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December 24, 1998

Mr. Hubert Chan
Engineering Field Activity West
Naval Facilities Engineering Command
900 Commodore Drive, Building 210
San Bruno, California 94066-2402

CLEAN Contract Number N62474-94-D-7609
Contract Task Order (CTO) 219

Subject: **Draft Final Record of Decision/Remedial Action Plan, Installation Restoration Program Sites 10, 12, 13, 14, 16, and 18, NASA Crows Landing Flight Facility, Crows Landing, California**

Dear Mr. Chan:

Enclosed are three copies of the draft final record of decision/remedial action plan (ROD/RAP) for Installation Restoration Program Sites 10, 12, 13, 14, 16, and 18 at the National Aeronautics and Space Administration (NASA) Crows Landing Flight Facility. In addition, attached to this letter are responses to technical review comments received from the Central Valley Regional Water Quality Control Board on the Draft Record of Decision/ Remedial Action Plan (ROD/RAP).

Please call me at (303) 312-8815 if you have any questions.

Sincerely,

for:

Keith Reamer
Installation Coordinator

KR/jed

cc: Don Chuck, Moffett Federal Airfield
Ray Leclerc, Department of Toxic Substances Control
Robert Reeves, Regional Water Quality Control Board
Brian Staab, National Aeronautics and Space Administration
Garrett Turner, Science Applications International Corporation
Jim Simpson, Stanislaus County Department of Environmental Resources
NASA Crows Landing Information Repository (2 copies)

ENCLOSURE 1

DRAFT FINAL
RECORD OF DECISION/REMEDIAL ACTION PLAN
INSTALLATION RESTORATION PROGRAM
SITES 10, 12, 13, 14, 16, AND 18

DATED 24 DECEMBER 1998

THIS RECORD IS ENTERED IN THE DATABASE AND FILED AS

RECORD NO. N60211_000189

RESPONSES TO TECHNICAL REVIEW COMMENTS
DRAFT RECORD OF DECISION/REMEDIAL ACTION PLAN
INSTALLATION RESTORATION PROGRAM SITES 10, 12, 13, 14, 16, AND 18
NASA CROWS LANDING FLIGHT FACILITY

This document presents responses to technical review comments on the National Aeronautics and Space Administration (NASA) Crows Landing Flight Facility draft record of decision/remedial action plan (ROD/RAP) for Installation Restoration Program (IRP) Sites 10, 12, 13, 14, 16, and 18. The draft ROD/RAP, dated March 31, 1998, was prepared for the U.S. Navy by Tetra Tech EM Inc. (TtEMI). The technical review comments reproduced below were received from the Central Valley Regional Water Quality Control Board (RWQCB) on June 26, 1998. No comments were received from the Department of Toxic Substances Control (DTSC).

GENERAL COMMENT

Comment 1: **The Navy should revise the ROD/RAP to provide a summary table for each site showing all contaminant concentrations detected during the RI and SI. Site maps should be presented showing all soil sample locations and depths. These site maps should show all groundwater monitoring wells that could be used to evaluate potential groundwater contamination. The Navy should provide an evaluation with these tables indicating which constituents were included in the sampling and analysis plan to evaluate potential groundwater contamination at the site.**

Response: The ROD/RAP has been revised to include a more extensive summary of previous contaminant investigation results for each site. This revision includes summary tables describing the investigation samples collected, tables summarizing analyses performed, tables summarizing analytical results, and expanded discussions of previous and recent Installation Restoration Program (IRP) site investigations. Figures showing sampling locations, depths, and analytical results have also been added. The additional tables and figures, however, have been included only to summarize previous contaminant investigations. The IRP sites remedial investigation (RI) report (PRC 1997) will remain the comprehensive source of information for these sites and should be consulted for investigation details.

