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TREASURE ISLAND
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DEPARTMENT OF THE NAVY
BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
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Ms. Agnes Farres
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Dear Ms. Farres:

Subj: TRANSMITTAL OF THE RESPONSE TO REGULATORY AGENCY COMMENTS ON THE DRAFT ANNUAL GROUNDWATER STATUS REPORT; SUMMARY OF GROUNDWATER MONITORING AT SITE 12, JULY AND NOVEMBER 2006, NAVAL STATION TREASURE ISLAND, SAN FRANCISCO, CALIFORNIA

Enclosure (1) is submitted for your files. This response to comments provides the Navy's final responses to Regulatory Agency comments on the Draft Annual Groundwater Status Report for Groundwater Monitoring at Site 12 July and November 2006 and will be included as an appendix in the final report.

Thank you for your continued support of this program. Should you have any questions or need additional information, please contact Mr. Jim Whitcomb, Remedial Project Manager at (619) 532-0936 or Mr. Charles Perry, Lead Project Manager, at (619) 532-0911.

Sincerely,

JAMES B. SULLIVAN
BRAC Environmental Coordinator
By direction of the Director

Encl: (1) Final Response to Regulatory Agency Comments on the Draft Annual Groundwater Status Report; Summary of Groundwater monitoring at Site 12, July and November 2006, Naval Station Treasure Island, San Francisco, California

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Distribution:
Mr. Henry Wong, California Department of Toxic Substances Control
Ms. Christine Katin, U.S. Environmental Protection Agency, Region IX
Ms. Mirian Saez, Treasure Island Development Authority
Mr. Gary Foote, Geomatrix Consultants
Ms. Marcie Rash, Tetra Tech EM Inc.
Mr. Pete Bourgeois, Shaw Environmental & Infrastructure
Mr. Gregg Olson, San Francisco Public Utilities Commission

Community RAB Members:
Mr. Nathan Brennan
Ms. Dale Smith
Mr. Douglas Ryan
Ms. Alice Pilram
Mr. Saul Bloom, Arc Ecology

ATTACHMENT H-1
NAVY COVER LETTER AND
RTCS ON THE "FINAL TECHNICAL MEMORANDUM SUMMARY OF SOIL GAS INVESTIGATION, INSTALLATION RESTORATION SITE 12, NAVAL STATION TREASURE ISLAND, SAN FRANCISCO, CALIFORNIA"
(TETRA TECH 2003)

25
~~24~~ pages.

RESPONSES TO REGULATORY AGENCY COMMENTS ON THE DRAFT ANNUAL GROUNDWATER STATUS REPORT: SUMMARY OF GROUNDWATER MONITORING AT SITE 12, JULY AND NOVEMBER 2006, NAVAL STATION TREASURE ISLAND, SAN FRANCISCO, CALIFORNIA (MARCH 2007, DT B209-06)

This document presents the U.S. Department of the Navy's (Navy) responses to comments from the regulatory agencies on the "Draft Annual Groundwater Status Report: Summary of Groundwater Monitoring at Site 12, July and November 2006, Naval Station Treasure Island, San Francisco, California" (Pacific Treatment Environmental Services, Inc. 2007). The Navy received comments from (1) the San Francisco Bay Regional Water Quality Control Board (Water Board) on April 26, 2007; (2) Geomatrix, on behalf of the Treasure Island Development Authority, on May 16, 2007; and (3) the Department of Toxic Substances Control (DTSC) on June 22, 2007.

RESPONSES TO COMMENTS FROM AGNES FARRES, PROJECT MANAGER, WATER BOARD

General Comments

1. **Comment:** **Purpose. The stated purpose of the report is to present data collected through the groundwater monitoring program. This purpose is incomplete and begs the question, "Why collect data over ten years?" In the revised report, provide a discussion of what lead to the decision to monitor groundwater at Site 12 beginning in 1995, when the groundwater monitoring program will end, and when remediation efforts will begin. Also, explain when the RI/FS will be completed and discuss how the groundwater monitoring program will support their development.**

   Clarify the role of monitored natural attenuation (MNA) at Site 12. The report alludes to MNA but it is never discussed as a remedy for Site 12. A summary of information and results for MNA is supposed to be included in Appendix E, but it is on CD only and was not provided to me.

   Response: The second paragraph of Section 1.0 has been revised to read as follows: "The basewide groundwater monitoring program at NAVSTA TI was established in 1994 to collect and report groundwater monitoring data in support of ongoing environmental restoration efforts. Groundwater monitoring at Site 12 is being conducted because substances defined as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) have been detected at elevated levels in groundwater samples from Site 12. Accordingly, information collected from the semiannual and annual groundwater monitoring sampling events conducted in July and November of 2006 may

be used, as appropriate, in a remedial investigation (RI) and feasibility study (FS) for Site 12. As indicated in the "Final Technical Memorandum: Long-Term Monitoring Optimization of Groundwater at Site 12, Old Bunker Area, Naval Station Treasure Island, San Francisco, California" (SulTech 2005b), groundwater monitoring will continue at Site 12 during the RI process and while any necessary remedial action is evaluated in an FS."

The studies for the remedial investigation (RI) report as well as remediation efforts are currently underway at Installation Restoration (IR) Site 12. The current strategy for IR Site 12 includes completing a non-time critical removal action in February of 2008 followed by an RI/feasibility study (FS) report as indicated in the "Final Environmental Closeout Strategy and Schedules, Naval Station Treasure Island, San Francisco, California" (SulTech 2006b). During Base Realignment and Closure (BRAC) Cleanup Team (BCT) meetings, the BCT will be updated on the progress of these actions as well as any additional activities involving IR Site 12.

Monitored natural attenuation (MNA) indicator parameters have been analyzed in IR Site 12 groundwater samples in order to document the potential for biodegradation. Additionally, these indicator parameters are expected to provide further explanation as to reduced chemical concentrations and an indirect means of supporting natural attenuation as a groundwater remedy, if appropriate.

A compact disc (CD) containing all the report elements will be provided with each document.

