APPENDIX S

RECENT RWQCB AND US EPA ORDERS

California Regional Water Quality Control Board
San Francisco Bay Region

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Secretary for Environmental Protection

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Arnold Schwarzenegger
Governor

Certified Mail No.
70033110000265564159

Date: JUN 0 2 2004
File No. 43S0286 (KER)

United Technologies Corporation
Pratt & Whitney Space Propulsion
Attn: Mr. Al B. Barake
600 Metcalf Road
San Jose, CA 95138

Subject: ORDER R2-2004-0032 FOR FINAL SITE CLEANUP REQUIREMENTS FOR UNITED TECHNOLOGIES CORPORATION, 600 METCALF ROAD, SAN JOSE, SANTA CLARA COUNTY

Dear Mr. Barake:

Attached please find Order No. R2-2004-0032, Revision to Final Site Cleanup Requirements and Rescission of Orders No. 94-064 (as Amended), 98-070, and 91-006, for the United Technologies Corporation site at 600 Metcalf Road in Santa Clara County. This order was adopted by the Regional Water Quality Control Board on May 19, 2004.

If you have any additional questions, please contact Keith Roberson of my staff at (510) 622-2404 [e-mail ker@rb2.swrcb.ca.gov].

Sincerely,

Bruce H. Wolfe
Executive Officer

Attachments: Tentative Order
cc w/attachments: Mailing List

Mailing List

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. R2-2004-0032

REVISION TO FINAL SITE CLEANUP REQUIREMENTS AND RESCISSION OF ORDERS NOS. 94-064 (AS AMENDED), 98-070, AND 91-006 FOR:

UNITED TECHNOLOGIES CORPORATION

for the property located at
600 METCALF ROAD
SANTA CLARA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter called the Water Board), finds that:

1. **Site Location**: United Technologies Corporation (UTC), hereinafter also referred to as the discharger, owns and operates the San Jose facility in Santa Clara County as shown in Figure 1. The site is located in an unincorporated area of Santa Clara County approximately five miles south of San Jose and four miles east of U.S. Highway 101. The site is located in an area of rolling hills and relatively broad valleys. The two main valleys within the developed portion of the site are Shingle Valley and Mixer Valley. Elevations range from 680 to 1400 feet above mean sea level. Four seasonal creeks flow through the site and converge near the southeastern corner of the site. The combined flow of these creeks discharges into Anderson Reservoir, Santa Clara County's largest drinking water reservoir. Water released from Anderson Reservoir flows to Coyote Creek, which flows northward across the Santa Clara Valley and empties to San Francisco Bay.

   Land usage surrounding the UTC site is primarily agricultural. Ranch lands are located to the north, east, and southeast of the site. To the northwest and west are two regional parks and some open public land. The nearest residences are a few ranch houses or other dwellings located within 3,000 feet to the north, northeast, and southeast of the site boundaries.

2. **Site History**: UTC began operations at the 5,113-acre site in 1959. The facility now includes over 200 stations used for laboratories, research, testing, manufacturing, storage, maintenance, and administration. UTC develops, manufactures, and tests space and missile propulsion systems at the site. Solid rocket motors are filled with propellants designed to cause a controlled oxidation reaction that releases large amounts of energy and gas. Solid rocket propellants produced at the UTC facility are typically composed of synthetic rubber with the reactive materials (primarily aluminum and ammonium perchlorate) suspended in the rubber matrix. Aluminum serves as the fuel while ammonium perchlorate is the oxidizer for the reaction. Typical solid rocket propellant consists of approximately 16% aluminum fuel, 12% polymer binder, 2% epoxy curing agent, and about 70% ammonium perchlorate. Large amounts of ammonium perchlorate were used at the site until operations were discontinued in August 2003.

Other materials used in the operations at UTC include epoxies, paints, and insulating materials. Chlorinated and non-chlorinated degreasing agents were also used to dissolve polymers from hardware. Degreasers included trichloroethene (TCE) and 1,1,1-trichloroethane (TCA). Other volatile organic compounds (VOCs) used at the site included chlorofluorocarbons such as Freon 11 and Freon 113. Historically, spent solvents were collected for evaporation in on-site surface impoundments or shipped off-site for recycling or disposal.

There are three Resource Conservation and Recovery Act (RCRA) Class I surface impoundments at the facility, all of which have been closed. Surface Impoundment 0250 was a 110,540-gallon surface impoundment in Upper Shingle Valley that received metal-finishing wastewater. Surface Impoundment 0635 was a 179,500-gallon surface impoundment in Mixer Valley that received wastewater from a polybutadiene acrylic acid acrylonitrile (PBAN) polymer plant. Surface Impoundment 0706 was a four-cell 42,964-gallon surface impoundment in Mixer Valley that received waste solvents, paint sludges, and ammonium perchlorate washwater. The California Department of Toxic Substances Control (DTSC) certified closure of the three surface impoundments on November 25, 1991. Because the surface impoundments were closed with groundwater contamination left in place, the units will have to be monitored under a post-closure permit. DTSC is in the process of adopting a RCRA Post-Closure Permit for the impoundments.

The former Open Burning Facility (OBF) located in the eastern portion of the facility was a RCRA-regulated treatment facility historically used for open burning of waste propellants and explosives. Wastes were ignited within burn units, which were constructed of earthen berms. Thermal treatment at this facility was discontinued on October 18, 1996. The OBF was certified closed on June 2, 2000. Like the three surface impoundments, the OBF must be monitored under RCRA post-closure permit because of contamination left in place.

3. **Named Discharger:** UTC is named as the sole discharger because it is the current property owner, and because it owned and occupied the property during the time of the activities that resulted in the discharges, has knowledge of the discharges or the activities that caused the discharges, and has the legal ability to prevent future discharges. The results of investigations have confirmed the presence of chemicals used by UTC in soil and groundwater in several areas of the site.

   If additional information is submitted indicating that other parties caused or permitted any waste to be discharged on site where it entered or could have entered waters of the State, the Water Board will consider adding that party's name to this order.

4. **Regulatory Status**: The site has been under Water Board oversight since 1965. The site has been regulated under several Water Board orders, including Site Cleanup Requirements (SCR) orders, Waste Discharge Requirements (WDR) orders, and a Water Reclamation Requirements order. To facilitate regulatory oversight, the site was divided in the 1990s into two operable units based on the status of environmental characterization. The fully characterized portion of the site (Mixer Valley and most of Shingle Valley) was designated Operable Unit 1 (OU1); the remainder of the site was designated Operable Unit 2 (OU2). The SCR for OU1, Order No. 94-064, was adopted May 18, 1994, and amended on May 24, 1995, September 13, 1995, and May 21, 1997. The original SCR for OU2, Order No. 95-193, was adopted September 14, 1995 and was later replaced by Order No. 98-070 which was adopted on July 15, 1998. This Order rescinds and supercedes Orders 94-064 (along with its amendments) and 98-070; combines the two operable units into one; and regulates cleanup of soil and groundwater for the entire site.

In 1991, the Water Board issued a Water Reclamation Requirements order, Order No. 91-006, which permitted the facility to reuse treated groundwater for irrigation and dust control. This Order rescinds Order 91-006; however, on-site reuse of reclaimed water is still permitted as discussed in Finding 15, subject to the requirements specified in Section D of this order (page 25).

The site is also regulated under a Waste Discharge Requirements order, Water Board Order No. 95-190, which was adopted on September 13, 1995. This WDR regulates discharge of treated water from the site's sanitary wastewater treatment plant. This Order does not affect or rescind the WDR. The site also manages storm water runoff under the State General Permit for Storm Water Discharges Associated with Industrial Activities, Permit No. CAS000001.

In addition to the Water Board Orders, the four closed waste management units at the site are regulated under RCRA Post-Closure Permits administered by the DTSC. As discussed in Finding #2, the OBF and three closed surface impoundments (stations 250, 635, and 706) will be regulated under post-closure because the units were not clean-closed due to residual volatile organic compound (VOC) and perchlorate contamination. These units under DTSC oversight are subject to specific RCRA monitoring requirements in addition to the regional groundwater monitoring requirements mandated by the Water Board. The RCRA monitoring requirements are incorporated into the Self-Monitoring Program attached to this Order.

5. **Study Area**: This order pertains to the entire UTC site. The site has been divided into eight geographic/investigative areas as follows:

- Upper Shingle Valley (USV)
- Middle Shingle Valley (MSV)
- Lower Shingle Valley (LSV)
- Motor Test Area (MTA)
- Research and Advanced Technology Area (R&AT)
- Motor Assembly Area and Component Test Area (MAA/CTA)
- Mixer Valley
- Open Burning Facility (OBF).

These areas are identified on the site map (Figure 2). More information on these areas is provided below.

6. **Surface Hydrology:** Three riparian systems, Shingle Creek, Mixer Creek, and Las Animas Creek, exist within the site boundaries. Shingle Creek and Mixer Creek flow in a southeasterly direction through Shingle Valley and Mixer Valley, respectively. Las Animas Creek flows southward through the site, passing between the OBF and the main developed portion of the site. A fourth creek, San Felipe Creek, traverses the eastern side of the site before flowing into Las Animas Creek southeast of the facility boundary. Shingle Creek, Mixer Creek, and San Felipe Creek all flow into Las Animas Creek, and this combined flow empties into Anderson Reservoir. Shingle and Mixer creeks, along with Las Animas Creek above its confluence with San Felipe Creek, are generally small, ephemeral streams with highly variable flows. A characteristic of the creeks is the existence of subsurface stream flow in some reaches. Hydrologic studies have confirmed that some stretches of the streams are gaining, or receive a contribution of their flow from groundwater discharge. The direct communication between groundwater and surface water

and the documented discharge of contaminated water into the creeks at the site requires that UTC conduct surface water monitoring at the site. Creeks are currently sampled on a monthly schedule at specified sampling stations both on the site and outside the property boundaries.

The creeks flowing through the site provide a pathway for the potential transport of VOCs and perchlorate to Anderson Reservoir. Preventing or minimizing contaminants in surface waters is a high priority to prevent the spread of contaminants and protect water quality in Anderson Reservoir, which is used as a source of drinking water for several hundred thousand Santa Clara County residents. VOCs and perchlorate are routinely detected in surface waters at the site, particularly during the wetter winter months. Studies have shown this results from the transport of contaminants from surface soils via storm water runoff, as well as from the discharge of contaminated groundwater at creek gaining sections. Perchlorate is occasionally detected, at low concentrations, in Las Animas creek between the site boundary and Anderson Reservoir. Neither VOCs nor perchlorate have been detected to date in the reservoir, which is sampled monthly for perchlorate and quarterly for VOCs by the Santa Clara Valley Water District. It is appropriate to prohibit detectable concentrations of contaminants in surface waters at or beyond the property boundary to assure protection of the existing beneficial use downstream. Tasks 1 and 2 of this Order require the discharger to improve its storm water monitoring program to allow better quantification of the mass of contaminants entering the creeks during and after storms, and to design and implement measures in and downgradient of on-site source areas to eliminate the discharge of contaminants into the creeks.

7. **Site Hydrogeology**

Hydrogeologic Units: Developed portions of the site are located either in stream valleys filled with young, unconsolidated alluvium, or on hilly areas underlain by exposed or thinly buried bedrock. Bedrock at the site generally consists of poorly consolidated, non-marine sediments of the Santa Clara Formation, which is of Plio-Pleistocene age. The Santa Clara Formation is a heterogeneous assemblage of discontinuous fluvial deposits ranging from clays to sandy gravels, and dips to the northeast. The alluvium that fills the stream valleys consists of lenses and layers of clay, silt, sand and gravel. Santa Clara Formation underlies the stream valleys.

The Santa Clara Formation's ability to store and transmit water is variable, but it typically has a lower hydraulic conductivity than the alluvium. Hydraulic conductivities measured in the alluvium range from 3×10^{-2} cm/sec to 2×10^{-4} cm/sec, while hydraulic conductivities measured in the Santa Clara Formation range from 2×10^{-3} to 1×10^{-8} cm/sec. In general, the alluvium serves as an aquifer where it is saturated, whereas the Santa Clara Formation is believed to act as a barrier to vertical (and in some places, lateral) groundwater migration. Isolated lenses of groundwater have been identified in the deeper Santa Clara Formation between 50 and 70 feet below the ground surface.

Hydrogeology of the Valleys: In Shingle and Mixer valleys, groundwater occurs primarily in the alluvium, but also occurs in limited portions of the Santa Clara Formation in the upper portions of each valley. The alluvium attains a maximum thickness of approximately 50 feet. In Shingle Valley, the water table typically occurs between 15 to 40 feet below the ground surface. In Mixer Valley, groundwater is encountered in the alluvium at shallower depths, typically between 4 and 20 feet. Groundwater in the alluvium appears to be unconfined in some portions of the valleys and semi-confined in others. This situation is characteristic of fluvial deposits containing interbedded, laterally varying materials with contrasting permeability. Saturated alluvium

generally overlies tighter Santa Clara deposits described as moist. However, in some areas saturated coarse-grained Santa Clara materials appear to be in contact with saturated alluvium, suggesting there may be localized hydraulic connections between the alluvial and Santa Clara Formation deposits.

Hydrogeology of the Hills: The other developed areas of the site are located in hilly areas underlain primarily by Santa Clara Formation bedrock. These areas include the Motor Assembly Area and Component Test Area (MAA/CTA), the Research and Advanced Technology Area (R&AT) area, the Motor Test Area (MTA), and the Open Burning Facility (OBF).

The MAA/CTA is located in the hills upland of Shingle Valley. Groundwater in the MAA/CTA is generally first encountered in the Santa Clara Formation at depths between 25 and 70 feet. The R&AT and the MTA are located in side valleys adjacent to seasonal creeks that drain into Shingle Valley. The R&AT area and MTA are located either on alluvial soils or directly on Santa Clara Formation. Groundwater at the R&AT and MTA area is encountered at various depths ranging from approximately 14 to 42 feet in alluvium and Santa Clara Formation. Because of the geologic complexity of the Santa Clara Formation, it is difficult to determine groundwater flow pathways in the area. Available data suggest that the groundwater flow direction and orientation of the pollution plumes reflects the orientation of surface drainages in the tributary valleys. These tributary drainages contain surface flow only during the winter months.

The OBF is located on a north-sloping ridge of exposed Santa Clara Formation. Surface drainage is toward both the northwest and east. A thin layer of colluvium varying from 1 to 5 feet thick overlies the Santa Clara Formation. Some alluvium occurs in isolated locations along the two small drainages that trend north and west of the OBF. Groundwater flow at the OBF is extremely variable because of the lateral discontinuity of Santa Clara Formation deposits, and because of surface topography associated with the nearby Calaveras fault.

8. **Remedial Investigation and Remedial Measures:** Remedial investigations at the site began in the 1980s, and continue to be performed as needed to facilitate remedial efforts. Remedial measures to remove VOCs and other chemicals from soil and groundwater began in the late 1980s, and continue to the present. Earlier efforts at the site were focused on remediation of VOCs, while the current focus is on perchlorate remediation. Remedial investigations conducted since 1998 have generally established the extent of perchlorate contamination. Perchlorate has been detected in groundwater in most developed portions of the site, and the distribution generally coincides with the VOC plumes. The highest levels of perchlorate in soil and groundwater occur in the Oxidizer Road area, followed by Mixer Valley and the OBF.

Because of the size and complexity of the site, summaries of the remedial investigations and remedial measures are provided for each main area of the site.

Shingle Valley

Investigations: Shingle Valley extends about 14,000 feet (2.5 miles) within the site property boundaries, and includes the most heavily developed areas of the facility. UTC has divided the valley into three investigative areas (Upper, Middle and Lower Shingle Valley). Investigations in Shingle Valley began in 1984, and have included 370 soil borings and installation of 148 monitoring wells.

Shingle Valley contains several VOC plumes and minor fuel hydrocarbon plumes that originated from numerous potential sources including historical drum storage areas, sumps, spills, fuel tanks, and abandoned open burning areas. Ten VOC source areas have been identified in Shingle Valley, including six in Upper Shingle Valley (USV), three in Middle Shingle Valley (MSV), and one in Lower Shingle Valley (LSV). The main VOC plume in USV is approximately 2,600 feet in length and approximately 600 feet wide. The maximum concentration of total VOCs in Shingle Valley groundwater (15,000 µg/L) occurs in the USV plume. The VOC plume in MSV is approximately 4,200 feet in length and 700 feet in width. VOC concentrations in MSV are lower than those in USV, with a single well containing total VOCs at a concentration exceeding 1,000 ug/L.

The VOC plume in Lower Shingle Valley is approximately 1,300 feet long and up to 500 feet wide. Total VOC concentrations in the LSV plume are generally below 50 ug/L. The VOC plume extends to the property boundary, but extraction wells at the boundary have been effective at preventing offsite migration of VOCs. Since 1998, there has been only one detection of VOCs in one of the five offsite monitoring wells just outside the property boundary, and that detection was at a level well below the drinking water standard.

Shingle Valley also includes one major diesel fuel plume, near Station 0710. The plume extends approximately 400 to 500 feet downgradient of the station and is estimated to be about 250 feet wide. Concentrations of TPH-diesel as high as 700,000 µg/L in groundwater have been detected in the presence of floating product. In August 1996, the Station 0710 air-injection biosparge system was started to remediate groundwater impacted by diesel fuel by stimulating aerobic degradation of diesel by naturally occurring microorganisms. Floating product is removed by periodic manual bailing. The maximum concentration of TPH-diesel in groundwater in 2002 was 85,000 ug/L.

Perchlorate plumes are also present in Shingle Valley, but are smaller and contain lower concentrations than the perchlorate plumes in Mixer Valley and the OBF. The most significant perchlorate plume in USV, near Station 1950, has contained concentrations in groundwater as high as 1,900 µg/L. This plume is no longer than 900 feet. The MSV perchlorate plume is approximately 3500 feet in length and 600 feet in width. The highest perchlorate concentrations in Shingle Valley (9,600 µg/L) occur in the MSV plume.

The perchlorate plume in LSV extends to property boundary, and perchlorate is occasionally detected in two of the five offsite groundwater monitoring wells that lie just outside the boundary. LSV perchlorate concentrations have been measured as high as 227 µg/L. In 2002, the highest perchlorate concentration detected in LSV groundwater was 59 ug/L.

Remedial Measures: Soil vapor extraction (SVE) is implemented at source areas with soil VOC concentrations greater than 1 mg/kg total VOCs. Soil cleanup by SVE is currently conducted at 7 areas in Shingle Valley.

The discharger operates 33 extraction wells in Shingle Valley (14 in USV, 9 in MSV, and 10 in LSV) to reduce contaminant concentrations, limit plume migration, and to limit the discharge of contaminated groundwater into Shingle Creek. Groundwater extraction in LSV has the additional goal of preventing off-site migration of contaminants. Groundwater extracted from

Upper and Middle Shingle Valley is treated for VOCs and perchlorate at groundwater treatment station (GTS) 2405. Groundwater extracted from Lower Shingle Valley is treated at GTS 2403. Effluent from the treatment systems is routed to holding ponds for on-site reuse.

Research and Advanced Technology Area (R&AT)

Investigations: The R&AT lies in a tributary valley to the west and south of Upper Shingle Valley, and drains into the upper part of USV. Characterization in the R&AT has included 46 soil borings and installation of 5 monitoring wells. A small groundwater plume containing low levels of VOCs (up to 68 µg/L of TCE) was identified in the vicinity of a basement sump at Station 1710. Perchlorate was detected near the sump at concentrations up to 690 mg/kg in soil and 370 µg/L in groundwater.

Remedial Measures: UTC conducts groundwater extraction and treatment for VOCs and perchlorate at Station 1710. Water extracted from this area is treated at GTS 1710, a small-capacity treatment unit used specifically for Station 1710. VOC concentrations have generally remained below MCLs since 1992.

Motor Test Area (MTA)

Investigations: The MTA occupies a relatively large side valley that drains into Shingle Valley from the southwest. Investigations at the MTA have included 69 soil borings and installation of 9 monitoring wells. Solvent handling areas have been identified as a potential source of VOC pollution in the MTA area. Although soil impacts appear to be relatively minor, groundwater has been significantly impacted. Historic maximum groundwater concentrations include 2,300 µg/L TCE, 29,000 Freon 11, and 8,300 µg/L Freon 113. Perchlorate has been detected in groundwater at 130 µg/L. The groundwater pollution plume migrates through saturated alluvium northeastward toward Shingle Valley. Concentrations attenuate rapidly with distance from the source area. Monitoring wells were installed in both alluvium and within the Santa Clara Formation.

Remedial Measures: CSD operates one groundwater extraction well near the MTA source area. Extracted water is treated at GTS 2406, a small-capacity treatment unit specifically used for one well in the MTA. The treatment unit was shut down in 1998, when perchlorate was detected at GTS 2406. The unit was restarted again in 2003 after modifying operation of the unit to treat perchlorate. Because groundwater pumping rates in the area are low (less than 0.5 gpm), it is unclear whether groundwater in this area can be successfully remediated through extraction. Task 6 of this Order requires the discharger to evaluate whether alternative remedial technologies (such as in-situ chemical oxidation) might achieve better remedial results than groundwater extraction for VOCs. Despite the intermittent nature of remediation in the area, migration of the MTA plume appears to be minimal due to the slow groundwater flow rates.

Motor Assembly Area/Component Test Area (MAA/CTA)

Investigations: The MAA/CTA is situated in a hilly area underlain by Santa Clara Formation bedrock on the south side of Middle Shingle Valley. Investigations here have included 164 soil borings and installation of 17 monitoring wells. Three source areas were identified. Observed soil impacts were not particularly significant for VOCs other than methylene chloride and acetone, and no perchlorate was detected in soil in the area. However, high VOC concentrations were detected in groundwater within the Santa Clara Formation. TCE has been detected at a maximum concentration of 43,000 µg/L, Freon 11 at a maximum concentration of 330,000 µg/L, and Freon 113 at a maximum concentration of 8,500 µg/L. Perchlorate was detected at a maximum

concentration of 102 µg/L in groundwater. Groundwater plumes migrating from each of the three MAA/CTA source areas appear to follow local surface drainage toward Shingle Valley. However, the MAA/CTA plumes do not appear to have migrated extensively, as VOC concentrations attenuate rapidly to less than 10 ug/L before reaching Shingle Valley alluvium.

Remedial Measures: Soil vapor extraction is currently performed at one source area to remediate acetone and methylene chloride contamination in soil. Groundwater extraction is performed in the MAA/CTA, however, because groundwater flow rates in the area are generally very low, it is unclear whether groundwater in this area can be remediated through extraction. Task 6 of this Order requires the discharger to evaluate whether alternative remedial technologies (such as in-situ chemical oxidation) might achieve better remedial results than groundwater extraction for VOCs.

Mixer Valley

Investigations: A series of groundwater investigations in Mixer Valley began in 1981 and ultimately resulted in 420 soil borings and the installation of 122 ground water monitoring wells with depths of up to 100 feet. Contaminant plumes originated from many potential sources including historical locations of drummed storage of various solvents, the Station 0706 Class I surface impoundment, and various inadvertent chemical releases. Six VOC source areas have been identified in Mixer Valley.

The major Mixer Valley groundwater plume currently contains concentrations of total VOCs up to 32,460 µg/L. The high concentrations suggest dense non-aqueous phase liquids (DNAPL) may be present in places, but DNAPL has not been identified. TCA and TCE are the major VOCs present, but vinyl chloride, 1,2-DCE, 1,1-DCE, and 1,1-DCA have also been detected. The Mixer Valley VOC plume is approximately 3,200 feet in length and 600 feet in width.

The Mixer Valley perchlorate plume is approximately 5,500 feet in length and 600 feet in width. Concentrations of perchlorate in Mixer Valley groundwater are highly elevated. The highest concentration of perchlorate in groundwater was measured at 1,282,000 µg/L in the Oxidizer Road area. Several monitoring wells in the Oxidizer Road area contain perchlorate at concentrations that routinely exceed 10,000 ug/L. Surface and shallow soils in the Oxidizer Road area also contain elevated levels of perchlorate, which is picked up by storm water runoff and transported into Mixer Creek. Storm water runoff samples from the Oxidizer Road drainages collected in a 2001 study yielded perchlorate at levels up to 82,000 ug/L. A significant mass of perchlorate is transported into surface water from contaminated soil areas into surface water during storms. In addition to the problem with storm water runoff, hydrologic studies have confirmed that groundwater containing high concentrations of perchlorate discharges into surface water in Mixer Creek. The surface water monitoring program for the site needs to be expanded to allow better monitoring and quantification of perchlorate discharge to streams during and after storm events.

In addition to the VOC and perchlorate plumes, Mixer Valley also contains a station that has been impacted by polychlorinated biphenyls (PCBs) and non-fuel petroleum hydrocarbons (TPH).

