RAMBOLL

ENVIRONMENT
& HEALTH

Ms. Wanda Washington
FOCUS
PO Box 28
Tallevast, FL 34270

December 20, 2021

Re: Review of AECOM's 2021 Remedial Action Status Report for the Groundwater Recovery and Treatment System, Tallevast Site, Florida

Dear Ms. Washington,

At your request I have reviewed the latest *Remedial Action Status Report for Groundwater Recovery and Treatment System* (AECOM; October 2021) for the Tallevast Site. This report describes the past and then-current ground water conditions beneath and around the Lockheed Martin Corporation (LMC) facility on Tallevast Road in Sarasota County, Florida (the "Site"), and covers the operating/reporting periods of September 2020 through August 2021. The ground water in aquifers beneath the Site and surrounding areas has been undergoing remediation by pumping/treatment to remove contaminants (principally 1,4 Dioxane and certain chlorinated volatile organic compounds, or CVOCs) that were previously released from the LMC facility by a predecessor operator. Having completed my review of this report, I would offer the following observations and recommendations.

Ramboll
10150 Highland Manor Drive
Suite 440
Tampa, FL 33610
USA

T +1 813 628 4325
F +1 813 628 4983
https://ramboll.com

Overall, the ground water recovery and treatment system being operated by AECOM for LMC continues to perform within the operating parameters contained in the approved RAP and operating permits for the Site. By this statement I mean that ground water continues to be recovered and the treatment system is successfully removing contaminants from the water (approximately 29.5 lbs were removed in the 2021 reporting period) before it is disposed to the ground water reinjection systems, or to the county sewer. This is about 80% of what was removed in the prior reporting period, an observation consistent with the asymptotic behavior of the system. As more contaminants are removed, the annual removal rate slows down. This pattern is normal and expected and demonstrates that these types of remediation systems are not particularly efficient in removing contaminants in the latter stages of a remediation project when diffusion from finer grained sediments in the aquifer zone becomes a more dominant and limiting process.

The contamination at the LMC site is defined as an overall plume within individual aquifer units (i.e., areas where contaminants are at concentrations above ground water cleanup standards), and more specific plumes which

characterize individual contaminants of concern (COC) in a particular aquifer unit. Although the concentrations of contaminants in ground water in some areas have been decreasing with remediation, the overall plume of contamination actually expanded this year from 119 to 126 acres due in large part to the 43 to 59 acres increase in the USAS with the discovery of a broader region of 1,4D contamination in the area southeast of the LMC facility near PZ-USAS-19. This 1,4 D plume appears to be moving horizontally, southeast in the lower part of the USAS aquifer.

Looking at temporal changes in individual contaminants, the overall levels of chlorinated CoCs (e.g. TCE) in the aquifers beneath the Site and adjoining properties continues to very gradually decline. In contrast, however, the concentrations of 1,4 Dioxane (1,4D) increased in the August sampling round in the USAS aquifer east of the LMC site near the recovery gallery (wells MW27 and 28), and less dramatically so north of Tallevast Road at wells MW-109 and EW2012. Concentrations in these areas returned to what had been measured in 2019 and a few years earlier. This is a potentially important trend to monitor in next year's report to see if the prior gradual declines in 1,4D concentrations resume.

I also noted in my review of this year's RASR that, like in past years, there is little drawdown of the water table in the USAS north of Tallevast Road in the areas of EW2012 and 2013. This is an area where 1,4D has been persistent over the years albeit at low concentrations just above the ground water cleanup standard. Why these extraction wells have such a minimal influence on water levels is unclear. I have noted in prior writings that an investigation of this area with DPT would be beneficial to confirm the gradation of the aquifer materials (used to confirm well screen and gravel pack designs) as well as to more accurately map the extent of 1,4D found in wells like MW-109 and EW2012. As present the full extent of 1,4D in this area of the plume remains unknown and the security of the capture system in limiting any migration to the north is unclear.

