ENVIRON

February 25, 2009

Ms. Elizabeth Zimmermann
Manager, Environmental Programs
Hitachi Global Storage Technologies
5600 Cottle Road (050/A168)
San Jose, CA 95193

Re: Errata Sheet, Page 10
Groundwater and Soil Gas Sampling Results- December 2008 Report
Chloroform Release Area at Former Building 028J
Hitachi Global Storage Technologies, Inc.
San Jose, California
ENVIRON Project No. 03-11903E

Dear Ms. Zimmermann:

It has come to our attention that our report titled, "*Groundwater and Soil Gas Sampling Results- December 2008 Report, Chloroform Release Area At Former Building 028J*" dated January 5, 2009 contains an inadvertent error on page 10. The error relates to the statement in the opening sentence of the first complete paragraph relating to the well screen interval for EW-17. The well screen for EW-17 extends between three and four feet into A/B Aquitard and between one and two feet into the A-Aquifer according to the well completion log and other field information. In addition, EW-17 was incorrectly referred to as a monitoring well.

Specifically, the first sentence is as follows:

> *The only monitoring well in which chloroform concentrations significantly increased in December 2008 was EW-17, a well that is screened approximately five feet into the A/B Aquitard, with the screen extending only a few inches into the overlying A-Aquifer.*

This sentence should be revised to read as follows:

> *The only well in which chloroform concentrations significantly increased in December 2008 was EW-17, a well that is screened between three and four feet into the A/B Aquitard, with the screen extending between one and two feet into the overlying A-Aquifer.*[1]

This error has no effect on the remaining conclusions in the paragraph which state that:

> *During sampling in December 2008, this well was very slow to recharge, indicating that water was primarily draining from the aquitard rather than from the overlying aquifer.*

[1] In Table 1 of the Final Remedy Completion Report, there is a footnote (8) to both EW-17 and EW-18 intending to be generally applicable to both wells, stating that those wells are screened three feet deep into the aquitard. The well logs show that it is more precise to state that EW-17 and EW-18 are screened between three and four feet deep into the aquitard.

> *The higher concentrations of chloroform in this well, therefore, likely represent the condition of the pore water in the aquitard, rather than the concentration in groundwater in the overlying aquifer. This conclusion is supported by the observation that two nearby A-Aquifer wells (EW-5 and EW-16, both located within 10-15 feet of EW-17) reported much lower concentrations of chloroform (91 and 140 µg/L) in the same sampling round.*

Furthermore, it should be noted that well construction details and the well log previously provided to DTSC for EW-17 are correct. The well log for EW-17 was previously provided to DTSC in the following reports:

- Attachment B of ENVIRON International Corporation (ENVIRON). 2008. *2-PHASE™ Extraction System Monitoring Report – January 2008 through June 2008 Former Building 028J Area*. July 1, 2008.

- Appendix B of ENVIRON International Corporation (ENVIRON). 2008. *Chloroform Mass Estimates and Projected Future Groundwater Conditions.* August 11, 2008.

In addition, well construction details for EW-17 were also provided in Table 3 and in the lithologic cross sections in Figures 22 and 23 in the following report:

- ENVIRON International Corporation (ENVIRON). 2008. *Final Remedy Completion Report (RCR) for the Chloroform Release Area at Former Building 028J. Hitachi Global Storage Technologies, Inc., Redevelopment Property, 5600 Cottle Road, San Jose, California.* November 17, 2008.

The information in this table and Figures 22 and 23 regarding EW-17 in the RCR is also correct.

We are attaching a replacement page 10 for the December 2008 report with the corrected sentence. In addition, replacement pages are also included for pages 11 through 15 since the revisions to page 10 resulted in different pagination and footnote numbering for the report. Please let us know if you have any questions or comments.

Very truly yours,

//original signed by//

Elizabeth A. Miesner, M.S.
Principal

//original signed by//

Anne W. Gates, P.E.
Senior Manager

Attachments: Revised pages 10 through 15

steps downward in concentration, coinciding with periods of seasonal recharge, rather than a steady rate of decline throughout the entire year) and over time a loss of chloroform mass to the A/B Aquitard and underlying B-Aquifer.

