

**EXHIBIT A**

**DECLARATION OF BRYAN A. STIRRAT, P.E.**

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**DECLARATION OF BRYAN A. STIRRAT, P.E.**

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I, Bryan A. Stirrat, P.E., declare as follows:

1. I am the president of Bryan A. Stirrat & Associates (“BAS”). Meyers, Nave, Riback, Silver and Wilson, special counsel for the County of Stanislaus (“County”), retained BAS to provide consulting support on behalf of the County in administrative proceedings on a tentative cease and desist order (“CDO”) proposed for adoption by the California Regional Water Quality Control Board, Central Valley Region, (“Regional Board”) for the Geer Road Class III Landfill. My analysis of the issues raised in the CDO proceedings, and my conclusions and recommendation in that regard, are set forth in this memorandum. Except as otherwise indicated, I have personal knowledge of the facts set forth herein. As to those facts stated on information and belief, I am informed and believe them to be true. If called as a witness, I could and would competently testify to the matters stated herein.

**Section 1.0: Introduction**

2. The Geer Road Landfill is a 168-acre facility located in Stanislaus County, California, approximately 10 miles southeast of the City of Modesto. Waste disposal operations at the site occurred in two separate areas, bisected by a paved roadway that serves as the primary drainageway for the center portion of the site. The site was operated by the County from 1970 until July 1990. Groundwater has been monitored at the site since 1987 and VOC impacts to groundwater have been confirmed. These impacts were predominantly to the south and southwest of the landfill and have generally declined over time, in response to site corrective actions and natural attenuation.

3. The groundwater monitoring network at the Geer Road Landfill is comprised of thirty-four monitoring wells. Twenty-two of these wells are designated as “shallow” wells and are indicated with an “S” in the well number. These wells are typically screened across the static water level of the first saturated zone. The remaining twelve wells are designated as “deep” wells and are typically screened at depths of 30 to 50 feet below the static water level.

1           4.     A groundwater extraction and treatment system (GWETS) was installed for VOC  
2 mitigation in 1993. The GWETS includes 12 extraction wells and two granular activated carbon  
3 vessels, in series, for removal of VOCs. Effluent from the treatment system is discharged to the  
4 subsurface through a series of reinjection trenches.

5           5.     The landfill was capped in 1995 and a landfill gas (LFG) collection and flaring  
6 system was installed. As part of ongoing improvements to the corrective action systems at the site,  
7 in March 2009 ten new LFG wells (RW-11 through RW-20) were installed to extract LFG from the  
8 unsaturated zone around the southern area of the landfill.

9           6.     The corrective action programs already implemented includes the GWETS and LFG  
10 extraction and treatment system, capping of the landfill, and the LFG containment and collection  
11 system, including extraction points both in the waste unit and in the unsaturated zone beneath the  
12 wastes. Corrective action monitoring is performed to demonstrate the effectiveness of corrective  
13 action and includes: groundwater monitoring; monitoring of the influent, midpoint, and effluent of  
14 the GWETS; LFG probe monitoring; and LFG treatment system monitoring of the LFG plant  
15 influent.

16 **Section 2.0: Experience and Qualifications**

17           Section 2.1: Bryan A. Stirrat, P.E.

18           7.     I am a registered civil engineer in the states of California, Arizona, Nevada, New  
19 Mexico, Hawaii, Illinois, Washington and Montana. I earned a Bachelors of Science degree in  
20 civil engineering from the Missouri School of Mines in 1967. I earned a Masters of Science in  
21 petroleum engineering from the University of Southern California in 1972. In 1974, I earned a  
22 Masters of Science degree in Environmental Engineering from the University of Southern  
23 California.

24           8.     I have more than 30 years of experience in civil engineering and hazardous and  
25 municipal solid waste landfill permitting, design, and operation. I am frequently retained to  
26 provide expert advice on innovative landfill remediation programs and regulatory agency liaison.  
27 I have been the Chief Consulting Engineer for projects at landfill facilities throughout California,  
28

1 Arizona, Oregon, Illinois, Washington, Nevada, Hawaii, New Mexico, and Montana as well as  
2 Israel, Manila, Guam and China. I was principal consulting engineer for the first U.S. EPA  
3 approved Resource Conservation and Recovery Act closure of a Class I, Hazardous Waste  
4 Landfill in the U.S. (BKK Landfill) and I have advised state and federal agencies on closure  
5 technologies for hazardous and solid waste sites. I have had primary responsibility for the design  
6 of more than 50 landfills, I have provided advice on remediation / corrective action at more than  
7 100 landfills, and I have developed closure / post-closure plans for more than 50 landfills. In all, I  
8 have worked on approximately 150 to 200 landfills in my career. I have also have particular  
9 experience and expertise in the design and development of landfill gas management systems.

10 9. A true and correct copy of my curriculum vitae is attached hereto as Exhibit 1.

11 Section 2.2: Greg Acosta, P.E.

12 10. BAS employs over 65 specialists with expertise in a wide variety of technical issues  
13 that arise with landfills. In analyzing the issues raised in the CDO proceedings regarding the Geer  
14 Road Landfill, I assigned Vice President of Environmental Services Greg Acosta, P.E. and several  
15 of his staff to provide assistance with groundwater issues. I am informed and believe that Mr.  
16 Acosta earned his Bachelors of Science degree in Civil Engineering from the California State  
17 Polytechnic University, Pomona, in 1989, that he earned his Masters of Science Degree in Civil  
18 Engineering from the University of California, Los Angeles, in 1997, and that he is a registered  
19 Professional Civil Engineer in the State of California.

20 11. Mr. Acosta has worked for BAS from 1989 until 1994 and again from 1996 to the  
21 present, and I am personally familiar with his work on numerous projects. I am informed and I  
22 believe that Mr. Acosta has conducted and supervised the assessment of numerous landfills and  
23 waste disposal facilities as well as the design and implementation of corrective actions for impacts  
24 to soil and groundwater at various landfill and non-landfill sites throughout California, and the  
25 operations, maintenance and monitoring of both groundwater extraction and treatment and landfill  
26 gas extraction and treatment systems.

27

28

1           12. A true and correct copy of Mr. Acosta's curriculum vitae is attached hereto as  
2 Exhibit 2.

3           Section 2.3: Marina Grigorova, P.E., REA I

4           13. In order to provide additional technical analysis of issues related to the fate and  
5 transport of constituents in groundwater, I also assigned Ms. Marina Grigorova, P.E. to this  
6 matter. I am informed and believe that Ms. Grigorova earned her Bachelors of Science degree in  
7 chemical engineering from the Moscow Institute of Fine Chemical Technology, in 1992, that she  
8 earned her Masters of Science Degree in Environmental Engineering from Johns Hopkins  
9 University, in 1995, and that she is a registered Professional Civil Engineer in the State of  
10 California and Registered Environmental Assessor I in the State of California..

11           14. Ms. Grigorova has worked for BAS since 1999 in the Environmental Services  
12 Division and I am personally familiar with her work on numerous projects. I am informed and I  
13 believe that Ms. Grigorova has over 15 years of experience in environmental engineering and  
14 environmental research and that she has directly performed and overseen performacne of  
15 numerous Phase II Environmental Site Assessments, Remedial Investigations, health risk analyses,  
16 preparation of Remedial Action Plans, Sampling Plans and Health and Safety Plans for both  
17 landfill and non-landfill sites using extensive knowledge of federal and state environmental  
18 statutes and regulations. I am informed and I believe that Ms. Grigorova has performed  
19 implementation of corrective actions for impacts to soil and groundwater at various non-landfill  
20 sites in Central California, and conducted engineering oversight of the operations, maintenance  
21 and monitoring of groundwater extraction and treatment systems at several landfills in Southern  
22 California. I am informed and I believe that prior to joining BAS, Ms. Grigorova was a Research  
23 and Development Engineer with the Los Alamos National Laboratory in Los Alamos, New  
24 Mexico, where she was responsible for the analysis of state-of-the-art technologies for the  
25 remediation of mixed and solid waste and waste water.

26           15. A true and correct copy of Ms. Grigorova's curriculum vitae is attached hereto as  
27 Exhibit 3.

28

1           Section 2.4: Juan Guerrero, P.G.

2           16. In order to provide additional technical analysis of issues related to groundwater  
3 hydrogeology, I also assigned Mr. Juan Guerrero, P.G. to this matter. I am informed and believe  
4 that Mr. Guerrero earned his Bachelors of Science degree in Geological Science from the  
5 University of Southern California, in 1979, that he completed his Masters of Science Thesis in  
6 Geology from California State University, Long Beach in 1983, and that he is a registered  
7 Professional Geologist in the State of California.

8           17. Mr. Guerrero has worked for BAS since 2010 in the Environmental Services  
9 Division and I am personally familiar with his work. I am informed and I believe that Mr.  
10 Guerrero has over 25 years of experience in soil and groundwater investigations, soil gas vapor  
11 surveys, waste water and storm water management, vadose zone and groundwater remediation of  
12 petroleum and chlorinated hydrocarbons, drilling and installation of water wells, remedial  
13 engineering design, environmental drilling and water well oversight, geochemical evaluations,  
14 hazardous waste management, technical oversight in the preparation of remedial action work  
15 plans, drilling and sampling plans, groundwater monitoring reports and site closure reports.

16           18. A true and correct copy of Mr. Guerrero's curriculum vitae is attached hereto as  
17 Exhibit 4.

18 **Section 3.0: Analytical Approach**

19           Section 3.1: Documents Reviewed, Persons Interviewed and Site Inspection

20           19. In order to assess the issues raised by the CDO, we reviewed a variety of documents.  
21 First, of course, I reviewed the CDO itself along with the other documents provided by the  
22 Regional Board in its public notice. I directed Mr. Acosta, Ms Grigorova, and Mr. Guerrero to do  
23 the same, and from our discussions about the site, I am confident that they reviewed these  
24 materials.

25           20. I reviewed, along with the other members of our BAS team, information on the Geer  
26 Road Landfill available on the State Water Resources Control Board's Geotracker database.

1           21. I and the other members of the BAS team reviewed the First and Second Semi-  
2 Annual & Annual 2010 Detection, Evaluation, and Corrective Action Monitoring Reports for the  
3 Geer Road Landfill, including the historical data provided in those reports.

4           22. We have also reviewed a number of technical reports prepared by County  
5 consultants for the Geer Road Landfill including, but not limited to:

6                   a. Corrective Action Workplan, Geer Road Landfill, Stanislaus County,  
7 California, October 29, 2010, prepared by SCS Engineers;

8                   b. Engineering Feasibility Study, Geer Road Landfill, Stanislaus County,  
9 California, February 13, 2009, prepared by SCS Engineers;

10                  c. Evaluation Monitoring And Engineered Feasibility Study Geer Road  
11 Landfill Stanislaus County, California, March 20, 2002, prepared by Kleinfelder, Inc.

12                  d. A spreadsheet compilation of historical data

13           23. We also reviewed rough transcripts of the depositions of Anne Olson, Howard Hold  
14 and Wendy Wyels.

15           24. In addition to the documents we reviewed, I had conversations with E. Wayne  
16 Pearce, P.G., Senior Technical Manager, SCS Engineers and Art Jones, Project Manager SCS  
17 Engineers. I also conducted a site inspection on February 10, 2011 with Mr. Pearce and Mr. Jones  
18 as well as, Jami Aggers, Assistant Director of the Stanislaus County Environmental Resources  
19 Department to obtain additional information about the Landfill and CDO proceedings.

20           Section 3.2: Method of Analysis

21           25. The information gathered was reviewed by registered professionals for concurrence  
22 with generally accepted engineering standards. This included a review of past assessment  
23 activities both for methodology and completeness; review of the landfill geometry with regard to  
24 lateral and vertical extent of waste material and its relation to groundwater levels beneath the site;  
25 review of past landfill gas system operational records in order to assess the adequacy of the current  
26 system; review of historical groundwater monitoring data with regard to water levels, gradients,  
27  
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1 and detected concentrations of organic and inorganic compounds and how they compare to  
2 relevant or applicable standards.

