



Via e-mail

Pfizer Inc.  
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April 12, 2018

Mr. Luis Negron  
Project Manager  
US EPA-Region 2  
Caribbean Environmental Protection Division  
City View Plaza II, Suite 7000  
Guaynabo, Puerto Rico 00968

**RE: RESPONSE TO EPA COMMENTS DATED MARCH 21, 2018  
ON JULY 2017 GROUNDWATER SAMPLING REPORT  
PFIZER PHARMACEUTICALS LLC, BARCELONETA SITE, EPA ID PRD090346909**

Dear Mr. Negron:

On behalf of Pfizer Pharmaceuticals, LLC (PPLLC), the following provides responses to EPA comments dated March 21, 2018 regarding the July 2017 Groundwater Sampling (Data) Report dated August 28, 2017. For your convenience, EPA comments are in italics followed by our responses.

Comment 1:

*Although the Groundwater Report may be voluntary, the document should include a brief historical background. At a minimum the Report should include an interpretation of the site conditions and a brief discussion of the source of the contaminants (e.g., chlorobenzene).*

Response 1:

As requested, future groundwater (data) reports will include a brief historical background section regarding the potential source and interpretation of the site conditions. A "**Background**" section will be added – with the following historical information: “The Tank Farm facility at the Barceloneta PPLLC site historically consisted of: an unlined tank farm (from 1973 to 1981), an underground tank farm vault (from 1981 to 1984), and an above-ground tank farm with additional containment since 2000. Chlorobenzene was reportedly used at the site between 1976 and 1980. In 2003, PPLLC installed monitoring wells MW-1 and MW-2 to assess groundwater quality in the tank farm area (SWMU-11), with the depth to groundwater being approximately 300 feet below surface. Wells MW-3, MW-4, MW-5 and MW-6 were installed during year 2006. Monitoring well MW-4 was destroyed - as reported in the February 2013 Groundwater Sampling Event Report.

Concentrations of chlorobenzene were detected in groundwater from MW-1 and MW-2 slightly above federal MCL of 100 µg/L. Historic monitoring and RFI supplemental studies downgradient, confirmed that the extent of chlorobenzene exceeding the MCL was relatively local to the tank farm area (SWMU-11), with levels varying from slightly above the MCL (<5x MCL) to below the MCL (<100 µg/L). The relatively low or dilute levels of chlorobenzene historically detected is consistent with very small



quantity release(s) or spillage – which is consistent with site information that there were no known major losses of chlorobenzene from tanks or spills. Even though chlorobenzene in groundwater posed no risk, given its dilute concentration and limited/localized extent (with no nearby receptors), PPLLC committed (Letter to EPA dated Oct. 7, 2008 included in Attachment A) to perform sufficient groundwater monitoring during soil vapor extraction (SVE) operations to: 1) assess chlorobenzene concentrations during SVE operations, which should diminish as SVE operations remove source mass, 2) confirm that the dilute, localized plume of chlorobenzene is shrinking (with source decline), and 3) provide sufficient data to help facilitate closure of SWMU 11 (the Tank Farm Area) and closure of the site Part B Permit.”

Comment 2:

*Section 2.1 of the Groundwater Report indicates that water levels could not be obtained from monitoring wells MW-5 and MW-6. As such only three wells (MW-1, MW-2, and MW-3) provided water levels. Figure 2 depicts the locations and indicates that monitoring wells MW-1 and MW-2 are within close proximity to one another, and monitoring well MW-3 is upgradient. Monitoring wells MW-5 and MW-6 appear to be downgradient. However, based on the limited water level data it does not appear that a detailed potentiometric map was constructed, nor provided in the Report. Without detailed potentiometric data it is difficult to discern the contaminant behavior in groundwater. For example, it is unclear whether monitoring wells MW-5 and MW-6 are appropriately located to detect downgradient contamination. The Report should discuss groundwater flow, and provide a detailed potentiometric map. Furthermore, if this is the first time that water levels could not be obtained, including a potentiometric map from previous sampling event would be beneficial. However, if this is a reoccurring issue, the Recommendations Section of the Groundwater Report should address whether repairs or other remedies are necessary to address this issue.*

Response 2:

As requested, a detailed potentiometric map will be attached to future report(s) along with a brief discussion about groundwater flow. The locations of MW-5 and MW-6 are based on lineament (geological) and regional groundwater flow studies presented in the Supplemental RFI dated March 2007. Vertical aquifer profile sampling was also conducted (with fast-turn analysis of chlorobenzene) during the drilling of MW-5 and MW-6 well locations to confirm the presence of chlorobenzene and select the vertical location of well screens. Well MW-6 is ideally located down-gradient and along flow-path of the tank farm based on such investigative data. Water level readings obtained during groundwater sampling events from October 2009 thru January 2018 are summarized in Table 1. As indicated in this table, water levels were consistently obtained from each monitoring well except during December 2016 at well MW-6 and July 2017 at wells MW-5 and MW-6. Water level readings were not obtained during these events due to difficulties with water level indicator probe stuck inside well casing. Historical water levels (included in Table 1), and the direction of flow have not changed significantly between events; however, if water levels cannot be obtained during a sampling event to generate a detailed potentiometric map, a previous potentiometric map will be included, as requested.

Comment 3:

*A second concern noted in the review is that chlorobenzene concentrations within monitoring well MW-2 appear to be fairly constant. Comparison of the data in Appendix 4 indicates that the chlorobenzene concentration in 2013 was 25.5 ppb, and now in 2017 it is 33.7 ppb. As such it is*



*unclear whether remediation is occurring in that location. It is also noted that chlorobenzene concentrations in MW-1 have increased slightly since March 2017 from 22.2 ppb to 61.4 ppb. The Groundwater Report should discuss the historical trends of chlorobenzene and evaluate whether remediation is effective. This information should be discussed in the recommendations section of the report. Currently the only recommendation in the Report is to modify the sampling frequency to semi-annually.*

Response 3:

The groundwater monitoring data summary report was intended to provide the sampling/analytical data (results), such that additional interpretations (e.g. historic trends) were planned to be included in the Remediation Completion Report – after the SVE system is discontinued based on benzene levels in soil vapor (which was is the main risk driver). Nevertheless, a brief discussion on groundwater trends will be included in future reports. Please refer to our response to Comment #1 regarding the purpose of such groundwater monitoring.

The last groundwater sampling event performed during January 2018 indicated that chlorobenzene concentrations decreased from 61.4 ppb (July 2017) to 8.20 ppb (January 2018) in well MW-1, and from 33.7 ppb (July 2017) to 20.4 ppb (January 2018) in well MW-2. January 2018 data for other monitoring wells (MW-5 and MW-6) indicated that chlorobenzene has been consistently non- detect in well MW-5 and continues to decrease in well MW-6 (3.7 ppb in March 2017 to 1.7 ppb in July 2017 to below detection limit in January 2018) indicating source depletion. Updated historical groundwater monitoring data is included in Attachment B.

It is also important to note that the Federal Maximum Contaminant Level (MCL) or drinking water standard for chlorobenzene is 100 µg/L. Some variability in concentrations is expected as a result of the monitoring wells being in a karst aquifer that is subject to fluctuations in groundwater recharge – along with basic sampling/analysis variability. Nevertheless, with groundwater concentrations being below the MCL (<100 µg/L) for chlorobenzene – in all wells – for the last three events (since March 2017), indicates the source of chlorobenzene has diminished to the extent that groundwater meets risk-based drinking water criteria, such that on-site groundwater use restrictions may no longer be warranted to support closure.

We would like to schedule a meeting with you to discuss our responses to make sure we fully addressed your comments, and to also discuss our submittal of the proposed benzene soil-vapor cleanup level (TRC Technical Memo, submitted March 19, 2018).

Sincerely,

A handwritten signature in blue ink that reads "William G. Gierke".

William G. Gierke, P.G., Senior Manager  
Pfizer Inc.

cc. Jorge Esquilin and Ruth Llorens (Pfizer)

**TABLE 1**

**HISTORICAL WATER LEVEL DATA  
 PFIZER PHARMACEUTICAL LLC  
 BARCELONETA , PUERTO RICO**

<b>Well ID</b>	<b>Well Depth (feet)</b>	<b>Well Elevation (feet)</b>	<b>20-Oct-09 Water Level (feet)</b>	<b>1-Mar-10 Water Level (feet)</b>	<b>30-Jun-10 Water Level (feet)</b>	<b>26-Feb-13 Water Level (feet)</b>	<b>6-Jun-16 Water Level (feet)</b>	<b>6-Dec-16 Water Level (feet)</b>	<b>22-Mar-17 Water Level (feet)</b>	<b>18-Jul-17 Water Level (feet)</b>	<b>22-Jan-18 Water Level (feet)</b>
<b>MW-1</b>	317.00	308.922	293.71	293.30	292.45	292.45	293.19	292.91	292.99	293.23	292.62
<b>MW-2</b>	316.00	307.817	293.07	292.35	291.95	291.95	292.38	292.04	292.07	292.57	291.86
<b>MW-3</b>	296.00	294.117	273.70	272.70	272.20	272.20	272.98	272.67	272.83	273.23	272.42
<b>MW-5</b>	378.00	315.775	303.31	302.70	302.45	302.45	302.60	302.35	302.53	<sup>1/</sup>	302.12
<b>MW-6</b>	394.00	328.026	318.32	318.00	317.95	317.95	317.88	<sup>1/</sup>	318.17	<sup>1/</sup>	317.67

Notes:

<sup>1/</sup> Not measured due to water level probe stuck inside well casing.

