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June 10, 2025

VIA E-MAIL AND U.S. MAIL

Mr. Paul Carpenter
Department of Toxic Substances Control
SSFL NASA GW CMS SB Phase 1 Public Comment
8800 Cal Center Drive, Sacramento, CA 95826
Email: DTSC_SSFLPublicComments@dtsc.ca.gov

Re: Comment Letter Regarding NASA Draft Phase 1 Groundwater Corrective Measures Study and DTSC Draft Groundwater Phase 1 Statement of Basis, Santa Susana Field Laboratory, Ventura County, California

Dear Mr. Carpenter:

This firm represents the City of Los Angeles, the City of Simi Valley, the County of Los Angeles, and the County of Ventura (collectively, the Local Jurisdictions), and submits these comments on their behalf regarding the National Aeronautics and Space Administration's (NASA) Draft Phase 1 Groundwater Corrective Measures Study (CMS) and the California Department of Toxic Substances Control's (DTSC) Draft Groundwater Phase 1 Statement of Basis (SB) regarding the NASA-administered portion of Santa Susana Field Laboratory (SSFL), Ventura County, California.

The Local Jurisdictions, with technical assistance from their consultant, Formation Environmental, LLC (Formation), have reviewed the potential cleanup methods evaluated in the CMS and DTSC's proposed remedy outlined in the SB. The Local Jurisdictions appreciate the opportunity to provide meaningful input and to work with DTSC to approve cleanup plans for SSFL. At the outset, the Local Jurisdictions support DTSC's continued oversight and enforcement of the 2007 Consent Order for Corrective Action, Health and Safety Code Section 25187, Docket No. P3-07108-003 (2007 Consent Order), and State Water Resources Control Board (SWRCB) Resolution No. 92-49, and prompt cleanup of the SSFL site, which included protections for the surrounding community. Any deviation from the requirements in the 2007 Consent Order and/or the SWRCB Resolution No. 92-49 would constitute a violation of their terms and obligations.

The Local Jurisdictions understand that NASA has proposed a two-phase cleanup approach in response to comments from DTSC and the Los Angeles Regional Water Quality Board (Regional Water Board), which identified significant deficiencies in NASA's August 2018 Draft Groundwater Corrective Measures Study. Phase 1 evaluates cleanup remedies for the

four Target Treatment Areas (TTAs) of groundwater and bedrock vapor contamination at NASA's portion of the SSFL; Phase 2 will address the remainder of NASA's site, based on information and data derived from Phase 1.

DTSC plans to issue a Final Statement of Basis for NASA Phase 1, which will adopt a final environmental cleanup decision for the TTAs, after considering comments submitted by the public on DTSC's draft SB and NASA's draft CMS. DTSC published the draft SB and CMS for public comment per DTSC's obligations under the Resources Conservation and Recovery Act (RCRA), as delegated to DTSC under state law.

Furthermore, DTSC stated it would issue a Notice of Determination (NOD) under the California Environmental Quality Act (CEQA) when it adopts the final NASA Phase I groundwater remedy. It is anticipated that this would be DTSC's first approval of a cleanup plan for SSFL under the 2023 Program Environmental Impact Report (PEIR) for the SSFL remedial activities. However, DTSC did not include any draft CEQA findings or other discussion of the CEQA process with the draft SB. The Local Jurisdictions assume that DTSC intends to rely on the PEIR in making its final cleanup decision for Phase 1. However, with no draft CEQA findings or NOD to review, it is unclear how DTSC intends to demonstrate that the final NASA Phase 1 groundwater remedy falls within the PEIR and that its actions comply with CEQA.

This uncertainty is compounded by the nature of the two-phase approach for groundwater mediation at the NASA site. Because DTSC does not plan to approve a cleanup plan for the groundwater for the entirety of NASA's site at this time, but rather intends to use the Phase 1 to inform cleanup of the rest of the site, there is no decision on final cleanup criteria for NASA SSFL groundwater. As a result, the Local Jurisdictions and public cannot determine whether the approach proposed in the CMS and SB will ultimately comply with the cleanup standards in the 2007 Consent Order for NASA's groundwater remediation. By the same measure, the Local Jurisdictions also cannot evaluate whether the proposed groundwater remedy represents significant changes from the Project as described in the PEIR certified by DTSC in 2023, or whether it introduces new information that was not previously considered.