2. **Comment:** **The report includes a lot of general site-wide information about Treasure Island rather than site specific information on Site 12. In fact, most of the information in Section 2 and Section 4 are not specific to Site 12. For example, Section 4.2.2 summarized the results from two different studies; one of tidal influence on groundwater levels and one estimating the extent and degree of the physical mixing of surface water and groundwater at Treasure Island. However, there is no discussion of how these studies' findings are relevant to Site 12. Please revise the text to include site specific information.**

Response: Both the tidal influence and physical mixing of surface water studies were conducted within parts of IR Site 12. These studies found the groundwater conditions to be the same throughout Naval Air Station Treasure Island (NAVSTA TI), with the exception of the southeastern

portion of the island. The groundwater summary report will not be modified to further discuss these findings. The findings will be presented in the forthcoming RI report.

These site-wide groundwater studies have influenced sample collection methodology across NAVSTA TI. To account for tidal influence and mixing processes, groundwater wells within 200 feet of the shoreline are monitored for groundwater levels and sampled within a three hour period around low tide.

3. **Comment:** **A final section should be included in the report to present a discussion of the results and recommendations for future activities. Based on the results, several issues need to be addressed and recommendations for future groundwater monitoring may be appropriate. For example, are there any proposed changes to the groundwater monitoring program in light of the elevated copper concentrations and lack of explanation for these findings?**

Response: The "Final Technical Memorandum: Long-Term Monitoring Optimization of Groundwater at Site 12, Old Bunker Area, Naval Station Treasure Island, San Francisco, California" (SulTech 2005b) discusses the continued plan for groundwater monitoring at IR Site 12. Further sampling will be performed as directed in this Technical Memorandum and will include all analyses as performed in 2005 and 2006, which followed the distribution described in the Technical Memorandum. Copper concentrations have been intermittently detected above the screening criteria at monitoring wells within IR Site 12 with the highest detections found in the Solid Waste Disposal Area (SWDA) 1207/1209. Copper cannot be fully assessed until the non-time critical removal action and additional groundwater sampling in the SWDAs has been completed.

Specific Comments

1. **Comment:** **Since monitoring data has been collected since 1995, it would be useful to discuss the results over the entire monitoring period and not just 2006 data.**

Response: The intent of the groundwater summary report is to provide a data summary update for the sampling conducted during the time period following the previous annual update. Results for contaminants of concern above the screening criteria observed in 2006 have been included in the discussion and presented in Figure 5-4 and Figure 5-5 for all wells

being monitored within IR Site 12. Additional data findings will be discussed in the forthcoming RI report.

2. **Comment:** **The report focuses only on total petroleum hydrocarbons (TPH), arsenic and copper. Discuss detections of additional analytes (e.g. aluminum, manganese) exceeding screening criteria.**

Response: Only detected analytes exceeding both the ecological screening criteria and the ambient values are considered chemicals of potential concern for the purposes of groundwater monitoring. Detected analytes that do not have an aquatic toxicity screening criteria are not evaluated in the groundwater monitoring program but will be evaluated as necessary in the forthcoming RI report.

3. **Comment:** **Provide a table summarizing data rather than using a narrative summary. Data for all four areas can fit into one table.**

Response: Tables have been added following each narrative summary in Section 5.0 for all 2006 detected chemicals above the screening criteria. Table 5-3 presents the data summary of detected results as compared to screening criteria sorted by area of concern at IR Site 12.

4. **Comment:** **Section 5.5 states that "elevated concentrations of arsenic are suspected to be geochemically associated with the TPH contamination in this area." Provide a more complete explanation with supporting references.**

Response: Section 5.5 has been provided to present a summary of previous information only. A full discussion on the potential effects of total petroleum hydrocarbons (TPH) biodegradation and arsenic is presented in Section 5.4.3.1.

5. **Comment:** **Results for arsenic are indicative of discharge to San Francisco Bay above ambient and water quality criteria concentrations. In a January 24, 2005 letter, we previously argued that discharge of arsenic above screening criteria, regardless of the cause, needs to be addressed.**

Response: Elevated concentrations of arsenic in groundwater have been detected inland from the tidal mixing zone (TMZ) within the Building 1311/1313 Petroleum Area at IR Site 12. These concentrations are a result of mobilization of arsenic under reducing conditions created by

biodegradation of TPH. The "Final Technical Memorandum Investigation of Arsenic in Groundwater, Installation Restoration Site 12, Naval Station Treasure Island, San Francisco, California" (SulTech 2005a) presented the following conclusions for arsenic concentrations near the shoreline at NAVSTA TI:

> "Arsenic is being attenuated within the TMZ. The decrease in concentrations of arsenic in groundwater within the TMZ is greater than the decrease caused only by physical mixing of surface water and groundwater within the TMZ. The precipitation of iron minerals and adsorption of arsenic is the mechanism in addition to physical mixing that is causing the decrease in concentrations of arsenic in the TMZ.
>
> The degree of tidal mixing and potential for attenuation of arsenic increase with proximity to the shoreline. Arsenic is attenuated under the more oxidizing conditions near the shoreline; therefore, it is unlikely that arsenic discharges to San Francisco Bay at concentrations greater than the ambient concentration of 15 micrograms per liter (μg/L) for arsenic in groundwater at NAVSTA TI."

Additionally, a treatability study work plan is forthcoming to research the applicability of low-flow air sparging technology to lower soluble arsenic concentrations in groundwater at the Building 1311/1313 Petroleum Area.

RESPONSES TO COMMENTS FROM GARY FOOTE, PROJECT MANAGER, GEOMATRIX

General Comments

1. **Comment:** **Potential Impact of Subsurface Utilities on Groundwater Flow (Section 5.3 Site 12—Hydrogeology). The second paragraph of Section 5.3 points out that anthropogenic subsurface features (utilities) are shown on the groundwater elevation contour maps (Figures 5-1 and 5-2), but it does not discuss whether these features may affect groundwater flow. We recommend including such a discussion. For example, the sanitary sewer lines near monitoring well 12-MW18 may be causing the low groundwater elevation consistently observed at this location.**

   Response: The intent of the groundwater summary report is to provide a data summary update for the sampling conducted during the time period following the previous annual update. More detail on site-related subsurface features potentially affecting groundwater flow or preferential pathways is not within the scope of the groundwater monitoring report but will be included along with soil data in the forthcoming RI report to provide a complete representation of IR Site 12.

2. **Comment:** **Concentrations that exceed Ambient (Section 5.4 Site 12—Analytical Results for Groundwater). The text should discuss results for all metals that exceed the Treasure Island Ambient Groundwater Concentration.**

   Response: Please see response to Water Board specific comment number 2.

