Yakima Valley Groundwater Advisory Committee
and
Yakima County
128 N. Second Street
Yakima, Washington 98901

Prepared by:

Pacific Groundwater Group
2377 Eastlake Avenue East, Suite 200
Seattle, Washington 98102
206.329.0141
www.pgwg.com

August 15, 2014
JE1308
GWMAMonPlan_v7

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

MONITORING PLAN APPROVALS

This Groundwater Monitoring Plan, developed (insert final date), 2014 for the Lower Yakima Valley Groundwater Management Area, has been reviewed and approved by the undersigned. Copies of the completed and signed Groundwater Monitoring Plan shall be distributed to the undersigned and all field personnel.

Lower Yakima Valley Groundwater Advisory Committee	Date
Project Manager	Date
QC Coordinator	Date
Field Manager	Date

This work was performed under HDR contract #CON0082545 and partially fulfills scope Item 2c. The Groundwater Monitoring Plan was prepared in accordance with hydrogeologic practices generally accepted at this time in this area, for the exclusive use of the Lower Yakima Valley Groundwater Advisory Committee and HDR, for specific application to the Initial Characterization. No other warranty, express or implied, is made.

1.0 PROJECT BACKGROUND

The Lower Yakima Valley (LYV) Groundwater Management Area (GWMA) was formed in 2011 in response to elevated nitrate concentrations in groundwater in the LYV. The GWMA project is a multi-agency, citizen-based, coordinated effort to reduce groundwater nitrate concentrations in the LYV to below Washington State drinking water standards. To achieve this goal, activities contributing to elevated groundwater nitrate concentrations must be identified based on scientific data and evaluation, and strategies for implementing best management practices must be developed. The GWMA extends from Union Gap southeast to the Yakima County boundary, minus the Yakama Reservation (Figure 1).

The LYV Groundwater Advisory Committee (GWAC) through Yakima County Public Services, selected HDR Engineering (HDR) and Pacific Groundwater Group (PGG) to perform two Scopes of Work under HDR contract #CON0082545. The first scope, led by HDR, is a study to identify applicable local, state, and federal regulatory requirements that control and manage nitrate in groundwater, identify Best management Practices (BMPs), and evaluate the effectiveness of these BMPs. The second scope, led by PGG, focuses on development of this Groundwater Monitoring Plan to establish a network of wells and field procedures to evaluate current and future nitrate concentrations in groundwater.

This interim final Groundwater Monitoring Plan addresses:

- Sampling Procedures
- Sampling Schedule (*developed following identification of the sampling network*)
- Sampling Network (*sampling network has not been established as of the date of issue for the interim final Groundwater Monitoring Plan*)
- Quality Assurance/Quality Control
- Reporting (*frequency developed following identification of the sampling network and schedule*)

While this Monitoring Plan is intended to be comprehensive, revisions and/or amendments may be required as the project evolves.

1.1 OBJECTIVES

The objectives of this Groundwater Monitoring Plan are to establish procedures for the collection and analysis of representative groundwater samples for nitrate and nitrate-related analytes. In accordance with objectives established in the Potential Groundwater Monitoring Stations Report (PGG, December 2014), the data should be used to:

- Evaluate BMP effectiveness
- Evaluate groundwater trends
- Identify nitrate hotspots

- Calculate basin-wide average nitrate concentrations

The GWAC will use analytical results from these samples to make administrative decisions and policy recommendations; therefore, the data inputs must be reliable and defensible. Following the sampling protocols and methods described in this Monitoring Plan will facilitate collection of samples that accurately represent the groundwater and minimize sampling artifacts.

1.2 PROJECT DESCRIPTION/SCOPE OF WORK

This project is designed for the GWAC to collect representative nitrate and nitrate-related groundwater data to assess current and future conditions and to meet the objectives summarized in Section 1.1.

The study boundaries for the groundwater monitoring program are the GWMA boundaries minus the area covered by the consent order between the United States Environmental Protection Agency and several dairies ("dairy cluster", Figure 1).

The sampling program described in this Groundwater Monitoring Plan involves collecting groundwater samples from a network of wells for analyses of nitrate, nitrite, ammonia, and the sum of organic nitrogen + ammonia + ammonium (Total Kjeldahl Nitrogen). The network is assumed to include wells that already have pumps (private, public, and irrigation supply wells), and monitoring wells that require use of sampling pumps.

Groundwater samples will be analyzed by labs accredited by the Washington State Department of Ecology (Ecology). To avoid data entry errors, PGG recommends that preference be given to labs that can provide electronic data deliverables (EDDs) to the GWAC for direct upload to a database. Data will be managed in the project database and evaluated for trends, effectiveness of BMPs, hotspots, etc.

1.3 PROJECT SCHEDULE

Once the Groundwater Monitoring Plan is approved, field personnel will be identified, associated training will be completed, and equipment purchases or rental arrangements (field instruments, etc.) will be made. Following completion of these tasks, the initial sampling event under this Monitoring Plan will be performed at the next occurring interval established by the sampling schedule (Section 3.5).

Reports summarizing monitoring data will be prepared and submitted to the GWAC (Section 5).

2.0 PARAMETERS OF CONCERN AND ANALYTICAL LABS

Based on previous investigations and the purpose for establishing the GWMA, the *parameters of concern for this study are:*

- Nitrate
- Nitrite
- Ammonia-nitrogen
- Sum of organic nitrogen + ammonia + ammonium (Total Kjeldahl Nitrogen)

Recommended and alternative analytical methods and holding times (from sample collection to analysis) are summarized in Table 1. The analytical method list in Table 1 was derived from Ecology's *Methods and Analytes Table* on their environmental lab accreditation website. The recommended analytical methods in Table 1 meet the PQL requirements, are common analytical methods, and have frequently been used by PGG in characterization studies. Alternative analytical methods are listed so that multiple labs (which may use acceptable but different methods of analysis from the recommended methods) could be contracted to analyze the parameters of concern. If there are discrepancies regarding preservation or holding time between Table 1 and the analytical method, the analytical method shall be considered correct.

Samples will be analyzed by a Washington State accredited chemical laboratory. A list of labs accredited for the GWMA parameters of concern is presented in Table 2, which was derived from Ecology's Lab Search website. Lab-prepared sample bottles should be acquired from the selected analytical lab prior to mobilizing to the field. Since nitrate and nitrite will be analyzed individually, rather than combined as nitrate+nitrite, the sample bottles will not have a sulfuric acid preservative. When sulfuric acid preservative is added to a sample, only nitrate+nitrite concentrations can be measured and not individual concentrations of nitrate or nitrite.

Considerations for selecting a lab from Table 2 should include price, logistics in delivering or shipping samples to the lab within 45 hours of collection, and EDD availability.

3.0 SAMPLING PROTOCOLS

Before mobilizing to the field, consult data collected during the Field Verification survey for information regarding well access. Note and meet any access notice requested by the well owner or operator. It is also important that a member of the sampling team can communicate effectively with well owners who are Spanish speakers.

Samples may be collected from either pre-existing, privately-owned supply wells, or project-specific monitoring wells. Sampling methods for both well types are given below.

3.1 WATER QUALITY METER CALIBRATION

Water quality instruments will be used to measure pH, electrical conductivity, temperature, and dissolved oxygen in the field during sampling. Flow through cells and multi-parameter meters are preferred; however, it may not be practical to use flow through cells at domestic and irrigation wells because unknown fittings may be required. In those cases, single-use CHEMetrics CHEMets may be used to measure dissolved oxygen.

Water quality instruments will be calibrated at the beginning (prior to sampling) and middle of each sampling day for pH and electrical conductivity following manufacturer's instructions. Readings will also be taken at the end of the day to evaluate drift.

Rented multi-parameter meters should be calibrated for dissolved oxygen by the rental company prior to delivery to the sampling team. Purchased multi-parameter meters should be calibrated for dissolved oxygen in the office prior to the sampling event. At the beginning (prior to sampling), middle, and end of each sampling day, partially fill the manufacturer supplied calibration cup or sensor storage container with enough tap water to submerge the dissolved oxygen sensor. Cap the cup/container and shake it up to aerate the water. Install the dissolved oxygen probe and record the reading, it should be about 10-12 mg/L if the probe is well calibrated. If not, all dissolved oxygen readings should be J-flagged in the field notes. The relative values will be useful to monitor stabilization; however, the absolute values will not be accurate. Alternatively, CHEMets may be used, which do not require calibration.

Calibration data will be recorded in the field notes. An example Field Instrument Calibration Form is presented in Appendix A.

3.2 WATER SUPPLY WELL SAMPLES FROM SPIGOTS

The following tasks will be performed at each domestic, irrigation, and water supply well to be sampled. An example Groundwater Monitoring – Supply Well Sampling Field Form is presented in Appendix A. Field forms or notebooks should be weather-resistant (e.g. Rite in the Rain paper).

1. Confirm that water quality instruments have been calibrated according to the schedule presented in Section 3.0.
2. Record date, time, Ecology well ID, well owner and number where applicable (e.g. City of Sunnyside Well #10), appearance and condition of the wellhead, and weather conditions.
3. Groundwater samples should be collected from a sampling port on the well or the nearest tap to the wellhead and upstream of any tank or treatment device. Any tank or treatment device upstream of the sampling location should be noted on the field form. The well owner should observe and approve of modifications and operations.
4. Inspect the sampling port to assess if it is possible to connect a flow through cell with available fittings. If so, open the spigot and allow water to run for approximately 1 minute to flush out any particulates. If sampling in a well house, this water may be collected in buckets. Close the spigot and connect the flow through cell outfitted with a calibrated multi-parameter meter. If it is not possible to connect a flow through cell with available fittings, record in field notes what additional fittings would be required for future sampling events.
5. Start purging the well by opening the spigot. Record the time purging began in the field notes. Purge water should be routed to the ground or a floor drain. A length of polyethylene (PE) tubing (typically 1/2 by 3/8 inch diameter) and female threaded metal clamp hose may be used if necessary to route water outside well houses to ground surface. The pump should be running when samples are collected, even

though a pressure tank could cause the sampling port to flow even when the pump is off.

6. Record the make/model of water quality instrument(s) in the field notes. During purging, monitor the following field parameters at regular intervals (2 to 5 minutes): temperature, pH, specific conductivity, and dissolved oxygen. Record the time and measurements in the field sheets. Also note on field sheets any observed color or odor in purge water.

7. Continue purging until field parameters have stabilized according to:

   - pH: ± 0.1 standard units
   - Specific conductance: ±10.0 umhos/com for values less than 1,000 umhos/cm, or ±20 umhos/cm for values greater than 1,000 umhos/cm
   - Dissolved oxygen if using a probe (multi-parameter meter): ±0.05 mg/L for values less than 1 mg/L, or ±0.2 mg/L for values greater than 1 mg/L
   - Dissolved oxygen if using CHEMets: ±0.1 mg/L for values less than 1 mg/L, or ±1 mg/L for values greater than 1 mg/L
   - Temperature: ±0.1 degree C

8. After field parameters have stabilized, disconnect the flow through cell and any tubing or hose used to route purge water to the ground. If the sampling port is located inside a well house, a 5-gallon bucket may be required to capture discharge water during sampling if a floor drain is not nearby.

9. Record unique well ID, sample date and time, and sampler's initials on each sample container, in the field notes, and on the Chain-of-Custody. Samples will be labeled in accordance with criteria described in Section 3.3. Bottles should not be filled until they are labeled.

10. Collect samples of water directly from the sampling port into laboratory-supplied containers for parameters listed in Table 1. The pump should be running when samples are collected. Do not use intermediate containers or vessels. Hands and clothing shall be clean when handling sampling equipment. Wear clean, disposable, latex gloves when filling bottles for analyses and change gloves between sampling locations. If it is necessary to set the bottle cap down during sampling, place it cap side up on a clean sheet of plastic or clean plastic storage bag (e.g. sandwich bag). Collect samples in the following manner:

    - Nitrate and nitrite: fill laboratory provided bottle to the top
    - Ammonia and Total Kjedahl Nitrogen (TKN): fill laboratory provided bottle to the neck of the bottle, but *do not overfill*. Bottles for these analyses are provided by the lab containing preservative that should not be washed out by dumping or overfilling.

11. Collect QA/QC samples according to Appendix B in the manner described in Step 7.
12. Turn off sampling port.
13. Place sample bottles in a clean plastic bag and place the bag in a clean, insulated container (ice chest or cooler) containing frozen gel ice or wet ice to maintain sample temperatures at approximately 6 degrees Celsius, but not at or below, freezing. Double bag ice to prevent leakage during shipping. Use sufficient cooling materials to maintain sample temperature near 6 degrees Celsius during the entire time of transport to the lab.
14. Restore any objects at the wellhead that may have been disturbed during sampling. Obtain owner approval that conditions are satisfactory prior to departure. In winter, special procedures for start-up and shut-down will likely be required to protect equipment.
15. Maintain custody of samples from time of sampling to receipt at the laboratory. "Custody" means that samples remain:
    - In direct possession of a person who is recorded on the Chain-of-Custody form, or
    - Locked in secure vehicles or offices

Complete the Chain-of-Custody forms and any other pertinent sampling/shipping documentation to accompany the samples.

Ship or deliver samples to the selected Washington State accredited chemical laboratory, accompanied by Chain-of-Custody forms and any other pertinent shipping/sampling documentation. One set of Chain-of-Custody forms will be used per laboratory shipment.

In order to meet holding times, samples must be received by the lab less than 45 hours from the time they were collected.

3.3 MONITORING WELL SAMPLING

The following tasks will be performed at each water-table monitoring well to be sampled. An example Monitoring Well Sampling Field Form is presented in Appendix A.

1. Record date, time, unique well ID, appearance and condition of the wellhead, and weather conditions.
2. Measure and record static water level to the nearest 0.01 foot using a decontaminated electric well sounder. Well sounders shall be decontaminated by rinsing the length of the sounder that will be submerged in the well with distilled water prior to each use. Water level measuring points (top of PVC well casing) will be permanently marked on each well.
3. Install sampling pump.
    - If the depth to water is less than 25 feet, a peristaltic pump may be used to collect the sample. Wearing clean, disposable gloves, lower new, clean, ¼ inch diameter

PE tubing or dedicated[1] ¼ inch diameter PE tubing into the well until the bottom of the tubing is below the water surface and within the well screen. Attach the top of the tubing to approximately 6 to 9 inches of silicone tubing and mount the silicone tubing in the peristaltic pump head. Attach approximately 2 feet of ¼ inch diameter PE tubing to the other end of the silicone tubing – this will be the sampling point. Confirm the pump rotation is set to lift water from the well.

- If the depth to water is greater than 25 feet, a portable or dedicated submersible pump should be used to collect the sample. Confirm with the distributor, manufacturer, or rental company that the pump has adequate lift for the anticipated depths to water. Wearing clean, disposable gloves, attach new, clean, PE tubing or dedicated PE tubing to the top of the pump motor and secure with a zip tie, hose clamp, or similar. Lower the pump until the intake is below the water surface and within the well screen. At the wellhead or ground surface, secure the electrical line of the pump so it does not slip during sampling. Attach the pump to the control box (if applicable), and power source.

4. If using a flow through cell, install the multi-parameter meter in the flow through cell and connect the pump discharge line to the inlet on the bottom of the cell. Connect a discharge line from outlet of the flow through cell of sufficient length to reach the discharge bucket.
5. Remove gloves and start the pump. Low-flow purge techniques will be used, with flow rates being less than 1.0 liters/minute (0.25 gallons per minute) to minimize drawdown and disturbance of sediment. Calculate flow rates using a stop-watch and calibrated vessel (e.g. kitchen measuring cup), adjust flow rates as necessary using the peristaltic pump speed dial, submersible pump control box speed dial, or a decontaminated PVC valve installed in the submersible pump discharge line. Discharge water into a 5-gallon bucket or similar that can be used to estimate purge volume. Filled buckets may be discharged to ground near the wellhead.
6. Record the make/model of water quality instrument(s) in the field notes. During purging, monitor the following field parameters at regular intervals (e.g. 2 to 5 minutes or every 0.5 gallons): temperature, pH, specific conductivity, dissolved oxygen, depth to water, estimated purge volume, and purge rate. Record the time and measurements in the field sheets. Also note on field sheets any purge water color or odor.
7. Continue purging until field parameters have stabilized according to:
   - pH: ± 0.1 standard units
   - Specific conductance: ±10.0 umhos/com for values less than 1,000 umhos/cm, or ±20 umhos/cm for values greater than 1,000 umhos/cm
   - Dissolved oxygen if using a probe (multi-parameter meter): ±0.05 mg/L for values less than 1 mg/L, or ±0.2 mg/L for values greater than 1 mg/L. If using CHEMets: ±0.1 mg/L for values less than 1 mg/L, or ±1 mg/L for values greater than 1 mg/L
   - Temperature: ±0.1 degree C

[1] "dedicated" devices are those permanently installed (left in the wells between sampling rounds).

8. Record unique well ID, sample date and time, and sampler's initials on each sample container, in the field notes, and on the Chain-of-Custody. Samples will be labeled in accordance with criteria described in Section 3.3. Bottles should not be filled until they are labeled.