The Local Jurisdictions understand that DTSC is seeking public comment on the draft CMS and SB primarily under RCRA, not CEQA, and that these uncertainties will be addressed by DTSC in the future. Accordingly, the Local Jurisdictions reserve their rights to provide comments on DTSC's CEQA determination and final NASA Phase 1 groundwater remedy. To the extent the Local Jurisdictions may be required to exhaust administrative remedies at this stage,[1] the Local Jurisdictions submit this comment letter that outlines their preliminary

[1] In January 2024, although DTSC publicly stated that no statute of limitations was triggered by the certification of the PEIR, the Local Jurisdictions—out of an abundance of caution—entered into a tolling agreement with DTSC, Boeing, NASA, and DOE. As to any potential CEQA petitioner, the agreement (1) tolls any statute of limitations that may have been triggered by DTSC's certification of the PEIR, if any; and (2) tolls any statute of limitation to (footnote continued)

CEQA concerns and substantive questions and comments on the draft NASA Phase 1 Groundwater CMS and DTSC's proposed Phase 1 Groundwater SB.

Background

In 2007, NASA, the Department of Energy (DOE), and Boeing (collectively, Responsible Parties) entered into a Consent Order with DTSC for Corrective Action at SSFL. The 2007 Consent Order is the initial agreement that DTSC and the Responsible Parties entered into to define the requirements for investigating contaminated soil and groundwater, and to implement the cleanup at SSFL.

In 2010, NASA entered into a subsequent 2010 Administrative Order on Consent (AOC) for Remedial Action with DTSC that governs characterization and remedial action activities for soils in its respective portion of SSFL. Thus, NASA's soil cleanup is regulated under the 2010 AOC, whereas all other media in the NASA area is regulated under the 2007 Consent Order. The 2007 Consent Order requires the Responsible Parties to prepare a Corrective Measures Study that provides DTSC with sufficient information to select corrective measures to remedy the contamination at the site. Specifically, the 2007 Consent Order requires,

> 3.5.2. The CMS work plans shall detail the methodology for developing and evaluating potential corrective measures to remedy chemical contamination at the Facility….Potential groundwater corrective measures shall evaluate all state-of-the-art remedial technologies including but not limited to the following: TCE Oxidation using Potassium - or Sodium-Permanganate; Nanoscale Zero-Valent Iron Particle Technology; Radio Frequency Heating; Blast-Fractured Enhanced Permeability Remediation; Steam Injection; and Enhanced Bioremediation.
>
> 3.6.1. At a minimum, DTSC shall provide the public with an opportunity to review and comment on the final draft of the CMS Reports, DTSC's proposed corrective measures for the Facility, and DTSC's justification for selection of such corrective measures. DTSC shall conduct a public hearing to obtain comments.
>
> 3.6.2. Following the public comment period, DTSC may select final corrective measures or require [Responsible Parties] to revise the CMS Reports and/or perform additional corrective measures studies.

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each DTSC approval of individual cleanup plans until DTSC adopts the final clean-up plan for the site.

> 3.6.3. DTSC shall notify [Responsible Parties] of the final corrective measures selected by DTSC in the Final Decision and Response to Comments. The notification shall include DTSC's reasons for selecting the corrective measures.
>
> 3.8. CEQA. [Responsible Parties] shall provide all information necessary to facilitate DTSC's preparation of a CEQA analysis, including a Facility-wide Environmental Impact Report (EIR). (2007 Consent Order, pp. 21, 23.)

On July 19, 2023, DTSC certified a PEIR for the cleanup program of potential remediation activities to address soil and groundwater contamination and the removal of structures at SSFL. At the time DTSC certified the PEIR, it stated:

> At this time, DTSC is not filing a notice of determination (NOD) or approving a project, as those terms are defined in CEQA. Per CEQA Guidelines § 15094, DTSC will file a NOD with the Office of Planning and Research within five days of deciding to approve individual decision documents for remediation plans. Under CEQA, the act of certifying the Final PEIR does not constitute approval of any project. The remediation technologies and corrective actions evaluated in the PEIR are based on available investigation and characterization documents that have been prepared to date. After completion of the investigation and characterization documents and treatability studies, each responsible party will prepare draft cleanup decision documents and propose specific corrective actions for their respective areas of responsibility. DTSC will file a separate NOD for each decision document. As such, DTSC believes that any legal challenges to the validity of the PEIR would not be ripe until such time as a NOD is filed. (DTSC Certification of Final PEIR for the Santa Susana Field Laboratory Site Remediation Program, at 1.)

The PEIR states "[i]f it is determined that subsequent project-level details would include new information that was not examined in the PEIR, further environmental review may be required pursuant to CEQA." (PEIR, p. P-12.) When an agency has prepared a program EIR and a further discretionary approval is necessary, a subsequent or supplemental EIR is required where the later activity would have effects that were not examined in the program EIR. (CEQA Guidelines,[2] § 15168.)