The only well in which chloroform concentrations significantly increased in December 2008 was EW-17, a well that is screened between three and four feet into the A/B Aquitard, with the screen extending between one and two feet into the overlying A-Aquifer[10.] Chloroform in this well in December 2008 was reported to be 560 µg/L, up from 160 µg/L in August 2008. As stated above, well EW-17 is constructed in the area of the A/B Aquitard where chloroform concentrations were the highest measured in aquitard soil samples. During sampling in December 2008, this well was very slow to recharge, indicating that water was primarily draining from the aquitard rather than from the overlying aquifer. The higher concentrations of chloroform in this well, therefore, likely represent the condition of the pore water in the aquitard, rather than the concentration in groundwater in the overlying aquifer. This conclusion is supported by the observation that two nearby A-Aquifer wells (EW-5 and EW-16, both located within 10-15 feet of EW-17) reported much lower concentrations of chloroform (91 and 140 µg/L) in the same sampling round.

As was explained and demonstrated in the *Chloroform Mass Estimates and Projected Future Groundwater Conditions Report* (the "Modeling Report") (ENVIRON, August 2008) and the Final Remedy Completion Report (ENVIRON, November 2008), the mass of chloroform remaining in the A/B Aquitard will be gradually dissipated by the downward drainage of water from the overlying A-Aquifer. It is clear from an examination of the groundwater data from December 2008, however, that the seasonal rebound of the water table does not cause water in the Aquitard to drain upward into the shallower A-Aquifer, thereby causing a rebound of chloroform concentrations. Indeed, as the water table has recovered in the Fall, chloroform concentrations in the A-Aquifer on average have declined (consistent with a process of periodic, seasonal flushing) and remain well below the DTSC-approved RBTCs for groundwater. It is, therefore, highly unlikely that chloroform concentrations in the A-Aquifer would rebound to a degree that would cause them to approach, much less exceed, the RBTC of 380 µg/L in the future.

4.2 Soil Gas

A comparison of shallower (i.e. at five and 10 feet bgs) soil gas test results for chloroform from October and December 2008 indicate that soil gas concentrations over this period have been generally stable. Concentrations for individual sample locations have exhibited either slight declines and/or increases in the range of up to about 0.2 µg/L over this sampling record. An examination of the sampling results for location SG-028J-27 at five, 10 and 15 feet bgs (see Figure 2) in December 2008[11], indicates that a normal sampling variability of $\pm$ 0.2 µg/L is to be expected at any location in a sampling round when the underlying concentration of chloroform has not significantly changed. In light of this inherent sampling variability, the data from October

[10] In Table 1 of the Final Remedy Completion Report, there is a footnote (8) to both EW-17 and EW-18 intending to be generally applicable to both wells, stating that those wells are screened three feet deep into the aquitard. The well logs show that it is more precise to state that EW-17 and EW-18 are screened between three and four feet deep into the aquitard.

[11] This location was sampled twice on succeeding days (December 22nd and 23rd, 2008).

to December 2008 demonstrate soil gas concentrations which are essentially stable and do not exhibit any demonstrable longer term trend.

All concentrations of chloroform measured in soil gas at five, 10, and 15 feet bgs in December 2008 are well below the DTSC-approved soil gas RBTCs of 1.1, 1.9 and 8.9 µg/L, respectively. The highest chloroform concentration in shallower soil gas in December 2008 (0.95 µg/L at 10 feet at location SG-028J-29) is approximately 50 percent of the DTSC-approved RBTC.

Soil gas concentrations at 15 and 23-25 feet bgs were measured for the first time in December 2008. This information was intended to provide chloroform soil gas data from the silty-clay layer at 12 to 23 feet bgs in the vadose zone[12], and data on the equilibrium concentrations that may exist with groundwater immediately above the capillary fringe. Chloroform concentrations in soil gas at 15 feet are well below the DTSC-approved RBTC of 8.9 µg/L and are generally within the lower end of the range measured in the shallower (five and 10 feet bgs) samples at the same location, with one notable exception at location SG-028J-38 where the concentration at 15 feet (0.76 µg/L) was approximately twice the concentration at 10 feet (0.34 µg/L).[13] These findings demonstrate that the remaining chloroform mass in the silty-clay layer is not a significant source that would cause concentrations of chloroform in shallower soils (i.e. at five and 10 feet) to increase in the future.

