



KELLY AFB
TEXAS

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 3299

KELLY RESTORATION ADVISORY BOARD
TECHNICAL REVIEW SUBCOMMITTEE
MEETING AGENDA
Tuesday, 14 December 1999, 6:30 P.M.
St. Mary's University, Garni Science Hall

<u>Topic</u>	<u>Time</u>	<u>Presenter</u>
I. Introduction Agenda Review and Handouts	6:30 - 6:35	Dr Lené
II. Draft TAPP Review of ATSDR Study	6:35 -7:15	Dr.Squibb, University of Maryland
III. TAPP Pre-Performance Meeting	7:15 -7:45	Mr. Lynch
IV. Site S-1 Update	7:45 -8:15	Russell Rohne IT Corporation
V. Administrative	8:15 - 8:35	Dr Lené
a) BCT Update		
b) Spill Summary Report		
c) Documents to TRS/RAB		
d) Action Item Review		
e) Agenda/Location/Time of Next TRS Meeting		
VI. Adjournment	8:35	All

MEETING MINUTES
KELLY AFB TECHNICAL REVIEW SUBCOMMITTEE (TRS)
TO THE RESTORATION ADVISORY BOARD (RAB)
14 Dec 99, St. Mary's University, Garni Science Hall

I. Introduction: The TRS meeting began at 6:45 p.m. Attachment 1 is the attendance report. Documents delivered to the TRS are specified in attachment 2.

II. Draft TAPP Review of ATSDR Study: Dr. Katherine Squibb from the University of Maryland presented her technical review of the "Public Health Assessment, Phase I for Kelly Air Force Base, San Antonio, Bexar County, Texas" conducted by the Agency for Toxic Substances and Disease Registry (ATSDR). Dr. Squibb discussed the 12 exposure pathways identified by ATSDR and provided comments regarding ATSDR's conclusions. Dr. Squibb's report is included as attachment 4.

III TAPP Pre-performance Meeting: Dan Zatopek from AFBCA/DX discussed the requirements for the next TAPP contract. The next TAPP review is for the Zone 3 CMS Addendum, contract number F41622-98-A-5882, call number 99001.

IV Site S-1 Update: Russell Rohne from Kelly AFB Environmental Management provided an update on the status of the interim remedial action activities at Site S-1. Excavation of contaminated soil has been completed and a soil vapor and groundwater extraction system is currently being installed. A copy of Mr. Rohne's presentation is included in attachment 5.

V. Administrative

- a) BCT Update: A copy of all handouts distributed during the 14 December 1999 BCT meeting were provided to the TRS Chair. A copy of the BCT minutes are included in attachment 6.
- b) Documents to TRS/RAB: A list of documents delivered is included in attachment 2.
- c) Spill Summary Report: There were no reportable spills during the month of November 1999. A copy of the spill summary report is included in attachment 3.
- d) Next TRS meeting: The next TRS meeting will be held 11 January 2000 at 6:30 pm at St. Mary's Garni Science Hall.
- e) Action Items: No new action items were discussed.
- f) Other Administrative Items: Dr. Squibb's final TAPP report for the ATSDR study will be included in the RAB packets, if it is received by 10 January 2000. If the final report is received after 10 January 2000, the report will be mailed to RAB members separately.
Next agenda: Kelly AFB Environmental Management personnel will present the BRA Groundwater Recovery System Performance Report.

VI. Adjournment: The TRS adjourned at 8:55 p.m.

Attachments:

- 1. Attendance
- 2. Documents list
- 3. Spill Summary Report
- 4. Draft TAPP Review of the Public Health Assessment, Phase I for Kelly AFB
- 5. Site S-1 Update Handout
- 6. BCT Minutes, 14 Dec 99

7 DEC 1999



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS SAN ANTONIO AIR LOGISTICS CENTER (AFMC)
KELLY AIR FORCE BASE, TEXAS

MEMORANDUM FOR REMEDIAL ACTION BOARD/TECHNICAL REVIEW
SUBCOMMITTEE (RAB/TRS)

FROM: SA-ALC/EMQC
307 Tinker Drive, Bldg. 306
Kelly AFB, TX 78241-5917

SUBJECT: Monthly Spill Report for November 1999

There have been no reportable quantity or otherwise notable spills for the month of November 1999. Should you have any further questions or require additional information, please contact Mr. Jerry Pantoja at 925-3100 ext. 310 or email jerrypantoja@kelly.af.mil.

Sincerely

A handwritten signature in black ink, appearing to read "C Williams", is positioned above the typed name.