Remedial Measures: Five of the six VOC source areas in Mixer Valley are being remediated by SVE; remedial alternatives are still being evaluated for the sixth. Groundwater plumes are being remediated through extraction and treatment. The discharger currently operates 14 extraction wells in Mixer Valley. All extracted water is treated for VOCs and perchlorate at GTS 2404, then routed to a holding pond for on-site reuse.

The primary remedial strategy to reduce the discharge of perchlorate-contaminated groundwater to surface water is to lower the groundwater elevations in the dominant pathway areas. Reduction of perchlorate concentrations in soil is another remedial goal in Mixer Valley. A successful pilot test of anaerobic soil composting conducted in 2001 demonstrated an effective technology for treating perchlorate-impacted soils to less than 1 mg/kg of perchlorate. Task 4 of this Order requires the discharger to evaluate remedial technologies for perchlorate contamination in surface and subsurface soils.

The PCB source area in Mixer Valley has been treated through soil excavation and groundwater extraction and treatment. Approximately 2,400 cubic yards of PCB-contaminated soil was excavated in October 1995. Soil was excavated to a total depth of 25 feet and soil cleanup goals were met. PCB-contaminated groundwater is being remediated by a groundwater treatment system consisting of 3 extraction wells and an aqueous granular activated carbon treatment unit.

Open Burn Facility (OBF)

Investigations: Extensive investigations have been conducted in and around the OBF, including 197 soil borings and installation of 60 groundwater monitoring wells. Several sources of soil and groundwater pollution have been identified, including several open burn units (OBUs) and areas designated as the Areas 1, 3, and 7, and the "Debris Area."

The most significantly impacted soils were found in OBU-3 and OBU-5, with levels of up to 1,300 mg/kg total VOCs. Low levels of PCBs were also detected in the OBUs. Areas 1, 3, and 7 contained metals, VOCs, semi-volatile organic compounds (SVOCs), PCBs, and other chemicals. Low levels of VOCs were also detected at the Debris Area. Surface soil sampling to assess the potential for perchlorate runoff impact to surface water yielded a maximum perchlorate concentration of 0.44 mg/kg.

Groundwater impacts at the OBF are significant. TCE was detected in groundwater at a maximum of 260,000 µg/L and TCA at a maximum of 14,000 µg/L. Perchlorate has been detected in most OBF groundwater monitoring wells, with a maximum concentration in groundwater of 52,000 µg/L. PCBs have not been detected in groundwater.

Hydrogeologic investigations suggest that groundwater at the OBF may be physically isolated to some extent. There is little evidence to date of extensive migration of contaminated groundwater away from the OBF area. The OBF is underlain by Santa Clara Formation bedrock of varying lithology and permeability. Three distinct water-bearing zones have been delineated. The water-bearing materials in the top two zones appear to pinch-out or be truncated by unconformities to the north, south, and west and to be truncated by the Calaveras Fault to the east/northeast.

Remedial Measures: UTC excavated and removed most contaminated soils in and around the OBF prior to 1995. Areas excavated include OBU-1 and 2, Areas 1, 3, and 7, and the Debris Area. Soils

excavated from OBU-1 and OBU-2 were placed in OBU-5 for treatment by SVE. A portion of impacted soil at the OBU-3 containing visible ash was also removed from the site and transported to an offsite permitted hazardous waste facility. The remainder of the impacted soils in OBU-3 and OBU-5 are currently being cleaned up utilizing SVE systems.

Groundwater in the OBF is currently being remediated by the operation of 15 extraction wells. Extracted groundwater is pumped to GTS 2404 in Mixer Valley where it is treated for VOCs and perchlorate. UTC's evaluation of the performance of the groundwater extraction system in 1996, along with subsequent groundwater monitoring, suggests the groundwater extraction system is reducing chemical concentrations and generally preventing migration of the VOC plume. Because of perchlorate's greater mobility, the ability of the extraction system to control perchlorate migration is less certain. Two monitoring wells (RI-45W and RI-46W) located along the UTC property boundary on the north side of the OBF have shown high concentrations of perchlorate (4,660 ug/L and 1,700 ug/L, respectively) in recent years, suggesting that perchlorate is migrating northward into the offsite area. In 2003, these monitoring wells were converted to extraction wells to provide additional plume migration control at the property boundary. UTC is required to install new monitoring wells in the offsite area north of the property boundary to allow downgradient monitoring of the new extraction wells' effectiveness. These new wells should provide information on the extent to which contaminated groundwater may have migrated into this area.

Remedial Effectiveness Evaluation: Between 1998 and 2002, a total of 238 pounds of VOCs were removed from site groundwater by the five GTS systems. Very little perchlorate was removed by the treatment systems prior to 2001 - 2002, when ion exchange resin beds were installed at GTS 2403 and 2404. Perchlorate is currently removed in GTS 2405 by performing more frequent carbon change-outs. The following table shows the amount of chemicals (in pounds) removed from groundwater by each groundwater treatment system in 2002.

Table 1: Pounds of Chemicals Removed from Groundwater in 2002

Chemical	GTS 1710	GTS 2403	GTS 2404	GTS 2405	GTS 2406
VOCs	0.003	1.9	25.0	53.8	0
Perchlorate	0	0.3	450	13.1	0

9. **Adjacent sites:** The area surrounding the UTC facility is undeveloped ranch land. No chemical sources have been identified in the areas adjacent to UTC that have impacted the UTC site.

Two offsite areas may potentially be impacted by releases from the UTC site. One of these is the area on the north side of the OBF, as discussed above (Finding 8). Surface drainage patterns limit the extent to which the property north of the OBF has been impacted by contaminated surface runoff or groundwater migration from the OBF. Of greater concern are the potential impacts to Anderson Reservoir, which receives the combined surface flow from all the creeks that pass through the site. As discussed in Finding 6, all of these creeks periodically contain chemicals (especially perchlorate) released from the UTC site. Anderson Reservoir is located approximately 800 to 4000 feet south of the point where Shingle Creek crosses the site boundary, depending on the volume of water stored in the reservoir.

10. **Environmental Risk Assessment:** In 1992, UTC performed a baseline risk assessment and a human health and environmental health evaluation. Primary chemicals of interest and their toxicity were determined, and potential exposure pathways were identified. Risks were identified for carcinogenic and noncarcinogenic chemicals in soil, water, and air, and compared to the acceptable risk range.

In the report entitled *Proposed Final Remedial actions and Cleanup Standards for Operable Unit 2* (December 1997), UTC provided a risk assessment for current industrial cleanup exposures to chemicals of concern, including VOCs and SVOCs. The report also evaluated risk from potential residential exposure to current site conditions, which reflects more health-protective criteria. For industrial receptors, the pathway for exposure to carcinogenic and potentially carcinogenic chemicals is inhalation of vapors and dermal contact with soil. For residential receptors, ingestion of groundwater is the primary pathway for exposure. A less significant pathway is inhalation of dust. Exposure to TCE represented the greatest cancer risk. Although the current estimated potential increased health risks to industrial receptors did not exceed the EPA guidelines, the current risks to potential residential receptors was found to be excessive. Assuming chemical concentrations proposed for soil and groundwater cleanup standards are achieved before the site would be developed for residential occupancy, the estimated carcinogenic risks would be below acceptable levels.

In December 2003, UTC submitted an addendum to the 1997 risk assessment that evaluated the human health risk posed by two additional chemicals, perchlorate and 1,4-dioxane (1,4-dioxane was used as a stabilizer in some blends of 1,1,1-TCA). On the basis of the perchlorate risk assessment, the addendum proposed cleanup standards for perchlorate of 0.02 mg/kg in soil and 6 ug/L in water. The addendum proposed cleanup standards for 1,4-dioxane of 0.002 mg/kg in soil and 3 ug/L in groundwater. The low soil cleanup standards for these chemicals reflect the ease with which these chemicals are leached from soil, and were driven primarily by the goal of protecting groundwater quality rather than limiting human exposure.

The Water Board considers the following risks to be acceptable at remediation sites: a hazard index of 1.0 or less for non-carcinogens, and an excess cancer risk of 10^{-4} or less for carcinogens.

Due to excessive risk that will be present at the site pending full remediation, the discharger has implemented institutional controls to limit on-site exposure to acceptable levels. Institutional constraints include a deed restriction, and measures to maintain site security and require worker notification of potential health and safety concerns due to the presence of hazardous chemicals in the environment. The deed restriction, approved by the Water Board's Executive Officer and recorded with Santa Clara County in 2002, prohibits the use of shallow groundwater for drinking water at the site. The deed restriction also prohibits residential development at the OBF and restricts use of the OBF for sensitive uses such as hospitals or day care centers.

11. **Feasibility Study**: The 1991 *RCRA Facility Investigation/Corrective Measures Study* included an evaluation of remedial alternatives for groundwater and soil at the UTC site. Also, a list of possible alternatives was developed and evaluated in the discharger's report titled *Proposed Final Remedial Actions and Cleanup Standards for Operable Unit 2* (dated December 1997). Additional alternatives for perchlorate remediation have been considered since 2000.

The objectives for soil remediation are to reduce chemical concentrations in vadose-zone soils to below the cleanup goals and to prevent further impacts to groundwater. The objectives for groundwater remediation are to stop migration of the leading edges of the plumes, minimize migration of the high mass of contamination at source areas, and to reduce chemical concentrations in groundwater within the plumes to below the groundwater cleanup goals.

Remedial actions considered for contaminated soils include no action, soil vapor extraction, soil leaching, biodegradation, excavation and offsite disposal, high temperature incineration, low temperature thermal stripping, and onsite soil washing. Newer technologies were also evaluated, including phytoremediation, in-situ soil flushing, enhanced soil vapor extraction, and anoxic soil composting.

Remedial actions considered for groundwater include no action, subsurface barriers, gradient control, and groundwater extraction and treatment. New groundwater remedial technologies were also evaluated, including in-well air stripping, reactive wells, reactive barriers, oxygen-reducing zones. The use of ion exchange resin beds has been evaluated as a means of removing perchlorate from extracted groundwater.

12. **Remedial Action Plan:** The discharger's report entitled *RCRA Facility Investigation/ Corrective Measures Study* and its addenda (dated June 1991 and June 1993, respectively) proposed a final cleanup plan for VOCs in Shingle Valley and Mixer Valley. The report entitled *Proposed Final Remedial Actions and Cleanup Standards for Operable Unit 2* (dated December 1997) proposed a final cleanup plan for VOCs in the Research and Advanced Technology area, Motor Test Area, Motor Assembly Area/Component Test Area, and the Open Burning Facility.

The *Five-Year Status Report and Remediation Effectiveness Evaluation* (July 2003) contained an evaluation of the remedial actions that have been implemented at the site between 1998 and 2002 and a summary of new, alternate technologies currently under consideration. This report determined that the remedial actions currently implemented for soil and groundwater cleanup are effective and recommended that these actions be continued.

Final Remedial Action Plan for VOCs: The final remedial actions currently implemented to address VOC contamination at the site are as follows:

Groundwater and surface water: The discharger plans to continue operation of the existing groundwater extraction and treatment systems to remove chemical mass, reduce concentrations, prevent vertical or lateral migration of contaminants, to prevent seepage of contaminated groundwater into creeks, and to restore groundwater quality. Extracted groundwater is treated at several treatment (GTS) units located throughout the site. These include GTS 2403 and 2405 in Shingle Valley, GTS 1710 in the R&AT area, GTS 2406 in the MTA, and GTS 2404 in Mixer Valley. Water extracted from the OBF area is piped to Mixer Valley for treatment at GTS 2404. Each treatment unit consists of an air stripper and carbon adsorption units with the exception of GTS 1710, 2405, and 2406, which use aqueous-phase carbon only. PCB-contaminated groundwater at Station 0535 in Mixer Valley is treated with aqueous-phase carbon at GTS 0535, then routed to GTS 2404 for further treatment.

Soil: Continuation of the existing soil vapor extraction systems to prevent leaching of volatile chemicals from the soil to the underlying groundwater, and to prevent volatilization to the

atmosphere. UTC currently operates 15 stationary SVE units, and uses 2 mobile, trailer-mounted SVE units. All identified sources will be treated to achieve soil cleanup standards. A source is defined as soils containing one or more chemicals at concentrations above the cleanup standards established for those chemicals.

Alternate remedial measures: The performance of the current soil and groundwater remedial actions will be re-evaluated periodically and if necessary, modifications to the remedial measures will be proposed and implemented.

Interim Remedial Actions for Perchlorate: The final cleanup plan summarized above was approved and implemented in the 1990s, prior to the recognition of perchlorate as a significant environmental and human health hazard. For this reason, the final remedial plan was focused on removal of VOCs. Since 2000, UTC has augmented its site cleanup strategies to include measures to reduce perchlorate concentrations in soil and groundwater; to control the migration of groundwater containing perchlorate; and to minimize the discharge of perchlorate into creeks. Anaerobic soil composting is successfully being used to reduce perchlorate concentrations in soil. Measures currently being implemented to address perchlorate contamination in groundwater include:

- operation of extraction wells to collect and treat perchlorate-contaminated water, and to depress the water table and inhibit discharge into creeks;
- addition of ion exchange resin beds to the treatment systems at GTS 2403 and 2404 to remove perchlorate from extracted groundwater;
- increasing the frequency of carbon change-outs at GTS 1710, 2405, and 2406 to prevent perchlorate breakthrough.

13. **Basis for Cleanup Standards:**

a. **General**: State Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," applies to this discharge and requires attainment of background levels of water quality, or the highest level of water quality which is reasonable if background levels of water quality cannot be restored. Cleanup levels other than background must be consistent with the maximum benefit to the people of the State, not unreasonably affect present and anticipated beneficial uses of such water, and not result in exceedence of applicable water quality objectives. The previously cited remedial action plan confirms the Board's initial conclusion that background levels of water quality cannot be restored. This order and its requirements are consistent with Resolution No. 68-16.

State Board Resolution No. 92-49, "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304," applies to this discharge. This order and its requirements are consistent with the provisions of Resolution No. 92-49, as amended.

b. **Beneficial Uses**: The Water Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on June 21, 1995. This updated and consolidated plan represents the Water Board's master water quality control planning document. The

revised Basin Plan was approved by the State Water Resources Control Board and the Office of Administrative Law on July 20, 1995, and November 13, 1995, respectively. A summary of regulatory provisions is contained in Title 23, California Code of Regulations, Section 3912. The Basin Plan defines beneficial uses and water quality objectives for waters of the State, including surface wāters and groundwaters.

Board Resolution No. 89-39, "Sources of Drinking Water," defines potential sources of drinking water to include all groundwater in the region, with limited exceptions for areas of high TDS, low yield, or naturally high contaminant levels. Groundwater underlying and adjacent to the site qualifies as a potential source of drinking water.

The Basin Plan designates the following potential beneficial uses of groundwater underlying and adjacent to the site:

a. Municipal and domestic water supply
b. Industrial process water supply
c. Industrial service water supply
d. Agricultural water supply
e. Freshwater replenishment to surface waters

At present, there is no known use of groundwater underlying the site for the above purposes other than replenishment to the creeks that flow through the site.

A drinking water reservoir, Anderson Reservoir, is located 800 to 4000 feet south of the point where Shingle Creek leaves the discharger's property. The existing and potential beneficial uses of Anderson Reservoir include:

a. Municipal supply
b. Groundwater recharge
c. Non - contact water recreation
d. Warm and cold water habitat
e. Wildlife habitat
f. Fish spawning

c. **Basis for Groundwater and Surface Water Cleanup Standards**: The groundwater cleanup standards for the site are based on applicable water quality objectives and are the more stringent of USEPA and California primary maximum contaminated levels (MCLs) for each chemical of concern. For chemicals that do not have established MCLs, current California provisional action levels or public health goals are used, if such exist. Secondary drinking water standards, based on taste and odor characteristics, were not used in setting cleanup standards at this site.

Because groundwater discharges to creeks that flow through the site, and these creeks discharge into Anderson Reservoir, which is used as a source of drinking water, the same cleanup standards are generally applied to surface water at the site. To protect aquatic life, surface water cleanup standards for some chemicals are lower than drinking water standards. Groundwater and surface water cleanup standards for the site are summarized in Table 2 (page 17). Cleanup to these levels will result in acceptable residual risk to humans.

d. **Basis for Soil Cleanup Standards**: The soil cleanup standards for the site are summarized in Table 3 (page 18). Cleanup to these levels is intended to minimize leaching of contaminants to groundwater and will result in acceptable residual risk to humans.

14. **Future Cleanup Standards:** The goal of this remedial action is to restore the beneficial uses of groundwater underlying and adjacent to the site. Results from other sites suggest that full restoration of beneficial uses to groundwater as a result of active remediation at this site may not be possible. If full restoration of beneficial uses is not technologically or economically achievable within a reasonable period of time, then the discharger may request modification to the cleanup standards or establishment of a non-attainment area, a limited groundwater pollution zone where water quality objectives are exceeded. Conversely, if new technical information indicates that cleanup standards can be surpassed, the Water Board may decide that further cleanup actions should be taken.

15. **Water Reclamation**: California Water Code Section 13512 declares it is the intention of the Legislature that the State undertake all possible steps to encourage development of water reclamation facilities so that reclaimed water may be made available to help meet the growing water demands of the State. State Water Board Resolution No. 88-160 allows discharges of extracted, treated groundwater from site cleanups to surface waters only if it has been demonstrated that neither reclamation nor discharge to the sanitary sewer is technically and economically feasible.

    Consistent with this policy, treated effluent has been used extensively throughout the site, under a Water Reclamation Requirements order issued by the Water Board in 1991 (Order 91-006). UTC reclaims groundwater that is extracted for remediation purposes throughout the site, and reuses it for various purposes such as dust control, landscape irrigation and pasture irrigation. Treated water from GTS 2403, 2404, and 2405 is discharged to Ponds 2140 and 2130 for storage prior to reuse. At times in the past (such as during extended droughts), treated groundwater was also used (as permitted in Order 91-006) for dust control at nearby offsite areas such as the motorcycle park on Metcalf Road, and for dust control and soil compaction during construction of the Silver Creek Country Club.

    Prior to 2001, the approved groundwater treatment and reuse systems were designed to treat groundwater containing VOCs, and had a limited capability to remove perchlorate. Because of this limitation, variable concentrations of perchlorate were present in the treated water. Through the practice of using treated effluent for water reclamation purposes, perchlorate was released at the site and to nearby offsite areas at low concentrations. Since the installation of new treatment technologies to remove perchlorate, the treated effluent from the GTS units is now free of detectable perchlorate.

    This Order rescinds Order 91-006 and prohibits the use of reclaimed water outside the UTC property. However, on-site reuse of reclaimed water is still permitted, subject to the requirements specified in Section D of this order (page 25).

16. **Basis for 13304 Order:** The discharger has caused or permitted waste to be discharged or deposited where it is or probably will be discharged to waters of the State and creates or threatens to create a condition of pollution or nuisance.

17. **Cost Recovery:** Pursuant to California Water Code Section 13304, the discharger is hereby notified that the Water Board is entitled to, and may seek reimbursement for, all reasonable costs actually incurred by the Water Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action required by this order.

18. **CEQA:** This action is an Order to enforce the laws and regulations administered by the Water Board. This action is categorically exempt from the provisions of the California Environmental Quality Act (CEQA) pursuant to Section 15321 of the Resources Agency Guidelines.

19. **Notification:** The Water Board has notified the discharger and all interested agencies and persons of its intent under California Water Code Section 13304 to prescribe Site Cleanup Requirements for the discharger and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

20. **Public Hearing:** The Water Board, at a public meeting, heard and considered all comments pertaining to this discharge.

IT IS HEREBY ORDERED, pursuant to Sections 13304 and 13523 of the California Water Code, that the discharger (or its agents, successors, or assigns) shall cleanup and abate the effects described in the above findings as follows:

A. PROHIBITIONS

1. The discharge, storage, or treatment of wastes or materials in a manner that will degrade groundwater or surface water quality or adversely affect beneficial uses of the waters of the State is prohibited.

2. Further significant migration of pollutants through surface or subsurface transport to waters of the State is prohibited.

3. Activities associated with the subsurface investigation and cleanup that will cause significant adverse migration of wastes or hazardous substances are prohibited.

4. The discharge of contaminated groundwater into creeks and surface water is prohibited. Specifically, no detectable concentrations of contaminants shall be allowed in surface waters or underflow at or beyond the property boundary, and no concentrations of contaminants in excess of cleanup standards shall be allowed in on-site surface waters.

B. CLEANUP PLAN AND STANDARDS

1. **Implement Cleanup Plan**: The discharger shall implement the remedial action plan described in Finding 12.

2. **Groundwater and Surface Water Cleanup Standards**: The groundwater cleanup standards specified in Table 2 shall be met in all wells. These same standards shall apply to surface waters in drainages and streams because these streams discharge into Anderson Reservoir.

Table 2: Groundwater / Surface Water Cleanup Standards

Chemical	Groundwater / Surface Water Cleanup Goal (µg/L) [a]
Acetone	700
Benzene	1
Chlorobenzene	50 (25 for surface water [b])
Chloroform	100
Carbon tetrachloride	0.5
1,1-Dichloroethene	6
1,1-Dichloroethane	5
cis-1,2-Dichloroethene	6
1,2-Dichloroethane	0.5
1,4-Dioxane	3
Freon 11	150
Freon 113	1,200
Methylene chloride (Dichloromethane)	5
Tetrachloroethene (PCE)	5
Perchlorate	6 [c]
Phenol	4,200 (1,300 for surface water [b])
Polychlorinated biphenyls (PCBs)	0.5
TPH-diesel	1,000 (200 for surface water [b])
Trichloroethene (TCE)	5
1,1,1-Trichloroethane (TCA)	200 (60 for surface water [b])
Toluene	150
Vinyl chloride	0.5
Xylenes	1,750 (13 for surface water [b])

[a] Groundwater cleanup standards are set at the primary Maximum Contaminant Level (MCL) or drinking water standard for each chemical. For chemicals that do not have an established MCL, the State of California provisional action level or Public Health Goal (PHG) is used as the cleanup standard.

[b] For most chemicals, the surface water cleanup standards are the same as for groundwater. To protect aquatic life, surface water cleanup standards for chlorobenzene, phenol, 1,1,1-TCA, xylenes, and TPH-diesel are set lower than drinking water standards. The surface water standard for these chemicals also applies to groundwater within 75 feet of surface water bodies.

[c] Cal/EPA issued a Public Health Goal of 6 ug/L for perchlorate in March 2004. Cal/EPA will use the PHG to establish an MCL for perchlorate. The groundwater cleanup standard is currently set equal to the PHG. If the MCL differs from the PHG, Water Board staff will consider changing the cleanup standard for perchlorate to the MCL.

3. **Soil Cleanup Standards**: The soil cleanup standards specified in Table 3 shall be met in all source areas.

Table 3: Soil Cleanup Standards

Chemical	Cleanup Goal, mg/kg
Total VOCs	1
1,4-Dioxane	0.002 [a]
PCBs less than 3 feet deep	3
PCBs greater than 3 feet deep	10
Perchlorate	0.020 [a]
TPH-diesel	500

[a] Based on results of 2003 Risk Assessment addendum. These cleanup standards reflect the tendency of these chemicals to leach from soil into groundwater, and will be protective of groundwater quality.

C. TASKS

1. ENHANCED SURFACE WATER MONITORING PROGRAM

1a. WORK PLAN FOR ENHANCED SURFACE WATER MONITORING

COMPLETION DATE: July 3, 2004

Submit a technical report acceptable to the Executive Officer that provides a detailed plan to expand the surface water monitoring program beyond the current program of monthly creek sampling to a program that includes real-time storm water monitoring and sampling. The plan must include, at a minimum:

- an evaluation of the hydrology of the Shingle Creek, Mixer Creek, and Las Animas Creek watersheds;

- a discussion of techniques to be implemented at the site to provide automated measurement of stream discharge during and after storm events and collection of flow-activated creek samples during peak flows; and
- a schedule for implementation of the new monitoring techniques.

The program must facilitate the quantification of dissolved contaminant mass and mass flux at designated creek sampling stations during and after storm events, especially in Las Animas Creek between the site boundary and Anderson Reservoir. Once the enhanced surface water monitoring plan is approved, UTC shall amend the Environmental Monitoring Program Plan (EMPP) reflecting the changes to the monitoring program.

1b. IMPLEMENTATION OF ENHANCED SURFACE WATER MONITORING PROGRAM

COMPLETION DATE: According to Schedule in Task 1a, as approved by Executive Officer

Submit a technical report acceptable to the Executive Officer that documents the completion of the tasks identified in the technical report submitted for Task 1a. Henceforth, surface water and storm water monitoring results are to be reported to the Regional Water Quality Control Board, San Francisco Bay Region. Storm water monitoring results will also be submitted to the State Water Board's storm water monitoring program in Sacramento.