The deeper soils at 15 feet bgs are more clay-rich, and hence tend to retain greater amounts of water. As soils become wetter (all other parameters being equal and the mass of chloroform remaining constant) chloroform mass will preferentially partition into a water phase and soil gas concentrations should decline somewhat as the soils become wetter. This may explain in part why the chloroform concentrations at some locations are lower at 15 feet than in the shallower 10 foot samples, which were collected from silty-sand soils that more readily drained, and have a higher air-filled porosity.

Concentrations of chloroform in the deepest soil gas samples, targeting a depth just above the water table[14], were generally low, and in the range of 1.2 to 2.5 µg/L along the northeast wall of former Building 028J area, where groundwater concentrations of chloroform are known to be highest. Assuming a Henry's law coefficient of 0.12, these soil gas concentrations are consistent with a chloroform concentration in groundwater of 10-20 µg/L, considerably less than measured in nearby monitoring wells. Because soil gas just above the capillary fringe is going to more accurately reflect the concentration of chloroform at the top of the water table (as opposed to a vertical average concentration across the entire water table as measured in a monitoring well), the low concentrations of chloroform measured in the deep soil gas samples appear to reflect the fact that the water table has been recharged in a manner that has resulted in a "cleaner" layer of ground water overlying a more contaminated layer at depth. This seasonal stratification of the water table will tend to reduce the diffusion of chloroform from the

[12] This layer may represent a zone of residual chloroform that was not completely flushed from the vadose zone during remediation due to it high water content and low air filled porosity.

[13] The low measured concentrations in soil gas are not inconsistent with the previously finding that chloroform in bulk soil samples were all reported as non-detect, with a detection limit of approximately 4.5 µg/kg. At this detection limit, a soil gas equilibrium concentration of up to 1.9 µg/L might have been expected.

[14] At the time of the December 2008 measurements the water table was at about 28 feet bgs.

deeper portion of the water table, thereby lessen the eventual impact on chloroform concentrations in the overlying vadose zone soils.

Although the DTSC has not formally approved a RBTC for soil gas at 23 feet, the concentrations measured at this level are none-the-less much less than the DTSC-approved RBTC for 15 feet (8.9 µg/L). Furthermore, soil gas modeling presented by ENVIRON to DTSC at a recent meeting in Sacramento[15], demonstrated that the concentration of chloroform is almost entirely dissipated across the wet silty-clay layer that forms the middle portion of the vadose zone from 12-23 feet across the Site. It is highly unlikely, therefore, that the low concentrations of chloroform measured at depths of 23 to 25 feet bgs in soil gas would pose any risk to public health from soil gas migration.

Taken in their entirety, the vadose zone data indicate that a low amount of chloroform mass remains in the vadose soils following the shut-down of remediation and there are no significant spatial trends in chloroform concentrations over the vertical extent of the vadose zone. Moreover, the sampling grid over which the soil gas samples were taken is very tight, approximately 20 to 25 feet apart. Therefore, there is no evidence of a long-term source of chloroform mass in the vadose zone that could diffuse outward to materially increase concentrations in adjoining (shallower or deeper) layers and it is ENVIRON's scientific judgment that soil gas concentrations will not exceed the DTSC-approved RBTCs in the future. In this respect, the current concentrations of chloroform in soil gas have reached a stable or near-term "steady-state" condition. Over the longer term, however, concentrations of chloroform in soil gas and groundwater should decline as chloroform mass is lost by gradual venting to the atmosphere and flushing into deeper aquifer zones with seasonal recharge.

4.3 Leak Detection Results

Over the course of the soil gas monitoring program, 1,1-DFA was used as a leak detection compound to detect for any significant leakage of ambient air into the sampling equipment that could affect reported soil gas results. All concentrations of 1,1-DFA were below the DTSC-prescribed maximum reporting limit of 10 µg/L[16] when this compound is used as for leak detection. None-the-less, very low concentrations of 1,1-DFA were detected in approximately one-half of the soil gas samples. The maximum detection of 1,1-DFA was 4.5 µg/L, and most detections were less than 0.1 µg/L, with a minimum detection limit of approximately 0.008 µg/L. The source of the 1,1-DFA in the soil gas samples (i.e. whether from leakage or cross contamination of sampling equipment) can not be readily determined from the test results, but the absence of 1,1-DFA in the laboratory method blanks indicates the 1,1-DFA was introduced in the field, not in the laboratory.