3 26. In addition, we are in the process of preparing a three-dimensional conceptual model  
4 of the Geer Road Landfill in order to provide the Regional Board with a more complete  
5 understanding of how the County's proposed remedial strategy will improve landfill gas recovery  
6 and achieve downgradient compliance. Because of the short time period allowed for preparation  
7 of comments on the CDO, the large amount of data and the need to carefully construct the  
8 conceptual model, it was not reasonably possible to prepare such a model before the February 14,  
9 2011, comment deadline.

10 **Section 4.0: Recommended Remedial Strategy**

11 27. The most appropriate remedial strategy for the Geer Road Landfill is to prioritize  
12 efforts to increase landfill gas extraction along with an optimization of the existing groundwater  
13 extraction and treatment system. Our experience has shown that the most effective ways to  
14 minimize groundwater contamination from volatile organic compounds at landfill sites is to  
15 control storm water infiltration into the waste prism and maximize the recovery of landfill gas.

16 **Section 4.1: Landfill Gas Remedy**

17 28. Landfill gas is generated through the ongoing anaerobic biological degradation of  
18 the waste mass and is predominantly composed of methane and carbon dioxide, with various trace  
19 organics. Because the gas production is an ongoing process, the volume of gas eventually reaches  
20 a point at which the pressure within the landfill causes the gas to migrate out of the waste prism.  
21 This migration can occur upward through the surface of the landfill, or laterally outward and  
22 downward into the surrounding subsurface, taking with it trace organic compounds. Because of  
23 the biological processes that created the gas, it is typically at a higher temperature than the  
24 surrounding formation or the ambient air at the surface. Upward vertical migration of landfill gas  
25 through the landfill surface can result in degradation of air quality. Lateral subsurface migration  
26 of landfill gas can result in the accumulation of methane in nearby enclosed spaces at potentially  
27 explosive levels. Lateral and downward migration of landfill gas can cause the gas to come into  
28

1 contact with underlying groundwater, resulting in the diffusion (or partitioning) of trace organic  
2 compounds into that medium.

3       29. In order to control the generated landfill gas, wells are typically drilled into the  
4 waste mass. These wells are then connected to a piping system that ties into a vacuum blower  
5 which discharges to a gas treatment unit, typically consisting of one or more flares, designed to  
6 burn the methane and destroy the trace organic compounds. As is implied by the name, when the  
7 vacuum blower is in operation, it creates a vacuum in the piping system and wells which draws the  
8 landfill gas out of the waste. Ultimately, a properly designed landfill gas extraction system will  
9 provide a preferential pathway for the generated gas and maintain the entire waste prism in a  
10 slightly negative pressure (or vacuum) condition, thereby ensuring that none of the landfill gas (or  
11 trace organics) escapes. The vacuum applied across the landfill should be relatively low in order  
12 to maintain the waste prism in an anaerobic state, thereby preventing the possibility of  
13 significantly elevated subsurface temperature conditions (often referred to as "landfill fires") that  
14 could occur if the landfill mass were to go into an aerobic condition. As such, it is important that  
15 a sufficient number of wells are placed at the site to blanket the entire waste mass laterally, and the  
16 wells should have screen intervals that allow for complete vertical coverage of the waste mass. In  
17 addition, because the processes that generate the landfill gas are biological, and because the waste  
18 prism is relatively heterogeneous in the distribution of the various types of waste, it is critical that  
19 the system is regularly monitored and that the vacuum to the various wells within the extraction  
20 well field are properly tuned, such that vacuum is concentrated to areas of high methane  
21 production and that oxygen from the surface, or the surrounding formation is not drawn into the  
22 waste mass.

23       30. If properly designed and operated, the landfill gas extraction and treatment system  
24 will prevent trace organics from coming into direct contact with the surrounding formation and  
25 underlying groundwater. Because the trace organic compounds typically have a stronger affinity  
26 for the vapor phase as opposed to the dissolved phase, and because it is easier and cheaper to  
27 move and process gas than water, addressing trace organic compounds in the landfill gas phase  
28

1 can be significantly more efficient than addressing them after they have dissolved into the  
2 underlying groundwater. This is clearly demonstrated by the relative effectiveness of the landfill  
3 gas and groundwater extraction and treatment systems at the Geer Road Landfill as reported in the  
4 Second Semi-Annual & Annual 2010 Detection, Evaluation, and Corrective Action Monitoring  
5 Report (SCS Engineers; 01/31/11). In this report the landfill gas system is estimated to have  
6 removed approximately 1,800 pounds of VOCs per year, while the groundwater extraction system  
7 is estimated to have removed approximately 1.15 pounds of VOCs per year while pumping over  
8 22 millions gallons per year. If the groundwater extraction system were expanded to the estimated  
9 400 gpm, the total VOC removed per year would still only be approximately 21.5 pounds of  
10 VOCs per year while treating over 200 million gallons.

11 31. The site conditions described above that make landfill gas recovery the preferred  
12 method, and the first line of attack, for reducing groundwater contamination from volatile organic  
13 compounds are present at the Geer Road Landfill.

14 32. After considering the information and data reviewed about the Geer Road Landfill,  
15 we have developed a recommended remedial strategy to maximize the recovery of landfill gas at  
16 the site. We believe that adding additional landfill gas wells will result in improved vacuum  
17 coverage of the waste prism. BAS' typical design includes landfill gas wells installed 200 feet on-  
18 center, or approximately one well per acre of landfill surface. At the Geer Road landfill, there are  
19 currently 83 wells in the system. As such, a significant expansion of the current well field is  
20 recommended and is expected to significantly improve landfill gas recovery. A review of the  
21 operational reading from the existing wells indicates that a comprehensive assessment of the  
22 current landfill gas production trends will likewise be needed to properly tune both the currently  
23 existing and newly installed wells.

24 33. In addition, because there are indications that the base of the landfill may be, or may  
25 have been, at least partially immersed in groundwater, it will be important to determine to what  
26 extent this condition exists. As such, it is recommended that the existing landfill gas and "vadose  
27 zone" wells be surveyed for water levels. The information gathered through this survey will be  
28

1 used along with existing historical information regarding the waste prism to create a three  
2 dimensional conceptual model of the landfill. This will be helpful in not only gaining a better  
3 understanding of the landfill gas conditions at the site, but also in assessing the nature of  
4 groundwater impacts. Concurrent with this water level assessment, it is recommended that a  
5 speciated VOC survey be performed of the landfill gas wells in the vicinity of groundwater  
6 monitoring well MW-4S. This, along with the three dimensional model will provide information  
7 to help define the conditions within the landfill adjacent to that well (discussed later herein), where  
8 vinyl chloride has been a persistent contaminant of concern. Based on the findings, it is possible  
9 that a more intensive landfill gas extraction scheme will be recommended for the area immediately  
10 adjacent to groundwater monitoring well MW-4S.

11 34. I understand that the County has limited resources to devote to remedial and  
12 corrective actions at the Geer Road landfill. Under these circumstances, it is critical to implement  
13 the most cost effective remedial strategies possible. Both from my analysis of the Geer Road  
14 Landfill, and from my experience at over 150 other landfills, I am confident based on the  
15 understanding detailed previously herein, that focusing resources on landfill gas extraction and  
16 applying a more intensive landfill gas extraction scheme in areas of elevated concern is the best  
17 use of limited resources. In her deposition, beginning on page 70, Ms. Wendy Wyels testified  
18 that:

19 Q. Do you have an opinion as to whether a landfill gas system could be deployed at  
20 the Geer Road Landfill that would be effective enough that an expanded ground  
21 water extraction system would not be justified?

22 A. My understanding is that the county could not show -- would not have the ability to  
23 show to us ahead of time that an expanded gas system could capture enough  
24 landfill gas to not need an expanded ground water treatment system. And, in  
25 addition, the gas system will not mitigate the metals and the inorganics.

26 Q. Is that a requirement that a discharger demonstrate ahead of time that one remedy  
27 will absolutely be effective?  
28

1 A. We need to have reasonable assurance that the remedy will work within a specified  
2 time frame.

3 Q. But if the county were able to provide reasonable assurance that it could deploy a  
4 landfill gas system at the Geer Road Landfill and there is reasonable assurance that  
5 that landfill gas system will achieve compliance with the water quality protection  
6 standards at the point of compliance, within a reasonable period of time, then it  
7 would be appropriate for staff to -- board staff to not require further ground water  
8 remedy; is that correct?

9 A. There is still the issue of the inorganics and metals.

10 Q. Okay. Let me -- can I take a peek at my question? Setting aside inorganics and  
11 metals and focusing only on VOCs, if the county could provide reasonable  
12 assurances -- I think those were your words -- that a proposed landfill gas system  
13 would achieve compliance with the VOC water quality protection standards, would  
14 the board staff be justified in recommending no further ground water remedy?

15 A. I believe so; but, based on what SCS has told me, I don't see how that could  
16 happen.

17 Q. Can you think of a way to describe for me what "reasonable assurances" would  
18 mean? I take it is something less than an absolute guarantee?

19 A. Can I tell you what it is not?

20 Q. Please answer -- if you can answer the question. If you really can't answer the  
21 question --

22 MR. PULUPA: You can certainly define it in the negative.

23 THE WITNESS: A reasonable assurance would be a study performed by a registered  
24 professional that says based on these site conditions I believe that this sort system  
25 would do this sort of work, and here is how I would monitor and show the success  
26 of this system. For what has been proposed by SCS for the next 1 phase of  
27 landfill gas extraction, none of that work was done.

28

1           35.     It is my opinion, and my intention, that the information provided in this declaration  
2 should provide the Regional Board with the reasonable assurances that Ms. Wyels described.

3           Section 4.2:     Groundwater Remedy

4           36.     It appears, based on a review of information made available with regard to the  
5 groundwater conditions at the site, that the levels of VOCs in groundwater beneath the site have  
6 been experiencing a general decreasing trend with the exception of those found at downgradient  
7 monitoring well MW-4S (and, in turn, off-site well MW-23S). It is likely that this downward  
8 trend is the result of ongoing landfill gas mitigation and, to a lesser extent groundwater extraction  
9 and treatment efforts at the site. At location MW-4S no such downward trend is observed. It is  
10 interesting to note that the distribution of various VOCs in well MW-4S is notably different from  
11 that found in other site wells where VOCs have been detected. In particular, vinyl chloride and  
12 *cis*-1,2-dichloroethene (*c*-1,2-DCE) have been consistently detected in samples collected from  
13 MW-4S since monitoring began in the mid 1980s. No other monitoring well at the site has  
14 consistently shown detectable levels of vinyl chloride (and to a lesser degree, *c*-1,2-DCE).  
15 Although both vinyl chloride and *c*-1,2-DCE are breakdown products of PCE and TCE (both  
16 common landfill contaminants), the fact that they have been consistently detected only at this  
17 location and at elevated levels since the start of monitoring, while concentrations of PCE/TCE  
18 were minor and/or below detection limits, indicate that some as-yet undefined condition may exist  
19 near MW-4S that is somehow different from the remainder of the site. Because vinyl chloride and  
20 *c*-1,2-DCE are present in the combined gas stream entering the site flare, it is likely that their  
21 presence is related to a source within the waste prism and not some other historical or nearby  
22 source. A focused landfill gas investigation of the area could potentially confirm the localized  
23 nature of the vinyl chloride and *c*-1,2-DCE impacts in the area of MW-4S. Such an investigation  
24 should be combined with a confirmation of the presences or absence of liquids within the landfill  
25 gas and/or vadose zone wells in this area. Should it be determined that these impacts are isolated  
26 in nature, as anticipated, a more focused groundwater corrective action approach could be  
27 implemented around this location. This, combined with an expanded landfill gas extraction  
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1 system across the entire site (to encourage further reductions in VOC impacts at other down  
2 gradient locations), and a more intensive landfill gas extraction effort targeted around the waste  
3 adjacent to MW-4S would provide a comprehensive VOC mitigation strategy for the site.