9. Hands and clothing shall be clean when handing sampling equipment. Wear clean, disposable, latex gloves when filling bottles for analyses and change gloves between sampling locations. Wearing gloves, disconnect the pump discharge line from the flow through cell. Collect samples of water directly from the discharge line into laboratory-supplied containers for parameters listed in Table 1. Do not use intermediate containers or vessels. If it is necessary to set bottle caps down during sampling, place the caps side up on a clean sheet of plastic or clean plastic storage bag (e.g. sandwich bag). Collect samples in the following manner:

    - Nitrate and nitrite: fill laboratory provided bottle to the top
    - Ammonia and Total Kjedahl Nitrogen (TKN): fill laboratory provided bottle almost to the neck, but do not overfill (see photo in Section 3.1). Bottles for these analyses are provided by the lab containing preservative that should not be washed out by dumping or overfilling.

10. Collect QA/QC samples according to Appendix B in the manner described in Step 9.

11. Turn off the pump.

12. Bag sample bottles in a clean plastic bag and place the bag in a clean, insulated container (ice chest or cooler) containing frozen gel ice or wet ice to maintain sample temperatures at approximately 6 degrees Celsius, but not at or below, freezing. Double bag ice to prevent leakage during shipping. Use sufficient cooling materials to maintain sample temperature near 6 degrees Celsius during the entire time of transport to the lab.

13. Remove non-dedicated equipment (e.g. submersible pump) from the well[2]. Dedicated peristaltic or submersible pump tubing may be stored in the well between sampling events provided the tubing is at least the length of the well casing (i.e. can be reached by hand if bottom of tubing rests on bottom of well). Alternately, dedicated pump tubing may be stored in labeled, clean, plastic bags. Secure, and lock the monitoring well.

14. Decontaminate non-dedicated submersible pumps, in-line flow valves, and water level sounders according to the following methods. Peristaltic pumps do not come in direct contact with purge or sampling water and therefore do not require decontamination:

    - Fill a clean bucket with sufficient distilled water to submerge the pump motor and intake and pour in approximately 1 ¼ ounces (or 2.5 tablespoons) per gallon of water of Liquinox™ or similar liquid detergent.

[2] For certain types of submersible pumps (e.g. Grundfos RediFlo 2™), it is often easiest and most effective to decontaminate the electrical line as the pump is being removed from the well, especially with a two-person sampling team. Soak heavy paper towel in a distilled water and Liquinox™ (or similar) solution (See Step 14) and grasp the electrical line in the paper towel with the hand closest to the well. Soak another heavy paper towel in distilled water and grasp the electrical line in the paper towel with the hand farthest away from the wellhead. Have the second team member pull up the pump. Re-soak or replace paper towels as necessary.

- One at a time, scrub the outside of the pump motor, pump electrical line (if not decontaminated during removal), in-line flow valve, and water level sounder (full length placed in the well) in the detergent solution using a clean nylon brush. Pour the detergent solution through the in-line flow valve.
- With the pump intake submerged, turn the pump on to run detergent solution through the pump.
- Rinse the outside of the pump motor, pump electrical line (if not decontaminated during removal), in-line flow valve, and water level sounder thoroughly with distilled water.
- Fill a second clean bucket with sufficient distilled water to submerge the pump motor and intake. Turn the pump on to rinse distilled water through the pump.
- Place decontaminated field equipment in clean bags or tote boxes for transport between stations.

15. Maintain custody of samples from time of sampling to receipt at the laboratory. "Custody" means that samples remain:
    - In direct possession of a person who is recorded on the Chain-of-Custody form, or
    - Locked in secure vehicles or offices

Complete the appropriate Chain-of-Custody forms and any other pertinent sampling/shipping documentation to accompany the samples.

Ship or deliver samples to the selected Washington State accredited chemical laboratory, accompanied by Chain-of-Custody forms and any other pertinent shipping/sampling documentation. One set of Chain-of-Custody forms will be used per laboratory shipment.

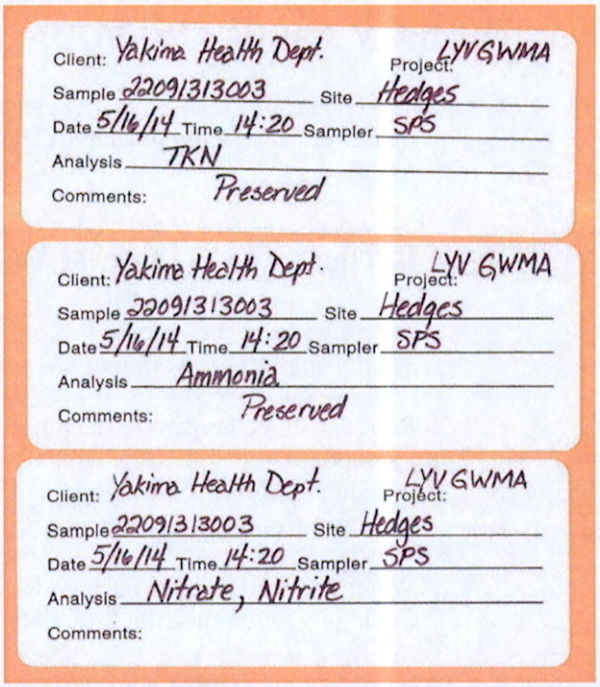
In order to meet holding times, samples must be received by the lab less than 45 hours from the time they were collected.

3.4 SAMPLE LABELING SYSTEM

Sample bottles will be provided and preserved by the analytical lab(s) chosen for the project. All containers will be clearly labeled in the field with indelible ink, **prior to filling**. Each sample container will be identified with the following information:

- Project (e.g. "LYV GWMA")
- Client/Entity analytical invoice will be submitted to (e.g. "Yakima County Health Department")

- Well ID (or QA/QC nomenclature)
- Well Owner name or Water System name and well name (e.g. "Hedges" or "Sunnyside Well 10")
- Initials of sampler (e.g. "SPS")
- Date and time of sample collection using the 24 hour time system (e.g. "5/16/14 14:20")
- Comments regarding bottle preservation, field filtering



Example labels for one sample (3 bottles) are shown to the right. Note that these labels are presented as examples for the type of information to be included only. The actual lab(s) used for the GWMA Groundwater Monitoring program may group analyses into bottles differently than presented.

3.5 SAMPLING SCHEDULE

Sampling schedule should be established following identification of the Groundwater Monitoring well network.

As described in the *Potential Groundwater Stations* report (PGG, 2013), results of approximately 1,000 nitrate and nitrate-related samples are estimated to be required to meet the objective of measuring basin-wide averages at a level of confidence that supports use of the data for future GWMA purposes. Therefore, the sampling frequency is dependent on the number of wells in the Groundwater Monitoring well network.

3.6 WELL NETWORK

The monitoring well network should be established following completion of the Field Verification survey currently being performed by the Yakima County Health Department.

The final Groundwater Monitoring Plan will identify network wells in a table, present the well locations in a figure(s), and provide background of how the network was established.

4.0 QUALITY ASSURANCE/QUALITY CONTROL

The Quality Assurance/Quality Control program is presented in Appendix B and identifies data quality objectives, quality control checks, and data validation and usability.

5.0 REPORTING AND DATA MANAGEMENT

Reporting frequency should be established following identification of the Groundwater Monitoring well network and sampling schedule.

Reports will be prepared to summarize data, update trend and other statistical analysis as appropriate, estimate basin-wide average concentrations as appropriate, identify data gaps or redundancies in the network, and present recommendations for adjustments to the monitoring program.

Water quality data associated with this Groundwater Monitoring Plan will be uploaded to Ecology's Environmental Information Management (EIM) System.

6.0 REFERENCES

Pacific Groundwater Group, 2013. Potential Groundwater Monitoring Stations Yakima Groundwater Management Area. Consultant's report prepared for HDR, Inc., Yakima County, and Lower Yakima Valley Groundwater Advisory Committee. December 3, 2013.

Washington State Department of Ecology, n.d. Lab Search. https://fortress.wa.gov/ecy/laboratorysearch/Default.aspx. Web. February 10, 2014

Washington State Department of Ecology, n.d. Methods and Analytes table. http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html. Web. September 4, 2013.

Table 1. Water Quality Parameters of Concern, Analytical Methods, and Project MCLs

Table 1a. Lab Analyzed Parameters

Parameter	Recommended Analytical Method	Alternative Analytical Methods	Preservative	Holding Time	Bottle Type	GWMA Project MCLs [2]	PQL Goal [3]
Ammonia-N	EPA 350.1	EPA 349.0 / USGS 1-3520-85 / SM4500-NH3 C, D, E, F, G, H, or I / ASTM D1426-08 or -98A / ASTM D 6919-03	H2SO4	28 days	Lab Provided	Not Established	0.3 mg/L or lower
Nitrate	EPA 353.2[1]	EPA 300.0 / SM 4110 B / SM 4500-NO3 B, D, E, F, H, or I		48 hours	Lab Provided	10 mg/L	1 mg/L or lower
Nitrite	EPA 353.2[1]	EPA 300.0 / SM 4500-NO2 B / SM 4110 B / SM 4500-NO3 F or I		48 hours	Lab Provided	1 mg/L	0.1 mg/L or lower
Sum of organic nitrogen + ammonia + ammonium (Total Kjeldahl Nitrogen, TKN)	SM 4500-Norg D	EPA 351.1 / EPA 351.2 / SM 4500-Norg B or C / ASTM D1426-93B	H2SO4	28 days	Lab Provided	Not Established	1 mg/L or lower

[1] Method may be used to determine nitrate+nitrite, nitrite, or nitrate. Nitrate and nitrite (individually) are parameters of concern for this study, while nitrate+nitrite is not. No preservative is used when individually measuring nitrate or nitrite concentrations, and therefore the holding time is 48 hours. If H2SO4 preservative is used the holding time is extended to 28 days, but only nitrate+nitrite concentrations can be measured and not individual nitrate or nitrite concentrations.

[2] As presented in Groundwater Monitoring Quality Assurance/Quality Control Plan Lower Yakima Valley GWMA Initial Characterization.

[3] Practical Quantitation Limits/Lab Reporting Limits for these methods are determined by individual labs. Practical Quantitation Limits/Lab Reporting Limits must be 10-percent of Project MCLs or lower for nitrate and nitrite. PQL Goals for Ammonia and TKN based on the maximum PQL among 6 accredited labs located in Eastern Washington based on June 27, 2014 survey

Analytical Methods consistent with Ecology's Methods and Analytes Table at: http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html

Discrepancies between Preservation/Holding Time between this table and the Analytical Methods should be resolved in favor of the Analytical Method

Table 1b. Field Parameters

Parameter	Meter	Stabilization Criteria
pH	Water Quality Meter	±0.1 standard units
Specific Conductance	Water Quality Meter	±10 umhos/cm for values <1,000 umhos/cm; ±20 umhos/cm for values >1,000 umhos/cm
Temerature	Water Quality Meter	±0.1 degrees Celsius
Dissolved Oxygen	Water Quality Meter or CHEMets™	Water Quality Meter: ±0.05 mg/L for values <1mg/L; ±0.2 mg/L for values > 1mg/L CHEMets™: ±0.1 mg/L for values < 1 mg/L; ±1 mg/L for values > 1 mg/L

Table 2. Ecology Accredited Labs for GWMA Parameters of Concern*

Analytical Lab Name	City	State	Phone	Accreditation No.	Accredited GWMA Parameters of Concern			
					Ammonia	Nitrate	Nitrite	TKN
AAA Laboratory	Cheney	WA	(509) 235-9390	C576-13	X	X	X	X
ALS Environmental - Kelso	Kelso	WA	(360) 577-7222	C544-13a	X	X	X	X
AmTest Laboratories	Kirkland	WA	(425) 885-1664	C554-13	X	X	X	X
Analytical Resources, Incorporated	Tukwila	WA	(206) 695-6205	C558-13b	X	X	X	X
Anatek Labs, Inc. - Spokane	Spokane	WA	(509) 838-3999	C585-13	X	X	X	X
Aquatic Research, Inc.	Seattle	WA	(206) 632-2715	C550-13	X	X	X	X
Archer Analytical	Richland	WA	(509) 375-6147	C872-13	X	X	X	X
Avocet Environmental Testing	Bellingham	WA	(360) 734-9033	C602-13	X	X	X	X
Benton-Franklin Health District Lab	Kennewick	WA	(509) 460-4206	H408-13	X	X	X	X
Cascade Analytical, Inc. - Wenatchee	Wenatchee	WA	(509) 662-1888	C564-13	X	X	X	X
Centric Analytical Labs, LLC	Port Orchard	WA	(509) 844-6597	C1003-13a	X	X	X	X
Dragon Analytical Laboratory, Inc	Olympia	WA	(360) 866-0543	C890-13	X	X	X	X
Edge Analytical, Incorporated	Burlington	WA	(800) 755-9295	C567-14a	X	X	X	X
Everett Environmental Laboratory	Everett	WA	(425) 257-8230	M667-13	X	X	X	X
Mukang Labs, Inc.	Pasco	WA	(509) 544-2159	C914-13	X	X	X	X
Soiltest Farm Consultants, Inc. Laboratory	Moses Lake	WA	(509) 765-1622	C605-13	X	X	X	X
Spectra Analytical, Inc.	Tacoma	WA	(253) 272-4850	C575-13a	X	X	X	X
Tshimakain Creek Laboratories	Spokane	WA	(509) 928-3577	T975-13	X	X	X	X
Twiss Analytical Laboratories, Inc.	Poulsbo	WA	(360) 779-5141	C594-13	X	X	X	X
Valley Environmental Laboratory	Yakima	WA	(509) 575-3999	C862-13	X	X	X	X
Water Management Laboratories, Inc.	Tacoma	WA	(253) 531-3121	C546-13	X	X	X	X
Weyerhaeuser Analysis & Testing	Federal Way	WA	(253) 924-4294	C551-13	X	X	X	X
Anatek Labs, Inc. - Moscow	Moscow	ID	(208) 883-2839	C595-13a	X	X	X	X
APPL, Incorporated	Clovis	CA	(559) 275-2175	C790-13	X	X	X	X
BSK Associates	Fresno	CA	(559) 497-2888 Ext.125	C997-13b	X	X	X	X
CH2M Hill Applied Sciences Laboratory - Corvallis	Corvallis	OR	(541) 768-3111	C556-13	X	X	X	X
Environmental Science Corporation	Mt. Juliet	TN	(615) 758-5858	C847-13	X	X	X	X
Eurofins Lancaster Laboratories, Inc.	Lancaster	PA	(717) 556-7327	C457-13	X	X	X	X
GEL Laboratories, LLC	Charleston	SC	(843) 556-8171	C780-13	X	X	X	X
Pace Analytical Services, Inc. - Billings	Billings	MT	(612) 607-1700	C993-13	X	X	X	X
Pyxis Laboratories LLC	Portland	OR	(503) 254-1794	C924-13	X	X	X	X
Specialty Analytical	Clackamas	OR	(503) 612-9007	C804-13	X	X	X	X
SVL Analytical, Incorporated	Kellogg	ID	(208) 784-1258	C573-13	X	X	X	X
TestAmerica Denver	Arvada	CO	303-736-0116	C583-13	X	X	X	X
TestAmerica Nashville	Nashville	TN	(615) 301-5759	C789-13	X	X	X	X

*As downloaded from Ecology's Lab Search Website February 10, 2014. https://fortress.wa.gov/ecy/laboratorysearch/Default.aspx

K:\PONY\Yakima Basin GWMA\GIS\mxds\GWMA_bndy_updated.mxd 2/14/2014

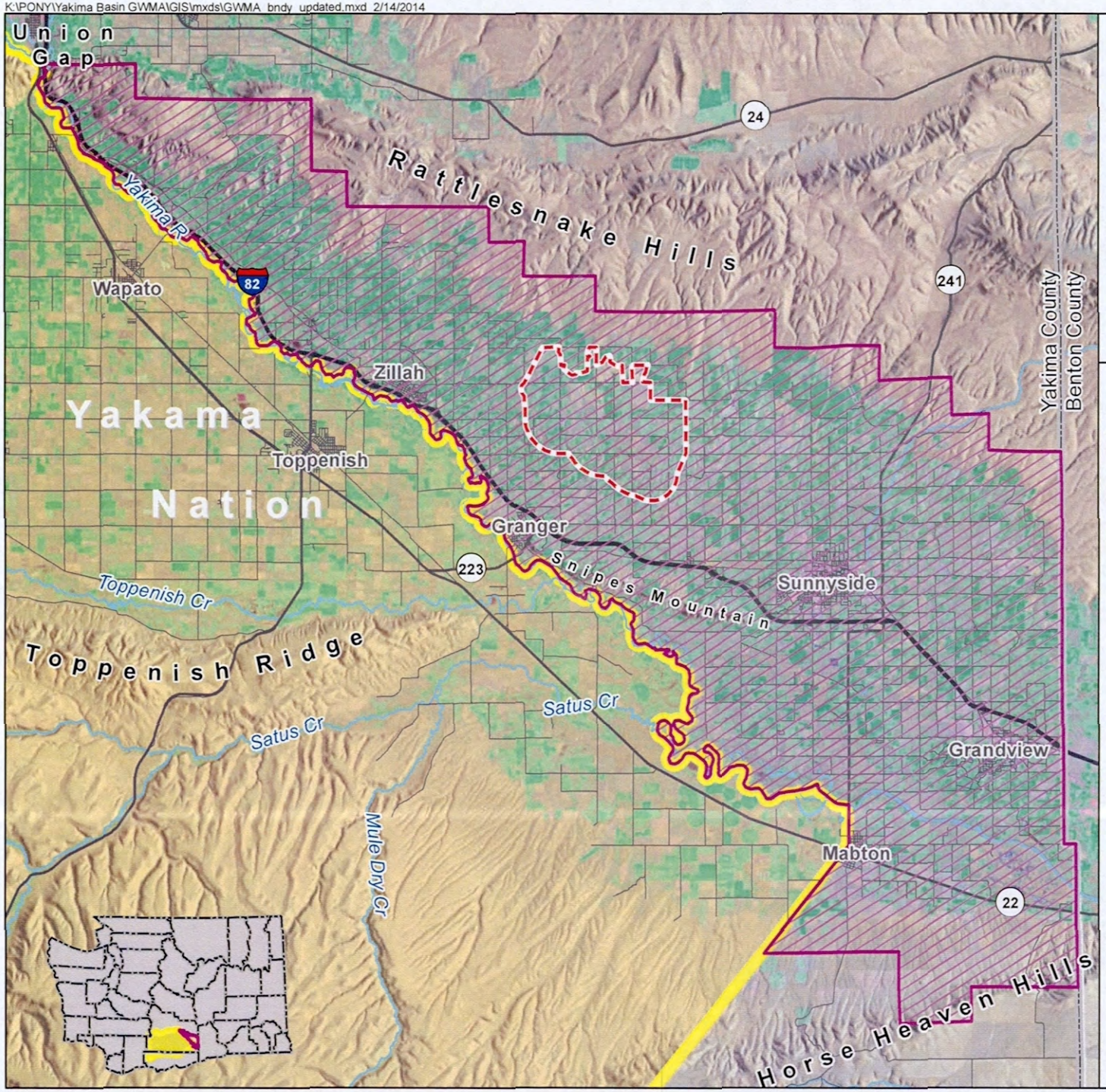


Figure 1

Lower Yakima Valley Groundwater Management Area Groundwater Monitoring Study Area