SWRCB Resolution No. 92-49, which applies to SSFL, requires that the Regional Water Board, or DTSC where it is providing regulatory oversight, shall "[e]nsure that dischargers are required to clean up and abate the effects of discharges in a manner that promotes

[2] Cal. Code Regulations, title 14.

attainment of either background water quality, or the best water quality which is reasonable…" (SWRCB Resolution No. 92-49, Section III.G.) The Regional Water Board stated that the "best water quality which is reasonable, [] may be the Federal and California [Maximum Contaminant Levels (MCLs) and California Notification Levels (NLs)]. If MCLs and NLs are selected as the best water quality which is reasonable to comply with SWRCB Resolution No. 92-49, it should be demonstrated that background water quality cannot be restored and that the Federal and California MCLs and California NLs are the best water quality that is reasonable, considering the factors in SWRCB Resolution No. 92-49, prior to their adoption as MCOs." (NASA CMS, Table J-2: Revised Response to LARWQCB Additional Comments on the September 2020 Draft NASA Groundwater Phase 1 CMS Report, p. 1., No. G2.)

CEQA Analysis

As stated above, it is not clear what DTSC's final Phase 1 remedy will be (and how it relates to the cleanup of the NASA site as a whole) and how DTSC intends to ensure compliance with CEQA. While DTSC states it plans to issue a NOD, it does not explain whether it will prepare any further environmental documentation or make any specific findings as to the PEIR or CEQA, generally. Moving forward with a remedy before completing the necessary CEQA review would violate state environmental regulations and undermine public transparency and input on potential impacts. A full and transparent CEQA process is essential before initiating any Phase 1 CMS and SB cleanup activities to ensure informed decision-making and environmental protection.

To that end, the Local Jurisdictions urge DTSC to address all potential issues under Public Resources Code, section 21166 and CEQA Guidelines, sections 15162-15164, among other legal requirements, before adopting the final SB. This includes ensuring that the following issues are fully addressed:

- **Change in Project Scope or Commitments:** If DTSC approves a SB and CMS that imposes a less stringent cleanup standard than previously committed to in the 2007 Consent Order and with SWRCB Resolution No. 92-49, this would be a fundamental change in the project description and cleanup approach from that analyzed in the PEIR. In such case, DTSC must prepare further environmental documentation under CEQA before approving the final Phase 1 remedy.

- **New or Substantially More Severe Environmental Impacts:** If DTSC approves a SB and CMS with alternatives that extend beyond the PEIR's projected 10-15 years of cleanup timeframe, it may pose greater long-term risks to human health and the environment. Potential impacts based on the footprint and concentrations of TCE-impacted TTAs were not analyzed in the PEIR, which assumed a more thorough remediation consistent with the 2007 Consent Order and with SWRCB Resolution No. 92-49. Again, in such case, DTSC must prepare further environmental documentation under CEQA before approving the final Phase 1 remedy.

- **New Information or Changed Circumstances:** Since the PEIR was certified in 2023, there have been significant physical changes in the environment, including, but not limited to, wildfires. In addition, there have been advancements in technology and scientific understanding of contaminant migration through different environmental media. These changes represent new information and changed circumstances requiring reassessment under CEQA Guidelines, § 15162(a)(3). DTSC must address these issues in the appropriate CEQA documentation before approving the final Phase 1 remedy.

- **Recirculation:** The Final PEIR that was certified by DTSC in 2023 contained significant new information as compared to the Draft PEIR released in 2017. The changes and new information were so extensive that the PEIR includes a separate section on project updates and changed circumstances for the SSFL cleanup. (See, e.g., PEIR, pp. P-1 to P-43.) DTSC's decision not to recirculate the PEIR with these major additions undermines its commitment to the transparent public process and conflicts with CEQA's mandatory requirements for recirculation. (CEQA Guidelines, § 15088.5.) DTSC must address this fundamental issue with appropriate CEQA documentation before approving the final Phase 1 remedy, which would be the first approval by DTSC under the PEIR.

- **Inconsistency with the PEIR's Mitigation and Cleanup Objectives:** The PEIR was predicated on achieving a level of cleanup consistent with the 2007 Consent Order and SWRCB Resolution No. 92-49. If DTSC approves a SB and CMS with alternatives that do not meet these thresholds, it would contradict the rationale for the PEIR's approval and violate CEQA. (Pub. Res. Code, § 21081.6(a); CEQA Guidelines, §§ 15091, 15097.)

Pursuant to the 2007 Consent Order, SWRCB Resolution No. 92-49, and CEQA, DTSC must not approve a final groundwater remedy alternative for Phase 1 unless it ensures full compliance with CEQA. Depending upon the final approval documents, DTSC may be required to prepare a supplemental or subsequent EIR process to assess the environmental health impacts of the proposed cleanup alternatives. (Pub. Res. Code, § 21166; CEQA Guidelines, §§ 15162-15163.) Yet the draft SB only states that DTSC intends to issue a NOD for its approval of the Phase I Groundwater cleanup. (SB, p. 23.) The Local Jurisdictions urge DTSC to ensure that its approval of any final remedy decision for the contaminated groundwater at the NASA portions of the SSFL fully comply with DTSC's CEQA obligations, and expressly reserve the right to provide further comments on DTSC's proposed CEQA findings for the final approval of Phase 1. The Local Jurisdictions further encourage DTSC to ensure that the public is fully informed of its CEQA process and has adequate opportunity to review and comment on any proposed CEQA documentation.