4 37. With regard to concentrations of inorganic parameters in groundwater beneath the  
5 site, it should be noted that the most recent site monitoring report, which summarizes groundwater  
6 monitoring performed in November of 2010 showed only specific conductance, bicarbonate  
7 alkalinity, chloride, and Total Dissolved Solids (TDS) as being present in excess of the established  
8 site concentration limits in any of the monitoring well samples. Of these parameters, bicarbonate  
9 alkalinity was found at levels above the concentration limit consistently in both upgradient and  
10 down gradient wells at the site, and as a result is considered to be associated with regional  
11 groundwater conditions, not related to the landfill. Likewise, in November of 2010 specific  
12 conductance was found at levels above the site concentration limits at three wells located  
13 hydraulically upgradient from the waste mass (MW-7D, MW-12S, and MW-21S) and seven wells  
14 located either hydraulically down gradient or cross gradient from the waste prism (MW-1S, MW-  
15 2S, MW-3D, MW-4S, MW-5S, MW23S and MW-23D). As such, this parameter may be  
16 influenced significantly by regional conditions. The remaining two inorganic parameters that  
17 showed detected concentrations in excess of the site specific concentration limits (chloride and  
18 TDS), both exceeded their limits in many of the same wells (MW-1S, MW-2S, MW-5S, and  
19 MW-7D). In addition, wells MW-3S, MW-15D, and MW-23D exceed the concentration limit for  
20 chloride only, and well MW-4S exceeded the concentration limit for TDS only. For each of these  
21 wells the ratio between the TDS and chloride concentration was relatively consistent indicating  
22 that they are related. In addition, the detected concentrations of these inorganic parameters at  
23 these wells are such that it would be reasonable to evaluate whether they pose a substantial present  
24 or potential hazard to human health and the environment even though they exceed the  
25 concentration limit. It should be noted, that none of these parameters has an established State or  
26 Federal drinking water primary Maximum Contaminant Level. This is of particular interest with  
27 regard to TDS, the removal of which can require application of treatment technologies that are  
28

1 often times economically infeasible. In accordance with the provisions of Title 27 Section 20400 ,  
2 it is recommended that an evaluation be done to assess whether selected inorganic constituents  
3 could be candidates for concentration limits greater than background (CLGB).

4 38. I understand that the Regional Board contends that the County should implement a  
5 groundwater remedy that would obtain hydraulic control of all impacted groundwater coming  
6 from the Geer Road Landfill. I believe that approach is unreasonable for several reasons. First,  
7 the much more efficient and targeted remedial strategy outlined herein is expected to achieve the  
8 objective of improved water quality downgradient of the site, so a more intensive groundwater  
9 remedy is unwarranted. Second, the volume of groundwater flowing through the defined point of  
10 compliance for the site is so large that it may not reasonably be controlled (captured), and even if  
11 it could be controlled, it would be impracticable to treat and dispose of such a vast quantity of  
12 water. Third, some of the inorganic constituents mentioned above are likely caused by regional  
13 conditions, which also may not be reasonably controlled.

14 39. In addition, I understand that the Regional Board contends that even if the County  
15 obtained hydraulic control of all impacted groundwater coming from the site – cut off the source,  
16 so to speak – it should design and implement an additional groundwater remedy to treat any  
17 impacted groundwater downgradient of the hydraulic control remedy. This strategy is sometimes  
18 referred to as “chasing the plume,” and I believe it would be a very bad strategy for this site. First,  
19 chasing the plume would likely consume an inordinate amount of resources, and would jeopardize  
20 the County’s ability to implement a sensible and effective remedial strategy. Second, once the  
21 source of contaminants is controlled by the remedies we propose, and there is no longer an  
22 ongoing contribution, we predict that any contaminants remaining down gradient will quickly  
23 naturally attenuate before any beneficial uses are impacted.

24 **Section 5.0: Monitoring Program**

25 40. The existing monitoring program should provide the necessary data to show that the  
26 proposed remedy outlined above is effectively reducing offsite impacts to groundwater.

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1 **Section 6.0: Summary of Conclusions and Recommendations**

2 41. In my opinion, the remedial approach mandated by the CDO is technically  
3 unsupportable, unreasonable, inefficient, and unwise. A phased approach to remedial and  
4 corrective action is critical not only to ensure efficient use of scarce resources, but also to ensure  
5 that remedies are implemented incrementally so that they can be designed to maximize the  
6 likelihood of success. The strategy outlined previously provides a logical progression for  
7 addressing the issues at the site in a time effective and cost efficient manner.

8 42. My recommended remedial strategy for the site can be summarized as follows:

9 a. The current landfill gas extraction system should be optimized and  
10 expanded to include more landfill gas wells, to improve vacuum coverage of the waste prism and  
11 maximize landfill gas recovery, along with perhaps extra gas extraction wells within the landfill in  
12 the vicinity of groundwater monitoring well MW-4S. ;

13 b. If necessary to accommodate the volume of gas recovered, additional gas  
14 destruction equipment should be deployed;

15 c. To help determine if the base of the landfill is immersed in groundwater,  
16 existing landfill gas and "vadose zone" wells should be surveyed for water levels;

17 d. Concurrently, a speciated VOC survey should be performed of landfill gas  
18 wells in the vicinity of the groundwater monitoring well MW-4S;

19 e. Based on the results of the water level surveys, three dimensional site  
20 model, the speciated VOC surveys, and site conditions following expansion/optimization of the  
21 landfill gas system, a focused engineering feasibility study should be prepared to identify the most  
22 appropriate approach for addressing the persistent vinyl chloride impacts at groundwater  
23 monitoring well MW-4S. Focused remedial alternatives evaluated for this area could include  
24 expansion of the landfill gas extraction network near the location, higher flow groundwater  
25 extraction in this focused area, or air sparging tied into the landfill gas extraction system.

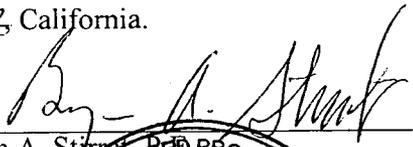
26 f. Continued monitoring of the existing network of groundwater wells is  
27 recommended to confirm the ongoing reduction of VOC impacts across the site as well as the  
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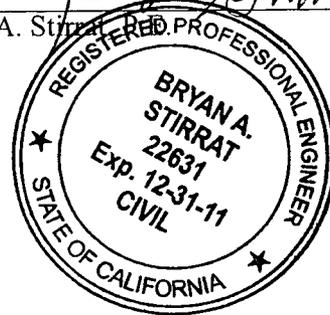
1 effectiveness of the focused efforts being applied to the area around groundwater monitoring well  
2 MW-4S. Increased monitoring of Wells MW-4S, MW-23S and other points within the defined  
3 area may be required upon implementation of the focused corrective actions, to monitor progress  
4 and for operational purposes depending on the approach taken.

5 43. I predict that implementation of this proposed remedial strategy will achieve  
6 compliance with appropriate water quality protection standards for all constituents of concern at  
7 the point of compliance within a reasonable period of time.

8 I declare under penalty of perjury under the laws of the State of California that the  
9 foregoing is true and correct.

10 Executed February 14, 2011, at Diamond Bar, California.

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13 Bryan A. Stirrat



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**EXHIBIT 1**

*Mr. Stirrat has more than 30 years of experience in civil engineering and hazardous and municipal solid waste landfill permitting, design, and operation. He is a highly regarded civil and environmental engineer and an authority on innovative landfill remediation programs and regulatory agency liaison. Mr. Stirrat has been Chief Consulting Engineer for projects at landfill facilities throughout California, Arizona, Oregon, New Mexico, and Montana. He was principal consulting engineer for the first U.S. EPA approved RCRA closure of a Class I, Hazardous Waste Landfill in the U.S. (BKK Landfill) and has advised state and federal agencies on closure technologies for hazardous and solid waste sites.*

#### **SOLID WASTE PLANNING EXPERIENCE:**

**Solid Waste Planning Study**, San Bernardino County, California. Chief Consulting Engineer to Norcal/San Bernardino in the development of the Partnership Strategy Implementation Plan (PSIP), a long-range strategic planning study for the operation and management of 46 active and inactive landfills and transfer facilities in San Bernardino County, California.

**Regional Landfill Options for Orange County (RELOOC) Study.** Chief Consulting Engineer/Project Manager for the preparation of the long-range solid waste planning study for Orange County Study. The primary objective of the RELOOC study is to select a set of solid waste disposal options and/or technological alternatives to meet the long-term regional disposal capacity requirements of Orange County. Alternatives evaluated include expansion of existing landfill facilities, development of a new landfill, export of waste to out-of-county facilities, and use of alternative waste disposal technologies.

**North Orange County Landfill and Alternative Technology Study (NOCLATS).** Provided comprehensive engineering design and analysis during Phase II of the study. This included conceptual design of landfill disposal sites at four different locations within Orange County, California, incorporating resource recovery/recycling and assessing potential environmental impacts.

#### **Education:**

MS, Environmental Engineering,  
University of Southern  
California, 1974

MS, Petroleum Engineering,  
University of Southern  
California, 1972

BS, Civil Engineering, Missouri  
School of Mines, 1967

#### **Registrations:**

Registered Civil Engineer,  
California (#22631), 1973

Registered Civil Engineer,  
Arizona (#29095), 1995

Registered Civil Engineer,  
Nevada (#17976), 2005

Registered Civil Engineer,  
New Mexico (#17226), 2006

Registered Civil Engineer,  
Hawaii (#12717), 2007

Registered Civil Engineer,  
Illinois (062.62797), 2010

Registered Civil Engineer,  
Montana (#18309), 2010

Registered Corrosion Engineer,  
California (#727), 1977

#### **Professional Affiliations:**

University of Missouri-Rolla,  
Academy of Civil Engineers

Governor's Task Force on Solid  
Waste

CIWMB Advisory Committee on  
Municipal Landfill Closure

SWANA Landfill Gas Committee

American Society of Civil  
Engineers, Vice President, Los  
Angeles Section (1988)

Member Pi Epsilon Tau,  
Petroleum Engineering Honor  
Society

National Association of  
Corrosion Engineers Western  
Region - Engineer of the Year  
(1979)

Elected into College of Fellows  
of the Institute for the  
Advancement of Engineering  
(1982)

American Public Works  
Association

**Solid Waste Bond Funding Study**, Orange County, California. Chief Consulting Engineer for the preparation of the Engineer's Statement for the Orange County Public Financing Authority Waste Management System Refunding Revenue Bonds. This report included an evaluation of the current status of the County waste management system including a summary of system expenses (i.e., landfill closure funding, post closure funding, maintenance cost for the County's 22 closed sites, Article 5 funding, environmental liability).

**Inactive Landfill Site Strategic Plan**. Chief Consulting Engineer for preparation of a strategic plan for the management of 18 inactive disposal sites for a large public landfill owner. The project included site inspections; evaluation of site maintenance costs; cost-benefit evaluation of sites based on costs for maintenance, corrective action requirements, and potential end-use options; and financial modeling of differing operations scenarios.

#### **SOLID WASTE FACILITY PLANNING / DESIGN:**

**Puente Hills Intermodal Facility**, Whittier, California. Design Team Manager for design of intermodal waste processing facility being developed by the Los Angeles County Sanitation Districts to serve as the cornerstone of a waste-by-rail program. Responsibilities include coordination of facility lay-out, design of civil improvements, and design of bridges, drainage improvements, and a pump station. Upon completion, the facility will be used to load 8,000 tons per day waste from Los Angeles area onto trains for shipment to a new landfill in Imperial County.

**Expansion Permitting and Design**, Mid-Valley Sanitary Landfill, San Bernardino County, California. Chief Consulting Engineer to the County of San Bernardino for the permitting of the expansion of this regional municipal landfill facility. The project involved expansion of an existing 170-acre landfill into a regional disposal facility. This involved lateral development of the site into six major excavation fill phases over a 400-acre area.