CHARLES WILLIAMS
Chief, Environmental Compliance Division

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Technical Review

of the

***Public Health Assessment, Phase I
for
Kelly Air Force Base, San Antonio, Bexar County, Texas
CERCLIS NO. TX2571724333***

conducted by

**Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry (ATSDR)**

**Released for Public Comment
September, 1999**

Prepared by

**Katherine S. Squibb, PhD
Program in Toxicology
University of Maryland, Baltimore
100 N. Greene Street
Baltimore, MD 21201**

**in accordance with
Technical Assistance for Public Participation (TAPP)
Contract F41622-98-A-5880**

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Table of Contents

	Page #
Background	1
Evaluation of Exposure Pathways: Summary and Comments	2
Category I: No Health Hazard	
Radioactive Waste in Landfills in Zone 1	3
Category II: No Apparent Health Hazard	
Thallium in Drinking Water	3
Garden Produce	4
Fuel Jettisoning	4
Aircraft Noise	5
Soil Gas	5
Drinking Water from Surficial Aquifer	6
Leon Creek	8
Current Air Emissions	9
Category III: Indeterminant Health Hazard	
Past Air Emissions	10
Non-Occupational On-Base Employees	10
Soil Migration	10
Health Outcome Data	11
Summary	12

DRAFT**Background**

In 1996, ATSDR was asked to determine whether chemicals from Kelly Air Force Base were causing adverse health effects in citizens living in communities adjacent to the base. The first of a series of reports by ATSDR addressing this question, entitled *Public Health Assessment, Phase I, Kelly Air Force Base, San Antonio, Bexar County, Texas (Cerclis No. TX2571724333)*, is the subject of this review. Additional reports (Phase II and Phase III) will be released by ATSDR in the near future. This technical review of the Phase I report includes: 1) a summary of the findings of the study, 2) a critical assessment of the conclusions presented in the report and 3) recommendations for additional studies needed to more completely characterize health problems in communities bordering Kelly AFB. This review was conducted by reviewing the methods and the data sets used by ATSDR to complete their assessment. The appropriateness and limitations of the methodology, the completeness of the data sets, and the strength of the conclusions are discussed. Recommendations for future actions reflect questions that arise from the conclusions of the study which suggest a need for additional studies to better understand current health problems in the area.

ATSDR takes two approaches to determine whether hazardous chemicals released from a facility or hazardous waste site are causing health problems. The first approach is the "completed exposure pathway" approach in which chemical data on environmental samples (such as groundwater, surface water, soil, food, and air) are used to determine whether people are being exposed to chemicals at concentrations high enough to cause diseases. Each possible pathway by which people could be exposed (drinking contaminated water, breathing contaminated air, having skin contact with contaminated water or soil, or eating contaminated soil or food) is examined. If people are being exposed to chemicals by some exposure route, then ATSDR makes calculations to determine whether the exposure dose is high enough to cause a health problem. These calculations are based on "comparison values," which are chemical specific concentration values developed from scientific studies designed to determine which doses of chemicals cause either cancer or organ dysfunctions, such as renal disease, neurological problems, or cardio/respiratory ailments. From this type of assessment, ATSDR can conclude) if people are or have been exposed to a chemical and 2) if they have been exposed, whether the exposure dose has been high enough cause health problems in some individuals. The categories ATSDR uses to describe their findings are defined in the glossary of the report: a "No public health hazard" designation means that ATSDR did not find from the data that they examined that people were ever exposed to a chemical or chemicals even though these chemicals might have been present at the site. Thus, there would be no health effect in a population from the chemicals because no exposure occurred. A second designation used by ATSDR is "No apparent public health hazard" which means that people have been exposed to the chemical(s), but at concentrations low enough that scientific evidence suggests there would not be any health effects resulting from this exposure.

The accuracy of all of these designations is obviously dependent upon the quality and completeness of the data used to make these assessments. Since ATSDR does not collect new

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data when they conduct their assessments, they are dependent upon the data that are available to them. Sometimes (many times) all of the data needed to make a good assessment are not available because the studies have not been conducted. Under these circumstances, ATSDR uses the designation "Indeterminant health hazard." This means that more data need to be collected before an accurate assessment can be made. It is important to understand these designations when reading this ATSDR report, because they provide a measure of the level of assurance underlying ATSDR's conclusions and clearly indicate the areas that need further study.

