June 10, 2025

COMMITTEE TO BRIDGE THE GAP COMMENTS ON NASA'S *FINAL*[1] *PHASE 1 GROUNDWATER CORRECTIVE MEASURES STUDY* & DTSC'S *DRAFT NASA GROUNDWATER PHASE 1 STATEMENT OF BASIS* FOR THE SANTA SUSANA FIELD LAB

Executive Summary

Beginning decades ago, the Santa Susana Field Laboratory (SSFL) site was used to develop civilian rockets, plus military missiles for delivering nuclear warheads that could end our world. Grossly irresponsible practices such as dumping hundreds of thousands of gallons of trichloroethylene (TCE) directly into the ground and groundwater resulted in widespread toxic contamination. In 2007, a Consent Order was signed requiring *all* contamination in soil to be fully cleaned up and the permanent groundwater remedy to be installed — by *2017*. We are now in *2025*, and *none* of those promises have been kept.

Now, the National Aeronautics and Space Administration (NASA) and the Department of Toxic Substances Control (DTSC) propose cleanup efforts at just three – *repeat, just three* – of the 53 wells polluted with TCE, and plan to target only a handful of the dozens of toxic chemicals that are contaminating the site. Those three wells are contaminated with TCE at levels at least *2,000 times higher* than legal limits. NASA and DTSC propose limited remediation for those three wells to marginally reduce contamination to levels that are still hundreds of times higher than health-based limits, and then to *walk away* from their cleanup obligations. They call this "monitored natural attenuation" and say that in centuries it will somehow get down to legal limits on its own. In other words, the plan put forward by NASA and DTSC is to do a trivially small cleanup and leave behind the vast majority of contamination for future generations to suffer from the toxic effects.

In Phase 2, to be released at an unknown time in the future, DTSC and NASA say they will "consider" other polluted wells, but it is clear their intention is to walk away from that contamination as well. It is sad beyond measure that those responsible for creating the

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[1] NASA submitted its draft CMS document to DTSC with the title "Final CMS." However, as DTSC pointed out in its Statement of Basis (PDF pg. 8, footnote 1), the document is actually a draft, and cannot be finalized until DTSC has received and responded to public comment on the document. *NASA's slip-up shows that it does not anticipate that any substantial changes will be made to the document in response to comments from the public*, even when those public comments raise very valid and very real concerns about violations of the regulatory process and ways in which the proposed cleanup would endanger human health and the environment. As always, DTSC and NASA are treating the public review and comment period as a legal formality rather than a meaningful opportunity to listen and respond to recommended changes to the cleanup by members of the community and outside experts.

contamination have, despite signing legally binding cleanup agreements, failed to stand by their word. Their breaches of solemn promises threaten the health of the hundreds of thousands of people living in surrounding areas.

Background

The current groundwater contamination in Area II and the Former LOX Plant in Area I is the result of decades of deliberate disregard for human health and the environment by the U.S. Air Force and NASA. From 1954-1983, many thousands of rocket and missile engine tests were conducted at the Alfa, Bravo, Coca, and Delta test stands.[2] After each test, the engines were flushed with an estimated 57 gallons of trichloroethylene (TCE), a cancer-causing industrial solvent.[3] Until 1961, when the Air Force installed a recovery system to capture the TCE, the TCE that was used to flush the engines drained directly into the ground.[4] *NASA estimates approximately 500,000 gallons of TCE were released into the ground over the span of Air Force and NASA rocket- and missile-testing operations at SSFL.*[5] In addition to TCE, *70 different toxic chemicals have been detected in NASA's groundwater at levels above their groundwater screening level (GSL)*.[6]

TCE storage tanks on the Air Force/NASA property were poorly maintained and at least one broke, releasing even more TCE into the ground.[7] Wastewater containing a range of contaminants including TCE, hydrazine,[8] polychlorinated biphenyls (PCBs),[9] and other toxic chemicals was dumped in uncapped, unlined ponds[10] that allowed the toxins to percolate into groundwater. The ponds at times exceeded capacity during rainstorms,[11] further releasing contamination into the soil and groundwater.[12] Storage tanks were rinsed down outside, and the contaminated waste water drained into the ground. The decades-long resistance by the Air Force

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[2] NASA, Final RCRA Facility Investigation Report Volume IV, Appendix C, Alfa/Bravo AIG Data Evaluation Report, November 2020, Section 1.2, PDF pg. 14 (link here); Volume V, Appendix D, Coca/Delta AIG Data Evaluation Report (PDF p. 13) (link here)
[3] *Ibid*
[4] NASA, The Use of Trichloroethylene at NASA's SSFL Sites, August 2, 2008, PDF pg. 2 (link here)
[5] *Ibid*
[6] 2020 NASA Final RFI Report: Volume IV Alfa-Bravo, Table 1-4 (pg. 35-36) (link here); Volume III B204-ELV, Table 1-4 (pg. 31-33) (link here); Volume V Coca-Delta, Table 1-4 (pg. 33-34) (link here); Volume II Former LOX Plant, Table 1-3 (pg. 23) (link here). A full list of elevated chemicals is available in Attachment 1 hereto. Note: metals that were detected at elevated concentrations in both solid and solute form were listed in two separate rows in NASA's tables, but are only counted as one chemical for the purposes of this summary.
[7] 2020 NASA Final RFI Report: Volume IV Alfa-Bravo, Section 1.1.1 (pg. 10) (link here)
[8] 2020 NASA Final RFI Report: Volume V Coca-Delta, Section 1.2.5 (pg. 18) (link here); Volume IV Alfa-Bravo, Section 1.2.4 (pg. 17) (link here)
[9] 2020 NASA Final RFI Report: Volume IV Alfa-Bravo, Section 1.2.3 (pg. 17) (link here)
[10] 2020 NASA Final RFI Report: Volume V Coca-Delta, Section 1.3.4 (pg. 295) (link here)
[11] 2020 NASA Final RFI Report: Volume IV Alfa-Bravo, Section 1.1.1 (pg. 10) (link here)
[12] 2023 DTSC Final SSFL PEIR, Section 2.2.2 (pg. 148) (link here)

and NASA to meeting their obligations to remediate the contaminated soil at their old facilities[13] has given the chemicals long periods of time to migrate into the unsaturated soil above the aquifer (the "vadose zone") and the groundwater and below, creating the high concentrations of pollution currently found in NASA's SSFL groundwater.

Unacceptably Narrow Scope of Phase 1

NASA has taken responsibility for contamination created by both it and the Air Force, and is legally required to conduct a cleanup that restores the SSFL aquifer to its original conditions, before it was polluted with immense quantities of toxic chemicals. Despite this obligation, NASA proposes at this stage to leave behind chlorinated ethenes at levels that are still hundreds of times above legal health-based limits,[14] to ignore the other 66 of the 70 toxic chemicals detected at elevated concentrations, and to ignore all but three of its fifty-four contaminated wells.

NASA's draft Phase 1 Corrective Measures Study (CMS) report,[15] and DTSC's corresponding draft Statement of Basis (SB), do not constitute a meaningful groundwater cleanup. The long-overdue cleanup now proposed by NASA and DTSC will only address a tiny fraction of the groundwater contamination that NASA is legally required to clean up, and leave the vast majority of contamination behind. Even within the minimal cleanup areas proposed, NASA and DTSC do not guarantee that the remediation will meet the cleanup standards that NASA is legally required to achieve. Instead, it is likely that NASA and DTSC's proposal would leave behind contaminants far above their legal limits for centuries to come, even in the very limited number of source zones that Phase 1 will address.