2. ELIMINATION OF PERCHLORATE DISCHARGE TO CREEKS

2a. WORK PLAN FOR ELIMINATION OF PERCHLORATE DISCHARGE TO CREEKS

COMPLETION DATE: September 1, 2004

Submit a technical report acceptable to the Executive Officer that provides a detailed plan for remedial measures that will be implemented to promptly reduce, and ultimately eliminate, the amount of perchlorate entering creeks and drainages from known source areas of historical perchlorate contamination at the site. The report must:

- list and compare remedial methods that were evaluated for use at the site to reduce perchlorate discharge;
- describe any remedial methods that have been pilot-tested or implemented as interim remedial actions;
- summarize available results of any interim remedial actions implemented to date; and
- provide a detailed plan and schedule of how and when the selected remedial methods will be implemented as final remedial method(s) across the site.

2b. IMPLEMENTATION OF REMEDIAL MEASURES TO ELIMINATE PERCHLORATE DISCHARGE TO CREEKS

COMPLETION DATE: According to Schedule in Task 2a, as approved by Executive Officer

Submit a technical report acceptable to the Executive Officer that documents the completion of the tasks identified in the technical report submitted for Task 2a.

3. ENHANCED LAS ANIMAS AREA GROUNDWATER MONITORING

3a. WORK PLAN FOR ENHANCED LAS ANIMAS AREA GROUNDWATER MONITORING

COMPLETION DATE: September 30, 2004

Submit a technical report acceptable to the Executive Officer that provides a detailed plan to enhance the groundwater monitoring program along Las Animas Creek in the vicinity of the downgradient property boundary. The goal of the enhanced monitoring is to ensure that an adequate array of sentry wells exists in the Las Animas Creek corridor beyond the leading edge of the Lower Shingle Valley contaminant plumes. An additional goal is to ensure that stream baseflow is adequately monitored. Should additional wells be necessary to achieve these goals, the report must:

- propose suitable locations for the new groundwater monitoring wells;
- provide a schedule for installation of the wells; and
- provide a schedule for measuring water levels and collecting representative samples from the wells.

Alternatively, a detailed plan may be provided that enhances control of the LSV contaminant plumes such that existing wells function satisfactorily as sentry wells. Once the plan and schedule are approved by the Water Board, UTC shall submit an addendum to the EMPP reflecting any changes to the monitoring program.

3b. IMPLEMENTATION OF ENHANCED LAS ANIMAS AREA GROUNDWATER MONITORING PLAN

COMPLETION DATE: According to Schedule in Task 3a, as approved by Executive Officer

Submit a technical report acceptable to the Executive Officer that documents the completion of the tasks identified in the technical report submitted for Task 3a.

4. CHARACTERIZATION AND REMEDIATION OF PERCHLORATE CONTAMINATION IN SOIL

4a. SUBMIT WORK PLAN FOR PERCHLORATE CHARACTERIZATION IN SOIL

COMPLETION DATE: June 30, 2004

Submit a technical report acceptable to the Executive Officer that discusses the work plan for characterization of the extent of perchlorate contamination in surface soil at the site.

4b. SUBMIT PERCHLORATE CHARACTERIZATION REPORT FOR SURFACE SOIL

COMPLETION DATE: January 31, 2005

Submit a technical report acceptable to the Executive Officer that documents characterization of the extent of perchlorate contamination in surface soil. Soil characterizations should be performed using the best achievable detection limit.

4c. SUBMIT WORK PLAN FOR PILOT TESTING OF SURFACE SOIL TREATMENT TECHNOLOGIES

COMPLETION DATE: September 1, 2004

Submit a technical report acceptable to the Executive Officer that discusses the work plan for pilot testing of perchlorate treatment technologies in surface soil at the site.

4d. COMPLETION OF PILOT TESTING OF SURFACE SOIL TREATMENT TECHNOLOGIES

COMPLETION DATE: February 28, 2005

Submit a technical report acceptable to the Executive Officer that documents the completion of the tasks identified in Task 4b.

4e. SUBMIT PERCHLORATE CHARACTERIZATION REPORT FOR SUBSURFACE SOIL

COMPLETION DATE: March 31, 2005

Submit a technical report acceptable to the Executive Officer that documents characterization of the extent of historical perchlorate contamination at the site in subsurface soil. Soil characterizations should be performed using the best achievable detection limit.

4f. **SUBMIT EVALUATION OF ALTERNATIVE REMEDIAL TECHNOLOGIES AND REMEDIAL ACTION PLAN SUPPLEMENT FOR PERCHLORATE IN SOIL**

COMPLETION DATE: August 30, 2005

Submit a technical report acceptable to the Executive Officer evaluating the feasibility of using remedial alternatives such as anoxic bioremediation, to achieve significant chemical mass reductions in source area soils, and proposes a final action plan for remediation of perchlorate in soil. The report should include:

- A comparison of all alternative remediation methods that were considered, pilot-tested, or implemented as interim remedial actions in the evaluation;
- A detailed summary of the results of the evaluation; and
- Recommendations based on the evaluation results.
- A detailed plan and schedule of how and when the selected remedial methods will be implemented as final remedial method(s) across the site.

4g. **IMPLEMENTATION OF FINAL REMEDIAL MEASURES FOR PERCHLORATE CONTAMINATION IN SOIL**

COMPLETION DATE: According to Schedule in Task 4e, as approved by the Executive Officer

Submit a technical report acceptable to the Executive Officer that documents the completion of the tasks identified in the technical report submitted for Task 4e.

5. **CHARACTERIZATION AND REMEDIATION OF PERCHLORATE CONTAMINATION IN GROUNDWATER**

5a. **SUBMIT WORK PLAN FOR PERCHLORATE CHARACTERIZATION IN GROUNDWATER**

COMPLETION DATE: June 30, 2004

Submit a technical report acceptable to the Executive Officer that discusses the work plan for characterization of the extent of perchlorate contamination in groundwater at the site.

5b. **COMPLETE CHARACTERIZATION OF PERCHLORATE CONTAMINATION IN GROUNDWATER**

COMPLETION DATE: January 31, 2005

Submit a technical report acceptable to the Executive Officer that documents complete characterization of the extent of perchlorate contamination at the site in groundwater. Groundwater characterizations should be performed using the best available method detection limit to define the extent of perchlorate contamination. Characterizations should

extend off-site as necessary to define the full, lateral extent of plumes. The report must include concentration contour maps showing the lateral extent of perchlorate plumes.

5c. SUBMIT EVALUATION OF REMEDIAL TECHNOLOGIES AND REMEDIAL ACTION PLAN SUPPLEMENT FOR PERCHLORATE IN GROUNDWATER

COMPLETION DATE: April 30, 2005

Submit a technical report acceptable to the Executive Officer evaluating the feasibility of using alternative remedial methods, such as in-situ chemical oxidation or enhanced anoxic bioremediation, to achieve significant chemical mass reductions in source areas, and proposes a final action plan for remediation of perchlorate in groundwater. The report should include:

- A summary of all source areas and other portions of the site where groundwater extraction may fail to achieve target remediation goals;
- A comparison of all remediation methods that were considered, pilot-tested or implemented as interim remedial actions in the evaluation;
- A detailed summary of the results of the evaluation; and
- Recommendations based on the evaluation results.
- A detailed plan and schedule of how and when the selected remedial methods will be implemented as final remedial method(s) across the site.

5d. IMPLEMENTATION OF FINAL REMEDIAL MEASURES FOR PERCHLORATE IN GROUNDWATER

COMPLETION DATE: According to Schedule in Task 5b, as approved by the Executive Officer

Submit a technical report acceptable to the Executive Officer that documents the completion of the tasks identified in the technical report submitted for Task 5.

6. EVALUATION OF ALTERNATIVE REMEDIAL TECHNOLOGIES FOR VOCS

6a. SUBMIT EVALUATION OF ALTERNATIVE REMEDIAL TECHNOLOGIES FOR VOCS

COMPLETION DATE: May 31, 2006

Submit a technical report acceptable to the Executive Officer evaluating the feasibility of using alternative remedial methods, such as in-situ chemical oxidation or enhanced anaerobic bioremediation, to achieve significant VOC mass reductions in source areas where groundwater extraction has been shown to be incapable of fully achieving target remediation goals. Examples of such areas include the area near Station 1710 in the R & AT area, and the MTA. The report should include:

- A summary of all source areas and other portions of the site where groundwater extraction has failed to achieve target remediation goals;
- A comparison of all alternative remediation methods that were considered in the evaluation;
- A detailed summary of the results of the evaluation; and
- Recommendations based on the evaluation results.

6b. IMPLEMENTATION OF ALTERNATIVE REMEDIAL TECHNOLOGIES FOR VOCS

COMPLETION DATE: According to Schedule in Task 6a, as approved by the Executive Officer

Submit a technical report acceptable to the Executive Officer that documents the completion of the tasks identified in the technical report submitted for Task 6a.

7. FIVE-YEAR STATUS REPORT AND EFFECTIVENESS EVALUATION

COMPLETION DATE: April 30, 2009, and every five years thereafter

Submit a technical report acceptable to the Executive Officer which includes a summary of the results of any additional investigation; an evaluation of the effectiveness of installed final cleanup measures and cleanup costs for the prior 5-year period; additional recommended measures to achieve final cleanup levels, if necessary; and the tasks and time schedule necessary to implement any additional final cleanup measures. This report shall also describe the reuse of extracted groundwater and evaluate and document the cleanup of contaminated groundwater. If cleanup standards in this Order have not been achieved on-site and are not expected to be achieved through continued groundwater extraction and/or soil remediation, this report shall also contain an evaluation addressing whether it is technically practicable to achieve the cleanup standards, and if so, a proposal for procedures to do so. This report shall also include cumulative stream discharge, groundwater level, and analytical data for the five-year period.

8. SOIL VAPOR EXTRACTION CURTAILMENT

8a. SOIL VAPOR EXTRACTION CURTAILMENT PROPOSAL

COMPLETION DATE: 90 Days Prior To Proposed Curtailment of Any Soil Vapor Extraction Well

Submit a technical report and implementation schedule acceptable to the Executive Officer containing a proposal for curtailing operation from any soil vapor extraction wells or piping and the criteria used to justify each curtailment. This report shall include a proposal indicating the locations of borings and sampling intervals to determine concentrations of VOCs remaining in soil. The proposal may include the temporary termination of vapor

extraction well operation for an extended period of time to study the effects on chemical migration prior to well destruction.

If the discharger claims that it is not practicable to achieve soil cleanup standards through continued soil vapor extraction in all or any portion of the soil plume area and that significant quantities of chemicals are not being removed through soil vapor extraction, the discharger shall evaluate the reductions in chemical concentrations and the alternative soil cleanup standards that can be practically achieved. The report shall evaluate alternative means of achieving soil cleanup standards and whether conditions for waiving these standards are met (e.g., that meeting the soil cleanup standards is technically impracticable from an engineering perspective) and that the alternative soil cleanup standards proposed will be protective of human health and the environment.

8b. COMPLETION OF SOIL VAPOR EXTRACTION CURTAILMENT

COMPLETION DATE:	According to Schedule in Task 8a as approved by the Executive Officer

Document in a technical report acceptable to the Executive Officer the completion of the necessary tasks identified in Task 8a. This report should include the results of chemical analyses of appropriate verification samples from the source areas, and copies of well destruction completion notices.

9. SOIL BIOREMEDIATION

9a. SOIL BIOREMEDIATION CURTAILMENT PROPOSAL

COMPLETION DATE:	90 Days Prior To Proposed Curtailment of Any Bioremediation System

Submit a technical report and implementation schedule acceptable to the Executive Officer containing a proposal for curtailing bioremediation and the criteria used to justify curtailment. This report shall include a proposal indicating the locations of verification borings and sampling intervals to determine concentrations of contaminants of concern (TPH, VOCs, or perchlorate) remaining in soil. The proposal may include the temporary termination of bioremediation operation for an extended period of time to study the effects on chemical migration prior to system abandonment.

If the discharger claims that it is not practicable to achieve groundwater and/or soil cleanup standards through continued bioremediation in all or any portion of the plume area and that significant quantities of chemicals are not being removed through bioremediation, the discharger shall evaluate the reductions in chemical concentrations and the alternative cleanup standards that can be practically achieved. The report shall evaluate alternative means of achieving cleanup standards and whether conditions for waiving these standards are met (e.g., that meeting the cleanup standards is technically impracticable from an engineering perspective) and that the alternative cleanup standards proposed will be protective of human health and the environment.

9b. COMPLETION OF BIOREMEDIATION CURTAILMENT

COMPLETION DATE: According to Schedule in Task 9a Approved by the Executive Officer

Document in a technical report acceptable to the Executive Officer the completion of the necessary tasks identified in Task 8a. This report should include the results of chemical analyses of appropriate verification samples from the source areas, and copies of well destruction completion notices.

10. GROUNDWATER EXTRACTION CURTAILMENT

10a. PROPOSAL TO CURTAIL GROUNDWATER EXTRACTION

COMPLETION DATE: 90 Days Prior To Proposed Extraction Well Pumping Curtailment

Submit a technical report and implementation schedule acceptable to the Executive Officer containing a proposal for curtailing pumping from groundwater extraction well(s) and the criteria used to justify such curtailment. Curtailment of groundwater extraction may include, but is not limited to: final shutdown of the system, phased approach to shutdown, pulsed pumping, or a significant change in pumping rates. The report shall include the rationale for curtailment or modifying the system. This report shall also include data to show that cleanup standards for chemicals of concern have been achieved and have stabilized or are stabilizing, and that the potential for contaminant levels rising above cleanup standards is minimal. This report shall also include an evaluation of the potential for contaminants to migrate into the creeks surface or subsurface flow, and downwards to the Santa Clara Formation aquifers.

All system modifications to the extraction and treatment systems are subject to approval by the Executive Officer. This requirement may be waived by the Executive Officer if deemed appropriate.

If the discharger claims that it is not technically feasible to achieve cleanup standards through groundwater extraction and treatment, the report shall evaluate the alternative standards that can be achieved, and demonstrate that the alternative cleanup standards proposed will be protective of human health and the environment.

10b. COMPLETION OF EXTRACTION WELL CURTAILMENT

COMPLETION DATE: According to Schedule in Task 10a Approved by the Executive Officer

Submit a technical report acceptable to the Executive Officer documenting completion of the necessary tasks identified in the technical report submitted for Task 10a.

11. **EVALUATION OF NEW HEALTH CRITERIA**

COMPLETION DATE: 90 Days After Request Made by the Executive Officer

Submit a technical report acceptable to the Executive Officer which contains an evaluation of how the final plan and cleanup standards would be affected, if the concentrations as listed in Tables 2 and 3 change as a result of promulgation of revised drinking water standards, maximum contaminant levels or action levels or other health based criteria.

12. **EVALUATION OF NEW TECHNICAL INFORMATION**

COMPLETION DATE: 90 Days After Request Made by the Executive Officer

Submit a technical report acceptable to the Executive Officer that contains an evaluation of new technical and economic information that indicates that cleanup standards or cleanup technologies in some areas may be considered for revision. Such technical reports shall not be required unless the Executive Officer determines that such new information indicates a reasonable possibility that the Order may need to be changed.

13. **DELAYED COMPLIANCE**

If the discharger is delayed, interrupted, or prevented from meeting one or more of the completion dates specified for the above tasks, the discharger shall notify the Executive Officer and the Water Board may consider revision to this Order.

D. **WATER RECLAMATION SPECIFICATIONS**

1. **Limits:** Reclaimed water as applied shall meet the following limits:

Constituent	Instantaneous Maximum Limit (µg/L)	Analytical Method
Volatile Organic Compounds Vinyl Chloride Benzene All others, per constituent	 0.5 0.5 5.0	U.S. EPA Method 8260, 8021 or equivalent
Semi Volatile Organic PCBs All others, per constituent	 0.5 5.0	U.S. EPA Method 8270, 8081, 8082 or equivalent
Total Petroleum Hydrocarbons	50	U.S. EPA Method 8015 or equivalent
Perchlorate	6.0*	U.S. EPA Method 300.0 or equivalent

* Cal/EPA issued a Public Health Goal of 6 ug/L for perchlorate in March 2004. Cal/EPA will use the PHG to establish an MCL for perchlorate. The groundwater cleanup standard is currently set equal to the PHG. If the MCL differs from the PHG, Water Board staff will consider changing the cleanup standard for perchlorate to the MCL.

2. **Runoff Control:** No reclaimed water shall be allowed to escape from the authorized use areas by airborne spray, nor by surface flow except in minor amounts associated with good irrigation practice, nor from conveyance facilities.

3. **Application Limitations:** No treated groundwater shall be applied to areas of reuse during rainfall, or when soils are saturated to a point where runoff is likely to occur.

4. **Public Contact:** Adequate measures shall be taken to minimize public contact with the reclaimed water, and to inform the public by placing legible conspicuous warning signs with proper wording at adequate intervals around the use and storage areas.

5. **Cross Connection:** There shall be no cross-connection between potable water supply and any piping containing treated groundwater.

6. **Freeboard:** The storage ponds shall be operated to have a minimum of 2 feet of freeboard to prevent overflows.

7. **Violation Notification:** In the event that the discharger is unable to comply with any of the specifications that apply to groundwater reclamation, the discharger shall notify the Water Board by telephone within 24 hours of the incident and confirm it in writing within one week of the telephone notification.

8. **Change in Reclamation**: In accordance with Section 13260 of the California Water Code, the discharger shall file a report with the Water Board of any material change or proposed change in the character, location or volume of the reclaimed water.

9. **No Consumption:** Treated groundwater shall not be used for public consumption.

10. **Vehicle Signs:** Vehicles used for carrying or spraying the reclaimed water shall be identified as such with legible signs.

E. PROVISIONS

1. **No Nuisance:** The storage, handling, treatment, or disposal of polluted soil or groundwater, including groundwater reclamation, shall not create a nuisance as defined in California Water Code Section 13050(m).

2. **Good Operation and Maintenance:** The discharger shall operate and maintain in good working order, and operate efficiently as possible, any facility or control system installed to achieve compliance with the requirements of this Order, including groundwater reclamation.

3. **Cost Recovery:** The discharger shall be liable, pursuant to California Water Code Section 13304, to the Water Board for all reasonable costs actually incurred by the Water Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this order. If the site addressed by this Order is enrolled in a State Board-managed reimbursement program, reimbursement shall be made pursuant to this Order and according to the procedures established in that program. Any disputes raised by the discharger over reimbursement amounts or methods used in that program shall be consistent with the dispute resolution procedures for that program.

4. **Access to Site and Records:** In accordance with California Water Code Section 13267(c), the discharger shall permit the Water Board or its authorized representative:

   a. Entry upon premises in which any pollution source exists, or may potentially exist, or in which any required record are kept, which are relevant to this Order.

   b. Access to copy any records that must be kept under the requirements of this Order.

   c. Inspection of any monitoring or remediation facilities installed in response to this Order.

   d. Sampling of any groundwater or soil that is accessible, or may become accessible, as part of any investigation or remedial action program undertaken by the discharger.

5. **Self-Monitoring Program:** The discharger shall submit, on an annual basis, an Environmental Monitoring Program Plan (EMPP) that describes in detail the monitoring program that will be conducted the following calendar year. The EMPP shall include, in a separate section, all monitoring required by DTSC for any waste management units under RCRA Post-Closure permit.

   The discharger shall also submit an annual environmental monitoring report and three quarterly monitoring reports. The annual monitoring report will provide a summary of data collected during the four quarters of the year. Each monitoring report will provide a summary of the results of any investigations conducted during the period covered, provide notice of any unusual results from environmental monitoring, and summarize any remedial actions implemented during the period covered.

6. **Contractor/Consultant Qualifications:** All technical documents shall be signed by and stamped with the seal of a registered California geologist, a California certified engineering geologist or a California registered civil engineer.

7. **Lab Qualifications:** All samples shall be analyzed by State certified laboratories or laboratories accepted by the Water Board using approved EPA methods for the type of analysis to be performed or other methods approved by the Water Board. All laboratories shall maintain quality assurance/quality control records for Water Board review. The

provision does not apply to analyses that can only reasonably be performed on-site (e.g. temperature).

8. **Document Distribution:** A copy of all correspondence, reports, and documents pertaining to compliance with this Order shall be provided in full, to the following agencies:

   a. Santa Clara Valley Water District
   b. Department of Toxic Substances Control, Geological Services Unit (Monitoring Reports only)
   c. U.S. EPA, Region IX

   The discharger shall provide a copy of cover letters, title pages, table of contents and the executive summaries of above compliance reports (except for the annual progress reports and workplans for soil or groundwater remediation, which shall be submitted in full) to the following agencies:

   a. Santa Clara County Department of Environmental Health
   b. California EPA/DTSC Site Mitigation Branch

   The Executive Officer may modify this distribution list as needed.

9. **Reporting of Changed Owner or Operator:** The discharger shall file a technical report on any changes in site occupancy and ownership associated with the property described in this Order.

10. **Reporting of Hazardous Substance Release:** If any hazardous substance is discharged in or on any waters of the State, or discharged and deposited where it is, or probably will be discharged in or on any waters of the State, the discharger shall report such discharge to this Board, by calling (510) 622-2300 during regular office hours (Monday through Friday, 8:00 AM to 5:00 PM). A written report shall be filed with the Water Board within five (5) working days. The report shall describe the nature of the quantity involved, duration of incident, cause of release, estimated size of affected area, nature of effect, corrective actions taken or planned, and persons/agencies notified.

    This reporting is in addition to the reporting to the Office of Emergency Services required pursuant to the Health and Safety Code.

11. **Rescission of Existing Orders:** This Order rescinds and supercedes all previous Site Cleanup Requirements Orders (94-064, 95-112, 95-194, 97-065, and 98-070). This Order also rescinds Water Reclamation Requirements Order 91-006. This Order does not rescind or supercede the existing Waste Discharge Requirements (Order 95-190) or other applicable permits or orders.

12. **Periodic SCR Review:** The Water Board will review this Order periodically and may revise the requirements when necessary.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on May 19, 2004.