Technical Comments on the CMS and SB

Please find enclosed a technical memorandum prepared by the Local Jurisdictions' consultant, Formation, incorporated by reference into this comment letter, providing detailed comments on the CMS and SB. We have highlighted a few of the issues below.

The Local Jurisdictions note that some elements of the Phase 1 groundwater CMS are integral to supporting work on the Phase 2 groundwater CMS. DTSC must ensure that the evaluation and remediation of comingled plumes is coordinated with the other Responsible Parties. For example, NASA notes that the full delineation of this southern seep TTA is uncertain as the contribution from Boeing's upgradient contamination is unknown. (CMS, p. 4-15.) "Sources that are upgradient of seeps will be addressed in the Phase 2 groundwater CMS." (*Id.*, p. ES-9.) DTSC must coordinate with Boeing and NASA to ensure the full delineation of the groundwater contamination in the southern seep TTA is defined and approve the appropriate remedy for each Responsible Party to clean up the contamination consistent with the 2007 Consent Order.

Ambient Air Quality

The SB does not refer to any existing or additionally planned ambient air monitoring during remedy implementation. The CMS identifies TCE and its daughter products as the chemicals of concern (COC), which are volatile at ambient conditions and may pose off-site inhalation risks. Vapor monitoring wells and performance tracking is proposed in the CMS; however, there is no proposed monitoring of ambient air.

The SB is silent on this issue. To correct this deficiency, DTSC must 1) reference the ongoing ambient air monitoring program (in place since 2018); 2) clarify whether the air monitoring program will be expanded for vapor-emitting remediation activities (i.e. to monitor for any potential fugitive vapor losses during implementation); and 3) indicate if quarterly reporting frequency will be modified for Phase 1 cleanup efforts.

Limited COC Focus of Phase 1 CMS

The SB does not address how limiting the focus of the Phase 1 CMS to certain COCs will affect the evaluation and selection of remedial alternatives in the Phase 2 CMS. DTSC must explain how the findings from the Phase 1 scope that addresses cleanup of TCE and its daughter products will be used to address the feasibility of remediating other COCs to background levels in compliance with SWRCB Resolution No. 92-49. For example, the other COCs may require different remedial strategies from TCE due to a variety of factors such as chemical characteristics and behavior in the environment, which are not evaluated.

In addition, the risk associated with other COCs in the Phase 1 TTA areas have not been fully evaluated. It is unclear how the Phase 1 CMS will inform the analysis in Phase 2, which is expected to address the cleanup of all groundwater contaminants. As discussed above, it is also unclear how the Phase 1 CMS will be applied to COCs in comingled plumes originating from other Responsible Parties. DTSC must provide further clarification on these issues.

Remediation Timeframes

The CMS and SB do not explain how remediation will take place within the timeframe analyzed in the PEIR, nor do they explain how compliance with SWRCB Resolution No. 92-49 will be achieved. The CMS states compliance with SWRCB Resolution No. 92-49 will be

evaluated in the Phase 2 CMS. However, this deferral leaves a significant gap in evaluating whether the proposed approaches are viable. The CMS does not attempt to evaluate even the relative timeframe differences between the alternatives to achieve cleanup to background levels. At a minimum, DTSC must ensure the CMS compares the relative effectiveness of different remediation technologies for each associated plume in achieving background levels in compliance with SWRCB Resolution No. 92-49.

Effectiveness Criteria for Alternative Selection

The SB indicates that two distinct alternatives have been selected for the remediation of groundwater and seeps. DTSC must clarify how it is applying the effectiveness criteria to each alternative, as well as the timeframe for assessing whether NASA will be required to implement alternative remedial technologies to ensure compliance with the 2007 Consent Order and SWRCB Resolution No. 92-49.

Conclusion

The Local Jurisdictions and their citizens affected by the SSFL site and cleanup deserve a process that upholds the environmental protection and regulatory commitments made to the community. To that end, DTSC must rigorously evaluate the groundwater alternatives proposed in the CMS to ensure that cleanup in accordance with the 2007 Consent Order and SWRCB Resolution No. 92-49 is achievable and comply with all CEQA obligations. Any deviation from those commitments must be subject to a full and transparent environmental review in accordance with CEQA, which is not currently the case.