Out of the 70 unique chemicals that NASA has detected at elevated concentrations in its areas of impacted groundwater (AIGs) from 1994-2016,[16] the Phase 1 remedial action will

[13] In 2020, NASA released a record of decision (ROD) document in which it indicated its intention to conduct its soil cleanup to a risk-based Suburban Residential Cleanup standard, rather than the background standard to which it is obligated pursuant to the Administrative Order of Consent (AOC). NASA's active resistance to complying with the legally binding AOC it signed has significantly delayed the soil cleanup from being implemented. See 2020 NASA Record of Decision Supplemental Impact Statement for Soil Cleanup Activities at Santa Susana Field Laboratory, Ventura County, California, Section E (pg. 39) (link here).
[14] NASA states in the CMS that "achieving a 90% mass reduction with treatment could be considered optimistic." Areas included in Phase 1 contain levels of TCE exceeding 10,000 µg/L, which is 2,000 times higher than the MCL of 5 µg/L. A 90% reduction of these levels, as NASA proposes, would leave TCE at levels around 1,000 µg/L, or roughly 200 times the legal level, the MCL of 5 µg/L. 2024 NASA Draft Phase 1 CMS, Section 4.2 (pg. 86), Section 6.1.1 (pg. 99), Table 6-8 (pg. 167) (link here)
[15] The CMS report is dated January 2024, but only being circulated for public comment in mid-2025. The delay follows a pattern of repeatedly delaying the cleanup and further violating the 2007 Consent Order's requirement that the permanent remedy for all groundwater was supposed to be in place by 2017.
[16] 2020 NASA Final RFI Report: Volume IV Alfa-Bravo, Table 1-4 (pg. 35-36) (link here); Volume III B204-ELV, Table 1-4 (pg. 31-33) (link here); Volume V Coca-Delta, Table 1-4 (pg. 33-34) (link here); Volume II LOX, Table 1-4 (pg. 23) (link here). A full list of elevated chemicals is available in the Attachment 1 spreadsheet. Note: metals

only consider cleaning up four chemicals: trichloroethylene (TCE) and three decomposition products of TCE – cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), and vinyl chloride (VC).[17] NASA's excuse for focusing on such a small number of chemicals at these wells is that these chemicals purportedly account for the majority of the health risks.[18] *This is highly questionable*,[19] but even if it were true, ignoring toxic chemicals that are dozens of times higher than legal limits because other chemicals are thousands of times higher is not defensible. In any case, the cleanup that NASA is legally required to conduct is not solely a risk-based cleanup: **NASA must restore the aquifer below SSFL to its original natural conditions,[20] before NASA polluted it**.

Out of the 53 monitoring wells at which chlorinated ethene concentrations are greater than their legal maximum concentration limit (MCL),[21] NASA's Phase 1 will only treat the three monitoring wells — WS-09, C-6 and ND-136 — at which the highest saturations of TCE have been detected, i.e. only treating the wells where TCE pollution is *more than 2000 times the MCL* – and aims to merely reduce concentrations so that they are still hundreds of times the MCL. The NASA-DTSC Phase I proposal thus violates both the requirements to reduce contaminants to meet MCLs and to restore the aquifer.

The Phase 1 cleanup also does not address the areas of groundwater where there are no monitoring wells located but where there is surely contamination. And, as indicated above, it doesn't cover cleanup of contaminants other than TCE and some of its degradation products.

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that were detected at elevated concentrations in both solid and solute form were listed in two separate rows in NASA's tables, but are only counted as one chemical for the purposes of this summary.

[17] 2024 NASA Draft Phase 1 CMS, Section 3.2 (pg. 68) (link here)

[18] 2024 NASA Draft Phase 1 CMS, Section 4.2 (pg. 84) (link here).

[19] The draft CMS asserts that chlorinated ethenes are responsible for 99% of the health risk associated with NASA's groundwater. However, the document to which NASA cites to support this claim, the 2021 Human Health and Ecological Risk Assessment (HHERA) (link here), provides no such supporting evidence: in CBG's review of the HHERA document, we could find no singular figure attributing overall groundwater health risk to chlorinated ethenes. Table 7-1 (pg. 134), Table 7-4 (pg. 137), Table 7-7 (pg. 140), and Table 7-10 (pg. 143) of the document show that chlorinated ethenes are responsible for most of the non-cancer hazard index (HI) risk at NASA's four Chatsworth Formation AIGs. These risk estimates at the AIG level could plausibly, depending on NASA's calculations, result in an estimate that chlorinated ethenes account for 99% of the *non-cancer risk*. However, the HHERA tells a very different story for the estimated lifetime cancer risk (ELCR) cancer risk estimates. According to those same aforementioned tables, cancer risk is much more evenly distributed between different COCs in different AIGs. For example, NASA estimates that arsenic accounts for 94% of the cancer risk in the Former Lox Plant AIG's near-surface groundwater (NSGW) and that NDMA accounts for 3% of the cancer risk in the Alfa-Bravo AIG's Chatsworth Formation groundwater (CFGW). Therefore, although it seems plausible that chlorinated ethenes could account for 99% of the *non-cancer risk*, depending on how risk is calculated, it does not seem plausible that chlorinated ethenes could account for 99% of the *cancer risk*. NASA should not make grand claims about chlorinated ethenes' risk contribution without specifying that it is referring to non-cancer risk, rather than cancer risk. There thus appears no basis for ignoring the contamination from chemicals other than VOCs and their degradation products.

[20] 2024 NASA Draft Phase 1 CMS, Section 3.2 (pg. 68) (link here).

[21] See Attachment 2 hereto.

The Proposed Cleanup Excludes Highly Contaminated Wells Without Explanation

The threshold established by DTSC for including wells in Phase I cleanup – that they must **exceed 2,000 times the legal limit for TCE** – is without a defensible basis.[22] One consequence of this arbitrary limit is that many of NASA's most polluted wells will be excluded from Phase 1 cleanup, despite containing high concentrations of the 66 toxins ignored in Phase 1, or concentrations of chlorinated ethenes up to 1,999 times higher than the legal limit.

NASA's Phase 1 CMS defines Phase 1 TTAs as groundwater areas in which TCE has a concentration greater than 10,000 micrograms per Liter (µg/L).[23] The MCL is 5 µg/L: thus the threshold used for considering contaminated wells for remedial action in Phase 1 is *2,000 times higher than the legal safe drinking water MCL.*

At least one well, ND-112, has TCE concentrations that meet the Phase 1 concentration threshold, yet is not included in NASA and DTSC's Phase 1 cleanup.[24] No basis is provided for NASA and DTSC to exclude this well that exceeds their already highly inflated Phase 1 threshold.