Bruce H. Wolfe
Executive Officer

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FAILURE TO COMPLY WITH THE REQUIREMENTS OF THIS ORDER MAY SUBJECT YOU TO ENFORCEMENT ACTION, INCLUDING BUT NOT LIMITED TO: IMPOSITION OF ADMINISTRATIVE CIVIL LIABILITY UNDER WATER CODE SECTIONS 13268 OR 13350, OR REFERRAL TO THE ATTORNEY GENERAL FOR INJUNCTIVE RELIEF OR CIVIL OR CRIMINAL LIABILITY

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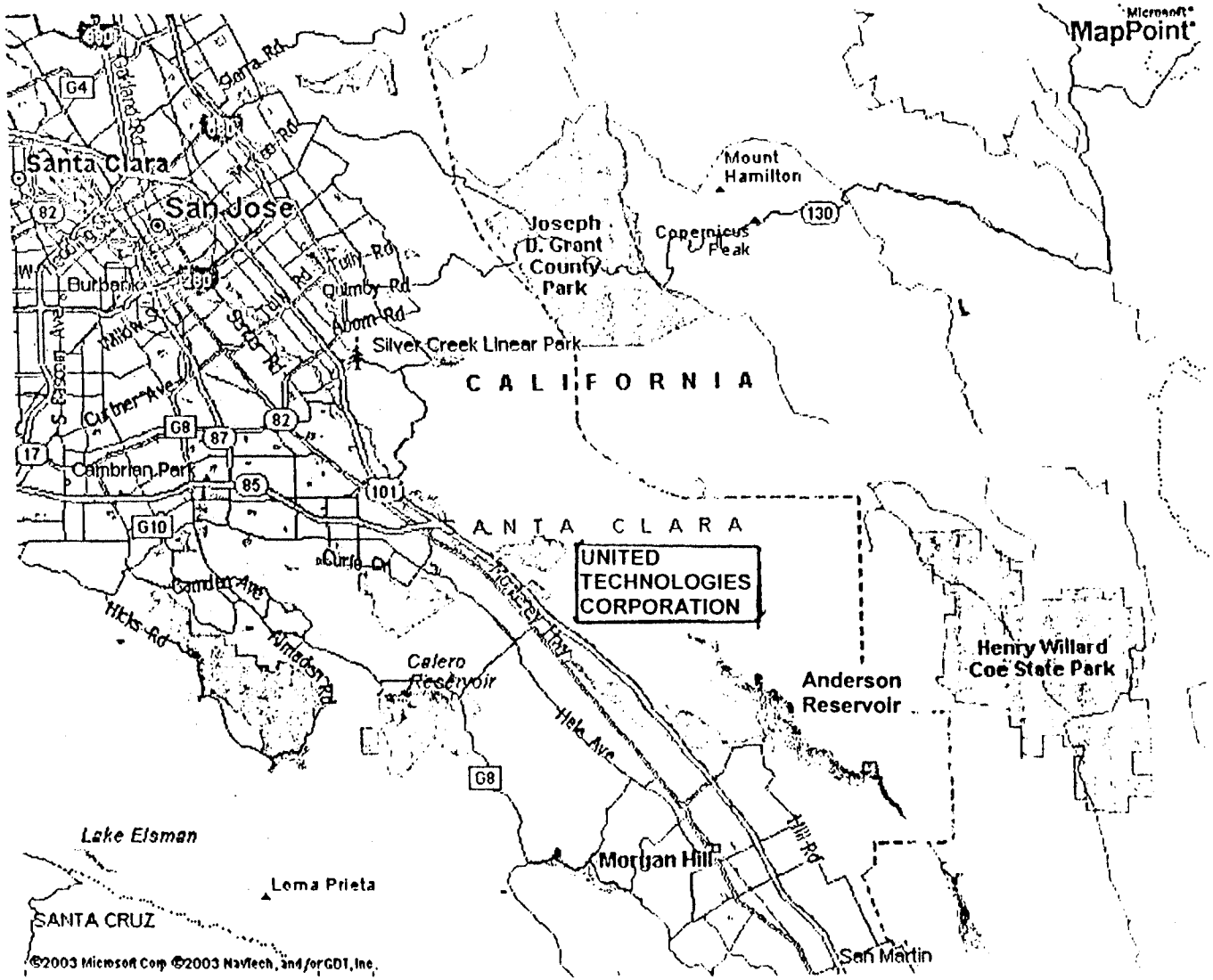
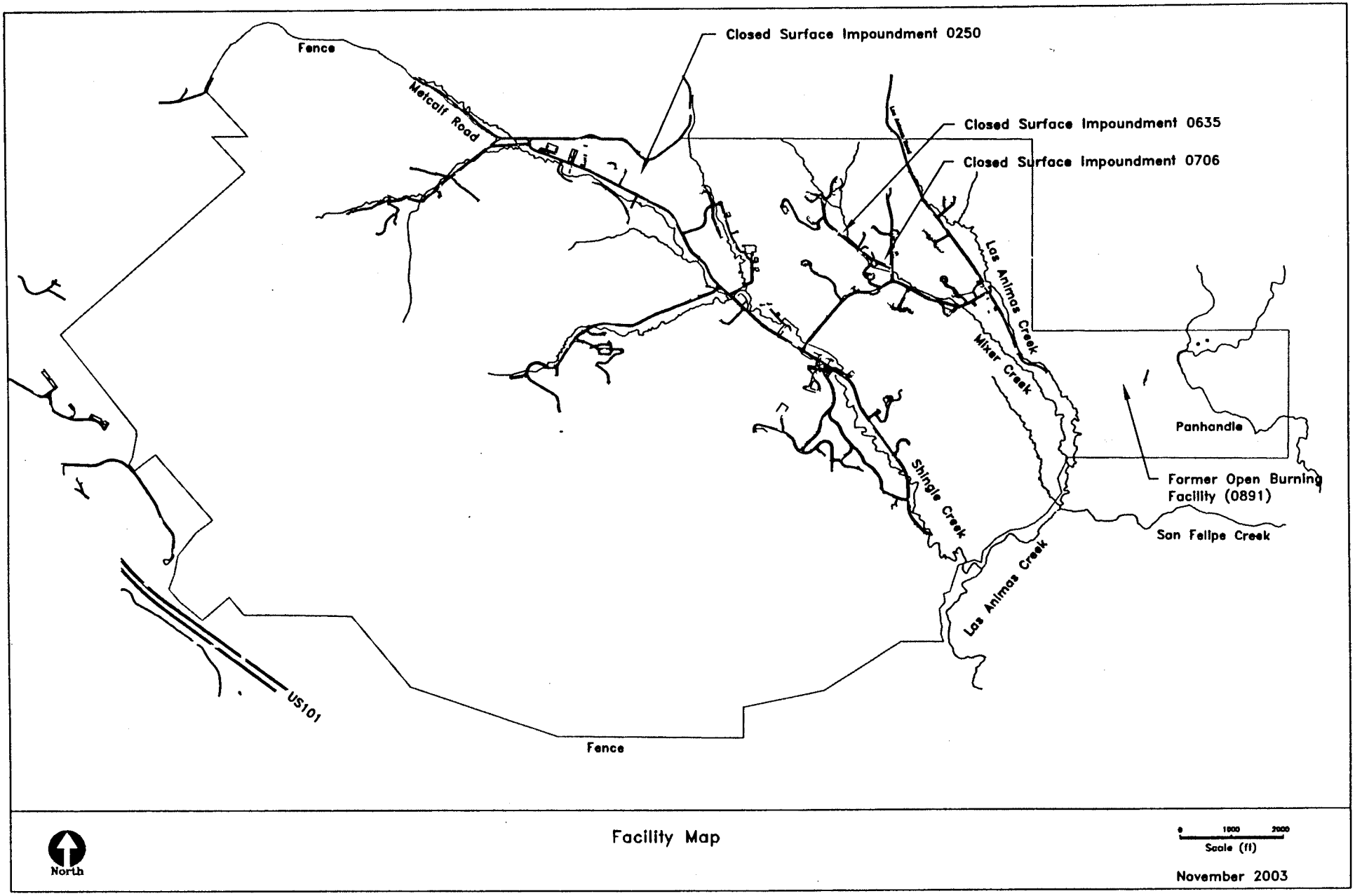
Attachments: Regional Map
Site Map
Self-Monitoring Program

General Location Map
United Technologies Corporation





Facility Map

November 2003

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

SELF-MONITORING PROGRAM FOR:

UNITED TECHNOLOGIES CORPORATION

for the property located at
600 METCALF ROAD
SANTA CLARA COUNTY

1. **Authority and Purpose**: The Water Board requests the technical reports required in this Self-Monitoring Program pursuant to Water Code Sections 13267 and 13304. This Self-Monitoring Program is intended to document compliance with Board Order No. RB2-2004-0032 (site cleanup requirements).

2. **Monitoring**: The discharger shall measure groundwater elevations in monitoring wells and shall collect and analyze representative samples of groundwater, surface water and reclaimed water according to the Environmental Monitoring Program Plan (EMPP) acceptable to the Executive Officer and submitted annually by October 1.

3. **Annual Monitoring Reports**: The discharger shall submit an annual monitoring report to the Water Board by no later than March 1 following the end of the year. Reports from other Self-Monitoring Programs required Water Reclamation Requirements, and Waste Discharge Requirements may be combined with the annual reports. The report shall include:

   a. Transmittal Letter: The transmittal letter shall discuss any violations during the reporting period and actions taken or planned to correct the problem. The letter shall be signed by the dischargers' principal executive officer or his/her duly authorized representative, and shall include a statement by the official, under penalty of perjury, that the report is true and correct to the best of the official's knowledge.

   b. Groundwater Elevations: Groundwater elevation data shall be presented in tabular form. Groundwater elevation map should be prepared for the wet and dry seasons for each monitored water-bearing zone. Historical groundwater elevations should be included with each annual report.

   c. Groundwater Analyses: All new wells shall be sampled on a quarterly basis for the first year. After the first year, the monitoring schedule shall be set at a frequency appropriate for the purpose of the well. The appropriate EPA methods, pH, and turbidity tests shall be required for all new monitoring and extraction wells. Other tests shall be required for some wells, depending on the well location. Groundwater sampling data shall be presented in tabular form, and an isoconcentration map should be prepared for one or more key contaminants for each monitored water-bearing zone, as appropriate. The annual report shall indicate the analytical method used, detection limits obtained for each reported

constituent, and a summary of QA/QC data. Historical groundwater sampling results shall also be included. Supporting data, such as lab data sheets, need not be included (however, see "Record Keeping" below).

d. Groundwater Extraction and Treatment: The report shall include groundwater extraction results in tabular form, for each groundwater treatment system and for the site as a whole, expressed in gallons per week and total groundwater volume for the year. The report shall also include contaminant removal results, from groundwater extraction and treatment systems expressed in units of chemical mass for the year. Historical mass removal results for groundwater extraction and treatment systems shall be included in the annual report. Contaminant removal results for the SVE systems in units of chemical mass shall be reported annually. Vapor concentrations for startup at each new SVE site visited during the year shall be reported. The report shall also include contaminant concentrations for influent and effluent flows at all the groundwater treatment systems at the site.

e. Status Report: The annual report shall describe relevant work completed during the reporting period (e.g. site investigation, interim remedial measures) and work planned for the following year.

4. **Quarterly Monitoring Reports**: The dischargers shall submit a quarterly monitoring report to the Water Board by no later than May 1 for the first quarter, August 1 for the second quarter, and November 1 for the third quarter. The quarterly report shall present and discuss (1) any violations during the reporting period and actions taken or planned to correct the problem, (2) problems with monitoring, investigative, or remedial activities conducted during the reporting period, and (3) status of new investigative or remedial actions that have not yet been reported.

5. **RCRA Post-Closure Compliance Monitoring:** Scheduled monitoring of groundwater at closed Resource Conservation and Recovery Act (RCRA) impoundments 0250, 0635, and 0706 and the former OBF is required under post-closure. This portion of the monitoring program is administered by the Department of Toxic Substances Control (DTSC). The sampling and analysis program proposed for these RCRA units is summarized in Table 1. Point of Compliance (POC) wells for former Surface Impoundments 0250, 0635, and 0706 and the OBF were selected from existing downgradient wells and are also shown in Table 1.

The groundwater monitoring plan for the units under RCRA post-closure permit will include, at a minimum, those analyses and frequency of analyses for those wells listed in Table 1. UTC will report the results of the RCRA sampling on an annual basis in a specific section of the Annual Monitoring Reports. DTSC may request that the RCRA monitoring data be submitted in separate reports or on a more frequent schedule. The RCRA post-closure monitoring program can only be changed with concurrence from DTSC. Other parts of the monitoring program performed under the EMPP can be changed by the RWQCB without concurrence from DTSC.

Former Surface Impoundment 0250 RCRA Monitoring: Previous groundwater sampling showed the presence of VOCs, perchlorate and cyanide in former Surface Impoundment 0250 groundwater. Therefore, the proposed RCRA monitoring for former Surface Impoundment 0250 includes VOCs, perchlorate, and total cyanides. Former Surface Impoundment 0250 was used to hold metal finishing wastewater. Therefore, the proposed monitoring will also include the 17 California Assessment Manual (CAM) metals. Because metals and cyanides have not been

detected in groundwater above MCLs, sampling for these parameters will only be performed annually.

Former Surface Impoundment 0635 RCRA Monitoring: Previous groundwater sampling showed the presence of VOCs and perchlorate in former Surface Impoundment 0635 groundwater. A pesticide, beta-BHC, was found at a maximum of 0.74 µg/L. Although beta-BHC was not part of the Station 0635 waste stream and may be an artifact (the concentration is too low to confirm using Method 8270), the level is above the California action level of 0.025 µg/L. Therefore, the proposed monitoring for former Surface Impoundment 0635 includes VOCs, perchlorate, and organochlorine pesticides. Due to the recent detection of beta-BHC, pesticides will be measured annually.

Former Surface Impoundment 0706 RCRA Monitoring: Previous groundwater sampling showed the presence of VOCs and perchlorate in former Surface Impoundment 0706 groundwater. Therefore, the proposed RCRA monitoring for former Surface Impoundment 0706 includes VOCs and perchlorate.

Former Open Burning Facility (OBF) RCRA Monitoring: Previous groundwater sampling showed the presence of VOCs, perchlorate, and cyanide in OBF groundwater. Historically, soil contamination with VOCs, semi-volatile organic compounds (SVOCs), perchlorate, metals and polychlorinated biphenyls (PCBs) were removed from the OBF. Therefore, the proposed RCRA monitoring for the OBF includes VOCs, perchlorate, cyanide, SVOCs, 17 CAM metals, and PCBs. Because cyanide, SVOCs, metals, and PCBs have not been detected in groundwater at concentrations exceeding MCLs, sampling for these parameters will only be performed on a 3to 5-year cycle.

6. **Miscellaneous Requirements:**

   a. Well depths shall be determined on an annual basis and compared to the depth of the well as constructed. If greater than twenty-five percent of the well screen is covered, the discharger shall clear the screen by the next sampling.

   b. Chemical detection limits shall be lower than cleanup standards established in the Order, unless it is technically impractical to achieve detection limits lower than cleanup standards.

7. **Violation Reports**: If the discharger violates requirements in the Site Cleanup Requirements, then the discharger shall notify the Water Board office by telephone as soon as practicable once the discharger has knowledge of the violation. Water Board staff may, depending on violation severity, require the discharger to submit a separate technical report on the violation within five working days of telephone notification.

8. **Other Reports**: The discharger shall notify the Water Board in writing prior to any site activities, such as construction or underground tank removal, which have the potential to cause further migration of contaminants or which would provide new opportunities for site investigation.

9. **Record Keeping**: The discharger or his/her agent shall retain data generated for the above reports, including lab results and QA/QC data, for a minimum of five years after origination and shall make them available to the Water Board upon request.

10. **SMP Revisions**: Revisions to the Self-Monitoring Program or the EMPP may be ordered by the Executive Officer, either on his/her own initiative or at the request of the discharger. Prior to making SMP or EMPP revisions, the Executive Officer will consider the burden, including costs, of associated self-monitoring reports relative to the benefits to be obtained from these reports.

I, Bruce H. Wolfe, Executive Officer, hereby certify that this Self-Monitoring Program was adopted by the Board on May 19, 2004.

Bruce H. Wolfe
Executive Officer

Attachment: Table 1, RCRA Post-Closure Groundwater Monitoring Plan

Table 1
RCRA Post-Closure Groundwater Monitoring Plan

RCRA Unit	RCRA Well ID	COC	Frequency	Next Sampling	USEPA Method
0250	18P-01R*	Perchlorate	6 MO		314.0
	18P-01R*	17 CAM Metals	A		6010
	18P-01R*	VOCs	6 MO		8260
	18P-01R*	Total Cyanides	A		9010
	18P-02	Perchlorate	6 MO		314.0
	18P-02	17 CAM Metals	A		6010
	18P-02	VOCs	6 MO		8260
	18P-02	Total Cyanides	A		9010
	AI-06	Perchlorate	6 MO		314.0
	AI-06	17 CAM Metals	A		6010
	AI-06	VOCs	6 MO		8260
	AI-06	Total Cyanides	A		9010
0635	20C-13	Perchlorate	6 MO		314.0
	20C-13	OC Pesticides	A		8081A
	20C-13	VOCs	6 MO		8260
	20C-14*	Perchlorate	6 MO		314.0
	20C-14*	OC Pesticides	A		8081A
	20C-14*	VOCs	6 MO		8260
	20C-17	Perchlorate	6 MO		314.0
	20C-17	OC Pesticides	A		8081A
	20C-17	VOCs	6 MO		8260
0706	20C-25	Perchlorate	6 MO		314.0
	20C-25	VOCs	6 MO		8260
	20C-35*	Perchlorate	6 MO		314.0
	20C-35*	VOCs	6 MO		8260
	20G-15	Perchlorate	6 MO		314.0
	20G-15	VOCs	6 MO		8260
OBF UPZ	RI-05W*	Perchlorate	6 MO		314.0
	RI-05W*	VOCs	6 MO		8260
	RI-05W*	17 CAM Metals	3 YR	2004	6010
	RI-05W*	PCBs	3 YR	2004	8082
	RI-05W*	SVOCs	3 YR	2004	8270
	RI-05W*	Total Cyanides	3 YR	2004	9010
	RI-12W*	Perchlorate	6 MO		314.0
	RI-12W*	VOCs	6 MO		8260
	RI-12W*	17 CAM Metals	3 YR	2004	6010
	RI-12W*	PCBs	3 YR	2004	8082
	RI-12W*	SVOCs	3 YR	2004	8270
	RI-12W*	Total Cyanides	3 YR	2004	9010
	RI-54W*	Perchlorate	6 MO		314.0
	RI-54W*	VOCs	6 MO		8260
	RI-54W*	17 CAM Metals	3 YR	2004	6010
	RI-54W*	PCBs	3 YR	2004	8082
	RI-54W*	SVOCs	3 YR	2004	8270
	RI-54W*	Total Cyanides	3 YR	2004	9010

Table 1 (cont.)
RCRA Post-Closure Groundwater Monitoring Plan

RCRA Unit	RCRA Well ID	COC	Frequency	Next Sampling	USEPA Method
OBF LUZ	RI-03W	Perchlorate	6 MO		314.0
	RI-03W	VOCs	6 MO		8260
	RI-03W	17 CAM Metals	3 YR	2004	6010
	RI-03W	PCBs	3 YR	2004	8082
	RI-03W	SVOCs	3 YR	2004	8270
	RI-03W	Total Cyanides	3 YR	2004	9010
	RI-25W	Perchlorate	6 MO		314.0
	RI-25W	VOCs	6 MO		8260
	RI-25W	17 CAM Metals	3 YR	2004	6010
	RI-25W	PCBs	3 YR	2004	8082
	RI-25W	SVOCs	3 YR	2004	8270
	RI-25W	Total Cyanides	3 YR	2004	9010
	RI-30W	Perchlorate	6 MO		314.0
	RI-30W	VOCs	6 MO		8260
	RI-30W	17 CAM Metals	3 YR	2004	6010
	RI-30W	PCBs	3 YR	2004	8082
	RI-30W	SVOCs	3 YR	2004	8270
	RI-30W	Total Cyanides	3 YR	2004	9010
	RI-32W	Perchlorate	6 MO		314.0
	RI-32W	VOCs	6 MO		8260
	RI-32W	17 CAM Metals	3 YR	2004	6010
	RI-32W	PCBs	3 YR	2004	8082
	RI-32W	SVOCs	3 YR	2004	8270
	RI-32W	Total Cyanides	3 YR	2004	9010
	RI-45W	Perchlorate	6 MO		314.0
	RI-45W	VOCs	6 MO		8260
	RI-45W	17 CAM Metals	3 YR	2004	6010
	RI-45W	PCBs	3 YR	2004	8082
	RI-45W	SVOCs	3 YR	2004	8270
	RI-45W	Total Cyanides	3 YR	2004	9010
	RI-46W	Perchlorate	6 MO		314.0
	RI-46W	VOCs	6 MO		8260
	RI-46W	17 CAM Metals	3 YR	2004	6010
	RI-46W	PCBs	3 YR	2004	8082
	RI-46W	SVOCs	3 YR	2004	8270
	RI-46W	Total Cyanides	3 YR	2004	9010
	RI-51W	Perchlorate	6 MO		314.0
	RI-51W	VOCs	6 MO		8260
	RI-51W	17 CAM Metals	3 YR	2004	6010
	RI-51W	PCBs	3 YR	2004	8082
	RI-51W	SVOCs	3 YR	2004	8270
	RI-51W	Total Cyanides	3 YR	2004	9010

Table 1 (cont.)
RCRA Post-Closure Groundwater Monitoring Plan

RCRA Unit	RCRA Well ID	COC	Frequency	Next Sampling	USEPA Method
OBF SQsc (LCZ)	BC-03W	Perchlorate	6 MO		314.0
	BC-03W	VOCs	6 MO		8260
	BC-03W	17 CAM Metals	5 YR	2004	6010
	BC-03W	PCBs	5 YR	2004	8082
	BC-03W	SVOCs	5 YR	2004	8270
	BC-03W	Total Cyanides	5 YR	2004	9010
	RI-16W	Perchlorate	6 MO		314.0
	RI-16W	VOCs	6 MO		8260
	RI-16W	17 CAM Metals	5 YR	2004	6010
	RI-16W	PCBs	5 YR	2004	8082
	RI-16W	SVOCs	5 YR	2004	8270
	RI-16W	Total Cyanides	5 YR	2004	9010
	RI-17AW	Perchlorate	6 MO		314.0
	RI-17AW	VOCs	6 MO		8260
	RI-17AW	17 CAM Metals	5 YR	2004	6010
	RI-17AW	PCBs	5 YR	2004	8082
	RI-17AW	SVOCs	5 YR	2004	8270
	RI-17AW	Total Cyanides	5 YR	2004	9010
	RI-19W	Perchlorate	6 MO		314.0
	RI-19W	VOCs	6 MO		8260
	RI-19W	17 CAM Metals	5 YR	2004	6010
	RI-19W	PCBs	5 YR	2004	8082
	RI-19W	SVOCs	5 YR	2004	8270
	RI-19W	Total Cyanides	5 YR	2004	9010

*Point of Compliance (POC) well
6 MO: Monitoring parameters sampled every 6 months
A: Sampled once each year
3 YR: Sampled every three years
5 YR: Sampled every five years
OBF: Open Burning Facility
UPZ: Upper Perched Zone of the Santa Clara Formation
LUZ: Lower Unconfined Zone of the Santa Clara Formation
LCZ: Lower Confined Zone of the Santa Clara Formation
SQsc: Standard Santa Clara Formation

RECEIVED
1991
R. J. MICHALAK

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 9

IN THE MATTER OF:	)	
	)	
UNITED TECHNOLOGIES CORPORATION,	)	ADMINISTRATIVE ORDER ON CONSENT
Chemical Systems Division	)	
Coyote Center	)	
600 Metcalf Road	)	U.S. EPA Doc. No.
Santa Clara County, California 95138	)	RCRA-09-89-0018
EPA I.D. No. CAD 001 705 235,	)	
	)	
RESPONDENT	)	Proceeding under Section 3008(h) of the Resource Conservation and Recovery Act, as amended, 42 U.S.C. § 6928(h)

I. JURISDICTION

This Administrative Order on Consent ("Consent Order") is issued pursuant to the authority vested in the Administrator of the United States Environmental Protection Agency ("EPA") by Section 3008(h) of the Solid Waste Disposal Act, commonly referred to as the Resource Conservation and Recovery Act of 1976 ("RCRA"), as amended by the Hazardous and Solid Waste Amendments of 1984, 42 U.S.C. Section 6928(h). The authority vested in the Administrator has been delegated to the Regional Administrators by EPA Delegation Nos. 8-31 and 8-32 dated April 16, 1985, and has been further delegated by the Regional Administrator for Region 9 to the Director of the Hazardous Waste Management Division ("Director").

EPA enters into this Consent Order with United Technologies Corporation ("Respondent"), the owner/operator of the facility located at Coyote Center, 600 Metcalf Road, San Jose, Santa Clara County, California ("Facility"). Respondent consents to and agrees not to contest EPA's jurisdiction to issue this Consent Order and to enforce its terms. Further, Respondent will not contest EPA's jurisdiction to: compel compliance with this Consent Order in any subsequent enforcement proceedings, either administrative or judicial; require Respondent's full or interim compliance with the terms of this Consent Order; or impose penalties as provided for under Section XIV hereof and/or seek

additional sanctions as provided in paragraph 7 of Section XIV hereof.

II. PARTIES BOUND

1. This Consent Order shall apply to and be binding upon EPA and Respondent and its officers, directors, successors and assigns. Respondent shall use its best efforts to cause its employees and agents and all contractors, subcontractors, consultants and other persons acting under or for Respondent to comply with the terms of this Consent Order. The failure of any of the persons described in the preceding sentence to comply with this Consent Order shall in no way diminish or otherwise affect Respondent's obligation to comply herewith.

2. No change in ownership or corporate status relating to the Facility will in any way alter Respondent's responsibility under this Consent Order.

3. Respondent shall provide a copy of this Consent Order to all contractors, subcontractors, laboratories, and consultants retained to conduct or monitor any portion of the work performed pursuant to this Consent Order within two (2) weeks of the effective date of this Consent Order or the date of such retention. Respondent shall condition all contracts entered into or renewed after the effective date of this Consent Order (and require its contractors to condition all such contracts with subcontractors) on compliance with the terms of this Consent Order. Respondent shall be deemed to have complied with this paragraph II.3 if such subcontractors receive such copy from such contractors in a timely manner.

4. Respondent shall give notice of this Consent Order to any successor in interest prior to transfer of ownership or operation of all or part of the Facility and shall notify EPA within seven (7) days prior to such transfer (except that Respondent's obligations in the case of a successor in interest that becomes such by means of a hostile public takeover of Respondent shall be limited to Respondent's best efforts).

