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MEMORANDUM

TO: Lenny Siegel
FROM: Peter Strauss
DATE: October 2020
SUBJ: Review of Site 28 Five-Year Review

Introduction

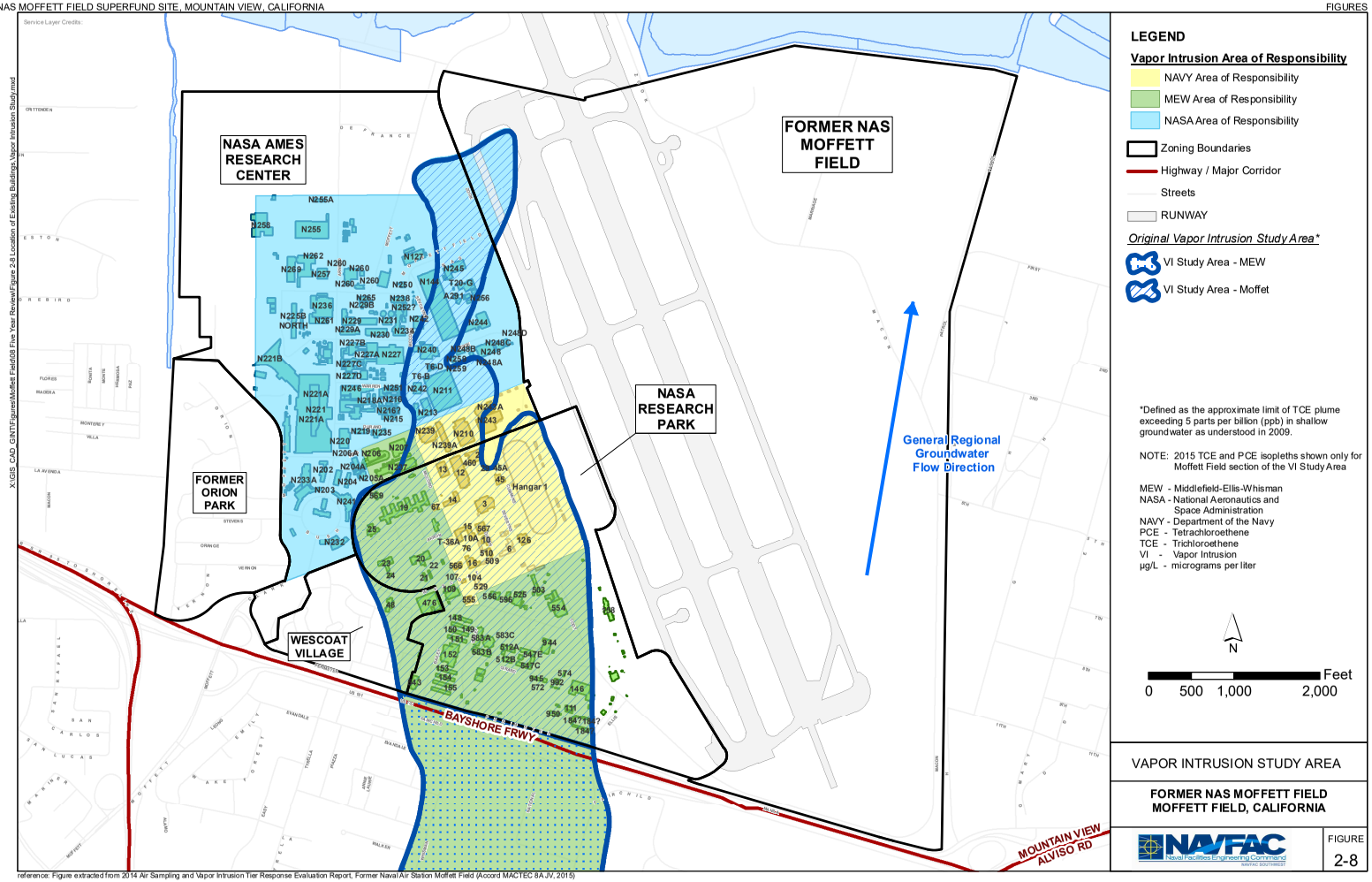
As you requested, I reviewed the Five-Year Review (FYR) for Site 28, Moffett Field, for areas that lie within the purview of co-contamination from the MEW site (Middlefield-Ellis-Whisman Superfund Study Area). The FYR reviews cleanup progress, makes recommendations for further work, and includes a protectiveness statement. This memo discusses:

- Vapor Intrusion
- Building 88 and the Traffic Circle. Both are located near the southern boundary of the Navy's area of responsibility, and neither is in the area of NASA's proposed new development at the southern boundary of Moffett Field.
- Progress toward meeting Remedial Action Objectives
- Protectiveness Statement
- My Conclusions and Recommendations

Vapor Intrusion

In January, the Navy issued a *Final Remedial Design* (RD) for Building 10. It concluded that the primary vapor migration pathway is a subsurface utility/steam-line tunnel connecting Building 10 with Hangar 1, approximately 500 feet to the east. To mitigate the vapor pathway, it recommended sealing the utility tunnel at the Building 10 entrance with a cement wall and filling the sub-floor trenches under Building 10 with a CLSM, a self-consolidating, cementing material, to mitigate vapor intrusion from shallow groundwater. In addition, it will install a sub-slab depressurization system at Building 10.

Based on air monitoring results through 2019, Buildings 3, 10, 45, 126, N239, and N239A have been Tier 1 or Tier 2, under the terms of the 2010 Vapor Intrusion Record of Decision (ROD). The Five-Year Review recommended the following vapor intrusion mitigation measures for these six buildings. (**See Below**: Tables 6A and 6B for Response Actions from the 2010 ROD.)



reference: Figure extracted from 2014 Air Sampling and Vapor Intrusion Tier Response Evaluation Report, Former Naval Air Station Moffett Field (Accord MACTEC 8A JV, 2015)

Building 3: Install sub-floor and sub-slab depressurization systems and conduct confirmation sampling.

Building 10: Remove the temporary vapor abatement system and asbestos-containing materials (ACM), construct a concrete wall, backfill with CLSM, remove the floor drain in Room 103, install a sub-slab depressurization system, and conduct confirmation sampling.

Building 45: Install a sub-slab depressurization system and conduct confirmation sampling.

Building 126: Install a sub-slab depressurization system and conduct confirmation sampling.

Building N239: Seal pathways and conduct confirmation sampling.

Building N239A: Seal pathways, install passive vents in the exterior walls of Rooms U101 and U102, and conduct confirmation sampling.

All remaining 17 buildings in the vapor intrusion study zone were classified as Tier 3A or 3B. That is, no engineering controls are mandated, but Institutional Controls (ICs) and/or a Long-Term Monitoring Plan is required.

Traffic Island and Building 88

A potential source of PCE (tetrachloroethylene) contamination to groundwater was discovered in the former Building 88 footprint, associated sewer lines, and the adjacent Traffic Island Area. The source consists of PCE in saturated soils and potentially as DNAPL (Dense Non-Aqueous Phase Liquid). In an effort to optimize the remedy, the Navy conducted a pilot test in 2010 to address contamination at the former Building 88, associated sewer lines, and Traffic Island Area. A supplemental investigation conducted in 2014 by the Navy confirmed the presence of residual DNAPL—PCE and trichloroethylene (TCE) in the lower portion of the A aquifer, with volatile organic compound (VOC) concentrations above their cleanup level in the deeper B2 aquifer beneath the Traffic Island Area. The Navy completed a Combined Enhanced Anaerobic Bioremediation/In Situ Chemical Reduction Treatability Study for the Traffic Island Area at Site 28.

The Study recommended two actions: (1) PCE DNAPL removal by limited soil excavation to treat the affected vadose zone and the upper A aquifer and installation of an extraction well within the excavation footprint for further source area reduction and containment; and (2) installation of an extraction well screened in the lower A aquifer for source reduction and control.

Progress Toward Meeting RAOs

In general, the Navy is making some progress toward meeting its Remedial Action Objectives (RAOs). However, the extent of contamination is not currently defined in the B2 aquifer. The Navy is evaluating installation of additional monitoring wells to define the extent of contamination in the lower aquifer as well as performing treatability studies to reduce contaminant mass in the B2 aquifer.

Long-term vapor intrusion control measures will be implemented at Buildings 3, 10, 45, 126, N239, and N239A pursuant to the tiered system established in the 2010 MEW ROD Amendment.