[15] This modeling was performed using actual properties of the vadose zone soils as established by the on-site investigations to develop an RBTC for deeper soil gas at 25 feet (just above the capillary fringe) and groundwater, assuming the water table remains in the range of 27-31 feet bgs as has been the case over the past two years of investigation. The estimated RBTC for deeper soil gas was well above the RBTC of 8.9 µg/L for 15 feet bgs.

[16] Section 2.7.3A of the *Advisory – Active Soil Gas Investigations* (DTSC and LARWQCB 2003) recommends that the detection limit for leak detection compounds be 10 µg/L or less.

To provide some context for the detection of DFA in the field samples it is important to recall that at DTSC's request, 1,1-DFA was used in generous amounts during the December 2008 test program, including the use of a shroud over the sampling equipment to maintain the leak detection environment. Two measurements of 1,1-DFA in ambient air during the sampling program (one collected inside a shroud placed over the Summa™ canister and the other at the ground surface inside the probe monument, which is the protective casing that surrounds the sample tubing) reported ambient concentrations of 28,000 and 2,600 µg/L, respectively (see sample numbers ATMLC-2 and -3 in Table 4). A comparison of these ambient measurements to the maximum test results in soil gas samples indicate a worse-case "dilution factor" of 1.7×10^{-3} or 1.6×10^{-4}, as compared to the reported ambient air concentrations. At these minute levels of dilution, even assuming that the source of 1,1-DFA was the leakage of air into the sample from the sample tubing or around the surface seal, the effect on the reported result would be so slight as to adjust only the third or fourth significant digit in the reported results.

The minimal effect of dilution by any leakage of ambient air on the soil gas results is also demonstrated by the fact that the measured chloroform concentrations at the two locations where 1,1-DFA were greater than 1.0 µg/L (locations SG-028J-29 at five feet and SG-028J-38 at 23 feet) reported chloroform concentrations that were in the same range as were reported in other nearby samples from the same soil horizon. If leakage of ambient air had been significant, chloroform readings in these two instances would have been expected to be much lower than surrounding samples. It is highly unlikely, therefore, that the leakage of air into the sampling train, as reflected by the presence of 1,1-DFA had any material impact on the reported results for chloroform.

5 CONCEPTUAL SITE MODEL

The CSM for the former Building 028J area is based on the assumption that chloroform was historically released into shallow soils and eventually migrated with seasonal recharge, or alternatively by the drainage of contaminated liquids, through the vadose zone soils into the deeper A-Aquifer and A/B Aquitard. The amount of chloroform remaining in soils and groundwater has been materially reduced by the operation of the 2-Phase™ Extraction remediation system in 2007/2008, but a small residual of chloroform remains today in the vadose zone soils, and in the underlying Aquifer and A/B Aquitard, which will be gradually depleted by natural venting to the atmosphere and seasonal flushing. The potential for exposure to chloroform in the former Building 028J area is based on the direct contact with contaminated soils or inhalation of chloroform as a gas which migrates into overlying structures via soil gas migration. The use of on-site shallow groundwater has been precluded by a deed restriction, so direct exposure to chloroform in a drinking water or irrigation supply has been institutionally precluded.

Testing of vadose zone soils in the former Building 028J area during the latter stages of the remediation program demonstrated that the concentration of chloroform in bulk soil samples was very low, with all soil samples above 20 feet bgs reporting chloroform concentrations as non-detect at a detection limit of approximately 4-5 µg/kg. These test results have been previously documented to the DTSC in the Final Remedy Completion Report (ENVIRON, November 2008). The RBTC for direct contact to chloroform in soils is 8.7 µg/kg, so these test results demonstrate that the direct contact pathway is no longer a concern.

