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Subject: **Independent Review of 2021 Remedial Action Summary Report**
Lockheed Martin Tallevast Site (Former American Beryllium Company Site)
1600 Tallevast Road
Tallevast, Manatee County, Florida
E Sciences Project Number 1-1440-004

Dear Mrs. Ward and Mrs. Washington:

E Sciences, Incorporated (E Sciences) is pleased to submit this letter outlining the findings and resulting opinions from our review of the 2021 Remedial Action Summary Report (RASR) and related regulatory correspondence for the Lockheed Martin Tallevast (former American Beryllium Company) site ("the Site"). These services were provided in accordance with our Proposal Number 1-1440-P04 dated July 21, 2020.

INTRODUCTION

E Sciences' understanding of the project is based on litigation support that we previously provided as part of an administrative challenge on the Site Assessment Report (SAR) and Remedial Action Plan (RAP) and Addenda that were prepared regarding the contamination caused by the former operation of the American Beryllium Company facility at the property located at 1600 Tallevast Road. Since that time, the RAP and supporting RAP Addenda (RAPA) were approved by Florida Department of Environmental Protection (FDEP) and Lockheed Martin has proceeded with remediation implementation. We were requested to provide support to FOCUS to compile information and opinions regarding the ongoing remediation progress and reporting. We prepared a letter dated January 11, 2021 outlining the results of our RASR document review. Recently, Lockheed Martin issued a RASR dated October 29, 2021 summarizing the remedial activities conducted between September 1, 2020 through August 31, 2021. The results of our review of the October 29, 2021 document are summarized in this letter.

PLUME MIGRATION AND TEMPORARY POINT OF COMPLIANCE

One of the main items of concern is the migration of the contaminant plume. The RASR shows that the size of the contaminant plumes in the Upper Surficial Aquifer System (USAS) has expanded from 43 acres in August 2020 to 59 acres in August 2021. The RASR shows that the Lower Surficial Aquifer System (LSAS) contaminant plume has expanded in size from 77 to 79 acres and the Arcadia Formation (AF) Gravels contaminant plume has decreased in size from 54 to 52 acres. Overall, the Temporary Point of Compliance (TPOC) boundary has expanded from 119 to 126 acres. Notice should be provided to property owners, residents, and business tenants of any property into which the point of compliance is allowed to extend. These notices need to be provided to properties that have been newly reported to be within the TPOC based on the current delineated plume.

Further, when utilizing a TPOC beyond the boundary of the source property to facilitate active remediation, an additional notice concerning the status of the site rehabilitation shall be provided every five years. The last notice that we identified in online regulatory records dates back to January 7, 2016, almost six years ago. Therefore, an updated TPOC status notice should be prepared and delivered since it is now overdue.

We had identified several deficiencies in the 2016 TPOC notice, including failure to notify property owners who were included in the contamination plume and failure to extend the TPOC boundary to all contaminated areas. Of particular concern was that the TPOC boundary excluded an area documented to be contaminated during several monitoring events (MW-114). This area is currently and finally being assessed several years later. We therefore urge a careful review of the updated TPOC status notice once it is drafted to confirm that the information provided to the property owners is correct and accurate and all affected property owners are notified. The affected third-party property owners are dependent upon the information presented and should be able to rely on that information. They do not have the expertise or resources to independently evaluate the data and how it impacts their individual properties. This situation is exacerbated when a contaminated property is excluded from the TPOC boundary and RASR plume maps and no notification is properly issued. The following link provides access to communications from community members expressing concerns or requesting additional information and our letter dated February 18, 2016, outlining the results of our review of the TPOC status update where we noted the inadequacies of the TPOC notice at that time. file:///C:/Users/nlocke/Downloads/comments%20to%20tpoc%205%20year%20update%20(1).pdf'

While the focus of plume migration has been on the area southeast of the source property (which will be discussed later), it is critical to the successful implementation of the remediation that analytical data for other areas be carefully reviewed as well. In particular, we want to point out the area northwest of the source property. Concerns in this area became apparent during our review of the updated 2018 groundwater model because it forecasted that contamination existed outside of the northwest area of the predicted USAS capture zone. There is no monitoring well located within that

specific gap of capture zone coverage so this area needs to be assessed. This is further supported by the fact that one of the closest USAS monitoring wells is MW-69. The 2021 RASR showed the concentration of 1,4-dioxane detected in the groundwater samples collected from monitoring well MW-69 in August 2021 is the highest concentration reported since 2018. Despite this being below the GCTL the increase in this area is concerning and unexplained.