DRAFT

PgG

GWMA Boundary

EPA Dairy Cluster Buffer Boundary

Yakama Nation Boundary (from Yakima County)

N

0 Miles 5

Image derived from Landsat 7 data (1999 - 2002)

APPENDIX A
EXAMPLE FIELD SAMPLING AND INSTRUMENT CALIBRATION FORMS

Lower Yakima Valley Groundwater Management Area

Supply Well Sampling Field Form

Date: _____ Weather: _____

Sampler: _____

Well ID:	Well Owner/System Name and Well Name:

Wellhead Condition: _____

_____

Sampling Point Description: _____

_____

Time Spigot Turned On: _____

Water Quality Meter(s): _____

Time	Temp Circle:C/F	pH	Ec umhos/cm	Diss. Ox mg/L	Comments (odor, color, bubbles, etc.)

Sample Date/Time: _____

Analytical Lab: _____

Number of Unpreserved Bottles Collected (Nitrate, Nitrite): _____

Number of Preserved Bottles Collected (Ammonia, TKN): _____

Lower Yakima Valley Groundwater Management Area

Monitoring Well Sampling Field Form

Date: _____ Weather: _____

Sampler: _____

Well ID:	Wellhead Condition:

Well Diameter (circle): 2 inch (gal/ft factor = 0.17) 4 inch (gal/ft factor = 0.65)

Total Well Depth (TD) in feet below measuring point (ft bmp): _____

Depth to Water (DTW) ft bmp: _____

Height of Water (h) [calculate by TD-DTW] ft: _____

One Casing Volume [calculate by h x gal/ft factor from Well Diameter] gal: _____

Purge Volume [calculate by One Casing Volume x 3] gal: _____

Pumping Method (circle): Peristaltic / Submersible (specify type): _____

Water Quality Meter(s): _____

Time	Volume gallons	Temp Circle:C/F	Ec umhos/cm	pH	Diss. Ox mg/L	DTW ft bmp	Rate mL/min	Comment
Table continued on page 2 (circle): Yes / No								

Sample Date/Time: _____

Analytical Lab: _____

Number of Unpreserved Bottles Collected (Nitrate, Nitrite): _____

Number of Preserved Bottles Collected (Ammonia, TKN): _____

Monitoring Well Sampling Field Form Continued...

Well ID:	Wellhead Condition:

Time	Volume gallons	Temp Circle:C/F	Ec uS/cm	pH	Diss. Ox mg/L	DTW ft bmp	Rate mL/min	Comment

Lower Yakima Valley Groundwater Management Area

Field Instrument Calibration Form

Date: _____

Start of Day

Time: _____ Field Staff: _____

	Standard	Reading	Adjusted To
pH	4.00		_____
pH	7.00		_____
Ec (umhos/cm)	1413		_____
Diss Ox	Aerated Water	_____	NA (see text)

Mid Day

Time: _____ Field Staff: _____

	Standard	Reading	Adjusted To
pH	4.00	_____	_____
pH	7.00	_____	_____
Ec (umhos/cm)	1413	_____	_____
Diss Ox	Aerated Water	_____	NA (see text)

End of Day

Time: _____ Field Staff: _____

	Standard	Reading
pH	4.00	_____
pH	7.00	_____
Ec (umhos/cm)	1413	_____
Diss Ox	Aerated Water	_____

APPENDIX B
GROUNDWATER MONITORING QUALITY ASSURANCE/QUALITY CONTROL PLAN
LOWER YAKIMA VALLEY GWMA INITIAL CHARACTERIZATION

GROUNDWATER MONITORING
QUALITY ASSURANCE/QUALITY CONTROL PLAN
LOWER YAKIMA VALLEY GWMA
INITIAL CHARACTERIZATION

September 16, 2013
Revised August 15, 2014

GROUNDWATER MONITORING QUALITY ASSURANCE/QUALITY CONTROL PLAN LOWER YAKIMA VALLEY GWMA INITIAL CHARACTERIZATION

Prepared for:

Yakima County
128 N. Second Street
Yakima, Washington 98901

Prepared by:

Pacific Groundwater Group
2377 Eastlake Avenue East, Suite 200
Seattle, Washington 98102
206.329.0141
www.pgwg.com

September 16, 2013 Revised August 15, 2014
JE1308
FinalQAQCPlan-v081514

TABLE OF CONTENTS

TABLES

FIGURES

QA/QC APPROVALS

This Groundwater Monitoring QA/QC Plan, developed September 16, 2013 for the Lower Yakima Valley Groundwater Management Area, has been reviewed and approved by the undersigned. Copies of the completed and signed QA/QC Plan shall be distributed to the undersigned and all field personnel.

Lower Yakima Valley Groundwater Management Committee	Date
Project Manager	Date
Analytical Lab Project Manager	Date
QC Coordinator	Date
Field Manager	Date

This Groundwater Monitoring Quality Assurance/Quality Control Plan has been prepared as an appendix to the forthcoming Groundwater Monitoring Plan, which has an anticipated publication date of March 2014. References to the Groundwater Monitoring Plan within this appendix should be understood as information that will be available in the future.

Project Background, Project Objectives, Scope of Work, and Sampling Protocols will be detailed in the Groundwater Monitoring Plan and are not included herein.

This work was performed under HDR contract #CON0082545 and partially fulfills scope Item 1a. The QA/QC Plan was prepared in accordance with hydrogeologic practices generally accepted at this time in this area, for the exclusive use of the Lower Yakima Valley Groundwater Advisory Committee and HDR, for specific application to the Initial Characterization. No other warranty, express or implied, is made.

1.0 INTRODUCTION

This Quality Assurance/Quality Control (QA/QC) Plan has been developed as an appendix to the Groundwater Monitoring Plan for the Lower Yakima Valley Groundwater Management Area (GWMA) Initial Characterization. The QA/QC Plan has been prepared in general accord with U.S. Environmental Protection Agency (EPA) (EPA, 2002) and Washington State Department of Ecology (Ecology) (Ecology, 2004) guidelines and specifications. This document addresses:

- Data Quality Objectives for stations (groundwater quality sampling stations) and analytical data
- Quality Control Checks for field and laboratory
- Analytical methods
- Data Validation and Usability

While this QA/QC Plan is intended to be comprehensive, revisions and/or amendments may be required as the project evolves. Descriptions of the project background, project objectives, scope of work, and field protocols are provided in the Groundwater Monitoring Plan.

1.1 OBJECTIVE

The Initial Characterization will be developed from existing water quality data collected during previous investigations, and future water quality data that will be collected as described in the Groundwater Monitoring Plan. The Initial Characterization will be used by the Groundwater Advisory Committee (GWAC) to make administrative decisions and policy recommendations; therefore, the data inputs must be reliable and defensible. This QA/QC Plan defines the quality of data necessary for various uses within the Initial Characterization.

"Core data" as used in this project is the information that Pacific Groundwater Group recommended for inclusion in the project database related to groundwater quality samples (PGG, 2013). These data include analytical and field test results for parameters of concern (Section 1.2), station location, and well construction information.

QA/QC data for the project consists of information that documents the accuracy and precision of the analytical results. Each analytical batch should have associated QA/QC data, which may include results of method blanks, laboratory replicates, and field duplicates. QA/QC data, where available, will also be uploaded to the project database for the parameters of concern.

Data Quality Objectives (DQO) for the project are described in Section 2.0 of this QA/QC Plan. Station DQOs will be used to evaluate lateral and vertical distribution of the sampling network and to evaluate potential bias that could be introduced from treatment or wells with poor surface seals. Analytical DQOs will be used to evaluate representativeness, precision, and potential bias from sampling or lab artifacts. Stations

and analytical sets that do not meet DQOs may be qualified or considered unacceptable for some or all project needs.

1.2 PARAMETERS OF CONCERN AND PROJECT MCLS

As described in the Groundwater Monitoring Plan, the GWMA was formed in response to elevated nitrate concentrations in groundwater in Lower Yakima Valley. The boundaries of the GWMA are presented in Figure 1. The concentrations of nitrate detected in groundwater indicate impact by human activity and may pose significant risk to human health in localized areas. The GWMA was formed with the stated purpose of reducing nitrate concentrations in groundwater to below drinking water standards.

Based on previous investigations and the GWMA's purpose, the parameters of concern for this study are:

- Nitrate
- Nitrite
- Ammonia-nitrogen
- Sum of organic nitrogen + ammonia + ammonium (Total Kjeldahl Nitrogen)

These parameters are a subset of inorganic parameters that are referred to as conventionals. Recommended and alternative analytical methods and holding times (from sample collection to analysis) are summarized in Table 1. The analytical method list in Table 1 was derived from Ecology's *Methods and Analytes Table* on their environmental lab accreditation website (Ecology, n.d.). The recommended analytical methods meet the PQL requirements, are common analytical methods, and have frequently been used by PGG in characterization studies. Alternative analytical methods are listed so that multiple labs (which may use acceptable but different methods of analysis from the recommended methods) could be contracted to analyze the parameters of concern. If there are discrepancies regarding preservation or holding time between Table 1 and the analytical method, the analytical method shall be considered correct. Since nitrate and nitrite are being analyzed individually, rather than combined as nitrate+nitrite, the sample bottles will not have a sulfuric acid preservative. When sulfuric acid preservative is added to a sample, only nitrate+nitrite concentrations can be measured and not individual concentrations of nitrate or nitrite.

Method detection limits (MDLs) are the minimum concentration of an analyte that can be identified, measured, and reported with 99 percent confidence that the analyte concentration is greater than zero. Analytical methods may specify MDLs or may describe procedures for establishing MDLs. Practical Quantitation Limits (PQLs) or lab Reporting Limits are the minimum concentration of an analyte that can be reliably achieved during routine laboratory operating conditions within specified limits of precision and accuracy. PQLs and Reporting Limits are greater than MDLs and are statistically determined by individual labs. Because the analytical labs for this project have not been identified, PQLs and lab Reporting Limits cannot be specified in this QA/QC Plan. PQLs and lab Reporting Limits must be 10-percent or less of the GWMA Project Maximum Contaminant Levels (MCLs) defined below for nitrate and nitrite. Because MCLs are not established for ammonia and TKN, PQL Goals are presented for

these parameters in Table 1 based on a June 27, 2014 survey of six accredited labs in eastern Washington.

Water quality standards or criteria established by regulatory agencies will be used to evaluate analytical results for the parameters of concern listed above. Standards applicable to the GWMA groundwater studies are EPA MCLs, Washington State Public Water Supply MCLs (WAC 246-290-310), and Washington State Groundwater Quality Criteria (WAC 173-200-050). Established standards for the GWMA parameters of concern are generally consistent between these regulations (Table 2). GWMA Project MCLs are based on the most stringent relevant regulatory water quality standards and are summarized in Table 2.

Water quality standards have not been established for ammonia-nitrogen or the sum of organic nitrogen + ammonia + ammonium under the regulations cited above; however, these analytical results may be useful for trend evaluation and for understanding nitrogen speciation.

2.0 DATA QUALITY OBJECTIVES

DQOs are qualitative and quantitative criteria established to limit uncertainty in analytical results. They are established to create analytical data sets that will support the study objectives. It is important to meet DQOs in order to produce analytical results that are considered defensible and reliable.

2.1 STATION DATA QUALITY OBJECTIVES

"Station Metadata" for this project refers to physical and access details about sampling stations, including the station location, owner and/or tenant name and contact information, well construction, and sampling point. Station DQOs will be used to:

- Understand the lateral distribution of the stations
- Understand what aquifer system (e.g. shallow or deep) the stations represent
- Understand potential bias in samples from surface contamination
- Understand potential bias in samples from treatment
- Identify stations for long-term monitoring consideration

A decision tree for evaluating Station Metadata against DQOs is presented in Figure 2. The DQOs may be used to evaluate those stations acceptable for Data Gap and Trend Analyses, and those acceptable for Long-Term Monitoring.

Data Gap and Trend Analyses DQOs. Station location and indications of completion depth and surface seals for wells are the DQOs for a station to be considered for Data Gap and Trend Analyses. Locations must be available by either coordinates in a known datum (preferred) or by a current parcel number. Station location information may be refined during field work. For wells, documented depth information must be available either for the open interval (preferred) or for the total depth of the well. Well depth

should be documented on a well log, video log, maintenance log, pump installation records, or similar means of documentation. An owner's recollection of total depth will not be considered valid documentation. An adequate surface seal should be documented in a well log. If no well log is available, field tests may be used to confirm the presence of seal material; however, field tests cannot confirm that the depth of the surface seal is adequate. Therefore, professional judgment shall be used to decide whether a well with a positive field test for the presence of a surface seal be advanced through the decision tree. A primary factor to consider is how critical the station is relative to other available stations in the area. Special consideration may be given to wells that do not meet the surface seal criterion in areas with limited stations; however, comparison of analytical results relative to project MCLs would not be valid.

Long-Term Monitoring Consideration DQOs. To be considered for Long-Term Monitoring, stations must meet the Data Gap and Trend Analyses DQOs plus long-term access to the station must be available. For well stations, the sampling port should be upstream of treatment. Long-term access and information about available sampling ports may be collected during field work. Special consideration may be given to wells that do not meet the sampling port relative to treatment criterion in areas with limited stations; however, comparison of analytical results relative to project MCLs would not be valid.

2.2 ANALYTICAL DATA QUALITY OBJECTIVES

QA/QC data associated with water quality samples can be used to assess the accuracy and precision of the analytical results. This QA/QC Plan stipulates the QA/QC data required for water quality samples, and the DQOs to evaluate the QA/QC data against. However, it is likely that some water quality data from previous investigations will not have available QA/QC data.

The availability and acceptability of QA/QC data will affect how sample results may be used in the GWMA Initial Characterization. A decision tree to assess usability of the analytical metadata is presented in Figure 3. If station location and depth information is available (Section 2.1), all existing analytical data will be considered in the evaluation of Data Gaps and Trends, regardless of whether associated QA/QC data are available. Water quality results with available QA/QC data that meet DQOs described in this section and water quality results associated with the Washington State Department of Health (DOH) compliance monitoring of public water systems will be considered in the evaluation of Data Gaps and Trends, and in addition will be used to establish Baseline Water Quality, evaluate Compliance with project MCLs, and establish Long-Term Monitoring Data. While QA/QC data associated with DOH compliance monitoring are not available, the data will be considered acceptable for the additional evaluations because the analytical labs are required to be accredited by Ecology; and samples are required to be collected and transported according to EPA or DOH approved methods (WAC 246-290-300 and WAC 246-291-300).

DQOs for analytical data are typically expressed in terms of accuracy, precision, representativeness, completeness, and comparability. Definitions of these terms follow.

Accuracy. Accuracy is how close an analytical result is to the true concentration in the sample. For conventional parameters, accuracy is analytically evaluated with spike samples.

A spike QA sample is prepared by adding a known concentration of an indicator parameter to an environmental sample. The indicator parameter should be the same or similar (for isotopically labeled compounds) as the target analyte. The spike should increase the concentration in the environmental sample by a predictable amount.

The analytical lab shall calculate and report the percent recovery (%R) of the target analyte in the spiked sample by:

$$\%R = \left(\frac{SSR - SR}{SA}\right) \times 100$$

Where:

SSR = measured value of analyte concentration in sample after addition of spike
SR = measured value of analyte concentration in sample before addition of spike
SA = value of spike added

The GWMA QA Reviewer (QA Reviewer) shall evaluate accuracy by comparing the %R to acceptable limits statistically determined by the laboratory (Section 4).