However, I note that the Navy is silent on meeting the following RAO from the Vapor Intrusion ROD Amendment:

> To accelerate the reduction of the source of vapor intrusion (i.e., Site contaminants in shallow groundwater and soil gas) to levels that are protective of current and future building occupants, such that the need for a vapor intrusion remedy would be minimized or no longer be necessary.

Rather, if defers action until EPA completes its Supplemental Site-wide Groundwater Feasibility Study (FS), and the 1989 MEW ROD (which was adopted by the Navy for this area) is modified by an Amendment to that ROD.

Protectiveness Statement

The remedy at Site 28 is protective of human health and the environment in the short-term because interim vapor intrusion mitigation measures have been implemented to achieve indoor air cleanup levels at buildings where they are required and the groundwater remedy continues to operate to control sources and clean up groundwater.

However, to ensure that the Site 28 remedy is protective in the long-term, the Navy will implement the long-term vapor intrusion control remedial measures at Buildings 3, 10, 45, 126, N239, and N239A and implement additional groundwater source control measures by excavating soil in the Traffic Island Area and source control extraction wells to address TCE and PCE contamination in the upper A, lower A, and B2 aquifer zones.

Conclusions and Recommendation

The activities proposed to address shallow groundwater contamination for Building 88 and the Traffic Island Area suggest that the remediation of shallow soil and groundwater is not going to be a problem in this area. However, for other areas where there is the potential for vapor intrusion, there is no mention of reducing shallow contamination to eliminate the need for long-term vapor intrusion mitigation.

I recommend that this be brought up as a topic at the next Restoration Advisory Board meeting, and that a request be made to the Navy and EPA to explain whether further measures are required to reduce shallow contamination so long-term vapor intrusion mitigation is no longer required. Since EPA is drafting the Feasibility and Proposed Plan for Shallow Groundwater, it may have an answer to this question that differs from the Navy's analysis.

TABLE 6A—Response Action Tiering System for Existing Commercial and Residential Buildings in Vapor Intrusion Study Area (Sampled with Passive or Active Engineering Control in Place or Operating)

Tier	Description	Response Action
Tier 1	Building with indoor air concentrations greater than outdoor (background)* air concentrations and indoor air cleanup level.	Implement selected remedy (appropriate engineering control) to meet indoor air cleanup levels. Once indoor air cleanup level achieved and confirmed, building recategorized as Tier 2. Implement governmental, proprietary, and informational ICs (see Table 8).
Tier 2	Building with indoor air concentrations below the indoor air cleanup levels. Former Tier 1 existing building and Tier A future (new) building that confirmed indoor air concentrations are below the indoor air cleanup levels.	Ensure continued operation and maintenance of active ventilation system or other selected engineered remedy to meet RAOs. Develop and implement long-term monitoring and ICs implementation plan. Implement governmental, proprietary, and informational ICs (see Table 8). Where remedy is achieved through operation of an active ventilation system, agreement of property owner must be contained in a recorded agreement.

TABLE 6B—Response Action Tiering System for Existing Commercial and Residential Buildings in Vapor Intrusion Study Area (Sampled with No Engineering Control in Place or Operating)

Tier	Description	Response Action
Tier 1	Building with indoor air concentrations greater than outdoor (background)* air concentrations and indoor air cleanup level.	Implement selected remedy (appropriate engineering control) to meet indoor air cleanup levels. Once indoor air cleanup level achieved and confirmed, building recategorized as Tier 2. Implement governmental, proprietary, and informational ICs (see Table 8).
Tier 3A	Building with indoor air concentrations below indoor air cleanup levels, but greater than outdoor (background) concentrations.	No engineered remedy required. Develop and implement long-term monitoring plan. Implement governmental ICs (see Table 8).
Tier 3B	Building with indoor air concentrations at or within outdoor air (background)* concentrations.	No engineered remedy nor long-term monitoring required. Implement governmental ICs (see Table 8)
Tier 4	Buildings where converging lines of evidence demonstrate that there is no longer the potential for vapor intrusion into the building exceeding indoor air cleanup levels.	No action required after performance of all necessary confirmation sampling and documentation approved by EPA that no action is necessary.

* Outdoor concentrations of TCE typically range from below laboratory analytical detection limits to 0.4 $\mu g/m^3$.