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ENVIRONMENTAL INC.

December 5, 2007

San Timoteo Watershed Management Authority (STWMA)
Project Committee 1 (PC-1)
Attn: J. Andrew Schlange
560 Magnolia Avenue
Beaumont, CA 92223

Subject: Response to Comments on WEI's Final Report:
*"Water Quality Impacts from On-Site Waste Disposal Systems in the
Cherry Valley Community of Interest, March 2007"*

Dear Mr. Schlange,

The purpose of this letter is to respond to comments concerning the subject report that were forwarded to County Supervisor Marion Ashley and Chairwoman Carole Beswick and Ms. Felipa Carrillo at the Santa Ana Regional Water Quality Board (Regional Board). These comments – in the form of a note – contain numerous inaccuracies, are not scientifically based, and expose considerable bias.

Scientific Study. A comment was made that, "The report as presented by W.E. Inc. is not a scientific study. A 'report' and a 'scientific study' are two different types of documents in the scientific world." Let's review a common definition of a scientific method or study in order to raise a couple of key points. The definition below is from wikipedia.org:

Scientific method is a body of techniques for investigating phenomena, acquiring new knowledge, or correcting and integrating previous knowledge. It is based on gathering observable, empirical and measurable evidence subject to specific principles of reasoning. The scientific method consists of the collection of data through observation and experimentation, and the formulation and testing of hypotheses.

Among other facets shared by the various fields of inquiry is the conviction that the process must be objective to reduce a biased interpretation of the results. Another basic expectation is to document, archive and share all data and methodology so it is available for careful scrutiny by other scientists, thereby allowing other researchers the opportunity to verify results by attempting to reproduce them. This practice, called full disclosure, also allows statistical measures of the reliability of these data to be established.

The formulation of a hypothesis is a key component of any scientific study and is *not* an example of pre-judging or bias. In this study, the question posed by San Timoteo Watershed Management Authority (STWMA), Project Committee 1 (PC-1) was "Is it possible to determine the potential source or sources of relatively high concentrations of nitrate in groundwater in the CVCOI?" The hypothesis formed was that a possible source was the On-Site Waste Disposal Systems (OSWDS) in the CVCOI. As discussed in the above definition of the scientific method, we collected data through observation and experimentation (in this case, routine laboratory procedures) in order to rigorously test this hypothesis – either prove or disprove it. The scientific data included chemical isotope data from samples that

were sent to three independent laboratories in a blind study (*i.e.*, the laboratories did not know the source of the samples). These laboratories were the Lawrence Livermore National Laboratories, the University of California at Davis, and Woods Hole Oceanographic Institute. The likelihood that researchers at these laboratories, conspired (and somehow determined the source of the samples) to falsify the results is preposterous. Other groundwater samples were submitted blind to MWH Laboratories for analyses of pharmaceuticals and personal care products (PPCPs). MWH Laboratories are highly regarded and its lab director is a member of the Joint Editorial Board of Standard Methods for the Examination of Water and Wastewater, and serves on multiple national and state committees evaluating data quality, including the National Environmental Laboratory Accreditation Conference (NELAC) Institute Advocacy Committee.

The results of the stable isotope study, the PPCP study, as well as other corroborating lines of evidence discussed in WEI's report (land use information, travel time for nitrate to groundwater, soil nitrate concentrations in the CVCOI, groundwater flow direction) preclude alternative hypotheses that WEI investigated (fertilizer, animal waste, *et cetera*).

It's important not to confuse an article accepted to a peer-reviewed journal with a scientific study. All articles published in a peer-reviewed science journal must employ the scientific method; however, not all scientific studies must be published in peer-reviewed journals. Scientists and engineers at WEI have published papers in peer-reviewed journals, published papers in other scientific journals, presented papers at symposia, and have conducted numerous scientific studies that have been widely accepted by stakeholder groups. That this study was not submitted for publication in a peer-reviewed journal does not, in any way, lessen the conclusions drawn or cast dispersions on the scientists writing the report. Peer reviewed journal articles are usually the culmination of original research. The work conducted by WEI was not a research project; just a careful, scientific study that employed normal forensic engineering and science and is backed by a large body of literature.

A comment was made that, "Ms Kristal Davis, a W.E. scientist instrumental in the development of the report, told me personally at the first town hall meeting at the Grange that the report was not a scientific study and would not be reviewed because it didn't have to be." In point of fact, Ms. Davis Fadkte was asked if the study had been peer reviewed. She replied that the study was not being submitted for publication and would therefore not undergo that process, but that the report had been reviewed by scientists at the Regional Board.