ATTACHMENT A

October 7, 2008 Response Letter EPA Comments on  
June 2007 Draft Supplemental RFI Report



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## Pfizer Global Manufacturing

**Eduardo Cordero, PE**  
Director/Team Leader, Environmental, Health & Safety

October 7, 2008

Mr. Carl-Axel P. Soderberg, Director  
USEPA Region 2 – Caribbean Environmental Protection Division  
Centro Europa Building  
1492 Ponce de Leon Avenue, Suite 417  
Santurce, Puerto Rico 00907-4127

RE: RESPONSE TO EPA COMMENTS ON  
JUNE 2007 DRAFT SUPPLEMENTAL RFI REPORT  
PFIZER PHARMACEUTICALS, LLC  
BARCELONETA, PUERTO RICO SITE  
EPA I.D. NO. PRD-090346909

Dear Mr. Soderberg:

On behalf of Pfizer Pharmaceuticals, LLC (PPLLC) Barceloneta, Puerto Rico, please find attached responses to U.S. EPA comments on the Draft RCRA Facility Investigation Supplemental Report dated June 2007, prepared by TRC Solutions on behalf of PPLLC.

Please don't hesitate to call me at 787-654-2277 if you have any questions, or Ramon Marrero at 787-846-4300 ext. 2904 in my absence.

Sincerely,

A handwritten signature in blue ink, appearing to read "Eduardo Cordero".

Eduardo Cordero  
Director EH&S  
Pfizer Pharmaceuticals, LLC

cc: Gloria Toro-Agrait (PR-EQB)  
Luis Negron, EPA Caribbean Field Office  
Mathew Garamone, Pfizer Inc.  
William Gierke, Pfizer Inc.

## GENERAL COMMENTS

- 1. The Supplemental RFI indicates that groundwater contamination has been well-defined. However, the monitoring well with the highest contaminant concentrations, MW-1, appears to have increasing contaminant trends. Monitoring wells MW-3, MW-4, MW-5, and MW-6 have only been sampled twice, which is insufficient to establish a trend. In particular, well MW-6, the furthest downgradient monitoring well, had measureable chlorobenzene concentrations in the first two rounds of sampling, up to 48 micrograms per liter (ug/L). All of these factors indicate that the extent of groundwater contamination has not been completely defined, and there are insufficient data to demonstrate that the plume is stable. Additional sampling of current monitoring wells, as proposed in the Supplemental RFI, should be performed.*

**Pfizer Response:** Pfizer is committed to sampling the on-site ground water monitoring wells on a regular basis for an adequate duration to evaluate the contaminant trends as well as the seasonal variability of contaminant concentration at the site. Consequently, additional ground water sampling data have been obtained since the Supplemental RFI Report.

A summary of these data are attached. The data indicate that wells MW-3, MW-4 and MW-5 do not contain VOC contaminants. The data also indicate that contaminant concentrations in MW-1, MW-2 and MW-6 are decreasing. There were no MCL exceedances noted in the most recent sampling round. Some variability (e.g. sampling and seasonal) is expected between sampling events; however, the overall trend is decreasing with time, which can be expected with the gradual decay of an old (~30 years based on last use in 1978) and relatively small source – given there were no known major losses from tanks or spills of chlorobenzene. Referenced half-lives (decay-rates) of chlorobenzene in soil range from 68 to 150 days aerobically (Howard, et. al); although anaerobic half-lives would likely be longer. In addition, mass transfer (loss) to the gas phase would be expected over time.

Based on these results, the chlorobenzene plume is adequately defined, given the low-level concentrations near the source (tank farm) area (below or near MCLs in near-source wells MW-1 & MW-2) and even lower levels down-gradient (MW-6).

Pfizer nevertheless, is prepared to design and pilot test a soil vapor extraction system (SVE) at SWMU-11 for 12 months to remove to remove the source of benzene in soils beneath the tank farm, which we believe will also remove or further diminish the source of chlorobenzene. If quarterly groundwater monitoring of the existing wells demonstrate that concentrations of chlorobenzene are further diminished during the pilot study, additional characterization would not be warranted if the source has been addressed. Removal of source concentrations will also allow the duration of monitoring to be reduced, so that closure of the SWMU can be obtained sooner.

*In addition, a comprehensive well survey will need to be submitted, as noted in Section 3.3, Regional Ground Water Quality, to ensure that groundwater contamination has not reached off site receptors.*

**Pfizer Response:** The Final survey was completed by Alpha Engineering in June 2008 and will be submitted to the Agencies.

*Finally, two monitoring wells should be installed downgradient of the current monitoring wells to confirm the downgradient extent of the plume. These wells would be used to demonstrate that the contamination is within site boundaries and would serve as sentinel wells to allow for additional remedial actions to be performed on-site in the event that contamination migrated to either of these downgradient wells. Acceptance of the proposed groundwater monitoring network is contingent on the installation of at a minimum of two monitoring wells installed downgradient of the current monitoring wells to confirm the downgradient extent of the plume.*

**Pfizer Response:** Although Pfizer originally proposed to install to monitoring wells at the north end of the property, the location of these wells was modified per EPA request to the locations of MW-5 and MW-6. Fortunately, repeated sampling results from these two wells indicates that chlorobenzene is not present above MCLs in either of those wells. Since we have determined the downgradient extent of MCL exceedances, and the northern property line is over 3000 feet further downgradient, there is no useful information that two additional wells would provide, relative to definition of the MCL plume. Furthermore, wells MW-5 and MW-6 are suitably located as “sentinel” wells, since they are adequately located to provide an early warning, should chlorobenzene concentrations increase above MCLs. Additional sentry wells over a half-mile downgradient in the karst aquifer would not be technically beneficial. Nevertheless, if the source is further reduced or eliminated with the SVE Pilot program, this issue is irrelevant.

2. *In a December 22, 2005, letter to EPA, Pfizer responded to several EPA comments from August 23, 2005 on the Draft Supplemental Work Plan dated May 2005. In Pfizer's response to General Comment 3, Pfizer agreed to include a discussion of observable contaminant concentration trends in the RFI Report. However, contaminant trends were not discussed in the Supplemental RFI. For future submittals, a discussion of contaminant trends over time should be included.*

**Pfizer Response:** Agreed. At the time the Supplemental RFI Report was submitted, there were insufficient data (as noted above in EPA Comment No. 1), to provide such interpretive text. After monitoring was conducted in 2007 and 2008 (to include new wells), Pfizer now believes that there are sufficient



data to assess trends, that better demonstrate plume concentrations are stable or decreasing, with minor fluctuations of low-level concentrations, below or near the MCL for chlorobenzene. Historic concentrations for site monitoring wells are attached.

3. *This Supplemental RFI does not discuss existing shallow soil gas sampling in the context of indoor air (IA) exposures to the degree necessary. Existing data are not sufficient to characterize ambient air breathing zone exposure to occupational workers within the Tank Farm area to indoor occupational workers in buildings surrounding the Tank Farm.*

**Pfizer Response:** Pfizer proposes to conduct a one-year Soil Vapor Extraction (SVE) Pilot Study to remove the source of benzene in soils beneath the tank farm to eliminate this potential issue and also remove or further diminish the source of chlorobenzene.

4. *Although soil gas sampling data have been collected (in the vicinity of the Tank Farm area) for use in the Johnson and Ettinger Vapor Intrusion Model (JEM) to quantitatively assess occupational exposures incurred via inhalation of volatile organic compound (VOC) contamination stemming from subsurface sources, these data are not ideal for the purposes of assessing potential breathing zone exposures on-site. Current soil gas data collected from beneath the Tank Farm indicate the potential for subsurface VOC contamination to adversely impact the ambient air breathing zone and current/potential future on-site workers. The current assessment employs the JEM, based on soil gas data. The JEM is applicable when assessing vapor intrusion (VI) to an overlying building or enclosed structure. EPA does not support application of the JEM in assessing ambient air exposures like those at the Tank Farm. The Supplemental RFI does not sufficiently describe the physical characteristics of the site, but EPA has been made to understand that: 1) the Tank Farm is composed of a number of aboveground storage tanks (ASTs) within a Resource Conservation and Recovery Act (RCRA)-compliant catastrophic release containment system; that there are no enclosed structures within the Tank Farm; and, that the former Tank Farm Vault is now a water retention structure. Subsurface soil gas detections collected within the confines of the Tank Farm area are significant, with an associated maximum detected concentration of benzene recorded at 81,763 ppmV (sample location B-1). Rather than attempt to model vapor flux emissions to ambient air using JEM or a box model (e.g., Jury), EPA suggests Pfizer collect multiple rounds of ambient air monitoring data for relevant VOCs as the basis to assess worker breathing zone exposures within the Tank Farm area.*

**Pfizer Response:** The risk assessment did not include evaluation of worker exposure to ambient air. As described in Section 6.3.1.2: Exposure Pathways, these workers are assumed to contact on-site soils through incidental ingestion and dermal contact, inhale volatiles in **indoor air** from soil gas, as

well as dermal contact with and ingestion of ground water. Therefore, the JEM model was not used in the risk assessment to model ambient (outdoor) air. Also, as noted above, site data indicate that there were no elevated VOCs in vapor wells installed in the bedrock surrounding the area of soil where elevated VOC's were observed, therefore Pfizer does not agree that further subsurface soil vapor sampling is needed. Nevertheless, Pfizer proposes to conduct a one-year Soil Vapor Extraction (SVE) Pilot Study to remove the source of benzene in soil beneath the tank farm to eliminate this potential issue.