Additionally of note is monitoring well MW-151, which is located outside of the estimated plume and the estimated capture zone, west of the facility, exhibits persistently low concentrations of 1,4-dioxane in this area of the USAS. The 2021 groundwater monitoring data for monitoring well MW-47, located within the capture zone but outside of the plume, is also showing the highest concentration of 1,4-dioxane since 2014.

Overall, monitoring well delineation is sparse in in the area northwest of the source property and we recommend that delineation monitoring wells be installed to confirm the plume boundaries estimated in this area.

Another area of particular concern is the residential neighborhood located immediately south and east of the source property. This neighborhood is about 12 acres in size, abuts the source property and is in the apparent downgradient direction of the shallow plume movement. Although supplemental assessment was conducted by Lockheed Martin to evaluate the leading edge of the 1,4-dioxane plume to the southeast of the neighborhood, no additional assessment has been conducted in this residential area to evaluate if the upper portion of the USAS is impacted or if the lower aquifers have been impacted. FDEP commented that there are several hot spots where contaminant concentrations remain quite a bit above the cleanup goals in their February 4, 2021 memorandum outlining comments from their review of the 2020 RASR. We noted elevated COC concentrations in the area toward the east-southeast of the source property, but it is possible that undetected hot spots could be present in between because the shallow groundwater quality in the residential area is not assessed. It is of particular concern because undetected hot spots in the USAS could create a potential for vapor encroachment and therefore residential exposure of COCs. We recommend additional assessment in this area be conducted to evaluate the potential pathways for exposure, to better define the horizontal extent of the contamination, and to confirm the vertical extent of the contamination plume in this direction.

CAPTURE ZONE

Based on previous document reviews, we had suspected that the capture zone of the remediation system proposed at the time of the RAPA approval was insufficient to contain and capture the contaminant plume. While the depiction of capture zones on maps showed that the entire plume would be within the cone of influence of the system, the lack of assessment data and exceedances of contaminants in groundwater outside of the plume contours are indicative of a failure to monitor and control the plume. This is further supported by the results of additional assessment being required by the FDEP, as documented in Lockheed Martin's Monitoring Well Installation Work Plan dated September 17, 2021.

The 2021 RASR indicates that optimization actions have been implemented to evaluate and extend the capture zone in the southeast area of the USAS to enhance capture of the COC plumes. Those optimizations reportedly began in June 2019 and were documented in the 2019 RASR and the 2020 RASR. A five-year modeling update and report were included in the 2019 RASR. This modeling update showcased simulated water levels and capture zones dated August 2018, which was prior to the implementation of remedial action optimizations. Similar to the previous RASRs, the 2021 RASR states "Based on professional judgment, the localized effects of extraction wells, infiltration galleries, wetlands areas, and stormwater control features, as well as modeling information, were considered when contouring." No updated modeling of the capture zone has been provided.

Figure 12E of the 2021 RASR shows the edge of the composite COC plume in the USAS from the data collected in August 2021. The leading edge of the composite COC plume is extrapolated from a 1,4-dioxane concentration of 7.9 micrograms per liter (µg/L) in the sample collected from the farthest monitoring point, PZ-USAS-19. Figure 12E also shows the inferred estimated edge of the current capture zone and it encompasses the leading edge of the plume. Figure 7 of the 2021 RASR shows the water table elevations measured, groundwater table contours and the inferred estimated edge of the capture zone. The capture zone should be represented by the point where the groundwater elevations no longer decrease in the direction of the pumping system. The water table elevations at PZ-USAS-18 (elevation 21.38) and PZ-USAS-19 (elevation 21.27) which are located approximately 300 feet apart, are both shown to be within the inferred estimated capture zone in Figure 7, but they represent a hydraulic gradient of about 3.6×10^{-4} toward the southeast. This gradient shows that groundwater within the capture zone is flowing away from the remediation system and therefore not being recovered or contained. When reviewing the groundwater elevation data, the gradient appears to shift toward the remediation system north of PZ-USAS-18 and would result in a capture zone that appears to be about 450 feet smaller in that direction than is depicted on these 2021 RASR figures. Therefore, it is suspected that the capture zone is not properly evaluated and determined and that the capture zone is not sufficient to recover the leading edge of the USAS plume in the southeast direction.

Using the same concept, we evaluated the groundwater elevations toward the northwest of the composite plume in the USAS depicted on Figure 7. We note that there are no monitoring wells located north of the plume to define the northern edge of the capture zone. The capture zone is drawn to be about 350 feet north of EW-2008 in the northwest portion of the plume, but the next closest staff gauge or monitoring well elevation measurement not directly close to the extraction well is located 1,000 feet away. We urge an independent expert review of the potentiometric figures and groundwater models to confirm the extent of the estimated capture zones and to evaluate if additional piezometers should be installed to substantiate the estimated capture zone configuration.