The definition of a scientific method further states, "Another basic expectation is to document, archive and share all data and methodology so it is available for careful scrutiny by other scientists, thereby allowing other researchers the opportunity to verify results by attempting to reproduce them." The methodology and all the data are contained in the report so that other scientists and stakeholders can scrutinize and attempt to reproduce the results.

A comment was made that, "Applying these factors to the Wildermuth report exposes examples of data that would be 'falsified' by peer review." It is not clear what is meant by "data that would be 'falsified' by peer review" - this sentence is fairly unintelligible. If the statement purports to state that the data were falsified by WEI, this is categorically untrue.

Age of Sources. A comment was made attempting to invalidate the WEI report by claiming that the research that led to the formulation of a health-based US Environmental Protection Agency (EPA) maximum contaminant level (MCL) for nitrate is "old." The objective of our

study was not to review and validate the health effects of nitrate in drinking water; the simple fact is that the current MCL for nitrate (as nitrogen) is 10 milligrams per liter (mg/L) and the current MCL for nitrite (as nitrogen) is 1 mg/L. As a side note, two of the three references provided in the comments are not cited correctly, making it difficult, if not impossible, to review.

Source of Funding, Bias. A comment was made insinuating that both STWMA PC-1 and WEI are biased and have doctored the study for profit: "Funding for the report was through STWMA Project Committee 1, whose bias on the issue is readily apparent...W.E. Inc. has a long history of contracts with several of the Pass area water agencies, and will continue to profit from these agencies and ratepayer's fees as long as they perform and their contracts are renewed." This statement is false and repugnant. WEI has a long history of working with a number of stakeholders in Southern California, precisely because of our reputation of independence, scientific scrutiny, and integrity. A firm such as the one described in the comment would not have the across-the-board respect of water agencies, dischargers, dairies, and regulatory agencies enjoyed by WEI.

Quality of Data/Conflicting Data: *Septic Failure Rates* Again, none of the references cited in the comment are documented properly, hence, an independent review of the sources cited in the comment cannot be conducted. The comment cites a 1981 study by DeValle that puts the septic system failure rate at between "1% and 5%." This may not materially conflict with the 2000 EPA study that we cited that put the failure rate at greater than 10 percent. The DeValle study is older and may cover a different geographic region (the EPA study was a national survey). Interestingly, the comment "contrasts the [DeValle] scientific study" with the EPA study that WEI cited - implying, perhaps, that the EPA study was somehow not scientific.

Quality of Data/Conflicting Data: *Septic Design Life* One of the three references cited in this section does not specify a septic system design life, while the other two put the design life at 30 years. The WEI reference (Maryland On-Site Sewage Disposal Task Force [MOSDT]/Maryland Department of Natural Resources) put the typical design life at 12 to 20 years. Regardless, the key to whether or not the OSWDS will be effective depends on soil conditions, how the OSWDS is operated, and how the OSWDS is maintained.

Quality of Data/Conflicting Data: *Septic Efficiency-Nitrogen Loading Rates* The 10 to 20 percent removal in the septic tank before disposal through the SAS cited in the comment are the same figures cited by WEI. The additional removal in the leach field claimed by in the comment is soil-, location-, climate-, and operation-specific. An overall removal range of 20 to 60 percent is cited in the comments. Stated another way, 40 to 80 percent of all nitrogen introduced into a conventional septic system will reach groundwater. As to the nitrogen loading rates, the references were not cited and could not be reviewed for context.

Quality of Data/Conflicting Data: *Future Discharge* One of the comments mischaracterizes the method used by WEI to estimate potential impacts to groundwater from OSWDS. For example, the comment makes misleading references to the annual nitrogen-loading rate per family. This value was not used in the calculation. As discussed, quite clearly, in Section 4.2, a simplified mass balance approach was used. This approach is documented in the peer-reviewed scientific journal, *Ground Water*, and is employed by Regional Boards in California to assess potential impacts from OSWDS. The approach considers:

- range of nitrogen concentrations in OSWDS discharge (source: Santa Ana Regional Water Quality Control Board);
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- nitrogen concentration in precipitation (source: USGS)
- actual water sales data (source: STWMA);
- the range of septic systems at build-out (Sec 4-1);
- nitrogen loss rate (source: 10% is the rate of denitrification used by the USGS in a study of sources of nitrate in groundwater in a region close to and similar in geology to Cherry Valley); and
- average recharge rate of precipitation (source: Beaumont Basin Groundwater model calibration).