3. **Comment:** **Data Presentation. It would be helpful if the document contained plan-view figures that post the results for key analytes of interest next to the well where they were detected. Most notably, it would be helpful to include a plan-view figure showing the concentrations of total petroleum hydrocarbons (TPH) and arsenic in Building 1311/1313 Petroleum Area. The report concludes that the elevated concentrations of arsenic in this area are suspected to be geochemically associated with TPH. However, there is no figure that demonstrates that the elevated arsenic and TPH are co-located. It is not possible to verify this conclusion from the chemical trend figures (Figures 5-4 and 5-5) of the summary statistics in Table 5-3.**

   Response: Figures 5-4 and 5-5 have been revised to present 2006 concentrations of arsenic and TPH, respectively, at IR Site 12 groundwater monitoring wells.

4. **Comment:** **Mariner Drive Petroleum Area. Please provide the rationale for why samples from this area are not analyzed for TPH. Also, it is unclear how the document can conclude that the elevated concentrations of arsenic in this area are suspected to be geochemically associated with TPH in the absence of current TPH data.**

Response: TPH was monitored in the Mariner Drive Petroleum Area from 1995 until 2001. TPH in this area was reduced to nondetects in 2000 as indicated in "Groundwater Status Report Summary of Groundwater Monitoring March through October 2000" (Tetra Tech 2002) and dropped from the analyte list after 2001. The second sentence in the fourth bullet of Section 5.5 has been revised to read as follows, "Elevated concentrations of arsenic and copper may be a result of solid waste construction debris observed in exploration trenches found in the area.".."

Specific Comments

1. **Comment:** **Section 2.2 History of Groundwater Monitoring Program. Please explain why there is a gap in the sampling record between November 2004 and July 2006.**

Response: The groundwater monitoring program was on hold while developing the long-term monitoring requirements. The "Final Technical Memorandum: Long-Term Monitoring Optimization of Groundwater at Site 12, Old Bunker Area, Naval Station Treasure Island, San Francisco, California" (SulTech 2005b) was developed with support from the regulatory agencies to further refine the sampling requirements at IR Site 12.

2. **Comment:** **Section 5.1.2 Petroleum Areas. There are three places where the text refers the reader to Figure 2-1. It appears that the correct figure is Figure 1-2.**

Response: The second sentence of Section 5.1.2 has been revised to read as follows: "The location of each of these areas is shown on Figure 1-2."

3. **Comment:** **Figure 1-2. The Mariner Drive Petroleum Area is not clearly identified on this figure. Also, we suggest identifying Site 20. As shown, it appears that the Site 20 Area is Building 1311/1312 Petroleum Area.**

Response: Figure 1-2 has been revised to clearly present the Mariner Drive Petroleum Area and Site 20.

RESPONSES TO COMMENTS FROM HENRY WONG, REMEDIAL PROJECT MANAGER, DTSC

General Comments

1. **Comment:** **Remedial Investigation: DTSC views the Annual Report as an integral appendix to the forthcoming Site 12 Remedial Investigation Report. The Navy would use the data and information presented in the Annual Report to support Site 12 remedial investigation and feasibility study efforts; therefore, the Navy should prepare and present the Annual Report for regulatory review as a primary CERCLA document. DTSC requests the Navy transmitting future Annual Report versions to both DTSC and the California Regional Water Quality Control Board as primary reviewers.**

   Response: Although the data collection efforts are performed to support the RI process, the intent of the groundwater summary report is to provide a data summary update for the sampling conducted during the time period following the previous data summary update. The groundwater summary report is not considered a primary Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) document because it is not a decision document and sampling activities at IR Site 12 have been performed as prescribed in the "Final Technical Memorandum: Long-Term Monitoring Optimization of Groundwater at Site 12, Old Bunker Area, Naval Station Treasure Island, San Francisco, California" (SulTech 2005b).

2. **Comment:** **Soil Gas Contamination: During review of the Annual Report, DTSC checked the May 2, 2003 "Technical Memorandum, Summary of Soil Gas Investigation Installation Restoration Site 12" (Soil Gas Technical Memorandum). DTSC has preliminary comments on the Soil Gas Technical Memorandum that interrelate with the groundwater results in the Annual Report. Please clarify whether any regulatory agency has reviewed the Soil Gas Technical Memorandum and forward all Responses to Comment and agencies' concurrences in PDF files to DTSC at hwong@dtsc.ca.gov.**

   Response: Responses to comments received during the June 2, 2003 BCT Meeting on the "Final Technical Memorandum Summary of Soil Gas Investigation, Installation Restoration Site 12, Naval Station Treasure Island, San Francisco, California" (Tetra Tech 2003) have been included below as Attachment H-1.

RESPONSES TO COMMENTS FROM EILEEN HUGHES, P.G., ENGINEERING GEOLOGIST, DTSC

General Comments

1. **Comment:** **Criteria. The monitoring program was based on aquatic protection criteria only (page ES-1, Table 2-1, and Appendix A). Pursuant to the LTMO TM and SAP Addendum, limited sampling was conducted within or directly adjacent to plumes delineated by aquatic criteria for total petroleum hydrocarbons (TPH: 1,400 µg/L, combined TPH-extractable and TPH-purgeable), arsenic (As: 15 ug/L, ambient value) and manganese (Mn: 600 ug/L, "toxicity screening" value). Aquatic criteria may not be sufficient for all expected re-uses. Other considerations may include indoor air intrusion and construction worker safety (page 2-4), as well as nuisance concerns. The text says that consideration of other pathways is outside the scope of the report (Section 2.4.1). However, if aquatic criteria are not sufficient for all expected re-uses, the monitoring program may not be sufficient for feasibility study (FS) and remedial action decision-making. Additional monitoring may be required prior to the FS. Also, the monitoring program has not taken into consideration results of recent removal actions (e.g., radiological contamination): hence, the program may not be sufficient for FS purposes.**

   Recommendations: Include expected and potential reuses in the report (e.g., residential reuse, wetlands). Evaluate whether the existing data set, including results from soil removals, soil gas investigations, and other groundwater investigations, is sufficient for decision-making for all expected reuses. Identify new contaminants (e.g., radioactive compounds at SWDAs 1207/1209 and 1231/1233). Identify data gaps. Propose additional monitoring, as needed.