Precision. Precision measures the reproducibility of results and can be evaluated through field duplicate (collocated samples collected in the field that are analyzed independently) and lab replicate (aliquots prepared in the lab of the same sample that are analyzed independently).

Field duplicates will be collected on at least a 10 percent frequency (1 duplicate per 10 samples collected). At least one field duplicate shall be collected each event (Section 3.1). Lab replicates may be analyzed according to an individual lab's Standard Operating Procedure (SOP). Lab replicates are prepared in the lab by taking an aliquot of an environmental sample and treating that aliquot throughout the analytical method as though it were another sample.

Relative Percent Differences (RPD) values between field duplicates shall be calculated by the QA Reviewer and RPD values between lab replicates shall be calculated and reported by the lab. RPDs are calculated by:

$$RPD = \frac{|(D1 - D2)|}{\frac{D1 + D2}{2}} \times 100$$

Where:

D1 = measured concentration of duplicate or replicate 1
D2 = measured concentration of duplicate or replicate 2

The QA Reviewer shall evaluate precision by comparing the RPD to acceptable limits (Section 4). For this study, the acceptable RPD limits for field duplicates shall be 20 percent or ± the lab reporting limit if the concentration of either the sample or duplicate is less than 5 x the lab reporting limit. The acceptable RPD limits for lab replicates shall be statistically established by the analytical lab.

Representativeness and Comparability. Representative samples accurately represent the environmental matrix being tested. Comparable samples are collected during different sampling events, but at the same station. For this study, representativeness and comparability shall be achieved by following the field sampling protocols and methods described in the Groundwater Monitoring Plan, using the same analytical methods, and to the degree possible, the same analytical lab.

As described in the Groundwater Monitoring Plan, the majority of water samples collected for this study will be collected directly into laboratory-provided bottles without the use of non-dedicated or non-disposable sampling devices such as bailers, portable pumps, dippers, or grab samplers. When non-dedicated or non-disposable sampling devices are used, representativeness and comparability will be evaluated using rinsate or decontamination blanks (Section 3.1). These blanks will be collected following decontamination of the sampling device, on at least a 10 percent frequency (1 blank per 10 samples collected with a non-dedicated or non-disposable sampling device) and a minimum of 1 blank will be collected per event where non-dedicated sampling devices are used.

Completeness. Completeness is the percentage of valid results obtained from a given sampling event. For this study, completeness is anticipated to be equal or better than 85 percent.

3.0 QUALITY CONTROL CHECKS

Quality control checks will be performed by project field staff and by the analytical lab as described below.

3.1 FIELD QUALITY CONTROL

Field quality control checks are summarized in Table 3.

Field Duplicates will be collected at a rate of at least 10 percent as described in Section 2.0. After collection of the original sample, a duplicate shall be collected by filling another set of laboratory-provided bottles using the same sampling procedure. Field duplicates shall be analyzed for each parameter of interest. Field duplicates will be labeled with a unique sample ID and collection date/time. Field sample forms shall document the stations where field duplicates were collected, the duplicate ID, and duplicate sample time.

Rinsate or decontamination blanks will be collected at a rate of at least 10 percent of samples collected per sampling team with non-disposable or non-dedicated equipment. After the non-dedicated equipment is decontaminated following procedures described in

the Groundwater Monitoring Plan, a rinsate or decontamination blank shall be collected by transferring commercially available distilled water from the sampling equipment to a set of laboratory-prepared bottles, or by pouring distilled water over the equipment and collecting the water that that rinses off in a set of laboratory-prepared bottles. The rinsate or decontamination blank shall be labeled with a unique sample ID and collection date/time. Field sample forms shall document the stations where field blanks were collected, the blank ID, and blank sample date/time.

Matrix Spike and Matrix Spike Duplicates (MS/MSD) will be analyzed per batch of samples. MS/MSDs prepared from samples collected for the GWMA project are preferred over MS/MSDs prepared from samples collected for another project that may be part of the same analytical batch. This may require additional volume to be collected in the field. The Field Sampling Manager or Lead should confer with the analytical lab about additional volume requirements when placing the bottle order. Sample bottles for MS/MSD analysis will be labeled with the station ID followed by "-MS/MSD" and field forms will document where the MS/MSD are collected.

3.2 LABORATORY QUALITY CONTROL

Analytical services for this study will be provided by labs accredited by Ecology for drinking water or non-potable water analyses of the parameters of concern (there are currently no drinking water accredited labs for analyses of ammonia or TKN, there are non-potable water accredited labs for these parameters). Prior to mobilization to the field, the lab will provide proof of Ecology accreditation for analytical methods and matrices related to this QA/QC Plan. Labs routinely perform performance checks and each analytical method requires specific QA/QC protocols that must be complied with by the lab. No additional audits will be performed on the analytical labs for this study.

The analytical lab will follow their written QA/QC Plan and Standard Operating Procedures (SOP) to assure data quality. Lab QC samples will be analyzed in accordance with the lab QA/QC Plan, SOP, and analytical method and may include the following:

- Method blanks are used to assess contamination that may be introduced in the lab during sample preparation. Method blanks are prepared, extracted, digested, and analyzed in the same manner as field samples. Analytical results will be included in lab reports.
- Laboratory control samples (LCS) are used to evaluate the performance of the total analytical system, including all preparation and analysis steps. They contain known concentrations of the analytes of interest and the percent recovery reflects the accuracy of the analysis. Analytical results will be included in lab reports.

Lab QA/QC also typically includes instrument-related calibration blanks and performance checks. Instrument-related QA/QC results will not be included in lab reports, but will be made available on request if other QA/QC results are considered unacceptable.

4.0 DATA VALIDATION AND USEABILITY

Data validation will be performed by the lab in accordance with their QA/QC plan and SOP prior to the release of the analytical results. The lab shall document their data validation in a case narrative, identifying any QA/QC recoveries that were outside the lab's acceptance criteria, and potentially flagging or reanalyzing unacceptable results.

The QC Reviewer will review field notes for compliance with sampling protocols described in the Groundwater Monitoring Plan and will validate the analytical data in accordance with the QA/QC requirements specified in this QA/QC Plan and the analytical methods. The analytical reports shall be checked for completeness that the data requested has been delivered. They shall also be checked for compliance of the analytical QA/QC results with acceptance limits. Data validation will also include review of the method blanks, holding times, and lab reporting limits.

DQOs or acceptance limits for Percent Recoveries (%R) of spike samples, including matrix spikes, shall be established statistically by the lab and provided in the lab reports. In the event that statistical acceptance limits are not available, the following limits from the Quality Assurance Project Plans for the Yakima Basin Nitrate Study Phase 3 (U.S. EPA, 2010b) and Lower Yakima Valley Dairy Investigation (SAIC, 2012) shall be applied:

- Accuracy (percent recovery of spikes including laboratory control samples and matrix spikes): 80-120 percent
- Precision (lab replicate and matrix spike duplicate): ± 20 percent

For this study, the acceptable RPD limits for field duplicates shall be 20 percent or ± the lab reporting limit if the concentration of either the sample or duplicate is less than 5 x the lab reporting limit.

Data associated with QA/QC results that fall outside acceptance limits may be qualified or rejected. The EPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (EPA 2010a) generally do not extend to conventional parameters; however, the guidelines may be referred to for qualification guidance. Findings and conclusions of the Data Validation will be summarized in a narrative by the QC Reviewer.

As presented in Figure 3 and described in Section 2.2, all existing analytical data will be considered in the evaluation of Data Gaps and Trends, regardless of whether associated QA/QC data are available or whether associated QA/QC data meet Analytical DQOs (acceptance limits) described in this Plan. Analytical results with QA/QC data that meet DQOs and analytical data associated with DOH compliance monitoring of public water systems will be considered to meet project needs to be valid for: Data Gaps and Trend analyses, establishing Background Water Quality, evaluating Compliance with project MCLs, and establishing Long-Term Monitoring Data.

5.0 REFERENCES

Pacific Groundwater Group, 2013. Core Data Recommendations. Consultant's technical memorandum prepared for Yakima County and HDR. July 29, 2013.

SAIC. 2012. Quality Assurance Project Plan Lower Yakima Valley Dairy Investigation Yakima County, Washington. Consultant's plan prepared for U.S. Environmental Protection Agency, Region 10. December 2012.

U.S. Environmental Protection Agency, 2002. Guidance for Quality Assurance Project Plans. EPA QA/G-5. EPA/240/R-02/009. December 2002.

U.S. Environmental Protection Agency, 2010a. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review. January, 2010.

U.S. Environmental Protection Agency, 2010b. Quality Assurance Project Plan For Yakima Basin Nitrate Study Phase 3 – Comprehensive Analytical Source Tracer April 2010 Sampling Event Yakima County. U.S. EPA Region 10. April 8, 2010.

Washington State Department of Ecology, 2004. Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies. Publication No. 04-03-030. Revision of Publication No. 01-03-003. July 2004.

Washington State Department of Ecology, n.d. Methods and Analytes Table. http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html. Web. September 4, 2013.

Table 1. Water Quality Parameters of Concern and Analytical Methods

Parameter	Recommended Analytical Method	Alternative Analytical Methods	Preservative	Holding Time	Bottle Type	PQL/Lab Reporting Limit Goals[2]
Ammonia-N	EPA 350.1	EPA 349.0 / USGS 1-3520-85 / SM4500-NH3 C, D, E, F, G, H, or I / ASTM D1426-08 or -98A / ASTM D 6919-03	H2SO4	28 days	Lab Provided	PQL Goal 0.3 mg/L or lower
Nitrate	EPA 353.2[1]	EPA 300.0 / SM 4110 B-00 / SM 4500-NO3 B, D, E, F, H, or I		48 hours	Lab Provided	PQL must be 10-percent or less of GWMA MCLs (Table 2), or 1 mg/L
Nitrite	EPA 353.2[1]	EPA 300.0 / SM 4500-NO2 B / SM 4110 B / SM 4500-NO3 F or I		48 hours	Lab Provided	PQL must be 10-percent or less of GWMA MCLs (Table 2), or 0.1 mg/L
Sum of organic nitrogen + ammonia + ammonium (Total Kjeldahl Nitrogen, TKN)	SM 4500-Norg D	EPA 351.1 / EPA 351.2 / SM 4500-Norg B or C / ASTM D1426-93B	H2SO4	28 days	Lab Provided	PQL Goal 1 mg/L or lower

[1] Method may be used to determine nitrate+nitrite, nitrite, or nitrate. Nitrate and nitrite (individually) are parameters of concern for this study, while nitrate+nitrite is not. No preservative is used whe individually measuring nitrate or nitrite concentrations, and therefore the holding time is 48 hours. If H2SO4 preservative is used the holding time is extended to 28 days, but only nitrate+nitrite concentrations can be measured and not individual nitrate or nitrite concentrations.

[2] Practical Quantitation Limits/Lab Reporting Limits for these methods are determined by individual labs and therefore are not specified in this QA/QC Plan. Practical Quantitation Limits/Lab Reporting Limits must be 10-percent of Project MCLs or lower for nitrate and nitrite. PQL Goals for ammonia and TKN are based on a June 27, 2014 survey of six accredited labs located in eastern Washington.

Analytical Methods consistent with Ecology's Methods and Analytes Table at: http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html

Discrepancies between Preservation/Holding Time between this table and the Analytical Methods should be resolved in favor of the Analytical Method

Table 2. Relevant Regulatory Water Quality Standards and GWMA Project MCLs

Parameter	Relevant Regulatory Water Quality Standards			**GWMA Project MCLs**
	EPA MCLs	WA Public Water Supply MCLs	WA Groundwater Quality Criteria	
Ammonia-N	Not Established	Not Established	Not Established	**Not Established**
Nitrate (as N)	10 mg/L	10 mg/L	10 mg/L	**10 mg/L**
Nitrite (as N)	1 mg/L	1 mg/L	Not Established	**1 mg/L**
Sum of organic nitrogen + ammonia + ammonium (Total Kjeldahl Nitrogen (TKN))	Not Established	Not Established	Not Established	**Not Established**

EPA MCLs established by Safe Drinking Water Act (SDWA)

WA Public Water Supply MCLs established by WAC 246-290-310

WA Groundwater Quality Criteria established by WAC 173-200-040

Practical Quantitation Limits/Lab Reporting Limits for these methods are determined by individual labs and are therefore not specified in this QA/QC Plan. Practical Quantitation Limits/Lab Reporting Limits must be 10-percent of Project MCLs or lower.

Table 3. Field Quality Control Summary

Type of Quality Control Check	Minimum Frequency	Bottle ID	Process
Field Duplicates	1 per 10 samples collected	Station ID + 200	After collection of the original sample, fill a second set of laboratory-provided bottles using the same sampling procedure. Label the duplicate uniquely and analyze for all sampling event parameters.
Rinsate/ Decontamination Blank	1 per 10 samples per team collected with non-disposable or non-dedicated equipment	Station ID + 100	Decontaminate the non-dedicated/non-disposable equipment following procedures described in the Work Plan. Transfer commercially available distilled water from the sampling equipment to a set of laboratory-prepared bottles, or pour DI water over the equipment and collect the water that rinses off in a set of lab-prepared bottles. Label the blank uniquely and analyze for all sampling event parameters.
MS/MSD	1 per event	Station ID + "-MS/MSD"	After collection of the original sample, fill a second and third set of laboratory-provided bottles using the same sampling procedure. Label the bottles with the addition of "-MS/MSD" and analyze for all sampling event parameters.

K:\PONY\Yakima Basin GWMA\GIS\mxds\GWMA_bndy_updated.mxd 2/14/2014

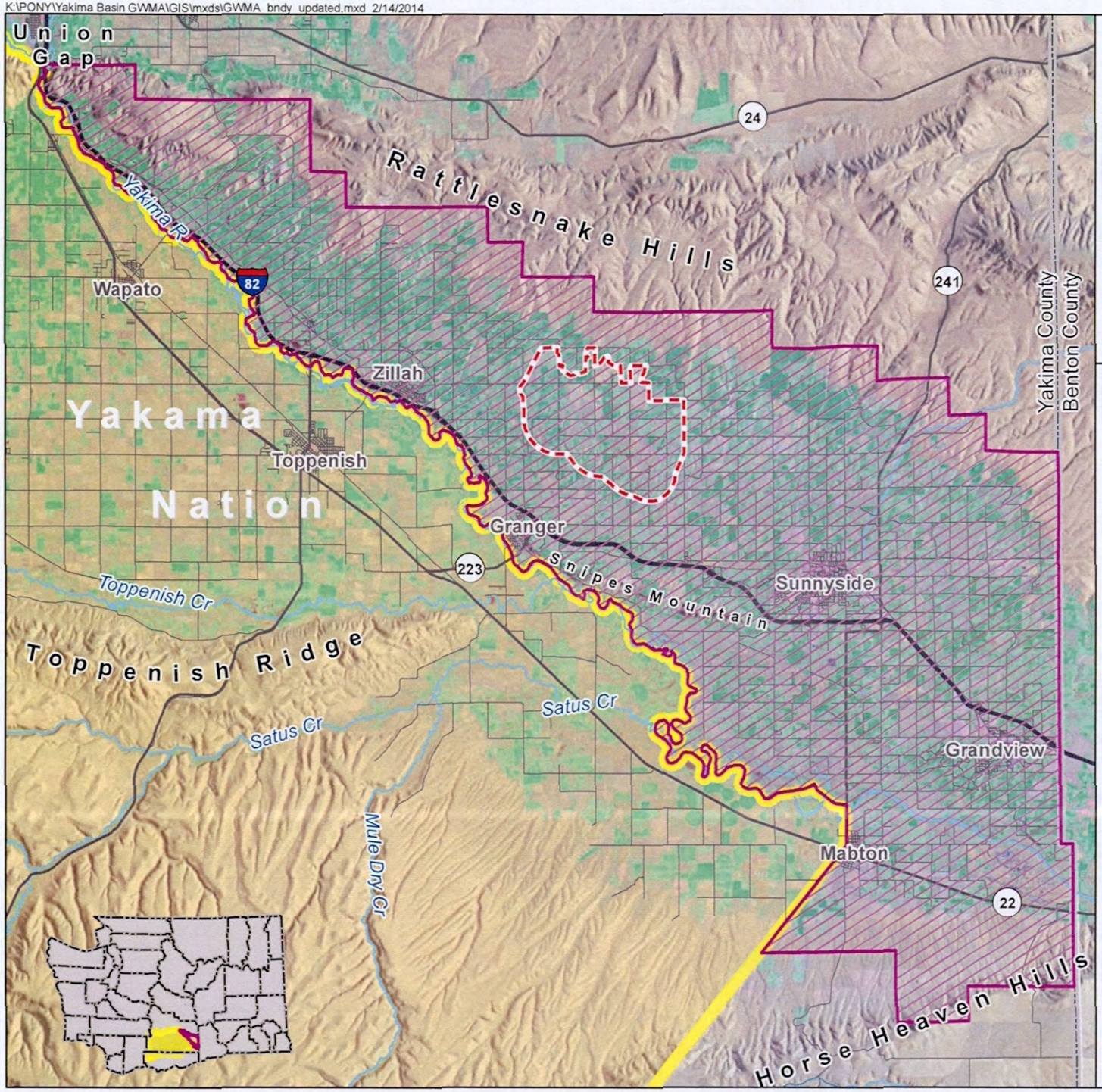


Figure 1

Lower Yakima Valley Groundwater Management Area Groundwater Monitoring Study Area