Conclusion The following comments were made in summary:

A report does not compare to the high standards of a scientific study. Several other areas of the Wildermuth report contain the same level of biased or exaggerated data, with conclusions reached that are not supported by current research or their own science (leach field excavation, PPCPs testing, etc.).

This report appears to be an example of the unethical business practice of "manufacturing consent". By selectively sharing information, glossing over risks, and ignoring contradictory data, decisions are made and opinions formed that benefit the agencies funding the report while ignoring the stakeholder's (Pass area citizens) best interests.

We rebut these statements with a simple re-statement of the facts:

- WEI provided an extensive literature review concerning OSWDS and their potential impacts to groundwater. The comments listed several studies, but did not provide any references so that these studies could be checked as to context and validity.
- WEI employed a scientific method in formulating and testing the proposed hypothesis. In this study, the question posed by STWMA, PC-1 was "Is it possible to determine the potential source or sources of relatively high concentrations of nitrate in groundwater in the CVCOI?" The hypothesis formed was that a possible source was the OSWDS in the CVCOI. We collected data through observation and routine laboratory work in order to rigorously test this hypothesis. The scientific data and observations include:
 - Several production wells have been negatively impacted as nitrate concentrations are increasing at BCVWD and other retailers' wells in the CVCOI.
 - Chemical isotope data from samples that were sent to three independent laboratories in a blind study have a nitrogen isotopic signature that is consistent with discharge from OSWDS.
 - Water produced from some of the wells high in nitrate in this area contain PPCPs that can only be explained by discharge from OSWDS.
 - The simultaneous occurrence of high nitrate concentrations, elevated levels of specific ions, and PPCPs and nitrogen isotopes associated with OSWDS discharge can only be explained by discharge from OSWDS.

These are compelling data: results from independent, highly regarded scientific laboratories. The work conducted by WEI was not a research project; just a careful, scientific study that employed normal forensic engineering and science and is backed by a large body of literature. There were no comments on this portion of the work that ties nitrate contamination in groundwater in the CVCOI to OSWDS. In fact the only comment in this portion of the report was, "conclusions reached that are not supported by current research or their own science (leach field excavation, PPCPs testing, etc.)" We have not seen anyone cite scientific studies that would support a different source of nitrate and PPCPs in groundwater in the CVCOI.

- All of the assumptions, data, equations, and calculations are contained within the report. Information was not "selectively shared," risks were not "glossed over", and "contradictory data" were not ignored.
- WEI employed a simplified mass balance approach to estimate future impacts to groundwater. This approach is documented in a peer-reviewed scientific journal and is employed by Regional Boards in California to assess potential impacts from OSWDS.
- If the CVCOI builds out to 4,900 lots, the impacts from OSWDS will significantly impact the local area and well-head treatment will be required in order to serve drinking water from the local production wells.
- If the CVCOI builds out to 8,800 lots, OSWDS will contribute enough nitrate to groundwater that in the fullness of time, the entire Beaumont Management Zone will be rendered non-potable.
- Left unmitigated, the magnitude of OSWDS discharges is sufficient to cause nitrate concentrations to exceed basin plan objectives.
- Based on a review of the law and the case histories of prohibitions on OSWDS in California, there is sufficient evidence of groundwater contamination by OSWDS to warrant the RWQCB to issue a prohibition on new OSWDS in the CVCOI.

The best available science shows that groundwater in the CVCOI is currently being impacted by OSWDS: elevated concentrations of nitrate and the presence of PPCPs. Simple mass balance calculations show that future impacts will be even greater. There is a social and civic responsibility to mitigate these impacts for current and future generations of citizens in the CVCOI. We welcome the opportunity to meet with Supervisor Ashley, Chairwoman Beswick, and any other stakeholder in this process to discuss this matter further.

Sincerely,



Mark Wildermuth, PE
President and CEO
Principal Engineer



Joseph P. LeClaire, PhD
Vice President and COO
Principal Scientist



Kristal Davis Fadtko
Senior Environmental Scientist I

cc: Marion Ashley/County of Riverside
Carole Beswick/Regional Board
Chuck Butcher/Beaumont Cherry Valley Water District
Felipa Carrillo/Regional Board
C. Tucker Cheadle/C. Tucker Cheadle - A Law Corporation
Jaime Hurtado/County of Riverside
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