Treatment Technologies Chosen Based on Cost-Cutting Rather Than Effectiveness

In considering what cleanup technologies to use for NASA's contaminated groundwater, NASA recommends, and DTSC approves, enhanced in-situ bioremediation (EISB) for one Phase 1 groundwater TTA, ND-136, and pump and treat (P&T) for the other two Phase 1 groundwater TTAs, WS-09 and C-6. However, the agencies' documents are lacking in any substantive comparison of the efficacy and feasibility of these two different technologies. Absent any credible scientific analysis of the technologies, it appears that the deciding factor for the proposed NASA groundwater cleanup is the minimization of NASA's costs.

The NASA draft CMS and DTSC draft SB repeatedly give the impression that EISB and P&T are roughly equally effective technologies, and thus conclude that there is little difference which

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22 NASA admits this number is not based on measurements supporting it, but is based on a "rule of thumb" that is "one approach" to guessing whether Non-Aqueous Phase Liquid (NAPL) is present. See 2020 NASA Draft Phase 1 CMS, Section 2.3.1 (pg. 38) (link here) and Appendix H, Table 1 (pg. 1,093) (link here).
23 2024 NASA Draft Phase 1 CMS, Figure 4-1 (pg. 237) (link here).
24 2023 NASA Annual Groundwater Monitoring Report Table A-1 (pg. 162) (link here); TCE at ND-112 was detected at 12,000 µg/L in 2023. Although TCE concentrations for ND-112 dropped to 6,100 µg/L in 2024, this sample was not collected until after NASA had already submitted to DTSC its Phase 1 CMS, in which ND-112 was excluded from the proposed Phase 1 cleanup (see 2024 NASA Annual Groundwater Monitoring Report, Table D-1 (pg. 486) (link here)

approach gets implemented.[25] P&T and EISB received similar scores in NASA's CMS scoring rubric,[26] with P&T coming out slightly ahead with an overall score of 4.9 (on a scale of 5) for "reduction in toxicity, mobility, and volume," and EISB a score of 4.4, indicating that P&T is the stronger approach for reducing groundwater contamination.

Yet NASA does not provide any defensible explanation to support this scoring outcome, and we have seen no substantive analysis in either document backing up the assertion that P&T is superior. Indeed, some sections of the CMS appear to contradict this claim, indicating that, in fact, EISB is the superior approach, writing that P&T is "relatively ineffective in the removal of contaminant mass,"[27] and that EISB results in "accelerated remediation time frames compared to traditional technologies, such as P&T, that do not enhance dissolution and desorption to the same degree as an EISB approach."[28]

NASA's Groundwater Extraction and Treatment System (GETS) and EISB pilot studies appear to support the superiority of EISB over P&T. Whereas the GETS pilot study was terminated prematurely due to decreasing effectiveness of chlorinated ethene concentration reduction,[29] the EISB pilot study reduced aggregate VOC concentrations in the entire TTA by an estimated 30%.[30] 10 of the 15 monitoring ports from which NASA was collecting data showed TCE concentration reductions of 90% or greater.[31] Frustratingly, NASA submitted its CMS to DTSC *prior to the completion* of the EISB pilot, meaning that none of the study results referenced above were included in the CMS. Although the explicit purpose of the EISB pilot was to inform remedial action decision-making in the CMS, it appears that the results from this study have not been taken into consideration at all.

Furthermore, even at the single area where it plans to conduct EISB, NASA appears to be ignoring another technology option, thermally assisted enhanced in-situ bioremediation (TA-EISB), that could potentially allow NASA to accelerate its remedial timeframes. DTSC has long believed that TA-EISB is a promising technology, and has encouraged NASA to seriously consider it.[32] In its draft Phase 1 SB, however, DTSC does not select TA-EISB as the treatment for ND-136, and does not provide any substantive rationale for that decision.

In the absence of any thorough comparative analysis of the treatment technologies, *NASA appears to have recommended, and DTSC appears to have approved, a cleanup plan based on*

[25] 2024 NASA Draft Phase 1 CMS, Section 7.1.3 (pg. 125) (link here); 2025 DTSC draft Phase 1 SB, Section 5.1 (pg. 30) (link here); 2025 DTSC draft Phase 1 SB, Section 5.1 (pg. 30-31) (link here).
[26] 2024 NASA Draft Phase 1 CMS, Figure 6-4 (pg. 251) (link here).
[27] 2024 NASA Draft Phase 1 CMS, Section 6.1.5.1 (pg. 106) (link here).
[28] 2024 NASA Draft Phase 1 CMS, Section 6.1.6 (pg. 111) (link here)
[29] 2023 Boeing GETS Optimization Approach to Reduce Water Level Drawdown and Increase Mass Removal Efficiency, Section 3 (pg. 5) and Figure 5 (pg. 14) (link here).
[30] Spring 2025 NASA Field Note (pg. 4) (link here).
[31] See Attachment 3 hereto.
[32] 2020 NASA Draft Phase 1 CMS, Appendix H, Table 1, Comment 14 (pg. 1,090) (link here)

convenience rather than based on efficacy. NASA has recommended and DTSC has approved that NASA only implement EISB at one area, ND-136, apparently because this is the only area where all the EISB equipment has already been installed. For the other two treatment areas, WS-09 and C-6, DTSC has recommended P&T, apparently because these areas are located close to existing P&T equipment, and do not have EISB equipment on them.[33] This is not a defensible approach to determining treatment options for NASA's groundwater cleanup, and provides the public no assurance that NASA and DTSC are making cleanup decisions that prioritize public health and the environment, rather than making decisions based on convenience and cost for NASA.

<u>NASA/DTSC Proposal is to Allow *Centuries* to Pass Before the Cleanup Goals are Met for the Three Phase 1 Wells</u>

DTSC, in its SB, identifies state and federal maximum contaminant levels (MCLs) as the interim cleanup goals for the four chemicals that NASA will be focusing on in its Phase 1 cleanup.[34] However, the SB provides no assurance that DTSC will actually be requiring NASA to achieve those MCLs. Instead, it appears likely that DTSC will allow NASA to operate active treatment technologies for 10 years or fewer[35] in order to achieve a relatively fast reduction of TCE concentrations in these three wells to levels still far above MCLs, and then transition to monitored natural attenuation (MNA) to very slowly – over generations – supposedly achieve the remaining several order of magnitude concentration reduction.

NASA predicts that the cleanup alternatives it is recommending for Phase 1 – a few years (~a decade) of active treatment to be followed by MNA (essentially walking away from any further cleanup) – *<u>will take 140 years, 275 years, and 215 years</u>* to achieve the TCE cleanup goal at wells ND-136, WS-09, and C-6, respectively.[36] NASA believes that even these absurd time estimates are optimistic, and that the actual remediation timeline could be much longer.[37]