Chloroform was detected, however, in deeper soils in the A-Aquifer and the A/B Aquitard. Based on the demonstrably higher concentrations of chloroform measured in bulk soil samples in the A/B Aquitard in the April/May 2008[17] (average of 184 µg/kg), as compared to the much lower concentrations measured in the A-Aquifer and seasonal capillary fringe (average of 23 µg/kg in the aquifer), and the absence of detections in soils from the shallower vadose zone, it is apparent that the principal mass of chloroform remaining at the Site today is in the A/B Aquitard. Because this aquitard is below the water table, and hence the soils therein are fully saturated, this chloroform mass is either dissolved in pore water or adsorbed to organic carbon in the aquitard soils.

The net movement of regional groundwater beneath the Site is downward towards the B-Aquifer, as is demonstrated by water level measurements across the Hitachi Site. The measurements of water levels and hydraulic conductivities for soils in the A–Aquifer and the aquitard indicate that the rate of drainage of water from the overlying A-Aquifer into the aquitard in the former Building 028J area is sufficiently high to prevent an upward diffusion of chloroform from the aquitard into the A-Aquifer. Modeling presented in the Modeling Report (ENVIRON, August 2008) demonstrates that this mass of chloroform will slowly migrate downward, causing a small increase in the chloroform concentrations in groundwater in the underlying B-Aquifer, to levels that will remain below the SFRWQCB action level of 80 µg/L for drinking water. Also, because the A/B Aquitard is, throughout the year, below the overlying water table, chloroform in

[17] See Table 6 in the Final Remedy Completion Report (ENVIRON, November 2008).

the aquitard cannot serve as a source for chloroform in soil gas migrating into shallower vadose zone soils.

A smaller residual mass of chloroform also remains in the overlying A-Aquifer, dissolved in groundwater and adsorbed to soils below the seasonal water table. While exposure to this chloroform has been limited by deed restrictions on groundwater use, it does serve as a minor source of chloroform to soil gas into the overlying deep vadose zone. The chloroform in the A-Aquifer is being gradually diluted and flushed with the seasonal recharge of cleaner groundwater.

Groundwater and soil gas data collected in December 2008 during a period of seasonal recharge indicated that this recharge mechanism operates in a manner such that the more contaminated groundwater in the water table zone likely remains near the bottom of this unit (i.e. near the contact with the A/B Aquitard), with a somewhat cleaner layer of groundwater overfilling the A-Aquifer from above. As a result, the impact of the chloroform in the A-Aquifer on the concentration in soil gas in the overlying vadose zone is mitigated in part by the seasonal recharge of this cleaner groundwater layer. Based on the very long time-frames (potentially years) for chloroform to migrate by diffusion as a soil gas from the water table at 25-30 feet to shallow soils at five to 10 feet bgs, and the significant mitigation of the chloroform gradient that occurs across the wet silty-clay layer in the middle of the vadose zone, it is ENVIRON's scientific judgment that the chloroform remaining in groundwater in the A-Aquifer will not be and cannot be a material source of chloroform in shallower soil gas (i.e. above 15 feet bgs) in the future.

A very small residual mass of chloroform also likely remains in the vadose zone soils, at concentrations too small to be detectable in bulk soil samples, but sufficient to cause detectable amounts in soil gas, which can be measured at much lower concentrations. This mass appears to be the source of chloroform that continues to be detected in shallow soil gas samples at five, 10, and 15 feet bgs in the October and December 2008 testing programs.

Soil gas measurements in October 2008 confirmed that the concentrations of chloroform in shallow soils are well below the DTSC-approved RBTCs. The subsequent measurements in December 2008 demonstrate that the concentrations in shallow soils are currently stable, and there are no demonstrable deeper zones of higher chloroform concentrations that will cause chloroform to migrate into shallower, near-surface soils, increasing the chloroform concentrations in shallow soil gas in the future. It is highly unlikely, therefore, that chloroform soil gas concentration in the vadose zone soils would ever increase in the future to concentrations that are above RBTCs. The residual mass of chloroform in the vadose zone, therefore, poses no practical concern for exposure via the soil gas migration/inhalation pathway. This chloroform mass will be gradually reduced over a period of years by venting into the atmosphere or flushing into the A-Aquifer with season recharge.