Another concern is in the southeast area in the USAS, where water level data on Figure 7 shows the highest local water level is at PZ-USAS-18 in August 2021. This well lies northwest of PZ-USAS-19 and the adjoining new areas where 1,4D has been detected. The gradient between PZ-USAS-18 and -19 in August 2021, at the later part of the 2021 rainy season, therefore, was southeast, away from the USAS extraction system to the north[1]. Unfortunately, water levels were not measured in this well in the other 3 quarterly monitoring events, so it is unclear if this gradient reversal was a summertime event or occurred earlier in the year. Water level measurements in other wells to the north show a higher-than-normal water table in February, likely the result of heavy rains in the late Fall and Winter of 2020-2021. It is also concerning that PZ-USAS-18 lies close to and just west of the new Amazon stormwater pond. Exfiltration of water from this pond could create a localized, but permanently higher, summertime-like water level in this area. It is important going forward that water level measurements be performed on all wells and piezometers in this area on the same quarterly or semi-annual cycle so that this potential important trend, which reflects on the security of the containment system, can be more accurately monitored.

[1] A similar orientation of the gradient was reported in the prior measurements of water levels in these piezometers prior to the Winter, 2020.

The new monitoring wells that are planned in the southeast investigation area should also help further define the gradients and capture zone of the pumping system in this area. If this southeast gradient orientation is confirmed, however, then the capture zone depicted on Figure 7 is incorrect, and portions of this new area of 1,4D contamination are outside the reach of the current capture system. If this turns out to be the case, 1,4D will likely continue to migrate southeast away from the Site in spite of the optimized pumping further to the north.

The deeper LSAS formation continues to show stable to slightly increasing concentrations of COCs (particularly 1,4D) in key monitoring wells, and overall progress towards cleanup here has been slower as compared to the USAS. Several areas of persistent, relatively stable contamination in the LSAS aquifer remain beneath the LMC property and on properties to the east, south and southwest. This observation is consistent with my prior observations when reviewing last year's RASR and suggests there are more recalcitrant regions of contamination embedded in this aquifer or overlying/separating confining units that pumping is only very slowly degrading, and/or the flow of clean water through these aquifers is naturally limited by the low permeability of overlying confining units. I think both factors are likely. Given that the flow of water through this area is naturally limited by the geometry and permeability of the aquifers and surrounding confining units, it is unlikely that increased pumping would be effective in accelerating the cleanup of these units. Other, more direct treatment approaches should be considered. Accordingly, I am reiterating here again the recommendations in my prior review of the 2019 and 2020 RASRs that LMC should consider pilot testing other treatment strategies in these areas to more directly attack the contamination and not rely solely on pumping.

I also recently noticed that the FDEP, in its' approval of the monitoring well installation plan for the southeast area, is now requiring LMC to install three new monitoring wells in the LSAS in the southeast area to investigate if 1,4D has migrated downward into this unit from the overlying plume in the USAS. This is appropriate as I have previously recommended and will also provide the opportunity to confirm the extent of the LSAS capture zone in this same area.

While pumping of the LSAS and AF Gravel beneath the LMC facility should continue to contain and very gradually reduce overall concentrations of COCs, the data and charts in these last three RASR reports demonstrate that the recovery of COCs in portions of the deeper LSAS and AF zones, as well as the USAS to the east (discussed above), have become quite asymptotic at concentrations well above applicable cleanup goals, and progress towards cleanup in some areas has slowed to virtually stopped in some areas. When faced with this condition on other like projects, I have seen examples where considerable progress towards accelerating or reinvigorating the cleanup of these same types of chemicals was achieved through the introduction of chemical oxidizer solutions (e.g., potassium permanganate) into the affected ground water systems. This has typically been done by draining oxidizer solutions into strategically located monitoring wells around the recalcitrant "hotspot" areas, while the pumping continues to remove the contaminants from the aquifers more broadly. Given this experience I have personally observed in analogous project settings, this technology could be an effective, relatively low-cost enhancement of the current remedial approach at Tallevast (which currently relies on pumping alone), applied to recalcitrant areas of the AF, LSAS and USAS formations to reinvigorate the progress of ground water cleanup. I would recommend LMC and FDEP consider

pilot testing this technology as part of their ongoing review of the project performance and milestones.

Lastly, I would encourage LMC and FDEP to engage the community in evaluating changes to the remedial action system so that community concerns and potential impacts can be fully discussed and evaluated as part of the decision-making process. I am happy to continue to engage with you and LMC in this process if the community feels it is providing the independent technical assistance it needs in evaluating progress in fulfilling the goals of LMC's Consent Order with the FDEP.

If you have any questions regarding these thoughts and comments, I would be happy to discuss them with you further.

Very truly yours,

Robert L Powell, PhD, PE
Principal