5. *While JEM is not applicable for use within the Tank Farm area, industrial buildings appear to exist within 100 feet of the soil gas detections collected within the Tank Farm. The JEM is applicable at these locations and may be tailored for use in assessing occupational indoor worker exposures based on VI from soil gas. The soil gas detections collected from beneath the Tank Farm, however, are not appropriate for this use due to the distances from the exposure points within the surrounding buildings. Due to the complex geology underlying the site and the potential for preferential pathways for vapor migration in the vadose zone, EPA does not recommend modeling vapor plume migration from the existing soil gas sampling points within the Tank Farm to the surrounding buildings. Further, EPA suggests the implementation of an IA monitoring program to develop data to assess IA breathing zone/inhalation exposures. Such an assessment should also consider soil gas results from monitoring locations positioned between the Tank Farm and the surrounding buildings. EPA has the understanding that soil gas samples collected from beneath the Tank Farm area were collected in unsaturated soil, but that the surrounding subsurface is composed predominately of rock. EPA is also of the understanding that soil gas sampling has occurred in these surrounding areas. These data should be evaluated for potential migration of subsurface vapor plumes. These data may refine the understanding of fate and transport of VOCs in the subsurface, show a natural attenuation gradient in the vadose zone between the source area(s) and the exposure points (i.e., IA), and help to support conclusions based on IA sampling results.*

**Pfizer Response:** The JEM model was not used to model ambient air within the Tank Farm area. Due to the near proximity of buildings, (part of Building 105 is within the SWMU 11 boundary, and Buildings 106 and 104 are well within the 100 foot lateral distance recommended by the Vapor Intrusion Guidance (USEPA 2002)), to the Tank Farm area, making this a complete exposure pathway. Therefore, these soil gas data were used as a conservative estimate of risk to the nearby building occupants. In addition, the potential presence of “*preferential pathways for vapor migration*”, could allow vapors to migrate more than 100 feet laterally (USEPA 2002). Pfizer does not believe IA sampling is needed because the elevated benzene concentrations have only been detected in the vapor monitoring wells that are screened in the small area of soil. Use of numerous vertical and angle borings has confirmed that the soil is surrounded by bedrock, and none of the

soil vapor monitoring wells screened in bedrock contain elevated benzene concentrations. We believe the proposed one-year SVE pilot study will also make this issue moot – by removing benzene source.

6. *Further, sub-slab soil gas data from relevant buildings should also be collected as part of this assessment. These latter data will help establish soil gas concentrations at the interface with the buildings, determine the potential impact of vapor pooling beneath existing buildings, and assist in the assessment of any IA detections from confounding indoor or ambient sources through comparative assessment using JEM.*

**Pfizer Response:** Pfizer does not agree that indoor air or sub-slab sampling is needed because the elevated benzene concentrations were only detected in the vapor monitoring wells that are screened in the small area of soil. Use of numerous vertical and angle borings has confirmed that the soil is surrounded by bedrock, and none of the soil vapor monitoring wells screened in bedrock contain elevated benzene concentrations.

## SPECIFIC COMMENTS

1. ***Figure 4.1-1: Chlorobenzene Plume Map (October 2006).*** *The plume map depicts a non-detect line along the northern and western boundaries of the plume even though there is little or no data in those directions to define the extent. For any future plume maps, undefined or uncertain contour lines should be dashed, and they should be depicted further out from the known concentrations.*

**Pfizer Response:** Comment noted and will be incorporated in future submittals.

2. ***Executive Summary, Page E-2 and Section 6.5, Risk Characterization, Page 6-12:*** *As presented in the Executive Summary (ES) and Section 6.5, the carcinogenic risk level associated with a current/future commercial/industrial worker is misleading. The estimated incremental carcinogenic risk level for a commercial/industrial receptor is presented as 5E-08. The text in the ES and Section 6.5 indicates that this carcinogenic risk level corresponds to soil, groundwater and IA exposures. However, incorporating the exposure parameter values (i.e., exposure frequency EF] and exposure duration ED]) applicable to a commercial/industrial receptor, as presented in Tables 4.1 through 4.2 of Appendix C, and the input variables presented in Appendix F for use in the JEM (version 3.1, SG-ADV, February 2004), it is evident that a carcinogenic risk level of 5E-08 does not encompass risk incurred via IA exposure. Using the aforesaid parameter values in the JEM and the 95% upper confidence limit (UCL) for benzene in soil gas from Table 3.3 in Appendix C (4.67E+03 ppmV), EPA was able to verify the projected IA concentration of benzene predicted by Pfizer of 109 mg/m<sup>3</sup>. However, at this IA concentration, the carcinogenic risk level*

*attributable to (just) benzene exposure is estimated to be orders of magnitude greater than 5E-08 (i.e., 2E-01). Furthermore, the hazard quotient (HQ) presented for benzene as 34.04 does not correspond to the HQ value produced using the aforesaid parameter values in the JEM. Instead, an HQ value of 2.5E+03 is generated. Provide the rationale for the disagreement among the discussed values for carcinogenic risk and non-cancer hazard attributable to benzene exposure. In addition, account for any uncertainties associated with the advancement of carcinogenic risk and non-cancer hazard estimates through the use of the JEM.*

**Pfizer Response:** As described in Section 6.4.4, “the indoor air concentrations calculated by USEPA’s SG-1 spreadsheets were compared against the OSHA PELs. As cited in USEPA’s draft guidance for evaluating subsurface vapor intrusion (USEPA 2002a), “OSHA and EPA have agreed that OSHA generally will take the lead role in addressing occupational exposures”. The OSHA PEL for benzene of 3.19 mg/m<sup>3</sup> was used to calculate risk for the industrial worker. The result of this evaluation is discussed in Section 6.5 Scenario 2: Current/Future Commercial/Industrial. The HI for the inhalation of volatiles was mislabeled as “non-cancer” and hence the probable confusion. Using the PEL provides a ratio between the indoor air and a health effects level, it does not connote either cancer or non-cancer risk. The terminology will be corrected in future submittals of this document.

3. ***Section 6.3.2, Estimation of Exposure Point Concentrations, Page 6-5:*** *ProUCL Version 3.0 has been updated, and the update to 3.0 (i.e., Version 4.0) may be accessed at <http://www.epa.gov/nerlesdl/tsc/software.htm>. It is suggested that the upper-bound estimates on the mean of individual datasets for use as exposure point concentrations (EPCs) in surface and subsurface soil, groundwater and soil gas be regenerated so that development of the EPCs reflect current EPA methodology. If the EPCs are not regenerated, any changes in the methodology for calculating EPCs and their potential impacts on the risks and hazards presented in the human health risk assessments (HHRAs) should be addressed qualitatively in Section 6.6.3.3 so that risk managers can make appropriate risk management decisions based on the best available information.*

**Pfizer Response:** Noted. Due to the methods used to address non-detect data in ProUCL version 3.0, where the only option is to use a surrogate value for non-detect data (i.e., one-half the sample quantitation limit), the 95% UCL would be overestimated for distributions that were not normally or lognormally distributed. However, this issue was resolved with the release of version 4.0, and it is strongly recommended not using surrogate values for non-detect data with the release of this version. Therefore, when using version 4.0, the exposure point concentrations will be calculated without the use of surrogate values for non-detect data and the appropriate data format will be used to allow ProUCL to calculate UCLs using the “with NDs” option.

The ProUCL-recommended UCL value will be selected as the 95% UCL exposure point concentration.

- 4. Section 6.5, Risk Characterization, Page 6-11: Unless a prior agreement has been established restricting future residential land use on-site, expand Section 6.5 to incorporate discussion pertaining to the carcinogenic risks and non-cancer hazards attributable to surface and subsurface exposures incurred by future residential receptors (adult and child). Assuming that residential development of the Barceloneta Pfizer facility is reliably precluded in the absence of legally enforceable and transferable institutional controls fails to provide sufficient rationale to justify elimination of a residential and/or unrestricted land use scenario. Essentially, if the facility lacks an instrument such as a restrictive covenant on the deed of the property to limit potential future land use, then the quantitative estimates of risk and hazard and associated uncertainties applicable to a residential receptor need to be sufficiently addressed.*

**Pfizer Response:** To support RCRA closure, Pfizer would place a deed restriction on the area specific to the tank farm, such that it would be restricted to industrial use.

- 5. Section 6.5.3, Uncertainties Related to the Exposure Assessment, Page 6-14, and Appendix F, Input Parameters for  $DA_{e,y,,i}$ : Dermal absorption factors ( $ABS_d$ ) applicable to VOCs have not been promulgated by the EPA. According to the EPA's 2004 Risk Assessment Guidance for Superfund (RAGS) (Part E, Supplemental Guidance for Dermal Risk Assessment), no default  $ABS_d$  values have been developed for VOCs since VOCs "... tend to be volatilized from the soil on skin and should be accounted for via inhalation routes in the combined exposure pathway analysis." Hence, by quantitatively assessing VOC exposure via the dermal absorption pathway, an additional level of uncertainty is introduced into the final point estimates of risk and hazard. This uncertainty, hence, should be qualitatively accounted for in the uncertainty component of the HHRA. As a result, expand the uncertainty section to incorporate discussion pertaining to the additional uncertainty introduced stemming from quantitative evaluation of VOC-contaminated soil exposure via the dermal absorption pathway.*

**Pfizer Response:** Noted. A discussion of the use of dermal absorption factors and its contribution to uncertainty will be added to the uncertainty analysis will be added in future submittals of this document.

- 6. Section 7.0, Conclusions, Release Characterization, Page 7-1. The first paragraph of this section indicates the "area of contamination is well defined, and the distribution of contaminants within the subsurface has been adequately assessed." While both soil vapor and groundwater contamination have been identified, no clear source has been identified for either type of*

*contamination. In addition, contaminant trend data do not suggest contamination is decreasing in either of these media, suggesting the potential for ongoing contaminant migration within and across media. These data gaps should be acknowledged in the Supplemental RFI. Additional data collection may be necessary to allow for an adequate corrective measures evaluation.*

**Pfizer Response:** Previous RFI reports have clearly demonstrated that the contaminant concentrations in the soil vapor are consistent with the contaminant concentrations measured in the soil, so the source of the soil vapor contamination, is organic solvents in the soil beneath the tank farm.

