Message

From: MORASH, MELANIE [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=C67B1B2EBFDF4795AA598EDA825F0589-MMORASH]
Sent: 12/10/2018 10:11:57 PM
To: J. Wesley Hawthorne [hawthornej@locustec.com]
CC: gcook@valleywater.org; Lynne Kilpatrick [lkilpatrick@sunnyvale.ca.gov]; Heather O'Cleirigh (Heather.OCleirigh@amd.com) [Heather.OCleirigh@amd.com]; Shantal Der Boghosian [shantal.derboghosian@ngc.com]; Nancy-Jeanne LeFevre [LeFevren@locustec.com]; Shau Luen Barker [shauluen.barker@philips.com]
Subject: RE: EPA Comments - Annual 2017 Groundwater Monitoring Report for Signetics Site - 811 East Arques Avenue, Sunnyvale, CA

Thank you. I will review.

From: J. Wesley Hawthorne <hawthornej@locustec.com>
Sent: Monday, December 10, 2018 12:45 PM
To: MORASH, MELANIE <morash.melanie@epa.gov>
Cc: gcook@valleywater.org; Lynne Kilpatrick <lkilpatrick@sunnyvale.ca.gov>; Heather O'Cleirigh (Heather.OCleirigh@amd.com) <Heather.OCleirigh@amd.com>; Shantal Der Boghosian <shantal.derboghosian@ngc.com>; Nancy-Jeanne LeFevre <LeFevren@locustec.com>; Shau Luen Barker <shauluen.barker@philips.com>
Subject: RE: EPA Comments - Annual 2017 Groundwater Monitoring Report for Signetics Site - 811 East Arques Avenue, Sunnyvale, CA

Melanie:

Per our discussion on 17 October, please find attached a response-to-comments letter for the 811 East Arques Avenue annual groundwater monitoring report. This response is being sent earlier than requested so that there is sufficient time to address these comments in the 2018 annual report (to be submitted on 30 January 2019). Please let me know if you have any further comments, and we will proceed with incorporating these changes into the 2018 annual report as we discussed.

Thank you,

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President
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From: MORASH, MELANIE <morash.melanie@epa.gov>
Sent: Wednesday, September 19, 2018 10:04 AM
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Subject: EPA Comments - Annual 2017 Groundwater Monitoring Report for Signetics Site - 811 East Arques Avenue, Sunnyvale, CA

Dear Wes, Nancy-Jeanne and Shau-Luen,

Thank you for submitting the *Annual Groundwater Monitoring Report, January to December 2017, 811 East Arques Avenue Site, Sunnyvale, California* (Report) on behalf of Philips Semiconductors, Inc. for the Signetics Site in Sunnyvale, California. The report submission is required for compliance with Regional Water Quality Control Board Order 91-104 (Order), which remains in effect subsequent to the lead-agency transfer from the State to EPA in August 2014.

EPA appreciates your continued operation and monitoring of the groundwater extraction and treatment system for the Signetics Site, in compliance with the Order. The following set of comments are being provided for your consideration during the period of "stop-work" for the Offsite Operable Unit (OOU) vapor intrusion (VI) effort and Signetics in-situ bioremediation (ISB) study. We recognize that this is a substantial set of feedback, and appreciate your consideration of these items. Please provide a response-to-comments letter and updated Report by **Friday, January 11, 2019**. If this timeframe is not feasible, please identify an alternate submittal date to EPA for approval by Friday, September 28, 2018.

1.0 GENERAL COMMENTS

1. The Report includes groundwater elevation and chemical data reporting for numerous groundwater-monitoring wells in the "A" and "B1" aquifers in the southern portion of the OOU. These data are associated with the OOU and are relevant to the Signetics Site only in regard to documenting off-site migration of contaminants from the Signetics Site and boundary conditions for the potentiometric surface reconstructions. The Report should present and discuss data generated from the Signetics Site and reference data from the OOU only in support of data generated from the Signetics Site. In addition, the Report presents interpretations of data from adjacent sites that are at variance with reports from these sites. The Report should reconcile data variances with adjacent sites and, if significantly different, present justifications for the interpretation. A preferable alternative is to present and discuss just data from the Signetics Site and reference adjacent site data where needed. Please revise the Report to address these issues.