III. STATEMENT OF PURPOSE

In entering into this Consent Order, the mutual objectives of EPA and Respondent are: (1) to dismiss EPA Administrative Order No. RCRA-09-89-0018, issued to Respondent on February 24, 1989, in favor of the issuance of this Consent Order; (2) to define the presence, magnitude, extent, direction, and rate of movement of any hazardous wastes or hazardous constituents within and beyond the Facility boundary; (3) to develop and evaluate the corrective action alternatives necessary to remedy those releases

identified pursuant to the preceding clause (2); (4) to perform clauses (2) and (3) above by means of a RCRA Facility Investigation/ Corrective Measures Study ("RFI/CMS") and to do so, to the extent deemed appropriate by EPA, by means of work performed and reports submitted pursuant to California Regional Water Quality Control Board, San Francisco Bay Region Order No. 89-008, Updated Waste Discharge Requirements for United Technologies Corporation, adopted December 21, 1988 ("WDR Order"); and (5) through an Administrative Order on Consent or other means, to implement at the Facility any corrective measure or measures selected by EPA. It is also a general purpose of this Consent Order to avoid, if possible, duplication of work being performed by Respondent pursuant to the WDR Order; provided, however, that EPA shall have sole authority to determine whether any such duplication exists and whether, as a result of any such duplication, the work required of Respondent will be altered.

IV. FINDINGS OF FACT

1. Respondent is a corporation organized under the laws of the State of Delaware, is authorized to do business in California, and is a person as defined in section 1004(15) of RCRA, 42 U.S.C. Section 6903(15).

2. Respondent is a generator of hazardous waste and an owner and operator of a hazardous waste management facility located at Coyote Center, 600 Metcalf Road, Santa Clara County, California. Respondent engages in the treatment, storage, or disposal of hazardous waste at the Facility subject to interim status requirements (40 CFR Part 265). Operations at the Facility consist primarily of the development, manufacture, and testing of rocket propellant and rocket motor configurations.

3. Respondent owned and operated its Facility as a hazardous waste management facility on and after November 19, 1980, the applicable date which renders facilities subject to interim status requirements or the requirement to have a permit under Sections 3004 and 3005 of RCRA, 42 U.S.C. Sections 6924, 6925.

4. Pursuant to Section 3010 of RCRA, 42 U.S.C. Section 6930, Respondent notified EPA of its hazardous waste activity. In its notification, dated August 14, 1983, Respondent identified itself as a generator of hazardous waste and an owner/operator of a treatment, storage, and/or disposal facility for hazardous waste.

5. On September 26, 1983, the State of California issued a RCRA permit to Respondent for a drum storage area at the

Facility.

6. Respondent represents to EPA that (1) the WDR Order contains certain waste discharge requirements for the Facility; (2) in general, the WDR Order requires the closure of three surface impoundments, the investigation of soil and groundwater conditions at the Facility, and the implementation of certain interim and final remedial corrective measures; and (3) the WDR Order is similar to a RCRA Facility Investigation ("RFI") and RCRA Corrective Measures Study ("CMS"). EPA expresses no opinion with respect to the accuracy of such representations.

7. Information regarding Respondent's Part A permit application, dated November 11, 1980 and revised on August 10, 1983; actions of the State of California concerning the Facility; a description of the Facility; documentation of releases from the Facility and their pathways of migration; and related matters is set forth in Attachment 1 hereto. Attachment 1 is incorporated by reference as if fully set forth herein.

V. CONCLUSIONS OF LAW AND DETERMINATIONS

Based on the Findings of Fact set out above, and after consideration of the administrative record, the Director has made the following conclusions of law and determinations:

1. Respondent is a "person" within the meaning of Section 1004(15) of RCRA, 42 U.S.C. Section 6903(15).

2. Respondent is the owner or operator of a facility that has operated or is operating subject to Section 3005(e) of RCRA, 42 U.S.C. Section 6925(e).

3. Certain wastes and constituents thereof found at the Facility are hazardous wastes or hazardous constituents thereof as defined by Section 1004(5) of RCRA, 42 U.S.C. Section 6903(5). These are also hazardous wastes or hazardous constituents within the meaning of Section 3001 of RCRA, 42 U.S.C. Section 6921 and 40 C.F.R. Part 261.

4. There is or has been a release of hazardous wastes and/or hazardous constituents into the environment from Respondent's Facility.

5. The actions required by this Consent Order are necessary to protect human health or the environment.

VI. WORK TO BE PERFORMED

1. Pursuant to Section 3008(h) of RCRA, 42 U.S.C. Section

6928(h), Respondent agrees to perform the following acts in the manner and by the dates specified herein. All work undertaken pursuant to this Consent Order (including work performed pursuant to the WDR Order) shall be performed in a manner consistent with, at a minimum: the attached Scopes of Work; any EPA-approved RCRA Facility Investigation Workplan and Corrective Measures Study Workplan; RCRA and its implementing regulations; and relevant EPA guidance documents. Relevant guidance may include, but is not limited to, the "RCRA Facility Investigation (RFI) Guidance" (EPA 530/SW-87-001), "RCRA Groundwater Monitoring Technical Enforcement Guidance Document" (OSWER Directive 9950.1, September 1986), "Test Methods For Evaluating Solid Waste" (SW-864, November 1986), "Construction Quality Assurance for Hazardous Waste Land Disposal Facilities" (EPA 530/SW-85-031, July 1986) and the proposed draft of 40 C.F.R. Part 264 Subpart S as set forth at 55 Fed. Reg. 30798 (July 27, 1990).

SUBMISSION OF RFI/CMS

2. The RFI/CMS shall define the presence, magnitude, extent, direction, and rate of movement of any hazardous wastes or hazardous constituents within and beyond the Facility boundary.

3. The RFI/CMS shall also: (1) characterize the geology and hydrogeology in and around the Facility; (2) characterize the existence, nature and extent of any groundwater contamination in and around the Facility; (3) characterize the existence, nature and extent of any surface water contamination in and around the Facility; (4) characterize the existence, nature and extent of any soil contamination in and around the Facility; (5) characterize the potential and actual pathways of contaminant migration; (6) characterize the sources of contamination; (7) identify actual and potential receptors; and (8) support the development of alternatives from which additional corrective measures will be selected by EPA, if deemed necessary by EPA.

4. The RFI/CMS shall also develop and evaluate corrective action alternatives necessary to remedy those releases identified as described in the preceding two paragraphs. Respondent represents to EPA that it has implemented and will implement corrective measures pursuant to the WDR Order. The RFI/CMS Report may describe such corrective measures implemented pursuant to the WDR Order.

5. Within one-hundred and twenty (120) days of the effective date of this Consent Order, Respondent shall submit to EPA a RFI/CMS Report. The RFI/CMS Report shall demonstrate how previous, ongoing and future work at the Facility has satisfied or will satisfy the goals, objectives and requirements of the

RFI/CMS as set forth in paragraphs 1, 2, 3 and 4 of this Section VI. Respondent shall organize the RFI/CMS Report in such a manner as to summarize the pertinent information, specify the source documents and the location therein of the information, delineate which requirements of an RFI or CMS the information is intended to satisfy and indicate where additional work, if any, is needed. The RFI/CMS Report shall be prepared in accordance with the requirements of the RFI Scope of Work contained in Attachment 2 to this Consent Order and the CMS Scope of Work contained in Attachment 3 to this Consent Order. Attachments 2 and 3 are incorporated by reference as if fully set forth herein. The RFI/CMS Report shall provide all information described in the attached Scopes of Work. EPA recognizes it is possible that some information required in the Scopes of Work may not be applicable in some cases. If Respondent concludes that any such information is not necessary to satisfy the goals, objectives and requirements of the RFI/CMS as set forth in paragraphs 1, 2, 3 and 4 of this Section VI, then the RFI/CMS Report shall include a complete, detailed justification of this conclusion. Any such conclusion shall be subject to EPA approval.

6. EPA will evaluate the RFI/CMS Report and notify Respondent in writing of the nature of any work required to complete the RFI portion of the RFI/CMS. EPA will attempt to transmit such notification within 120 days from the date of EPA's receipt of the RFI/CMS Report if possible. EPA's failure to do so within such 120-day period shall in no way diminish or affect Respondent's obligations under this Consent Order, subject EPA to any sanctions, penalties, damages, equitable or other remedies or other consequences or give rise to any estoppel doctrine against EPA.

7. If so notified by EPA, Respondent will prepare a workplan to complete the RFI. Respondent shall submit such workplan to EPA per a submittal schedule determined by EPA in consultation with Respondent. The submittal schedule shall be deemed incorporated into this Consent Order upon receipt by Respondent of written approval by EPA. The workplan is subject to EPA approval and shall detail how the investigation will be carried out, include a schedule for submitting the RFI reports and be consistent with the goals, objectives and requirements of the RFI Scope of Work contained in Attachment 2 to this Consent Order.

8. Following EPA's determination that Respondent has completed the RFI, EPA will further evaluate the RFI/CMS Report and will notify Respondent in writing, if possible within ninety (90) days, of any work required to complete the CMS portion of the RFI/CMS. EPA's failure to do so within such 90-day period shall in no way diminish or otherwise affect Respondent's

obligations under this Consent Order, subject EPA to sanctions, penalties, damages, equitable or other remedies or other consequences or give rise to any estoppel doctrine against EPA.

9. If notified by EPA pursuant to the preceding paragraph, Respondent shall submit a CMS Workplan to EPA within ninety (90) days of Respondent's receipt of such notification. The CMS Workplan shall summarize the corrective action alternatives that will be evaluated in the CMS Report, provide an outline of the CMS Report and include a schedule for submitting the CMS Report. The CMS Report shall be consistent with the goals, objectives and requirements of the CMS Scope of Work contained in Attachment 3 to this Consent Order.

CORRECTIVE MEASURES IMPLEMENTATION

10. If EPA determines it shall require Respondent to implement corrective measures in addition to any measures Respondent may have implemented pursuant to the WDR Order and if Respondent has complied with the terms of this Consent Order, EPA shall provide a sixty (60) day period for negotiation of a new administrative order on consent for implementation of the corrective measures. If agreement is not reached during this period (unless it shall have been extended by a written agreement signed by EPA and Respondent), EPA reserves all rights it has to implement the corrective measures or other remedial response and to take any other appropriate actions under RCRA, CERCLA, or any other legal authority.

SUBMISSIONS/AGENCY APPROVAL/ADDITIONAL WORK/MISCELLANEOUS

11. Except as otherwise provided in this Section VI, EPA will review all workplans, reports and other submittals pursuant to this Consent Order and notify Respondent in writing of EPA's approval, disapproval or modification of such document or any part thereof. In the event of disapproval, EPA shall specify in writing the deficiencies and reasons for such disapproval. Within sixty (60) days of the receipt of EPA's disapproval of any document, Respondent shall revise it and submit the revised document to EPA.

12. Within thirty (30) days of approval or modification by EPA of any workplan, Respondent shall commence work and implement the tasks required by the workplan submitted pursuant to the Scopes of Work contained in Attachments 2 and 3, in accordance with the standards, specifications and schedule stated in the workplan as approved or modified by EPA. Except to the extent additional or modified work is required or approved by EPA pursuant to this Section VI, Respondent will complete all work described in the RFI/CMS Report according to the schedule set

forth therein.

13. Beginning with the first quarterly progress report due pursuant to the WDR Order after the date on which the RFI/CMS Report is due, Respondent shall provide EPA with a copy of each such progress report on or before the seventh calendar day after it is due pursuant to the WDR Order. The progress reports shall conform to requirements in the relevant Scopes of Work contained in Attachments 2 and 3. If EPA requires Respondent to perform work in addition to that performed pursuant to the WDR Order, Respondent shall include a progress report covering this work with such quarterly progress reports. The quarterly reports shall also include the information specified in paragraph 2 of Section X of this Consent Order.

14. All work performed pursuant to this Consent Order (including work performed pursuant to the WDR Order) shall be under the direction and supervision of a professional engineer or geologist with expertise in hazardous waste site cleanup. Within one (1) week after the effective date of this Consent Order, Respondent shall notify EPA in writing of the name, title and qualifications of the engineer or geologist, and of the major consultants it is using to carrying out such work.

15. EPA may determine that certain tasks, including investigatory work or engineering evaluation, are necessary in addition to the tasks and deliverables included in the workplans or RFI/CMS Report when new findings indicate that such additional work is necessary. EPA shall request in writing that Respondent perform the additional work in this situation and shall specify the basis and reasons for EPA's determination that the additional work is necessary. Within fourteen (14) days after the receipt of such request, Respondent shall have the opportunity to meet with EPA to discuss the additional work EPA has requested. Thereafter, Respondent shall perform the additional work EPA has requested according to an EPA approved workplan. All additional work performed by Respondent under this paragraph shall be performed in a manner consistent with this Consent Order.

VII. QUALITY ASSURANCE

Throughout all sample collection, analysis and evaluation activities (including those conducted pursuant to the WDR Order), Respondent represents that it has used and agrees that it shall use EPA-approved quality assurance, quality control, and chain-of-custody procedures as specified in the approved workplans and attached Scopes of Work. In addition, Respondent shall:

1. Ensure that laboratories used by Respondent for analyses perform such analyses according to the EPA methods included in

"Test Methods for Evaluating Solid Waste" (SW-846, November 1986) or other methods deemed satisfactory to EPA. If methods other than EPA methods are to be used, Respondent shall submit all protocols to be used for analyses to EPA for approval on or before the fourteenth day prior to the commencement of analyses.

2. Ensure that laboratories used by Respondent for analyses participate in a quality assurance/quality control program equivalent to that which is followed by EPA. As part of such a program, and upon request by EPA, such laboratories shall perform analyses of samples provided by EPA to demonstrate the quality of the analytical data.

3. Inform the EPA Project Coordinator within thirty (30) days of the effective date of this Consent Order which laboratories Respondent is using. If Respondent changes laboratories, Respondent will inform EPA in advance of each such change. Respondent will ensure that EPA personnel and EPA authorized representatives have reasonable access to the laboratories and personnel used for analyses.

4. Provide all data quality evaluations to EPA as part of the RFI/CMS Report and CMS Workplan and Report, and update such evaluations as required by EPA.

Each of the agreements above shall apply to laboratories used in connection with analyses or other work performed pursuant to the WDR Order. Respondent represents that the laboratories previously used in connection with analyses or other work performed pursuant to the WDR Order met the standards specified in paragraphs 1 and 2 of this Section VII.

VIII. PUBLIC COMMENT AND PARTICIPATION

1. Upon approval by EPA of a CMS Report or EPA's determination that one is not needed, EPA shall make the RFI/CMS Report, any other RFI reports, the CMS Report (if any) and a summary of EPA's proposed corrective measures (if any) and EPA's justification for proposing selection of that corrective measure, if different from that selected in the CMS Report, available to the public for review and comment for at least twenty-one (21) days.

2. Following the public review and comment period, EPA shall notify Respondent of the corrective measure (if any) selected by EPA. If the corrective measure selected by EPA after consideration of public comments is not described in the Corrective Measure Study Report, EPA shall inform Respondent in writing of the reasons for such decision, and the Respondent

shall modify the RFI/CMS based upon public comment if directed to do so by EPA.

3. The Administrative Record supporting the selection of the corrective measure will be available for public review at the EPA Region 9 Library, San Francisco, California, during the library's public hours.

IX. ON-SITE AND OFF-SITE ACCESS

1. Subject to Respondent's reasonable safety restrictions applying equally to persons not employed by or representing EPA, EPA and its representatives are authorized to enter and freely move about all property at the Facility during the effective dates of this Consent Order for the purposes of inspecting and/or overseeing the performance of work related to carrying out this Consent Order or the WDR Order or related to other releases or potential releases subject to EPA's authority, including, inter alia: interviewing Facility personnel and contractors; inspecting records, operating logs, and contracts; reviewing the progress of Respondent in carrying out the terms of this Consent Order; conducting such tests, sampling or monitoring as EPA or its Project Coordinator deem necessary; and verifying the reports and data submitted to EPA by Respondent. Subject to Respondent's reasonable security rules that (i) implement U.S. Department of Defense security requirements and (ii) apply equally to persons not employed by or representing EPA (rules meeting both such conditions being called "Respondent's Security Rules"), Respondent shall permit such persons to inspect and copy all records, files, photographs, documents, and other writings, including all sampling and monitoring data, that pertain to work undertaken pursuant to this Consent Order or the WDR Order. All parties with access to the Facility pursuant to this Section shall comply with all EPA-approved health and safety plans and with Respondent's Security Rules. Subject to Respondent's Security Rules, Respondent will, promptly upon request by EPA or its representatives, provide to any EPA employee or representative visiting the Facility for the purposes described in this paragraph an employee of Respondent who will accompany such EPA employee or representative with an adequate camera, tape recorder or other documentary-type equipment and take pictures, make sound recordings or use such other equipment as directed by such employee or representative.

2. EPA and its representatives admitted to the Facility for the purposes described in the preceding paragraph shall:

a. report first to 600 Metcalf Rd. and present badges or other formal identification indicating identity and employment or authorization by EPA;

b. sign the security log, including name, position, affiliation, phone number, badge number and date and time of entry;

c. receive and prominently display a visitor's pass while at the Facility;

d. be escorted at all times at the Facility by an employee or security guard;

e. upon completion of the visit, return the pass to the escort and enter on the security log the admittee's time of departure;

provided, however, that EPA and its representatives shall be subject to such requirements only to the extent they (i) apply equally to persons not employed by or representing EPA and (ii) are not implemented so as to unreasonably interfere with the activities permitted under the preceding paragraph.

3. If EPA in its sole discretion deems it appropriate, EPA will (a) give Respondent one business day's advance notice of the time and date of entry desired and of the identity of the visitors, and (b) coordinate visits by EPA employees and representatives.

4. To the extent that work required by this Consent Order or by any Scope of Work, workplan or RFI/CMS Report attached hereto or prepared pursuant hereto (including work done pursuant to the WDR Order or any workplan or scope of work prepared thereunder) must be done on property not owned or controlled by Respondent, Respondent shall use its best efforts to obtain site access agreements from the present owner(s) of such property within sixty (60) days of approval of any workplan or RFI/CMS Report for which site access is required. Best efforts as used in this paragraph shall include, at a minimum, a certified letter from Respondent to the present owners of such property requesting access agreements to permit Respondent and EPA and its authorized representatives to access such property. Any such access agreement shall be incorporated by reference into this Consent Order. In the event that agreements for access are not obtained within such sixty-day period, Respondent shall notify EPA in writing within seven (7) days thereafter regarding the efforts undertaken to obtain access and their failure to obtain such agreements.

5. Nothing in this Section limits or otherwise affects EPA's right of access and entry pursuant to applicable law, including RCRA and the Comprehensive Environmental Response,

Compensation and Liability Act, 42 U.S.C. §9601 et seq. ("CERCLA"). The failure or EPA or its employees or representatives to comply with any of Respondent's security or safety rules or any other provision of this Section IX shall in no way limit or otherwise affect Respondent's obligations or EPA's rights and powers under this Consent Order or under law.

X. SAMPLING AND DATA/DOCUMENT AVAILABILITY

1. Respondent shall submit to EPA the results of all sampling and/or tests and all other information generated by or on behalf of Respondent pursuant to the requirements of this Consent Order and its attachments (including sampling and tests performed pursuant to the WDR Order).

2. In the quarterly progress reports submitted pursuant to paragraph 13 of Section VI, Respondent shall provide EPA with a list and projected start dates (or ranges of not more than one week for such start dates) of any field activities (such as well drilling, equipment installation and sampling) that Respondent will perform pursuant to this Consent Order (including work performed pursuant to the WDR Order) during the three-month period commencing the fifteenth day after EPA's receipt of the quarterly report. On or before such fifteenth day, EPA may, in its sole discretion, designate any or all of such activities. With respect to each activity so designated, Respondent shall provide EPA with at least 10 days' advance notice of the start date of the activity and any changes in such date; provided that with respect to changes resulting from events not reasonably foreseeable and beyond Respondent's control, Respondent shall notify EPA of such changes as early as possible but in no event later than two business days before the original date or the changed date, whichever is earlier. At the request of EPA, Respondent shall provide or allow EPA or its authorized representative to take split samples of all samples collected by Respondent pursuant to this Consent Order. Similarly, at the request of Respondent, EPA shall allow Respondent to take split samples of any samples collected by EPA under this Consent Order.

3. Respondent may assert a business confidentiality claim under 40 C.F.R. 260.2(b) covering all or part of any report submitted to EPA or of information EPA otherwise obtains pursuant to this Consent Order. Any assertion of confidentiality shall be adequately substantiated by Respondent when the assertion is made. Information determined to be confidential by EPA shall be disclosed only to the extent permitted by 40 C.F.R. Part 2. If no such confidentiality claim accompanies a report when it is submitted to EPA, it may be made available to the public by EPA without further notice to Respondent. Physical or analytical data shall not be deemed confidential under 40 C.F.R. 260.2(b).

XI. RECORD PRESERVATION

Respondent agrees that it shall preserve, until the later of (a) the termination of all of Respondent's obligations hereunder other than those set forth in this sentence and (b) the eleventh year after its generation, all data, records and documents in its possession or in the possession of its divisions, officers, directors, employees and agents that relate in any way to this Consent Order (including data, record and documents prepared pursuant to the WDR Order) or to hazardous waste treatment, storage and/or disposal at the Facility. Respondent shall cause its contractors, successors and assigns to give Respondent originals or complete and accurate copies of all such data, records and documents in their possession. After ten (10) years, Respondent may destroy such data, records or documents; provided, however, that Respondent shall notify EPA thirty (30) days prior to any such destruction, and shall provide EPA with the opportunity to take possession of, inspect and/or copy any or all such data, records or documents.

XII. PROJECT COORDINATOR

1. EPA and Respondent have each designated the Project Coordinator listed below. Each Project Coordinator shall be responsible for overseeing the implementation of this Consent Order. The EPA Project Coordinator will be EPA's designated representative at the Facility. All communications between Respondent and EPA, and all documents, reports, approvals, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Consent Order, shall be directed through the Project Coordinators.

For EPA:	Thomas C. Canaday
For Respondent:	Dale Thrasher

2. The parties agree to provide at least fourteen (14) days written notice prior to changing Project Coordinators.

3. If EPA determines that activities in compliance or noncompliance with this Consent Order have caused or may cause a release of hazardous waste, hazardous constituents, or a pollutant or contaminant, or a threat to the public health or to the environment, EPA may order Respondent to stop further implementation of this Consent Order and/or the WDR Order for such period of time as may be needed to abate any such release or threat and/or to undertake any action which EPA determines is necessary to abate such release or threat.

4. The absence of the EPA Project Coordinator from the

Facility shall not be cause for the stoppage of work.

XIII. NOTIFICATION

Unless otherwise specified, reports, correspondence, approvals, disapprovals, notices or other submissions relating to or required under this Consent Order shall be in writing and shall be sent to:

For EPA (two copies of all documents):
Thomas C. Canaday
H-3-2
U.S. EPA Region 9
75 Hawthorne St.
San Francisco, CA 94105

For Respondent:
Dale Thrasher
United Technologies Corp. Chemical Systems Division
P.O. Box 49028
San Jose, CA 95161

XIV. DELAY IN PERFORMANCE/STIPULATED PENALTIES

1. Unless there has been a written modification of a compliance date by EPA or excusable delay as defined under "Force Majeure and Excusable Delay" (Section XVI), in the event Respondent fails to meet any requirement set forth in this Consent Order, Respondent shall pay stipulated penalties as set forth below. Compliance by Respondent shall include completion of an activity under this Consent Order, the RFI/CMS Report or any plan approved under this Consent Order or any matter under this Consent Order (including activities, plans and other matters conducted or adopted pursuant to the WDR Order) in an acceptable manner and within the specified time schedules in and approved under this Consent Order.

a. For failure to commence or perform work as prescribed in the RFI/CMS Report, CMS Report or any workplan or to submit at the time required pursuant to this Consent Order any workplan or report (other than a progress report): $4,000 per day for one to seven days of delay and $10,000 per day for each day of delay thereafter;

b. For failure to submit progress reports at the time required: $2,500 per day for the first one to seven days of delay and $5,000 per day for each day of delay thereafter;

c. For failure to submit other deliverables at the time

required: $2,500 per day for the first one to seven days of delay, and $5,000 per day for each day of delay thereafter;

d. For other failure to comply with provisions of this Consent Order after notice by EPA of non-compliance: $2,500 per day for the first one to seven days of delay, and $5,000 per day for each day of delay thereafter;

2. All penalties shall begin to accrue on the date that complete performance is due or a violation occurs, and shall continue to accrue through the final day of correction of the noncompliance. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations.

3. All penalties owed to EPA under this Section shall be due within thirty (30) days of receipt of a notification that penalties are due. Such notification shall describe the noncompliance and shall indicate the amount of penalties due. Interest shall begin to accrue on the unpaid balance at the end of the thirty-day period.

4. All penalties shall be made payable by certified or cashier's check to the Treasurer of the United States of America and shall be remitted to:

U. S. Environmental Protection Agency
Region 9 Hearing Clerk
P. O. Box 360863M
Pittsburgh, Pennsylvania 15251

All payments shall reference the name of the Facility, the Respondent's name and address, and the EPA docket number of this action. Copies of the transmittal of payment shall be sent simultaneously to the EPA Project Coordinator.