   Response: The groundwater data collected at IR Site 12 will be evaluated along with the soil data for all potential receptors and pathways of concern, and the results discussed in the forthcoming RI report.

   Although the screening criteria presented in the groundwater status report is for potential ecological exposures, the sampling and analysis requirements for groundwater monitoring are of the data quality to support all potential activities at IR Site 12, including, but not limited to, an RI/FS and potential remedial actions. Based on the "Naval Station Treasure Island Reuse Plan – Public Review Draft" (City and County of San Francisco 1996), IR Site 12 is designated for reuse as Residential/Open Space/Publicly Oriented Use. Detection limits, precision criteria, and accuracy criteria requirements as well as the validation requirements in the

groundwater sampling program are of a quality required for data to be used for assessments involving these reuse scenarios.

Hot-spot removals of Radium 226 "button" sources during excavation activities at the SWDA 1207/1209 have left residual soils within background radiation levels. The lack of elevated radiation during the hot-spot removals suggests that radiation was confined at the source and not available to leach to groundwater. The potential for Radium 226 contamination beyond the shallow soils is therefore not likely; however, further assessment of Radium 226 cannot be fully assessed until the completion of the non-time critical removal action.

2. **Comment:** **Metals. Increased mobility of As, and other metals (in particular: copper (Cu), iron (Fe), manganese (Mn), and zinc (Zn)) is associated with elevated TPH at Site 12. As, Cu, and Zn were measured above aquatic screening levels. Aluminum, As, barium, Cu, Fe, molybdenum, Mn, vanadium, and Zn were measured above ambient levels. Some exceedences were very significant: for example, Fe (42,000 ug/L) was two orders of magnitude above ambient (200 ug/L) at Building 1311/1313 (12-MW22). The concentration increase is not unexpected, since As and other metals can be mobilized during TPH biodegradation (As TM). Microbial reactions create reducing conditions. Fe+3 is reduced to Fe+2 and mobilized. As associated with Fe+3 is mobilized at the same time. Other minerals (e.g., Cu, Mn, Zn) may also be mobilized. Removal of TPH soil sources may eventually result in decreasing concentrations of As and other metals in groundwater. However, metal mobility may impact remedial decisions and/or design.**

Recommendations: In addition to As, identify and discuss other metals that may be of concern for all expected and potential reuses (e.g., residential reuse, wetlands). Discuss all metals above ambient values. Discuss metals with regard to monitored natural attenuation (MNA) parameters and groundwater stabilization parameters (e.g., oxidation-reduction potential, or ORP). Evaluate whether all TPH areas on Site 12 have been characterized for metals. Discuss whether radiological contaminants may mobilize. Identify data gaps, propose monitoring (if needed) and provide criteria, accordingly.

Response: The fate and transport of metals and an overall more in depth discussion of metals in groundwater is a topic that will be more appropriately addressed in the RI report. Please see response to general comment 1 and Water Board specific comment number 2.

All TPH sites within IR Site 12 are being monitored for metals. The complete evaluation of the TPH and metals contaminants of concern along with the soil data will be presented in the forthcoming RI report.

3. **Comment:** **DTSC concurs with Geomatrix's comment that the Navy's attribution of increasing arsenic in the Mariner Drive Area to TPH contamination is unsupported, given the absence of accompanying TPH data. Recommendation: Add TPH to the analytical program for wells in the Mariner Drive Area.**

Response: TPH monitoring was dropped from the list of analytes in the Mariner Drive Area after repeated non-detections of TPH were reported. Please see response to Geomatrix general comment number 4.

4. **Comment:** **Monitored natural attenuation (MNA). MNA data and field parameter data is presented from 1998 to 2006 (Appendix E). However, the data is not evaluated.**

Recommendation: Please evaluate MNA results (as discussed in comments on Appendix E, below).

Response: The intent of the groundwater summary report is to provide a data summary update for the sampling conducted during the time period following the previous data summary update. The analysis of MNA indicator parameter data and evaluation and discussion of MNA will be handled in the fate and transport section of the forthcoming RI report.

5. **Comment:** **Turbidity. Low flow purging is supposed to result in low turbidity. However, high turbidity was measured at several wells, especially 12-MW20, where turbidity was measured at >1,100 nephelometric turbidity units (NTU). High turbidity may increase uncertainty of sampling results.**

Recommendation: Evaluate elevated turbidity at 12-MW20, and elsewhere (as discussed in comments on Appendix C, below).

Response: With the exception of 12-MW20, elevated turbidity values have been consistently reported during the initial purging process at many IR Site 12 monitoring wells (as shown in Appendix C). Based on the 2003, 2004, and 2006 data, the increased turbidity values appear to be limited to the end of the dry season groundwater monitoring events for most of the

wells. Additional discussion of turbidity results will be included as necessary in the forthcoming RI report.

6. **Comment:** **Well depths are all similar, at about 13 to 14 feet below the ground surface. No sampling of deeper zones is included. Generally, monitoring of deeper zones is conducted, to evaluate whether vertical migration has occurred.**

Recommendation: Explain why sampling of deeper zones is not included.

Response: Continued groundwater sampling at IR Site 12 is based on the "Final Technical Memorandum: Long-Term Monitoring Optimization of Groundwater at Site 12, Old Bunker Area, Naval Station Treasure Island, San Francisco, California" (SulTech 2005b) which was prepared in consultation with the regulatory agencies. This Technical Memorandum presents the sampling and analysis requirements for groundwater wells in IR Site 12.

7. **Comment:** **A tank is postulated as the source of the TPH in the Building 1311/1313 Petroleum Area (e.g., As TM: Figure 2). However, the large area of contamination (about the size of a football field) suggests that a more probable explanation may be disposal of petroleum waste, hazardous substances, and/or hazardous wastes. Moreover, the extent of contamination in the Building 1311/1313 area has not been fully determined, since samples to the east do not extend to the depth of the TPH smear zone.**

Recommendations: With respect to sources of TPH contamination in the Building 1311/1313 area, please evaluate other options and revise the conceptual site model accordingly. Propose additional investigations, as needed.

