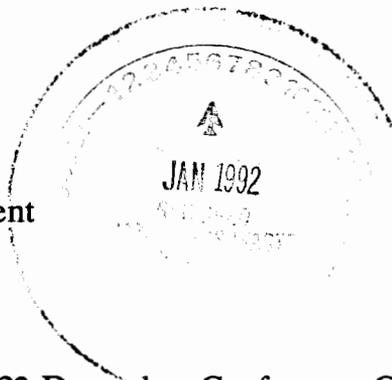


30 December 1991

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Subject: Responses Related to 23 December Conference Call, Holloman AFB
Groundwater Monitoring Program

Dear Bruce:

This letter is to respond to two issues remaining unresolved following the 23 December conference call involving you and representatives of the Army Corps of Engineers (USACE), the Environmental Protection Agency (USEPA), and Radian. The topic of the conference call was the data obtained for groundwater samples taken in September 1991 in support of the groundwater monitoring program at Holloman AFB. The two remaining issues are:

- 1) The data for volatile organic compounds obtained using Method 8240 and a suggestion that GC/MS instruments used to perform Method 8240 be isolated from sources of contamination.
- 2) The difference between reporting data to a reporting limit and to a method detection limit.

Below, I address these issues.

Issue 1: NMED is reluctant to dismiss the possibility that methylene chloride and other compounds detected in samples and trip blanks are present in the groundwater although these compounds are common contaminant in the laboratory.

The problem of contamination by airborne solvents during sample collection and determination of volatile organic compounds has been long recognized by EPA, regulatory bodies, analytical laboratories, and the regulated community. The problem continues to vex data validators despite efforts in the field and laboratory to minimize contamination during shipment of sample containers to and from the sampling site, during sample collection, and during chemical analysis. Contamination during analysis is usually by methylene chloride, toluene, acetone, and other ketones such as 2-butanone. These solvents, particularly methylene chloride, are commonly used in laboratories. The impact of these solvents on determination of volatile organic compounds may be profound although they are used some distance from where volatile organic compounds are being determined.

The analysis of trip blanks, field blanks, and system blanks, respectively, contribute data which often prove useful in documenting potential sources of suspected contamination.

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Trip blanks provide data concerning contamination during transit and analysis. Field blanks provide data concerning contamination during decontamination, return transit, and analysis. System blanks provide data concerning airborne contamination during analysis. Examination of the September 1991 data for volatile organic compounds suggests that the data obtained are valid and defensible for the following reasons:

- a) The similarity of the data for Method 8240 for trip blanks and associated system blanks suggests that the methylene chloride detected by Radian during the September 1991 analyses is due to airborne contamination within the laboratory. The concentrations of methylene chloride in several of the samples were only slightly greater than the concentrations in the trip and system blanks. Please note that this assessment was made using previously unreported data which were less than the reporting limit; see below.
- b) The data obtained by the EPA subcontract laboratory using Method 8240 on split samples showed low levels of methylene chloride in samples and trip blanks as did Radian's data, but also showed acetone unlike Radian's data. These data document the identities and relative levels of airborne contaminants which may prevail in two laboratories analyzing identical samples.
- c) The data obtained by a third laboratory employing Method 8010 showed no contamination by methylene chloride down to 2 $\mu\text{g/L}$.
- d) One yardstick of reasonable GC/MS system blanks for volatile compounds is provided by the criteria for EPA's Contract Laboratory Program (CLP) which supplies analytical data for CERCLA enforcement actions. The most recent CLP Scope of Work (OLM01.0) carries acceptance criteria which mandate that system blanks must contain less than 50 $\mu\text{g/L}$ of methylene chloride, acetone, and 2-butanone, respectively, and less than 10 $\mu\text{g/L}$ for other target analytes. Otherwise, analyses for volatile compounds may not proceed. The criteria published in the Holloman project Analytical Plan, dated 28 August 1991, mandated a maximum concentration of 25 $\mu\text{g/L}$ for methylene chloride in system blanks. The system blank data for the September 1991 analyses certainly meet the criteria of CLP and the Holloman project Analytical Plan.

The recent relocation of Radian's laboratories to a new facility should significantly reduce the impact of airborne solvents on the determination of volatile organic compounds using Methods 8240 and 8010. The instruments used to perform these methods are physically segregated from all other instruments. A further measure of isolation is afforded by segregating the ventilation system of this dedicated work area from the rest of the laboratory building and particularly the area in which solvent extractions are performed. Preliminary results are very promising. Acetone has been seen as an intermittent contaminant despite the careful planning in designing the laboratory. The suspected

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source of acetone is the standard construction material used to construct the building and the resulting contamination of reagents.