The Local Jurisdictions remain committed to a prompt and complete cleanup of SSFL that is transparent and protective of the environment and human health and safety. We would welcome the opportunity to meet with DTSC staff to discuss these items and engage in further dialogue as DTSC considers selecting a remedy to clean up groundwater and bedrock vapor at NASA's portions of SSFL and works to meet all of its legal obligations.

Sincerely,

Shaye Diveley

c: Elena Miller
Enclosure

6203979.8

TECHNICAL MEMORANDUM

FORMATION

SANTA SUSANA FIELD LABORATORY

COMMENTS ON NASA PHASE 1 GROUNDWATER CORRECTIVE MEASURES STUDY & DTSC STATEMENT OF BASIS

TO: Mr. Paul Carpenter
Department of Toxic Substances Control
SSFL NASA GW CMS SB Phase 1 Public Comment
8800 Cal Center Drive, Sacramento, CA 95826
Email: DTSC_SSFLPublicComments@dtsc.ca.gov

FROM: Mike Tietze, PG, CHG, CEG, Senior Engineering Geologist / Hydrogeologist
Sara Moore, Senior Environmental Scientist
Laura Moore, Senior Environmental Scientist / Hydrogeologist
Jamie Henderson, P.E., Principal Engineer

DATE: June 10, 2025

1 Background and Overview

On behalf of the City of Los Angeles, the County of Los Angeles, the County of Ventura, and the City of Simi Valley (collectively the Local Jurisdictions), Formation Environmental (Formation) completed a high-level review of the National Aeronautics and Space Administration (NASA) Phase 1 Groundwater Corrective Measures Study (CMS)[1] and the accompanying Statement of Basis (SB)[2] prepared by the Department of Toxic Substances Control (DTSC) for the Santa Susana Field Laboratory (SSFL). The purpose of Formation's review was to identify key issues relevant to the Local Jurisdictions and develop comments on their behalf for submittal to DTSC.

Formation understands NASA is addressing their groundwater CMS in two separate phases, the first of which was issued for public review and comment by DTSC in April 2025. This work is being conducted under a 2007 Consent Order,[3] and the first phase focuses on the areas with the highest contaminant mass

[1] National Aeronautics and Space Administration. (2024, January). NASA Phase 1 Groundwater Corrective Measures Study. https://dtsc.ca.gov/wp-content/uploads/sites/31/2025/04/NASA_SSFL_P1-Groundwater-CMS_FINAL_AUG2024.pdf

[2] California Department of Toxic Substances Control. (2025, April). Draft Statement of Basis for the Phase 1 Groundwater Remedy Selection, NASA Santa Susana Field Laboratory. https://dtsc.ca.gov/wp-content/uploads/sites/31/2025/04/NASA-SB-DRAFT-FORMATTED-18APRIL2025-1.pdf

[3] Consent Order for Corrective Action, The Boeing Company, U.S. Department of Energy, and U.S. National Aeronautics and

of trichloroethene (TCE) and its daughter products (cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride). These represent the highest-risk areas and source zones for groundwater contaminant plumes.[4] Other COCs are not being addressed in this phase.

NASA used the following criteria to identify "target treatment areas" (TTAs) for inclusion in the Phase 1 CMS:

1. Areas where TCE concentrations in groundwater exceed 10,000 micrograms per liter (ug/L)
2. Areas where soil/bedrock vapor TCE concentrations exceed 12,000,000 micrograms per cubic meter (ug/m^3)
3. Locations where TCE-contaminated groundwater flows from surface seeps with the potential for offsite migration[5]

It is important to note that TCE and daughter product concentrations detected in the TTAs exceed thresholds commonly used to infer the presence of contamination by dense non-aqueous phase liquid (DNAPL).[6]

In applying these three criteria, NASA used groundwater characterization data, plume mapping and site-specific modeling to identify four TTAs for evaluation of remedy strategies:[7]

1. ND-136 (based on both groundwater and soil/bedrock vapor criteria);
2. WS-09 (based on groundwater criteria);
3. C-6 (based on groundwater criteria); and
4. Coca/Delta AIG near the Burro Flats Fault Zone (based on seep criteria – also referred to as the "southern seeps").

In addition, DTSC requested the inclusion of one additional seep area for contingency consideration as a TTA, which is referred to as B204/ELV AIG (also referred to as the "northern seeps").[8]

The Phase 1 CMS and SB indicate that the Phase 2 groundwater CMS will be informed by a Technical and Economic Feasibility Analysis[9] that will assess the ability of the Phase 1 cleanup measures to achieve background concentrations required under the 2007 Consent Order.[10] While not discussed in detail, NASA

Space Administration, Docket No. P3-07/08-003, August 16, 2007. https://www.dtsc-ssfl.com/files/lib_doe_area_iv/RMHF_Complex_Demo/DOE_Supporting_Documents/69377_2007_Consent_Order_for_Corrective_Action.pdf .