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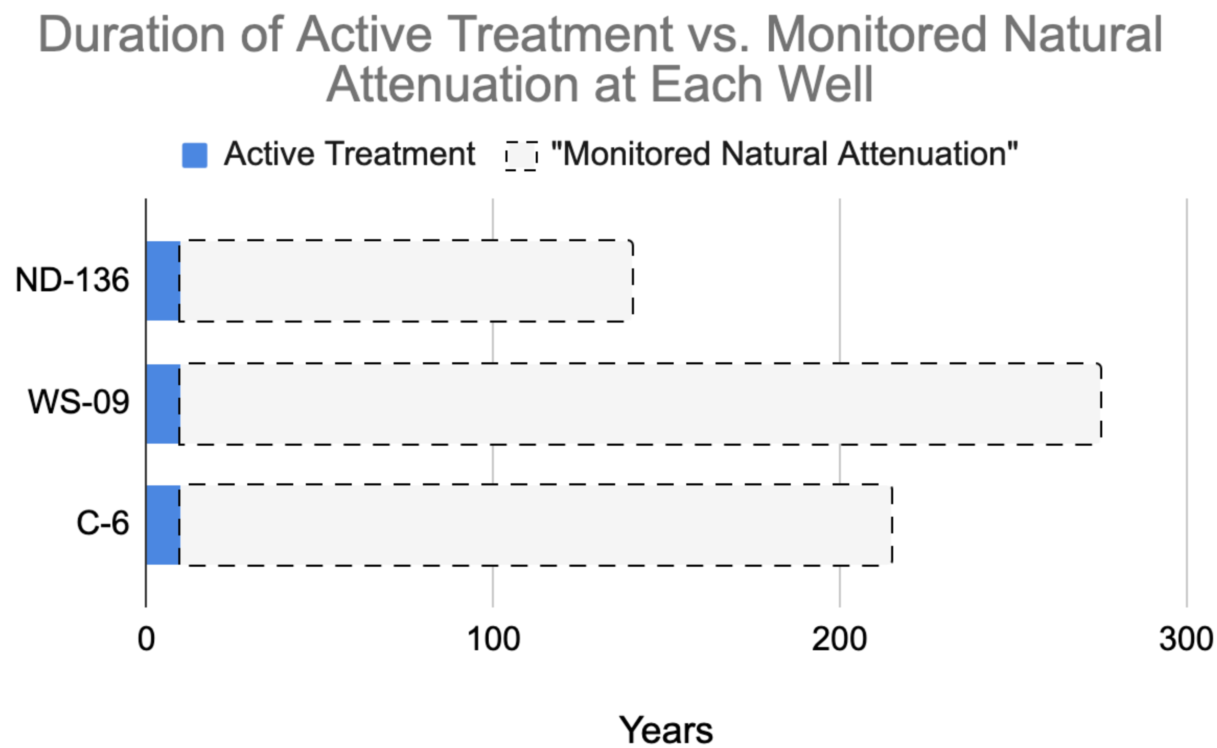
[33] DTSC, in its SB, asserts that one reason that it is not recommending EISB for C-6 is that the Delta Skim Pond could obstruct the installation of the monitoring wells necessary for EISB. However, NASA's draft Phase 1 CMS does not address any physical constraints to the implementability of EISB at C-6. The Phase 1 CMS mentions that there could potentially be challenges associated with permitting for EISB at C-6 because the Delta Skim Pond is under a Hazardous Waste Facility Post-Closure Permit (PCP), but that "NASA will work with DTSC to address how this alternative could be implemented in the C-6 TTA without impacting the status of that permit." (2024 NASA Draft Phase 1 CMS, Table 6-8, pg. 180, link here and 2020 NASA Draft Phase 1 CMS, Section 6.4.7.4, pg. 157, and Section 6.6.7.4, pg. 169, link here). What was the outcome of those conversations between DTSC and NASA? Is EISB officially not eligible to receive permitting at C-6? DTSC's SB provides no clear explanation. (2024 NASA Draft Phase 1 CMS, Table 6-8, pg. 180, link here).

[34] 2025 DTSC draft Phase 1 SB, Section 4.2 (pg. 23) (link here)

[35] 2024 NASA Draft Phase 1 CMS, Section 6.1.1 (pg. 100) (link here)

[36] 2024 NASA Draft Phase 1 CMS, Table 6-1 (pg. 153) (link here)

[37] 2024 NASA Draft Phase 1 CMS, Section 6.1.1 (pg. 101) (link here)



MNA – Abandoning Cleanup Obligations – Likely the Main Alternative for Phase 2

The public-facing explanation that DTSC and NASA provide for separating NASA's groundwater cleanup into a Phase 1 and Phase 2 is that doing so will streamline the cleanup process by allowing NASA to get started on treating the highest-concentration wells while it figures out what its options are for the lower-concentration wells.[38] The reality is much more sinister: NASA and DTSC cut a backroom deal for a trivial active cleanup of three wells in Phase 1, to be followed by a Phase 2 for the rest of the site relying almost exclusively on monitored natural attenuation (MNA).

The decision to separate NASA's groundwater cleanup into a Phase 1 and Phase 2 dates back to 2018, when NASA submitted to DTSC its first draft groundwater CMS. In its 2018 CMS draft, NASA declared that it would only implement active treatment at three high-concentration source zones located at the center of three TCE plumes—WS-09, C-6 and ND-136—and by implication would implement MNA for the rest of those plumes.[39]

[38] 2020 NASA Draft Phase 1 CMS, Executive Summary (pg. 7) (link here)

[39] 2018 NASA draft CMS, Section 4.3 (pg. 68-70) (link here); "NASA has concluded that active plume scale treatment is not possible… [T]reatment appears to be feasible only in small localized areas where high concentrations in groundwater can be remediated to limit the downgradient migration of contaminants to the downgradient plume."

DTSC knew that it would be legally vulnerable would it approve such a document, given its responsibility to enforce a cleanup to MCLs and to background.[40] After closed-door meetings in 2019 and 2020 between DTSC and NASA about the 2018 draft groundwater CMS,[41] DTSC and NASA compromised (i.e., DTSC caved) by agreeing to separate NASA's groundwater cleanup process into two phases. As discussed herein, the first phase would contain active treatment for a few wells for a short period of time, and the second apparently would be fully if not entirely composed of MNA.

The second revision of the CMS report, which NASA submitted to DTSC in September 2020, was the draft Phase 1 CMS. It presented the exact same plan as the 2018 draft in regards to the active treatment of TCE at the same three discrete TTAs, but rather than proposing MNA for the rest of the COCs and the rest of the TCE contamination outside of the TTAs, the new report said that any contamination in groundwater or soil vapor that was outside the scope of the Phase 1 would be "assessed"[42] (without an explicit commitment that it would be actually *remediated*) in the forthcoming Phase 2 CMS report. The final Phase 1 CMS is structured identically to the previous 2020 draft and states that NASA has agreed to "address"[43] in Phase 2 the contaminated areas and the contaminants that were not remediated in Phase 1, once again without explicit commitment to remediating them in Phase 2.