Issue 2: New Mexico Environmental Department has chosen the method detection limits (MDLs) as the action levels triggering verification sampling. Radian's data were reported down to our standard reporting limits which are greater than our demonstrated MDLs but meet the published practical quantitation limits (PQLs). These reporting limits appear under the header Method Detection Limit in Appendix B of the Holloman project Analytical Plan dated 28 August 1991.

The data reported for the September 1991 analyses were reported down to Radian's standard reporting limits carried on its laboratory information management system (LIMS). These laboratory reporting limits (LRLs) are typically the published practical quantitation limits (PQLs) listed in the method except where the published PQLs are unattainable. The laboratory is obligated to demonstrate that its method detection limits (MDLs) for laboratory-grade water are less than the LRLs. A similar approach is taken by the EPA CLP in which the LRL is contractually known as the contract required quantitation limits (CRQLs). Typically, the EPA PQLs, EPA CRQLs, and most laboratories' LRLs are identical or, at least, comparable for most tests and analytes.

The MDL is defined in a regulatory sense as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The MDL for a compound is determined by analyzing numerous spiked aliquots of pristine, laboratory-grade water and then performing the prescribed calculations using the resulting data. The MDLs are thus obtained at a single interval of time for reference samples which undoubtedly differ in most regards from the aqueous investigative samples subsequently analyzed. Radian has found that these calculated MDLs usually underestimate the prevailing detection limits even for laboratory-grade water for which they are obtained. That is, if standards prepared at the concentration of the MDLs are analyzed, the target compounds may or may not be detected. Clearly, this experience is contrary to the regulatory definition of MDL. Further, after the MDLs are calculated, the prevailing detection limits of the instrument will necessarily change over time under the influence of subsequent analyses on the analytical system. Detection limits for specific investigative samples are also influenced by the levels of target and non-target constituents present and physical/chemical matrix interferences.

Most laboratories elect, therefore, to report data down to LRLs at which they feel they can report data of specified accuracy and precision. The foremost reason for reporting down to LRLs is that data are necessarily reported on a sample-by-sample basis and it is impractical to determine and report MDLs for each sample analyzed. To report down to the MDL calculated for laboratory-grade water may overestimate the sensitivity actually realized for a particular sample analyzed. This approach also allows use of a single LRL for a compound in the face of differences in sensitivity between redundant instruments used to perform the same test. Such an approach is absolutely necessary given the nature

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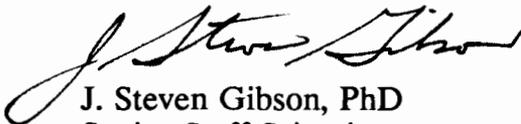
and volume of the data obtained from these instruments and the practical need to report data on a timely, ongoing basis.

Radian understands that NMED needs to take a conservative stance with regard to the data it reviews. One approach which accommodates this need and the data obtained in September 1991 would be that taken by the EPA CLP for GC/MS data. Data obtained less than the LRL could be reported using the "J-flag" convention of CLP. This approach would allow for reporting of data less than the LRL as qualified. For example, if the LRL is 10 $\mu\text{g}/\text{L}$ for an analyte detected in a sample at 3 $\mu\text{g}/\text{L}$, the reported value would appear as 3J $\mu\text{g}/\text{L}$. The "J-flag" denotes that a greater degree of quantitative uncertainty is associated with the data reported than data closer to or exceeding the LRL. The lower end of the reporting range would approximate the prevailing detection limit with the additional confidence that the mass spectral identification criteria of retention time and mass spectral match must be met.

This situation is contrasted with that for determinations with chromatographic methods using conventional detectors (e.g., Method 8080). The prevailing detection limit for such methods are very dependent on matrix interferences which cannot be distinguished from analyte response. It is recommended that LRLs be used for chromatographic methods, as the data were initially reported, since values below the LRL are generally of limited value. The LRLs for methods involving inorganic parameters are very close to the MDLs; these data may be used as initially reported.

I hope this letter adequately responds to the two remaining issues regarding the September 1991 data for the Holloman groundwater monitoring program. I will be glad to discuss these issues further during our next scheduled conference call on 31 December at 10:00 a.m. MST.

Sincerely,



J. Steven Gibson, PhD
Senior Staff Scientist
Client Services Coordinator

JSG:kla

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