[4] Phase 2 is expected to address the remaining areas of NASA groundwater contamination considering the full range of chemical contaminants, establish sitewide cleanup goals, and fully integrate NASA's groundwater remedy with other responsible parties. NASA CMS, p. ES-2 (PDF p. 8).

[5] Id. at p. ES-1 (PDF p. 7).

[6] Id. at p. 2-13 (PDF p. 43).

[7] Id. at pp. 1-2 – 1-3 (PDF pp. 26-27).

[8] Id.

[9] Id. at p. ES-3 (PDF p. 9).

[10] California State Water Resources Control Board (SWRCB). (1992). Resolution No. 92-49, §III(G). Retrieved from https://www.waterboards.ca.gov/water_issues/programs/scp/resolution_92_49.html.

further explains that some elements of the Phase 1 groundwater CMS are integral to supporting work on the Phase 2 groundwater CMS. This will include coordination, evaluation, and cleanup of plumes that are comingled with other SSFL responsible party contaminated groundwater plumes (e.g., Boeing).[11] For example, NASA notes that existing data suggest that Boeing Area III sources contribute to the plumes in the NASA-administered Area II Delta Area.[12] In addition, NASA observes the seeps south of the Coca/Delta AIG could potentially be along a migration pathway originating from both Coca/Delta AIG source areas as well as source areas in Boeing Area III.[13] One of the challenges in this seep area relates to coordination of data collection; NASA points out that the full delineation of this southern seep TTA is uncertain as the contribution from Boeing's upgradient contamination is unknown.[14]

2 Comments on CMS and SB

1. Air Quality Monitoring

The SB for the NASA Phase 1 Groundwater CMS does not refer to any existing or additionally planned ambient air monitoring during remedy implementation. The CMS identifies TCE and its daughter products as the Phase 1 COCs. These compounds are volatile at ambient conditions and may pose off-site inhalation risks if emitted during remediation.[15] Accordingly, both long and short-term exposure at elevated concentrations may present a risk to sensitive receptors. The CMS specifies vapor monitoring wells and performance tracking within the subsurface but does not appear to extend monitoring to ambient air, specifically perimeter air conditions. As a result, potential community or ecological exposure pathways during remedy implementation are not directly considered. Accordingly, DTSC should require NASA to do the following:

1. Reference the ongoing ambient air monitoring program (in place since 2018);[16]
2. Clarify whether this program will be expanded or modified to address vapor-emitting remediation activities at the Phase 1 TTAs. (i.e. to monitor for potential fugitive vapor losses); and
3. Indicate whether the current quarterly reporting frequency will be adjusted during implementation of the Phase 1 remedial actions.

Alternatively, DTSC should have NASA explain if additional air monitoring was considered and if so, why it is not required at this time. Further, DTSC should confirm the cleanup proposed in Phase 1 is compliant with the California Environmental Quality Act (CEQA) and consistent with the conditions and findings

[11] NASA CMS, p. ES-2 (PDF p. 8).
[12] Id. at p. 2-27 (PDF p. 57).
[13] Id. at p. 2-28 (PDF p. 58).
[14] Id. at p. 4-15 (PDF p. 87).
[15] U.S. Environmental Protection Agency. (n.d.). Technical Overview of Volatile Organic Compounds. https://www.epa.gov/indoor-air-quality-iaq/technical-overview-volatile-organic-compounds
[16] California Department of Toxic Substances Control. (n.d.). Santa Susana Field Laboratory Site Activity Overview. https://dtsc.ca.gov/santa_susana_field_lab/ssfl_site_activities_overview/

presented in the Final Program Environmental Impact Report (PEIR)[17] regarding groundwater remediation and air quality impacts therefrom.

2. Implications of Limited COC Focus of the Phase 1 CMS

DTSC should clarify how limiting the COC focus in Phase 1 affects the evaluation and selection of remedial alternatives in Phase 2.[18] Since the Phase 1 work only addresses TCE and its daughter products, it is not clear how the findings will be used in Phase 2 to address the feasibility of remediating other COCs to background levels. The CMS states that Phase 1 findings will address the feasibility of remediating groundwater to background levels:

> Final cleanup criteria have not been defined for NASA SSFL groundwater. State Water Resources Control Board [SWRCB] Resolution No. 92-49 requires cleanup to background conditions unless the Regional Water Board makes a determination of technological or economic infeasibility. Associated with completing the Phase 2 CMS, NASA will prepare a Technical and Economic Feasibility Analysis to support cleanup levels for the Phase 2 CMS. The Technical and Economic Feasibility Analysis will evaluate results of ongoing onsite treatment to support conclusions and recommendations.[19]

TCE and its daughter products represent a significant component of the human health risks defined for the NASA areas of impacted groundwater. However, the risk assessment identifies other COCs that contribute to excess cumulative risk. The following table lists the COCs in each of the TTAs that contribute more than 1% of the total cancer risk and total noncancer hazard estimates for domestic groundwater use, vapor intrusion, and seeps/springs recreational use.[20]

[17] California Department of Toxic Substances Control, Final Program Environmental Impact Report for the Santa Susana Field Laboratory, February 2023 (Released June 2023), p. 2-12 (PDF p. 96). https://www.envirostor.dtsc.ca.gov/getfile?filename=/public%2Fdeliverable_documents%2F5178303360%2F00_SSFL%20Final%20PEIR.pdf.

