

## PSC RW-02 Wastewater Treatment Annex

PSC RW-02 consists of a former 28-acre landfill at the Luke AFB wastewater treatment plant (WWTP) annex located north of Glendale Avenue and, two miles east of the main Base. The former landfill is located in the northwestern portion of the WWTP annex, adjacent to the western bank of the Agua Fria River. The site served as the Base's main landfill for the disposal of refuse from 1953 until 1970.

A small quantity of low-level radioactive electron tubes and dials were buried at the site in 1956. The radioactive material was encased in concrete and disposed in a pit 12 feet deep with 4 feet of concrete cover and 6 feet of earth cover. The radioactive material burial site is currently located within the boundaries of the Defense Reutilization Marketing Office (DRMO) storage yard.

During the OU-1 RI, two soil borings (SB-1 and SB-2) were advanced and sampled near the radiological waste containment structure to assess its integrity. The borings were located approximately 15 feet north and south of the radiological monument marker and advanced to a depth of 17 feet below ground surface (bgs). A third soil boring (SB-11) was also advanced 30 feet north of the radiological waste containment to assess background radiological conditions. Two soil samples were collected from each of the borings at depths between 10-12 feet and 15-17 feet bgs. The samples were submitted to IT laboratory and analyzed for total uranium, radium-226, radium-228, gross alpha, and gross beta.

Radiochemical analyses of soil samples adjacent to the monument were not significantly different from the background boring SB-11, and the results of the radiochemical analyses for all samples are within the background ranges for natural soils. Specifically, samples adjacent to the containment structure contained uranium concentrations of 0.3 to 1.0 micrograms/per gram ( $\mu\text{g/g}$ ). These concentrations are within the background range for natural geologic materials (up to 4.8  $\mu\text{g/g}$ ). Radium-226 (alpha radiation emitters associated with the uranium decay series), and radium-228 (a beta radiation emitter associated with the thorium decay series) are also present at concentrations expected in natural soils.

Natural gamma ray geophysical logging was conducted in borings drilled adjacent to the monument (SB-1, SB-2) and at a nearby groundwater monitoring well (MW-115). The natural gamma logs displayed total gamma counts that ranged up to 235 American Petroleum Institute (PSI) units. Gamma radiation in natural geologic materials range from a few API units to more than 300 API units. Thus, no gamma radiation anomalies were noted.

While natural gamma logs and soil sampling results indicate that radioactive materials have not impacted soils adjacent to the containment structure, the mere presence of the low-level radioactive waste containment structure warrants concern. As a result, remedial alternatives were developed and evaluated for PSC RW-02.

### PSC LF-03 Outboard Runway

PSC LF-03 consists of a former construction debris landfill located on the western side of the Base near the central part of the outboard runway, south of Taxiway F. The site occupies approximately 21 acres. The outboard runway currently covers 60 percent of the site. The remainder of the site consists of a bare low-lying area with sparse vegetation. The Base reportedly used the site for limited disposal of refuse from 1951 to 1953. Land filling operations at this site ceased when the outboard runway was constructed.

During the OU-1 RI, geophysical and soil gas surveys were conducted to define the landfill boundaries and to select locations for test pits. Six test pits were excavated and sampled to characterize its extent and contents. Two additional soil borings were advanced and sampled in August 1996 to collect additional VOC and BNA data for risk assessment purposes.

Numerous metallic wastes were unearthed at the central portion of PSC LF-03 during test pit excavation. Samples of the wastes collected from Test Pit TP-5 at depths of 8 feet bgs and a 7-8 feet bgs contained chromium at concentrations of 349 and 386 mg/kg, respectively. Because the metallic wastes containing elevated concentrations of chromium are buried and extend below the outboard runway, direct exposure is not likely under current land use scenarios.

The risk assessment concluded that the site does not present unacceptable health risks given its current land uses. However, long-term exposure in unacceptable health risks could result if the runways were removed and the site was developed for residential purposes. As a result, remedial alternatives were developed for the site.