Response: As noted in Section 5.1.2, a geotechnical investigation in the Building 1311/1313 area indicates that the potential source of contamination was a former underground storage tank that was to be removed as part of the site grading before the construction of housing units (Lowry and Associates, Inc. 1971). Review of 1945 and 1966 aerial photographs does not indicate that petroleum waste, hazardous substances, and/or hazardous wastes have been disposed in the Building 1311/1313 area. Additionally, soil and groundwater data collected during the TPH characterization at IR Site 12 (Tetra Tech 1999a) and IR Site 12 Operable Unit Remedial Investigation

Report (Tetra Tech 1999b) does not support wastes being disposed in this area. Evaluation of TPH detected in soil and groundwater at the Building 1311/1313 area will be addressed in more detail in the forthcoming RI report.

8. Comment: **Methane is a common degradation product in petroleum areas and SWDAs. In addition to being an MNA parameter, methane may present a risk of fire and/or explosion. Methane in soil gas may migrate along preferential pathways (e.g. utility lines) and may serve as a carrier gas for volatile organic compounds (VOCs). During this review, concentrations of methane in groundwater presented in the annual report were compared with methane in soil gas report: Technical Memorandum, Summary of Soil Gas Investigation Installation Restoration Site 12 (SG TM), Tetra Tech EM Inc., May 2, 2003.**

In the soil gas report, source areas for methane and VOCs were indicated in SWDAs A/B, 1231/1233 and/or 1207/1209, and in the Mariner Drive Petroleum Area. Excavations were proposed for the SWDAs. Buildings overlie SWDAs and petroleum areas. Soil, soil gas, and groundwater under existing buildings has not been investigated. So, sources under buildings cannot be ruled out. But, soil under buildings will not be excavated. No excavation or further investigation was proposed for the Building 1311/1313 Petroleum Area. A pipeline investigation was proposed for the Mariner Drive Petroleum Area.

Recommendation: Several deficiencies were observed with respect to the soil gas report. But since this memorandum is not the appropriate forum for comments on the soil gas report, it is recommended a meeting be scheduled to discuss the soil gas report and current vapor intrusion and methane guidance. For example, buildings overlying SWDAs and petroleum areas are scheduled for occupancy following excavation. But since sources may exist under buildings, sub-slab monitoring of buildings prior to and during occupancy is recommended. Another example (from DTSC's methane advisory): in order to limit methane generation, DTSC recommends that fill soils contain less than 0.5% total organic carbon.

Response: Methane was not detected above the action level of 0.125% (2.5% of the lower explosive limit [LEL]) in any of the six indoor air samples collected from buildings adjacent to the SWDAs (Tetra Tech 2003). The lack of methane detections above 2.5% of the LEL in buildings in the SWDAs,

especially Buildings 1319 and 1321 near the highest methane soil gas detections, indicate that methane is not being released at a level high enough to approach the flammable limits (5% - 15% methane) within the housing units.

Recommendation noted for fill material following the SWDA removal action.

9. **Comment:** **It was observed that methane in groundwater was associated with methane in soil gas at SWDA A/B and Mariner Drive Petroleum Area. Therefore, methane in groundwater may serve as an indicator of source areas. Similarly, soil gas data may indicate additional analytes or locations for the groundwater program.**

Recommendations: Evaluate groundwater data for methane with respect to potential source areas and potential risk of fire and/or explosion. Discuss whether all petroleum areas and other areas of concern on Site 12 have been evaluated with regard to potential for methane (and VOCs) in soil gas. Identify potential data gaps. Compare results of investigations in various media, and propose changes to the groundwater program, as appropriate.

Response: Methane concentrations in groundwater samples collected in 2006 ranged from 0.011 milligrams per liter (mg/L) to 13 mg/L reported in monitoring wells 12-MW20 and 12-MW22, respectively. The highest methane concentration reported to date in groundwater samples from IR Site 12 is 27 mg/L reported from a sample collected at monitoring well 12-MW22 in the Building 1311/1313 Petroleum Area. These highest methane detects are below the solubility level of methane in water (35 mg/L at 17 degrees Celsius). Soil gas sample results for methane in the Building 1311/1313 Area were below the action level of 0.125% (2.5% of the LEL) (Tetra Tech 2003).

Soil gas samples for volatile organic compounds (VOC) and methane have been collected from five areas at IR Site 12 including SWDAs A and B, 1207/1209, and 1231/1233, and Building 1311/1313 and Mariner Drive Petroleum Areas. Groundwater monitoring for methane and VOCs has also occurred in these five areas. Of these five areas sampled for methane in soil gas, the Mariner Drive Petroleum Area and SWDA A and B had methane soil gas detections greater than the action level of 0.125%. Areas with methane detections in soil gas above the action level in SWDA A and B are not accessible to the public. Although the Mariner Drive Petroleum Area is open to the public, the range for methane soil gas detections was

1.3 – 3 percent which is below the flammable limit of 5 - 15 percent in air. The three methane soil gas results over the screening criteria in the Mariner Drive Petroleum Area were all within 20 feet of an active utility gas line. Soil gas sampling for methane closer to building structures did not result in any methane detections above the 0.125% screening criteria. Sampling for methane in groundwater in the Mariner Drive Petroleum Area was suspended in 2001 due to the low concentrations reported in the area (highest result was 1.5 mg/L at monitoring well 12-MW14).

Results from all IR Site 12 investigations will be further discussed in the forthcoming RI report.

Specific Comments

1. **Comment:** **Title Page. All engineering or geologic work should be performed or supervised by a California Registered Professional in accordance with the Business and Professions Code, Chapters 7 and 12.5, and the California Code of Regulations, Title 16, Chapters 5 and 29. Confirm that the person in responsible charge is a California Professional Engineer or a California Professional Geologist. Provide name, signature, stamp and/or registration number on the title page.**

   Response: The Final version of the groundwater status report will be signed by the project manager, a Professional Geologist in the state of California.

2. **Comment:** **Explain the differences between wells designated as inactive, abandoned, or destroyed (Figure 1-2). Confirm that all wells have been decommissioned in accordance with California Well Standards Bulletin 74-91: Section 19: Requirements for Destroying Monitoring Wells and Explorations Holes. Please include a table with well construction details for all wells and ground penetrations on Site 12. Include dates of decommissioning on the table. Provide copies of required decommissioning documentation.**

   Response: No well abandonment or decommissioning at IR Site 12 was conducted as part of groundwater monitoring activities in 2006. Table 5-1 provides further information on current well status in addition to well construction details. Further discussion of groundwater monitoring well abandonment and decommissioning will be presented where applicable in the forthcoming RI report.