There are many possible reasons that the precise location of the ground water contaminant source could not be determined. The release must have occurred almost 30 years ago, since chlorobenzene has not been used at the facility since 1978. Nevertheless, there was an underground storage tank for chlorobenzene in the tank farm, and it is likely and reasonable that overfills and incidental spillage from pump priming prior to construction of the containment vault is the source of the ground water contamination. This information has been presented numerous times in previous RFI Reports for the site.

The estimated volume of soil under the tank farm is approximately 3,500 cubic yards. Pfizer has collected approximately 1,000 soil samples from this area (representing one sample for every 3.5 cubic yards of soil). All of those samples were subjected to GC/MS headspace screening in accordance with an EPA-approved Work Plan, and approximately 10 percent of those samples (100 samples, representing one sample for every 35 cubic yards of soil) were submitted for confirmatory lab analysis. Previous RFI reports have demonstrated correlation between the headspace sample results and the lab sample results. At this point, the quantity of soil sampling that has been performed in this very limited area greatly exceeds that which is normally required by EPA or that which is typically available at a RCRA facility.

Pfizer has collected significant additional data, beyond that requested by EPA, including data to evaluate a soil vapor extraction (SVE) corrective measure, and has also conducted pilot testing to evaluate the applicability and effectiveness of an SVE remedy. Pfizer is prepared to design, implement and pilot test a soil vapor extraction system at SWMU-11 for 12 months to remove benzene and chlorobenzene. Pfizer also is planning to conduct four more quarters of ground water sampling at the site to further establish and evaluate ground water contaminant trends.

Pfizer does not believe there are any significant data gaps that need to be addressed for SWMU-11.

7. ***Section 7.0, Conclusions, Release Characterization, Page 7-1. The second paragraph of this section states the fate and transport analysis "showed that the contaminant mass still present at the site is attenuating via***

*biodegradation, based on decreasing subsurface gas concentrations." Based on the data provided in the Draft Supplemental Work Plan, dated February 2006, it appears that several soil vapor wells do not have decreasing concentrations. In fact, several vapor wells have concentrations of benzene over 10,000 parts per million. Revise the Supplemental RFI to remove this statement or revise the text to more accurately summarize the subsurface gas concentrations.*

**Pfizer Response:** We will re-evaluate the highlighted statement prior to submitting a revised version of the Supplemental RFI. Subsurface vapor concentrations are not decreasing at a rapid rate, but given the lack of oxygen in the subsurface and the high concentrations of methane (from methanogenesis), we have made a preliminary conclusion that anaerobic biodegradation is occurring in the subsurface.

8. ***Section 7.0, Conclusions, Release Characterization, Page 7-2.*** *The last paragraph of this section states the maximum contaminant level (MCL) exceedances in groundwater are "limited to a small plume entirely contained within the site." The full downgradient extent of the plume has not been delineated. The monitoring well furthest downgradient has only been sampled twice and one chlorobenzene concentration was almost half of the MCL. Unless further sampling has been performed to define the extent of the plume, the statement referenced above should be revised to acknowledge that only limited groundwater data are available for the chlorobenzene plume.*

**Pfizer Response:** The quoted statement in the RFI report is correct as the statement was specific to the extent of exceedances above the MCL. There was only one exceedance of the MCL in the network of monitoring wells at that time. It is also correct that the plume has not been delineated to "non-detect" levels, but such an effort is not necessary, since it is clear that the MCL exceedance is limited to an extremely small region at SWMU-11, with low-level source concentrations near the tank farm that are near or below MCLs. At the time the Supplemental RFI report was submitted, there was limited data available for newly installed wells. As noted above, additional data do now exist to further support the assertions made in the Supplemental RFI Report.

9. ***Appendix C, RAGS Part D Tables, Tables 4.1 through 4.2, Values Used for Daily Intake Calculations:*** *Consult EPA's Child-Specific Exposure Factors Handbook (ChEFH) (2006) during the selection of pertinent exposure parameter values during deliverable development in the future.*

**Pfizer Response:** Tables 4.1 and 4.2 will be amended to reflect the appropriate exposure scenarios for the site.

## MINOR COMMENTS

1. *Subsections in Section 6.5, Risk Characterization, are not in proper sequential order. Reorder the subsections under Section 6 to reflect chronological accord.*

**Pfizer Response:** Comment noted and this will be addressed in future versions of this report.

2. *All Appendix F, Input Parameters for  $DA_{event}$ , tables are labeled as Appendix J. Similarly, all Appendix D and E tables do not appropriately correspond. Revise the table designations to resolve these discrepancies.*

**Pfizer Response:** Comment noted and this will be addressed in future versions of this report.

## COMMENTS VAPOR INTRUSION

1. *As elaborated upon below, there are a few noteworthy items regarding the quantitative assessment of the vapor intrusion (VI) pathway. Please note that even though some of these comments have been included above, they are also summarized below in the context of vapor intrusion.*

**Pfizer Response:** Noted.

2. *Although soil gas sampling data have been collected (in the vicinity of the Tank Farm area) for use in the Johnson and Ettinger Vapor Intrusion Model (JEM) to quantitatively assess occupational exposures incurred via inhalation of volatile organic compound (VOC) contamination stemming from subsurface sources, these data are not ideal for the purposes of assessing potential breathing zone exposures on-site. Current soil gas data collected from beneath the Tank Farm indicate that there is the potential for subsurface VOC contamination to adversely impact the ambient air breathing zone and current/potential future on-site workers. The current assessment employs the JEM, based on soil gas data. The JEM is applicable when assessing VI to an overlying building or enclosed structure. EPA does not support application of the JEM in assessing ambient air exposures like those at the Tank Farm. The Supplemental RFI does not sufficiently describe the physical characteristics of the site, but it is EPA's understanding that: 1) the Tank Farm is composed of a number of aboveground storage tanks (ASTs) within a Resource Conservation and Recovery Act (RCRA)-compliant catastrophic release containment system; that there are no enclosed structures within the Tank Farm, and, that the former Tank Farm Vault is now a water retention structure. Subsurface soil gas detections collected within the confines of the Tank Farm area are significant, with an associated maximum detected concentration of benzene recorded at 81,763 ppmV (sample location 13-1). Rather than attempt to model vapor flux emissions to ambient air using JEM or a box model (e.g., Jury), Pfizer should collect multiple rounds of ambient air monitoring data for relevant VOCs as the basis to assess worker breathing zone exposures within the Tank Farm area.*



**Pfizer Response:** See response to General Comment 4 above.

3. *While JEM is not applicable for use within the Tank Farm area, industrial buildings appear to exist within 100 feet of the soil gas detections collected within the Tank Farm. The JEM is applicable at these locations and may be tailored for use in assessing occupational indoor worker exposures based on VI from soil gas. The soil gas detections collected from beneath the Tank Farm, however, are not appropriate for this use due to the distances from the exposure points within the surrounding buildings. Due to the complex geology underlying the site and the potential for preferential pathways for vapor migration in the vadose zone, modeling vapor plume migration from the existing soil gas sampling points within the Tank Farm to the surrounding buildings is not an acceptable method. Further, Pfizer should implement an indoor air (IA) monitoring program to develop data to assess IA breathing zone/inhalation exposures. Such an assessment should also consider soil gas results from monitoring locations positioned between the Tank Farm and the surrounding buildings. EPA has the understanding that soil gas samples collected from beneath the Tank Farm area were collected in unsaturated soil, but that the surrounding subsurface is composed predominately of rock. EPA is also of the understanding that soil gas sampling has occurred in these surrounding areas. These data should be discussed in the context of the potential for migration of subsurface vapor plumes. These data may refine the understanding of fate and transport of VOCs in the subsurface, show a natural attenuation gradient in the vadose zone between the source area(s) and the exposure points (IA), and help to support any conclusions developed based on the IA sampling results from the proposed sampling. Further, sub-slab soil gas data from relevant buildings should also be collected as part of this assessment. These latter data will help establish soil gas concentrations at the interface with the buildings, determine the potential impact of vapor pooling beneath existing buildings, and assist in the assessment of any IA detections from confounding indoor or ambient sources through comparative assessment using JEM.*

**Pfizer Response:** See response to General Comment 5 above.

4. *Sub-slab soil gas data are greatly preferred to soil gas measurements collected outside the existing building footprint. Subslab soil gas data may reflect the potential for vapor pooling underneath the existing building and best represent the soil gas concentration at the interface between the source and the exposure point (i.e., the building IA).*

**Pfizer Response:** See response to General Comment 6 above.

5. *Current occupational hazards incurred via inhalation of modeled IA concentrations (as estimated through the employment of the JEM) have been compared to the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs). Generally, this type of comparative analysis using OSHA PELs is not an appropriate health-protective*

methodology for evaluating the risks and hazards associated with VI. However, the one exception where OSHA PELs may be considered is at operating RCRA facilities pursuant to EPA's Environmental Indicators (EI) Program. The Pfizer Barceloneta facility is part of EPA's EI Program. Nevertheless, according to Appendix F - Use of Permissible Exposure Limits of Ca/EPA's 2004 Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air', "**The OSHA PELs are used only at operating RCRA sites as an interim measure to evaluate buildings that house a commercial or industrial process. These buildings must house a process that involves the use of chemicals that are similar to the chemicals subject to vapor intrusion due to prior releases to the environment. Additionally, the workers in these buildings must be subject to Occupational Safety and Health Standards Pursuant to Title 29, Code of Federal Regulations. For final remedies at RCRA corrective action sites, risk-based standards are used rather than OSHA PEL endpoints.**"

**Pfizer Response:** Noted. A determination will be made as to which VOC COPCs are still in use at the facility. For those compounds no longer in use, a risk-based approach will be made using existing soil gas data.