**Expansion Permitting and Design**, Prima Deshecha Landfill, Orange County, California. Chief Consulting Engineer to the Orange County Integrated Waste Management Board for the expansion and facility permitting. The project has involved development of the site's Master Development Plan and two phases (Phases A and A1) of liner construction bid documents in support of development of this 1,500-acre regional metropolitan landfill.

**Expansion Master Planning and Permitting**, Olinda Alpha Landfill, Orange County, California. Chief Consulting Engineer to the Orange County Integrated Waste Management Board for vertical expansion project which involved preparation of master plan and permitting assistance for the vertical expansion of this 340-acre metropolitan landfill facility.

**Master Development Planning & Phasing Design**, Frank R. Bowerman Landfill, Orange County, California. Chief Consulting Engineer, for development of a comprehensive Master Development

Plan for long-term site planning, intermediate phasing designs, operational designs, and coordination of refuse disposal and borrow excavation activities. Work also included the development of plans and specifications for liner construction documents.

**Landfill Master Planning and Design**, Flathead County Landfill, Kalispel, Montana. Chief Consulting Engineer for site master planning and development. Project involves on-call solid waste engineering services in support of site development activities.

**Landfill Planning and Permitting**, Glendale Landfill, Glendale, Arizona. Chief Consulting Engineering for master planning and development of the Glendale Landfill. Project has included review of the facility's master development plan, development interim fill sequencing plans, design of improvements to the gas extraction and treatment system, permitting and regulatory agency liaison, and preparation of end-use plans for the site's existing 140-acre footprint.

**Landfill Expansion Permitting**, West Miramar Landfill, San Diego, California Chief Consulting Engineer to the City of San Diego for permitting and expansion design. Project included design, permitting, and construction services during the development of lined cells at this 807-acre site.

**Landfill Expansion Permitting**, Crazy Horse Landfill, Salinas, California. Chief Consulting Engineer for the City of Salinas providing engineering design services for landfill expansion and preparation of the Draft and Final EIR for the Crazy Horse Landfill. The project included construction, engineering, operational, and permitting assistance for the master planning and development of this 160 acre Class III landfill.

**Landfill Siting and Expansion Planning**, Central Landfill, Maui, Hawaii. Chief Consulting Engineer to the County of Maui for the siting and expansion of the existing Central Landfill located in the County of Maui, Hawaii. This included preparation of a master plan for vertical expansion and development of future phases of the site.

**Landfill Expansion Design**, Santa Cruz, California. Chief Consulting Engineer to the City of Santa Cruz for site expansion. Provided general engineering consulting services to the City since 1994 during the development of lined cells at the facility.

**Master Plan Development**, Aca Verde and Valle Verde Landfills, Mexico. Chief Consulting Engineer for the development of Master Plans for two landfill sites.

**Municipal Landfill Design**, Corral-Del-Indio Landfill, Mexico. Chief Consulting Engineer to the Municipality of Naucalpan (Mexico City) on the design of the 450-acre Corral-Del-Indio Landfill.

**Municipal Landfill Design**, BKK Landfill, West Covina, California. Chief Consulting Engineer responsible for the design of the 170-acre Class III Municipal Landfill at the BKK site.

**Municipal Landfill Design**, Los Angeles County, California. Chief Consulting Engineer to the Elsmere Corporation for the proposed municipal landfill in Elsmere Canyon in North Los Angeles County, California.

**Landfill Siting and Conceptual Design**, Ventura County, California. Chief Consulting Engineer responsible for the selection of a potential landfill site (Alamos Canyon) in Ventura County for a large land developer. Study included siting, grading design, access road design, geotechnical evaluation, capacity studies, and groundwater evaluation.

#### LANDFILL CLOSURE PLANNING / DESIGN:

**Carson Marketplace Development, Carson, California.** Providing engineering and regulatory agency negotiation support during design and construction of environmental control measures at a State Superfund Site (Cal Compact Landfill) landfill where a private developer is constructing a commercial and residential development with over 2.4 million square feet of pile-supported structural concrete slabs. Provided engineering support during the design of landfill gas extraction and treatment system, and final cover system construction. Provided negotiation support with the California Department of Toxic Substances Control during approval of environmental control features at the site.

**Investigation and Clean-Closure of former landfill in Anaheim, California.** Chief Consulting Engineer providing regulatory agency interface, and program management services during the closure of a former landfill where the Anaheim Redevelopment Agency wishes to construct a commercial development. This has included evaluation of waste excavation, landfill capping, landfill gas control, and installation of a membrane systems under proposed structures.

**Landfill Closure/Redevelopment Planning**, Palos Verdes Landfill, Los Angeles County, California. Chief Consulting Engineer for environmental engineering associated with the development of an 18-hole golf course and clubhouse facilities on the 173 acre site of a closed landfill. This includes development of designs presented in the EIR, technical and public meeting support to the EIR process, engineering and evaluation of special-purpose membrane cap and landfill gas control systems, drainage controls, irrigation controls, monitoring systems, and methane controls for the clubhouse and a re-located equestrian center. The site was used as a co-disposal site for municipal and hazardous waste from 1957 to 1980.

**Disposal Site Clean-up Program**, Chief Consulting Engineer to the California Integrated Waste Management Board's solid waste disposal and co-disposal site cleanup program.

Responsibilities under this engineering services contact have included site investigations, closure design, and construction support during the clean-up of more than 50 illegal and abandoned disposal sites and burn dumps in 15 California counties.

**Landfill Final Closure Design**, BKK Class I Landfill, West Covina, California. Responsible for the preparation, design, and implementation of the Closure Plan for the 170-acre former Hazardous Waste Disposal Area. This included design of a final cover system, leachate management system, interior and perimeter landfill gas extraction systems, landfill gas flaring system, and drainage system.

**Landfill Closure Design**, Elsinore Landfill, Riverside County, California. Chief Consulting Engineer for final cover design, drainage and grading plans, borrow evaluation, QA/QC Plan, Health and Safety Plan, and construction management services.

**Landfill Closure Design**, Coyote Canyon Landfill, Orange County, California. Project involved preparation of Final Closure and Post-Closure Maintenance Plans for this 300-acre site. This included development of final landfill disposal plans, final cover design, leachate and landfill gas control systems evaluation and design, storm drain designs, and construction support services.

**Landfill Closure Plans**, Santiago Canyon Landfill, Orange County, California. Chief Consulting Engineer for the County of Orange Integrated Waste Management Department providing the Closure and Post-Closure Maintenance Plans for the Santiago Canyon Landfill

**Landfill Closure Plans**, San Diego County, California. Chief Consulting Engineer for the development of Final Closure and Post-Closure Maintenance Plans, San Diego County Landfill Sites: Poway Landfill, Viejas Landfill, Valley Center Landfill, Encinitas Landfill, Gillespie Landfill, Jamacha Landfill, and Bonsall Landfill.

#### LANDFILL GAS MANAGEMENT:

**Landfill Gas-to-Energy System Evaluation**, Glendale Landfill, Glendale, Arizona. Chief Consulting Engineer on a project to develop landfill gas resources for energy generation purposes at this municipal landfill facility.

**Landfill Gas System Design**, 19th Avenue Landfill, Phoenix, Arizona. Chief Consulting Engineer for the design and replacement of a gas extraction system and flare station.

**Landfill Gas System Design**, Skunk Creek Landfill, Phoenix, Arizona. Chief Consulting Engineer to the City of Phoenix for the design and construction of a landfill gas extraction system and treatment system.

**Landfill Gas System Upgrades**, San Bernardino County, California. Chief Consulting Engineer for the implementation of upgrades to landfill gas extraction and treatment systems at the Colton, Mid-Valley, Milliken, and San Timoteo landfills in San Bernardino County, California. The program was implemented under an accelerated schedule as mandated by the requirements of the alternative energy tax credit program.

**Landfill Gas System Upgrades**, Lopez Canyon Landfill, Los Angeles, California. Chief Consulting Engineer for the design of the flare station and landfill gas collection and condensate handling system.

**REMEDICATION / CORRECTIVE ACTION:**

**Evaluation of Remedial Cost Alternatives**, Cal Compact Landfill, Carson, California. Prepared preliminary cost estimates for an investment group evaluating the feasibility of developing a shopping mall at the site. This included development of cost estimates for the construction of a five-foot thick mono cover utilizing on-site soils; installation of a gas control barrier to mitigate migration of landfill gas into mall buildings; and installation of landfill gas and groundwater extraction and treatment systems.

**Expert Review Services** in connection with litigation to determine the allocation of responsibility among responsible parties associated with the Cal Compact Landfill site. Developed estimates of actual waste tonnage in place; estimated of the amount of landfill gas generated since site began operating; reviewed remediation approach presented in the DTSC-approved Remedial Action Plan (RAP); developed a conceptual mitigation system design based on the process approved RAP for costing purposes; and prepared estimates of costs to implement the RAP and operate, monitor, and maintain the mitigation system.

**Remediation Program**, Fairchild Controls Brownfields Site, Manhattan Beach, California. Chief Consulting Engineer for preparation and implementation of a Remedial Action Plan for the site of an aerospace manufacturing firm and features chromium, PCE and TCE contamination in groundwater.

**Remedial Investigation, Belmont Learning Center, Los Angeles, California.** Chief Consulting Engineer for the preparation of a Supplemental Remedial Investigation/ Feasibility Study and design of a liner system and gas extraction and treatment system to mitigate hydrogen sulfide migration conditions at the Belmont Learning Center site in downtown Los Angeles.

**R/FS, Final Cover Design/Construction Management**, Royal Boulevard Land Reclamation Site, Torrance, California. The project involved design of a final cover system for a former foundry waste disposal site, and preparation of final grading and drainage plans.

**Closure Evaluation**, Gardena Valley 1&2 Landfill, Gardena, California. Chief Consulting Engineer for the remedial action plan and closure planning for a former Class II landfill which is listed as a State Superfund Site. The project involves preparation of an RI/FS, a Baseline Health Risk Assessment, and preparation of a Remedial Action Plan. The preferred alternative in the approved RAP included preliminary designs for a multi-layer low permeability cover, a landfill gas collection and treatment system, and long-term monitoring of the site. Special consideration was taken during the preliminary design to ensure that the site could be commercially developed upon completion of remedial activities.

**Site Control and Monitoring**, Operating Industries, Inc. Landfill, Monterey Park, California: Project Director to the PRP Technical Committee (1989 - 1995) for the site control and monitoring and leachate management systems (SCM/LMS) for the Operating Industries Landfill (Federal Superfund Site) in Monterey Park, California.

**CIVIL ENGINEERING:**

**Industry Hills Civic Recreation Complex Project**, Industry, California. Overall Engineering Coordinator for project involving construction of a hotel complex and two championship golf courses on the site of a former municipal landfill. The project won the 1981 Outstanding Civil Engineering Achievement Award from the American Society of Civil Engineers.

**Highway Interchange Design**, Project Manager for the design of Crossroads Parkway Interchange to the Pomona Freeway. Project included a new freeway interchange on the Pomona Freeway and construction of a railroad overcrossing and triple box storm drains.

**Water Supply System Design**, Industry, California. Project Manager for the design and construction of five MGD reclaimed water supply systems to the Industry Hills Recreational Complex. This system services the irrigation needs for two 18-hole championship golf courses encompassing roughly 260 acres.

**Tres Hermanos Ranch Infrastructure Design**, Project Coordinator included design of internal roadway circulation storm drain facilities, water systems supply, storage, and distribution.

**Storm Drain Assessment**, Beverly Hills, California. Chief Consulting Engineer for an assessment of the storm drain system along Hamilton Way in the City of Beverly Hills.

**Storm Drain System Design**, Coyote Canyon Landfill, Orange County, California Consulting Engineer for the design of the storm drain system at this municipal landfill

**Plaza at West Covina Shopping Mall Expansion**, West Covina, California. Chief Consulting Engineer for project which included parking lot reconfiguration and rehabilitation, plus street, storm drain, utility planning, and grading improvements during Phases I and II of the expansion of this major commercial shopping mall.