DRAFT

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GWMA Boundary

EPA Dairy Cluster Buffer Boundary

Yakama Nation Boundary (from Yakima County)

N

0 Miles 5

Image derived from Landsat 7 data (1999 - 2002)

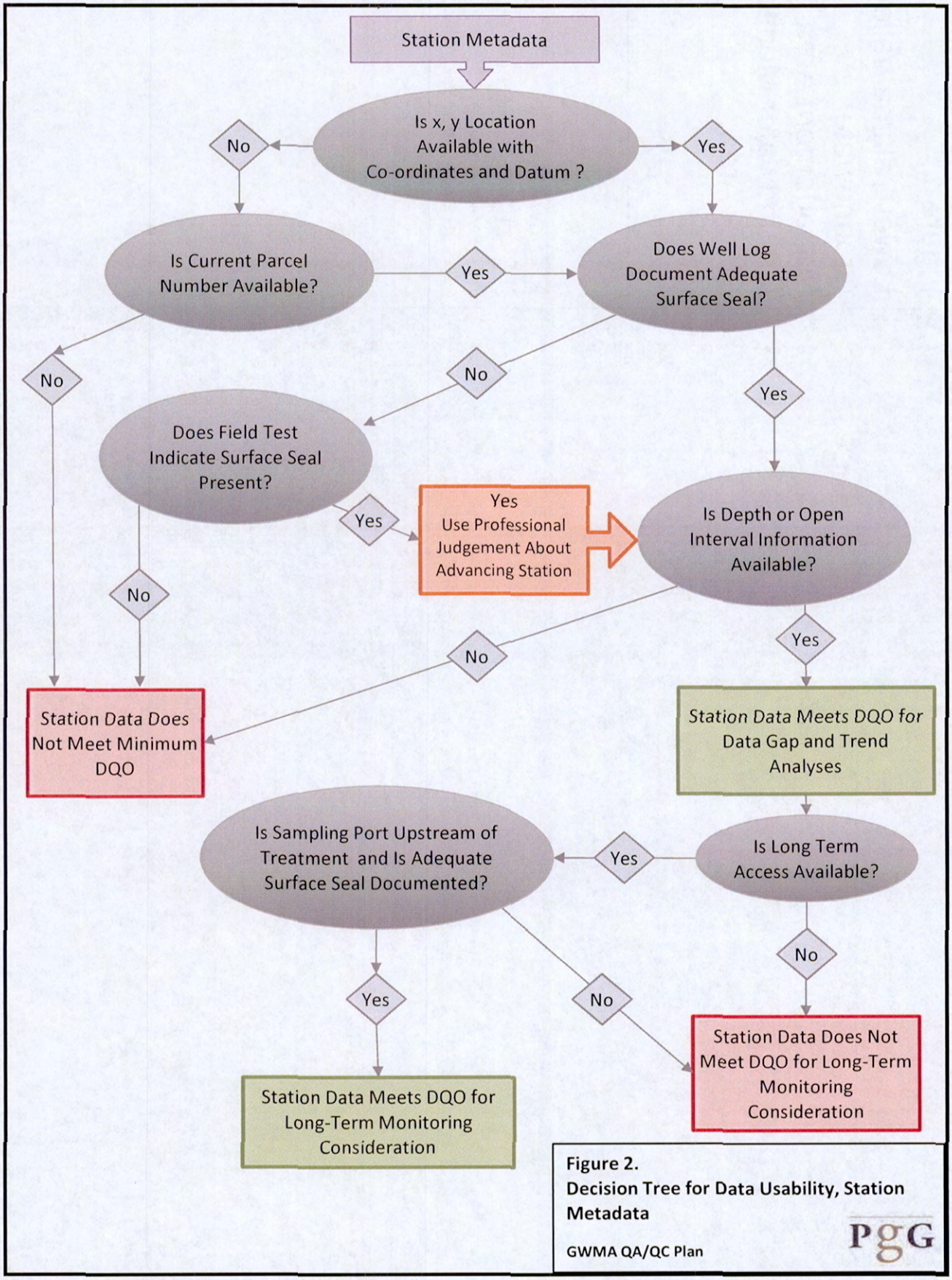

Figure 2.
Decision Tree for Data Usability, Station Metadata

GWMA QA/QC Plan

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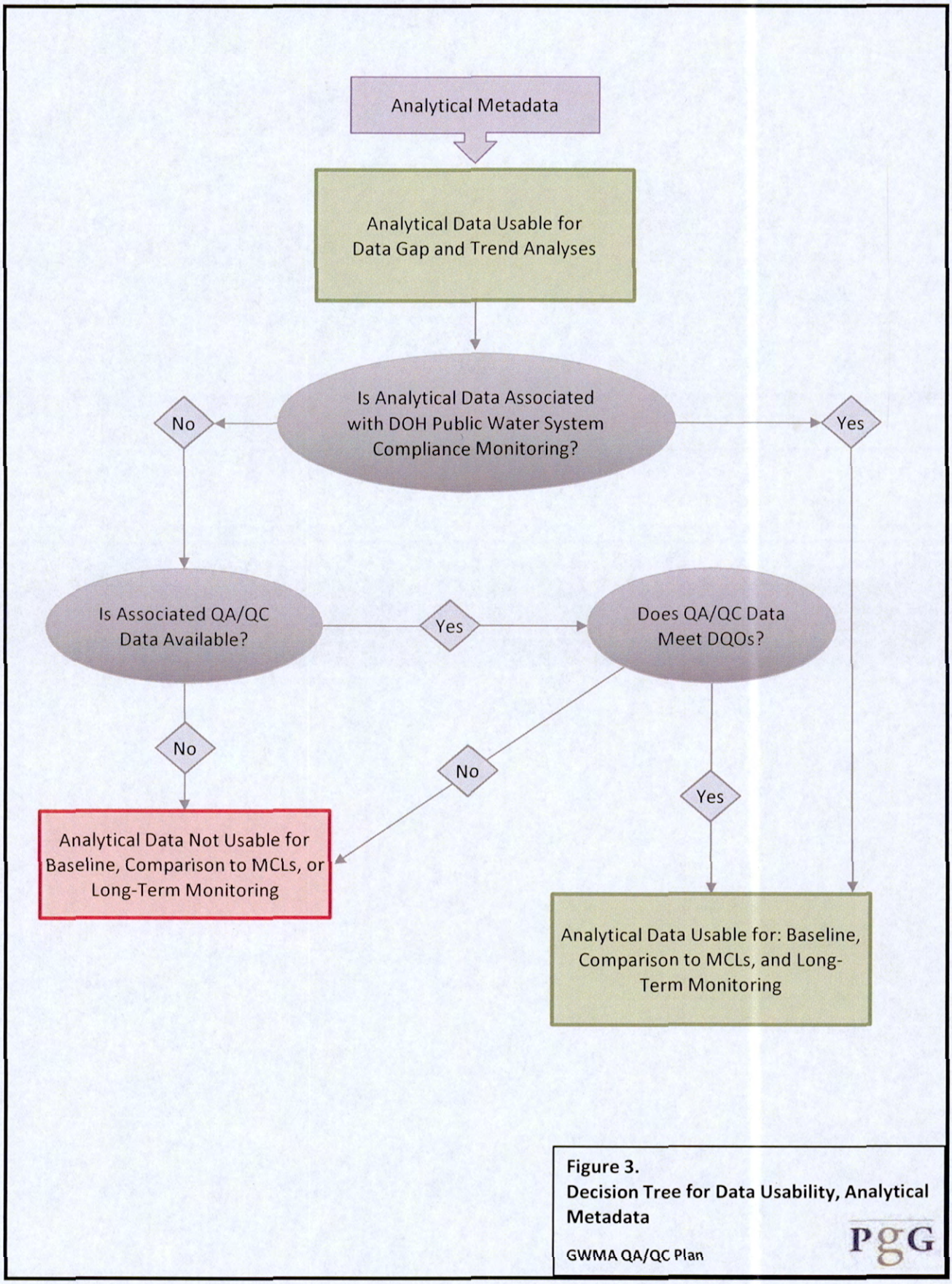

Figure 3.
Decision Tree for Data Usability, Analytical Metadata

GWMA QA/QC Plan

PgG

P 206.329.0141 | **F** 206.329.6968

2377 Eastlake Avenue East | Seattle, WA 98102

P 206.842.3202 | **F** 206.842.5041

8150 West Port Madison NE | Bainbridge, WA 98110

P 360.570.8244 | **F** 360.570.0064

1627 Linwood Avenue SW | Tumwater, WA 98512

www.pgwg.com

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Attachment D

- Deep Soil Sampling Combined Report
- Deep Soil Sampling Soil Sample Report

LOWER YAKIMA VALLEY GROUNDWATER ADVISORY COMMITTEE — Groundwater Management Area (GWMA)

Deep Soil Sampling

1001

FIELD	1001-0-5
Acres	4
Soil Type	18 - Cleman Very Fine Sandy Loam 0-2% Slopes
Soil Testing?	NO
Test Frequency	
Irigation Type	Solid Set Above Canopy
Sprinkler Type	Impact
Irrigation Schedule	Routine Schedule
Hour Sets	Daily
Irrigation years	

NO3 (#N/ACRE)	
10/31/2014	
1 ft	8
2 ft	3
3 ft	3
4 ft	3
5 ft	5
6 ft	3
TOTAL	25
NH4-N	28
ORGANIC	1.87

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0

Comments: Just 4 to 5 head of Cattle

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition
Pasture				Fair
Pasture				
Pasture				
Pasture				

1002

FIELD	1002-0-2
Acres	50
Soil Type	121 - Scoon Silt Loam 5-8% Slopes
Soil Testing?	YES
Test Frequency	Two Times per Year
Irigation Type	Wheel Lines
Sprinkler Type	Impact
Irrigation Schedule	Routine Schedule
Hour Sets	
Irrigation years	2

NO3 (#N/ACRE)	
10/29/2014	
1 ft	285
2 ft	124
3 ft	115
4 ft	
5 ft	
6 ft	
TOTAL	524
NH4-N	11
ORGANIC	2.4

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	337.5	0	100	0	0	0	437.5
2013	112.5	0	100	0	0	0	212.5
2012	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0

Comments:

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition	
Triticale	5 TONS PER ACRE			Fair	PLANNED
Wheat	65 BUSHELS PER ACRE				

1004

FIELD	1004-0-5
Acres	40
Soil Type	178 - Warden Silt Loam 5-8% Slopes
Soil Testing?	YES
Test Frequency	
Irigation Type	Pivot
Sprinkler Type	Rotators
Irrigation Schedule	
Hour Sets	
Irrigation years	

NO3 (#N/ACRE)	
10/30/2014	
1 ft	177
2 ft	79
3 ft	63
4 ft	69
5 ft	42
6 ft	50
TOTAL	480
NH4-N	16
ORGANIC	2.06

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	250	0	0	0	250
2013	0	0	250	0	0	0	250
2012	0	0	250	0	0	0	250
2011	0	0	250	0	0	0	250

Comments:

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition	
Corn Silage	25	Triticale	6	Fair	
Corn Silage	25	TRITICALE	6		
Corn Silage	25	TRITICALE	6		
Corn Silage	25	TRITICALE	6		

1005

FIELD	1005-0-5
Acres	15
Soil Type	177 - Warden Silt Loam 2-5% Slopes
Soil Testing?	YES
Test Frequency	Annual to Semi-annual
Irigation Type	Rill Irrigation and Hand Lines w/ Impacts
Sprinkler Type	
Irrigation Schedule	Routine Schedule
Hour Sets	
Irrigation years	

NO3 (#N/ACRE)	
10/30/2014	
1 ft	25
2 ft	3
3 ft	3
4 ft	3
5 ft	3
6 ft	4
TOTAL	41
NH4-N	20
ORGANIC	2.21

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	0	0	0	0	0
2013	0	0	12	0	0	0	12
2012	0	0	12	0	0	0	12
2011	0	0	12	0	0	0	12

Comments: The field has gotten manured for awhile. Solids are composted and spread as needed. Pond water is diluted down to irrigate with. No liquid sample taken.

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition	
Mint	70 Pounds Of Oil			Good	ACTUAL
Corn Silage	35				
Corn Silage	35 TONS PER ACRE				
Corn Silage	35 TONS PER ACRE				

LOWER YAKIMA VALLEY GROUNDWATER ADVISORY COMMITTEE — Groundwater Management Area (GWMA)

Deep Soil Sampling

1006

FIELD	1006-0-5
Acres	15
Soil Type	179 - Warden Silt Loam 8-15% Slopes
Soil Testing?	NO
Test Frequency	
Irrigation Type	Wheel Lines
Sprinkler Type	Impact
Irrigation Schedule	Soil Moisture Sensors
Hour Sets	24
Irrigation years	5

NO3 (#N/ACRE)	
10/30/2014	
1 ft	45
2 ft	4
3 ft	3
4 ft	3
5 ft	4
6 ft	3
TOTAL	62
NH4-N	20
ORGANIC	2.17

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	100	0	0	0	100
2013	0	0	100	0	0	0	100
2012	0	0	100	0	0	0	100
2011	0	0	100	0	0	0	100

Comments: 50 pounds of N in spring and 50 pounds of N after second cutting

Cropping History

Crop 1	Crop 1 Yield		Crop 2	Crop 2 Yield		Condition	
						Fair	ACTUAL
Alfalfa	9	TONS PER ACRE					
Alfalfa	10	TONS PER ACRE					
Alfalfa	10	TONS PER ACRE					

1007

FIELD	1007-0-3
Acres	7
Soil Type	179 - Warden Silt Loam 8-15% Slopes
Soil Testing?	NO
Test Frequency	
Irrigation Type	Solid Set Below Canopy
Sprinkler Type	Rotators
Irrigation Schedule	
Hour Sets	
Irrigation years	10

NO3 (#N/ACRE)	
10/30/2014	
1 ft	3
2 ft	3
3 ft	3
4 ft	3
5 ft	
6 ft	
TOTAL	12
NH4-N	8
ORGANIC	1.09

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0

Comments: Only leaf feed applied during crop year

Cropping History

Crop 1	Crop 1 Yield		Crop 2	Crop 2 Yield		Condition	
						Good	ACTUAL
FAILURE							
FAILURE							
Cherries		TONS PER ACRE					
FAILURE							

1008

FIELD	1008-0-3
Acres	45
Soil Type	10 - Burke Silt Loam 2-5% Slopes
Soil Testing?	YES
Test Frequency	Yearly
Irrigation Type	Drip
Sprinkler Type	
Irrigation Schedule	Have coil moisture but use boots on ground
Hour Sets	
Irrigation years	19

NO3 (#N/ACRE)	
10/30/2014	
1 ft	246
2 ft	73
3 ft	14
4 ft	3
5 ft	
6 ft	
TOTAL	336
NH4-N	37
ORGANIC	1.39

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0

Comments: 9 acres of problem field raw manure application in adjacent acres subs into our wine grape rows

Cropping History

Crop 1	Crop 1 Yield		Crop 2	Crop 2 Yield		Condition	
						Per Qualit	LOW YIELD
Wine Grapes							
Wine Grapes							
Wine Grapes							
Wine Grapes							

1009

FIELD	1009-0-3
Acres	10
Soil Type	177 - Warden Silt Loam 2-5% Slopes
Soil Testing?	NO
Test Frequency	
Irrigation Type	Rill Irrigation
Sprinkler Type	
Irrigation Schedule	Routine Schedule
Hour Sets	
Irrigation years	99

NO3 (#N/ACRE)	
10/31/2014	
1 ft	12
2 ft	3
3 ft	40
4 ft	81
5 ft	
6 ft	
TOTAL	136
NH4-N	10
ORGANIC	1.64

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	80	0	0	0	80
2013	0	0	80	0	0	0	80
2012	0	0	80	0	0	0	80
2011	0	0	80	0	0	0	80

Comments:

Cropping History

Crop 1	Crop 1 Yield		Crop 2	Crop 2 Yield		Condition	
						Good	
	8	TONS					
	8	TONS					
	8	TONS					

LOWER YAKIMA VALLEY GROUNDWATER ADVISORY COMMITTEE — Groundwater Management Area (GWMA)

Deep Soil Sampling

1010

FIELD	1010-0-2
Acres	2
Soil Type	178 - Warden Silt Loam 5-8% Slopes
Soil Testing?	NO
Test Frequency	
Irigation Type	Solid Set Above Canopy
Sprinkler Type	Rotators
Irrigation Schedule	Routine Schedule
Hour Sets	6
Irrigation years	

NO3 (#N/ACRE) 10/31/2014	
1 ft	50
2 ft	112
3 ft	6
4 ft	
5 ft	
6 ft	
TOTAL	168
NH4-N	17
ORGANIC	1.47

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0

Comments: 4 to 6 Head of cattle

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition
Pasture				
Pasture				
Pasture				
Pasture				

1011

FIELD	1011-0-5
Acres	27
Soil Type	179 - Warden Silt Loam 8-15% Slopes
Soil Testing?	YES
Test Frequency	Yearly
Irigation Type	Rill Irrigation
Sprinkler Type	Impact
Irrigation Schedule	Routine Schedule
Hour Sets	24
Irrigation years	