6. Typically, when engaged in risk-based decision-making for the purposes of the EIs at currently operating RCRA facilities where VOCs in the subsurface are similar to VOCs being used in on-going processes, a detailed VI assessment is not required. A facility must: 1) identify the specific identity of potentially intruding chemicals, including degradation products; 2) compare the toxicity of the intruding chemicals to those currently in use; 3) ensure that relevant chemicals have been incorporated into the existing Health and Safety Plan; and, 4) ensure that appropriate institutional controls are in place to communicate changes in land use to the regulatory authorities. Thus the nature of the subsurface contamination must be characterized and contaminants that are not closely approximated by the existing OSHA monitoring plan may need to be added to ongoing IA monitoring, but a detailed EM-based assessment is not necessary. The supporting assumption for this position is that the contribution from subsurface VI to IA concentrations typically will not be distinguishable from workplace-related vapors. This consideration of the OSHA PELs in protection of current land use may or may not be applicable to decision requirements under other conditions within the RCRA program - such as corrective action decision-documents. Consideration of the OSHA standards will preclude a complete baseline assessment of risks, but may be part of a negotiated settlement in consideration of enforceable and transferable land use or institutional controls. For further clarification, please refer to the July 3, 2007 Memorandum entitled Final Review of Draft Memorandum on Assessing Non-Residential Exposures to Vapor Intrusion, from M Hale and J. Woolford to RCRA Directors.

**Pfizer Response:** Noted.

7. *Recognizing all the limitations outlined above, EPA/TechLaw attempted to verify Pfizer's projected associated risks to occupational workers predicated on IA exposures in a review of the HHRA component of the Supplemental RFI. Total risk (inclusive of IA exposure) for an occupation worker is presented as 5E-08, with an associated noncarcinogenic hazard of 34. Using the JEM, EPA/TechLaw was able to verify the predicted IA concentration of benzene as 109 mg/m<sup>3</sup>. (Please note that this value exceeds the OSHA PEL of 3.25 by a factor of nearly 34.) This projected IA concentration translates to an associated risk (based solely on benzene) well above the National Contingency Plan upper brightline of 1 E-04 and has an associated hazard of 2.5E+03. Both risk and hazard values are significantly greater than the values proffered by Pfizer. Please see Specific Comment No. 2 for additional information on this topic.*

**Pfizer Response:** Please see response to Specific Comment No. 2 for the response to this topic. The results table of Appendix E shows the 34 fold exceedance of the OSHA PEL.

8. *According to Section 1.4, Site History, benzene has not been stored and/or used in any of the industrial processes undertaken at the Barceloneta Pfizer facility for close to three decades. Consequently, comparing a chemical like benzene, which is no longer stored and/or used at the facility, to its respective OSHA PEL is not typically an acceptable methodology in the evaluation of current worker risks and hazards attributable to IA exposure via VI. For those VOCs detected in the subsurface (especially those that are no longer stored and/or used at the facility) IA monitoring data, coupled with modeled IA concentrations based on subslab soil gas, should be used quantitatively to develop risk and hazard point estimates applicable to current on-site workers at the Barceloneta Pfizer facility.*

**Pfizer Response:** Noted. A determination will be made as to which VOC COPCs are still in use at the facility. For those compounds no longer in use, a risk-based approach will be made using existing soil gas data. Pfizer does not believe IA or sub-slab sampling is needed because the elevated benzene concentrations have only been detected in the vapor monitoring wells that are screened in the small area of soil. Use of numerous vertical and angle borings has confirmed that the soil is surrounded by bedrock, and none of the soil vapor monitoring wells screened in bedrock contain elevated benzene concentrations. In addition, Pfizer plans to conduct a one year pilot test of a Soil Vapor Extraction system that will address any concerns over subsurface gas and vapor intrusion.

9. *These data and associated assessments will also be reviewed within the context of any updates which may need to be applied to the CA725 determination.*

**Pfizer Response:** Understood.

**Ground Water Laboratory Results  
Pfizer Pharmaceuticals, Barceloneta, PR**

		Compound				
		Benzene	Chloro - benzene	Chloro form	Methyl Iodide	
MCL		5.00	100.00	None	None	
	Date					
<b>MW-1</b>	2/26/03	3.00 U	<b>146.00 J</b>	8.00 J		NA
	6/3/03	3.00 U	33.20	17.10		NA
	6/3/03	1.00 U	33.00	16.40		NA
	7/15/03	3.00 U	67.70	13.90		NA
	7/15/03	1.00 U	56.30	21.30		NA
	1/21/05	0.50	<b>197.00</b>	1.00 U		NA
	10/10/2006	5.00 U	<b>370.00</b>	8.50		NA
	1/11/2007	5.00 U	<b>450.00</b>	11.00 U		NA
	1/11/2007	5.00 U	<b>450.00</b>	11.00 U		NA
	10/17/07	1.00 U	<b>210.00</b>	7.83		2.00 U
	1/30/08	1.00 U	<b>118.00</b>	2.45		2.00 U
	4/23/08	1.00 U	<b>207.00</b>	11.50		2.00 U
	7/29/08	0.90	85.60	0.30 U		9.00 U
	7/29/08	0.90	88.50	0.30 U		9.00 U
<b>MW-2</b>	2/26/03	1.00	<b>177.00 J</b>	3.00 UJ		NA
	2/26/03	1.00 J	<b>152.00 J</b>	3.00 UJ		NA
	6/3/03	1.30 J	<b>234.80</b>	3.00 U		NA
	6/3/03	1.30 J	<b>239.00</b>	3.00 U		NA
	6/3/03	1.30 J	<b>192.00 J</b>	1.00 U		NA
	6/3/03	0.80 J	<b>118.00 J</b>	1.00 U		NA
	7/15/03	1.50 J	<b>216.00</b>	3.00 U		NA
	7/15/03	1.50 J	<b>216.00</b>	3.00 U		NA
	7/15/03	1.10	<b>203.00</b>	2.00 U		NA
	7/15/03	1.10	<b>194.00</b>	2.00 U		NA
	1/21/05	0.90	90.00	1.00 U		NA
	1/21/05	0.70	75.00	1.00 U		NA
	10/10/2006	5.00 U	63.00	5.00 U		NA
	1/11/2007	5.00 U	76.00	5.00 U		NA
	10/17/07	1.00 U	85.60	1.00 U		2.00 U
	1/30/08	1.00 U	50.80	1.00 U		2.00 U
4/23/08	1.00 U	72.70	1.00 U		2.00 U	
7/29/08	0.30 U	29.80	1.10		9.00 U	

**Ground Water Laboratory Results  
Pfizer Pharmaceuticals, Barceloneta, PR**

		Compound			
		Benzene	Chloro - benzene	Chloro form	Methyl iodide
MCL		5.00	100.00	None	None
Date					
<b>MW-3</b>	10/9/06	5.00 U	5.00 U	5.00 U	NA
	1/10/07	5.00 U	5.00 U	5.00 U	NA
	10/15/07	1.00 U	1.00 U	1.93	2.00 U
	1/28/08	1.00 U	1.00 U	1.07	2.00 U
	4/23/08	1.00 U	1.00 U	3.56	2.00 U
	7/29/08	0.30 U	0.20 U	0.30 U	9.00 U
<b>MW-4</b>	10/9/06	5.00 U	5.00 U	5.00 U	NA
	1/10/07	5.00 U	5.00 U	5.00 U	NA
	10/15/07	1.00 U	1.00 U	1.00 U	2.00 U
	1/29/08	1.00 U	1.00 U	1.26	2.00 U
	4/23/08	1.00 U	1.00 U	2.45	2.00 U
	7/29/08	0.30 U	0.20 U	1.60	9.00 U
<b>MW-5</b>	10/9/06	5.00 U	5.00 U	5.00 U	NA
	1/10/07	5.00 U	5.00 U	5.00 U	NA
	10/17/07	1.00 U	1.00 U	1.00 U	NA
	10/17/07	1.00 U	1.27	1.00 U	2.00 U
	1/29/08	1.00 U	1.00 U	1.00 U	2.00 U
	4/23/08	1.00 U	1.00 U	1.00 U	2.00 U
	7/29/08	0.30 U	0.20 U	0.30 U	9.00 U
<b>MW-6</b>	11/10/06	5.00 U	48.00	5.00 U	NA
	1/11/07	5.00 U	25.00	5.00 U	NA
	10/16/07	1.00 U	39.20	1.00 U	2.00 U
	1/29/08	1.00 U	8.86	1.00 U	2.00 U
	1/29/08	1.00 U	8.74	1.00 U	2.00 U
	4/23/08	1.00 U	17.00	1.00 U	10.40
	4/23/08	1.00 U	15.50	1.00 U	2.00 U
	7/29/08	0.30 U	18.70	0.30 U	9.00 U