### PSC FT-07E East Portion of North Fire Training Area

PSC FT-07E is located in the northern portion of the Base, west of Fire Department Training Facility 1355. Fire training activities in the eastern portion of PSC FT-07E began in 1973 when the Base constructed three fire-training pits (FTPs). The two largest training pits were constructed with sprinkler systems to dispense flammable POL waste onto mock aircraft or similar structures. According to Base records, the

three pits were active from 1973 until 1989. The two largest pits were designated as Fire Training Pit #3 (FTP-3) and Fire Training Pit #4 (FTP-4). The third pit was identified as Fire Training Pit #6 (FTP-6).

Luke AFB conducted a soil vapor extraction (SVE) removal action at fire training pits FTP-3 and FTP-4 from April 1992 through December 1992. Calculations indicate that over 14,000 pounds of contaminants were removed from the soil and destroyed by a thermal oxidizer treatment system. The objectives of the OU-1 RI at PSC FT-07E were to assess effectiveness of the removal action, to further evaluate the vertical extent of any constituents still remaining in the soils, and to assess the potential for groundwater impacts beneath the site. Fourteen soil borings were advanced and sampled at the two fire training pits where vapor extraction was performed (FTP-3 and FTP-4). Three soil borings were also advanced and samples at fire training pit FTP-6. Two groundwater monitoring wells (MW-118 and MW-123) were installed during the OU-1 investigation to assess groundwater quality at the site.

Soil sampling results indicated that residual hydrocarbon contamination was effectively reduced at depths greater than 16 feet bgs. Groundwater sampling results indicate the underlying groundwater resources have not been impacted. Vadose zone transport modeling also indicated that residual petroleum hydrocarbon contaminants in the soil would not leach to the underlying groundwater. However, relatively high concentrations (27,000 mg/kg) of total petroleum hydrocarbons (TPH) remained in the soils near the surface. While the current site conditions do not pose a threat to human health or the environment given the its current land use (military/industrial), unacceptable health risks would occur if the site were developed and used for residential purposes. For this reason, remedial alternatives were developed.

#### PSC SS-11 Former Outside Transformer Storage

PSC SS-11 consists of a 0.79-acre site located in the northeastern portion of Luke AFB, northeast of Facility 328 and west of Building 360. The Luke AFB exterior electric shop used the site prior to 1981 for temporary storage of out-of-service electrical transformers, some of which may have contained polychlorinated biphenyls (PCBs). Approximately 20-percent of the site is covered by bare ground with no vegetation, and the remaining 80-percent is covered with degraded asphalt which has been present for the past 40 years. The transformers were reportedly stored on the bare ground. The shallow soils at this PSC contain PCBs at low concentrations. The Base-wide risk assessment concluded that these levels pose no risk to human health or the environment.

### PSC OT-12 Old EOD Site

PSC OT-12 consists of a 15-acre former landfill area located between the outboard runway and the west perimeter road. The majority of the site lies in a low depression covered with exposed soil and grass. The exact dates of operation of the pit could not be determined, however, it was reportedly in existence in the early 1970s. The site is located just south of the EOD Demolition and Burn Facility #1047, which was constructed in 1963. The pit was probably excavated at that time to dispose of residue from the incineration or detonation of unused or outdated ordinance. Currently, all unexploded ordnance is taken to the Luke Air Force Base Range at Gila Bend for demolition and disposal. Prior to remedial investigations, this area was surveyed by air force explosion ordnance disposal technicians and found the site to be free of Unexploded Ordnance (UXO). The soils at this PSC contain TPH, PAHs, arsenic and beryllium. The Base-wide risk assessment concluded these levels pose no risk to human health or the environment.

### PSC DP-13 Drainage Ditch Disposal Area

PSC DP-13 is located in the northwest corner of the Base (Figure 8). During the 1940s, this site was the location of a drainage ditch that was reportedly used for refuse disposal. The ditch was filled and covered when the Base was deactivated in 1946. Asphalt and concrete rubble stored in the northwest corner of the site was disposed in a burial pit in 1974. No known or suspected industrial-type wastes or hazardous wastes were disposed at this site. Currently, a majority of the site is covered with bare ground. The northern portion of the site is used as a bivouac area for preparedness training.