[18] DTSC's SB states "As noted above, the Phase 2 Groundwater CMS will evaluate other COCs in the Phase 1 TTAs, the remaining TCE source areas, other contaminated NASA groundwater areas outside of the Phase 1 TTAs, and the feasibility of achieving groundwater remediation to background levels in accordance with State Water Resources Control Board Resolution No. 92-49." DTSC Statement of Basis, p. 16 (PDF p. 23).

[19] NASA CMS, p. ES-3 (PDF p. 9). (emphasis added)

[20] National Aeronautics and Space Administration. (2024, August). Human Health and Ecological Risk Assessments for NASA Areas of Impacted Groundwater, pp. 7-1 – 7-6 (PDF pp. 61-66). https://www.envirostor.dtsc.ca.gov/getfile?filename=/esi%2Fuploads%2Fgeo_report%2F4547589957%2FNASA_SSFL_GW_HH_RiskAssessment_Final_Revised.pdf

Table 1. COCs Contributing to Total Cancer Risk in the CMS TTAs

TTA[21]	Equivalent RiA Area[22]	COCs Listed in Addition to TCE/Daughter Products by Relevant Media[23]
ND-136	Alfa Area	**Groundwater**: NDMA, chlorotrifluoroethylene, arsenic, lead, 1,1-dimethylhydrazine, chlorotrifluoroethylene, DRO – aliphatic, DRO – aromatic, and formaldehyde **Vapor**: no additional COCs
WS-09	Bravo Area	**Groundwater**: NDMA, chlorotrifluoroethylene, arsenic, lead, 1,1-dimethylhydrazine, chlorotrifluoroethylene, DRO – aliphatic, DRO – aromatic, and formaldehyde; **Vapor**: no additional COCs
C-6	DELTA Area	**Groundwater**: arsenic, lead and NDMA **Vapor**: no additional COCs **Seep**: no additional COCs
Coca/Delta AIG southern seep area	DELTA Area	**Groundwater**: arsenic, lead and NDMA **Vapor**: no additional COCs **Seep**: no additional COCs
B204/ELV AIG (contingency northern seep area)	ELV	**Groundwater**: lead, hexavalent chromium, arsenic, cobalt, aluminum, thallium, 1,4-dioxane, 1,2,3-TCP, DRO – aliphatic, and DRO -aromatic; **Vapor**: no additional COCs **Seep**: no additional COCs

Assessing the full array of chemicals present in TTAs is important given DTSC's assertions about the Phase 2 CMS:

> The evaluations performed in the NASA Draft Phase 1 Groundwater CMS used Federal and California Maximum Contaminant Levels (MCLs) as Phase 1-specific temporary target goals. . . Final NASA SSFL sitewide remedial actions and final media cleanup objectives (MCOs) will be established in the Phase 2 NASA groundwater CMS and the Phase 2 DTSC Statement of Basis, where final groundwater remediation concentration goals will be set. DTSC will apply these final MCOs to the four NASA TTAs presented in this document as part of the Phase 2 Statement of Basis.[24]

In a February 20, 2024, Groundwater U Session sponsored by DTSC, a community member noted that TCE is not the only contaminant of concern at the Site and questioned DTSC's focus on that chemical. DTSC's lead presenter, Dr. Matt Becker, acknowledged that other contaminants are present and they may require different remedial strategies from TCE due to a variety of factors like chemical characteristics and behavior in the environment (e.g., metals).

[21] DTSC Statement of Basis, PDF p. 43.
[22] NASA Human Health and Ecological Risk Assessments, Figure 1-1 (PDF p. 155).
[23] Id. at pp. 7-1 – 7-6 (PDF pp. 61-66).
[24] DTSC Statement of Basis, p. 7 (PDF p. 14).

Because other COCs contribute to risk in the areas of the Phase 1 TTAs, DTSC should explain how information from the Phase 1 groundwater CMS will contribute to the feasibility analysis in Phase 2, which purportedly will address cleanup of all contaminants present in groundwater.