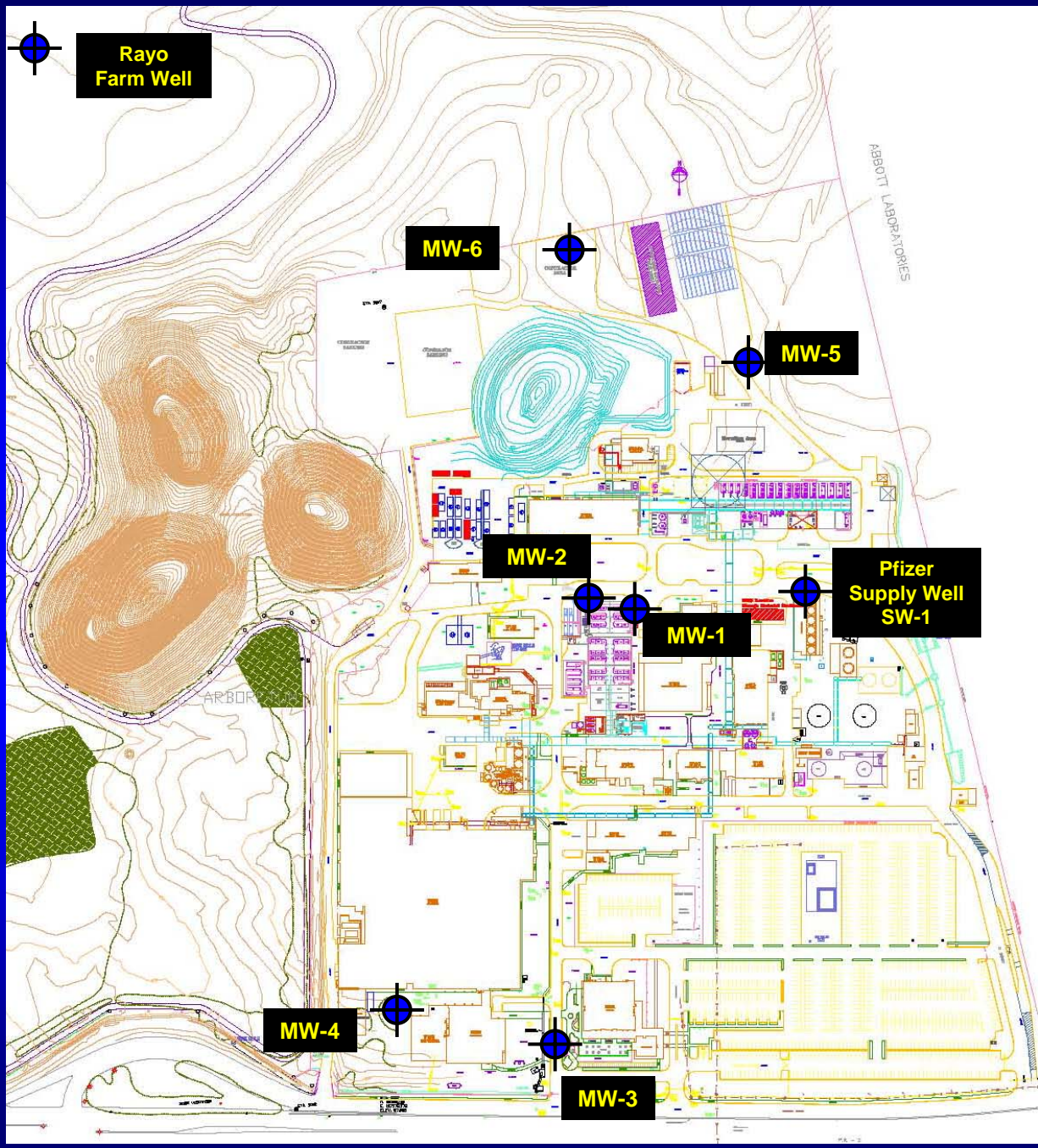
NA = Not Analyzed

25.00 = Compound detected

194.00 = Compound detected at concentration above MCL

**Note:** All samples collected after 2005 we obtained using dedicated pumps that were installed in each monitoring well





ATTACHMENT B

Historical Monitoring Data – with Trend Plots



**WELL MW-1 HISTORICAL GROUNDWATER MONITORING DATA  
GROUNDWATER SAMPLING REPORT - JANUARY 2018  
PFIZER PHARMACEUTICALS LLC  
BARCELONETA, PUERTO RICO**

MW-1	Period:	Feb-03	Jun-03	Jul-03	Jan-05	Oct-06	RL	Jan-07	Oct-09	Mar-10	MDL	Jun-10	MDL	Feb-13	MDL
	Units:	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
<b>VOCs</b>		<b>MCL</b>													
Benzene	5	3U	3U	3U	0.46	5U	5	5U	0.8	0.9	0.3	0.7	0.3	ND	0.3
Chlorobenzene	100	<b>146J</b>	33.2	67.7	<b>197</b>	<b>370</b>	10	<b>450</b>	<b>320</b>	<b>223</b>	2.0	84.3	2.0	<b>109</b>	0.2
Chloroform	70 <sup>1/</sup>	8J	17.1	13.9	1U	8.5	5	11U	8.2	3.4	0.3	0.6	0.3	ND	0.3

MW-1	Period:	Aug-16	MDL	Dec-16	MDL	Mar-17	MDL	Jul-17	MDL	Jan-18	MDL
	Units:	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
<b>VOCs</b>		<b>MCL</b>									
Benzene	5	ND	1.2	1.3	1.2	ND	1.2	ND	1.2	ND	1.2
Chlorobenzene	100	<b>120</b>	1.2	<b>163</b>	1.2	22.2	1.2	61.4	1.2	8.20	1.2
Chloroform	70 <sup>1/</sup>	1.8	1.2	4.7	1.2	ND	1.2	ND	1.2	ND	1.2

Notes:

<sup>1/</sup> Maximum Contaminant Level Goal for chloroform.

ug/L Micrograms per liter.

MCL Maximum Contaminant Level.

RL Reporting Limit.

MDL Method Detection Limit.

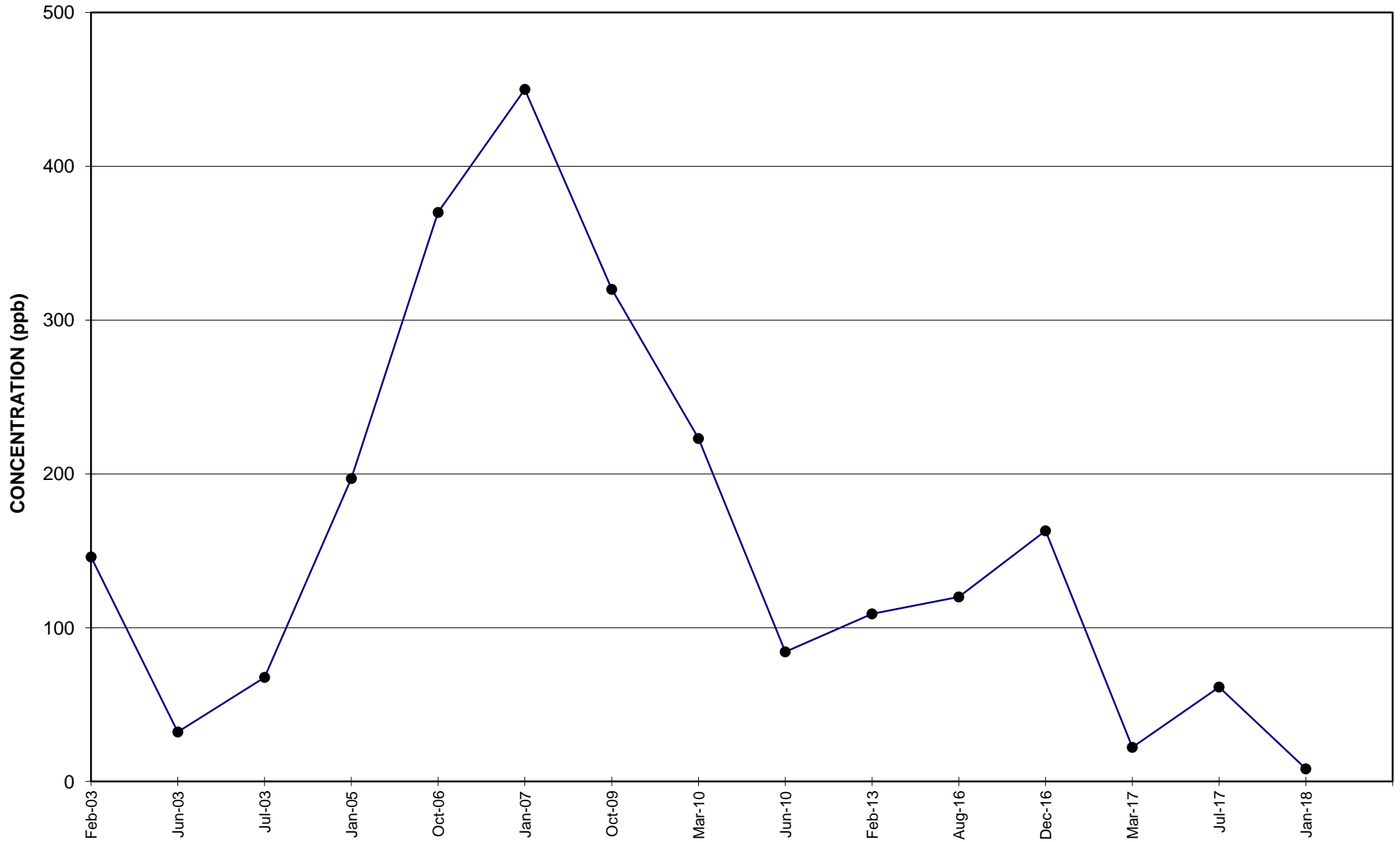
ND Not detected.

U Compound not detected at concentration listed.

J Result shown is estimated.

Analyte concentrations in bold exceeds MCL.

**MONITORING WELL MW-1  
CHLOROBENZENE IN GROUNDWATER - FEBRUARY 2003 TO JANUARY 2018  
GROUNDWATER MONITORING REPORT - JANUARY 2018**



ppb = Parts per billion or micrograms per liter (ug/L).