2. The scale of the figures could be improved as the Signetics Site encompasses only about 10 percent of the figures. The Signetics Site should be prominent presented on the figures to such a degree that they do not have to be enlarged to identify details on the Signetics Site. Please revise the figures accordingly.

3. In accordance with the Order, reporting shall include identification of potential problems that will, or may, cause noncompliance with the Order. Accordingly, hydraulic capture of the contaminant plumes for the hydrostratigraphic units (HSUs) does not appear to be sufficiently demonstrated. Please revise the Report to discuss and address this issue. Evaluation of the capture zones should be in accordance with EPA's guidelines (2008).

4. The Report did not present discussions of vertical gradients between HSUs. Please revise the Report to discuss vertical gradients for each pair of HSUs and to document no adverse contaminant migration (i.e. contaminant migration resulting in an increased human health risk) occurring between HSUs.

5. The Report describes groundwater-monitoring activities conducted during the 2017 reporting period, but does not include the Remedial Action Objectives (RAOs) of the groundwater monitoring program. Please revise the Report accordingly.

6. The Report describes quality assurance/quality control (QA/QC) results for groundwater-monitoring activities, but does not reference a parent Quality Assurance Project Plan (QAPP) to which the protocol can be compared. Please revise the Report accordingly.

7. Concentration units for volatile organic compounds (VOCs) are shown inconsistently throughout the report. In Section 3 the units are shown as micrograms per liter or "µg/L"; in Tables 2 and 5 the units are shown as "ug/l"; in Tables 2 and Table 5 the units are shown as "µg/l", switching to milligrams per liter or "mg/L" in Figures 8 through 19. Many TCE concentrations shown on the figures were not converted correctly from µg/L to mg/L, as VOCs are reported by the analytical laboratory to two significant figures. EPA recommends using "µg/L", used for the California MCL values (Section 3), as VOC units for the report. Please revise the Report accordingly.

2.0 SPECIFIC COMMENTS

1. Section 1.3.2, Page 2, Third Bullet – Reference is made to a possible four-month termination of system operations because of Sunnyvale East Channel improvements preventing effluent discharge. As the extraction and treatment system may be off for an unknown period, contingencies should be implemented to evaluate potential enhanced off-site migration of contaminants. With termination of extraction for an extended period of time, groundwater will likely recover to static conditions. A synoptic groundwater elevation measurement event should be conducted to determine static groundwater conditions that can be used for comparison to active extraction, and possibly used to recalibrate existing groundwater models. Please revise the Report accordingly.

2. Section 2.1, Page 3 – Groundwater elevation measurements for wells S006A, S027A, and S150A were included in the Annual Groundwater Monitoring Report January to December 2016 report (Locus, 2017), but not included in the 2017 report. The rationale for not obtaining/reporting groundwater elevation data for these wells should be presented, especially since a groundwater sample was collected from well S027A for analytical testing. Please revise the Report accordingly.

3. The potentiometric surface contours for the "A" aquifer on Figure 3 appear to be inaccurate, as they do not account for the active groundwater occurring at the Advanced Micro Devices, Inc. (AMD) 915 Site (Haley Aldrich, 2018a). Please revise the figure accordingly. EPA concurs that groundwater extraction significantly influences the direction of "A" aquifer groundwater flow in many areas of the Signetics Site as shown on Figure 3, but there is no indication that the potentiometric surface demonstrates plume capture. Please revise the Report to address this issue.

4. Section 2.2.1, Page 3 – Groundwater elevation measurements for wells S026B1, S082B1, S100B1, and S154B1 were included in the Annual Groundwater Monitoring Report January to December 2016 report (Locus, 2017), but not included in the 2017 report. The rationale for not obtaining/reporting groundwater elevation data for these wells should be presented, especially since groundwater samples were collected from most of these wells for analytical testing. Please revise the Report accordingly.