SPECIFIC COMMENTS

Site 10 - Rubble Disposal Area

Comment 1: **Site 10 - Rubble Disposal Area. The Navy indicated that the U.S. Environmental Protection Agency (EPA) evaluated this site previously and determined that the nature of activities and historical descriptions suggest that Site 10 warrants no further action. The Navy has indicated that no samples were collected at this site. The ROD should provide the basis for the no further action determination and should at a minimum include information that was presented to the U.S. EPA. We will evaluate this data and determine if we are able to concur with the U.S. EPA's determination. Our experience with similar disposal sites at other military facilities indicates that historical records alone are often not a complete record of disposal practices.**

Response: IRP Site 10 was identified and evaluated by the Naval Energy and Environmental Support Activity (NEESA) in 1984 during the initial assessment study (IAS) of Naval Air Station Moffett Field and NASA Crows Landing (NEESA 1984). The IAS included a records search, interviews with long-term base personnel, and an on-site survey. IRP Site 10 was described as a rubble disposal pit used in 1952 and 1953 to dispose of scrap lumber, dry wall, metal, ash, wire, and building demolition and construction debris. Historical maps and air photographs of the base indicate that most facilities that existed during World War II were demolished in the early 1950s, while several current buildings were constructed. No visible evidence of the disposal pit was observed during the IAS on-site survey and no additional study was recommended.

In 1990, Ecology and Environment (E&E), contractor to the U.S. Environmental Protection Agency (EPA), reviewed the IAS report for compliance with EPA requirements (EPA 1990). The evaluation included review of contaminant investigation reports completed after the IAS, and interviews with state agency personnel. The review included recommendations for further investigation at several sites, including new sites not identified in the IAS. The recommendations formed the basis for the site investigation (SI) for IRP Sites 11, 12, 13, and 16 completed in 1992 (PRC 1992). No additional investigation was recommended for IRP Site 10.

In summary, both the IAS and EPA's subsequent review concluded that no further evaluation of IRP Site 10 was warranted. In response to RWQCB's concerns, however, the Navy conducted an additional investigation of IRP Site 10 in November 1998. The additional investigation included a review of historical records and aerial photographs to locate IRP Site 10 as accurately as possible. Trenching was conducted to evaluate the presence of buried debris, rubble, or other material. Results from the additional investigation have been included in the revised ROD/RAP.

Site 12 - Maintenance Shop Area

Comment 2: **Site 12 - Maintenance Shop Area. Previous investigations indicate that the Navy evaluated pesticides, petroleum hydrocarbons and chlorinated VOCs and SVOCs [semivolatile organic compounds]. Based on the site history there appears to be sufficient justification to evaluate most of these constituents. However, the Navy performed only a limited investigation to evaluate chlorinated VOCs. Table 4-10 of the RI report shows that most of the sampling for VOCs was done at 2 feet below ground surface (bgs). Several samples were collected approximately 18 feet bgs. However, these samples were not evaluated for chlorinated VOCs. The site's historical record, however, indicates that the wash pad contained 4 drains located at the center of the wash pad. The completion depth of these drains is unknown. The presence of these drains and the limited depth of VOC samples leaves too much uncertainty with respect to the presence or absence of VOCs. Additional data should be collected to evaluate chlorinated VOCs.**

Response: Table 4-10 in the RI report is a summary of contaminant detections in soil samples collected during the IRP Site 12 RI only. As described in Section 4.4.1 of the RI report, 12 subsurface soil samples were collected and analyzed for volatile organic compounds (VOCs) from four soil borings completed during the IRP Site 12 SI (PRC 1992). Three of these borings, 12-SB-01, 12-SB-02, and 12-MW-01, were located adjacent to the west side, southwest corner, and north side of the wash rack pad,

respectively. Boring 12-SB-03 was drilled through the center of the wash rack pad. Soil samples were collected and analyzed for VOCs from depths of 5.5, 15.5, and 25.5 feet bgs in each of these borings (5.5, 15.5, and 20.5 feet bgs in 12-SB-03). Seven surface soil samples were also analyzed for VOCs during the SI. During the RI, 23 surface and near-surface soil samples collected at the wash rack pad were analyzed for VOCs (as shown in Table 4-10 in the RI report). In total, 30 surface or near-surface and 12 subsurface soil samples collected from the wash rack pad area were analyzed for VOCs during the SI and RI. No chlorinated VOCs were detected in any of these samples.

A specific objective of removing the wash rack pad during the RI was to further evaluate whether contamination existed under the floor drains, or whether any piping connected to the drains led to other potentially contaminated areas. During excavation, the drains were observed to be open holes through the concrete pad. The drains were not connected to any piping, and no contaminants, including chlorinated VOCs, were detected in soil samples collected immediately beneath the drains (RI samples 12-EX-05 through 12-EX-08).