**WELL MW-2 HISTORICAL GROUNDWATER MONITORING DATA  
GROUNDWATER SAMPLING REPORT - JANUARY 2018  
PFIZER PHARMACEUTICALS LLC  
BARCELONETA, PUERTO RICO**

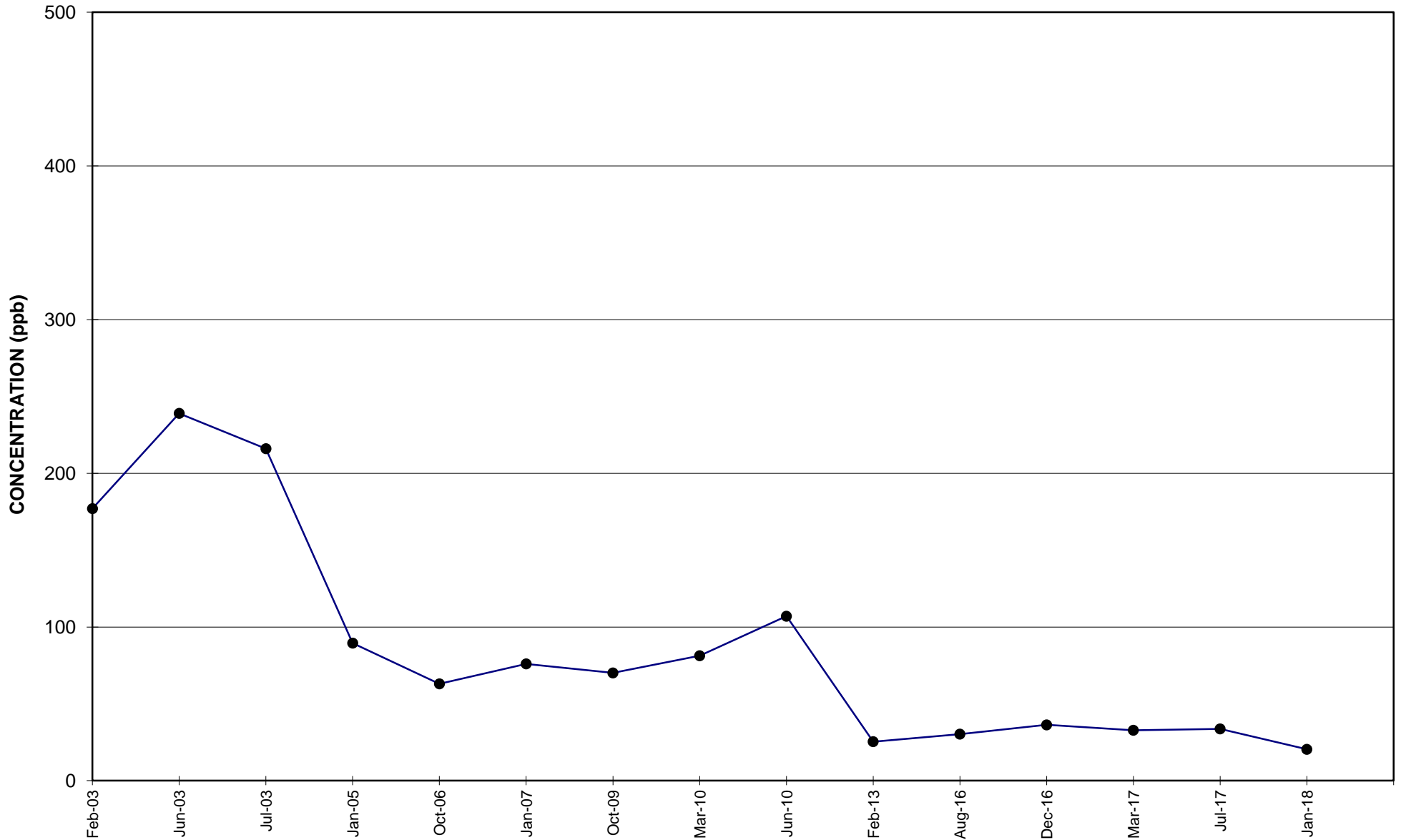
MW-2	Period:	Feb-03	Jun-03	Jul-03	Jan-05	Oct-06	RL	Jan-07	Oct-09	Mar-10	MDL	Jun-10	MDL	Feb-13	MDL	
	Units:	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	
<b>VOCs</b>		<b>MCL</b>														
Benzene	5	1	1.3J	1.5J	0.9	5U	5	5U	ND	0.8	0.3	0.9	0.3	ND	0.3	
Chlorobenzene	100	<b>177J</b>	<b>239</b>	<b>216</b>	89.5	63	5	76	70.1	81.3	0.2	<b>107</b>	0.2	25.4	0.2	
Chloroform	70 <sup>1/</sup>	3UJ	3U	3U	1U	5U	5	5U	ND	ND	0.3	ND	0.3	ND	0.3	

MW-2	Period:	Aug-16	MDL	Dec-16	MDL	Mar-17	MDL	Jul-17	MDL	Jan-18	MDL
	Units:	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
<b>VOCs</b>		<b>MCL</b>									
Acetone	NA	ND	6.0	ND	6.0	ND	6.0	ND	6.0	6.80	6.0
Benzene	5	ND	1.2	BDL	1.2	BDL	1.2	BDL	1.2	ND	1.2
Chlorobenzene	100	30.3	1.2	36.3	1.2	32.8	1.2	33.7	1.2	20.4	1.2
Chloroform	70 <sup>1/</sup>	ND	1.2	ND	1.2	ND	1.2	ND	1.2	ND	1.2

Notes:

- <sup>1/</sup> Maximum Contaminant Level Goal for chloroform.
- ug/L Micrograms per liter.
- MCL Maximum Contaminant Level.
- RL Reporting Limit.
- MDL Method Detection Limit.
- ND Not detected.
- BDL Below detection limit.
- U Compound not detected at concentration listed.
- J Result shown is estimated.
- Analyte concentrations in bold exceeds MCL.

MONITORING WELL MW-2  
CHLOROBENZENE IN GROUNDWATER - FEBRUARY 2003 TO JANUARY 2018  
GROUNDWATER MONITORING REPORT - JANUARY 2018



ppb = Parts per billion or micrograms per liter (ug/L).

**WELL MW-3 HISTORICAL GROUNDWATER MONITORING DATA  
GROUNDWATER SAMPLING REPORT - JANUARY 2018  
PFIZER PHARMACEUTICALS LLC  
BARCELONETA, PUERTO RICO**

MW-3	Period:	Oct-06	RL	Jan-07	Oct-09	Mar-10	Jun-10	Feb-13	MDL
	Units:	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
<b>VOCs</b>	<b>MCL</b>								
Benzene	5	5U	5	5U	2/	2/	2/	ND	0.3
Chlorobenzene	100	5U	5	5U	2/	2/	2/	ND	0.2
Chloroform	70 <sup>1/</sup>	5U	5	5U	2/	2/	2/	ND	0.3

MW-3	Period:	Aug-16	MDL	Dec-16	Mar-17	Jul-17
	Units:	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
<b>VOCs</b>	<b>MCL</b>					
Benzene	5	ND	1.2	2/	2/	2/
Chlorobenzene	100	ND	1.2	2/	2/	2/
Chloroform	70 <sup>1/</sup>	4	1.2	2/	2/	2/

Notes:

- <sup>1/</sup> Maximum Contaminant Level Goal for chloroform.
- <sup>2/</sup> Well not included in sampling event for this period.
- ug/L Micrograms per liter.
- MCL Maximum Contaminant Level.
- RL Reporting Limit.
- MDL Method Detection Limit.
- ND Not detected.
- U Compound not detected at concentration listed.

**WELL MW-5 HISTORICAL GROUNDWATER MONITORING DATA  
GROUNDWATER SAMPLING REPORT - JANUARY 2018  
PFIZER PHARMACEUTICALS LLC  
BARCELONETA, PUERTO RICO**

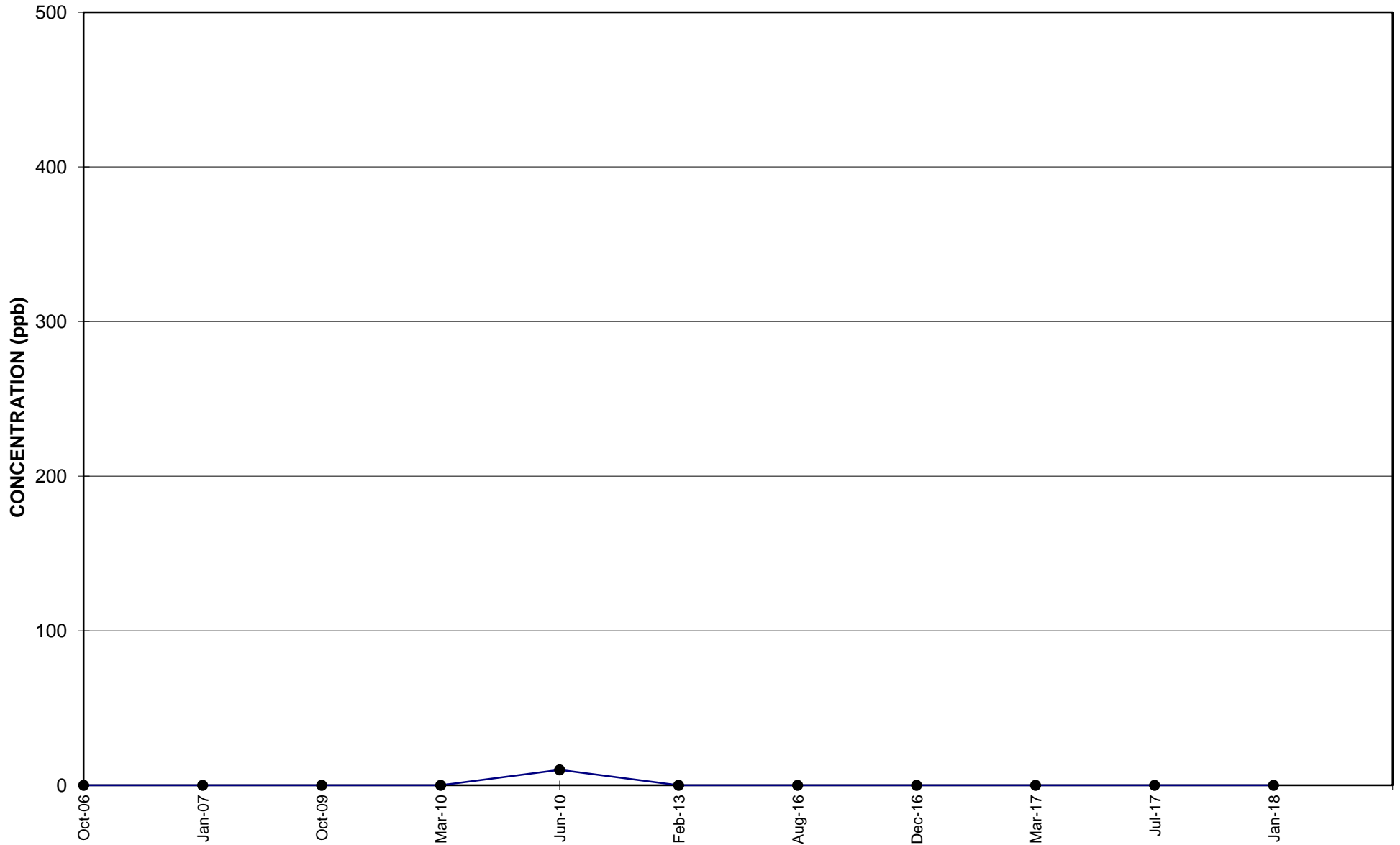
MW-5	Period:	Oct-06	RL	Jan-07	Oct-09	Mar-10	MDL	Jun-10	MDL	Feb-13	MDL	Aug-16	MDL
	Units:	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
<b>VOCs</b>	<b>MCL</b>												
Benzene	5	5U	5	5U	ND	ND	0.3	ND	0.3	ND	0.3	ND	1.2
Chlorobenzene	100	5U	5	5U	ND	ND	0.2	10	0.2	ND	0.2	ND	1.2
Chloroform	70 <sup>1/</sup>	5U	5	5U	ND	ND	0.3	ND	0.3	ND	0.3	ND	1.2