NO3 (#N/ACRE) 10/31/2014	
1 ft	57
2 ft	141
3 ft	295
4 ft	269
5 ft	93
6 ft	50
TOTAL	905
NH4-N	40
ORGANIC	3.18

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	90	0	0	0	0	0	90
2013	90	0	0	0	0	0	90
2012	90	0	0	0	0	0	90
2011	90	0	0	0	0	0	90

Comments:

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition
Corn Silage	TONS PER ACRE			Good ACTUAL
Wheat	110 BUSHELS PER ACRE			
Corn Silage	30 TONS PER ACRE			
Wheat	100 BUSHELS PER ACRE			

1012

FIELD	1012-0-2
Acres	10
Soil Type	179 - Warden Silt Loam 8-15% Slopes
Soil Testing?	NO
Test Frequency	
Irigation Type	None
Sprinkler Type	No irrigation last 3 years
Irrigation Schedule	
Hour Sets	
Irrigation years	

NO3 (#N/ACRE) 11/4/2014	
1 ft	53
2 ft	60
3 ft	102
4 ft	
5 ft	
6 ft	
TOTAL	215
NH4-N	9
ORGANIC	3.06

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0

Comments:

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition

1013

FIELD	1013-0-3
Acres	6
Soil Type	178 - Warden Silt Loam 5-8% Slopes
Soil Testing?	NO
Test Frequency	
Irigation Type	Drip
Sprinkler Type	Drip Only - Tube
Irrigation Schedule	As Needed
Hour Sets	
Irrigation years	10

NO3 (#N/ACRE) 11/4/2014	
1 ft	68
2 ft	9
3 ft	4
4 ft	6
5 ft	
6 ft	
TOTAL	87
NH4-N	30
ORGANIC	3.09

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	150	0	0	0	150
2013	0	0	150	0	0	0	150
2012	0	0	150	0	0	0	150
2011	0	0	150	0	0	0	150

Comments:

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition
Pears	40 BINS PER ACRE			Fair
Pears	35 BINS PER ACRE			

LOWER YAKIMA VALLEY GROUNDWATER ADVISORY COMMITTEE — Groundwater Management Area (GWMA)

Deep Soil Sampling

1015

FIELD	1015-0-5
Acres	40
Soil Type	95 - Quincy Loamy Fine Sand 0-10% Slopes
Soil Testing?	YES
Test Frequency	Annual
Irrigation Type	Pivot
Sprinkler Type	Rotators
Irrigation Schedule	Routine Schedule
Hour Sets	
Irrigation years	10

NO3 (#N/ACRE)	
11/5/2014	
1 ft	271
2 ft	125
3 ft	266
4 ft	97
5 ft	94
6 ft	77
TOTAL	930
NH4-N	18
ORGANIC	2.26

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	300	0	0	0	300
2013	0	0	300	0	0	0	300
2012	0	0	300	0	0	0	300
2011	0	0	300	0	0	0	300

Comments

Cropping History

Crop 1	Crop 1 Yield		Crop 2	Crop 2 Yield		Condition	
Corn Silage	40	TONS PER ACRE				Good	
Corn Silage	40	TONS PER ACRE					
Corn Silage	40	TONS PER ACRE					
Corn Silage	40	TONS PER ACRE					

1016

FIELD	1016-0-5
Acres	40
Soil Type	172 - Warden Fine Sandy Loam 0-2% Slopes
Soil Testing?	YES
Test Frequency	Annual
Irrigation Type	Pivot
Sprinkler Type	Rotators
Irrigation Schedule	Routine Schedule
Hour Sets	
Irrigation years	

NO3 (#N/ACRE)	
11/5/2014	
1 ft	94
2 ft	19
3 ft	27
4 ft	36
5 ft	73
6 ft	124
TOTAL	373
NH4-N	16
ORGANIC	1.71

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	300	0	0	0	300
2013	0	0	300	0	0	0	300
2012	0	0	260	0	0	0	260
2011	0	0	260	0	0	0	260

Comments: Split Application of N

Cropping History

Crop 1	Crop 1 Yield		Crop 2	Crop 2 Yield		Condition	
Corn Silage	40	TONS PER ACRE				Good	
Corn Silage	40	TONS PER ACRE					
Corn Silage	40	TONS PER ACRE					
Corn Silage	40	TONS PER ACRE					

1017

FIELD	1017-0-5
Acres	
Soil Type	171 - Wanser Loamy Fine Sand
Soil Testing?	YES
Test Frequency	Annual
Irrigation Type	Pivot
Sprinkler Type	Rotators
Irrigation Schedule	Routine Schedule
Hour Sets	
Irrigation years	20

NO3 (#N/ACRE)	
11/5/2014	
1 ft	133
2 ft	14
3 ft	12
4 ft	14
5 ft	20
6 ft	9
TOTAL	202
NH4-N	11
ORGANIC	1.52

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	300	0	0	0	300
2013	0	0	300	0	0	0	300
2012	0	0	300	0	0	0	300
2011	0	0	300	0	0	0	300

Comments

Cropping History

Crop 1	Crop 1 Yield		Crop 2	Crop 2 Yield		Condition	
Corn Silage	8	TONS PER ACRE				Good	ACTUAL
Corn Silage	8	TONS PER ACRE					
Corn Silage	8	TONS PER ACRE					
Corn Silage	8	TONS PER ACRE					

1018

FIELD	1018-0-5
Acres	
Soil Type	95 - Quincy Loamy Fine Sand 0-10% Slopes
Soil Testing?	YES
Test Frequency	Annual
Irrigation Type	Pivot
Sprinkler Type	Rotators
Irrigation Schedule	Routine Schedule
Hour Sets	
Irrigation years	20

NO3 (#N/ACRE)	
11/5/2014	
1 ft	155
2 ft	55
3 ft	32
4 ft	35
5 ft	52
6 ft	100
TOTAL	429
NH4-N	10
ORGANIC	1.64

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	300	0	0	0	300
2013	0	0	300	0	0	0	300
2012	0	0	300	0	0	0	300
2011	0	0	300	0	0	0	300

Comments

Cropping History

Crop 1	Crop 1 Yield		Crop 2	Crop 2 Yield		Condition	
Corn	8	TONS PER ACRE				Good	ACTUAL
Corn	8	TONS PER ACRE					
Corn	8	TONS PER ACRE					
Corn	8	TONS PER ACRE					

LOWER YAKIMA VALLEY GROUNDWATER ADVISORY COMMITTEE — Groundwater Management Area (GWMA)

Deep Soil Sampling

1019

FIELD	1019-0-5
Acres	10
Soil Type	95 - Quincy Loamy Fine Sand 0-10% Slopes
Soil Testing?	NO
Test Frequency	
Irigation Type	Rill Irrigation
Sprinkler Type	Rotators
Irrigation Schedule	Routine Schedule
Hour Sets	12
Irrigation years	1

NO3 (#N/ACRE)	
11/5/2014	
1 ft	10
2 ft	7
3 ft	4
4 ft	5
5 ft	9
6 ft	27
TOTAL	62
NH4-N	9
ORGANIC	1.29

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	100	0	0	0	100
2013	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0

Comments

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition	
Barley	55 BUSHELS PER ACRE			Fair	ACTUAL

1020

FIELD	1020-0-5
Acres	45
Soil Type	173 - Warden Fine Sandy Loam 2-5% Slopes
Soil Testing?	YES
Test Frequency	Annual
Irigation Type	Pivot
Sprinkler Type	Rotators
Irrigation Schedule	Routine Schedule
Hour Sets	
Irrigation years	10

NO3 (#N/ACRE)	
11/7/2014	
1 ft	93
2 ft	276
3 ft	208
4 ft	78
5 ft	38
6 ft	23
TOTAL	716
NH4-N	23
ORGANIC	2.32

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	100	0	0	0	100
2013	0	0	100	0	0	0	100
2012	0	0	300	0	0	0	300
2011	0	0	300	0	0	0	300

Comments

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition	
Wheat	100 BUSHELS PER ACRE			Good	PLANNED
Wheat	100 BUSHELS PER ACRE				
Corn	8 TONS PER ACRE				
Corn	8 TONS PER ACRE				

1021

FIELD	1021-0-5
Acres	30
Soil Type	172 - Warden Fine Sandy Loam 0-2% Slopes
Soil Testing?	YES
Test Frequency	At Least Once
Irigation Type	Rill Irrigation
Sprinkler Type	
Irrigation Schedule	Routine Schedule
Hour Sets	
Irrigation years	

NO3 (#N/ACRE)	
11/7/2014	
1 ft	315
2 ft	33
3 ft	99
4 ft	17
5 ft	40
6 ft	15
TOTAL	519
NH4-N	23
ORGANIC	2.15

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	100	0	0	0	100
2013	0	200	100	0	0	0	300
2012	0	200	0	0	0	0	200
2011	0	200	0	0	0	0	200

Comments

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition	
Corn	28			Fair	
Corn	28				
Corn	28				

1022

FIELD	1022-0-5
Acres	20
Soil Type	57 - Hezel Loamy Fine Sand 0-2% Slopes
Soil Testing?	YES
Test Frequency	Annual
Irigation Type	Wheel Lines
Sprinkler Type	Impact
Irrigation Schedule	Routine Schedule
Hour Sets	
Irrigation years	2

NO3 (#N/ACRE)	
11/6/2014	
1 ft	16
2 ft	10
3 ft	17
4 ft	15
5 ft	21
6 ft	33
TOTAL	112
NH4-N	11
ORGANIC	1.53

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	100	0	0	0	100
2013	0	0	100	0	0	0	100
2012	0	0	100	0	0	0	100
2011	0	0	100	0	0	0	100

Comments

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition	
Hay	10 BUSHELS PER ACRE			Fair	
Hay	9 TONS PER ACRE				
Wheat	100 BUSHELS PER ACRE				
Hay	8 TONS PER ACRE				

LOWER YAKIMA VALLEY GROUNDWATER ADVISORY COMMITTEE — Groundwater Management Area (GWMA)

Deep Soil Sampling

1023

FIELD	1023-0-5
Acres	20
Soil Type	95 - Quincy Loamy Fine Sand 0-10% Slopes
Soil Testing?	YES
Test Frequency	Annual
Irigation Type	Pivot
Sprinkler Type	Rotators
Irrigation Schedule	Routine Schedule
Hour Sets	
Irrigation years	2

NO3 (#N/ACRE)	11/6/2014
1 ft	28
2 ft	53
3 ft	152
4 ft	81
5 ft	59
6 ft	66
TOTAL	439
NH4-N	11
ORGANIC	1.19

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	75	0	300	0	0	0	375
2013	75	0	300	0	0	0	375
2012	75	0	300	0	0	0	375
2011	75	0	300	0	0	0	375

Comments

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition
Corn Grain	8 TONS PER ACRE			Good ACTUAL
Corn Grain	8 TONS PER ACRE			
Corn Grain	5 TONS PER ACRE			
Corn Grain	5 TONS PER ACRE			

1024

FIELD	1024-0-5
Acres	40
Soil Type	95 - Quincy Loamy Fine Sand 0-10% Slopes
Soil Testing?	YES
Test Frequency	Annual
Irigation Type	Pivot
Sprinkler Type	Rotators
Irrigation Schedule	Routine Schedule
Hour Sets	
Irrigation years	4

NO3 (#N/ACRE)	11/6/2014
1 ft	22
2 ft	21
3 ft	19
4 ft	34
5 ft	121
6 ft	57
TOTAL	274
NH4-N	19
ORGANIC	2.4

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	75	0	300	0	0	0	375
2013	75	0	300	0	0	0	375
2012	75	0	300	0	0	0	375
2011	75	0	300	0	0	0	375

Comments

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition
Corn	8 TONS PER ACRE			Fair
Corn	8 TONS PER ACRE			
Corn	8 TONS PER ACRE			
Corn	8 TONS PER ACRE			

1025

FIELD	1025-0-5
Acres	20
Soil Type	95 - Quincy Loamy Fine Sand 0-10% Slopes
Soil Testing?	YES
Test Frequency	Spring
Irigation Type	Rill Irrigation
Sprinkler Type	
Irrigation Schedule	Routine Schedule
Hour Sets	
Irrigation years	

NO3 (#N/ACRE)	11/6/2014
1 ft	215
2 ft	18
3 ft	13
4 ft	4
5 ft	32
6 ft	4
TOTAL	286
NH4-N	8
ORGANIC	1.34

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	180	0	0	0	180
2013	0	0	180	0	0	0	180
2012	0	0	180	0	0	0	180
2011	0	0	140	0	0	0	140

Comments: Split aplication on fields; 200 lbs. N to start grow season and side dress 100 lbs throughout rest of season

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition
Hops	.5 TONS PER ACRE			Fair ACTUAL
Hops	.75 TONS PER ACRE			
Hops	.75 TONS PER ACRE			
Hops	.75 TONS PER ACRE			

1026

FIELD	1026-0-5
Acres	51
Soil Type	172 - Warden Fine Sandy Loam 0-2% Slopes
Soil Testing?	YES
Test Frequency	Spring
Irigation Type	Rill Irrigation
Sprinkler Type	
Irrigation Schedule	
Hour Sets	
Irrigation years	

NO3 (#N/ACRE)	11/6/2014
1 ft	314
2 ft	10
3 ft	7
4 ft	7
5 ft	7
6 ft	3
TOTAL	348
NH4-N	22
ORGANIC	1.33

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	150	0	0	0	150
2013	0	0	150	0	0	0	150
2012	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0

Comments

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition
Hops	.75 TONS PER ACRE			Fair
Hops	.75 TONS PER ACRE			
Hops	.75 TONS PER ACRE			
Hops	.75 TONS PER ACRE			

LOWER YAKIMA VALLEY GROUNDWATER ADVISORY COMMITTEE — Groundwater Management Area (GWMA)

Deep Soil Sampling

1027

FIELD	1027-0-5
Acres	50
Soil Type	171 - Wanser Loamy Fine Sand
Soil Testing?	YES
Test Frequency	Annual
Irigation Type	Pivot
Sprinkler Type	Rotators
Irrigation Schedule	Routine Schedule
Hour Sets	
Irrigation years	7

NO3 (#N/ACRE)	
11/6/2014	
1 ft	115
2 ft	121
3 ft	99
4 ft	67
5 ft	114
6 ft	66
TOTAL	582
NH4-N	23
ORGANIC	1.94

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	100	0	0	0	100
2013	0	0	300	0	0	0	300
2012	0	0	100	0	0	0	100
2011	0	0	100	0	0	0	100

Comments

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition	
Alfalfa	10 TONS PER ACRE			Good	ACTUAL
Corn	8 TONS PER ACRE				
Wheat	95 BUSHELS PER ACRE				
Wheat	120 BUSHELS PER ACRE				

1028

FIELD	1028-0-5
Acres	25
Soil Type	143 - Starbuck-Rock Outcrop Complex 0-45% Slop
Soil Testing?	NO
Test Frequency	
Irigation Type	Solid Set Below Canopy
Sprinkler Type	Impact
Irrigation Schedule	Routine Schedule
Hour Sets	12
Irrigation years	25

NO3 (#N/ACRE)	
11/7/2014	
1 ft	11
2 ft	3
3 ft	3
4 ft	3
5 ft	3
6 ft	3
TOTAL	26
NH4-N	16
ORGANIC	1.39

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0

Comments

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition	
Apples				Poor	PLANNED
Apples					
Apples					
Apples					

1029

FIELD	1029-0-5
Acres	25
Soil Type	177 - Warden Silt Loam 2-5% Slopes
Soil Testing?	NO
Test Frequency	
Irigation Type	Solid Set Below Canopy
Sprinkler Type	Impact
Irrigation Schedule	Routine Schedule
Hour Sets	12
Irrigation years	25

NO3 (#N/ACRE)	
11/7/2014	
1 ft	8
2 ft	3
3 ft	11
4 ft	4
5 ft	3
6 ft	3
TOTAL	32
NH4-N	10
ORGANIC	1.17

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0

Comments

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition	
Apples				Poor	PLANNED
Apples					
Apples					
Apples					

1030

FIELD	1030-1-5
Acres	40
Soil Type	66 - Kittitas Silt Loam
Soil Testing?	YES
Test Frequency	Every 4 Years
Irigation Type	Pivot
Sprinkler Type	Impact
Irrigation Schedule	Routine Schedule
Hour Sets	
Irrigation years	8

NO3 (#N/ACRE)	
11/7/2014	
1 ft	113
2 ft	57
3 ft	8
4 ft	6
5 ft	7
6 ft	6
TOTAL	197
NH4-N	31
ORGANIC	2.86

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0

Comments: Bio Solids applied 7 years ago, no fertilizer of any kind has been applied for 6 growing seasons. Crop advisor told producer that the Nitrogen is bound up in the first foot.