Finally, historical descriptions of activities at IRP Site 12 identified stoddard solvent as the parts cleaning fluid used (NEESA 1984). Stoddard solvent is a type of petroleum-based mineral spirit and not a chlorinated VOC. Based on the above discussion, the Navy believes the wash rack pad area has been adequately investigated for the potential occurrence of chlorinated VOCs and that additional investigation is not warranted. No changes have been made to the ROD/RAP report in response to this comment other than including additional contaminant investigation summary information, as described in the response to general comment 1.

Comment 3: **Site 12 - Maintenance Shop Area. We have reviewed groundwater data associated with IRP Site 12. The RI report indicates that the Navy installed one well 12-MW-1 near this site. Also, additional monitoring wells in the vicinity of UST [underground storage tank] 117, adjacent to IRP Site 12, were evaluated for VOCs. However, all these wells went dry shortly after their construction. The RI report indicates that monitoring well 12-MW-1 was sampled only twice for VOCs. We are concerned that these monitoring wells were not evaluated for more than 2 quarters. We believe that 2 quarters of groundwater monitoring data is insufficient to evaluate this site because the groundwater flow direction appears to be variable and appears to be influenced by several irrigation wells surrounding the facility. Therefore, the Navy should evaluate if any other monitoring wells could be used to provide further evaluation for chlorinated VOCs at IRP Site 12. If the Navy is unable to evaluate if this site is a potential VOC source area, the Navy may need to construct additional monitoring wells in this area. Additional evaluation of the groundwater data is also necessary in order to evaluate if additional soil characterization for chlorinated VOCs is necessary.**

Response: Groundwater monitoring well 12-MW-01 was located immediately adjacent to the north end of the wash rack pad. Variable groundwater flow directions have resulted in radial migration of contaminant plumes from source areas at sites adjacent to IRP Site 12 at NASA Crows Landing. Because of the characteristic radial migration pattern, traditional concepts of upgradient and downgradient are not applicable in this area at NASA Crows Landing. Monitoring well 12-MW-01 was appropriately located to

detect any contaminant release to groundwater from the wash rack pad. Chlorinated VOCs were not detected in either of the groundwater samples collected from this well.

In addition, groundwater samples from existing monitoring well 117-MW-01 have been collected for VOC analysis on nine separate occasions between December 1995 and March 1998. This well is located approximately 100 feet northwest of the wash rack pad at IRP Site 12. Samples analyzed from well 117-MW-01 frequently contain carbon tetrachloride in concentrations near analytical detection limits. However, the carbon tetrachloride contamination is associated with a plume originating from IRP Site 17, also northwest of IRP Site 12. Chlorinated VOCs potentially associated with IRP Site 12 have not been detected in samples collected from well 117-MW-01.

Finally, as discussed in the response to specific comment 2, subsurface soils in the vicinity of the wash rack pad have been thoroughly investigated for the occurrence of chlorinated VOCs and none were found. With no indication of any source of chlorinated VOCs in soils beneath IRP Site 12, there should be no concern over potential chlorinated VOC contamination to groundwater associated with the site. The Navy believes that IRP Site 12 has been adequately evaluated as a potential source of chlorinated VOCs and that additional groundwater data collection is not warranted. No changes have been made to the ROD/RAP report in response to this comment other than including additional contaminant investigation summary information, as described in the response to general comment 1.

Site 14 - Fire Training Exercise Area

Comment 4: **Site 14 - Fire Training Exercise Area. Site 14 was a fire training exercise area that was used for burning of JP-4 fuel and cleaning solvents. The area consisted of an unlined burn pit that was used from 1943 to 1987. The RI report indicates that soil and groundwater sampling was conducted at this site. The Navy installed one monitoring well which was sampled two times before it became dry. Sampling of this well (B-13) did not indicate the presence of VOCs. The Navy conducted soil excavation and soil remediation by a thermal heat process which volatilizes VOCs (March 1992). Confirmation sampling results indicated low concentrations of BTEX [benzene, toluene, ethylbenzene, and xylenes] suggesting that this site was remediated to protect groundwater from these constituents. However, the confirmation sampling results also indicated the presence of 1,1,1 TCA and TCE in one side wall excavation sample (5 feet below ground surface). The Navy only included analyses for chlorinated VOCs in 5 near surface soil sampling locations (see Figure 4-11 in RI report).**

