



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, Washington 98101

December 1, 2011

Reply to: Donald M. Brown  
Attn of: OEA-095

**MEMORANDUM**

Subject: Data Validation Report for the Dissolved Gas and Age Dating Analyses of the Samples Collected from the Yakima Basin Nitrate Study Phase 3

From: Donald M. Brown, QA Chemist <sup>DMB</sup>  
USEPA Region 10, Office of Environmental Assessment, Environmental Services Unit

To: Ginna Grepo-Grove, Regional Quality Assurance Manager  
USEPA Region 10, OEA

The quality assurance (QA) review of the analytical data generated from the analysis of twenty-eight (28) water samples collected from the Yakima Basin Nitrate Study Phase 3 has been completed. These samples were analyzed for Age Dating using sulfur hexafluoride (SF<sub>6</sub>) by the United States Geological Survey (USGS) Reston Chlorofluorocarbon Laboratory located in Reston, Virginia using in-house Standard Operating Procedures (SOPs).

This review was conducted for the following Age Dating samples from the Phase 3 Study:

10154201	10154202	10154203	10154204	10154205	10154206
10154207	10154208	10154209	10154210	10154211	10154212
10154213	10154214	10154215	10154216	10154217	10154218
10154219	10154220	10154221	10154222	10154223	10154224
10154225	10154226	10154227	10154228		

In addition, this QA review also includes the analytical data generated from the analysis of five (5) water samples for Dissolved Gas by the USGS Reston Chlorofluorocarbon Laboratory using in-house SOPs.

This review was conducted for the following Dissolved Gas samples from the Phase 3 Study:

10154201	10154202	10154214	10154221	10154225
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All sample analyses were evaluated following EPA's Stage 2B Data Validation Manual Process (S2VM). The validation was conducted according to the Quality Control Specifications outlined in the Quality Assurance Project Plan for the Yakima Basin Nitrate Study Phase 3 (April 2010) and the methods outlined on the Reston Chlorofluorocarbon Laboratory website (<http://water.usgs.gov/lab/>) as well as the research publication *Dating Young Ground Water with Sulfur Hexafluoride: Natural and Anthropogenic Sources of Sulfur Hexafluoride* (E. Busenberg & L. Plummer, 2000). The conclusions

presented herein are based solely on the information provided for this review (see below). None of the detected results and calculations were verified using the instrument raw data.

### **Limitations of Data Validation**

The following documents were used as supporting documentation for data review:

- *USGS Dissolved Gas Excel Spreadsheet*
- *USGS Age Dating Excel Spreadsheet*

### **Overall Assessment**

The age dating analysis is a screening tool that uses dissolved gas values to calculate the recharge date and recharge age of groundwater samples. Since excess air can dissolve in the samples during recharge, the laboratory notes the importance of dissolved gas analysis when dating groundwater. As shown in the above sample lists, only five of the twenty-eight samples had dissolved gas measurements that were used to calculate the recharge date and recharge age. For the remaining samples, the dissolved gas results for sample 10154225 were used as a default for calculating the age dating results. **Therefore, with the exception of samples 10154201, 10154202, 10154214, 10154221, and 10154225, all of the age dating samples were flagged estimated.**

### **Sample Results & Reporting Limits**

On the Age Dating Excel Spreadsheet, several samples (10154201, 10154211, 10154212, 10154223, and 10154228) were given a value of “C” instead of recharge date and age. The “C” stands for contaminated but indicates that the concentration of SF<sub>6</sub> in the groundwater exceeded the highest expected concentration based on the average atmospheric concentration of SF<sub>6</sub>. There were no reported results for samples with a “C” value.