5. The potentiometric surface contours for the "B1" aquifer on Figure 4 appear to be inaccurate, as they do not account for the active groundwater extraction from the "B1" aquifer at the AMD 915 Site (Haley Aldrich, 2018a). Please revise the figure accordingly. EPA concurs that groundwater extraction significantly influences the direction of "B1" aquifer groundwater flow in many areas of the Signetics Site as shown on Figure 4, but there is no indication that the potentiometric surface demonstrates plume capture along the western and eastern downgradient boundary of the site. Please revise the Report to address this issue.

6. Section 2.2.2, Page 4 – The potentiometric surface contours at the Signetics Site is based upon four "B2" wells on the Signetics Site and select wells on the adjacent TRW and AMD sites (Figure 5). The presented data do not appear to support the potentiometric contours as presented in the central and southern portions of the Signetics Site. The discussion should be revised to recognize that the potentiometric surface and groundwater flow is known only for the northern and north-central portions of the Signetics Site. Please revise the Report accordingly. Furthermore, EPA concurs that a localized significant potentiometric depression is evident on Figure 5 along the north-central border of the Signetics Site; however, this localized potentiometric depression does not extend eastward to demonstrate plume capture. Please revise the Report to address this issue.

7. Section 2.2.3, Page 4 – Groundwater elevation measurements for well S005B3 were included in the Annual Groundwater Monitoring Report January to December 2016 report (Locus, 2017), but were not included in the 2017 report. The rationale for not obtaining/reporting groundwater elevation data for this well should be presented, especially since a groundwater sample was collected from this well for analytical testing. Please revise the Report accordingly.

8. The potentiometric surface contours west of well S003B3 and east of off-site wells T-9C and 35-DDD (Figure 6) do not appear to be justified on the basis of the data presented and should be removed. Please revise the Report accordingly.

9. Section 2.2.4, Page 4 – Based on the data, EPA feels that the text should state that no reasonable potentiometric surface for the Signetics Site can be inferred on the basis of groundwater elevations from three wells along the northern boundary of the Signetics Site. Please revise the Report accordingly.

10. Section 3.0, Page 5 – The discussion of contaminants in each of the HSUs is abbreviated and could be made more robust. In addition to stating the greatest concentration of the three primary contaminants, the subsections should include discussions of the general contaminant plume characteristics, significant changes in extent or concentration, and anomalous results. Please revise the Report accordingly.

11. Section 3.0, Page 5 – The samples were analyzed by the analytical laboratory using EPA Method 8260B, not EPA Methods 8010 and 8020 as stated. Please correct this text.

12. Section 3.1, Page 5 –The extent and magnitude of the primary contaminant plumes in the "A" aquifer appear to be relatively unchanged for the past 10 years, except for a reduction in contaminants in the eastern portion of the Signetics Site downgradient of the AMD 901/902 Thompson Place Site. In regards to TCE, the text should recognize that the plume is not defined to clean-up criteria west of well S033A, south of well S157A, and east of well S027A. The isocontours beyond these locations should indicate the lack of plume definition. Please revise the Report accordingly.

13. The concentration of TCE appears to have been slowly increasing in well S033A during the past 30 years. This well appears to be upgradient from known Philips contaminant sources. The TCE concentration trend in this well suggests that an upgradient, off-site source is contributing to groundwater contamination at the Signetics Site, or that groundwater flow is far more variable than inferred from the potentiometric surface presented on Figure 4. A similar situation is found at well S157A, where the TCE concentrations have remained relatively stable since this well was first sampled in 2006. As this is the most upgradient "A" aquifer well on the Signetics Site, contaminant stability in this well again suggests an upgradient source is contributing to groundwater contamination at the Signetics Site, or that groundwater flow is far more variable than inferred from the potentiometric surface presented on Figure 4. The extent and source of contaminant impacts to the west and south of the Signetics Site should be evaluated. Please revise the Report accordingly.