Response: A total of 10 soil samples were analyzed for VOCs during the course of contaminant investigations and cleanup at IRP Site 14. Five soil samples collected from soil borings and soil piles were analyzed for VOCs during a contaminant investigation completed in 1987 (ERM West 1987). Five additional soil samples collected from the excavation sidewalls and base were analyzed for VOCs during site cleanup in 1991 (Battelle 1992). Excavation sidewall sample CROW-8-BB was the only sample collected that contained chlorinated VOCs, including 1,1,1-trichloroethane (1,1,1-TCA) and trichloroethene (TCE). Concentrations of 1,1,1-TCA and TCE detected in the excavation sidewall sample were 15 and 18 micrograms per kilogram (µg/kg), respectively. Samples

collected from boring SB-11, completed approximately 10 feet from where sample CROW-8-BB was collected, did not contain chlorinated VOCs, including in a sample collected deeper than sample CROW-8-BB.

Assuming a combined environmental attenuation and leachability factor of 100, soil concentrations of 1,1,1-TCA and TCE would have to be 20,000 and 500 µg/kg, respectively, to leach to groundwater in concentrations exceeding California maximum contaminant levels (MCLs). No VOCs were detected in groundwater samples collected in May 1987 and September 1988 from monitoring well ERM-3, located roughly 20 feet from where sample CROW-8-BB was collected. The concentrations of 1,1,1-TCA and TCE detected were also below EPA Region 9 residential soil preliminary remediation goals (PRGs) of 1,200,000 and 3,200 µg/kg, respectively. In summary, the concentrations of 1,1,1-TCA and TCE detected were negligible. In response to RWQCB's concerns, however, an additional investigation of IRP Site 14 was conducted in November 1998 and is described in the response to specific comment 6.

Comment 5: **Site 14 - Fire Training Exercise Area. We are concerned that the confirmation sampling results did not evaluate the extent of residual chlorinated VOCs. In addition, the groundwater monitoring data presented in the Annual Groundwater Monitoring Reports show that the groundwater flow direction is variable and appears to be influenced by irrigation well pumping. Because the site soil and groundwater monitoring data is very limited and inconclusive, additional evaluation appears to be necessary to determine the extent of VOCs at Site 14.**

Response: As discussed in the response to specific comment 4, a total of 10 soil samples and two groundwater samples were collected to evaluate potential chlorinated VOC contamination at IRP Site 14. Concentrations of 1,1,1-TCA and TCE detected in the IRP Site 14 excavation sidewall sample do not appear to present a potential threat of future groundwater contamination or to human health. Chlorinated VOCs were not detected in confirmation samples collected at the base of the excavation near the center of the fire training area at greater depths than the sidewall samples. No chlorinated VOCs were detected in the two groundwater samples collected. Finally, it should be noted that cleanup at IRP Site 14 was overseen by RWQCB, the California Department of Health Services, and the Stanislaus County Department of Environmental Resources (EPA 1990 and Battelle 1992). No information exists suggesting that these regulatory agencies regarded the cleanup or confirmation sampling inadequate. In response to RWQCB's concerns, however, an additional investigation of IRP Site 14 was conducted in November 1998 as described in the response to specific comment 6.

Comment 6: **Site 14 - Fire Training Exercise Area. We request that the Navy construct additional monitoring wells that should be located downgradient of this site, taking into account seasonal changes in the groundwater flow direction. If possible, the Navy can use existing monitoring wells if they are appropriately located. These monitoring wells must be sufficient to establish the flow direction and the observed seasonal changes. At least 4 quarters of groundwater monitoring data should be collected to evaluate if chlorinated VOCs are present at this site. In addition, the ROD/RAP should include drawings that clearly indicate the original depth of the burn pit, the depth of the excavation and the soil sampling locations.**

Response: No VOCs were detected in groundwater samples collected in May 1987 and September 1988 from monitoring well ERM-3. Well ERM-3 was located immediately adjacent to the northeast corner of the fire training pad. Variable groundwater flow directions have resulted in radial migration of contaminant plumes from source areas at sites adjacent to IRP Site 14. Because of the characteristic radial migration pattern, traditional concepts of upgradient and downgradient are not applicable in this area at NASA Crows Landing. Monitoring well ERM-3 was appropriately located to detect any contaminant release to groundwater from the fire training pad. In response to RWQCB's concerns, however, the Navy conducted an additional investigation of potential chlorinated VOC contamination in groundwater associated with IRP Site 14. The additional investigation included HydroPunch (HP) groundwater sampling at two locations at IRP Site 14. Specifically, HP groundwater samples were collected from the southern and northern ends of the former excavation boundary and analyzed for the presence of VOCs. Results from the additional investigation are included as part of the revised ROD/RAP.