NASA appears likely to propose, and DTSC to approve, a Phase 2 groundwater cleanup that will be composed predominantly if not fully of MNA (i.e., allowing NASA to just walk away from groundwater cleanup obligations). In a March 2023 document transmitted from NASA to DTSC about a monitoring well located in the Coca-Delta Chatsworth Formation AIG, NASA wrote that "identifying the depth, downgradient distribution, and COC concentration trends of the Coca Area COC plume is required to support the Phase 2 CMS MNA evaluations."[44] Furthermore, in a May 2023 DTSC letter to NASA, DTSC wrote that a computer modeling report that NASA had previously submitted to DTSC, which NASA is using to forecast how its chlorinated ethene plumes will migrate between the years 2080 and 2260,[45] "will be used later for locating monitoring wells for Monitored Natural Attenuation and support remedial design and

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[40] 2020 NASA Draft Phase 1 CMS, Table 1, Comment 37 (pg. 1,093) (link here) DTSC, in its comments on NASA's initial groundwater CMS draft, wrote that "None of the three alternatives listed achieve the cleanup objective of aquifer restoration."
[41] The decision to separate NASA's groundwater cleanup into a Phase 1 and a Phase 2 appears to have been made in a meeting between DTSC and NASA on January 24, 2020. See 2020 NASA Draft Phase 1 CMS, Table 1, Comment 37 (pg. 1,093) (link here) for further discussion.
[42] 2020 NASA Draft Phase 1 CMS, Section 2.3 (pg. 38) (link here)
[43] 2024 NASA Draft Phase 1 CMS, Section 4.2 (pg. 84) (link here).
[44] 2023 NASA Coca Plume Monitored Natural Attenuation Data Gap Well Installation Work Plan to Support Phase 1 CMS Design and Implementation Activities, Section 1.1 (pg. 9) (link here)
[45] 2022 Numerical Groundwater Model Documentation for the Coca-Delta Areas of Impacted Groundwater, Figure 7-5a (pg. 89) and Figure 7-5b (pg. 90) (link here)

implementation."[46] Though NASA and DTSC do not explicitly state it in the Phase 1 CMS and SB, their correspondence strongly suggests that both agencies are preparing to allow most if not all of the contamination that is left behind after Phase 1 to "naturally attenuate" over centuries rather than be actively treated.

Implementing MNA in Phase 2 for the groundwater contamination that is not addressed in Phase 1, if this is indeed what NASA and DTSC agree to, is a decision that will expose the public to great risk of contaminant migration offsite through the various migration pathways[47] that connect NASA's AIGs to the offsite seeps and springs and neighboring aquifers, impacting wildlife as well as the surrounding human communities.

NASA and DTSC assert that the COC plumes in NASA's AIGs, if left unremediated for the next several decades through monitored natural attenuation (MNA), will not become larger and expand offsite but will rather become smaller and shrink towards their center as the contamination inside them diffuses outwards from the center at concentrations below their screening levels. Since a *plume* is defined as a region of groundwater in which a contaminant exceeds its screening level, the slow, widespread diffusion of contamination throughout NASA's AIGs will not reduce the amount of contamination that is held in the aquifer, in terms of the mass of the contaminants, but will rather alter the aquifer's contaminant plumes, because the diffusion will cause contaminant spread and thus concentrations to eventually become lower than their screening level, and thus no longer considered a plume, over very long periods. *Dilution is not the solution to pollution*. Furthermore, this assertion is based on computer simulations, not on real life. In real life, NASA continues to add new plumes and expand existing plumes on the maps of its groundwater contamination in response to new monitoring well data that shows the detections of new COCs or the detection of new maximum concentrations of COCs that had already been detected at those wells.[48]

Furthermore, even assuming that NASA's computer modeling simulations are an accurate representation of NASA's current AIG conditions, the simulations do not consider potential future changes to the AIGs' recharge rate. The "atmospheric rivers" which southern California is expected to experience with an increasing frequency and increasing severity in the coming decades as a result of climate change[49] will deliver historically unprecedented volumes of rain water into NASA's subsurface in short discrete pulses, unlike the slow, steady, and low-volume rain patterns that have historically characterized groundwater recharge in NASA's AIGs.[50] If the

[46] May 22, 2023 DTSC Memo: Numerical Groundwater Model Documentation for Coca/Delta Area of Impacted Groundwater, Introduction (pg. 2) (link here)
[47] 2018 NASA Draft CMS, Figures 2-10 (pg. 161), 2-12 (pg. 165), 2-15 (pg. 172), and 2-19 (pg. 180) (link here)
[48] 2024 NASA SSFL Area I LOX and Area II Groundwater Monitoring Report Annual 2024, Section 4.2.4 (pg. 22-26) (link here).
[49] Stone, Erin. "LA Is Capturing More Rain, But Increasingly Extreme Storms Present A Challenge." *LAist*. February 27, 2023 (link here).
[50] 2023 NASA Annual Groundwater Monitoring Report, Table C-1 (pg. 451) (link here).

relationship between rainfall and SSFL groundwater recharge is indeed non-linear, as some analysis has indicated,[51] these atmospheric rivers are likely to accelerate both the short-term and the long-term migration of contaminants throughout NASA's AIGs, permanently altering the geometry of NASA's COC plumes and increasing the health hazards they pose to humans and wildlife.

Failure to Employ Key Cleanup Technology for TCE Vapor in Bedrock at Two of the Three Phase 1 Wells

Whereas the cleanup we have been discussing so far is for the groundwater itself, the TCE contamination also exists as vapor in the bedrock and soil that overlie the aquifer. This contamination needs to be cleaned up, and NASA addresses its soil vapor contamination in the Phase 1 CMS. NASA has demonstrated that the use of a certain kind of cleanup technology, Bedrock Vapor Extraction (BVE), achieved a significant reduction of TCE in bedrock. Despite that success, NASA set thresholds for using BVE at 25,000 times higher than residential risk-based screening levels, thus avoiding using BVE in other cleanup zones. In other words, NASA is proposing to avoid using cleanup technology in Phase 1 that it knows is effective. NASA's proposal is woefully inadequate, inexplicably declining to use a technology it has demonstrated to be effective.

NASA and DTSC argue that bedrock vapor extraction (BVE) is an effective technique for the cleanup of contaminated soil vapor. Yet they have abandoned plans for BVE in the Phase I CMS. Without removing significant amounts of chlorinated ethene contaminant mass from the bedrock via BVE or some other technique, contaminants will continue to percolate into the saturated zone, causing increases in contaminant concentrations at the center of chlorinated ethene plumes and thus continuing to spread contamination throughout the aquifer.

NASA's recent BVE pilot at the ND-136 TTA demonstrated that BVE is an apparently effective technology that can and should be implemented at NASA's other chlorinated ethene source zones. In 21 months, using only one well, BVE achieved a reduction of approximately 1,160 pounds of TCE,[52] or 6.2% of the presumed entire Alfa vadose zone TCE mass.[53] (As indicated earlier, the vadose zone is the unsaturated soil and bedrock above an aquifer.)

However, as with the cleanup of Chatsworth Formation groundwater, NASA set its own Phase 1 TTA concentration threshold for vadose zone soil vapor so high—at 12,000,000 micrograms per cubic meter ($\mu g/m^3$),[54] *more than 25,000 times* the residential risk-based screening (RBSL) level

[51] 2022 DTSC Comments on Boeing Mountain-Scale Flow Groundwater Report, Comment 5 (pg. 12-13) (link here).
[52] Spring 2025 NASA SSFL Field Note (pg. 4) (link here)
[53] 2020 NASA Draft Phase 1 CMS, Table 2-2 (pg. 61) (link here)
[54] 2024 NASA Draft Phase 1 CMS, Section 2.3.1 (pg. 43) (link here)

for soil vapor[55]—that NASA proposes to not implement BVE at two of its most highly saturated chlorinated ethene source zones, C-6 and WS-09. NASA selected 12,000,000 µg/m^3 as the Phase 1 soil vapor threshold based on a computer modeling simulation,[56] *which DTSC itself found questionable*. In 2022, DTSC referred to the 12,000,000 µg/m^3 threshold as "arbitrary" and demanded that NASA select a new, more accurate one.[57] Now, when the time comes to actually exert its regulatory authority in order to enforce a more logical and protective cleanup, DTSC backs down and allows NASA to do whatever it pleases.