Objectives of the RI at PSC DP-13 were to define the boundaries of the former landfill and characterize its contents. Geophysical and soil gas surveys were conducted to define the landfill boundaries and to select locations for test pits. Fifteen test pits were excavated to characterize the extent and contents of the landfill. Ten soil borings were advanced to further define the vertical and lateral extent of constituents of potential concern detected in the test pit samples. In August 1996, three additional soil borings were advanced to collect supplemental VOC and BNA data for risk assessment purposes.

Test Pits TP-12 (located near the side of a maintained road within the bivouac area) intercepted an inactive underground utility line. A paint pail and dried paint residue were also observed in Test Pit TP-12. Wastes collected from that test pit at a depth of 5 feet bgs contained chromium at 15,900 mg/kg and lead at 36,000 mg/kg. Because these wastes are buried and the surface area is maintained, direct exposure is not likely under current land use scenarios. However, exposure to these buried wastes could result if excavation were to occur or if the site were developed for residential purposes.

For this reason, remedial alternatives were developed for PSC DP-13 as a protective measure.

#### PSC LF-14 Old Salvage Yard Burial Site

PSC LF-14 consists of a former landfill site located in the northeastern corner of the Base. In the 1940s, this site was part of the main drainage canal for the north end of the Base. The canal was abandoned when the drainage was changed in the 1950s. The abandoned canal may have been used as a landfill and was completely filled and covered by 1962. According to interviews with Base personnel, PCB-containing transformer fluids may have been disposed in the ditch in the northern portion of this site. The site is currently unpaved and covered with bare ground.

The objectives of the RI at PSC LF-14 were to define the boundaries of the former drainage ditch landfill and to characterize its content. Geophysical and soil gas surveys were conducted to define the landfill boundaries and to select locations for test pits. Phase II activities consisted of excavating four test pits and sampling 10 soil borings. Two additional soil borings were advanced in August 1996 to collect supplemental VOC and BNA data for risk assessment purposes.

Relatively high PCB concentrations (2,300 mg/kg) were detected at the site, however, the depth at which this concentration was detected was greater than 16 feet bgs and exposure is unlikely. Based on the results of the Base-wide risk assessment, contaminants identified at PSC LF-14 were not present at areas of potential exposure at concentrations high enough to cause adverse health effects under current land use scenarios. However, the concentrations of PCBs and chromium present in soils 0 to 16 feet bgs could theoretically cause adverse health effects in unlikely event that PSC LF-14 were developed for residential purposes in the future. For this reason, remedial alternatives were developed for the site.

#### PSC SS-17 Former Defense Property Disposal Office (DPDO) Yard

PSC SS-17 consists of the former DPDO yard facility located in the northeastern corner of Luke AFB and occupies approximately 13-acres. Forty percent of the site is paved with old asphalt and concrete pads and 60 percent is soil ground cover. During the 1950s and 1960s, hazardous materials and 55-gallon drums of industrial wastes were stored on the floor of the former DPDO building. The hazardous waste included spent thinners and strippers, paint, solvents, mercury-contaminated rags, and asbestos-containing material. In 1986, all wastes were shipped from the site for proper disposal

in California. Soil samples and samples of the concrete pad were collected in May 1986. None of the samples contained detectable concentrations of potential contaminants. The DPDO yard was listed as “closed” on September 21, 1988, with closure acknowledged by ADEQ on September 30, 1988. Despite its “closed” status, PSC SS-17 was included in the OU-1 RI. The soils at this PSC contain TPH, PCBs, arsenic and beryllium. The Base-wide risk assessment concluded these levels pose no risk to human health or the environment.

#### PSC SD-20 Oil/Water Separator Canal and Earth Fissures

PSC SD-20 consists of a drainage canal located on the southern side of Luke AFB. This unlined canal originates at the Oil/Water Separator 912, approximately 100-feet north of N Street, and extends southward. The 912 oil/water separator system serves two drainage systems, a 30-inch diameter system for the areas to the northwest and a 43-inch diameter system for an area to the northeast. In some instances during past storm events, stagnant oily water in the 30-inch diameter system overflowed into the oil/water separator canal. Recent upgrades to Luke AFB sewer system have eliminated the potential for additional discharges to the canal. Two earth fissures, apparently resulting from differential land subsidence, are present at the end of the drainage canal. The soils at PSC SD-20 contain TRPH, benzo(a)pyrene, arsenic, and beryllium at low concentrations. Groundwater samples collected at the site were found to contain TCE, arsenic and lead. The Base-wide risk assessment concluded these levels pose no risk to human health or the environment.