5. Respondent may dispute EPA's right to the stated amount of penalties by invoking the dispute resolution procedures under Section XV of this Consent Order. If Respondent does not prevail upon resolution of the dispute, EPA has the right to collect all penalties which accrued prior to and during the period of dispute. If Respondent prevails upon resolution of the dispute, penalties shall be reduced or eliminated pursuant to the terms of such resolution.

6. Neither the filing of a petition to resolve a dispute nor the payment of penalties shall alter in any way Respondent's obligation to complete the performance required hereunder.

7. The stipulated penalties set forth in this Section do not preclude EPA from pursuing any other remedies or sanctions which may be available to EPA by reason of Respondent's failure to comply with any of the requirements of this Consent Order.

XV. DISPUTE RESOLUTION

1. If Respondent disagrees, in whole or in part, with any EPA disapproval or modification or other decision or directive made by EPA pursuant to this Consent Order, Respondent shall notify EPA in writing of its objections and the basis therefor within twenty-one (21) days of receipt of EPA's disapproval, decision or directive. Said notice shall set forth the specific points of the dispute, the position Respondent is maintaining should be adopted as consistent with the requirements of this Consent Order, the basis for Respondent's position, and any other matters it considers necessary for EPA's determination. EPA and Respondent shall then have an additional 14 days (which period may be extended by written agreement signed by EPA and Respondent) from EPA's receipt of Respondent's objections to attempt to informally resolve the dispute. During this period, Respondent may request a meeting with management of EPA's Hazardous Waste Management Division, and EPA and such management, in their sole discretion, will decide whether to hold such meeting. If agreement is reached, the resolution shall be reduced to writing, signed by a representative of each party and incorporated into this Consent Order. If the parties are unable to reach agreement within the 14-day period, EPA shall provide to Respondent its written decision on the pending dispute, which shall be binding upon both parties to this Consent Order.

2. The existence of a dispute as defined herein, and EPA's consideration of such matters as placed into dispute, shall not excuse, toll or suspend any compliance obligation or deadline under this Consent Order unless so determined by EPA in writing.

3. Notwithstanding any other provisions of this Consent Order, no action or decision by EPA, including without limitation decisions of the Director, pursuant to this Consent Order shall constitute final agency action giving rise to any rights to judicial review prior to EPA's initiation of judicial action to compel Respondent's compliance with this Consent Order.

XVI. FORCE MAJEURE AND EXCUSABLE DELAY

1. Respondent shall perform the requirements of this Consent Order within the time limits set forth herein, unless the performance is prevented or delayed by events which constitute a force majeure. Respondent shall have the burden of proving such a force majeure. A force majeure is defined as any event arising

from causes not reasonably foreseeable and beyond the control of Respondent which could not be overcome by due diligence and which delays or prevents performance by a date required by this Consent Order. Such events do not include increased costs of performance, changed economic circumstances, normal precipitation events, or failure to obtain federal, state or local permits (unless Respondent demonstrates that it filed complete applications therefor in a timely manner and diligently pursued approval thereof).

2. Respondent shall notify EPA in writing within seven (7) days after it becomes aware of events which Respondent knows or should know constitute a force majeure. Such notice shall estimate the anticipated length of delay, including necessary demobilization and remobilization, its cause, measures taken or to be taken to minimize the delay, and an estimated time table for implementation of these measures. Failure to comply with the notice provision of this section shall constitute a waiver of Respondent's right to assert a force majeure.

3. If EPA determines that the delay has been or will be caused by circumstances not reasonably foreseeable and beyond Respondent's control, which could not have been overcome by due diligence, the time for performance for that element of the relevant scope of work or workplan may be extended, upon EPA approval, for a period equal to the delay resulting from such circumstances. This shall be accomplished through an amendment to this Consent Order pursuant to Section XXII. Such an extension does not in and of itself alter the schedule for performance or completion of other tasks required by any workplan or otherwise unless these are also specifically altered by amendment of this Consent Order. In the event that EPA and Respondent cannot agree that any delay or failure has been or will be caused by circumstances not reasonably foreseeable and beyond the control of Respondent, which could not have been overcome by due diligence, or if there is no agreement on the length of the extension, the dispute shall be resolved in accordance with the Dispute Resolution provisions of Section XV of this Consent Order.

XVII. RESERVATION OF RIGHTS

1. EPA expressly reserves all rights and defenses that it may have, including the right to disapprove of work performed by Respondent pursuant to this Consent Order and the right to require that Respondent perform tasks in addition to those stated in any workplan, scope of work or RFI/CMS Report or those required under the WDR Order.

2. EPA hereby reserves all of its statutory and regulatory

powers, authorities, rights and remedies, both legal and equitable, that may pertain to Respondent's failure to comply with any of the requirements of this Consent Order, including without limitation the assessment of penalties under Section 3008(h)(2) of RCRA, 42 U.S.C. 6928(h)(2). This Consent Order shall not be construed as a covenant not to sue, release, waiver or limitation of any rights, remedies, powers and/ or authorities, civil or criminal, which EPA has under RCRA, CERCLA, or any other statutory, regulatory or common law enforcement authority of the United States.

3. Compliance by Respondent with the terms of this Consent Order shall not relieve Respondent of its obligations to comply with RCRA or any other applicable local, State or federal laws or regulations.

4. The entry of this Consent Order and Respondent's consent to comply shall not limit or otherwise preclude EPA from taking additional enforcement action pursuant to Section 3008(h) should EPA determine that such actions are warranted.

5. This Consent Order is not intended to be nor shall it be construed as a permit. This Consent Order does not relieve Respondent of any obligation to obtain and comply with any local, State or federal permits.

6. EPA reserves the right to perform any portion of the work consented to herein or any additional site characterization, feasibility study, and response/corrective actions as it deems necessary to protect public health and the environment; provided, however, that EPA will not, absent an immediate hazard, perform such work if Respondent is performing such work in a timely and satisfactory manner. EPA may exercise its authority under CERCLA to undertake removal actions or remedial actions at any time. Notwithstanding compliance with the terms of this Consent Order, Respondent is not released from any liability provided by law for the costs of any response actions taken by EPA.

7. Respondent neither admits nor denies any the Findings of Fact and Conclusions of Law and Determinations set forth in Sections IV and V of this Consent Order (including those in Attachment 1 hereto). Specifically, Respondent neither admits nor denies the hazardous nature of the wastes and constituents under investigation at the Facility under this Consent Order. Respondent reserves the right to dispute such Findings of Fact and Conclusions of Law and Determinations in any subsequent proceeding other than a proceeding to enforce this Consent Order. Respondent reserves all rights and defenses in law and in equity it may have against any person, firm, partnership or corporation not a party hereto.

XVIII. OTHER CLAIMS

Nothing in this Consent Order shall constitute or be construed as a release from any claim, cause of action or demand in law or equity against any person, firm, partnership, or corporation for any liability it may have arising out of or relating in any way to the generation, storage, treatment, handling, transportation, release, or disposal of any hazardous constituents, hazardous substances, hazardous wastes, pollutants, or contaminants found at, taken to, or taken from the Facility.

XIX. OTHER APPLICABLE LAWS

All actions required to be taken pursuant to this Consent Order shall be undertaken in accordance with the requirements of all applicable local, State, and federal laws and regulations. Respondent shall obtain or cause its representatives to obtain all permits and approvals necessary under such laws and regulations.

XX. INDEMNIFICATION OF THE UNITED STATES GOVERNMENT

Respondent agrees to indemnify and save and hold harmless the United States Government, its agencies, departments, agents, and employees, from any and all claims or causes of action arising from or on account of acts or omissions of Respondent or its agents, independent contractors, receivers, trustees, and assigns in carrying out activities required by this Consent Order. This indemnification shall not be construed in any way as affecting or limiting the rights or obligations of Respondent or the United, States under their various contracts. The United States shall not be held out as or construed to be a party to any contract entered into by Respondent in carrying out activities pursuant to this Consent Order.

XXI. FINANCIAL RESPONSIBILITY

Respondent hereby represents to EPA that it has and will maintain adequate financial resources to perform the work reasonably anticipated to be required under this Consent Order, including all workplans. Breach of the above representation or covenant shall constitute waiver of any rights Respondent may have hereunder. Respondent shall notify EPA of any breach of such representation or covenant. EPA shall notify Respondent if it has determined that such representation or covenant has been breached and Respondent shall have the rights set forth in Section XV (Dispute Resolution) with respect to such determination.

XXII. MODIFICATION

1. This Consent Order may be amended only by agreement of EPA and Respondent. Such amendments shall be in writing, shall be signed by both parties, shall have as their effective date the date on which they are signed by EPA, and shall be incorporated into this Consent Order.

2. Any reports, workplans, schedules, and attachments required by this Consent Order are, upon written approval by EPA, incorporated into this Consent Order. Any noncompliance with such EPA-approved reports, plans, schedules, and attachments shall be considered a violation of this Consent Order and shall subject Respondent to the stipulated penalty provisions included in Section XIV of this Consent Order.

3. No informal advice, guidance, suggestions, or comments by EPA regarding reports, plans, specifications, schedules, and any other writing submitted by Respondent will be construed as relieving Respondent of its obligation to obtain written approval, if and when required by this Consent Order.

XXIII. SEVERABILITY

If any provision or authority of this Consent Order or the application of this Consent Order to any party or circumstances is held by any judicial or administrative authority to be invalid, the application of such provisions to other parties or circumstances and the remainder of the Consent Order shall remain in force and shall not be affected thereby.

XXIV. TERMINATION AND SATISFACTION

The provisions of this Consent Order shall be deemed satisfied upon Respondent's receipt of written notice from EPA that Respondent has demonstrated, to the satisfaction of EPA, that the terms of this Consent Order, including any additional tasks determined by EPA to be required pursuant to this Consent Order and any continuing obligation or promises (including but not limited to those under Section XI (Record Preservation)), have been satisfactorily completed.

XXV. SURVIVABILITY/PERMIT INTEGRATION

1. Subsequent to the issuance of this Consent Order, a RCRA permit may be issued to the Facility incorporating the requirements of this Consent Order by reference into the permit.

2. Any requirements of this Consent Order shall not terminate upon the issuance of a RCRA permit unless the requirements are expressly replaced by more stringent requirements in the per-

mit.

XXVI. EFFECTIVE DATE

The effective date of this Consent Order shall be the date on which it is signed by EPA. Because this Consent Order was entered with the consent of both parties, Respondent waives its right to request a public hearing pursuant to Section 3008(b) of RCRA, 42 U.S.C. Section 6928(b).

IT IS SO AGREED AND ORDERED:

DATE: 1/23/91 BY: D. E. Lee
Title: Exec. V.P. & Gen. Mgr.
United Technologies Corporation
Chemical Systems Division

DATE: 2-22-91 BY:
Jeff Zelikson, Director
Hazardous Waste Management Division
United States Environmental
Protection Agency, Region 9

ATTACHMENT 1

IV. FINDINGS OF FACT

1. Respondent is a corporation organized under the laws of the State of Delaware, is authorized to do business in the State of California, and is a person as defined in Section 1004(15) of RCRA, 42 U.S.C. Section 6903(15).

2. Respondent is a generator of hazardous waste and an owner and operator of a waste management facility located at 600 Metcalf Road, Santa Clara County, California, also known as

Coyote Center. Respondent engaged in the treatment, storage, or disposal of hazardous waste at the Facility subject to interim status requirements (40 CFR Part 265).

3. Respondent owned and operated its Facility as a hazardous waste management facility on and after November 19, 1980, the applicable date which renders facilities subject to interim status requirements and to the requirement to have a permit under Sections 3004 and 3005 of RCRA, 42 U.S.C. Sections 6924, 6925.

4. Pursuant to Section 3010 of RCRA, 42 U.S.C. Section 6930, Respondent notified EPA of its hazardous waste activity. In its notification, dated August 14, 1980, Respondent identified itself as a generator of hazardous waste and an owner/operator of a treatment, storage, and/or disposal facility for hazardous waste.

5. In its Part A permit application dated November 11, 1980, and revised on August 10, 1983, Respondent identified itself as handling the following hazardous wastes at the Facility:*

(a) Hazardous wastes exhibiting the characteristics of ignitability, identified at 40 CFR § 261.21 (D001);

(b) Hazardous wastes exhibiting the characteristic of corrosivity, identified at 40 CFR § 261.22 (D002);

(c) Hazardous wastes exhibiting the characteristic of reactivity, identified at 40 CFR § 261.23 (D003);

(d) Hazardous wastes exhibiting the characteristic of EP Toxicity for chromium, identified at 40 CFR § 261.24 (D007);

(e) Hazardous wastes from non-specific sources containing spent halogenated solvents, identified at 40 CFR § 261.31 (F001, F002);

(f) Hazardous wastes from non-specific sources containing non-halogenated solvents, identified at 40 CFR § 261.31 (F003, F004, F005);

(g) Hazardous wastes of wastewater treatment sludges from electroplating operations, identified at 40 CFR § 261.31 (F006);

(h) Hazardous wastes from electroplating operations containing cyanides, identified at 40 CFR § 261.31 (F007, F008, F009);

(i) Hazardous wastes from metal heat treating operations containing cyanides, identified at 40 CFR § 261.31 (F010, F012);

* Respondent has submitted a revised Part A application, which is under review by EPA.

(j) Hazardous wastes from the specific source of wastewater treatment sludges from the manufacturing and processing of explosives, identified at 40 CFR ⅡⅡ 261.32 (K044);

(k) Acute hazardous wastes containing discarded commercial chemical products, manufacturing chemical intermediates, off-specification commercial chemical products, container residues, and spill residues thereof, identified at 40 CFR ⅡⅡ261.33(e) (P012, P078, P105, P081);

(l) Hazardous wastes containing discarded commercial chemical products, manufacturing chemical intermediates, off-specification commercial chemical products, container residues, and spill residues thereof, identified at 40 CFR ⅡⅡ261.33(f) (U002, U003, U008, U009, U012, U019, U021, U031, U037, U044, U056, U075, U080, U098, U108, U112, U117, U121, U122, U129, U133, U134, U151, U154, U159, U160, U161, U169, U188, U196, U207, U210, U211, U213, U220, U223, U226, U227, U228, U229, U234, U238, and U239).

6. Organic compounds that evaporate at relatively low temperatures are commonly referred to as "volatile organic compounds" or "VOCs". VOCs generally include hazardous compounds, such as 1,1,2-Trichloroethane (TCA), benzene, toluene, and Trichloroethylene (TCE), which are listed as hazardous constituents in Appendix VIII to 40 C.F.R. Part 261.

7. On November 19, 1980 the State of California had an existing hazardous waste management program that was substantially equivalent to the Federal program, and pursuant to Section 3006(c) of RCRA, 42 U.S.C. ⅡⅡ 6926, the State was granted interim authorization to carry out its program in lieu of the Federal program.

8. On September 26, 1983, the State of California issued a RCRA permit to the Respondent for a drum storage area at the Facility. No other RCRA-regulated units at the Facility were issued permits. Accordingly, all other RCRA-regulated units continue to operate under interim status. 40 C.F.R. ⅡⅡ270.1(c)(4).

9. The State of California, through the California Department of Health Services and the Regional Water Quality Control Board, is investigating contamination at the Facility involving hazardous wastes and/or hazardous constituents. The Board issued an Interim Status Document, Comprehensive Ground Water Monitoring Evaluation dated 1987. In August, 1988, the Department of Health Services issued a Report of Violations. On October 19, 1988, the Board issued Order No. 89-008 to UTC, updating discharge requirements for the Facility. This Order addresses closure of three surface impoundments and corrective action for groundwater contamination, wastestreams discharged to the ground, emergency containment facilities, sumps and tanks, fuel tanks and sewerage facilities.

10. Facility Description

(a) Operational History: UTC has been operating at the Facility since the late 1950s.

(b) Location: The Facility is located approximately 14 miles southeast of downtown San Jose, California, in the foothills of Santa Clara County. The Facility occupies approximately 5,200 acres (13 square miles) and encompasses two valleys of the Diablo Range; Mixer Valley and Shingle Valley. The surrounding lands include agricultural lands, parklands, undeveloped lands, and low density residential areas.

(c) Products/Processes: Operations at the Facility include the development, manufacture, and testing of rocket fuels and rocket motor configurations. Most of these operations involve mixing solid and semisolid components to produce solid fuels. Various chlorinated and non-chlorinated solvents are or have been used in these operations. Some solvents have been stored in drums onsite. Trichloroethylene and other chlorinated solvents have been stored in several ponds at the Facility.

(d) Facility Layout: The Facility includes approximately 180 buildings and stations, located in part in Shingle Valley and in part in Mixer Valley. A map of the Shingle Valley buildings and stations, with boundaries showing work areas, is attached hereto as Exhibit 1 and incorporated herein. A similar map of the Mixer Valley portion of the Facility is attached hereto as Exhibit 2 and incorporated herein.

(e) Waste Management Units: Waste management units and waste discharges at the Facility include hazardous waste surface impoundments, tanks, burn pits, sumps, spill containment structures, wastewater treatment plant with storage pond and sprayfield, septic system leachfields, sewage tanks, drum storage facilities, land discharges, and surface water discharges. A RCRA Facility Assessment report (RFA), dated September 30, 1986, identified at least 27 solid waste management units (SWMUs) at the Facility. These SWMUs are listed in Table 1 on page 6. The locations of these SWMUs are shown on the Facility maps which are attached hereto as Exhibits 1 and 2, and are incorporated herein.

TABLE 1

Waste Management Units
at Coyote Center

- Station 0250 Impoundment - RCRA regulated
- Station 0250 Pond
- Station 0250 Building Sumps
- Station 0321 Drum Storage Area
- Station 0635 Polymer Plant Pond - RCRA regulated
- Station 0635 Sump
- Station 0706 Impoundment - RCRA regulated
- Station 0706 Drum Storage
- Station 0891 Burn Pit - RCRA regulated
- Station 1233 Drum Storage Facility
- Station 2233 Drum Storage Facility - RCRA regulated
- Station 2233 Tanks
- Station 2215 Pond P-2
- Station 0650 Tool Cleaning and Solvent Recovery Plant
- Station 1950 Storage Sump
- Station 1920 Storage Sump
- Stations 1860 and 1861 Storage Sumps
- Station 1810 Storage Tank
- Station 0705 Emergency Containment Pond
- Station 1319 Emergency Containment Pond
- Station 1713 Emergency Containment Tank
- Station 1811 Emergency Containment Pond
- Stations 0531, 0561, & 0571 Emergency Containment Facilities
- Drum Storage Areas identified in RFA report
- Former Drum Storage Areas
- Station 2100 Sewage Treatment Plant
- Station 2100 Spray Field

(f) Status of units: Respondent has submitted a RCRA Part B application for the closure of three surface impoundments at the Facility. These impoundments were used for the storage and disposal of wastewaters resulting from metal cleaning (Pond 0250), polymer manufacture (Pond 0635), and container washing (Pond 0706).

(g) Facility Geology: The Facility is located over unconsolidated recent alluvial deposits which are composed of poorly sorted stiff silts, clays, sands, and gravel. Within the silts and clays are lenses and layers of more permeable clayey sand, clayey gravelly sand, and gravel. Individual beds of more permeable sediment vary in thickness from a few inches to as much as ten feet. The alluvial sediments thicken in the downstream direction, from about 10 feet in the upper ends of the valleys to 30 feet or more in the lower portions of the valleys.

Underlying the alluvium is the Santa Clara Formation consisting of alluvial fan deposits. In general, this formation consists of poorly consolidated gravel beds, sand and silt beds, some clay beds, bedded silt and rare tuff layers. In the area of the Facility, the Santa Clara Formation dips northeastward and the valleys generally parallel the strike of the beds.

(h) Facility Hydrogeology: Mixer Tea Valley has a shallow groundwater table between 4 and 11 feet below the surface. Shingle Valley, too, has groundwater at shallow depths; one location has ground water 10 feet below the surface. These shallow groundwater tables are referred to herein as the "upper aquifers" or as the "alluvium." In addition, both valleys have deep groundwater levels located in the Santa Clara Formation at 50 to 70 feet below the surface.

The groundwater in the upper aquifers has been determined to have a velocity of 100 feet per year. Groundwater in the lower Santa Clara Formation moves at a velocity of 2.5 feet per year. Groundwater velocity direction is primarily southeast, generally following surface water flow direction.

The California Regional Water Quality Control Board has determined that the groundwater underlying the Facility has existing and potential beneficial uses including industrial process water supply, industrial service water supply, municipal and domestic water supply, and agricultural water supply.

11. Groundwater Monitoring Wells: More than 100 groundwater monitoring wells have been installed at the Facility. The locations of these wells in Shingle Valley are shown in Exhibit 3, attached hereto and incorporated herein. The locations of these wells in Mixer Road Valley are shown in Exhibit 2.

12. Documentation of Releases

There have been a number of releases and spills of hazardous wastes and/or hazardous constituents at the Facility. The following discussion is based upon information, data, analyses, and evaluations set forth in the following reports and studies:

"RCRA Facility Assessment of Solid Waste Management Units at United Technologies Chemical Systems Division, Santa Clara County, California" (September 30, 1986), prepared by A.T. Kearney, Inc. and Science Applications International Corporation under contract to EPA (hereinafter "RFA");

"Phase I Progress Report for Ground Water Protection Study in Shingle Valley, UTC Coyote Center" (December, 1985), prepared by Weiss Associates for UTC (hereinafter "Weiss 1985 Report");

"Ground Water Protection Study - Phase II - in Shingle Valley, UTC Coyote Center" (December, 1987), prepared by Weiss Associates for UTC (hereinafter "Weiss 1987 Report"); and

"Information Review and Proposed Workplan, Mixer Road Valley" (Draft, October, 1988), prepared by Wahler Associates for UTC (hereinafter "Wahler Report").

The latter three documents were prepared for UTC by its consultants, at least in part in conjunction with Respondent's obligations imposed by the State of California.

(a) Releases to Ground Water

The reports published by Respondent's consultants discuss releases of hazardous wastes and hazardous constituents into the groundwater in both the Shingle and Mixer Valleys. Moreover, these reports document groundwater contamination in these valleys, based upon data collected from a series of groundwater monitoring wells located throughout the Facility.

For Shingle Valley, Respondent collected forty-three groundwater samples from thirty-six locations, and analyzed the samples for purgeable organics. See Weiss 1987 Report. These analyses detected organic chemicals consisting of synthetic volatile organic compounds (VOCs) and/or fuel hydrocarbons in the groundwater. Based on these analyses, Respondent mapped six discrete plumes of groundwater contamination, as well as three other

areas with trace concentrations of contamination. The areas of contamination are shown on the map attached as Exhibit 4 and incorporated in this Order. The contaminants detected in these groundwater samples, and the wells which were sampled, are listed in Table 3 of the Weiss 1987 Report, atttached as Exhibit 5 and incorporated herein. These contaminants include 1,1,1-Trichloroethane (TCA), Trichloroethylene (TCE), Freon-11, Freon-113, 1,2-Dichloroethylene (1,2-DCE), 1,1-Dichloroethylene (1,1-DCE), Tetrachloroethylene (PCE), toluene, benzene, and xylene.

For Mixer Valley, Respondent collected and analyzed water quality data from the alluvium (i.e., the upper aquifer) and from the aquifer in the Santa Clara Formation. These analyses indicate groundwater contamination in both the alluvium and in the Santa Clara Formation. Specifically, the analyses detected 11 predominant VOCs, with concentrations ranging from 100's to 1,000's parts per billion in groundwater. Total VOC concentrations were reported as high as 25,000 ppb (from Well 20D1 on March 17, 1988). The six major VOCs in the groundwater samples are TCE, TCA, DCE, DCA, t-DCE, and vinyl chloride. In the alluvium, the VOC contamination forms one large plume encompassing most of the Mixer Valley portion of the Facility. The concentrations and distribution of VOCs in the alluvium are shown in Figure 8 of the Wahler Report, attached hereto as Exhibit 6 and incorporated herein. In the Santa Clara Formation, Respondent has mapped two plumes of VOC contamination. The concentrations and distribution of VOCs in this Formation are shown in Figure 9 of the Wahler Report, attached hereto as Exhibit 7 and incorporated herein.

(b) Releases to Soil

Soil gas testing and soil sampling results have shown several areas where the soil is contaminated with high concentrations of volatile organics.

For Shingle Valley, the Weiss 1985 Report analyzed the extent of contamination in the alluvial soils. Iso-concentration contours of total VOC concentrations in soil gas are shown in Figure 4 of that report, attached hereto as Exhibit 8 and incorporated herein. As part of the Respondent's Phase II study, Respondent collected and analyzed sixty-four soil samples from sixteen locations at the Facility. These analyses show soil contamination at several areas of the Facility. The contaminants detected, and the sample locations, are shown in Table 4 of the Weiss 1987 Report. Table 4 is attached hereto as Exhibit 9 and incorporated herein.