Thus, NASA has already conducted a BVE pilot study, finding that BVE is effective at reducing TCE levels in the vadose zone, yet has set such a high threshold level for the inclusion of soil vapor in Phase 1 that two of its most contaminated chlorinated ethene source zones are excluded. At another area of exceptionally high soil vapor TCE concentrations, the ND-112 monitoring well located in the Former Lox Plant AIG, NASA does not commit to full-scale BVE treatment in Phase 1, but instead intends to conduct another BVE "pilot study," with results to be included in Phase 2.[58] Although this is better than NASA doing nothing, as it appears will likely be the case for soil vapor contamination at C-6 and WS-09, the fact that NASA is merely doing a pilot study, not full-scale treatment, provides no reassurance that NASA will actually achieve specific cleanup goals during the pilot or will scale up the pilot into a full-scale BVE treatment at ND-112 in the Phase 2 CMS. NASA has already demonstrated at ND-136 that BVE is effective; there should be no further BVE pilot study, but rather implementation of the treatment that NASA already knows works.

<u>DTSC Acting as Advocate for, Rather Than Regulator of, the Responsible Party, NASA</u>

In a normal regulatory setting, the polluter would propose its preferred remedy and opponents would identify defects in the proposal and better alternatives and the public would be able to comment on the responsible party's proposal. Then, having heard from both sides and the general public, the regulator would consider all that information and issue a proposed decision, which would be subject to further public input and final revision. In robust proceedings, the responsible party and intervenor groups would all be parties, able to call expert witnesses to testify and submit evidence, before Administrative Law Judges. But at minimum, the agency would hear from all sides before making its proposed decision.

In this case, however, DTSC held a public hearing in which it put forward NASA's proposal and DTSC's plan to adopt it. Similarly, DTSC issued its proposed Statement of Basis, which essentially adopts the responsible party's proposal, with public comment limited to after-the-fact objections.

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55 2022 DTSC-Boeing Settlement Agreement, Exhibit 5 (pg. 140) (link here)
56 2024 NASA Draft Phase 1 CMS, Appendix A, Table 3 (pg. 267) (link here).
57 October 3, 2022 letter from DTSC to NASA (pg. 1) (link here).
58 2024 NASA Draft Phase 1 CMS, Section 4.2 (pg. 84) (link here).

DTSC appears far more interested in protecting the responsible party than protecting the public and environment. Though the cleanup under consideration is for groundwater contaminated by NASA, and though NASA is the author of the main substantive environmental document at issue (the *Phase 1 Corrective Measures Study*), DTSC has basically adopted whatever NASA has proposed. *Indeed, at the public meeting held by DTSC, it appeared to present NASA's proposals as its own.* DTSC is ostensibly the regulator overseeing the cleanup, yet here it seems rather to be doing work on behalf of one of the parties it is supposed to be regulating, NASA.

Conclusion

The public should not be deceived: NASA has no intention to fulfill its legal responsibility to restore its groundwater at SSFL to background conditions, nor anywhere near legal risk-based Maximum Concentration Limits. Instead, it hopes to conduct a low-cost, low-stakes Phase 1 minimal partial cleanup on just 3 wells to pretend to address the public's immediate concerns that nothing is being done, then wait until several years from now to quietly slide a Phase 2 MNA plan through the regulatory process without making it clear that regulators would be allowing NASA to walk away from almost all of its groundwater cleanup obligations. As the responsible party with the first groundwater cleanup plan for which comments are allowed, NASA's groundwater cleanup also sets an important precedent for those of Boeing and DOE. DTSC's unconditional approval of essentially everything that NASA proposes in its CMS document[59] demonstrates that DTSC is collaborating with, rather than regulating, NASA in this decisive moment for determining whether the contamination at SSFL will ever be cleaned up.

For more information, please visit committeetobridgethegap.org, or email us at committeetobridgethegap@gmail.com

[59] For NASA's cleanup recommendations, see 2024 NASA Draft Phase 1 CMS, Section 7.1.3 (pg. 125) and Section 7.2.3 (pg. 127) (link here). For DTSC's cleanup recommendations, see 2025 DTSC Draft Phase 1 SB, Section 5.1 (pg. 30-31) and Section 5.2 (pg. 31) (link here).

Attachment 1

Elevated chemicals
Source: 2020 NASA Final RFI Report; Volume IV Alfa-Bravo, Table 1-4 (pg. 35-36); Volume III B204-ELV, Table 1-4 (pg. 31-33); Volume V Coca-Delta, Table 1-4 (pg. 33-34); Volume II LOX, Table 1-4 (pg. 23).
(C11-C14)
(C12-C14)
(C14-C20)
(C15-C20)
(C21-C30)
(C4-C12)
(C6-C12)
(C8-C11)
(C8-C30)
(C8-C32)
(C8-C40)
1,1-Dichloroethane
1,1-Dichloroethene
1,1,2-Trichloro-1,2,2-trifluoroethane
1,1,2-Trichloroethane
1,2-Dibromoethane
1,2-Dichloroethane
1,2,3-Trichloropropane
1,3-Dinitrobenzene
1,4-Dioxane
2-Butanone
2,3,7,8-Tetrachlorodibenzo-p-dioxin
2,6-Dinitrotoluene
3,3'-Dichlorobenzidine
4,6-Dinitro-2-methylphenol
Alpha, gross, dissolved
Aluminum
Antimony
Arsenic
Barium
Beryllium
Beta, gross, dissolved
Bis(2-ethylhexyl)phthalate
Boron
Cadmium
Chloride
Chromium
cis-1,2-Dichloroethene
Cobalt
Copper

Fluoride
Formaldehyde
Hexavalent chromium
Iron
Lead
Magnesium
Manganese
Mercury
Methyl-tert-butyl Ether
Methylene chloride
Molybdenum
n-Nitroso-di-n-propylamine
n-Nitrosodimethylamine
Nickel
Nitrate
Potassium
Selenium
Silver
Sodium
Strontium
Sulfate
Thallium
Tin
Toluene
Total petroleum hydrocarbons as diesel
Total petroleum hydrocarbons as gasoline
trans-1,2-Dichloroethene
Trichloroethene
Vanadium
Vinyl chloride