3. **Comment:** **Figure 1-2. Include the Mariner Drive Petroleum Area.**

Response: Figure 1-2 has been revised to clearly present the Mariner Drive Petroleum Area and Site 20.

4. **Comment:** **Figure 5-1. 12-MW29, with a groundwater elevation of 3.72 feet above mean sea level (MSL) is plotted between contours of 3.0 and 3.5 feet MSL. Please resolve this discrepancy.**

Response: Figure 5-1 presented 12-MW29 below the 3.5 feet mean sea level (MSL) contour. This 3.5 feet MSL contour will be moved toward the shoreline to appropriately reflect the 3.72 feet MSL at 12-MW29 between 4.0 and 3.0 feet MSL.

5. **Comment:** **Figure 5-4, 5-5a, and 5-5b. Generally, detection limits (DLs) are depicted on tables and figures (not ½ DLs). Explain why ½ DLs are shown on the figures. Please revise figures to show DLs. Also, revise figures so that connecting lines on both sides of non-detect (ND) values (hollow points) are dashed.**

Response: One-half detection limits were applied to nondetects to be consistent with the approach used for nondetect results during risk assessment calculations. The concentration graphs have been prepared to present solid lines leading to detects and dashed lines leading to nondetected results.

6. **Comment:** **Tables. Include a table with summary results on a per well basis, with results of MNA parameters (anions, methane, ethane, ethane, nitrate and sulfide) and field test kits (e.g., alkalinity, Fe+2, and Mn+2). Similar tables are included in appendices (CD only): however, summary tables should be included as hardcopies in the front of the report.**

Similarly, include a table with stabilization parameters for each well: these have a bearing on sample integrity and geochemistry of degradation (e.g., ORP, pH). Include both values for duplicate results (not the average value).

Response: Further evaluation and presentation of MNA and field parameters will be provided in the forthcoming RI report.

7. **Comment:** **Table 2-1. Confirm that Table 2-1 lists all compounds detected on Site 12, with criteria and ambient values (when available).**

Response: Confirmed. Table 2-1 is correct as provided.

8. **Comment:** **Table 5-3. Include both values for duplicate results (not the average value).**

Response: Table 5-3 is provided as a summary of the data results. Appendix G has been provided for a complete set of groundwater monitoring data results.

9. **Comment:** **Appendix A. Please resolve the following discrepancies:**

a) In the LTMO TM, the toxicity screening value for Mn was 900 ug/L. In this report, two values are presented. Table A-1 contains an ambient value for Mn of 900 ug/L (but no toxicity screening criteria). However, an ambient value of 600 ug/L is included on Table 2-1. Identify the correct ambient value and revise the report accordingly. Verify whether there is a "toxicity screening criteria" for Mn.

b) For As, a screening criteria of 36 ug/L was used in this report: the ambient value (15 ug/L) was used in the LTMO. Explain why the value was changed.

c) Table A-2 lists 1,400 ug/L as the criteria for each individual TPH, including TPH as motor oil (TPH-mo). Table 5-3 says that the TPH criterion (1,400 ug/L) applies to the summed value of TPH-e and TPH-p. Verify the correct interpretation and revise the report accordingly.

Response: As presented in Section 2.4 of the groundwater status report, screening criteria for the 2006 groundwater monitoring sampling results were as presented in the "Final Remedial Investigation Report Work Plan, Installation Restoration Site 12, Old Bunker Area, Naval Station Treasure Island, San Francisco, California" (SulTech 2006a). The screening criteria for manganese is 900 micrograms per liter (μg/L) as presented in Table 2-1 and Table A-1 in Appendix A. There are no ecological screening criteria applicable for manganese at NAVSTA TI.

In 2005 the lowest groundwater screening criterion for arsenic was 0.14 µg/L (SulTech 2005a). Because this screening criterion, applicable to the human health consumption of aquatic organisms, was lower than the ambient arsenic value (15 µg/L), the ambient arsenic value was used as the screening criterion for groundwater sample results. In 2006, the screening values for human health consumption of aquatic organisms were no longer deemed applicable for use; therefore, the next lowest applicable arsenic screening value of 36 µg/L became the screening criterion.

To account for the potential of a combined TPH result above the screening criteria of 1,400 µg/L, each petroleum result reported as well as the TPH results reported are compared to 1,400 µg/L. Table 2-1 has been revised to include the total TPH screening criterion of 1,400 µg/L.

10. Comment: Discuss ambient values in Appendix A. Describe when ambient values are selected as criteria.

Response: Appendix A presents applicable screening criteria for NAVSTA TI. Ambient values provided in Table A-1 are for reference purposes only. The discussion of ambient values is provided in Section 2.4.2 of the groundwater summary report.

Detected chemicals discussed in this report were considered above the criteria only if they exceeded the ambient value and the toxicity criterion, where available.

11. Comment: Appendix A says that in 2006, "screening values for human health consumption of aquatic organisms were no longer deemed applicable for use" (page A-1). Expand this discussion. Are new values under consideration? If the criteria for "consumption of aquatic organism" are no longer applicable, explain why the criteria are still included on Table A-2.

Response: Appendix A, Table A-2 has been updated to not include human health consumption of aquatic organism criteria as an applicable screening tier. As stated in Section 2.4 of the groundwater status report, screening criteria for the 2006 groundwater monitoring sampling were as presented in the "Final Remedial Investigation Report Work Plan, Installation Restoration Site 12, Old Bunker Area, Naval Station Treasure Island, San Francisco, California" (SulTech 2006a).

12. Comment: **Table A-1 contains "DTSC recommended screening criteria", calculated as one-tenth the lowest observable effect level, acute (LOEL, acute). According to the report, DTSC's more protective (lower concentration) criteria were provided in 2006. Add DTSC's criteria to Table A-2. Include DTSC's criteria in the discussion of tiers on page A-2.**

Response: Page A-2 and Table A-2 of Appendix A have been updated to present DTSC criteria in the screening tiers.

