

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
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DRAFT FINAL SITE INVESTIGATION (SI) REPORT FORMER LOCATIONS OF TANKS 109 AND 117, CROWS LANDING NAVAL AUXILIARY LANDING FIELD (NALF), STANISLAUS COUNTY

Thank you for the additional copy of the subject Draft Final SI Report submitted to our office in May 1993. We apologize for our late response. We have completed our review and have provided comments which focus on the need to completely define the extent of soil and ground water contamination at Sites 109 and 117. The details of our comments are provided in the enclosed memorandum. Please address these comments in the Final SI Report and/or in a Work Plan for subsequent work.

If you have any questions concerning these comments, please call me at (916) 255-3066.

KAREN A. BESSETTE
Project Engineer

KAB:kb

Enclosure

cc: Mr. Robert Fourt, Stanislaus County Department of Environmental Resources, Modesto
Mr. Kent Strong, Department of Toxic Substances Control, Sacramento
Ms. Carolyn Douglas, U.S. Environmental Protection Agency, Region IX, San Francisco
Ms. Camille Garibaldi, Department of the Navy Western Division, San Bruno
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MEMORANDUM

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD • CENTRAL VALLEY REGION

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DATE: 15 December 1993

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SUBJECT: ***DRAFT FINAL SITE INVESTIGATION (SI) REPORT FORMER LOCATIONS OF TANKS 109 AND 117, CROWS LANDING NAVAL AUXILIARY LANDING FIELD (NALF), STANISLAUS COUNTY***

I have reviewed the subject SI Report, dated 17 December 1992, submitted on behalf of the Naval Facilities Engineering Command, Western Division. The report contains the results from the second phase of investigation of two former underground storage tank sites (Sites 109 & 117) at Crows Landing NALF.

Underground storage tanks (USTs) at Crows Landing NALF were reportedly installed in the 1940s and 1950s. Tanks 109 and 117 were removed from Crows Landing NALF in October of 1988. Tank 109 was a 1,000 gallon UST which reportedly stored both diesel and JP-5 fuel during its operation. Tank 117 was a 1,200 gallon UST which reportedly stored unleaded gasoline. Laboratory analyses of soil samples collected from the UST excavations confirmed the presence of total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, xylenes, and dichlorobenzene at various levels.

In December of 1989, ERM-West, Inc. (ERM-West) completed the initial field investigation of the former tank sites. This investigation included drilling five borings at Site 109 and six borings at Site 117, and converting one boring at each site to a ground water monitoring well. ERM-West concluded that both soil and shallow ground water had been impacted by hydrocarbons at Sites 109 and 117, and that halogenated volatile organic contaminants were also present in shallow ground water originating from an unknown source. Concentrations of TPH in ground water samples were reported at 3,000,000 micrograms per liter ($\mu\text{g}/\text{l}$) at Site 109 and 110,000 $\mu\text{g}/\text{l}$ at Site 117.

The objectives of the December 1992 SI were to define the lateral and vertical extent of soil and ground water contamination previously identified at the two former UST sites, and to develop possible remedial strategies.

The work performed for this SI included drilling six borings at Site 109 and eight borings at Site 117, collecting soil samples for field and laboratory analysis, converting all drilled boreholes to ground water monitoring wells, collecting ground water samples for laboratory analysis, and performing step-drawdown/constant discharge and rising head/falling head aquifer tests on selected monitoring wells. Field activities were performed from late April of 1992 through mid May 1992.

The report confirms the presence of soil and ground water contamination at both Sites 109 and 117. The primary contaminants at Site 109 include TPH-E (characterized as JP-5) benzene, toluene, and o-xylene. The primary contaminants at Site 117 include TPH-P (identified as gasoline) benzene, toluene, ethylbenzene, xylene, 1,2-dichloroethane, and 1,2 dichloropropane.

At Site 109, concentrations of 510 and 550 milligrams per kilogram (mg/kg) TPH-E were detected in soil samples collected from the two boreholes closest to the former tank location at a depth of 30 feet. Although no confining layers were identified, contaminated soil appears to be limited to a zone between 30 and 40 feet below ground surface (bgs).

Low levels of benzene and toluene (1.5 and 3.8 $\mu\text{g/l}$, respectively) were detected in only one monitoring well (MW-109-6) north of the former UST 109 location. Contaminants were not detected above detection limits in the ground water sample collected from this well after it had been pumped for 96 consecutive hours during the constant discharge pump test. However, free product was removed from the well previously installed by ERM-West (ERM-2) closest to the former tank location. This well is screened in what is now the unsaturated zone. Recharge did not occur after removal of the fluid.

Ground water contamination detected at Site 117 includes TPH-Ps, aromatic volatile compounds (AVOCs), and halogenated volatile organic compounds (HVOCs). The locations and concentrations of the HVOC contaminants apparently correspond to the distribution of the TPH-P and AVOC contaminants. Concentrations ranged from 4.4 to 100,000 $\mu\text{g/l}$ TPH-P, 320 to 18,000 $\mu\text{g/l}$ benzene, and from 1.5 to 940 $\mu\text{g/l}$ of 1,2-dichloroethane. Ground water contour maps (Figures 20, 21 and 22) are provided in the report which estimate the areal extent of the TPH-P, benzene, and 1,2-dichloroethane plumes. These figures depict the areal extent of these plumes as similar.