Site 16 - Pesticide Mix Area

Comment 7: **Site 16 - Pesticide Mix Area. The Navy conducted soil and groundwater investigations and evaluated pesticides, VOCs and metals at the site. Only one groundwater sample was collected from a groundwater monitoring well located adjacent to the pesticide mix area (16-MW-01). This sample was analyzed for VOCs, pesticides and TPH, but only detected low concentrations of TPH [total petroleum hydrocarbons]. It appears only one sampling event (September 1991) was conducted before this well went dry. Soil samples were limited to two locations to a depth of 25.5 feet below ground surface at the northern side of the concrete pad and mixing sink. Later RI activities, performed in 1995, determined that arsenic concentrations were above background concentrations and could potentially impact water quality. The presence of arsenic was attributed to the use of herbicides. The Navy proceeded to remove arsenic contaminated soils in areas that surrounded the concrete pad and excavations extended as far as 20 feet south of the pad.**

Response: No response necessary.

Comment 8: **Site 16 - Pesticide Mix Area. Although the SI sampling, did not indicate the presence of pesticides, we believe the number of samples that were evaluated, was insufficient to provide an adequate characterization of the site. The presence of arsenic contamination (see Figure 4-13, RI report) around the concrete pad shows that a larger area was impacted by site operations than was previously suspected during the SI.**

Response: Please see response to specific comment 9.

Comment 9: **Site 16 - Pesticide Mix Area. The presence of arsenic contamination in areas surrounding the concrete pad and the description of site operations, suggest that pesticides should have also been evaluated in areas where arsenic was detected. Because the Navy has performed soil excavation in this area, we request that the Navy provide additional confirmation sampling for pesticides and evaluate if pesticides are present in areas surrounding the former concrete pad. If this**

confirmation sampling indicates leachable concentrations of pesticides are present that could impact groundwater, the Navy may also be required to construct additional groundwater monitoring well(s) and evaluate potential impacts to groundwater for a minimum of 4 consecutive quarters.

Response: Discussions with long-term base personnel during the RI indicated that herbicides used for weed control on and adjacent to the runways were the only pesticides that would have been mixed at the pesticide rinse area (Philips 1995). Since at least the mid-1970s, the herbicides used were the same over-the-counter varieties available to the general public. These herbicides typically are not persistent in the environment and quickly degrade to harmless byproducts.

The apparent arsenic contamination removed from IRP Site 16 was attributed to the possible use of arsenic-based herbicides. Arsenic herbicides were commonly used prior to World War II, but were largely replaced by synthetic herbicides following the war. Although no direct evidence of arsenic herbicide use at NASA Crows Landing was discovered, it seemed logical to assume that remaining stockpiles could have been used soon after World War II. Possible use of arsenic herbicides could have been the source of elevated arsenic concentrations excavated and removed from the pesticide rinse area. The Navy believes that arsenic concentrations in soil were an appropriate indicator of the extent of potential pesticide contamination at IRP Site 16.

RI sampling showed that the apparent arsenic contamination was removed from IRP Site 16. The Navy does not believe that additional investigation of potential contamination from over-the-counter herbicides is worthwhile. No changes have been made to the ROD/RAP report in response to this comment other than including additional contaminant investigation summary information, as described in the response to general comment 1.

REFERENCES

Battelle. 1992. Evaluation of the LT3 System for the Remediation of Hydrocarbon Contaminated Soil, Naval Auxiliary Landing Field Crows Landing. March.

ERM-West. 1987. Report on Site Investigation, Naval Auxiliary Landing Field Crows Landing, Fire Fighting School, Crows Landing, California. November.

Naval Energy and Environmental Support Activity (NEESA). 1984. Initial Assessment Study of Naval Air Station, Moffett Field, Sunnyvale, California. March.

Philips, T. 1995. Naval Auxiliary Landing Field Public Works Manager (retired), personal communication with Neil Bingert, PRC Environmental Management, Inc. February 23.

PRC Environmental Management, Inc. (PRC). 1992. Naval Auxiliary Landing Field Crows Landing Site Investigation Report, Installation Restoration Program Sites 11, 12, 13, and 16. July 31.

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