14. The TCE and *cis*-1,2-dichloroethene (*cis*-1,2-DCE) contours northeast and east of the Signetics Site in the vicinity of the AMD 915 and 901/902 Sites appear to be at variance with data presented by Haley Aldrich (2018a and

2018b) that use a more robust data set. The Report should be revised to reconcile data variances with adjacent sites and justify the interpretation when data for sites other than the Signetics Site are presented.

15. Analytical testing was not conducted on samples from wells S006A, S142A, and S145A, each of which were included in the Annual Groundwater Monitoring Report January to December 2016 report (Locus, 2017). The rationale for not sampling and testing groundwater from these three wells should be presented. Please revise the Report accordingly.

16. Section 3.2.1, Page 5 – Similar to the "A" aquifer, the extent and magnitude of the primary contaminant plumes in the "B1" aquifer appear to be relatively unchanged for the past 10 years, except for a reduction in contaminants in the eastern portion of the Signetics Site downgradient of the AMD 901/902 Site. The text of the Report should be revised to recognize that the TCE plume is not fully defined south of well S157B1 or east of well S027B1 and that the *cis*-1,2-DCE plume is also not fully defined east of well S027B1. In addition, the TCE and *cis*-1,2-DCE contours northeast and east of the Signetics Site in the vicinity of the AMD 901/902 and 915 Sites appear to be at variance with data presented by Haley Aldrich (2018a and 2018b) that use a more robust data set. The Report should be revised to reconcile data variances with adjacent sites and, if significantly different, present justifications for the interpretation. Please revise the Report to address these issues.

17. TCE concentrations in well S157B1 have remained relatively stable since this well was first sampled in 2006, suggesting an upgradient source is contributing to groundwater contamination at the Signetics Site, or that groundwater flow is far more variable than inferred from the potentiometric surface presented on Figure 5. The extent of contaminant impact to the south should be defined. Please revise the Report to address these issues.

18. Analytical testing was not conducted on a sample from well S082B1 that was included in the Annual Groundwater Monitoring Report January to December 2016 report (Locus, 2017). The rationale for not sampling and testing groundwater from this well should be presented. Please revise the Report accordingly.

19. Section 3.2.2, Page 5 and 6 - The extent of the primary "B2" contaminant plumes appear to be relatively unchanged for the past 10 years. However, the text should address uncertainties related to the fact that only two "B2" wells were sampled on the Signetics Site. Accordingly, the extent of TCE above cleanup criteria is not known west, south, or east of the Signetics Site, and these uncertainties should be discussed and expressed on Figure 14. Please revise the Report accordingly.

20. Section 3.2.3, Page 6 - This section should include a discussion of the uncertainties associated with characterizing the "B3" aquifer plume using only four wells along the downgradient boundary of the Signetics Site and that the TCE plume is not defined to below cleanup criteria to the west or south. Please revise the Report accordingly.

21. Section 4.0, Page 7 – The introduction to the groundwater extraction and treatment system section should include a discussion of the progress towards cleanup goals, as required by the Order. Accordingly, as the Order estimated a 25-year duration of operation to attain cleanup goals and cleanup activities have surpassed that milestone, it can be concluded that the extraction and treatment system is not effectively attaining remediation goals and is not likely to attain goals in the foreseeable future. The justification of the alternative cleanup technology of bioremediation referenced in the Report is not supported by the discussions of the groundwater extraction program. Please revise this section of the Report accordingly.

22. Section 4.3 – EPA interprets the Report text to mean that the mass of VOCs removed during each month from the groundwater extracted at the Signetics Site is calculated as a difference from the mass of VOC removed from the combined onsite (Signetics) and offsite (OOU) streams and VOC mass removed from the offsite stream. If this supposition is correct, the Report should clearly articulate this in Section 4.3, or indicate otherwise. Total VOC concentrations in the influent stream measured each month can be assumed as an average VOC

concentration for that month and used in mass removal calculations for a given month. Then, monthly values can be combined for quarterly and yearly values. Note that usage of average concentrations for a quarter and a year for mass removal calculation is mathematically incorrect, thus the values for quarterly and yearly mass removal need to be corrected, if different.