**Sewer Improvement Plans**, Monterey Park, California. Chief Consulting Engineer for design and improvement plans for the Potrero Grande Sewer, Monterey Park, California.

**Director of Engineering** for the National Engineering Company. Responsibilities included infrastructural projects in the City of Industry.

**Street Corridor Improvement Projects**, Industry, California. Project Engineer, Gale Avenue and Azusa Avenue corridor street improvement projects.

**EXPERT TESTIMONY:**

Del Rio Landfill. Expert witness for the City of Phoenix regarding a claim concerning offsite migration of contamination from the Del Rio Landfill.

Weyerhaeuser Mortgage Company regarding the migration of landfill gas at the Coastal and Santa Clara Landfills in California.

Meeks versus Birdsall regarding a landfill gas explosion and fire in a leachate collection sump at the Monmouth County Landfill in New Jersey.

Represented Emcon versus Hillsborough Homeowners Association regarding landfill maintenance and gas migration control systems at the closed Hillsborough Landfill.

Represented City of Los Angeles versus SCAQMD regarding landfill gas control system design for the Lopez Canyon Landfill.

Ghilotti Brothers Contractors regarding a landfill gas explosion in a storm drain manhole adjacent to the San Quentin Landfill.

Birtcher Riverside Marketplace versus Union Pacific Railroad Company. Represent the Union Pacific Railroad in the lead contaminated Riverside Market Place Remedial Action Plan review and cost estimate evaluation.

Represented City of Beverly Hills versus Arman regarding the performance of a storm drain system.

Represented the municipal defendants in the Acme Landfill hazardous waste site in the review of remedial alternatives and cost estimates.

Represented the County of San Diego at the former Duck Pond Landfill in the evaluation of remedial alternatives and cost reviews.

Represented Chevron Oil Company at the West Contra Costa Hazardous Waste site in the evaluation of closure alternatives and cost reviews.

Represented the City of Brea at the Brea Reservoir Construction Site, regarding cost overruns and poor environmental remediation.

**PUBLICATIONS:**

*"The Influence of Design and Construction on the Performance of Landfill Gas Extraction Wells"* B.A. Stirrat, K. Johnson, R. Bauer, G. Andraos, A. Rivera; Solid Waste Association of North America 2004 Landfill Gas Symposium, San Antonio, Texas.

*"Golf Course Reuse for a Landfill that Accepted Hazardous Waste and State-of-the-Art Review - Palos Verdes Landfill"* B.A. Stirrat, R. Katherman; 2004 Brownfields Conference, Phoenix, Arizona.

*"Regional Landfill Options for Orange County (RELOOC), County of Orange Integrated Waste Management Department Long-Range Strategic Planning"* B.A. Stirrat, J.V. Goss, S. McClanahan, C. Arbogast, Solid Waste Management Association of North America Western Regional Meeting, Lake Tahoe, Nevada, 2002.

*"On-Site Treatment of Dual-Phase Solvent/Alcohol Groundwater Contamination at an Old Paint Plant in Southern California,"* A. Lebel and B. A. Stirrat, Proceedings of AEHS' Fifth Annual West Coast Conference on Contaminated Soils and Groundwater, Long Beach, California, 1994.

*"Cost-Effective Pump and Treat System for Groundwater Remediation Using Innovative Technology,"* A. Lebel and B. A. Stirrat, Proceedings of WEF's Site Management Specialty Conference, Miami, Florida, 1994.

*"Leachate Treatment Facility at a Large Hazardous Waste Landfill in Southern California: An Environmental Perspective,"* A. Lebel and B. A. Stirrat, Fourth International Conference on Environmental Quality and Ecosystem Stability, Jerusalem, Israel, 1989.

*"Startup Operation of Biophysical Leachate Treatment Facility,"* A. Lebel, A. Raveh, R. Meeden, and B. A. Stirrat, 61st Annual WPCF Conference, Water Pollution Control Federation, Dallas Texas, 1988.

*"Biophysical Treatment Facility for Hazardous Waste Landfill Leachates,"* A. Lebel, R. Meeden, and B. A. Stirrat, 14th Semi-Annual IAWPRC Conference, Brighton, England, 1988.

*"Biophysical Treatment of Landfill Leachates Containing Organic Compounds,"* T. McShane, E. Pollock, A. Lebel, and B. A. Stirrat, 41st Annual Purdue Industrial Waste Conference, Purdue University, Indiana, 1986.



**Bryan A. Stirrat, P.E.**  
President, Tetra Tech/BAS

**PROFESSIONAL EXPERIENCE:**

- 2009 – Present President, Tetra Tech/BAS, Diamond Bar, California
- 1984 – 2009: President, Bryan A. Stirrat & Associates (BAS), Diamond Bar, California
- 1978 – 1984: Director of Engineering, National Engineering Company, Industry, California
- 1975 – 1978: Head of Planning and Engineering, Los Angeles County Sanitation Districts, Solid Waste Management Department
- 1972 – 1975: Senior Design Engineer, Los Angeles County Sanitation Districts, Sewage Treatment Plant Design Department

**EXHIBIT 2**

*Mr. Acosta is a registered Civil Engineer with 18 years experience in conducting Remedial Investigations, Feasibility Studies and Environmental Site Assessments, preparation of Remedial Action Plans and design and implementation of contaminated site remediations. Mr. Acosta has had extensive experience in the implementation and supervision of both site characterizations and cleanup activities. His experience includes investigations of inactive landfills, burn dumps, and industrial waste disposal sites. He has directed large, regional environmental response contracts for public agencies; and has specialized experience providing environmental engineering services in support of large landfill redevelopment projects.*

**LANDFILL INVESTIGATION / REMEDIATION PLANNING:**

**Landfill Investigation and Remediation, Meyers Landfill, El Dorado County, California.** Project Manager for preparation and implementation of a Remedial Action Work Plan for the cleanup of an inactive landfill located on Forest Service lands in the Lake Tahoe Basin Management Unit. Site closure plans were prepared in accordance with USEPA CERCLA guidance and were reviewed by the US Forest Service acting as the lead agency, and other involved agencies. Also provided engineering support during final closure construction.

**Landfill Redevelopment Planning, Anaheim, California.** Project Manager for site evaluations and closure planning at property featuring three historic landfills where the Anaheim Redevelopment Agency plans to construct a 258,000 square foot commercial and retail complex. Overseeing engineering, environmental cleanup planning, regulatory agency interface, and program management tasks. Overall project includes evaluation and design of waste excavation, landfill capping, implementation of landfill gas control measures, and installation of a membrane systems under proposed structures.

**Landfill Investigation and Remedial Action Planning, EPC Eastside Landfill, Kern County, California.** Project Manager for remedial investigation and feasibility study of oil drilling waste disposal site in Kern County. Responsibilities included preparation of a

**Education:**

M.S., University of CA, Los Angeles (UCLA), Environmental Engineering (1997)

B.S., California State Polytechnic University, Pomona, California, Civil Engineering (1989)

The Princeton Course on Groundwater Pollution and Hydrology

**Registrations:**

Professional Civil Engineer Registered in the State of California (#C 48725)

Arizona Department of Environmental Quality Pre-qualified UST Consultant

**Certifications :**

40-Hour Hazardous Waste Operation/Emergency Response

8-Hour Hazardous Waste Operations Site Supervisor Training

8-Hour HAZWOPER Refresher Training

First Aid / CPR, 1995

**Professional Affiliations:**

American Society of Civil Engineers

California Groundwater Association

National Groundwater Association

focused risk evaluation for the site, assistance in preparation of the feasibility study, and coordination and supervision of groundwater monitoring and reporting program. Also directed preparation of a Remedial Action Plan that proposes to mitigate potential environmental concerns through installation of a soil cap and implementation of institutional controls, such as site security, deed restrictions and continued site monitoring. Remedial construction will involve installation of surface emissions monitoring stations, demolition of existing structures, abandonment of leachate collectors, and protection of existing groundwater monitoring wells.

**Landfill Assessment and Clean Closure Planning, San Dimas Grove Station Landfill, San Dimas, California.** Project Manager for development and implementation of a clean closure plan for a commercial development in the City of San Dimas. Work included investigation of soil, waste and landfill gas at the site, coordination with the developer and development team on closure alternatives, development of a clean closure work plan, coordination with overseeing regulatory agencies on approvals and permits, oversight of clean closure activities, and preparation of a closure report.

**Landfill Remedial Investigation, Gardena Valley 1 & 2 Landfill, State Superfund Site, Gardena, California.** Project Engineer preparing the approved Remedial Investigation (RI) / Feasibility Study (FS) Workplan, implementing field operations including sampling of soil, groundwater, landfill gas, and soil pore liquids, preparing the approved RI Report, preparing the approved FS Report, preparing CEQA documentation, preparing the approved Remedial Action Plan (RAP), and coordinating community relations activities. All activities were performed for submittal to California Department of Toxic Substances Control.

**Burn Dump Investigation, Ford City Burn Dump, Ford City, California.** Project Manager performing an investigation to delineate the lateral extent of contamination of a former burn dump site. Work included development and implementation of a sampling plan and preparation of a report of findings for submittal to the California Integrated Waste Management Board.

**Landfill Investigation, Cajon Landfill, San Bernardino County, California.** Project Manager directing the emergency investigation of emissions from a subsurface fire at an illegal landfill located in the Cajon Pass, north of San Bernardino California. Work included coordination with the California Integrated Waste Management Board and local fire officials; development of a sampling plan; collection of point source samples from within the landfill and at the landfill surface; analyses of samples for VOCs, metals, carbon monoxide, PAHs, dioxins, furans, and PCBs; and preparation of a report of findings for submittal to the California Integrated Waste Management Board.

**Landfill Investigation, Basin-By-Products Landfill State Superfund Site, Wilmington, California.** Project Engineer preparing the RI/FS Workplan, implementing field operations including sampling of soil and groundwater, and preparing the interim RI Report. All activities were performed for submittal to California Department of Toxic Substances Control.

**Landfill Investigation, Cal Compact Landfill State Superfund Site, Carson, California.** Member of technical staff preparing Remedial Investigation and Feasibility Study Work Plan site located in City of Carson, California.

**Landfill Assessment and Remediation Planning, Mountain View, California.** Conducted subsurface investigations and performed engineering evaluations for contaminated areas adjacent to and part of the Vista and Crittenden Landfills. This included investigations of areas used for agricultural purposes, former warehouse and vehicle fueling areas, former material processing areas, areas of previous unauthorized disposal, and an associated welding shop. Contaminants of concern included pesticide, petroleum and heavy metal contaminated soils. Potential remedial options evaluated included on-site and off-site treatment and/or disposal of 60,000 cubic yards of pesticide-contaminated soils, 50,000 cubic yards of petroleum contaminated soils and construction debris, and a variety of smaller areas of unauthorized disposal.

**Milliken Landfill Groundwater Pump and Treat System Design.** Project design engineer during construction of the groundwater pump and treat system at the Milliken Landfill. Work included review of submittals, field design of system elements, preparation of an O&M manual, system start-up and shakedown, coordination of system operation and sampling, and coordination with the project construction manager and client.

**Mid Valley Landfill Groundwater Pump and Treat System Design.** Project manager in charge of the design of the upgrade and expansion of the groundwater extraction, treatment and re-injection system at the Mid Valley Landfill. The system expansion included installation of 16 groundwater extraction wells and 19 re-injection wells over a 3/4 mile point of compliance, installation of conveyance piping and controls for new wells, upgrade of air stripper treatment system, upgrade of electrical system and process controls and instrumentation. Work included evaluation of the existing treatment system and preparation of design drawings, specifications and bid documents for the expansion.

#### LANDFILL MONITORING & MAINTENANCE:

**San Bernardino County Landfill Groundwater Monitoring Program.** Project Manager supervising and coordinating field activities for groundwater monitoring at 24 operating and closed municipal waste landfills within the County of San Bernardino. Work includes supervision and coordination of field crews in collecting groundwater, surface water, landfill gas condensate and

soil pore gas samples, review of field data, coordination with the analytical laboratory, other technical staff and landfill operators, and development and implementation of a low-flow minimal drawdown sampling program.