#### PSC SD-21 WWTP Effluent Canal

PSC SD-21 is located approximately 3-miles east of the Base, south of Glendale Avenue, adjacent to the west bank of the Agua Fria River. Prior to 1997, treated effluent was discharged to this canal from the Base WWTP. The canal and associated wetlands comprise approximately 33-acres. The water in the canal is categorized as effluent dominated surface water according to the ADEQ. In 1997 effluent discharge to the canal was discontinued and discharge was piped to the new Luke AFB golf course for irrigation. The soils at PSC SD-21 contained BNAs, arsenic and beryllium. Sediment samples collected at this PSC contained arsenic and beryllium. Surface water samples collected at this PSC contained arsenic and lead. Samples collected from groundwater monitoring wells at the site contained arsenic and lead. The Base-wide risk assessment concluded these levels pose no risk to human health or the environment.

### PSC LF-25 Northwest Landfill

PSC LF-25 consists of an area formerly used for land filling and is located along the southwest boundary of the Base, between the west perimeter and the northwest runway. This narrow site occupies approximately 43-acres. Portions of PSC LF-25 are located immediately downrange of the Base skeet shooting range. Small, localized sections of the site were used as a landfill for construction debris in the past for an undetermined length of time, but it has not been used since 1989.

The objectives of the RI at PSC LF-25 were to define the boundaries of any former landfills and to characterize their content. During the OU-1 RI investigations, geophysical and soil gas surveys were conducted to define landfill boundaries and to select locations for test pits and soil borings.

Lead and antimony were detected in the surface soils adjacent to the skeet range at concentrations that could cause adverse health effects if prolonged exposure, such as excavation work or residential occupation, were to occur. The lead and antimony are present in the form of metal shot that was fired from the adjacent Base skeet shooting range. Metal shot continues to impact the site because the skeet range is still active. As a protective measure, remedial alternatives were developed for the site.

### PSC SD-26 Hush House Canal

PSC SD-26 consists of a surface drainage canal located southeast of the Hush Houses. This canal merges with the Oil/Water Separator canal (PSC SD-20) at a location southwest of the Base Ammunition Storage Area. The combined flows discharge to an area of subsidence fissures. From the mid-1960s until 1993, the oil/water separators attached to the Hush Houses discharged directly into PSC SD-26. The oil/water separators were connected to the Base WWTP in 1993 and no longer discharge to the canal. Drainage from the runway and taxiway to the west, and most of the facilities for the 944th Tactical Air Group are also channeled into the Hush House canal. This site was not included in any IRP documents or reports. The soils at this PSC contain TRPH, benzo(a)pyrene, arsenic, and beryllium. The Base-wide risk assessment concluded these levels pose no risk to human health or the environment.

### PSC LF-37 Northeast Landfill

PSC LF-37 is located in the northeast corner of Luke AFB and occupies approximately 11.9 acres. The site is currently unpaved except for the perimeter road. Luke AFB canal and a railroad spur are located adjacent to the north side of the site. This site was not investigated in any IRP documents or reports. The soils at PSC LF-37 contain TRPH, benzo(a)pyrene, arsenic, and beryllium. The Base-wide risk assessment concluded these levels pose no risk to human health or the environment.

#### PSC SD-38 Oil/Water Separator at Auto Hobby Shop

PSC SD-38 is located near the middle of the Base at the northwest corner of "D" Street and 3rd Street. The site consists of the former oil/water separator serving Building 248, the old Base Auto Hobby Shop. In March 1991, the SD-38 oil/water separator was inspected as part of the RCRA Facilities Assessment (RFA). It was discovered that this oil/water separator did not have a concrete bottom. This separator has since been removed. The Base for laboratory analysis submitted samples of the sludge from the bottom of the oil/water separator. Other than the sludge sampling, no previous investigations or environmental sampling was performed at this site prior to the OU-1 RI.