Attachment 2

Monitoring location	TCE concentration	TCE exceeds MCL? (Y/N)	Other COC(s) that exceed MCL, if TCE is below MCL? (Y/N)	Chemical(s) (Excuding TCE)	Well with a chlorinated ethene exceedance?	Well ID	Singular wells with a chlorinated ethene exceedance?	Singular well?
C-5-1	44	Y	-		X	C-5-1	X	X
C-5-2	46	Y	-		X	C-5-2		
C-5-3	0.45	N	Y	1,4-dioxane, cis-1,2-DCE, VC	X	C-5-3		
C-5-4	1.2	N	Y	cis-1,2-DCE, VC	X	C-5-4		
C-5-5	1.2	N	Y	1,4-dioxane, cis-1,2-DCE, VC	X	C-5-5		
C-5-6	1.1	N	Y	VC	X	C-5-6		
C-6	410	Y	-		X	C-6	X	X
C-7-1	110	Y	-		X	C-7-1	X	X
C-7-2	4.7	N	Y	cis-1,2-DCE, trans-1,2-DCE, VC	X	C-7-2		
C-7-3	7.3	Y	-		X	C-7-3		
ES-19	0.39	N	N			ES-19		X
ES-21	2	N	N			ES-21		X
HAR-06	0.39	N	Y	1,1-DCE	X	HAR-06	X	X
HAR-22	0.87	N	N			HAR-22		X
ND-111-1	0.39	N	N			ND-111-1		X
ND-111-2	1	N	N			ND-111-2		
ND-111-3	1.6	N	Y	cis-1,2-DCE	X	ND-111-3	X	
ND-112-2	6100	Y	-		X	ND-112-2	X	X
ND-112-3	6000	Y	-		X	ND-112-3		
ND-112-4	130	Y	-		X	ND-112-4		
ND-113-1	2.8	N	Y	cis-1,2-DCE, trans-1,2-DCE	X	ND-113-1	X	X
ND-113-2	5.1	Y	-		X	ND-113-2		
ND-113-3	9.2	Y	-		X	ND-113-3		
ND-114-1	140	Y	-		X	ND-114-1	X	X
ND-114-2	87	Y	-		X	ND-114-2		
ND-114-3	0.45	N	Y	cis-1,2-DCE, 1,4-dioxane	X	ND-114-3		
ND-114-4	0.39	N	Y	cis-1,2-DCE, VC	X	ND-114-4		
ND-115-1	0.47	N	Y	cis-1,2-DCE, VC	X	ND-115-1	X	X
ND-115-2	450	Y	-		X	ND-115-2		
ND-115-3	96	Y	-		X	ND-115-3		
ND-115-4	0.39	N	Y	VC, 1,4-dioxane	X	ND-115-4		
ND-116-2	0.57	N	Y	1,4-dioxane, cis-1,2-DCE	X	ND-116-2	X	X
ND-116-3	30	Y	-		X	ND-116-3		
ND-116-5	0.39	N	N			ND-116-5		
ND-116-6	0.39	N	Y	1,4-dioxane		ND-116-6		
ND-117	0.39	N	N			ND-117		X
ND-118	2	N	N			ND-118		X
ND-123-1	80	Y	-		X	ND-123-1		X
ND-122-2	0.3	N	N			ND-122-2		X
ND-122-3	0.2	N	N			ND-122-3		
ND-123-2	1.7	N	N			ND-123-2		
ND-123-3	1.8	N	Y	cis-1,2-DCE	X	ND-123-3		
ND-123-4	0.39	N	N			ND-123-4		
ND-124-4	0.39	N	N			ND-124-4		X
ND-125-1	16	Y	-		X	ND-125-1	X	X
ND-125-2	29	Y	-		X	ND-125-2		
ND-125-3	1	N	Y	cis-1,2-DCE, VC	X	ND-125-3		
ND-125-4	0.39	N	Y	VC	X	ND-125-4		
ND-125-5	0.39	N	Y	1,4-dioxane, VC	X	ND-125-5		
ND-126	0.39	N	N			ND-126		X
ND-128-1	13	Y	-		X	ND-128-1	X	X
ND-128-2	2.2	N	Y	cis-1,2-DCE	X	ND-128-2		
ND-128-3	30	Y	-		X	ND-128-3		
ND-132-1	45	Y	-		X	ND-132-1	X	X
ND-132-3	70	Y	-		X	ND-132-3		
ND-132-5	6.5	Y	-		X	ND-132-5		
ND-133-1	0.39	N	N			ND-133-1		X
ND-133-3	1.4	N	Y	cis-1,2-DCE	X	ND-133-3	X	
ND-133-4	8.7	Y	-		X	ND-133-4		
ND-134-1	2000	Y	-		X	ND-134-1	X	X
ND-134-3	2.4	N	Y	1,4-dioxane		ND-134-3		
ND-134-4	7.4	Y	-		X	ND-134-4		
ND-135-1	91	Y	-		X	ND-135-1	X	X

ND-135-2	64	Y	-		X	ND-135-2		
ND-135-4	1.7	N	Y	cis-1,2-DCE, VC	X	ND-135-4		
ND-135-6	0.2	N	Y	VC	X	ND-135-6		
ND-136	13000	Y	-		X	ND-136	X	X
ND-137A	0.39	N	N			ND-137A		X
ND-137B	9.6	Y	-		X	ND-137B	X	
ND-138A	0.68	N	N			ND-138A		X
ND-138B	0.51	N	N			ND-138B		
ND-160	7400	Y	-		X	ND-160	X	X
ND-160-1	550	Y	-		X	ND-160-1		
ND-160-2	8	Y	-		X	ND-160-2		
ND-160-3	37	Y	-		X	ND-160-3		
ND-160-4	14	Y	-		X	ND-160-4		
ND-160-5	190	Y	-		X	ND-160-5		
ND-160-6	200	Y	-		X	ND-160-6		
ND-160-7	140	Y	-		X	ND-160-7		
ND-161	11	Y	-		X	ND-161	X	X
ND-161-1	24	Y	-		X	ND-161-1	X	
ND-161-2	6.8	Y	-		X	ND-161-2		
ND-161-3	23	Y	-		X	ND-161-3		
ND-161-4	19	Y	-		X	ND-161-4		
ND-161-5	24	Y	-		X	ND-161-5		
ND-161-6	9.8	Y	-		X	ND-161-6		
ND-162	5600	Y	-		X	ND-162	X	X
ND-163-1	5300	Y	-		X	ND-163-1	X	X
ND-163-2	7.7	Y	-		X	ND-163-2		
ND-163-3	910	Y	-		X	ND-163-3		
ND-163-4	970	Y	-		X	ND-163-4		
ND-163-5	15	Y	-		X	ND-163-5		
ND-164	33000	Y	-		X	ND-164	X	X
ND-165-1	6200	Y	-		X	ND-165-1	X	X
ND-165-2	1100	Y	-		X	ND-165-2		
ND-165-3	1800	Y	-		X	ND-165-3		
ND-165-4	19	Y	-		X	ND-165-4		
ND-165-5	13	Y	-		X	ND-165-5		
ND-166	43000	Y	-		X	ND-166	X	X
ND-167-1	1700	Y	-		X	ND-167-1	X	X
ND-167-2	8900	Y	-		X	ND-167-2		
ND-167-3	17	Y	-		X	ND-167-3		
ND-167-4	39	Y	-		X	ND-167-4		
ND-167-5	79	Y	-		X	ND-167-5		
ND-168-1	7200	Y	-		X	ND-168-1	X	X
ND-168-2	8300	Y	-		X	ND-168-2		
ND-168-3	26	Y	-		X	ND-168-3		
ND-168-4	11	Y	-		X	ND-168-4		
ND-168-5	3.1	N	Y	1,4-dioxane, cis-1,2-DCE, trans-1,2-DCE	X	ND-168-5		
ND-168-6	3.9	N	Y	1,4-dioxane, cis-1,2-DCE, VC	X	ND-168-6		
ND-169	19000	Y	-		X	ND-169	X	X
NS-42B	580	Y	-		X	NS-42B	X	X
PZ-001E	190	Y	-		X	PZ-001E	X	X
PZ-001F	39	Y	-		X	PZ-001F		
PZ-007G	64	Y	-		X	PZ-007G	X	X
PZ-009F	66	Y	-		X	PZ-009F	X	X
PZ-009D	7.7	Y	-		X	PZ-009D		
PZ-010G	8.1	Y	-		X	PZ-010G	X	X
PZ-010F	64	Y	-		X	PZ-010F		
PZ-017A	32	Y	-		X	PZ-017A	X	X
PZ-017B	2.5	N	Y	NDMA, cis-1,2-DCE, trans-1,2-DCE, VC	X	PZ-017B		
PZ-047	280	Y	-		X	PZ-047	X	X
PZ-054	0.39	N	N			PZ-054		X
PZ-048	0.39	N	Y	cis-1,2-DCE, VC	X	PZ-048	X	X
PZ-058	0.39	N	N			PZ-058		X
PZ-129	75	Y	-		X	PZ-129	X	X
PZ-139	1.3	N	N			PZ-139		X
PZ-140	1.3	N	N			PZ-140		X
PZ-141	30	Y	-		X	PZ-141	X	X
PZ-146	3.9	N	N			PZ-146		X