For Mixer Valley, Respondent conducted soil sampling in the areas around Stations 706 and 635. The Wahler Report states that analyses of these samples show significant contamination of the soils in these areas with VOCs, including TCE (as high as 29 ppm) and TCA. The soil areas contaminated by VOCs are described

in Exhibit 10 attached hereto and incorporated herein. The Report also notes that a spill of 1,1,1-Trichloroethane occurred near Station 630 in November, 1981.

The contaminants discussed above which have been detected in the groundwater and soil samples include hazardous constituents as set forth in 40 C.F.R. Part 261, Appendix VIII.

(c) Releases to Surface Water

The Wahler report of October, 1988 states that sampling in 1982 showed that surface waters have had concentrations of up to 0.5 parts per million (ppm) of VOCs.

13. Hazardous wastes and/or hazardous constituents may further migrate from the Facility into the environment by the following pathways:

Contaminants in the upper aquifers are migrating within the aquifers due to the groundwater flow, primarily in a southeasterly direction. Moreover, due to the permeable nature of the Santa Clara Formation, these contaminants may percolate down through the soils to reach the Santa Clara aquifer. Alternatively, past or future well drilling activities may provide a pathway for the hazardous wastes and constituents in the upper aquifers to migrate down into the Santa Clara Formation. Furthermore, since the upper aquifers recharge and discharge into surface waters, the hazardous wastes and constituents may migrate from the groundwater into the surface waters. Finally, the hazardous wastes and constituents in the upper aquifers may migrate upward through the subsurface soils by outgassing or other means, thereby contaminating the soils and possibly outgassing into the atmosphere.

In addition to the migration pathways from the existing groundwater contamination, the hazardous wastes and constituents in the soils may migrate by means of several pathways. VOCs can be highly mobile in soils. Therefore, the existing soil contamination may be exacerbated by further movement through the soils, as well as migration to groundwater, surface water and into the atmosphere.

14. The groundwater basin in which the hazardous wastes and constituents are found is a major source of drinking water for the Santa Clara Valley. Moreover, surface water from the Facility and groundwater in the upper aquifers discharge into Anderson Reservoir, located one-half mile from the Facility. Anderson Reservoir is used for recharge of the groundwater basin, municipal water supply, and recreation, and is a habitat for fish and wildlife.

There are at least four water supply wells one-half mile east and downgradient of the Facility. There are also several water wells located east of the burn pit that supply water for the Facility. These latter wells are approximately 600 feet deep.

15. The hazardous wastes and/or hazardous constituents identified in paragraph 12 above may pose a threat to human health and the environment. According to "Chemical, Physical, and Biological Properties of Compounds present at Hazardous Waste Sites", prepared by Clement Associates for the EPA (September 27, 1985); and the "Superfund Public Health Evaluation Manual", EPA//540/1-86/060 (October, 1986), the hazardous wastes and/or hazardous constituents identified above have the following characteristics:

Vinyl Chloride: carcinogen, teratogen, mutagen. In addition, vinyl chloride is considered to cause chronic toxicity (i.e. to cause serious irreversible effects other than cancer or reproductive effects after extended exposure to certain dosages).

Carbon tetrachloride: causes liver and kidney damage in animals and humans.

Chloroform: carcinogen.

1,1-Dichloroethylene (DCE): carcinogen, teratogen, mutagen.

Methylene chloride: carcinogen, mutagen.

1,1,1-Trichloroethane (TCA): mutagen.

Trichloroethylene: carcinogen, mutagen.

Benzene: carcinogen, teratogen, mutagen, and causes chronic effects.

Toluene: teratogen.

SCOPE OF WORK FOR A RCRA FACILITY INVESTIGATION (RFI) AT UNITED TECHNOLOGIES CHEMICAL SYSTEMS DIVISION COYOTE CENTER

PURPOSE

The purpose of this RCRA Facility Investigation is to determine the nature and extent of releases of hazardous waste or constituents from regulated units, solid waste management units, and other source areas at the facility and to gather all necessary data to support the Corrective Measures Study. The Respondent shall furnish all personnel, materials, and services necessary for, or incidental to, performing the RCRA remedial investigation at United Technologies Chemical Systems Division's Coyote Center.

SCOPE

The RCRA Facility Investigation consists of seven tasks:

Task I: Description of Current Conditions

- A. Facility Background
- B. Nature and Extent of Contamination
- C. Implementation of Interim Measures

Task II: Pre-Investigation Evaluation of Corrective Measure Technologies

Task III: RFI Workplan Requirements

- A. Project Management Plan
- B. Data Collection Quality Assurance Plan
- C. Data Management Plan
- D. Health and Safety Plan
- E. Community Relations Plan

Task IV: Facility Investigation

- A. Environmental Setting
- B. Source Characterization
- C. Contamination Characterization
- D. Potential Receptor Identification

Task V: Investigation Analysis

- A. Data Analysis
- B. Protection Standards

Task VI: Laboratory and Bench-Scale Studies

Task VII: Reports

- A. Preliminary and Workplan
- B. Progress
- C. Draft and Final

TASK I: DESCRIPTION OF CURRENT CONDITIONS

Respondent shall submit for U.S. EPA approval a report providing the background information pertinent to the Facility, contamination and interim measures as set forth below. The data gathered during any previous investigations or inspections and other relevant data shall be included.

A. Facility Background

Respondent's report shall summarize the regional location, pertinent boundary features, general Facility physiography, hydrogeology, and historical use of the Facility for the treatment, storage or disposal of solid and hazardous waste. Respondent's report shall include:

1. Map(s) depicting the following:
   a. General geographic location;
   b. Property lines, with the owners of all adjacent property clearly indicated;
   c. Topography and surface drainage (with a contour interval of 10 feet and a scale of 1 inch = 100 feet) depicting all waterways, wetlands, floodplains, water features, drainage patterns, and surface-water containment areas;
   d. All tanks, buildings, utilities, paved areas, easements, rights-of-way, and other features;
   e. All solid or hazardous waste treatment, storage or disposal areas active after November 19, 1980;
   f. All known past solid or hazardous waste treatment, storage or disposal areas regardless of whether they were active on November 19, 1980;
   g. All known past and present product and waste underground tanks or piping;
   h. Surrounding land uses (residential, commercial, agricultural, recreational); and
   i. The location of all production and ground-water monitoring wells. These wells shall be clearly labeled and ground and top of casing elevations and construction details included (these elevations and details may be included as an attachment).

   All maps shall be consistent with the requirements set forth in 40 CFR §270.14 and be of sufficient detail and accuracy to locate and report all current and future work performed at the site;

2. A history and description of ownership and operation, solid and hazardous waste generation, treatment, storage and disposal activities at the Facility;

3. Approximate dates or periods of past product and waste spills, identification of the materials spilled, the amount spilled, the location where spilled, and a description of the response actions conducted (local, state, or federal response units or private parties), including any inspection reports or technical reports generated as a result of the response; and

4. A summary of past permits requested and/or received, any enforcement actions and their subsequent responses and a list of documents and studies prepared for the Facility.

B. Nature and Extent of Contamination

Respondent shall prepare and submit for U.S. EPA approval a preliminary report describing the existing information on the nature and extent of contamination.

1. Respondent's report shall summarize all possible source areas of contamination. This, at a minimum, should include all regulated units, solid waste management units, spill areas, and other suspected source areas of contamination. For each area, Respondent shall identify the following:

   a. Location of unit/area (which shall be depicted on a facility map);
   b. Quantities of solid and hazardous wastes;
   c. Hazardous waste or constituents, to the extent known; and
   d. Identification of areas where additional information is necessary.

2. Respondent shall prepare an assessment and description of the existing degree and extent of contamination. This should include:

   a. Available monitoring data and qualitative information on locations and levels of contamination at the Facility;
   b. All potential migration pathways including information on geology, pedology, hydrogeology, physiography, hydrology, water quality, meteorology, and air quality; and
   c. The potential impact(s) on human health and the environment, including demography, ground-water and surface-water use, and land use.

C. Implementation of Interim Measures

Respondent's report shall document interim measures which were or are being undertaken at the Facility. This shall include:

1. Objectives of the interim measures: how the measure is mitigating a potential threat to human health and the environment and/or is consistent with and integrated into any long term solution at the Facility;
2. Design, construction, operation, and maintenance requirements;
3. Schedules for design, construction and monitoring; and
4. Schedule for progress reports.

TASK II: PRE-INVESTIGATION EVALUATION OF CORRECTIVE MEASURE TECHNOLOGIES

Prior to starting the Facility investigation, Respondent shall submit to EPA a report that identifies the potential corrective measure technologies that may be used on-site or off-site for the containment, treatment, remediation, and/or disposal of contamination. This report shall also identify any field data that needs to be collected in the Facility investigation to facilitate the evaluation and selection of the final corrective measure or measures (e.g., compatibility of waste and construction materials, information to evaluate effectiveness, treatability of wastes, etc.).

TASK III: RFI WORKPLAN REQUIREMENTS

Respondent shall prepare a RCRA Facility Investigation (RFI) Workplan. This RFI Workplan shall include the development of several plans, which shall be prepared concurrently. During the RCRA Facility Investigation, it may be necessary to revise the RFI Workplan to increase or decrease the detail of information collected to accommodate the Facility-specific situation. The RFI Workplan includes the following:

A. Project Management Plan

Respondent shall prepare a Project Management Plan which will include a discussion of the technical approach, schedules, budget, and personnel. The Project Management Plan will also include a description of qualifications of personnel performing or directing the RFI, including contractor personnel. This plan shall also document the overall management approach to the RCRA Facility Investigation.

B. Data Collection Quality Assurance Plan

Respondent shall prepare a plan to document all monitoring procedures: sampling, field measurements and sample analysis performed during the investigation to characterize the environmental setting, source, and contamination, so as to ensure that all information, data and resulting decisions are technically sound, statistically valid, and properly documented.

1. Data Collection Strategy

The strategy section of the Data Collection Quality Assurance Plan shall include but not be limited to the following:

a. Description of the intended uses for the data, and the necessary level of precision and accuracy for these intended uses;
b. Description of methods and procedures to be used to assess the precision, accuracy and completeness of the measurement data;
c. Description of the rationale used to assure that the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition or an environmental condition. Examples of factors which shall be considered and discussed include:

i) Environmental conditions at the time of sampling;
ii) Number of sampling points;
iii) Representativeness of selected media; and

parameters.

d. Description of the measures to be taken to assure that the following data sets can be compared to each other:

   i) RFI data generated by Respondent over some time period;
   ii) RFI data generated by an outside laboratory or consultant versus data generated by Respondent;
   iii) Data generated by separate consultants or laboratories; and
   iv) Data generated by an outside consultant or laboratory over some time period.

e. Details relating to the schedule and information to be provided in quality assurance reports. The reports should include but not be limited to:

   i) Periodic assessment of measurement data accuracy, precision, and completeness;
   ii) Results of performance audits;
   iii) Results of system audits;
   iv) Significant quality assurance problems and recommended solutions; and
   v) Resolutions of previously stated problems.

2. Sampling

The Sampling section of the Data Collection Quality Assurance Plan shall discuss:

a. Selecting appropriate sampling locations, depths, etc.;
b. Providing a statistically sufficient number of sampling sites;
c. Measuring all necessary ancillary data;
d. Determining conditions under which sampling should be conducted;
e. Determining which media are to be sampled (e.g., ground water, air, soil, sediment, etc.);
f. Determining which parameters are to be measured and where;
g. Selecting the frequency of sampling and length of sampling period;
h. Selecting the types of sample (e.g., composites vs. grabs) and number of samples to be collected;
i. Measures to be taken to prevent contamination if the sampling equipment and cross contamination between sampling points;
j. Documenting field sampling operations and procedures, including;

i) Documentation of procedures for preparation of reagents or supplies which become an integral part of the sample (e.g., filters, and adsorbing reagents);
ii) Procedures and forms for recording the exact location and specific considerations associated with sample acquisition;
iii) Documentation of specific sample preservation method;
iv) Calibration of field devices;
v) Collection of replicate samples;
vi) Submission of field-biased blanks, where appropriate;
vii) Potential interferences present at the Facility;
viii) Construction materials and techniques, associated with monitoring wells and piezometers;
ix) Field equipment listing and sample containers;
x) Sampling order; and
xi) Decontamination procedures.

k. Selecting appropriate sample containers;
l. Sample preservation; and
m. Chain-of-custody, including:

i) Standardized field tracking reporting forms to establish sample custody in the field prior to and during shipment; and
ii) Pre-prepared sample labels containing all information necessary for effective sample tracking.

3. Field Measurements

The Field Measurements section of the Data Collection Quality Assurance Plan shall discuss:

a. Selecting appropriate field measurement locations, depths, etc.;
b. Providing a statistically sufficient number of field measurements;
c. Measuring all necessary ancillary data;
d. Determining conditions under which field measurement should be conducted;
e. Determining which media are to be addressed by appropriate field measurements (e.g., ground water, air, soil, sediment, etc.);
f. Determining which parameters are to be measured and where;
g. Selecting the frequency of field measurement and length of field measurements period; and

cedures, including:

i) Procedures and forms for recording raw data and the exact location, time, and facility-specific considerations associated with the data acquisition;
ii) Calibration of field devices;
iii) Collection of replicate measurements;
iv) Submission of field-biased blanks, where appropriate;
v) Potential interferences present at the Facility;
vi) Construction materials and techniques associated with monitoring wells and piezometers use to collect field data;
vii) Field equipment listing;
viii) Order in which field measurements were made; and
ix) Decontamination procedures.

4. Sample Analysis

The Sample Analysis section of the Data Collection Quality Assurance Plan shall specify the following:

a. Chain-of-custody procedures, including:

i) Identification of a responsible party to act as sample custodian at the laboratory facility authorized to sign for incoming field samples, obtain documents of shipment, and verify the data entered onto the sample custody records;
ii) Provision for a laboratory sample custody log consisting of serially numbered standard lab-tracking report sheets; and
iii) Specification of laboratory sample custody procedures for sample handling, storage, and dispersement for analysis.

b. Sample storage procedures and storage times;
c. Sample preparation methods;
d. Analytical procedures, including:

i) Scope and application of the procedure;
ii) Sample matrix;
iii) Potential interferences;
iv) Precision and accuracy of the methodology; and
v) Method detection limits.

e. Calibration procedures and frequency;
f. Data reduction, validation and reporting;

g. Internal quality control checks, laboratory performance and systems audits and frequency, including:

i) Method blank(s);
ii) Laboratory control sample(s);
iii) Calibration check sample(s);
iv) Replicate sample(s);
v) Matrix-spiked sample(s);
vi) "Blind" quality control sample(s);
vii) Control charts;
viii) Surrogate samples;
ix) Zero and span gases; and
x) Reagent quality control checks.

h. Preventive maintenance procedures and schedules;
i. Corrective action (for laboratory problems); and
j. Turnaround time.

C. Data Management Plan

Respondent shall develop and initiate a Data Management Plan to document and track investigation data and results. This plan shall identify and set up data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also provide the format to be used to present the raw data and conclusions of the investigation.

1. Data Record

The data record shall include the following:

a. Unique sample or field measurement code;
b. Sampling or field measurement location and sample or measurement type;
c. Sampling or field measurement raw data;
d. Laboratory analysis ID number;
e. Property or component measured; and
f. Result of analysis (e.g., concentration).

2. Tabular Displays

The following data shall be presented in tabular displays:

a. Unsorted (raw) data;
b. Results for each medium, or for each constituent monitored;
c. Data reduction for statistical analysis;
d. Sorting of data by potential stratification factors (e.g., location, soil layer, topography); and
e. Summary data.

3. Graphical Displays

The following data shall be presented in graphical formats (e.g., bar graphs, line graphs, area or plan maps, isopleth plots, cross-sectional plots or transects, three dimensional graphs, etc.):

a. Display sampling location and sampling grid;
b. Indicate boundaries of sampling area, and areas where more data are required;
c. Displays levels of contamination at each sampling location;
d. Display geographical extent of contamination;
e. Display contamination levels, averages, and maxima;
f. Illustrate changes in concentration in relation to distance from the source, time, depth or other parameters; and
g. Indicate features affecting intramedia transport and show potential receptors.

D. Health and Safety Plan

Respondent shall prepare a Facility Health and Safety Plan.

1. Major elements of the Health and Safety Plan shall include:

a. Facility description including availability of resources such as roads, water supply, electricity and telephone service;
b. Describe the known hazards and evaluate the risks associated with the incident and with each activity conducted;
c. List key personnel and alternates responsible for site safety, responses operations, and for protection of public health;
d. Delineate work area;
e. Describe levels of protection to be worn by personnel in work area;
f. Establish procedures to control site access;
g. Describe decontamination procedures for personnel and equipment;
h. Establish site emergency procedures;
i. Address emergency medical care for injuries and toxicological problems;
j. Describe requirements for an environmental surveillance program;
k. Specify any routine and special training required for responders; and
l. Establish procedures for protecting workers from weather-related problems.

with:

a. NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985);
b. EPA Order 1440.1 - Respiratory Protection;
c. EPA Order 1440.3 - Health and Safety Requirements for Employees engaged in Field Activities;
d. Facility Contingency Plan;
e. EPA Standard Operating Safety Guide (1984); f. OSHA regulations particularly in 29 C.F.R. §1910 and §1926;
g. State and local regulations; and
h. Other EPA guidance as provided.

E. Community Relations Plan

Respondent shall prepare a plan, for the dissemination of information to the public regarding investigation activities and results.

Respondent shall conduct those investigations necessary to: characterize the Facility (Environmental Setting); define the source (Source Characterization); define the degree and extent of contamination (Contamination Characterization); and identify actual or potential receptors.

The investigations should result in data of adequate technical quality to support the development and evaluation of the corrective measure alternative or alternatives during the Corrective Measures Study.

The site investigation activities shall follow the plans set forth in Task III. All sampling and analyses shall be conducted in accordance with the Data Collection Quality Assurance Plan. All sampling locations shall be documented in a log and identified on a detailed site map.

A. Environmental Setting

Respondent shall collect information to supplement and verify existing information on the environmental setting at the Facility. Respondent shall characterize the following:

1. Hydrogeology

Respondent shall conduct a program to evaluate hydrogeologic conditions at the Facility. This program shall provide the following information:

a. A description of the regional and Facility-specific geologic and hydrogeologic characteristics affecting ground-water flow beneath the Facility, including:

i) Regional and Facility-specific stratigraphy: description of strata including strike and dip, identification of stratigraphic contacts;
ii) Structural geology: description of local and regional structural features (e.g., folding, faulting, tilting, jointing, etc.);
iii) Depositional history;
iv) Identification and characterization of areas and amounts of recharge and discharge.
v) Regional and Facility-specific ground-water flow patterns; and
vi) Characterize seasonal variations in the ground-water flow regime.

b. An analysis of any topographic features that might influence the ground-water flow system.

tative and accurate classification and description of the hydrogeologic units which may be part of the migration pathways at the Facility (i.e., the aquifers and any intervening saturated and unsaturated units), including:

i) Hydraulic conductivity and porosity (total and effective);
ii) Lithology, grain size, sorting, degree of cementation;
iii) An interpretation of hydraulic interconnections between saturated zones; and
iv) The attenuation capacity and mechanisms of the natural earth materials (e.g., ion exchange capacity, organic carbon content, mineral content etc.).

d. Based on field studies and cores, structural geology and hydrogeologic cross sections showing the extent (depth, thickness, lateral extent) of hydrogeologic units which may be part of the migration pathways identifying:

i) Sand and gravel deposits in unconsolidated deposits;
ii) Zones of fracturing or channeling in consolidated or unconsolidated deposits;
iii) Zones of higher permeability or low permeability that might direct and restrict the flow of contaminants;
iv) The uppermost aquifer: geologic formation, group of formations, or part of a formation capable of yielding a significant amount of ground water to wells or springs; and
v) Water-bearing zones above the first confining layer that may serve as a pathway for contaminant migration including perched zones of saturation.

e. Based on data obtained from ground-water monitoring wells and piezometers installed upgradient and downgradient of the potential contaminant source, a representative description of water level or fluid pressure monitoring including:

i) Water-level contour and/or potentiometric maps;
ii) Hydrologic cross sections showing vertical gradients;
iii) The flow system, including the vertical and horizontal components of flow; and

iv) Any temporal changes in hydraulic gradients, for example, due to tidal or seasonal influences.

f. A description of manmade influences that may affect the hydrogeology of the site, identifying:

i) Active and inactive local water-supply and production wells with an approximate schedule of pumping; and
ii) Manmade hydraulic structures (pipelines, french drains, ditches, unlined ponds, septic tanks, NPDES outfalls, retention areas, etc.).

2. Soils

Respondent shall conduct a program to characterize the soil and rock units above the water table in the vicinity of the contaminant release(s). Such characterization shall include but not be limited to, the following information:

a. SCS soil classification;
b. Surface soil distribution;
c. Soil profile, including ASTM classification of soils;
d. Transects of soil stratigraphy;
e. Hydraulic conductivity (saturated and unsaturated);
f. Relative permeability;
g. Bulk density;
h. Porosity;
i. Soil sorptive capacity;
j. Cation exchange capacity (CEC);
k. Soil organic content;
l. Soil pH;
m. Particle size distribution;
n. Depth of water table;
o. Moisture content;
p. Effect of stratification on unsaturated flow;
q. Infiltration
r. Evapotranspiration;
s. Storage capacity;
t. Vertical flow rate; and
u. Mineral content.

3. Surface Water and Sediment

Respondent shall conduct a program to characterize the surface - water bodies in the vicinity of the Facility. Such characterization shall include, but not be limited to, the following activities and information:

a. Description of the temporal and permanent surface-water bodies including:

i) For lakes and estuaries: location, elevation, surface area, inflow, outflow, depth, temperature stratification, and volume;
ii) For impoundments: location, elevation, surface area, depth, volume, freeboard, and purpose of impoundment;
iii) For streams, ditches, drains, swamps and channels: location, elevation, flow, velocity, depth, width, seasonal fluctuations, and flooding tendencies (i.e., 100 year event);
iv) Drainage patterns; and
v) Evapotranspiration.

b. Description of the chemistry of the natural surface water and sediments. This includes determining the pH, total dissolved solids, total suspended solids, biological oxygen demand, alkalinity, conductivity, dissolved oxygen profiles, nutrients (NH_3, NO_3^-/NO_2^-, PO_4^{-3}), chemical oxygen demand, total organic carbon, specific contaminant concentrations, etc.

c. Description of sediment characteristics including:

i) Deposition area;
ii) Thickness profile; and
iii) Physical and chemical parameters (e.g., grain size, density, organic carbon content, ion exchange capacity, pH, etc.)

4. Air

Respondent shall provide information characterizing the climate in the vicinity of the Facility. Such information shall include, but not be limited to:

a. A description of the following parameters:

i) Annual and monthly rainfall averages;
ii) Monthly temperature averages and extremes;
iii) Wind speed and direction;
iv) Relative humidity/dew point;
v) Atmospheric pressure;
vi) Evaporation data;
vii) Development of inversions; and
viii) Climate extremes that have been known to occur in the vicinity of the Facility, including frequency of occurrence.

which affect air flow and emission patterns, including:

i) Ridges, hills or mountain areas;
ii) Canyons or valleys;
iii) Surface water bodies (e.g. rivers, lakes, bays, etc.);
iv) Wind breaks and forests; and
v) Buildings.

B. Source Characterization

Respondent shall collect analytical data to completely characterize the wastes and the areas where wastes have been placed, collected or removed including: type; quantity; physical form; disposition (containment or nature of deposits); and Facility characteristics affecting release (e.g., Facility security, and engineered barriers). This shall include quantification of the following specific characteristics, at each source area:

1. Unit/Disposal Area characteristics:

a. Location of unit/disposal area;
b. Type of unit/disposal area;
c. Design features;
d. Operating practices (past and present);
e. Period of operation;
f. Age of unit/disposal area;
g. General physical conditions; and
h. Method used to close the unit/disposal area.

2. Waste Characteristics:

a. Type of waste placed in the unit;

i) Hazardous classification (e.g., flammable, reactive, corrosive, oxidizing or reducing agent);
ii) Quantity; and
iii) Chemical composition.

b. Physical and chemical characteristics;

i) Physical form (solid, liquid, gas);
ii) Physical description (e.g., powder, oily sludge);
iii) Temperature;
iv) pH;
v) General chemical class (e.g., acid, base, solvent);
vi) Molecular weight;
vii) Density;

viii) Boiling point;
ix) Viscosity;
x) Solubility in water;
xi) Cohesiveness of the waste;
xii) Vapor pressure.
xiii) Flash point

c. Migration and dispersal characteristics of the waste;

i) Sorption;
ii) Biodegradability, bioconcentration, biotransformation;
iii) Photodegradation rates;
iv) Hydrolysis rates; and
v) Chemical transformations.

Respondent shall document the procedures used in making the above determinations.