PSC SD-38 was originally assigned to the OU-2 investigation. Because OU-2 data indicated a deep soil impact and thus, a potential threat to groundwater, the site was reclassified as an OU-1 PSC. In May 1992, three soil borings were advanced and sampled to assess the nature and extent of any impacts at the site. During the OU-1 investigation, three soil borings were advanced and sampled to further evaluate the vertical and horizontal extent of any impact. A groundwater monitoring well (MW-117) was also installed and sampled at this time to evaluate groundwater quality at the site. In August 1996, one additional boring was advanced and sampled to collect supplemental VOC and BNA data for use in the risk assessment.

Soil samples collected directly beneath the former oil/water separator at a depth of 8 feet bgs contained TRPH at a concentration of 58,000 mg/kg. Based on the results of the Base-wide risk assessment, prolonged exposure to this concentration of TRPH could potentially cause adverse health affects. Because the soils containing elevated concentrations of TRPH are located at depth, direct exposure is not likely under current land use scenarios. However, prolonged exposure to the TRPH in the subsurface soils could result if the site were developed for residential purposes in the future. For this reason, remedial alternatives were developed for PSC SD-38.

#### PSC SD-39 Waste Discharge at the Old Lockheed Site

PSC SD-39 consists of two separate areas located near the northern end of the inboard runway. According to information obtained during the RFA conducted in March 1991, Luke AFB used the facilities in the area for aircraft ground equipment maintenance prior to 1964. Lockheed Aircraft Company occupied the facilities in the area from 1964 to 1982. Presently, the 405th TPW Maintenance Shop occupies the facilities. This site was identified as a PSC because of the lack of information on the composition and quantity of wastes released. The soils at PSC SD-39 contain TRPH and arsenic. The Base-wide risk assessment concluded these levels pose no risk to human health or the environment.

#### PSC OT-41 Skeet Range Canal

PSC OT-41 consists of Luke AFB Skeet Range. The site occupies approximately 3.27 acres located along the western side of Luke AFB near the southern end of the outboard runway in a triangular extension of the western boundary of Luke AFB. The paved west perimeter road comprises 5 percent of the site. The remainder of the site is desert soil and grass, except for an unlined irrigation canal, which passes through the site. The irrigation canal originates off Base and flows south along the west boundary and exits Luke AFB to the south. The site was identified as a PSC because lead shot from skeet shooting could potentially enter the canal and could be transported off of Luke AFB property. The area where lead shot and broken clay pigeons primarily fall is not within the boundary of PSC OT-41. Rather, the impact areas for the skeet range are further to the east of the irrigation canal within the boundaries of PSC LF-25. The boundary of PSC OT-41 was established as such because the irrigation canal was the point of interest for the investigation, not the impact area. Detected lead concentrations were all below the USEPA Region IX residential PRGs, which is 400 mg/Kg.

#### PSC SS-42 Bulk Fuels Storage Area

PSC SS-42 consists of a former leaking UST site located within the eastern portion of the bulk fuels storage area of Luke AFB. The leaking UST was part of an oil/water separator system that received condensate from the two large aboveground fuel tanks.

In March 1993, the leak detection system for the oil/water separator UST sounded, indicating a release had occurred. According to Base personnel, unusually heavy rains caused the soil around the UST to settle. The settling apparently caused the fill line to dislodge from the tank. In response, the oil/water separator and fiberglass UST were removed from service and excavated.

Environmental investigations by Environmental Engineering Consultants, Inc. (EEC) in response to the release from the oil/water separator UST began in March 1993. EEC advanced seven soil borings (UST-1 through UST-7) adjacent to the oil/water separator and leaking UST. Several of the borings advanced to define the horizontal extent of the impact contained detections of TRPH and benzene, toluene, ethylbenzene, and total xylenes in samples collected at depths between 70 feet and 160 feet bgs. Because of these unexpected detections, the horizontal extent of the impact was not defined by the seven borings advanced by EEC.

After review of the EEC data, the FFA parties added this site as a PSC in the CERCLA investigation. Because of the depth of the impact and magnitude of the release, the FFA parties agreed that additional investigations were warranted because of the potential for groundwater impact. Therefore, PSC SS-42 was assigned to OU-1 in August 1993.