MW-5	Period:	Dec-16	MDL	Mar-17	MDL	Jul-17	MDL	Jan-18	MDL
	Units:	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
<b>VOCs</b>	<b>MCL</b>								
Benzene	5	ND	1.2	ND	1.2	ND	1.2	ND	1.2
Chlorobenzene	100	ND	1.2	ND	1.2	ND	1.2	ND	1.2
Chloroform	70 <sup>1/</sup>	ND	1.2	ND	1.2	ND	1.2	ND	1.2

Notes:

- <sup>1/</sup> Maximum Contaminant Level Goal for chloroform.
- ug/L Micrograms per liter.
- MCL Maximum Contaminant Level.
- RL Reporting Limit.
- MDL Method Detection Limit.
- ND Not detected.
- U Compound not detected at concentration listed.

**MONITORING WELL MW-5  
CHLOROBENZENE IN GROUNDWATER - OCTOBER 2006 TO JANUARY 2018  
GROUNDWATER MONITORING REPORT - JANUARY 2018**



ppb = Parts per billion or micrograms per liter (ug/L).

**WELL MW-6 HISTORICAL GROUNDWATER MONITORING DATA  
GROUNDWATER SAMPLING REPORT - JANUARY 2018  
PFIZER PHARMACEUTICALS LLC  
BARCELONETA, PUERTO RICO**

MW-6	Period:	Oct-06	<i>RL</i>	Jan-07	Oct-09	Mar-10	<i>MDL</i>	Jun-10	<i>MDL</i>	Feb-13	<i>MDL</i>
	Units:	(ug/L)	( <i>ug/L</i> )	(ug/L)	(ug/L)	(ug/L)	( <i>ug/L</i> )	(ug/L)	( <i>ug/L</i> )	(ug/L)	( <i>ug/L</i> )
<b>VOCs</b>	<b>MCL</b>										
Acetone	NA	10U	<i>10</i>	ND	ND	ND	<i>2.0</i>	ND	<i>2.0</i>	ND	<i>2.0</i>
Benzene	5	5U	<i>5</i>	5U	ND	ND	<i>0.3</i>	ND	<i>0.3</i>	ND	<i>0.3</i>
Chlorobenzene	100	48	<i>5</i>	25	23.1	24.2	<i>0.2</i>	9.6	<i>0.2</i>	8.2	<i>0.2</i>
Chloroform	70 <sup>1/</sup>	5U	<i>5</i>	5U	ND	ND	<i>0.3</i>	ND	<i>0.3</i>	ND	<i>0.3</i>

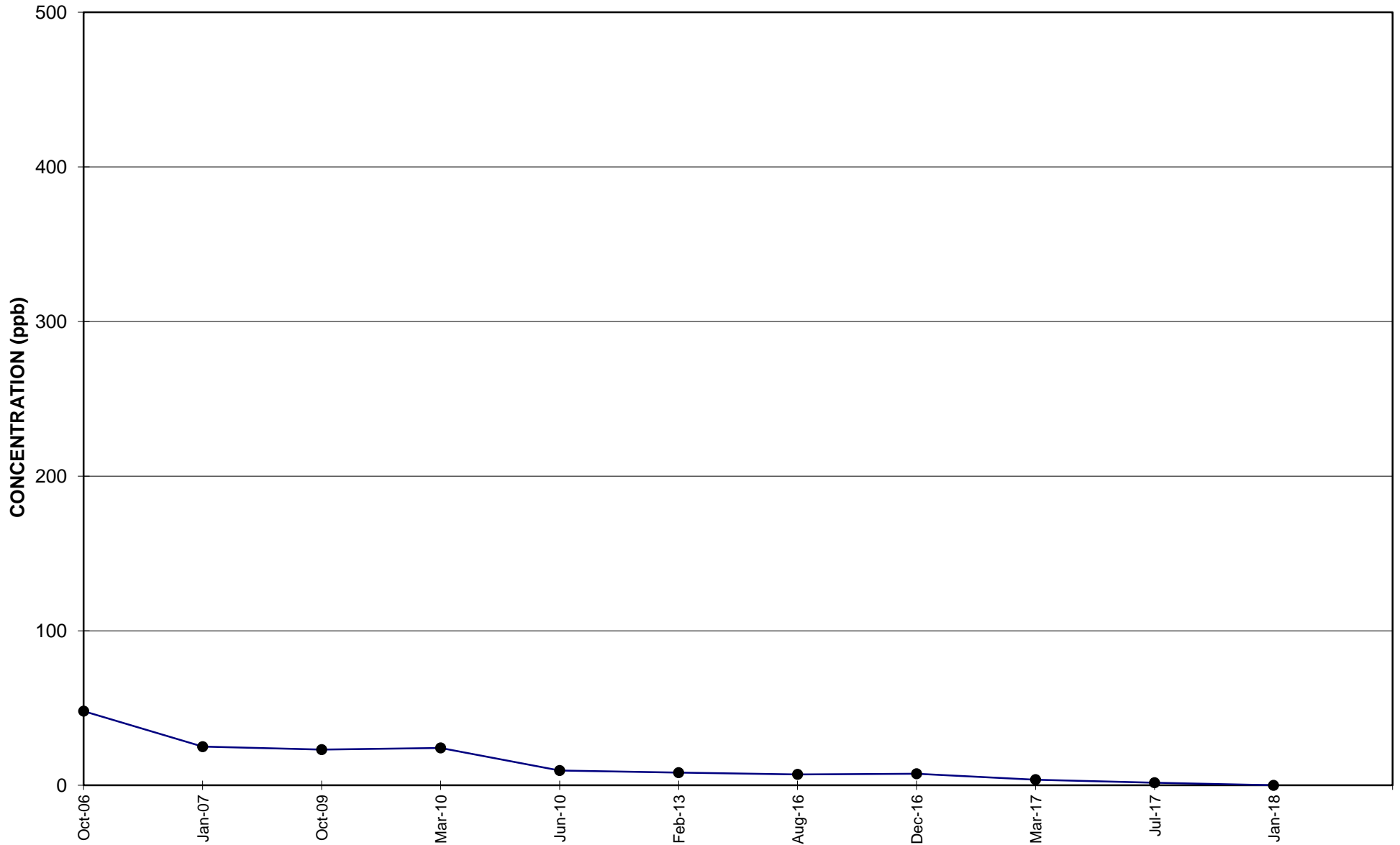
MW-6	Period:	Aug-16	<i>MDL</i>	Dec-16	<i>MDL</i>	Mar-17	<i>MDL</i>	Jul-17	<i>MDL</i>	Jan-18	<i>MDL</i>
	Units:	(ug/L)	( <i>ug/L</i> )	(ug/L)	( <i>ug/L</i> )	(ug/L)	( <i>ug/L</i> )	(ug/L)	( <i>ug/L</i> )	(ug/L)	( <i>ug/L</i> )
<b>VOCs</b>	<b>MCL</b>										
Acetone	NA	ND	<i>6.0</i>	ND	<i>6.0</i>	17.3	<i>6.0</i>	ND	<i>6.0</i>	BDL	<i>6.0</i>
Benzene	5	ND	<i>1.2</i>	ND	<i>1.2</i>	ND	<i>1.2</i>	ND	<i>1.2</i>	ND	<i>1.2</i>
Chlorobenzene	100	7.1	<i>1.2</i>	7.5	<i>1.2</i>	3.7	<i>1.2</i>	1.70J	<i>1.2</i>	BDL	<i>1.2</i>
Chloroform	70 <sup>1/</sup>	ND	<i>1.2</i>	ND	<i>1.2</i>	ND	<i>1.2</i>	ND	<i>1.2</i>	ND	<i>1.2</i>

Notes:

- <sup>1/</sup> Maximum Contaminant Level Goal for chloroform.
- ug/L Micrograms per liter.
- MCL Maximum Contaminant Level
- RL Reporting Limit.
- MDL Method Detection Limit.
- ND Not detected.
- BDL Below detection limit.
- U Compound not detected at concentration listed.
- J Result shown is estimated.



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CHLOROBENZENE IN GROUNDWATER - OCTOBER 2006 TO JANUARY 2018  
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