At Site 117, concentrations of TPH-P (up to 200 mg/kg) were detected in soil samples, collected between 35 and 45 feet bgs, from the boreholes to the north, southwest, and southeast of the former tank location. This contamination may have been transported by the ground water table which has dropped at this site from 33 feet bgs in 1990 to 48 feet bgs at the time of this investigation.

My comments regarding the subject report are as follows:

1. **Delineation of the Extent of Contamination.** Soil and ground water contamination at Site 109 appears to be localized in the immediate area of the former tank location. However, when the water table dropped at this site, contaminants could have moved laterally in a sandy layer rather than remaining in the immediate area of the release. Areas of highest soil and ground water contamination may be beneath the Administration Building adjacent to, and west of, the former tank area.

To further evaluate the nature and extent of ground water contamination at Site 109, a monitoring well should be installed in the vicinity of ERM-2, the previously drilled 109-B2 boring location, and the former tank location. Information from installation of a well in this location will assist in characterizing the contaminant source area thereby providing a more adequate data base for making remedial action decisions.

At least two additional wells should be installed at Site 117 to complete the definition of the lateral extent of ground water contamination to the west and east-southeast of the former tank location. If information from these wells does not define the contaminants at the analytical detection level, additional wells may be necessary to complete the vertical and horizontal extent for all contaminants detected.

A soil vapor survey should be performed at Sites 109 and 117 in order to define the vertical and horizontal extent of volatile organic contamination in soil. In our experience, soil boring data for volatile organic contaminants are not representative of actual amounts of these contaminants present in the vadose zone. Collection and handling procedures for analyses of soil samples inherently result in loss of volatiles prior to conducting the analyses. In addition, soil vapor data are necessary as a basis for the design of a soil vapor extraction system.

Because the extent of soil and ground water contamination has not yet been completely defined at Sites 109 and 117, it is premature to evaluate whether the remedial actions proposed in the SI report are acceptable. As previously discussed, soil vapor surveys should be performed, the installation of at least one additional monitoring well is necessary at Site 109 and at least two additional monitoring wells are necessary at Site 117. Sampling and analysis procedures for ground water should be in accordance with those used for this investigation. Further phases of site investigation work may be necessary depending on data obtained from the installation of these wells.

2. **Continued Ground Water Level Measurements.** Regional ground water flow direction was reported to be to the northwest. Local ground water flow direction appears to be highly variable. Ground water level measurements were taken from the newly installed wells between May 11 and 13, 1992. Ground water was reported to be flowing in a southwesterly direction at Site 109 and a northeasterly direction at Site 117. In December of 1989, ERM-West reported the local ground water flow at these sites to be to the northwest. This ground water flow direction was confirmed by PRC Inc. in their October 1990 report that presented results from the investigation of two additional tank cluster areas in close proximity to Sites 109 and 117.

The SI report states that pumping and irrigation occurring at the adjacent agricultural properties are likely responsible for the counter-regional ground water flow direction determined during this investigation. However, after a recent investigation of the influences of agricultural activities on ground water, PRC Inc. concluded that nearby irrigation practices were not affecting ground water flow beneath Crows Landing NALF on April 7, 1993 (Draft Final Irrigation Practices Technical Memorandum, dated 12 August 1993).

Ground water level measurements should continue to be taken from the newly installed wells at Sites 109 and 117, quarterly for at least an additional year, to provide for further evaluation of local ground water flow directions and gradients. If there are frequent fluctuations in flow direction, it may be necessary to take ground water level measurements monthly for at least one year.

3. **Ground Water Contour Map.** One map illustrating ground water contour elevations at both Sites 109 and 117 should be provided. This map should include water level data from

Installation Restoration Program Sites 12 and 16. All water level data should be from measurements taken during the same period.

4. **Cross Sections.** The cross sections provided in the report should correlate lithologies of the boring information based on interpretations. One approach is to group generalized similar hydrogeologic units together, e.g. units with predominantly low, medium, and high permeabilities. Units such as USGS: ML/CL; CL; SM/ML; ML etc. could be used.
5. **Recommended Further Actions.** I concur that a formal feasibility study, including pilot tests, should be conducted to identify the most effective remedial action for Sites 109 and 117; however, the site investigation phase must be completed prior to initiating this work. Once the nature and extent of contamination has been completely defined at these sites, it will be appropriate to determine suitable remedial actions.

Continued monitoring with a subsequent request for a "no further action required" decision is discussed in the SI report for Site 109. Continued monitoring without taking remedial action may be an option; however, this approach would not provide for closure of this site, i.e. monitoring would always be required. Acceptability of this approach must be based on additional site investigation information and any potential for future ground water contamination. Removal of localized areas of highest contamination may be necessary to eliminate or significantly reduce the source of ground water pollutants.

The recommended further action discussed in the report for Site 117 appears to be acceptable based on the information provided in the SI report. However, as indicated previously, any determination of remedial action will depend on data obtained from the soil vapor survey, the installation of additional wells and subsequent feasibility study work.

6. **Quarterly Sampling and Analysis.** To develop an adequate data base for making future remedial action decisions, quarterly sampling of all wells at Sites 109 and 117 should continue for at least one year. Constituents of concern at both sites, including TPH-E, benzene, toluene, xylene, TPH-P, ethylbenzene, 1,2-dichloroethane, and 1,2 dichloropropane should be analyzed for. In addition, analysis of dissolved metals (Title 22), general minerals, and general ground water parameters, should be conducted to characterize ground water. Sampling and analysis procedures should be in accordance with those used for this investigation.

Transmittal

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