The objectives of the RI at PSC SS-42 were to define the horizontal extent of the impact detected at the former oil/water separator UST, identify other potential sources of contamination at the site, and to assess the groundwater quality. Initial activities included conducting a geophysical survey to identify underground lines and utilities. A soil-gas scan was also conducted to assess the integrity of the underground distribution system and identify other potential sources of contamination. Sixteen soil borings were advanced and sampled to determine the horizontal and vertical extent of the impacts identified at the site. Four groundwater monitoring wells (MW-119 through MW-121, and MW-125) were also installed and sampled to evaluate the groundwater quality.

TPH and BTEX concentrations were detected at depths ranging from 10 to 160 feet bgs. The highest detected concentration of TPH was 33,900 mg/kg at a depth of 70 feet bgs. BTEX compounds were also detected at their highest concentrations at this depth. Based on the results of the Base-wide Risk Assessment, contaminants identified at PSC SS-42 were not present at areas of potential exposure at concentrations high enough to cause adverse health effects under current land use scenarios, or even under residential land use scenarios. However, results of the vadose zone transport modeling indicated that petroleum related contaminants (TPH and BTEX) detected in the soil could migrate to the underlying groundwater resources. For this reason, remedial alternatives were developed for the site.

The remedial alternative selected for PSC SS-42 in the OU-1 ROD was S-11 (In-situ Soil Vapor Extraction with Long-term Groundwater Monitoring). The remedial components included:

- Installing, operating, and maintaining a Soil Vapor Extraction (SVE) System.
- Monitoring soil and groundwater to confirm effectiveness and potential migration of the contaminants.

Because the Base-wide risk assessment concluded that the site did not pose a threat to human health, the only remedial objective was to reduce TPH and BTEX concentrations in the soil to levels that would no longer pose a threat to the underlying groundwater resources. More specifically, ARARs for the site (Arizona Soil Remediation Standards) required that soil remediation continue until contaminants remaining in the soil did not cause or threaten to cause a violation of Aquifer Water Quality Standards at a point of compliance. The Arizona Department of Environmental Quality Groundwater Protection Limit (GPL) screening model was to be used for determining whether residual contaminant concentrations in the soil were protective of groundwater.

Prior to the signing of the OU-1 ROD, the Base initiated a SVE removal action at PSC SS-42. The SVE removal action was performed using a highly modified internal combustion engine (ICE) to create necessary vacuum to draw the contaminated soil vapors from the subsurface. The ICE used the petroleum laden vapors as a fuel source, effectively treating the soil vapors prior to discharge. An on-board computer adjusted carburation to ensure emissions met air quality standards. Supplemental propane was used to fuel the engine as petroleum concentrations in the soil gas decreased. The SVE removal action continued through November 1998. Results of the removal action were documented in a series of letter reports produced by Parsons Engineering Science, Inc.

Data collected during the removal action between August 6, 1996, and November 2, 1998, indicated that over 399,514 pounds of total volatile hydrocarbons (TVH) (approximately 66,586 gallons) were removed from the subsurface soils. BTEX concentrations in the soil gas decreased from 4,590 parts per million by volume (ppmv) to 608 ppmv. This calculates to a reduction of soil gas BTEX concentrations by 87 percent.

In January 1999, following completion of the removal action, a confirmation boring was installed and sampled to evaluate the residual TPH and BTEX concentrations in soil. While TPH and BTEX were still detectable at reduced concentrations at depths between 50 and 180 feet bgs, residual TPH and BTEX were not detected in the upper 40 feet of soil.

Vadose zone transport modeling was conducted following completion of the SVE removal action to determine whether the remaining hydrocarbon contamination could migrate beneath the site and impact the groundwater resources. The ADEQ Groundwater Protection Limit (GPL) model was used for this evaluation. The model results indicated that the residual TPH and BTEX concentrations would not impact groundwater at concentrations above Arizona Aquifer Water Quality Standards, and furthermore, additional remediation was not needed to satisfy all applicable, relevant and appropriate requirements (ARARs). For this reason, the first part of the remedial alternative selected for the site (In-situ Soil Vapor Extraction) was not implemented.

The remedial alternative selected for PSC SS-42 also involved a groundwater monitoring program. At a minimum, groundwater monitoring was to be conducted at the site annually for 5 years.