23. Section 5.0, Page 9 – No QAPP or Sampling and Analysis Plan were referenced to which the QA/QC protocol can be compared. A QAPP and Sampling and Analysis Plan in accordance with EPA's guidelines (2001) and Intergovernmental Data Quality Task Force (2012) should be associated with sampling and testing activities. Please revise the Report accordingly.

24. Table 5 – Please change the note from "All results analyzed by ..." to "All samples analyzed by ...".

25. Appendix A –

    a. The historical groundwater elevation measurement data table shows groundwater elevation values (fourth column) in feet, but the values prior to and after 2007 are presented in different units and thus not comparable. All values should be in the same units (feet NAVD88). Note that after being calculated, groundwater elevation values are independent of the top of casing or any other elevations and their changes, defined only by the datum. EPA recommends adding a column for Groundwater Elevation in feet NAVD88 to the table.

    b. Please explain the difference in adjustment of Reference Elevation (we assume it is Top of Casing Elevation) in 2007 between the Signetics Site wells and OOU wells. Two point seven zero three (2.703) feet were used for Signetics Site wells and twice of that, 5.406 feet, for OOU wells. Please revise the Report to provide an explanation of the origin of these values.

    c. Please explain the adjustment in Reference Elevation for well S078A done in 2002 (4.58 feet). There was no adjustment in 2002 for well S078B1. Groundwater contour in the A-zone in the vicinity of well S078A has a significant curve due to elevation at this well. Note that the groundwater elevation in the nearby B2-zone well COM036B2 (Figure 5), showing similar ~36 foot elevation, was discarded from B2 elevation contouring, creating an inconsistency. Please revise the Report to address these issues.

Regards,

Melanie Morash

Melanie Morash, Project Manager
California Site Cleanup Section I, Superfund Division

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References

Haley Aldrich, 2018a, *2017 Annual Groundwater Monitoring Report, 915 DeGuigne Drive, Sunnyvale, California*, January.

Haley Aldrich, 2018b, *Combined 2017 Annual Groundwater Monitoring Report and Annual In Situ Bioremediation Program Report, Former 901/902 Thompson Place, Sunnyvale, California*, January.

Intergovernmental Data Quality Task Force, 2012, *Uniform Federal Policy for Quality Assurance Project Plans*, March.

Locus Technologies, 2018, *Annual Groundwater Monitoring Report January to December 2017, 811 East Arques Avenue Site, Sunnyvale, California.* January 30.

Locus Technologies, 2017, *Annual Groundwater Monitoring Report January to December 2016, 811 East Arques Avenue Site, Sunnyvale, California.* January 30.

U.S. Environmental Protection Agency (EPA), 2008, *A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems, EPA 600/R-08/003*, January.

EPA, 2001, *EPA Requirements for Quality Assurance Project Plans*, EPA/240/B-01/003, March.

From: Nancy-Jeanne LeFevre [mailto:LeFevren@locustec.com]
Sent: Tuesday, January 30, 2018 3:36 PM
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Cc: Ricky Kazakoff <kazakoffr@locustec.com>; J. Wesley Hawthorne <hawthornej@locustec.com>
Subject: Annual 2017 Groundwater Monitoring Report for 811 East Arques Avenue Site

Please see the attached Annual 2017 Groundwater Monitoring Report for the Philips Electronics site at 811 East Arques Avenue, Sunnyvale, California. Note that unless the word "paper" is following your name in the distribution list below, you will not receive a printed copy of this report. Please contact J. Wesley Hawthorne at (415) 799-9937 or me if you have any questions regarding this transmittal or if you would prefer a printed copy. A copy of the report will be uploaded to GeoTracker shortly.

Distribution List
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Thank you,

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