**Santiago Canyon Landfill.** Project Manager in charge of operations and maintenance of the groundwater and condensate treatment system. The system includes a groundwater and condensate extraction, collection and storage system, a metals precipitation pretreatment system, an air stripper for removal of organics and a final treated water storage and testing area. Work included routine and non-routine operations and maintenance of all system components, ongoing system evaluation, and development of recommendations for system modifications and improvements.

**Imperial County Groundwater Monitoring Program.** Project Manager supervising and coordinating field activities for groundwater monitoring at various operating and closed municipal waste landfills within Imperial County. Work included supervision and coordination of field crews in collecting groundwater samples, review of field data, coordination with the analytical laboratory, and other technical staff.

**Santiago Canyon Landfill Water Quality Monitoring Program.** Supervised procurement and installation of purging and sampling pumps. Member of team implementing the sampling program (Santa Ana RWQCB).

**San Bernardino County 1150.1 Monitoring Program.** Project engineering for SCAQMD Rule 1150.1 monitoring and reporting programs for four active landfills in the County of San Bernardino. Work included coordination with field crews and analytical laboratories in completing all monitoring, sampling and analyses in accordance with the rule, reporting of exceedances and coordination with operators on mitigation measures and re-monitoring, and preparation and submittal of quarterly reports. In addition, assisted in the development of revised monitoring and report programs for the sites following update of the rule by SCAQMD.

**San Bernardino County Landfill Gas Extraction and Treatment Systems.** Project Engineer and client liaison for operations, maintenance and monitoring of landfill gas extraction and treatment systems at four sites in San Bernardino County. Work included coordination with field crews, subcontractors, vendors and operations personnel for each site to maintain the landfill gas extraction and treatment (flaring) systems in compliance with SCAQMD requirements while minimizing impacts to landfill operations.

**San Bernardino County Perimeter Probe Monitoring.** Project Manager coordinating the monitoring of perimeter landfill gas detection probes for fifteen sites in the County of San Bernardino. Work includes coordination of field crews and data reduction and preparation for inclusion in the quarterly Subtitle 'D' monitoring reports.

**Royal Boulevard Land Reclamation Site.** Project Manager supervising and coordinating post-closure activities for the closed inert waste landfill near the City of Carson, California. Work includes monthly inspections and reporting, coordination of site maintenance, and semi-annual groundwater monitoring and reporting for the Los Angeles Regional Water Quality Control Board.

**ADDITIONAL RELEVANT EXPERIENCE:**

**Rosen's Electric Site Clean Closure, Pico Rivera, California.** Project Manager for development and implementation a remedial design for the cleanup of a PCB impacted site. PCB impacts to shallow soil and groundwater encompass portions of the site and the adjacent railroad right of way. Activities included development of a remedial design for the excavation and removal of the most highly impacted soil and capping of the areas of the site where contamination is to be left in place. The project is being overseen by the California Department of Toxic Substances Control, Glendale office.

**San Diego Unified Port District, Campbell Shipyard Remediation.** Provided engineering oversight for the removal, stabilization and disposal of impacted sediments adjacent to the San Diego Convention Center. Impacted sediments located beneath an existing concrete ramp and pier contained free petroleum hydrocarbons which had to be contained and controlled during implementation of removal activities. Prepared a removal action workplan (RAW) and associated documents detailing various elements of the remedial activities to be performed at the site, coordinated confirmation sampling efforts, documented and recorded the progress of removal actions, and interfaced with the Port's consultant on technical issues. The RAW for the site was reviewed and approved by the Port of San Diego, the Regional Water Quality Control Board, the Coast Guard, the US Fish and Game Department, and the San Diego County Environmental Health Department.

**California Department of Transportation As-Needed Environmental Investigation and Remediation Contract.** Project Manager overseeing the performance and administration of various Task Orders requested by Caltrans for work performed under this \$2 million contract. In this position, acted as Task Order Manager overseeing completion of specific task orders as well as supervising and advising Task Order Managers in the completion of work. Coordinated task orders being performed in various Districts and acted as primary contact for Caltrans technical and administrative staff.

**EXHIBIT 3**



**Marina Grigorova, P.E.**  
Project Manager, Tetra Tech/BAS

*Ms. Grigorova has 15 years of experience in environmental engineering and environmental research. She is responsible for conducting Phase I and II Environmental Site Assessments, Remedial Investigations, health risk analyses, preparation of Remedial Action Plans, Sampling Plans and Health and Safety Plans, and oversight of operations and maintenance of treatment systems. She also has extensive knowledge of federal and state environmental statutes and regulations. Prior to joining BAS, Ms. Grigorova was a Research and Development Engineer with the Los Alamos National Laboratory in Los Alamos, New Mexico, where she was responsible for the analysis of state-of-the-art technologies for the remediation of mixed and solid waste and waste water.*

**LANDFILL ASSESSMENT / REMEDIATION / O&M / PLANNING:**

**Risk Analysis, EPC Eastside Landfill, Bakersfield, California.** Provided health risk analysis in support of Remedial Investigation/Feasibility Study for this former oil field disposal facility listed as a State of California Superfund site overseen by the Department of Toxic Substances Control. In addition, prepared the Work Implementation Plan for ultimate site closure and cap construction.

**Design of Groundwater Pump and Treat Systems, Mid Valley and Milliken Sanitary Landfills, San Bernardino County, California.** Staff Engineer for the design, construction and operation of the POC/CAP groundwater extraction and treatment systems. Both systems are pump-and-treat systems designed to remove volatile organic compounds. Currently, provides engineering oversight of Mid-Valley groundwater treatment system O&M.

**Basin ByProducts, Wilmington, California.** Project Manager for various investigation activities at this State Superfund Site, under oversight of DTSC. The site is a former liquid hazardous waste disposal facility, currently operated as a municipal waste transfer station and a materials recovery facility, and located in heavily industrialized Log Angeles-Long Beach port area. The site contains three historical industrial waste disposal areas and was

**Education:**

MS, Environmental Engineering,  
Johns Hopkins University, 1995

BS, Chemical Engineering,  
Moscow Institute of Fine  
Chemical Technology, 1992

**Registrations:**

Registered Civil Engineer,  
California (#67877) 2005

Registered Environmental  
Assessor I, California  
(REA-07567) 2002

**Certifications :**

40-Hour Hazardous Waste  
Operation / Emergency  
Response

8-Hour HAZWOPER Refresher  
Training

8-Hour Site Supervisor  
Training

**Professional Affiliations:**

California Groundwater  
Association

used to dispose of highly acidic and basic, heavy metal contaminated liquid waste into on-site injection wells and pits. Work included preparation of work plans, health and safety plans for the site and the surrounding community, and reports of investigations. Investigations included extensive soil gas surveys at and around the property, assessment of previously installed groundwater wells, groundwater monitoring, and survey of site vicinity. Also assisted in the planning of indoor air assessment of the site buildings, and liaison with Port of Long Beach. All field activities were closely coordinated with and were performed under oversight of DTSC.

**Valle Vista Landfill Clean-up Investigation and Planning**, Hemet, California. Project Manager for investigation and remediation services in support of the construction of a residential development at the site of an illegal landfill. Developed site specific Remedial Action Plan, including site sampling plan and health and safety plan. Provided permitting support and construction management assistance for the clean closure of the former landfill.

**Assessment of Landfill Buffer Property**, San Bernardino County, California. Project Manager for Phase 1 of a property north of the Milliken Sanitary Landfill, in support of studies evaluating the development potential of the property.

**Landfill Site Investigation**, 38th Street Disposal Site, San Diego, California. Performed sampling and assisted in preparation of investigation reports.

**Landfill Site Investigation**, City of Lindsay Illegal Dump, Tulare County. Prepared site specific Sampling Plan and Health and Safety Plan, performed sampling, prepared Site Investigation Report.

**Illegal Dump Site Closure**, Nicholson Avenue Disposal Site, Long Beach, California. Assisted in construction management duties, performed sampling, prepared Remedial Investigation Report.

#### SITE ASSESSMENT/REMEDIATION:

**Brownfields Cleanup Assessment Study**, North Fork Mill, North Fork, California. Project involved preparation of a Remedial Investigation Workplan, implementation of the Remedial Investigation (collection of surface and near surface soil samples, identification and sampling of nearby groundwater supply wells, drilling, logging, and sampling of soil borings, construction and monitoring of groundwater wells); preparation of a remedial investigation report, focused feasibility study and focused Health Risk Assessment, all of which were approved by both the CV-RWQCB and DTSC. Subsequently, prepared a Removal Action Plan, under DTSC oversight, which was successfully implemented by a third party.

**Fresno Housing Authority Site Investigations**, Fresno, California. Project Manager for site investigations in support of the redevelopment of the Fruit/Triangle and Old Snake Road

Landfill sites. Investigation activities were funded through Brownfields Assessment grants obtained by the Housing Authority. Prepared assessment plan, approved by US EPA Region IX, US Army Corp of Engineers, CV-RWQCB, and DTSC. Implemented investigations and prepared reports of findings and a conceptual Remedial Action Plan. At the Old Snake Road Landfill site, installed and tested gas probes to investigate potential production and migration of methane from the old landfill.

**Beaudry Site Redevelopment Environmental Studies**, Los Angeles, California. Project Manager for environmental support to a developer who was evaluating the feasibility of purchasing a property near downtown Los Angeles for the construction of a mixed-use residential complex. Prepared an environmental assessment of the site, supervised a soil gas survey, soil sampling, and the installation and sampling of groundwater monitoring wells at the site, removal of undocumented UST, soil remediation and abandonment of a historical oil well. Project demonstrated that with the implementation of measures to mitigate subsurface methane migration and limited soil remediation, the property posed no risks for residential development. The client subsequently purchased the property and constructed the award-winning residential development.

**GOE Engineering**, City of Industry, California. Following remediation of the site soils, impacted with various chlorinated VOCs, conducted soil vapor testing and performed health risk assessment to demonstrate to the regulatory agency (LA-RWQCB) that the site can be granted closure. Residual soil gas impacts were shown to result from volatilization of VOCs from groundwater, impacted on a regional basis and treated as part of San Gabriel Valley Superfund.

**Broadstone Glendale Development Environmental Studies**, Glendale, California. Project Manager for Phase I and II Site Assessments, and asbestos/lead based paint survey where a private developer intends to demolish existing buildings and construct a mixed use development consisting of 200 residential units and 20,000 square feet of retail space. Existing improvements on the site included eight structures and three parking lots. Currently providing construction/demolition support.

**Site Investigation/Remediation**, Oakhurst, California. Project Manager for the investigation of a UST site where soil and groundwater were contaminated by petroleum hydrocarbons, BTEX and MTBE. Work at the site included drilling of exploratory borings, construction of groundwater monitoring and vapor extraction wells, vapor extraction testing, remedial design, and soil and groundwater remediation. Significant technical aspects of the project included the evaluation of alluvial, decomposed granite, and fractured bedrock zones and coordination with owners of nearby impacted potable water wells. The site was overseen by the Central Valley

RWQCB and was a priority site on the state's UST Fund list. As Project Manager, provided coordination between the site owner, RWQCB, the state UST fund, and surrounding well owners. Also coordinated all site activities and contractors. Soil remediation was initiated in May 2002 and completed in October 2005. Groundwater remediation started in June 2005 and completed at the end of 2008. The CV-RWQCB granted case closure in 2010.

**Site Investigation/Remediation, Reedley, California.** Project Manager for the investigation of a UST site where soil and groundwater were contaminated by petroleum hydrocarbons and BTEX. Work at the site included vapor extraction testing, remedial design, and soil remediation. Significant technical aspects of the project included the evaluation of potentially dynamic groundwater flows in the area resulting from seasonal pumping of the underlying aquifer. The site is overseen by the Central Valley RWQCB and is receiving funding from the state UST Fund. As Project Manager, provided coordination between the site owner, RWQCB, and the state UST fund. Also coordinated all site activities and contractors. Soil remediation began in June 2003 and was completed by March 2005.