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition	
Sudan Grass					
Alfalfa	10 TONS PER ACRE				
Alfalfa	10 TONS PER ACRE				
Alfalfa	10 TONS PER ACRE				

LOWER YAKIMA VALLEY GROUNDWATER ADVISORY COMMITTEE — Groundwater Management Area (GWMA)

Deep Soil Sampling

1031

FIELD	1031-0-2
Acres	80
Soil Type	177 - Warden Silt Loam 2-5% Slopes
Soil Testing?	YES
Test Frequency	Yearly
Irigation Type	Pivot
Sprinkler Type	Rotators
Irrigation Schedule	Routine Schedule
Hour Sets	24
Irrigation years	

NO3 (#N/ACRE) 11/7/2014	
1 ft	568
2 ft	601
3 ft	760
4 ft	
5 ft	
6 ft	
TOTAL	1929
NH4-N	12
ORGANIC	2.34

Comments

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	90	0	0	0	0	0	90
2013	90	0	0	0	0	0	90
2012	90	0	0	0	0	0	90
2011	90	0	0	0	0	0	90

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition	
Corn	5 BUSHELS PER ACRE			Good	PLANNED
Corn	4.5 TONS PER ACRE				
Wheat	70 BUSHELS PER ACRE				
Corn	4 TONS PER ACRE				

1032

FIELD	1032-0-1
Acres	80
Soil Type	177 - Warden Silt Loam 2-5% Slopes
Soil Testing?	YES
Test Frequency	Yearly
Irigation Type	Pivot
Sprinkler Type	Rotators
Irrigation Schedule	Routine Schedule
Hour Sets	24
Irrigation years	25

NO3 (#N/ACRE) 11/7/2014	
1 ft	50
2 ft	268
3 ft	
4 ft	
5 ft	
6 ft	
TOTAL	318
NH4-N	19
ORGANIC	2.28

Comments

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	90	0	60	0	0	0	150
2013	90	0	0	0	0	0	90
2012	90	0	0	0	0	0	90
2011	90	0	0	0	0	0	90

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition	
Wheat	90 BUSHELS PER ACRE			Good	ACTUAL
Corn	5.25 TONS PER ACRE				
Corn	5 TONS PER ACRE				
Corn	4.5 TONS PER ACRE				

1033

FIELD	1033-0-1
Acres	80
Soil Type	177 - Warden Silt Loam 2-5% Slopes
Soil Testing?	YES
Test Frequency	Yearly
Irigation Type	Pivot
Sprinkler Type	Rotators
Irrigation Schedule	Routine Schedule
Hour Sets	24
Irrigation years	

NO3 (#N/ACRE) 11/7/2014	
1 ft	110
2 ft	28
3 ft	
4 ft	
5 ft	
6 ft	
TOTAL	138
NH4-N	25
ORGANIC	2.96

Comments

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	90	0	0	0	0	0	90
2013	90	0	0	0	0	0	90
2012	90	0	0	0	0	0	90
2011	90	0	0	0	0	0	90

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition	
Corn	4 TONS PER ACRE			Fair	PLANNED
Wheat	100 BUSHELS PER ACRE				
Corn	5 TONS PER ACRE				
Corn	4 TONS PER ACRE				

1034

FIELD	1034-0-1
Acres	80
Soil Type	177 - Warden Silt Loam 2-5% Slopes
Soil Testing?	YES
Test Frequency	Yearly
Irigation Type	Solid Set Above Canopy
Sprinkler Type	Impact
Irrigation Schedule	Routine Schedule
Hour Sets	24
Irrigation years	25

NO3 (#N/ACRE) 11/7/2014	
1 ft	285
2 ft	55
3 ft	
4 ft	
5 ft	
6 ft	
TOTAL	340
NH4-N	17
ORGANIC	2.62

Comments

Fertilzer Applications (#N/Acre)

Year	Liquid Manure	Solid Manure	Commercial	Biosolids	Compost	Other	Total
2014	90	0	120	0	0	0	210
2013	90	0	0	0	0	0	90
2012	90	0	0	0	0	0	90
2011	90	0	0	0	0	0	90

Cropping History

Crop 1	Crop 1 Yield	Crop 2	Crop 2 Yield	Condition	
Corn	5 TONS PER ACRE			Good	PLANNED
Corn	5.5 TONS PER ACRE				
Corn	4.5 TONS PER ACRE				
Wheat	60 BUSHELS PER ACRE				

LOWER YAKIMA VALLEY GROUNDWATER ADVISORY COMMITTEE

Groundwater Management Area (GWMA)

Deep Soil Sampling

Grower	Field #	Soil Sampling Results NO3 (#N/ACRE)							NH4-N	ORGANIC	NRCS SOIL TYPE
		1 ft	2 ft	3 ft	4 ft	5 ft	6 ft	TOTAL			
1001	1001-0-5	8	3	3	3	5	3	25	28	1.87	18 - Cleman Very Fine Sandy Loam 0-2% Slopes
1002	1002-0-2	285	124	115				524	11	2.4	121 - Scoon Silt Loam 5-8% Slopes
1004	1004-0-5	177	79	63	69	42	50	480	16	2.06	178 - Warden Silt Loam 5-8% Slopes
1005	1005-0-5	25	3	3	3	3	4	41	20	2.21	177 - Warden Silt Loam 2-5% Slopes
1006	1006-0-5	45	4	3	3	4	3	62	20	2.17	179 - Warden Silt Loam 8-15% Slopes
1007	1007-0-3	3	3	3	3			12	8	1.09	179 - Warden Silt Loam 8-15% Slopes
1008	1008-0-3	246	73	14	3			336	37	1.39	10 - Burke Silt Loam 2-5% Slopes
1009	1009-0-3	12	3	40	81			136	10	1.64	177 - Warden Silt Loam 2-5% Slopes
1010	1010-0-2	50	112	6				168	17	1.47	178 - Warden Silt Loam 5-8% Slopes
1011	1011-0-5	57	141	295	269	93	50	905	40	3.18	179 - Warden Silt Loam 8-15% Slopes
1012	1012-0-2	53	60	102				215	9	3.06	179 - Warden Silt Loam 8-15% Slopes
1013	1013-0-3	68	9	4	6			87	30	3.09	178 - Warden Silt Loam 5-8% Slopes
1015	1015-0-5	271	125	266	97	94	77	930	18	2.26	95 - Quincy Loamy Fine Sand 0-10% Slopes
1016	1016-0-5	94	19	27	36	73	124	373	16	1.71	172 - Warden Fine Sandy Loam 0-2% Slopes
1017	1017-0-5	133	14	12	14	20	9	202	11	1.52	171 - Wanser Loamy Fine Sand
1018	1018-0-5	155	55	32	35	52	100	429	10	1.64	95 - Quincy Loamy Fine Sand 0-10% Slopes
1019	1019-0-5	10	7	4	5	9	27	62	9	1.29	95 - Quincy Loamy Fine Sand 0-10% Slopes
1020	1020-0-5	93	276	208	78	38	23	716	23	2.32	173 - Warden Fine Sandy Loam 2-5% Slopes
1021	1021-0-5	315	33	99	17	40	15	519	23	2.15	172 - Warden Fine Sandy Loam 0-2% Slopes
1022	1022-0-5	16	10	17	15	21	33	112	11	1.53	57 - Hezel Loamy Fine Sand 0-2% Slopes
1023	1023-0-5	28	53	152	81	59	66	439	11	1.19	95 - Quincy Loamy Fine Sand 0-10% Slopes
1024	1024-0-5	22	21	19	34	121	57	274	19	2.4	95 - Quincy Loamy Fine Sand 0-10% Slopes
1025	1025-0-5	215	18	13	4	32	4	286	8	1.34	95 - Quincy Loamy Fine Sand 0-10% Slopes
1026	1026-0-5	314	10	7	7	7	3	348	22	1.33	172 - Warden Fine Sandy Loam 0-2% Slopes
1027	1027-0-5	115	121	99	67	114	66	582	23	1.94	171 - Wanser Loamy Fine Sand
1028	1028-0-5	11	3	3	3	3	3	26	16	1.39	143 - Starbuck-Rock Outcrop Complex 0-45% Slopes
1029	1029-0-5	8	3	11	4	3	3	32	10	1.17	177 - Warden Silt Loam 2-5% Slopes
1030	1030-1-5	113	57	8	6	7	6	197	31	2.86	66 - Kittitas Silt Loam
1031	1031-0-2	568	601	760				1929	12	2.34	177 - Warden Silt Loam 2-5% Slopes
1032	1032-0-1	50	268					318	19	2.28	177 - Warden Silt Loam 2-5% Slopes
1033	1033-0-1	110	28					138	25	2.96	177 - Warden Silt Loam 2-5% Slopes
1034	1034-0-1	285	55					340	17	2.62	177 - Warden Silt Loam 2-5% Slopes

Attachment E

- Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area – Scope of Work and Budget – Version 1.2a dated December 3, 2014

LOWER YAKIMA VALLEY GROUNDWATER ADVISORY COMMITTEE

Groundwater Management Area (GWMA)

Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area – Scope of Work and Budget

Version 1.2a

December 3, 2014

Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area – Scope of Work

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Project Management

WSDA Lead:

Kirk V. Cook, LG, LHG

Mr, Cook has over 35 years of experience with the US Geological Survey, the Washington State Departments of Health and Ecology, and current oversees the Washington Department of Agriculture's Natural Resource Assessment Section comprised of 10 research staff with expertise in environmental toxicology, pesticide use, hydrogeology, water resource management, GIS application science, environmental engineering, water quality and water resource modeling, endangered species protection, and agricultural science. Combined experience and education of section staff exceeds 80 years.

1.0 Purpose

The goal of the Lower Yakima Groundwater Management Area is to reduce nitrate contaminations in groundwater below state drinking water standards. Within the boundaries of the Lower Yakima Groundwater Management Area exists areas where the state drinking water standard for nitrate (10mg/L) has been exceeded for years. This area has supported a variety of agricultural practices for over 100 years. Many of these practices have required the use of nitrogen fertilizers and nutrients (both organic and inorganic) or where nutrient rich effluent haves been allowed to enter the soil column via permitted or otherwise sanctioned activities. These applications are suspected to have contributed to the elevated levels of nitrate in groundwater currently used as drinking water supplies. In order to determine to what extent the application of nitrogen has contributed to the elevated nitrate levels in groundwater, it is necessary to evaluate current land use management practices suspected of contributing to groundwater loading of organic and inorganic nitrogen. This is necessary to determine the activities contributing and to what degree that contribution may be impacting groundwater quality.

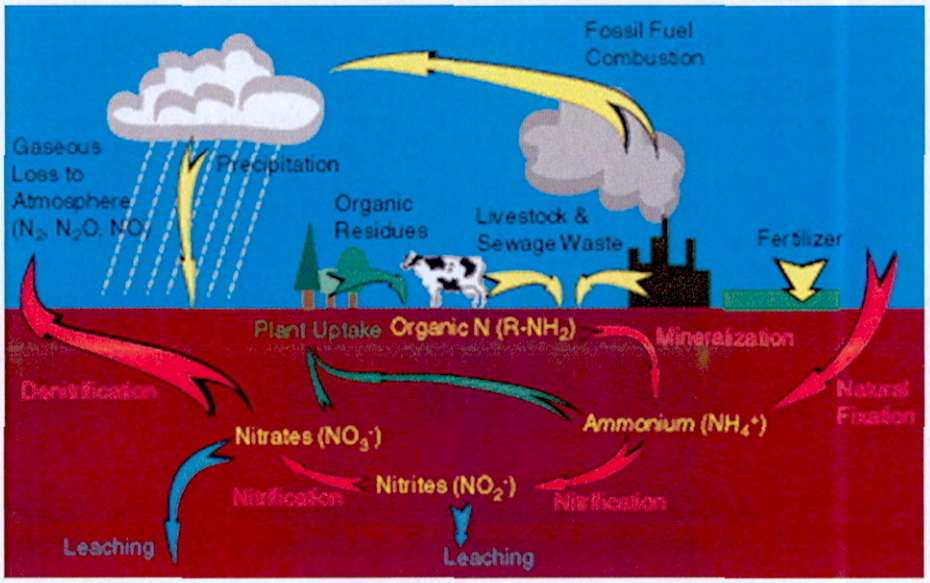

Figure One: Factors to be considered during the assessment of nitrogen loading and relationship to groundwater quality

The Nitrogen Loading Assessment is a mass-balance model. These models are the simplest models employed by researchers. These models have value in that they are able to predict mass flux in a generalized sense and do assist in estimating loading rates from various land uses and estimating input rates and concentrations for transport modeling. The limitation on these types of models is that they cannot be used to predict solute concentration at any single point in time or space. The Nitrogen Loading

Assessment will provide the information necessary to evaluate the nitrate contribution from various sectors within the boundaries of the GWMA and will provide information loading estimates to crop management / livestock management, and activities associated with residential, commercial, industrial and municipal activities. These estimates are necessary to evaluate the spatial loading of vulnerable groundwater within the Groundwater Management Area boundaries (which can result in elevated nitrate levels in drinking water), the effectiveness of current management practices in limiting that loading, and if necessary, provide a basis for implementation of new or expanded practices that may be required to achieve the goals of the GWMA.

Establishing a relationship between nitrogen loading to land surface and underlying water quality requires an understanding of, the factors influencing the degree to which that nitrogen is used by crops, lost to the atmosphere, or modified as it passes through the soil column. This assessment will utilize a combination of peer reviewed scientifically derived estimates applicable to the Yakima Valley in combination with specific land use management data collected through the Deep Soil Sampling project and supplemented by targeted data collection activities conducted by WSDA, Yakima County, the Washington Departments of Ecology and Health.

2.0 Overall Concept

The Nitrogen Loading Assessment is a cooperative project between Yakima County and The WA Department of Agriculture. The goal of the Assessment will be to develop a mass balance for nitrogen usage within the GWMA. In achieving this goal, assessments of specific activities conducting both permitted and non-permitted nitrogen application will be developed and will provide data on which to base both land use recommendations within the Groundwater Management Area Plan and educational materials for use by residents within the GWMA. The results will provide focus on those modifications in land management or facility operations that have the greatest potential to reduce or eliminate excess nitrogen loading to the land surface which ultimately result in excessive nitrate leaching to underground sources of drinking water.

The assessment, in addition to accessing the degree to which current land management activities may be impacting groundwater quality, will provide data (in conjunction with the Deep Soil Sampling Project) regarding the extent to which current groundwater quality is being impacted by historic nitrogen management techniques.

The assessment of nitrogen loading and loss will be divided into two sub-activities. One for irrigated and livestock agriculture, the other for residential, commercial, industrial municipal activities. WSDA will have primary responsibility for the assessment of irrigated and livestock activities, Yakima County will focus on assessment of residential, commercial, industrial, and municipal activities. These two areas of interest will be addressed in the application of the following overriding equation:

NLGW = RL + BL + IACF + IAOF + CAFOPP +AL

Where

• NLGW = nitrogen load to groundwater, which assumes that all nitrogen present below the root zone will become nitrate and either be denitrified or leach to groundwater.

• RL = nitrogen loading to groundwater from residential sources including septic tanks, lawn fertilization, and onsite septic systems

.

• BL = nitrogen loading to groundwater from sites with municipal biosolids, and municipal and industrial wastewater (under State Waste Discharge Permits, or NPDES permits)

• IACF = nitrogen loading to groundwater from irrigated agriculture land use where chemical fertilizers are applied and further discussed below

• IAOF = nitrogen loading to groundwater from irrigated agriculture land use where organic fertilizers (e.g., manure) are applied

• CAFOPP = nitrogen loading to groundwater from livestock pond and pen sources this will include such activities as lagoon operations, composting activities, feeding and milking areas

• AL = nitrogen loading to groundwater from atmospheric deposition. Local values from national atmospheric monitoring data sets will be used and applied evenly across the GWMA.

Note: Where appropriate denitrification will be factored into the overall sector contribution for the equation above. As specified in Sections 4 thru 6 below, denitrification will (when appropriate) will be applied to the original nitrate load as calculated or estimated in the respective source category.

3.0 Development of Comprehensive Nitrogen Source Database

In order to adequately evaluate the effects of nitrogen application for the majority of land uses within the GWMA boundaries, it will be necessary to develop a database or GIS linkage capable of housing application and management data from a wide variety of source specific information collected using differing methodologies. Some database fields will be similar for all sources, whereas other data fields will be source-specific, and it will be designed so that it will be expandable and able to include additional fields. Data collected for the major sectors identified by the GWAC will be clearly identifiable within the data so that analysis can be conducted on a sector by sector basis if desired. Most data fields will be identified during the initial creation of the database or GIS linkage, though some will likely be added as management practices change or updated information becomes available. WSDA and Yakima County have taken steps toward the development of a GIS linkage structure. This structure will be submitted for review to the County, and the Data, RCIM, IA, and Livestock/CAFO working groups prior to entering source data into it. This review will apply to the final draft report and will exclude any trial or developmental runs of the database). The database will include numeric fields to support calculations, as well as fields necessary for display within the GIS environment. Three main tasks are associated with this activity; data evaluation prior to database development in order to develop necessary fields and evaluate the utility of a single database or two separate databases linked to operate as one, development of database structure, and database population.

Task 3.1 Evaluate current and planned data sources to determine necessary database fields[1]

Estimated Budget 100 hours @ 26.00/hr $ 2600.00

Task 3.2 Develop comprehensive database for all nitrogen sources covered by RCIM, Irrigated Agriculture, and Livestock Agriculture. Database will be developed using Access from which a geodatabase will be created for use within the ESRI environment.

Estimated Budget 100 hours @ 35.00/hr $ 3500.00

Task 3.3 Population of database with data collected as a result of grower surveys, estimates for various land uses associated with residential, commercial, industrial, and municipal sources, and data collected from on-site livestock operations.

[1] Data quality will be guided by a developed QA/QC plan, some of which currently exists within documents produced by PGG for environmental data collection.