13. Comment: **Appendix C. Low flow purging is supposed to result in low turbidity. However, high turbidity was measured at several wells. High turbidity may influence interpretation of chemical analytical results and selection of sampling methodology (e.g., active vs. passive sampling), and may also suggest processes that require additional evaluation (e.g., microbial blooms) and possible revision of the site conceptual model. The highest value and the widest range was measured at 12-MW20 with a range >1,100 to 55, and a final reading of 800 nephelometric turbidity units (NTUs). For the first sampling on July 13, 2006, field notes for 12-MW20 say:**

> **"First 7.0 L were extremely turbid due to iron precipitate perhaps due to weathering of the inner part of the well. Then we cleaned out YSI bc/H20 from pumping well was clean but chamber of YSI was dirty. Turbidity reading at 8 L [57 NTUs] was from clean chamber. At 11.0 [L] took one last turbidity reading 21.3 (NTU)."**

The notes indicate that the field crew was attentive to the problem and tried to correct it. However, the final reading was still elevated, so it is not clear that corrective action was sufficient, despite perceptively "clean" water. For the second sampling on November 6, 2006, turbidity was still elevated (i.e., >1,100 NTUs, as mentioned previously). Iron was elevated to 3,000 ug/L (above ambient value of 200 ug/L). Zn was elevated to 480 ug/L (above ambient value of 4.4 ug/L). But the duplicate for Zn was ND: so, elevated Zn was considered an anomaly (Section 5.4.3.1). Total suspended solids (TSS) were 63,000 ug/L. 12-MW20 is constructed of PVC so weathering of the well (as postulated by the field crew) does not seem a likely cause of turbidity in the well. What is causing elevated turbidity in 12-MW20? Please investigate 12-MW20 further. For example, were similar conditions encountered during previous sampling events?

Response: Please see response to general comment number 5.

14. Comment: **Appendix C. High initial values of turbidity may indicate that geochemical processes in well water are significantly different from processes in formation water. Elevated values are of concern even when final readings are stable (at +/- 10%). High values were measured at wells throughout Site 12, including (in NTUs): 12-MW15 (277 decreasing to 58.7), 12-MW17 (61 decreasing to 6.51), 12-MW20 (discussed above), 12-MW30 (175 decreasing to 3.80), 12-MW31 (55.3 decreasing to 4.73), and 12-MW34 (86.1 decreasing to 5.51). In some cases, turbidity less than zero was recorded or "estimated" values were recorded when negative values were observed (e.g., field forms for As TM).**

Recommendations: Evaluate whether elevated turbidity values are real or artifacts (e.g., due to an equipment malfunction or contamination from previous well). Instruct the field crew to conduct corrective action when turbidity values are elevated or less than zero. Corrective action may involve re-measurement, cleaning equipment, calibrating equipment, and/or changing equipment.

Response As noted in general comment number 5 above, elevated turbidity values have been consistently reported during the initial purging process at many IR Site 12 monitoring wells. The increased turbidity values appear more prevalent during dry season groundwater monitoring events for the majority of the wells. In order to obtain more accurate and stable readings for water clarity at low levels, turbidity measurements were performed with a separate turbidity meter in 2005 and 2006. When using a multiprobe instrument for recording field groundwater parameters, low-level turbidity measurements may be recorded by the instrument as a negative number because the true turbidity reading is approaching zero.

Corrective action is taken for all suspect readings and includes cleaning the sample container, calibrating the turbidity meter using a new calibration solution, re-measurement, and the use of new equipment if the problem is not resolved.

15. **Comment:** **Appendix C. Dissolved oxygen (D.O.) less than 0.5 mg/L is usually paired with low ORP (negative values). High D.O. and low ORP are inconsistent with each other and may indicate equipment problems. For example, 12-MW05 has D.O. of 2.96 mg/L and ORP of -206 mV and 12-MW16 has D.O of 1.5 mg/L and ORP of -168 mV. D.O. and ORP are further discussed in Appendix E comments, below.**

Response: Field measurements for dissolved oxygen in monitoring wells 12-MW05 on January 12, 2006 and 12-MW16 on November 6, 2006 were recorded in percent and not mg/L. The instrumentation being used provides dissolved oxygen results in both mg/L and percent. Field personnel recorded the incorrect dissolved oxygen result from the instrument. Because percent dissolved oxygen in any particular sample cannot be directly converted to mg/L, the field measurements reported in percent have been rejected from the data set.

16. **Comment:** **Appendices E. The discussion in Appendix E1 is good but it is general in nature. A site-specific evaluation is not provided with regard to the MNA parameters and the field data included in Appendix E2 as well as the chemical analytical results presented in Appendix G. Lines of evidence are mentioned for TPH and VOCs, but site-specific lines of evidence are not presented (e.g., trend analyses). Metals are not fully discussed or evaluated. However, the mobilization of metals (above criteria and/or above ambient levels) with TPH degradation may be an important process at TI. Previously, mobilization of As and Fe was discussed in the As TM. And, mobilization of As and Mn was discussed in the LTMO TM. Mobilization of metals should be discussed wherever TPH is elevated in groundwater and soil. Metals may also be mobilized with degradation of VOCs: however, VOC concentrations in groundwater are typically low (less than 10 ppb) in the areas monitored.**

Recommendations: Please expand the text to include a site-specific evaluation of the data: include figures illustrating trends and associations (e.g., "MNA polygons", as presented in the As TM). Continue the discussion (which was begun in the As TM and LTMO TM) regarding mobilization of As and other metals with degradation of TPH.

Response: Please see response to specific comment number 6.

17. **Comment:** **Appendices E. D.O. and ORP (as well as other field parameters) are used to demonstrate MNA. However, inconsistent values are**

presented in Appendix E2. For example, in many final readings, D.O. values in the aerobic range (e.g., above 1 mg/L) are paired with ORP values in the anaerobic range (e.g., below -50 mV). For example, at 12-MW21, D.O. at 11.9 mg/L was reported with ORP at -140 mV (May 30, 2003): many other examples of inconsistent values were reported. Initial readings from some wells are inconsistent and exhibit greater disparity than final readings. For example, for both 12-MW33 and 12-MW34 on October 7, 2003, initial D.O. values were about 8 mg/L and initial ORP values were about -300 mV. For wells sampled twice in the same day (As TM), D.O. concentrations in some wells quickly increased to above 1 mg/L between first and second sampling events, while ORP values were more stable (i.e., approximating the final reading of the first sampling).