**Site Investigation/Remediation, Ahwahnee, California.** Project Manager for the investigation of a UST site in where soil and groundwater were contaminated by petroleum hydrocarbons and MTBE. Work included the preparation of a site investigation work plan to investigate both groundwater and soil at the site, drilling of exploratory borings, construction of groundwater monitoring wells, and establishment of a groundwater monitoring program. As a result of continuous monitoring, the site was shown not to present a risk to human health or the environment, and as a result, received regulatory closure from the Central Valley RWQCB in March 2003.

**Site Investigation/Remediation, Kingsburg, California.** Project Manager for a site investigation at the Former Kingsburg Union Station. Prepared a corrective action workplan and installed and operated a soil vapor extraction/air sparging (SVE/AS) system at a former gasoline station site. Planned and implemented a subsurface investigation to delineate soil and groundwater contamination at the site. Designed full-scale SVE and AS remediation systems to mitigate high concentration of gasoline and VOCs in the soil and shallow groundwater beneath the site. Following installation, oversaw operation, maintenance and monitoring of the SVE/AS system from July 2004 through September 2006, at which point the site clean-up goals were reached. The CV-RWQCB granted closure of this case in February 2007.

**Site Investigation/Remediation Coalinga, California.** Project Manager for a soil investigation, implementation of remedial action services, and closure certification for a commercial gasoline station. Significant technical aspects of the project included installation of vapor extraction wells to depths of 200 feet below ground surface through hard sands, which required utilization of unconventional drilling methods. Operated the full-scale SVE system from

November 2003 through February 2005, at which point the site clean-up goals have been reached. The CV-RWQCB granted closure of this case in March 2005.

**Soil Vapor Extraction Treatment System Construction and Operation, Former Tank Farm, Norwalk, California.** Provided engineering support, construction management, data analysis, sample collection, O&M oversight and reporting on SVE system operation. SVE system consisted of a network of vapor extraction wells and a thermal oxidation treatment unit. Upon completion of remediation, the former tank farm was redeveloped into a mini-storage facility.

**Los Angeles to Pasadena Blue Line Construction.** Assisted in environmental oversight and compliance during construction of a segment of Metrolink light rail line between Los Angeles and Pasadena. This included field observation of contractor activities, monitoring of remediation efforts, review and auditing of storm water pollution prevention, soil sampling and characterization, review of contractor records for compliance, coordinating with waste disposal contractors and signing of waste manifests, and coordination with site contractors and the Construction Authority on environmental issues.

**Environmental Site Assessments, North Downtown Redevelopment Area, Compton, California.** Project Manager for Phase I and Phase II Site Assessments of 34 parcels that the Compton Redevelopment Agency was considering for redevelopment. The environmental site assessment complied with the ASTM Standard E1527-05, the EPA All Appropriate Inquiry standards, and/or DTSC/LA-RWQCB Advisory for Active Soil Investigations.

**Caltrans Initial Site Assessment, I-5 Corridor Improvement Project, Los Angeles County, California.** Part of technical team that prepared an ISA of approximately 350 parcels being acquired by CALTRANS in support of the widening of I-5 between the Los Angeles/Orange County line, and the I-605 interchange. The project involved visual inspection of properties, a search of historical records and environmental databases, and a review of regional geology and hydrogeology.

**Project Manager for Phase I and II Site Assessments** on properties proposed to be impacted by the enlargement of the Prado Dam Reservoir Basin. Several independent investigations were performed for various sites in Riverside and Orange Counties. Each investigation included review of historical records and information sources and site reconnaissance in accordance with ASTM standards and the specific requirements of the Orange County Public Facilities Resource Department. Where necessary, subsequent investigations were performed which included collection and analysis of soil, groundwater and soil gas samples.

**Environmental/Historical Assessment, San Bernardino, California.** Project Engineer for assessment of properties in eastern San Bernardino as part of the development of new City



**Marina Grigorova, P.E.**  
Project Manager, Tetra Tech/BAS

groundwater wells. Project involved site inspection/interviews, review of state and federal databases, interpretation of historical photographs, and preparation of a final report.

**EXHIBIT 4**

*Mr. Guerrero has more than 25 years of geologic and environmental management experience. His technical experience encompasses soil and groundwater investigations, soil gas vapor surveys, waste water and storm water project experience, vadose zone and groundwater remediation of petroleum and chlorinated hydrocarbons, drilling and installation of water wells, and management and development of oil fields and exploration for new petroleum reserves. He has extensive knowledge of project management and technical development of geologic staff, remedial engineering design, environmental drilling and water well oversight, geochemical evaluations, hazardous waste management, cost/schedule responsibility, technical review and approval of remedial action work plans, drilling and sampling plans, groundwater monitoring reports and site closure reports. Additionally, Mr Guerrero presently serves as a City Planning Commissioner reviewing and approving California Environmental Quality Act documents. Mr. Guerrero has been selected by the State of California Board of Registration for Professional Engineers and Land Surveyors as a Subject Matter Expert and writes questions for use on the Professional Geologist Exam.*

#### **ENVIRONMENTAL INVESTIGATIONS:**

**Environmental Assessment,** Preisker Park Site, Santa Maria, California. Senior Geologist. Provided site assessment activities on a former landfill and burn pit that will be the location of a new fire station. Environmental assessment included geoprobe soils sampling and delineation of a burn ash deposit beneath the proposed new fire station. Also prepare a Construction Contingency Plan for the project. (City of Santa Maria Department of Public Works 2010- 2011)

**Groundwater Monitoring,** Former Sparks, Anderson and Rains Pits Site, Anaheim, California. Senior Geologist. Provided technical review and quality assurance/quality control on quarterly groundwater monitoring reports for this former landfill that was used for sand and gravel quarrying, received drilling muds from oil wells and was used for disposal of municipal solid waste and construction debris. Quarterly reports included chemical analysis,

#### **Education:**

BS, Geological Sciences  
University of Southern California  
(1979)

Masters Thesis: Geology of the  
Northern White Pine Range,  
East-Central Nevada, California  
State University - Long Beach,  
California (1983)

#### **Registrations:**

Professional Geologist, (#6321),  
California (1995)

Registered Environmental  
Assessor I (#6299), California,  
(1995)

Registered Environmental  
Assessor II (#20169), California,  
2001

#### **Certifications :**

40-hr HAZWOPER

8-hr Supervisor HAZWOPER

First Aid/CPR Certified

Transportation Worker  
Identification Card

Security Clearance

time-concentration graphs of volatile organic compounds and evaluation of hydrogeology of the site. (City of Anaheim Redevelopment Agency 2010 - 2011)

**Due Diligence Environmental Assessment**, South Yuma County Landfill Site, Yuma County, Arizona. Senior Geologist. Provided review of technical documents as part of due diligence prior to property acquisition. Evaluated groundwater monitoring well chemical concentrations and site hydrogeology. (Confidential Client 2011)

**Detection Monitoring Program**, Billy Wright Landfill Site, Los Banos, Merced County, California. Senior Geologist. Assisted with preparation of a Detection Monitoring Program for the existing landfill. Evaluated groundwater monitoring wells and need for expansion of well network and provided post-closure cost estimates for groundwater monitoring. (Merced County Department of Public Works 2010)

**Joint Technical Document**, Fairmead Landfill Site, Madera, California. Reviewed a Joint Technical Document and prepared a Technical Memorandum regarding the proposed vertical expansion of waste management units 1, 2, and 3 at the Fairmead Landfill. The Central Valley RWQCB requested technical responses to the JTD regarding the site hydrogeology and proposed waste cells. (Waste Connections 2011)

**Environmental Assessment**, El Sobrante Landfill Site, California. Assisted in an evaluation of the cement treated ash material in terms of human health perspective in utilizing the material as an Alternative Daily Cover at the El Sobrante Landfill. (USA Waste of California 2010)

**Quarterly Groundwater Monitoring**, Basin By-Products, Wilmington, California. Provided technical review and quality assurance/quality control on quarterly groundwater monitoring reports for this site that is a current refuse transfer station. Includes assessment of chemical trends in groundwater and preparation of groundwater maps. (BKK Corporation 2010 - 2011)

**Phase I & II ESA**, Mixed Use Development, Los Angeles, California. Conducted a Phase I ESA and environmental screening evaluation of a former Mercedes Benz/BMW auto dealership to be redeveloped into an 8-story mixed use facility with apartments and retail services. The site was located in a methane district adjacent to the South Lake and San Vicente Oil Fields. (Caruso Affiliated Holdings 2010)

**Phase II ESA Work Plan**, R.D. Olson Property, Pasadena, California. Conducted site assessment services and prepared an expedited Phase II ESA work plan at a petroleum hydrocarbon and chlorinated hydrocarbon-impacted site to be developed with a hotel. Received work plan approval in less than 24 hours. Will provide environmental services during construction activities. (R.D. Olson 2010)

**Phase II ESA & Remediation Services**, Santa Ana, California. Assisted a former metal plating company with responding to a DTSC Consent and Corrective Action order to mitigate soil, soil gas and groundwater impacts of heavy metals and chlorinated hydrocarbons on the abandoned metal plating facility. Services included representing the client in negotiations with the DTSC and OCHCA, preparing site assessment work plans, implementing subsurface plume delineation and preparing a remediation strategy leading to site closure. (Engineering Plating Company 2010)

**Asphalt Plant Environmental Investigations**, Santa Maria, Atascadero, Paso Robles, California. Conducted site investigation services and remedial action for four asphalt plants to evaluate TPH, VOC, PAH and heavy metal impacts to soil and groundwater as part of acquisition of a new company's' assets. Multi-year investigations included interfacing with various regulatory agencies, attorneys and consulting firms for the purchased company. Relationship strengthened so work has been awarded sole source exceeding \$1 million in booked revenue. (CalPortland Cement 2008 - 2010)

**Phase I ESA and Soil Vapor Investigation**, Bloomington, California. Project Manager for Phase I ESA and soil vapor investigation to assess potential subsurface impacts at a newly acquired property adjacent to a petroleum oil tank farm. This fast-track project resulted in recommendations to assess detected VOCs emanating from adjacent properties. (CMC Americas 2009 - 2010)

**Phase I ESA, Site Assessment and Soil Vapor Investigation**, Fullerton, California. Project Manager for a Phase I ESA, environmental assessment of the vadose zone and a soil vapor investigation to assess potential subsurface impacts to a corrugated paper manufacturing plant as part of closure activities. Scope included UST site closure, limited access rig drilling inside of buildings and analysis for TPH, VOCs, pesticides, herbicides and heavy metals. This fast-track project included providing urgent response to attorneys, real estate professionals, and the buyer's environmental consultants. Submitted a request for site closure and received in 4 days from the DTSC. (Smurfit Stone Container Corporation 2008 - 2009)

**Assessment of Paper Manufacturing Plant**, Industry, California. Conducted an environmental assessment of the vadose zone inside a corrugated paper manufacturing plant to assess potential subsurface impacts as part of property closure activities. Removed decommissioned piping and other subsurface structures and analyzed for TPH, VOCs and heavy metals. (Smurfit Stone Container Corporation 2008 - 2009)

**CEQA Support and Site Assessment Services**, Buena Park, California. Senior Technical Reviewer. Conducted a Phase I ESA, Water Supply Assessment and soil/groundwater/soil vapor investigation for the Beach and Orangethorpe Mixed-Use Specific Plan for the Buena

Park, CA redevelopment project. Provided CEQA M&D Properties Redevelopment technical support to CEQA consultant, corresponded with regulators and city officials. (M&D Properties 2008 - 2009)

**Site-Wide Soil Vapor Investigation**, Thousand Oaks, California. Sr. Technical Reviewer for site-wide soil gas survey to evaluate and quantify the presence of VOCs in shallow soil. The survey was conducted in response to the California Regional Water Quality Control Board-Los Angeles Region letter. Scope included over 75 multiple completion soil vapor probes with some requiring limited access drilling. Report was provided to the client 1 month ahead of schedule (Confidential Client 2009 - 2010)