3. Evaluation of Remediation Timeframes

In the Phase 1 CMS, NASA notes uncertainties related to screening level solute transport modeling:

> [T]he values summarized in Table 6-1 were used as remediation time estimates for high TCE concentration TTAs to compare the different alternatives. In general, NASA believes these time estimates are optimistic and the actual amount of time could be much longer. However, as a basis for comparing the different alternatives, the values in Table 6-1 are considered appropriate.[25]

DTSC should have NASA clarify their evaluation of remediation timeframes and if it will affect compliance with the 2007 Consent Order which requires clean up to background. DTSC and NASA had several exchanges around remediation implementation timeframes that are summarized in Table J-1 of the CMS. NASA's final response to date notes:

> NASA recognizes DTSCs concerns pertaining to inferring cleanup to MCOs in a reasonable time as "impossible or impractical". The tone of these kinds of statements will change to "the ability to achieve MCOs within the near term (e.g., several decades) is uncertain." More data is needed to better estimate time of remediation for NASA SSFL source areas and plumes and assess the feasibility to remediate to background as the MCO. Additional data are expected to come from the implementation and operation of current pilot studies and the Phase 1 CMS/CMI remedies. Other data will be gathered as part of implementing the Phase 2 groundwater CMS alternatives and the follow-on adaptive management phase. If aquifer restoration to background is infeasible (if identified through a T&E feasibility assessment), the overall goal for the combined Phase 1 and Phase 2 groundwater CMS/CMI will be to use the lowest T&E feasible MCO for the site. Please note that given the long projected timeframes to achieve cleanup objectives, it is <u>not practical to differentiate</u> differences in time of remediation of the different alternatives evaluated in the Phase 1 groundwater CMS.[26]

While Formation recognizes that precise estimates of remediation timeframes are inherently uncertain, it is still feasible, and would be informative, to compare the relative timeframes of different technologies. Such comparisons are critical for determining the appropriate compliance path for the TTAs and associated plumes. Therefore, NASA should provide a clear justification for its conclusion that evaluating relative differences in remedial timeframes between alternatives is "not practical".[27]

[25] NASA CMS, p. 6-3 (PDF p. 101).
[26] Id. at PDF p. 1179 (emphasis added).
[27] Id.

NASA has acknowledged the exceptionally long timeframes to remediate sites with TCE DNAPL and the general limited effectiveness of pump and treatment systems to remove source mass.[28] DNAPL remediation timeframes for EISB are also uncertain and highly dependent on local conditions.[29,30] The implications of the findings from these studies and NASA's own conclusions should be used to inform the Phase 1 and Phase 2 CMS.

DTSC should also require NASA to provide a discussion of how the compliance path with SWRCB Resolution 92-49[31] will be evaluated under Phase 2. Finally, DTSC should consider the implications of the selected compliance approach, including cleanup timeframes, relative to the PEIR and CEQA if changes to the cleanup strategy are implemented.

4. Process Consideration Related to Remedial Alternative Recommendations

The selection of remedial alternatives for both groundwater and seep areas considers the presence of existing remediation systems. For groundwater, Alternative 3 (P&T) received the highest overall score; however, at TTA ND-136, Alternative 2a (EISB-Bedrock) was selected "because of the ongoing operation of the EISB pilot study."[32]

Notably, DTSC acknowledges that ND-136 TTA has existing infrastructure to support both Alternatives 2a and 3 and states they "may require implementation of Alternative 3 if pilot testing and monitoring demonstrates the EISB methods do not prove to be more effective than P&T."[33]

To ensure transparency and facilitate informed evaluation, DTSC should clarify:

1. How "effectiveness" is being defined and evaluated at TTA ND-136;
2. What performance criteria or decision thresholds will be used to determine the success or failure of the EISB pilot study; and
3. The expected timing and process by which DTSC will decide whether NASA must implement a different remedial technology at TTA ND-136.

Providing these clarifications would demonstrate how DTSC anticipates applying the effectiveness criteria compliant with the 2007 Consent Order.

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[28] NASA CMS p. 6-8 (PDF p. 106).
[29] National Academies of Sciences, Engineering, and Medicine. (1999). Groundwater and Soil Cleanup: Improving Management of Persistent Contaminants. Washington, DC: The National Academies Press. https://doi.org/10.17226/9615
[30] Haluska, A.A., Schaefer, C.E., Cho, J., Lavorgna, G.M., Annable, M.D. (2019, December). Long-term mass flux assessment of a DNAPL source area treated using bioremediation. *Journal of Contaminant Hydrology*. Volume 227. https://www.sciencedirect.com/science/article/abs/pii/S0169772218302171
[31] California State Water Resources Control Board (SWRCB). (1992). Resolution No. 92-49, §III(G). Retrieved from https://www.waterboards.ca.gov/water_issues/programs/scp/resolution_92_49.html.
[32] NASA CMS, p. ES-7 (PDF p. 13).
[33] DTSC Statement of Basis, p. 24 (PDF p. 31).