RECOMMENDED EWPARM

In 2019 and 2020 Lockheed Martin shut down several USAS extraction wells that met the criteria for shutting down with a requirement that groundwater monitoring of the extraction well and certain designated monitoring wells in the vicinity be conducted. This groundwater monitoring is referred to as Extraction Well Post Active Remediation Monitoring (EWPARM). The criteria to shut those extraction wells down and place them into EWPARM is that there needs to be two consecutive sampling events where samples did not show COCs above GCTLs. The EWPARM can be discontinued once COC concentrations are below GCTLs for a minimum of two consecutive events during four quarterly groundwater monitoring events.

Lockheed Martin is now recommending permanently discontinuing the use of eight extraction wells based upon them having met the criteria outlined above. This seems to be a reasonable recommendation based upon the report narrative, but upon closer review, it would be prudent that a careful evaluation of available information be conducted prior to deciding to discontinue EWPARM and permanently place the extraction wells out of service. The following outlines a few areas that should prompt further inquiry by FDEP from Lockheed Martin:

- EWPARM extraction well sampling sheets are not included in Appendix C of the 2021 RASR, with the other groundwater sampling logs. Not only are sampling data sheets required to be submitted to FDEP, but this is also important because the purging techniques cannot be evaluated.
    - Wells are purged prior to sampling so that the groundwater being sampled is representative of the aquifer. The selection of the purging technique is dependent on the hydrogeologic properties of the aquifer. The intent of proper purging is to stabilize the water level in the well and minimize the hydraulic stress to the hydrogeologic formation. Purging rates are to be adjusted so that the flow is equivalent to the well recovery rate to minimize drawdown. Typically, three to five well volumes are purged. The purging technique could not be ascertained due to the absence of the groundwater sampling logs.
    - The extraction well samples are designated as “inf” in Table 15, so it is presumed that they were collected using dynamic sample collection techniques rather than static samples with purging techniques for groundwater. Admittedly, remediation wells with

plumbing can be sampled using FDEP procedures for collecting samples for drinking water wells. The drinking water samples procedures were designed to test the quality of the water as extracted (not in-situ) and so that the in-place plumbing does not need to be removed. We strongly encourage FDEP to require proper groundwater purging as if these extraction wells were monitoring well before allowing them to be placed out of permanent service so that the data represents the in-situ groundwater condition, rather than the dynamically flushed sample. If Lockheed Martin already intends to remove the plumbing for taking it out of service and believes that the results will support this, then removing the plumbing to sample should not impose an undue burden.

- Section 4.8 of the 2021 RASR states that these extraction wells have been periodically operated for short durations to maintain well function and for the collection of quarterly groundwater samples. Table 8 of the 2021 RASR presents the total monthly extraction well volumes for a 12-month period, September 2020 to August 2021 and shows that the extraction wells are indeed periodically operated for short durations during the months when the samples are collected. It is suspected that periodic pumping of the wells affected the groundwater data and promoted meeting the criteria to shut off the wells. We note that EW-2005 showed exceedances of GCTLs during the May 2020 sampling event when 200 gallons were pumped during that month. Trichloroethene and 1,4-dioxane were detected at concentrations of 4.4 µg/L and 12 µ/L, respectively. In June, Lockheed Martin pumped 3,200 gallons of water from EW-2005 and then resampled. The results of the resampling showed the sample did not exceed GCTLs. We tried to determine the timing of the sampling and the pumping event, but that information has not been provided by Lockheed Martin. Lockheed Marin ceased sampling EW-2005 since November 2020. Updated sampling should be conducted using quiescent purging methods suitable for monitoring wells. All sampling data sheets should be provided, and sampling methods clearly described.

Also of note is that the monthly well volumes have been included in past RASRs, but in the 2021 RASR, Lockheed Martin has excluded that information to show monthly data only for the reporting period. This seems to be a conscious action that is contrary to usual and customary remedial reporting. The result is that it makes it more difficult to conduct a thorough evaluation of the current recommendations for discontinuing extraction wells.

MONITORING OF PRIVATE WELLS

Of the eight private wells that were being monitored as of 2012, only two private wells continue to be monitored. We were able to identify Lockheed Martin acknowledging a rationale for removing wells from monitoring some of the time, but not in each instance. The following discusses some of the wells being monitored and some that are not.

PW-7 (7561/7571 15TH Street E)

PW-7 (7561/7571 15th St E) is the only AF Gravels private well still remaining in Lockheed Martin's monitoring program according to Table 2 of the 2021 RASR. This well is located about 400 feet northwest of the 1,4-dioxane plume contour in the AF Gravels formation. This private well has been sampled 11 times prior to 2021 and had no detections of COCs and was shown on the AF Gravels plume maps since 2009. During the August 2021 sampling event, the results indicated a detection of 1,4-dioxane.