C. Contamination Characterization

Respondent shall collect analytical data on ground-water, soils, surface water, sediment, and subsurface gas contamination in the vicinity of the Facility. This data shall be sufficient to define the extent, origin, direction, and rate of movement of contaminant plumes. Data shall include time and location of sampling, media sampled, concentrations found, and conditions during sampling, and the identity of the individuals performing the sampling and analysis. Respondent shall address the following types of contamination at the Facility:

1. Ground-water Contamination

Respondent shall conduct a Ground-water Investigation to characterize any plumes of contamination at the Facility. This investigation shall at a minimum provide the following information:

a. A description of the horizontal and vertical extent of any immiscible or dissolved plume(s) originating from the Facility;
b. The horizontal and vertical direction of contamination movement;
c. The velocity of contaminant movement;
d. The horizontal and vertical concentration profiles of 40 C.F.R. §264 Appendix IX constituents in the plume(s);
e. An evaluation of factors influencing the plume movement; and
f. An extrapolation of future contaminant movement.

Respondent shall document the procedures used in making the above determinations (e.g., well design, well construction, geophysics, modeling, etc.).

2. Soil Contamination

Respondent shall conduct an investigation to characterize the contamination of the soil and rock units above the water table in the vicinity of the contaminant release. The investigation shall include the following information:

a. A description of the vertical and horizontal extent of contamination.
b. A description of contaminant and soil chemical properties within the contaminant source area and plume. This includes contaminant solubility, speciation, adsorption, leachability, exchange capacity, biodegradability, hydrolysis, photolysis, oxidation and other factors that might affect contaminant migration and transformation.
c. Specific contaminant concentrations.
d. The velocity and direction of contaminant movement.
e. An extrapolation of future contaminant movement.

Respondent shall document the procedures used in making the above determinations.

3. Surface-Water and Sediment Contamination

Respondent shall conduct a surface-water investigation to characterize contamination in surface-water bodies resulting from contaminant releases at the Facility. The investigation shall include, but not be limited to, the following information:

a. A description of the horizontal and vertical extent of any immiscible or dissolved plume(s) originating from the Facility, and the extent of contamination in underlying sediments;
b. The horizontal and vertical direction of contaminant movement;
c. The contaminant velocity;
d. An evaluation of the physical, biological and chemical factors influencing contaminant movement;

e. An extrapolation of future contaminant movement; and
f. A description of the chemistry of the contaminated surface waters and sediments. This includes determining the pH, total dissolved solids, specific contaminant concentrations, etc.;

Respondent shall document the procedures used in making the above determinations.

4. Air Contamination

Respondent shall conduct an investigation to characterize the particulate and gaseous contaminants released into the atmosphere. This investigation shall provide the following information:

a. A description of the horizontal and vertical direction and velocity of contaminant movement;
b. The rate and amount of the release; and
c. The chemical and physical composition of the contaminants(s) released, including horizontal and vertical concentration profiles.

Respondent shall document the procedures used in making the above determinations.

5. Subsurface Gas Contamination

Respondent shall conduct an investigation to characterize subsurface gases emitted from buried hazardous waste and hazardous constituents in the ground water. This investigation shall include the following information:

a. A description of the horizontal and vertical extent of subsurface gases mitigation;
b. The chemical composition of the gases being emitted;
c. The rate, amount, and density of the gases being emitted; and
d. Horizontal and vertical concentration profiles of the subsurface gases emitted.

Respondent shall document the procedures used in making the above determinations.

D. Potential Receptors

Respondent shall collect data describing the human populations and environmental systems that are susceptible to contaminant exposure from the Facility. Chemical analysis of biological samples may be needed. Data on observable effects in ecosystems may also be obtained. The following characteristics shall be identified:

1. Local uses and possible future uses of ground water:

   a. Type of use (e.g., drinking water source: municipal or residential, agricultural, domestic/non-potable, and industrial); and
   b. Location of groundwater users including wells and discharge areas.

2. Local uses and possible future uses of surface waters draining the Facility:

   a. Domestic and municipal (e.g. potable and lawn/gardening watering);
   b. Recreational (e.g. swimming, fishing);
   c. Agricultural;
   d. Industrial; and
   e. Environmental (e.g. fish and wildlife propagation).

3. Human use of or access to the Facility and adjacent lands, including but not limited to:

   a. Recreation;
   b. Hunting;
   c. Residential;
   d. Commercial;
   e. Zoning; and
   f. Relationship between population locations and prevailing wind direction.

4. A description of the biota in surface water bodies on, adjacent to, or affected by the Facility.

5. A description of the ecology overlying and adjacent to the Facility.

6. A demographic profile of the people who use or have access to the Facility and adjacent land, including, but not limited to: age; sex; and sensitive subgroups.

7. A description of any endangered or threatened species near the Facility.

TASK V: INVESTIGATION ANALYSIS

Respondent shall prepare an analysis and summary of all Facility investigations and their results. The objective of this task shall be to ensure that the investigation data are sufficient in quality (e.g., quality assurance procedures have been followed) and quantity to describe the nature and extent of contamination, potential threat to human health and/or the environment, and to support the Corrective Measures Study.

A. Data Analysis

Respondent shall analyze all Facility investigation data outlined in Task IV and prepare a report on the type and extent of contamination at the Facility including sources and migration pathways. The report shall describe the extent of contamination (qualitative/ quantitative) in relation to background levels indicative for the area.

B. Protection Standards [where applicable]

1. Ground-water Protection Standards

For regulated units Respondent shall provide information to support the Agency's selection/development of Ground-water Protection Standards for all of the Appendix VIII constituents found in the ground-water during the Facility Investigation (Task IV).

a. The Groundwater Protection Standards shall consist of:

i) for any constituents listed in Table 1 of 40 C.F.R. §264.94, the respective value given in that table (MCL) if the background level of the constituent is below the given in Table 1; or
ii) the background level of that constituent in the groundwater; or
iii) a U.S. EPA approved Alternate Concentration Limit (ACL).

b. Information to support the Agency's subsequent selection of Alternate Concentration Limits (ACL's) shall be developed by Respondent in accordance with U.S. EPA guidance. For any proposed ACL's Respondent shall include a justification based upon the criteria set forth in 40 C.F.R. §264.94(b).

c. Within thirty (30) days of receipt of any proposed ACL's. The U.S. EPA shall notify Respondent in writing of approval, disapproval or modifications, the U.S. EPA shall specify in writing the reason(s) for any disapproval or modification.

d. Within thirty days of receipt of the U.S. EPA's notification or disapproval of any proposed ACL, Respondent shall amend and submit revisions to the U.S. EPA.

2. Other Relevant Protection Standards

Respondent shall identify all relevant and applicable standards for the protection of human health and the environment (e.g. National Ambient Air Quality Standards, Federally-approved state water quality standards, etc.).

TASK VI: LABORATORY AND BENCH-SCALE STUDIES

Respondent shall conduct laboratory and/or bench scale studies to determine the applicability of a corrective measure technology or technologies to Facility conditions. Respondent shall analyze the technologies, based on literature review, vendor contracts, and past experience to determine the testing requirements.

Respondent shall develop a testing plan identifying the types(s) and goal(s) of the study(ies), the level of effort needed, and the procedures to be used for data management and interpretation.

Upon completion of the testing, Respondent shall evaluate the testing results to assess the technology or technologies with respect to the site-specific questions identified in the test plan.

Respondent shall prepare a report summarizing the testing program and its results, both positive and negative.

TASK VII: REPORTS

A. Preliminary and Workplan

Respondent shall submit to the EPA reports on Tasks I and II when it submits the RCRA Facility Investigation Workplan (Task III).

B. Progress

Respondent shall at a minimum provide the EPA with signed, ~~bimonthly~~ QUARTERLY progress reports containing:

1. A description and estimate of the percentage of the RFI completed;
2. Summaries of all findings;
3. Summaries of all changes made in the RFI during the reporting period;
4. Summaries of all contacts with representative of the local community, public interest groups or State government during the reporting period;
5. Summaries of all problems or potential problems encountered during the reporting period;
6. Actions being taken to rectify problems;
7. Changes in personnel during the reporting period;
8. Projected work for the next reporting period; and
9. Copies of daily reports, inspection reports, laboratory/ monitoring data, etc.

C. Draft and Final

Upon EPA approval, Respondent shall prepare a RCRA Facility Investigation Report to present Tasks IV-V. The RCRA Facility investigation Report shall be developed in draft form for U.S. EPA review. The RCRA Facility Investigation Report shall be developed in final format incorporating comments received on the Draft RCRA Facility Investigation Report. Task VI shall be submitted as a separate report when the Final RCRA Facility Investigation Report is submitted.

Three copies of all reports, including the Task I report, Task II report, Task III workplan, Task VI report and both the Draft and Final RCRA Facility Investigation Reports (Task IV-V) shall be provided by Respondent to U.S. EPA. One additional copy of each report will be provided by Respondent to the California Department of Health Services and the Regional Water Quality Control Board.

SCOPE OF WORK FOR A CORRECTIVE MEASURE STUDY AT UNITED TECHNOLOGIES CHEMICAL SYSTEMS DIVISION COYOTE CENTER

PURPOSE

The purpose of this Corrective Measure Study (CMS) is to develop and evaluate the corrective action alternative or alternatives and to recommend the corrective measure or measures to be taken at United Technologies Chemical System Division's Coyote Center. The Respondent will furnish the personnel, materials, and services necessary to prepare the corrective measure study, except as otherwise specified.

SCOPE

The Corrective Measure Study consists of four tasks:

Task VIII: Identification and Development of the Corrective Measure Alternative or Alternatives

A. Description of Current Situation
B. Establishment of Corrective Action Objectives
C. Screening of Corrective Measures Technologies
D. Identification of the Corrective Measure Alternative or Alternatives

Task IX: Evaluation of the Corrective Measure Alternative or Alternatives

A. Technical/Environmental/Human Health/Institutional
B. Cost Estimate

Task X: Justification and Recommendation of the Corrective Measure or Measures

A. Technical
B. Environmental
C. Human Health

Task XI: Reports

A. Progress
B. Draft
C. Final

TASK VIII: IDENTIFICATION AND DEVELOPMENT OF THE CORRECTIVE ACTION ALTERNATIVE OR ALTERNATIVES

Based on the results of the RCRA Facility Investigation and consideration of the identified Preliminary Corrective Measure Technologies (Task II), Respondent shall identify, screen and develop the alternative or alternatives for removal, containment, treatment and/or other remediation of the contamination based on the objectives established for the corrective action.

A. Description of Current Situation

Respondent shall submit an update to the information describing the current situation at the Facility and the known nature and extent of the contamination as documented by the RCRA Facility Investigation Report. Respondent shall provide an update to information presented in Task I of the RFI to the Agency regarding previous response activities and any interim measures which have or are being implemented at the Facility. Respondent shall also make a Facility-specific statement of the purpose for the response, based on the results of the RCRA Facility Investigation. The statement of purpose should identify the actual or potential exposure pathways that should be addressed by corrective measures.

B. Establishment of Corrective Action Objectives

Respondent, in conjunction with the U.S. EPA, shall establish site specific objectives for the corrective action. These objectives shall be based on public health and environmental criteria, information gathered during the RCRA Facility Investigation, EPA guidance, and the requirements of any applicable Federal statutes. At a minimum, all corrective actions concerning ground water releases from regulated units must be consistent with, and as stringent as, those required under 40 C.F.R. §264.100.

C. Screening of Corrective Measure Technologies

Respondent shall review the results of the RCRA Facility Investigation and reassess the technologies specified in Task II and to identify additional technologies which are applicable at the Facility. Respondent shall screen the preliminary corrective measure technologies identified in Task II of the RCRA Facility investigation and any supplemental technologies to eliminate those that may prove unfeasible to implement, that rely on technologies unlikely to perform satisfactorily or reliably, or that do not achieve the corrective measure objective within a reasonable time period. This screening process focuses on eliminating those technologies which have severe limitations for a given set

of waste and site-specific conditions. The screening step may also eliminate technologies based on inherent technology limitations.

Site, waste, and technology characteristics which are used to screen inapplicable technologies are described in more detail below:

1. Site Characteristics

   Site data should be reviewed to identify conditions that may limit or promote the use of certain technologies. Technologies whose use is clearly precluded by site characteristics should be eliminated from further consideration;

2. Waste Characteristics

   Identification of waste characteristics that limit the effectiveness or feasibility of technologies is an important part of the screening process. Technologies clearly limited by these waste characteristics should be eliminated from consideration. Waste characteristics particularly affect the feasibility of in-situ methods, direct treatment methods, and land disposal (on/off-site); and

3. Technology Limitations

   During the screening process, the level of technology development, performance record, and inherent construction, operation, and maintenance problems should be identified for each technology considered. Technologies that are unreliable, perform poorly, or are not fully demonstrated may be eliminated in the screening process. For example, certain treatment methods have been developed to a point where they can be implemented in the field without extensive technology transfer or development.

D. <u>Identification of the Corrective Measure Alternative or Alternatives</u>

Respondent shall develop the Corrective measure alternative or alternatives based on the corrective action objectives and analysis of Preliminary Corrective Measure Technologies, as presented in Task II of the RCRA Facility investigation and as supplemented following the preparation of the RFI Report. Respondent shall rely on engineering practice to determine which of the previously identified technologies appear most suitable for the site. Technologies can be combined to form the overall corrective action alternative or alternatives. The alternative or alternatives developed should represent a workable number of option(s) that each

appear to adequately address all site problems and corrective action objectives. Each alternative may consist of an individual technology or a combination of technologies. Respondent shall document the reasons for excluding technologies, identified in Task II, as supplemented in the development of the alternative or alternatives.

TASK IX: EVALUATION OF THE CORRECTIVE MEASURE ALTERNATIVE OR ALTERNATIVES

Respondent shall describe each corrective measure alternative that passes through the Initial Screening in Task VIII and evaluate each corrective measure alternative and it's components. The evaluation shall be based on technical, environmental, human health and institutional concerns. Respondent shall also develop cost estimates of each corrective measure.

A. Technical/Environmental/Human Health/Institutional

Respondent shall provide a description of each corrective measure alternative which includes but is not limited to the following: preliminary process flow sheets; preliminary sizing and type of construction for buildings and structures; and rough quantities of utilities required. Respondent shall evaluate each alternative in the four following areas:

1. Technical;

Respondent shall evaluate each corrective measure alternative based on performance, reliability, implementability and safety.

a. Respondent shall evaluate performance based on the effectiveness an useful life of the corrective measure:

i) Effectiveness shall be evaluated in terms of the ability to perform intended functions, such as containment, diversion, removal, destruction, or treatment. The effectiveness of each corrective measure shall be determined either through design specifications or by performance evaluation. Any specific waste or site characteristics which could potentially impede effectiveness shall be considered. The evaluation should also consider the effectiveness of combinations of technologies; and

ii) Useful life is defined as the length of time the level of effectiveness can be maintained. Most corrective measure technologies, with the exception of destruction, deteriorate with time. Often, deterioration can be slowed through proper system operation and maintenance, but the technology eventually may require replacement. Each corrective measure shall be evaluated in terms of the projected service lives of its component technologies. Resource availability in the

future life of the technology, as well as appropriateness of the technologies, must be considered in estimating the useful life of the project.

b. Respondent shall provide information on the reliability of each corrective measure including their operation and maintenance requirements and their demonstrated reliability:

i) Operation and maintenance requirements include the frequency and complexity of necessary operation and maintenance. Technologies requiring frequent or complex operation and maintenance activities should be regarded as less reliable than technologies requiring little or straightforward operation and maintenance. The availability of labor and materials to meet these requirements shall also be considered; and

ii) Demonstrated and expected reliability is a way of measuring the risk and effect of failure. Respondent should evaluate whether the technologies have been used effectively under analogous conditions; whether the combination of technologies have been used together effectively; whether failure of any one technology has an immediate impact on receptors; and whether the corrective measure has the flexibility to deal with uncontrollable changes at the site.

c. Respondent shall describe the implementability of each corrective measure including the relative ease of installation (constructability) and the time required to achieve a given level of response:

i) Constructability is determined by conditions both internal and external to the Facility conditions and include such items as location of underground utilities, depth to water table, heterogeneity of subsurface materials, and location of the Facility (i.e., remote location vs. a congested urban area). Respondent shall evaluate what measures can be taken to facilitate construction under these conditions. External factors which affect implementation include the need for special permits or agreements, equipment availability, and the location of suitable off-site treatment or disposal facilities; and

ii) Time has two components that shall be addressed: the time it takes to implement a corrective measure and the time it takes to actually see beneficial results. Beneficial results are defined as the reduction of contaminants to some acceptable, pre-established level.

d. Respondent shall evaluate each corrective measure alternative with regard to safety. This evaluation shall include threats to the safety of nearby communities and environments as well as those to workers during implementation. Factors to consider are fire, explosion, and exposure to hazardous substances.

2. Environmental;

Respondent shall perform an Environmental Assessment for each alternative. The Environmental Assessment shall focus on the Facility conditions and pathways of contamination actually addressed by each alternative. The Environmental Assessment for each alternative will include, at a minimum, an evaluation of: the short- and long-term beneficial and adverse effects of the response alternative; any adverse effects on environmentally sensitive areas; and an analysis of measures to mitigate adverse effects.

3. Human Health; and

Respondent shall assess each alternative in terms of the extent of which it mitigates short- and long-term potential exposure to any residual contamination and protects human health both during and after implementation the corrective measure. The assessment will describe the levels and characterizations of contaminants on-site, potential exposure routes, and potentially affected population. Each alternative will be evaluated to determine the level of exposure to contaminants and the reduction over time. For management of mitigation measures, the relative reduction of impact will be determined by comparing residual levels of each alternative with existing criteria, standards, or guidelines acceptable to EPA.

4. Institutional.

Respondent shall assess relevant institutional needs for each alternative. Specifically, the effects of Federal, state and local environmental and public health standards, regulations, guidance, advisories, ordinances, or community relations on the design, operation, and timing of each alternative.

B. Cost Estimate

Respondent shall develop an estimate of the cost of each corrective measure alternative (and for each phase or segment of the alternative). The cost estimate shall include both capital and operation and maintenance costs.

1. Capital costs consist of direct (construction) and indirect (non-construction and overhead) costs.

   a. Direct capital costs include:

      i) Construction costs: Costs of materials, labor (including fringe benefits and worker's compensation), and equipment required to install the corrective measure.
      ii) Equipment costs: Costs of treatment, containment, disposal and/or service equipment necessary to implement the action; these materials remain until the corrective action is complete;
      iii) Land and site-development costs: Expenses associated with purchase of land and development of existing property; and
      iv) Buildings and services costs: Costs of process and non-process buildings, utility connections, purchased services, and disposal costs.

   b. Indirect capital costs include:

      i) Engineering expenses: Costs of administration, design, construction supervision, drafting, and testing of corrective measure alternatives;
      ii) Legal fees and license or permit costs: Administrative and technical costs necessary to obtain licenses and permits for installation and operation;
      iii) Startup and shakedown costs: Costs incurred during corrective measure startup; and
      iv) Contingency allowances: Funds to cover costs resulting from unforeseen circumstances, such as adverse weather conditions, strikes, and inadequate Facility characterization.

2. Operation and maintenance costs are post-construction costs necessary to ensure continued effectiveness of a corrective measure. Respondent shall consider the following operation and maintenance cost components:

a. Operating labor costs: Wages, salaries, training, overhead, and fringe benefits associated with the labor needed for post-construction operations;
b. Maintenance materials and labor costs: Costs for labor, parts, and other resources required for routine maintenance of facilities and equipment;
c. Auxiliary materials and energy: Costs of such items as chemicals and electricity for treatment plant operations, water and sewer service, and fuel;
d. Purchased services: Sampling costs, laboratory fees, and professional fees for which the need can be predicted;
e. Disposal and treatment costs: Costs of transporting, treating, and disposing of waste materials, such as treatment plant residues, generated during operations;
f. Administrative costs: Costs associated with administration of corrective measure operation and maintenance not included under other categories;
g. Insurance, taxes, and licensing costs: Costs of such items as liability and sudden accidental insurance; real estate taxes on purchased land or rights-of-way; licensing fees for certain technologies; and permit renewal and reporting costs;
h. Maintenance reserve and contingency funds: Annual payments into escrow funds to cover (1) costs of anticipated replacement or rebuilding of equipment and (2) any large unanticipated operation and maintenance costs; and
i. Other costs: Items that do not fit any of the above categories.

TASK X: JUSTIFICATION AND RECOMMENDATION OF THE CORRECTIVE MEASURE OR MEASURES

Respondent shall justify and recommend a corrective measure alternative using technical, human health, and environmental criteria. This recommendation shall include summary tables which allow the alternative or alternatives to be understood easily. Tradeoffs among health risks, environmental effects, and other pertinent factors shall be highlighted. The U.S. EPA will select the corrective measure alternative or alternatives to be implemented based on the results of Tasks IX and X. At a minimum, the following criteria will be used to justify the final corrective measure or measures.

A. Technical

1. Performance - corrective measure or measures which are most effective at performing their intended functions and maintaining the performance over extended periods of time will be given preference;
2. Reliability - corrective measure or measures which do not require frequent or complex operation and maintenance activities and that have proven effective under waste and Facility conditions similar to those anticipated will be given preference;
3. Implementability - corrective measure or measures which can be constructed and operating to reduce levels of contamination to attain or exceed applicable standards in the shortest period of time will be preferred; and
4. Safety - corrective measure or measures which pose the least threat to the safety of nearby residents and environments as well as workers during implementation will be preferred.

B. Human Health

The corrective measure or measures must comply with existing U.S. EPA criteria, standards, or guidelines for the protection of human health. Corrective measures which provide the minimum level of exposure to contaminants and the maximum reduction in exposure with time are preferred.

C. Environmental

The corrective measure or measures posing the least adverse impact (or greatest improvement) over the shortest period of time on the environment will be favored.

A. Corrective Measures Study Workplan

Respondent shall submit to EPA a Preliminary Corrective Measures Study Workplan within thirty (30) days of approval of the final RFI Report. Respondent will finalize its Workplan within thirty (30) days of receipt of comments from EPA.

B. Progress

Respondent shall at a minimum provide the EPA with signed, ~~bimonthly~~ QUARTERLY progress reports containing:

1. A description and estimate of the percentage of the CMS completed;
2. Summaries of all findings;
3. Summaries of all changes made in the CMS during the reporting period;
4. Summaries of all contacts with representative of the local community, public interest groups or State government during the reporting period;
5. Summaries of all problems or potential problems encountered during the reporting period;
6. Actions being taken to rectify problems;
7. Changes in personnel during reporting period;
8. Projected work for the next reporting period; and
9. Copies of daily reports, inspection reports, laboratory/ monitoring data, etc.

C. Draft

Respondent shall prepare a Corrective Measure Study Report presenting the results of Task VIII through X and recommending a corrective measure alternative or alternatives. Three copies of the preliminary report shall be provided by Respondent to EPA. The Report shall at a minimum include:

1. A description of the Facility;

   a. Site topographic map & preliminary layouts.

2. A summary of the corrective measure or measures;

   a. Description of the corrective measure or measures and rationale for selection;
   b. Performance expectations;
   c. Preliminary design criteria and rationale;
   d. General operation and maintenance requirements; and
   e. Long-term monitoring requirements.

3. A summary of the RCRA Facility Investigation and impact on the selected corrective measure or measures;

   a. Field studies (ground-water, surface water, soil, air); and
   b. Laboratory studies (bench scale, pick scale).

4. Design and Implementation Precautions;

   a. Special technical problems;
   b. Additional engineering data required;
   c. Permits and regulatory requirements;
   d. Access, easements, right-of-way;
   e. Health and safety requirements; and
   f. Community relations activities.

5. Cost Estimates and Schedules;

   a. Capital cost estimate;
   b. Operation and maintenance cost estimate; and
   c. Project schedule (design, construction, operation).

C. <u>Final</u>

Respondent shall finalize the Corrective Measure Study Report incorporating comments received from EPA on the Draft Corrective Measure Study Report.

APPENDIX T

HEALTH AND SAFETY PLANS

HEALTH AND SAFETY PLAN

FOR UNITED TECHNOLOGIES CORPORATION

PRATT & WHITNEY ROCKETDYNE SAN JOSE

HAZARDOUS WASTE OPERATIONS

Prepared for:

United Technologies Corporation
Pratt & Whitney Rocketdyne
600 Metcalf Road
San Jose, California 95138-9601

HEALTH AND SAFETY PLAN

FOR UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY ROCKETDYNE, SAN JOSE

HAZARDOUS WASTE OPERATIONS

United Technologies Corporation
Pratt & Whitney Rocketdyne
600 Metcalf Road
San Jose, California 95138-9601

Approved:

Joe McKean
Safety Manager

April 24, 2007
Date

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4/24/07
Date

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