PZ-144	0.39	N	N			PZ-144		X
PZ-147	0.39	N	N			PZ-147		X
PZ-148	0.58	N	N			PZ-148		X
PZ-154	48000	Y	-		X	PZ-154	X	X
PZ-158	0.39	N	N			PZ-158		X
PZ-155	3.6	N	Y	cis-1,2-DCE, VC	X	PZ-155	X	X
RD-04	2000	Y	-		X	RD-04	X	X
RD-101-5	380	Y	-		X	RD-101-5	X	X
RD-101-9	150	Y	-		X	RD-101-9		
RD-26	1.6	N	N			RD-26		X
RD-79	35	Y	-		X	RD-79	X	X
RD-80	2.6	N	N			RD-80		X
RD-82	0.2	N	N			RD-82		X
RS-21	7.7	Y	-		X	RS-21	X	X
WS-12A	2.1	N	N			WS-12A		X
WS-12B	0.33	N	N			WS-12B		
RD-05A	0.39	N	Y	NDMA		RD-05A		X
RD-05B	0.39	N	Y	NDMA		RD-05B		
RD-05C	0.39	N	N			RD-05C		
RD-09	190	Y	-		X	RD-09	X	X
RD-40	0.39	N	N			RD-40		X
RD-41B	69	Y	-		X	RD-41B	X	X
RD-41C	7.2	Y	-		X	RD-41C		
RD-82	0.39	N	N			RD-82		X
RD-42	0.39	N	N			RD-42		X
RD-56A-1	240	Y	-		X	RD-56A-1	X	X
RD-56A-2	270	Y	-		X	RD-56A-2		
RD-56A-3	92	Y	-		X	RD-56A-3		
RD-56B	0.39	N	N			RD-56B		
RD-60	140	Y	-		X	RD-60	X	X
RD-68A	0.39	N	N			RD-68A		X
RD-68B	0.39	N	N			RD-68B		
RD-69	0.39	N	N			RD-69		X
RD-70	0.39	N	N			RD-70		X
RD-81-1	0.39	N	Y	1,4-dioxane		RD-81-1		X
RD-81-2	0.54	N	Y	cis-1,2-DCE	X	RD-81-2	X	
RD-81-3	0.69	N	N			RD-81-3		
RD-81-4	0.8	N	N			RD-81-4		
RD-83	0.85	N	N			RD-83		X
SP-25A	0.39	N	N			SP-25A		X
SP-25B	0.39	N	N			SP-25B		
SP-25C	0.39	N	N			SP-25C		
SP-25D	0.39	N	N			SP-25D		
SP-29A	0.39	N	N			SP-29A		X
SP-29B	0.39	N	N			SP-29B		
SP-29C	0.39	N	N			SP-29C		
SP-30A	0.39	N	N			SP-30A		X
SP-30B	0.39	N	N			SP-30B		
SP-30C	0.39	N	N			SP-30C		
SP-30D	0.39	N	N			SP-30D		
SP-33A	0.39	N	N			SP-33A		X
SP-33B	0.39	N	N			SP-33B		
SP-33C	0.39	N	N			SP-33C		
SP-881A	0.39	N	Y	cis-1,2-DCE, VC	X	SP-881A	X	X
SP-881G	0.5	N	Y	cis-1,2-DCE	X	SP-881G		
SP-882A	0.39	N	N			SP-882A		X
SP-882G	0.39	N	N			SP-882G		
SP-890A	2	N	Y	cis-1,2-DCE, VC	X	SP-890A	X	X
SP-890G	1100	Y	-		X	SP-890G		
WS-04A	0.39	N	N			WS-04A		X
WS-09A	0.39	N	Y	cis-1,2-DCE	X	WS-09A	X	X
Exceedances		94	36				53	65
Source: 2023 NASA Groundwater Monitoring Report, Table 4-4 (pg. 85-105) & Table A-1 (pg. 125-427), 2024 NASA Groundwater Monitoring Report, Table 4-4 (pg. 90-128) & Table D-1 (pg. 477-572).								

Attachment 3

Well ID	Concentration from Sample taken 1/11/23	Concentration from Sample taken 5/30/23	Concentration from Sample taken 8/29/23	Concentration from Sample taken 11/30/23	Concentration from Sample taken /29/24	Concentration from Sample taken 6/27/24	Concentration from Sample taken 8/15/24	Concentration from Sample taken 12/12/24	Change (%)
ND-163-1	3100	2600	56	22	5700	770	32	58	-98.13%
ND-163-2	890	40	170	7.4	10	31	43	57	-93.60%
ND-163-3	7900	2700	120	90		19	3.5	39	-99.51%
ND-163-4	12000	3100	390	81	2300	52	44	39	-99.68%
ND-163-5	3000	260	490	250	1800	16	47	3.9	-99.87%
ND-165-1	38000	10000	26000	30000	45000	24000	2	38000	0.00%
ND-165-2	11000	39	39	10	12	6000	60000	2600	-76.36%
ND-165-3	670	15	56	4.3	13	1200	2600	480	-28.36%
ND-165-4	1700	590	110	13	11	1800	74	700	-58.82%
ND-165-5	7400	2900	2600	2400	10	780	38	77	-98.96%
ND-167-1	7900	1800	11000	120	1600	1200	1300	14	-99.82%
ND-167-2	9900	8800	790	11000	9800	8200	18000	13000	31.31%
ND-167-3	860	2300	73	34	20	8.2	10	9.7	-98.87%
ND-167-4	760	1300	30	23	8.3	6.6	8.3	9.7	-98.72%
ND-167-5	6600	4100	520	160	72	48	53	74	-98.88%
Sum	111680	40544	42444	44214.7	66356.3	44130.8	82254.8	55161.3	-50.61%

Source: 2024 Q4 NASA Waste Discharge Requirements Report, Table B-2 (pg. 55).

Concentrations are in units of micrograms per liter (ug/L).