TCE Vapor Intrusion Mitigation through Adaptive Design at a 174,300 Square Foot Aircraft Maintenance Hangar

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Background/Objectives. The U.S. Air Force Civil Engineer Center (AFCEC) and Naval Facilities Engineering Command (NAVFAC) recently procured the design of a 174,300 ft^2 3-bay aircraft hangar as bedown facilities for large aircraft being brought to Travis Air Force Base. The hangar structure includes three aircraft maintenance bays with adjoining single-story structures containing a hydraulic shop, an ELEN shop, general maintenance shops, and administration/support areas. The site of this new hangar is located adjacent to Building 18, where historic degreasing operations and the storage of degreaser are believed to have resulted in the release of TCE to the environment. TCE has been observed in groundwater near Building 18 at concentrations as high as 75,000 micrograms per liter A groundwater extraction and treatment system is in place and operated as a remedy for the 180-acre chlorinated solved plume originating from this area. Given the concentrations of TCE in groundwater, the hangar design needed to include a vapor intrusion mitigation system that would protect future workers from exposure to TCE vapor, balance performance with cost, and pass regulatory review. While historical investigations have included the collection of soil gas samples from locations nearby, soil gas data was not available from within the hangar footprint to assess concentrations of TCE at this location. Furthermore, construction activities will result in the over excavation of soils beneath the foundation, changing the nature of subsurface materials present and limiting the ability to use current soil gas data to predict VI risks that will be present following construction. As a result, the design team needed to develop an approach to VI mitigation that was protective and cost effective despite the unknown conditions present. This presentation presents an adaptive approach to VI mitigation which allowed this project to proceed.

Approach/Activities. To overcome these challenges, the design team developed an approach that would result in minimal increases to the previously proposed construction costs yet will allow flexibility to upgrade to a more robust system if performance data indicates the need. VI mitigation measures were integrated into the design package such that the hangar design included the following components:

- A VI geomembrane that will be installed to account for expansion joints;
- Permanent soil gas sampling ports to assess sub-slab vapor concentrations; and
- Passive sub-slab depressurization systems with infrastructure to allow for easy conversion to an active system should performance data indicate an active system is needed.

Results/Lessons Learned. This design provided AFCEC with a solution capable of addressing VI risks present at the hangar. Furthermore, this design considered the additional cost of the installation, operation and maintenance of an active sub-slab depressurization. While the design is resilient in that it can be adapted into an active system as needed, these costs will only be incurred if post-construction performance data indicates that level of mitigation is necessary.