We note that the results for this monitoring well have been included on all RASR maps but were removed from the AF Gravels plume maps in the 2021 RASR, when it showed its first detection of 1,4-dioxane. We recommend that Lockheed Martin update the maps to be transparent about the detection of 1,4-dioxane so that it does not go ignored and that the analytical results of this well are closely monitored for future contaminant trends. Comparisons cannot be made without consistency - all of the data depicted should be depicted on the maps regardless of whether the data shows an exceedance of GCTLs.

PW-84 (2400 Tallevast Road)

Table 2 of the RASR stated that PW-84 (2400 Tallevast Road) was removed from monitoring in 2021 due to development of the property. No replacement well is proposed, and it was removed from the 2021 RASR AF Gravels maps. Although this well did not show COCs above the GCTLs during historic sampling events, it has been the southern defining monitoring location for the AF Gravels southeast of monitoring well MW-158 which has historically shown 1,4-dioxane concentrations above the GCTL. This well was not sampled during the 2021 sampling event. We did not identify any request to remove this monitoring point from the monitoring program in the 2020 RASR, the 2021 RASR, or reference to this action in a field notice or in other correspondence on OCULUS. We recommend that monitoring wells be placed in locations to properly define and monitor the southeastern extent of 1,4-dioxane in the AF gravels formation.

2105 Tallevast Rd

Groundwater samples collected from private well 2105 Tallevast Rd, which is an AF Gravels well, exhibited a concentration of 1,4-dioxane of 95 µg/L when it was sampled in 2009. It was listed in the 2009 RAPA as a well to be monitored annually. While not included in the cumulative tables, we noted that there was also a 2008 sampling event in the 2008 Groundwater Monitoring Report that

showed a 1,4-dioxane concentration of 96 µg/L. In the 2012 Groundwater Monitoring Report, this private well was reportedly deleted due to abandonment of the well. No explanation as to why it was abandoned, but the report was stated that monitoring well MW-158 which was located around 200 feet away was stated to be a replacement well. We noted that the screened intervals for these monitoring wells are 28 to 152 BLS for 2105 Tallevast Road and 100 to 110 feet BLS for MW-158.

We have noted several additional instances where private wells were removed using justification that other wells would suffice for providing plume monitoring coverage. A closer review revealed that private wells being removed were screened in completely different stratigraphic zones and at considerable distances from the monitoring wells being cited as providing duplicate coverage. There is a continued reduction in monitoring well coverage. Considering the large size of the plume, the dynamic nature of the plume and the large unassessed areas, no additional wells should be removed from the monitoring program.

ABANDOMENT OF MONITORING WELLS

The 2021 RASR indicates that two monitoring locations were abandoned due to third-party development activities that occurred in the southeast area of the Site during the reporting period. Monitoring well MW-107 and piezometer PZ-USAS-20 were abandoned in October 2020 and March 2021, respectively. No prior notice to FDEP was provided for these abandonments. In the 2021 RASR, Lockheed Martin states that "these abandonments were reported in the Direct Push Groundwater Sampling Work Plan (AECOM, 2021a) submitted to the FDEP on April 12, 2021". This is misleading as there is no mention of these well abandonments in that document, they are merely shown on a figure with a symbol matching the legend for an abandoned monitoring well. While this may seem like a minor point, it is another example of the narrative being unsupported by the facts.

OPINIONS

We are very concerned that the reported data demonstrates that the remediation system has been inadequate to contain and control the contamination plumes. It is our opinion that a critical review of the under assessed areas of the plumes, both horizontally and vertically, should be conducted and that additional assessment be required. We also recommend that groundwater models be updated to include the optimization actions and an evaluation of the capture zone and plume extent be conducted by an independent expert. This expert evaluation should include scrutinizing potentiometric data and maps and development of estimated capture zones based upon the model and potentiometric data and maps provided by Lockheed Martin.

We believe that it is prudent for there to be a higher level of justification for removal of wells from the ongoing monitoring program and that extraction well EW-2005 be monitored under static conditions consistent with monitoring well sampling per FDEP's Standard Operating Procedures for two quarters before making a decision to shut it down. The other extraction wells should also have this requirement imposed during EWPARM for the reasons outlined above.

In summary, it is our opinion that the impact of the largely unassessed areas and overestimated capture zones leave the potential for contamination plume migration to continue, and that sufficient data should be provided for FDEP to make prudent and responsible determinations.

We appreciate the opportunity to offer our professional services to you. If you have any questions concerning our evaluation, please contact us at 954-484-8500.

Sincerely,
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