Recommendations: To ensure that MNA data are robust enough to support the MNA model (and are not sampling or equipment artifacts), please instruct the field crew to conduct corrective actions for inconsistent values. Corrective actions may include repeating measurements, checking/cleaning/changing/re-calibrating equipment, and/or collecting samples for laboratory analysis.

Response: Comment noted.

18. Comment: Appendices E. Values presented in Appendix E2 were reviewed and, for some wells, values were checked against field forms in the As TM. Several errors (and/or anomalous values) were noted, which suggest that quality assurance/quality control (QA/QC) procedures could be improved. Errors may include transcription errors, inconsistent use of significant figures, incorrect units, or equipment malfunctions. For example, negative D.O values were reported (-1.55 mg/L at 12-MW17 on October 13, 2004 and -.10 mg/L at 12-MW23 on October 7, 2003). Very low ORP was reported (-7,140 mV at 12-MW22 on October 14, 2004). Very high specific conductivity was reported at several wells on November 6, 2006: 12-MW17 (10,900 mS/cm), 12-MW19 (1,870 mS/cm), 12-MW22 (1,740 mS/cm), 12-MW28 (9,590 mS/cm), 12-MW30 (5,050 mS/cm), 12-MW31 (1,210 mS/cm), and 12-MW34 (40,400 mS/cm). Values presented on field forms did not always agree with Appendix E2 values (e.g., 12-MW33 and 12-MW34 on December 16, 2002).

Recommendations: Please explain the QA/QC process for each field analyte, and discuss uncertainties. Several D.O. results were rejected (as indicated by the "R" qualifier). Discuss the criteria used to reject

D.O. values. With respect to Mn, ">" signifies results greater than the calibration limit: on the table, please change "700>" to ">700". Please confirm that field test kits are not available for the range of Mn concentrations at the site. If kits are not available, perform lab analyses for Mn samples that are outside the range of field test kits. Check results in Appendix E2 against field forms with respect to transcription errors, significant figures, units, and possible equipment malfunctions. Comment on whether specific conductivity values for November 2006 are acceptable.

Response: Field measurements are manually entered into the database. Data entry is verified using the groundwater monitoring well sampling sheets as compared to the data printouts from the database. An additional quality control review was conducted, comparing field data from 2003, 2004, and 2006 to the database, and several results were corrected from the field dataset.

Dissolved oxygen results have been rejected for several field readings because the measurements were reported in the field by percent dissolved oxygen and not mg/L of dissolved oxygen.

Manganese II results have been provided with the greater than ">" sign following the result to prevent confusion of the result being potentially less than 700. This presentation of results was to clarify the data as proposed in a previous groundwater monitoring status report. Field test kits are available to quantify high range results in mg/L; however, an additional step to potentially quantify manganese II does not add additional information for evaluating MNA parameters and may result in a nondetected value that is between 700 μg/L and the detection limit of the high range kits (1,000 μg/L). Future groundwater samples will be diluted to correct for some of the higher manganese II values reported.

As noted on the field forms, specific conductivity was reported using micro- and milli-seconds per centimeter as the applicable units. These values were entered correctly; however, the units were not applied to appropriately enter the results. The values have been corrected.

19. **Comment:** **Appendices E. Field measurements of alkalinity, Fe+2, and Mn+2, as provided in Appendix E2, were not included on field forms in the As TM. Recommendation: Please include all field measurements on field forms.**

Response: Comment noted.

20. **Comment:** **Appendices E. pH values between 6 and 8 are required for VOC and TPH degradation. Metals are sensitive to pH. Some metals may be mobilized at both high and low values of pH (e.g., amphoteric metal hydroxides). pH values above 8 were observed at some locations, which may indicate increased potential for metal mobilization. For example, at 12-MW31, pH was usually above 8 (e.g., 8.7 on June 12, 2001). In May 2004, elevated pH was measured at several wells, including: 8.8 at 12-MW19, 8.6 at 12-MW21, 8.7 at 12-MW23, 8.4 at 12-MW28, 8.6 at 12-MW33 in May 2004.**

Recommendation: Please comment on potential effects of high pH, including mobilization of metals and suppressed degradation of TPH and VOCs. Comment on whether elevated values (and by extension, all pH values) for May 2004 are acceptable.

Response: Please see response to specific comment number 6.

21. **Comment:** **Appendices E. Remark 1 says that average values of detected results are presented for duplicate samples. Please provide all results.**

Response: Appendix E results have been presented as such to limit repetition in data summary reporting for the MNA indicator parameters. The reporting and further treatment of MNA parameter data will be addressed in the forthcoming RI report.

21. **Comment:** **Appendices E. Typo. Appendix E1, page E1-3. Add a negative sign: change "400 mV" for anaerobic environments to "-400 mV".**

Response: The third paragraph in Section 4.0 of Appendix E has been revised as follows, "The oxidation-reduction potential of groundwater ranges from 800 millivolts (mV) for aerobic environments to -400 mV for anaerobic environments."

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SULLIVAN

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December 14, 2007

Responses to Regulatory Agency Comments on the Draft Annual Groundwater Status Report: Summary of Groundwater Monitoring at Site 12, July and November 2006, Naval Station Treasure Island, San Francisco, California (March 2007, DT B209-06)

Dear Ms. Silva,

Please find enclosed three (3) copies of the subject document as well as a CD-ROM containing the electronic files. Please note that this is not a formal deliverable, hence there is no transmittal receipt. We are sending you these copies per direction from James Whitcomb, Remedial Project Manager, and because copies of this response to comments (RTCs) are being sent to representatives from agencies such as the California Regional Water Quality Control Board, the California Department of Toxic Substances Control, the U.S. Environmental Protection Agency, the Treasure Island Development Authority, among others, as well as Restoration Advisory Board members.

These RTCs will be formally delivered at a future date as an appendix to the *Final Annual Groundwater Status Report: Summary of Groundwater Monitoring at Site 12, July and November 2006, Naval Station Treasure Island, San Francisco, California.*

Please feel free to contact me with any questions, at (619) 260-1432.

Sincerely,

Gabe Samrock
Supervisor – Production & Quality
Sullivan International Group, Inc.

Enclosures: 3 hardcopies, 1 CD-ROM

cc: Hannah Thompson, Project Manager, Sullivan International Group, Inc.

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