Estimated Budget	*80 hours @ 26.00/hr*	*$ 2080.00*
Total Budget for Task 3.0		***$ 8180.00***

4.0 Residential, Commercial, Industrial, and Municipal Assessment

Yakima County will be the lead for assessing the overall nitrogen loading that occurs as a result of activities associated with RCIM activities. This will include assessment of septic systems, state waste discharge permits (Ecology), underground injection well contribution, and hobby farm activities. WSDA will provide technical assistance to Yakima County regarding application of various methodologies applied to the parcels to estimate N loading. WSDA will also assist the County by facilitating the involvement of technical experts currently working for cooperating state and federal agencies, or consultants.

Residential and Municipal Septic Systems and other Residential Sources

Parcel data from Yakima County will be used by the County to identify parcels where residential septic systems are present. Septic loads from each parcel will be calculated assuming an average sized household in Yakima County (based on census data), consultation with Yakima County, WA Department of Ecology and the Washington State Department of Health. In estimating daily septage volumes and nitrogen loads per person, WSDA will utilize a septic system leaching model developed by the Environmental Assessment Program at the Department of Ecology. Model developers will assist WSDA in its application. These data sources and assessment methodology will be referenced in the final report. Prior to employing these sources/references, project leader(s) will consult the Monitoring and Data Work Group for review and comment.

If a large on-site septic system (LOSS) is designed to enhance denitrification and that design is identifiable in WDOH or Ecology records, the enhanced denitrification rate will be considered.

In addition to septic loads, other residential nitrogen sources such as fertilization of lawns and gardens will be examined. Information on fertilization practices and the percent of homeowners who actively fertilize will be pursued and the data most representative of LYV (given geography, environment, and socio-economic factors) will be used for this project. If local data are unavailable, regionally recommended fertilization practices and data will be reviewed to estimate nitrogen loading due to lawn fertilization. These data currently exist in peer reviewed documents published by the University of California-Davis, and other research institutions. Existing data sources (GIS coverage's, aerial photographs, and previous reports) will be reviewed to assess the most feasible way to quantify local lawn areas. City parks and golf courses with their associated fertilization rates will be included in this analysis.

Currently Regulated RCIM Activities

Sites for which there exists a State Waste Discharge Permit (discharging to the ground) will be identified based on Department of Ecology online records. These permits include mandated limits for nitrogen discharge to underlying groundwater. Additionally the locations of municipal Underground Injection Control (UIC) devices will be obtained from the online Ecology UIC database and local municipalities to identify features that may act as conduits allowing surface water (and potentially contaminants within it) to more easily enter groundwater. All sites will be entered into the database but sites used for groundwater calculations will be limited to those with potential to impact groundwater based on consultation with the Department of Ecology. Location and source data will be entered into the nitrogen source database so that nitrogen loading rates can be estimated. Facilities that are potential nitrogen sources and are not regulated under NPDES/State Waste Discharge Permits (such as large onsite septic systems, biosolid application areas, or com-posting facilities) will also be reviewed, with relevant data obtained from Ecology the Washington State Department of Health, and Yakima County for inclusion in the nitrogen source database.

Other potential sources of nitrogen from residential land use include pet waste and hobby farms/livestock nutrients. Regional or literature values will be used to estimate nitrogen loads associated with pet and hobby-farm livestock nutrient management. Prior to use of any regional or literature values, the Monitoring and Data Work Group will be consulted.

Assessment of RCIM nitrogen loads will require a minimum of field work and data collection, therefore the budget does not reflect an allocation for field data collection.

Task 4.1 Analysis of septic system N loading using existing parcel data and database

Estimated Budget 90 hours @ 30.00/hr $ 2700.00

Task 4.2 Identify and analyze N loading from permitted land application sites. This task will be coordinated with the Washington State Department of Ecology.

Estimated Budget 30 hours @ 30.00/hr $ 900.00

Task 4.3 Develop N loading estimates from municipal Underground Injection Control devices. This will include analysis of stormwater management structures, but will not include an assessment of potentially existing UIC's

nor will there be an attempt to identify UIC not currently noted in Ecology's UIC database.

Estimated Budget *60 hours @ 30.00/hr* *$ 1800.00*

Task 4.4 Develop N loading estimates from hobby farm operations. This task will require coordination with WSDA and CD's within the GWMA. Typical N loading for pasture parcels will be developed by WSDA and CD's and applied to existing parcel database. Loading estimates due to application for lawn and garden uses will be captured in this Task.

Estimated Budget *60 hours @ 30.00/hr* *$ 1800.00*

Task 4.5 Assemble data analysis for RCIM elements and produce estimated N loading in both database and GIS formats.

Estimated Budget 60 hours @ 30.00/hr *$ 1800.00*

Total Budget for Task 4.0 ***$ 9000.00***

5.0 Irrigated Agriculture Source Quantification

Data for the irrigated agriculture nitrogen loading assessment will be collected using three different methods:

1) County specific crop use, irrigation method, and fertilizer databases

2) Information gathered from a voluntary grower questionnaire that will report site-specific information regarding nitrogen application and removal over several growing cycles and

3) Information collected through a series of group interviews/surveys with local crop consultants and agronomists.

Because collection of the deep soil survey data set may take up to two years as part of the GWMA's Deep Soil Sampling program, WSDA has developed a GIS layer based on recommended fertilizer application from published crop-specific growing manuals. This will be used as an initial baseline and modified as additional information collected from grower surveys (from DSS project) and group interviews becomes available[2]. As the representative set of grower surveys increase in numbers they will be compiled and calculations will be updated using that additional site specific data.

Nitrogen application and removal rates will be evaluated to estimate nitrogen excess or deficiency for groups of crop, soil, fertilization, irrigation, and removal combinations. This evaluation will be conducted by a group of qualified agronomists selected by WSDA for their expertise in nitrogen behavior and local expertise. Fields contained within the operational boundries of livestock operations and upon which manure is applied will be evaluated using the same process as outlined below for irrigated agriculture fields using manure, chemical fertilizer, or combination of chemical fertilizer and manure. Excess nitrogen determined through the evaluation will be assumed to be available for leaching to groundwater. The 2013 WSDA field-specific crop distribution map will then be used as a platform to allocate nitrogen loading across the GWMA based on crop acreage and growing areas. This process will identify a long-term nitrogen balance consistent with current (and recent historical) practices which is not dependent on irrigation or weather (these factors mostly affect timing of nitrate percolation which is not addressed in this analysis).

Use of Grower Survey Data

[2] WSDA has developed a contingency explained in Section 9 that can be used to supplement data collection in the event that the number of grower surveys completed are insufficient to provide a statically valid population on which to conduct the analysis.

WSDA will use data collected from voluntary grower surveys that will provide detailed information regarding nitrogen application and loss over several growing cycles. WSDA will conduct an assessment as to the statistical validity of the surveys as compared to the total number of crop specific parcels. Coordination with the National Agricultural Statistics Service (NASS) will be sought to determine at which level statistical validity will occur, This will be completed prior to assessment of the N loading for irrigated crop lands.

Survey data from a representative sample of the major crops grown in the GWMA boundaries will be analyzed and a typical application/loss determination made for each major crop or livestock activity. Using the 2013 WSDA crop distribution map those typical results would be allocated across the GWMA based on acreage for each crop and/or activity and determination made as to excess or deficient of nitrogen available for leaching to groundwater across the GWMA or in smaller sub-areas as deemed necessary. Based on these results targeted Best Management Practices and educational products can be selected or developed to address those areas, crops, or activities that are determined to contribute to nitrate loading to shallow groundwater.

WSDA, is aware that a sufficient number of surveys may not be received to allow for extrapolation of typical use of nitrogen for each major crop within the boundaries of the GWMA. To address this potential "issue", WSDA will conduct a series of group interviews for growers, consultants, and agronomists to collect data regarding nitrogen timing, application amount, irrigation, etc. This process will mimic that used in the collection of pesticide use data that WSDA has implemented since 2002 with good results. This data combined with that received from grower surveys should provide for an adequate population to conduct the necessary analysis. Depending upon the number of these "meetings" that are considered necessary; the budget estimate may vary by $1000.00 to $2,000.00 this activity.

General

The following equation will be used to estimate nitrate loading to groundwater from irrigated agricultural fields:

Nitrogen load to ground water = (Nitrogen input - Nitrogen removed by cropping)*(1- denitrification fraction)

For crops that fix nitrogen (legumes such as alfalfa and peas), either a fixation term will be included in the nitrogen input term or a calculation using a leached concentration and recharge volume will be used to calculate loading (as performed in other studies), depending on data availability.

Use of the above equation requires the following assumptions and limitations:

- All nitrogen not consumed by the crop and removed will become nitrate
- Excess nitrate is denitrified in the vadose zone or leaches to groundwater
- Input and results are not variable over time and can be approximated with average annual values
- Removal of nitrogen from a field via runoff or tile drainage is negligible

Task 5.1 Develop spreadsheet of grower survey results including estimates of N application, irrigation amounts and timing, biomass removal, crop type, etc.

Estimated Budget 50 hours @ 55.00/hr *$ 2750.00*

Task 5.2 Conduct statistical analyses of survey populations, and analyze spreadsheet data as to major influences.

Estimated Budget 30 hours @ 55.00/hr *$ 1655.00*

Task 5.3 Develop crop specific and basin wide NO3 loss estimation, this includes analysis of all survey and published data, working with agronomists to determine crop uptake and N removal from "non-fertilizer" activities. An estimation of total nitrogen budget for each major crop will be develop and rolled into a basin wide estimation following the equation contained in Section 2.0 of this scope.

Estimated Budget 280 hours @ 55.00/hr *$ 15400.00*

Total Budget for Task 5.0 ***$ 19805.00***

Revised Budget to Include Grower Meetings ***$21805.00***

6.0 Livestock Sources Quantification

Evaluation of N loading from livestock sources will be confined to those areas under the jurisdiction of WSDA (Dairy) or under permit by Ecology as a Confined Animal Feeding Operation[3]. Movement of manure off these designated facilities on to cropland will be captured under the assessment for irrigated agriculture. Nitrogen sources from livestock are divided into two categories, and will focus on dairy and CAFO operational lands:

- Lagoons, feeding and milking pens on unpaved surfaces, composting facilities, manure storage areas, liquid (stormwater) storage areas
- Other possible sources (ditches and pipelines between lagoons and solids separators, and silage leachate)

Agricultural areas where manure is spread to grow a crop will be covered under the irrigated agriculture chapter

Existing data from WSDA and Ecology will be evaluated and may include number of animals per facility, lagoon size, manure storage system, and animal yard size. Required data for this analysis is the current number of head per facility.

Additional data that will be obtained through a literature review or data collection include:

- Manure produced per dairy cow and per beef cow and manure nitrogen content
- A range of lagoon seepage and nitrogen leaching rates
- Ammonia volatilization rates from stored and applied manure
- Typical nitrogen loads generated in unpaved animal yards
- Typical manure management practices for animal yards
- Amount of solids/compost or other nitrogen-containing material that is exported from the GWMA

One meeting is planned with the Livestock/CAFO working group to review and receive feedback regarding "typical" management practices and implemented BMPs within the LYV. Potential nitrogen sources and sinks on local CAFOs will also be discussed as an exercise to identify potentially overlooked nitrogen sources or sinks.

[3] Data collected as a result of US EPA's consent order with four dairies will be considered as appropriate and where QA/QC requirements meet federal data collection protocols

Published data and work group feedback will be compiled and analyzed to define typical management practices for livestock facilities. Nitrogen mass balances will be calculated based on the number of cows per facility and type of facility (dairy vs beef), typical manure management and storage practices, calculated lagoon/pond leaching rates, expected loading rates from pens, manure removed from the facility for land application or other uses, denitrification, and other quantifiable nitrogen sources/sinks. Nitrogen mass balance results will be allocated across the GWMA at dairy and CAFO facilities. The following equation will be used as a basis for calculating a livestock N loading mass balance:

(Number of cows x Manure generated per cow x Nitrogen content of manure) = Nitrogen leached from storage ponds + Nitrogen leached from unpaved animal yards + Nitrogen removed for local land application + Nitrogen exported from the GWMA as compost or in other forms + Nitrogen lost to volatilization + Nitrogen lost to denitrification

The use of this equation assumes that:

- Input and results are not variable over time and can be approximated with average annual values
- On an average annual basis, all manure and nutrients generated on a livestock operation will be removed, leached, or volatilized (i.e. long-term storage of manure does not occur)
- All major nitrogen sources/sinks for a given livestock are identified in the equation

Data collected within the area referred to as the "dairy cluster" will be evaluated for use in the N evaluation provided that acceptable QA/QC requirements are met (data collected using federal data collection protocols will be considered acceptable).

Task 6.1 Conduct literature review to assemble peer reviewed data on lagoon leakage rates, regional nitrogen content of manure from dairy and beef cattle, required manure handling activities on facility sites. Coordinate with EPA regarding "lagoon" data collected from "Dairy Cluster".

Estimated Budget 30 hours @ 26.00/hr $ 780.00

Task 6.2 Conduct evaluation of manure generation using latest livestock population data, evaluate 3rd party application, develop lagoon leakage rates, evaluate soil testing results and evaluate manure export activities.

Estimated Budget 90 hours @ 45.00/hr $ 4050.00

Task 6.3 Develop N loading estimate for designated dairy and CAFO properties

Estimated Budget *35 hours @ 45.00/hr* *$ 1575.00*

Total Estimated Budget Task 6.0 ***$ 6405.00***

7.0 Comparison of Nitrogen Loading Assessment to Other Related Estimates

Quality Assurance/Quality Control evaluations are proposed to check assumptions and parameters used in the Nitrogen Loading Assessment. These activities include:

- Compare livestock mass balance results with grower survey results to verify assumptions used related to manure application. If the total nitrogen applied across the GWMA as organic fertilizer based on grower survey data differs significantly from the mass expected based on the number of livestock in the GWMA and other identified organic nitrogen sinks, input parameters for the nitrogen loading assessment will be reevaluated. This activity will be addressed through periodic revisions to the document as is warranted as new information become available.

- Conduct an assessment on synthetic fertilizer use using the mass applied to fields *(based on grower surveys and WSU rates) compared to nitrogen fertilizer mass sold* by fertilizer distributors (assuming data are available). This will provide a check on amounts claimed on grower surveys.

    - Use of current and historical groundwater quality data may be used to assist in defining areas where the results of the mass balance appear to be at odds with groundwater data. Care will be exercised not to confuse water quality that may be the result of historic application from land management activities currently being conducted.

- Upon completion of the Deep Soil Sampling analysis, compare and contrast Nitrogen Loading Assessment with DSS findings. Existing shallow groundwater nitrate data may also be used for this purpose. *The installation of shallow groundwater wells for N loading verification is not considered part of this project. If deemed necessary, this activity should be included in any future groundwater monitoring projects.*

Task 7.1 Conduct evaluation of synthetic fertilizer use (grower survey vs. synthetic fertilizer sold). This task is dependent upon willingness of fertilizer outlets and crop consultants to supply WSDA with data.

Estimated Budget *40 hours @ 45.00/hr* *$ 1800.00*

Task 7.2 Evaluate DSS results with N Assessment results and determine relative gaps in assessment.

Estimated Budget 80 hours @ 55.00/hr $ 4400.00

Total Estimated Budget Task 7.0 ***$ 6200.00***

8.0 Communication and Reporting

A GWMA-wide nitrogen balance will be calculated using the database(s) at the parcel/field scale. The total load from a parcel/field will be the sum of loads from all sources considered. The data will then be mapped at a scale necessary for the GWAC to base GWMA plan recommendations.. A draft report will then be submitted to the Data, IA, RCIM, and Livesock/CAFO work groups for review. It is assumed that up to four conference calls will occur for comments, feedback, and clarification for working group members. The chairs of the working groups will compile, summarize, and resolve conflicting written comments and generate a set of comments for Yakima County/WSDA to complete a GWAC-review draft. Yakima County/WSDA will address working group comments, then produce a GWAC-draft report. A final report will be generated after addressing GWAC comments.

Task 8.1 Develop draft report on nitrogen loading and loss for the Lower Yakima Valley Groundwater Management Area. This will include sub-assessments of the three major areas of concern: RCIM, Irrigated Agriculture, and Livestock/CAFO operations. This report will be submitted to the GWAC for comment. This will be a cooperative effort between WSDA and Yakima County

Estimated Budget 120 hours @ 45.00/hr $ 5400.00

Task 8.2 Review comments from GWAC, and workgroups. This item includes up to four single or joint meetings with workgroups to consider comments, and will conclude with the presentation of a final report on N loading in the Lower Yakima Valley. This will be a cooperative effort between WSDA and Yakima County

Estimated Budget 50 hours @ 45.00/hr $ 2250.00

Total Estimated Budget Task 8.0 ***$ 7650.00***

Total Project Budget Estimate ***$ 56660.00 - $58660.00***

This budget is for the combined work from Yakima County and WSDA and represents and estimated split of $ 13,000.00 for Yakima County specific activities and $ 45,000.00 due WSDA.

It should be noted that the budget submitted does not reflect the true cost of the project but rather approximately 70% of the cost. Because of the critical nature of the project and the need to establish a N loading baseline, WSDA and Yakima County will contribute significant staff resources not funded by GWMA monies to ensure the timely completion of the project.