**Quarterly Groundwater Monitoring**, Sunland, California. Sr. Technical Reviewer for quarterly groundwater monitoring events at a public golf course located within the Big Tujunga Wash. Groundwater and surface water are monitored quarterly to assess any impact the golf course operations may have on groundwater or surface-water quality. Reports uploaded to the State of California Geotracker system. (Los Angeles International Golf 2008 - 2009)

**Soil Remediation**, Sunland, California. Sr. Technical Reviewer for the remediation of soil impacted with VOCs present in the subsurface soil that was largely remediated by means of excavation. The purpose of the assessment was to document the remediation of the remaining impacted soil at the Site through the use of soil vapor extraction technology. Soil remediation was conducted in accordance with the Revised Soil Remedial Action Plan which was submitted to the Los Angeles Regional Water Quality Control Board. Site closure was requested on behalf of the client. (Country Hills Dry Cleaner/Animal Clinic 2008 - 2009)

**Environmental Assessment and Closure Support**, Berth 120, Port of Los Angeles, California. Senior Technical Reviewer and Project Manager for the assessment and site closure activities for the Kinder Morgan property at Berth 120. Scope includes removal of over 1000 feet of petroleum pipelines, management of soil and disposal of petroleum impacted material in accordance with LARWQCB and Port of Los Angeles requirements. (El Paso Corporation 2009 - 2010)

**Closure Assessment**, Santa Fe Springs, California. Sr. Technical Reviewer for the assessment and property closure activities for a film developing plant. Scope included review of environmental permits, site reconnaissance, and subsurface soil sampling and closure of clarifiers through Santa Fe Springs. (Fuji Films 2009)

**Site Assessment Services**, Prado Dam - Santiago Pits, Orange, California. Program Manager. Conducted site assessment services for the County of Orange to evaluate potential recognized environmental conditions (REC). The subject site is known collectively as the Santiago Pits, Blue Diamond Pit, Smith Pit, and the Bond Pit and is approximately 278 acres in size. The

site was historically used as a sand and gravel mining pit and is currently used as a water retention and flood control basin for the Santiago Creek. At the time of the site reconnaissance approximately 70% of the property was covered by water. No RECs were identified and the site was recommended for site acquisition. (Orange County Public Facilities Resources Department 2000 - 2004)

**As Needed Site Assessment Services**, Various Locations, Los Angeles County, California. Project Manager for a contract to provide multiple site assessment services at various County facilities on an as-needed basis. The scope of work included site assessments and preparation of remedial action plans based on previous underground storage tank removals. Gasoline, diesel, and PCE contamination were detected at these sites during previous sampling. Sites included the San Dimas Sheriffs Station, East Los Angeles Sheriffs Station, Bonelli Park, Arboretum and Biscailuz Men's Jail facility. (Los Angeles County Department of Public Works 2000 - 2004)

**Limited Phase II Environmental Site Assessment**, Segunda Descehcha Canada Channel Right-Of-Way, San Clemente, California. Project Manager responsible for a Limited Phase II ESA in a portion of the Segunda Deschecha Canada Channel right-of-way. The limited site assessment was performed to evaluate a leaking UST considered as a possible source for hydrocarbons beneath the subject site. Drilled several borings within the channel under submerged conditions. (Orange County Public Facilities Resources Department 2002)

**Site Investigation**, Huntington Beach Channel, Huntington Beach, California. Project Manager for soil-sampling activities conducted for to characterize petroleum-impacted soils encountered at the Huntington Beach Channel. Work was performed to provide urgent chemical profiling of the affected material to assist in selecting disposal options. Impacted soil was encountered submerged below sea level. Field activities included health and safety management, collection of subsurface soil samples, chain of custody documentation, and submittal of soil samples to a State of California-certified laboratory. Recommended disposal options to the client for managing the impacted soil. (City of Huntington Beach 1998)

**MILITARY/SUPERFUND:**

**U.S. Navy CLEAN Remediation, Fuel Farm Facility, Naval Air Facility, El Centro, California.** Sr. Technical Reviewer. Performed remediation and technical oversight of the U.S. Navy's remedial action contractor (OHM Remediation Services Corporation). Remediation included Fluid Injection Vapor Extraction (FIVE), multi-phase extraction (MPE), pneumatic fracturing/air injection and bioremediation in-situ technologies to remediate JP-4, JP-5, aviation gasoline and diesel-impacted soil and groundwater due to leaking above-ground and USTs. The integrated system included a 16,000 SCFM thermal oxidizer, four 100-horsepower vacuum extraction blowers, oil/water separator, diatomaceous earth filtration unit and approximately 150 MPE wells. The groundwater system was designed to treat a 100 gpm waste stream with activated carbon. Inspected and approved the construction of equipment pads, equipment configuration, system installation and optimization. Responsible for quality control/quality assurance of quarterly reports submitted to the CRWQCB on behalf of the U.S. Navy. Site was an operating military airfield. Site closure was received within 1 year. (Bechtel Corporation/US Navy 1996 - 1997)

**Camp Ono - Apex Parcel, U.S. Army Corps of Engineers, San Bernardino County, California.** Project Manager. Managed the investigation services at this 1,650-acre, former military storage and prisoner-of-war campsite. VOCs were discovered in the groundwater and contaminants of concern include tetrachloroethene (PCE), trichloroethene (TCE) and their degradation products (cis- and trans-dichloroethene and vinyl chloride), and Freon 11 and 12. Additional analytes were assessed to characterize the aquifer to facilitate potential contaminant source determination and provide general geochemistry evaluation for hydrogeologic interpretation. Services included the preparation of a Project Workplan Summary, Field Sampling Plan, Quality Assurance Project Plan and Site-Specific Health and Safety Plan. (1999 - 2000; US Army Corps of Engineers)

Several tasks were implemented in parallel (seismic survey, geophysical clearance, soil gas sampling) to expedite the collection of data to be used during the discovery phase of existing litigation. This multi-disciplinary, multi-task contract involved coordination between 14 Corps personnel, 10 staff, 11 subcontractors, the USEPA Region IX, California EPA/DTSC, and the California RWQCB, Santa Ana Region.

**CERCLA Site Inspection, Naval Weapons Station, Seal Beach, California.** Principal Author of a Site Inspection Work Plan for assessing impacts to soil and groundwater from previous NASA activities. The work plan included data quality objectives (DQO), applicable, relevant and appropriate requirements (ARARs), Sampling and Analysis plan, Quality Assurance Project



**Juan A. Guerrero, P.G.**  
Director, Environmental Programs, Tetra Tech/BAS

Plan, Data Management Plan, Waste Management Plan, and Health and Safety Plan. Served as technical lead between Department of the Navy, RWQCB, and California DTSC. (Bechtel Corporation/US Navy 1994 - 1995)

**CERCLA Removal Site Evaluation (RSE)**, Naval Weapons Station, Seal Beach, California. Senior Geologist. Performed a RSE that included drilling soil borings, Hydropunch sampling and soil sampling with a cone penetrometer test. Field team leader responsible for geophysical, drilling and analytical laboratory contractors. Reduced field data, verified and validated data and drafted RSE Report. (Bechtel Corporation/US Navy 1994 - 1995)

**Superfund/CERCLA Site**, Defense Fuel Supply Point, San Pedro, California. Senior Geologist. Supervised drilling during the RSE Phase. Extensive soil sampling program within the Department of Navy facilities included supervision of geophysical surveys, subcontractor management, collection of soil samples for analytical, QA/QC, and geotechnical analyses, field documentation and performing Field team leader responsibilities. (Bechtel Corporation/US Navy 1995 - 1996)

**Vacuum Extraction Pilot Test**, McClelland Air Force Base, Sacramento, California. Senior Geologist for vacuum extraction pilot test. Supervised drilling activities and provided soil boring logging for a pilot test. (US Air Force 1993)

**Air Force Superfund Site**, Norton Air Force Base, Southern California. Senior Geologist for a vacuum extraction pilot test. Supervised drilling activities and provided soil boring logging for a pilot test. (US Air Force 1994)

**Vacuum Extraction Operations**, Sacramento Army Air Depot, California. Senior Geologist for confirmatory borings after completion of full-scale vacuum extraction operations. Supervised drilling activities and performed soil boring logging. (US Air Force 1993)

**Site Investigation**, Aerospace Facility, Redondo Beach, California. Role. Subsurface plume delineation involved gasoline and chlorinated hydrocarbons and preparation of a feasibility study for remediation. Project included soil borings, petrophysical analyses, and recommending remedial options. (Raytheon 1992)

**Vacuum Extraction System Design and Installation**, Aerospace Facility, Newbury Park, California. Project Geologist. Designed the installation of approximately 75 pneumatic soil fracture probes to assist in creating secondary permeability in conjunction with the installation of a vacuum extraction remediation system. Designed the drilling and sampling program and provided technical oversight of field crews. (Confidential Client 1991)

REMEDICATION:

**Vacuum Extraction Remediation**, Former Gasoline Service Station, Santa Monica, California. Sr. Project Manager. Directed and managed the remediation of a former gasoline service station impacted with petroleum hydrocarbon to 110 feet below grade due to leaking underground storage tanks (USTs). The remediation system included a 2000 SCFM catalytic oxidizer, three 40 hp vacuum extraction blowers and 33 nested vacuum extraction wells. The project remediated over 250,000 pounds of hydrocarbon over a 1½-year period. A site closure report was submitted to the Los Angeles Regional Water Quality Control Board (RWQCB). Duties included construction of a sound wall around equipment, performing a sound survey, bringing electric & natural gas power to vacant lot, obtaining air emissions permit, operation and maintenance (O&M) for 1½ year, monitoring, optimization and closure. (Shell Oil Company 1992 – 1993)

**Vacuum Extraction Remediation**, Former Gasoline Service Station, Hawthorne, California. Project Manager. Managed the remediation of a former gasoline service station facility impacted with gasoline hydrocarbons due to leaking USTs. The VES included an internal combustion engine under the oversight of the Los Angeles County Department of Public Works. The system was installed at an operating major shopping center. Permits for air emissions, construction of security fence and equipment were procured from local and state agencies. Equipment was installed below grade. (The Hahn Corporation 1992 – 1993)

**Vacuum Extraction Remediation**, Manufacturing Facility, Fullerton, California. Sr. Geologist. Managed remediation of a manufacturing facility impacted with chlorinated hydrocarbons. Utilized dual vacuum extraction technology for remediation of impacted soil and groundwater. Duties included bringing electric & natural gas power to vacant lot, obtaining air emissions permit, O&M for 1 year, monitoring, optimization and site closure. Monthly reports to the client and quarterly reports to the CRWQCB were prepared. (1993; Hughes Aerospace)

**Vacuum Extraction Remediation**, Former Gasoline Service Station, Los Angeles, California. Project Manager. Managed the remediation of hydrocarbon-impacted soils at a former service station due to leaking USTs utilizing 30 vacuum extraction wells, a 1000 SCFM catalytic oxidizer and two 40 hp vacuum extraction blowers. The site was impacted with free product at groundwater depths of 120 feet below surface grade and was characterized by complex lenticular lithologies. Site soils ranged in permeability from >10,000 millidarcies in coarse sands to hydraulic conductivities of  $1 \times 10^{-10}$  cm/sec. Responsible for construction equipment pad, bringing electric & natural gas power to vacant lot, obtaining air emissions permit, O&M for 1 year, monitoring, optimization and site closure. Monthly reports to the Client and quarterly reports to the CRWQCB were prepared. (Shell Oil Company 1991 – 1992)

**Stringfellow Superfund Site**, Riverside County, California. Senior Geologist for a vacuum extraction pilot test involving Level C soil sampling and logging, field QA/QC oversight and



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interface with client and EPA representatives. Scanning electron microscope pictographs were evaluated as part of the pilot test. (Bechtel Corporation 1994)