The second approach used by ATSDR to assess possible health effects from a hazardous chemical site is to look at local disease prevalence to determine whether the location and incidence of specific diseases is consistent with the hypothesis that chemicals from a site are causing the diseases. If a disease cluster suggests that it might be due to a chemical exposure, then further work can be done to document whether such an exposure is occurring or has occurred in the past. Because of the latency period associated with the onset of many cancers, the identification of past exposures is important. The quality of this type of assessment by ATSDR is very dependent upon the disease incidence data available to them. Federal, state and county cancer and birth defect registries can provide some good information for these assessments, however health data for a neighborhood, or potential exposure group within a neighborhood, are often lacking and need to be collected. Again, ATSDR does not collect new data as a part of its health assessment studies. They identify when evidence suggests that it is important that additional health data for an area should be collected.

With this understanding in mind, the conclusions of ATSDR in this Phase I report can be better understood with respect to their meaning and usefulness. Since chemical contamination problems arising from historical uses and disposal practices at sites such as Kelly AFB are often very complex due to the large number and types of chemicals involved and the wide spread contamination of groundwater, surface water, soil and air, it is important to prioritize environmental and human health concerns as they are identified. ATSDR's conclusions provide a ranking of the concerns addressed in this report and identify those that the agency feels require further attention.

Evaluation of Exposure Pathways: Summary and Comments

In Phase I of this health assessment, ATSDR reports the results of their examination of twelve pathways by which citizens living north or southeast of the Kelly AFB may be or may have been in the past exposed to chemicals emanating from the base. Of these twelve pathways, one was determined to represent "no hazard" because of the absence of an exposure pathway and eight were categorized as "no apparent health hazard" based on evidence that people were being exposed to chemicals, however the exposure doses were lower than those likely to cause health effects. The final three pathways were designated "indeterminant" health hazards due to the lack of sufficient data available for accurate analysis. These twelve pathways of exposure are reviewed in detail below.

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Category I: No Health Hazard

(1) **Exposure to radioactive waste in landfills in Zone 1.** ATSDR concluded that there is no evidence of a potential for health effects from the radioactive waste buried in Zone 1 based on monitoring data from Kelly AFB studies. Radiation levels in the area of the dump have been measured and are no higher than background levels. There is no evidence from soil and groundwater monitoring reports that radioactivity is leaching from the dumps. Institutional controls are also in effect to prevent future exposures due to possible construction activities in the area.

Comments

- Groundwater flow patterns for Kelly AFB (1) indicate that groundwater in Zone 1 discharges to Leon Creek, however a review of the monitoring reports for Leon Creek (2,3) revealed that fish tissue and sediments from the creek are not analyzed for radioactive compounds. Because sediments and fish accumulate lipid soluble compounds to higher concentrations than they occur in water, samples collected as part of the ongoing monitoring program for Leon Creek should be analyzed for gross alpha and beta activity to provide an early detection of radioactive compounds leaching from the landfills in Zone 1. In addition to serving as a biomonitoring tool for the release of radioactivity from the landfills, these measurements will also assure the safety of ingesting fish from the creek.

Category II: No Apparent Health Hazard

Chemical exposures through eight other pathways were categorized as posing "no apparent health hazard" on the basis that although they were pathways through which people were exposed to chemicals, the exposure concentrations were lower than those expected to cause health effects. These pathways include:

(2) **Exposure to the element, thallium, which was present in drinking water from the Roselawn Well for possibly as long as 3.25 years.** Since the exposure dose calculated from the highest detected concentration was approximately 8 times lower than the lifetime daily reference dose for thallium in children, ATSDR concluded that it is unlikely that this exposure caused health effects. In addition, this exposure is no longer occurring because the well was closed in December, 1993.

Comments

- ATSDR's assessment that past exposures to thallium did not cause health effects is well supported. Also, since exposures are no longer occurring, this exposure pathway can be considered a low priority concern.

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(3) Exposure to volatile organic compounds (VOCs) and fuel in fruits and vegetables irrigated with contaminated groundwater water and growing in areas with contaminated groundwater. ATSDR concluded that VOCs are not accumulated by edible portions of fruit and vegetable plants to concentrations of concern.

Comments

- The primary support ATSDR gives as a basis for this conclusion is a single study by Kirk (4) which found that TCE was not measured at concentrations above 5 ppb in fruits or vegetables (carrots, tomatoes, peaches, apples, cantaloupe, nectarines, and plums) irrigated for one growing season with water contaminated with 300 ppb TCE. This study did not examine other VOCs present in the surficial aquifer underlying Kelly AFB and surrounding neighborhoods, such as PCE, DCE and vinyl chloride. Also, the study by Kirk (4) doesn't measure TCE in green leafy vegetables such as lettuce which may contain greater concentrations of VOCs than the fruit portions of a plant. The fact that some plants will take up VOCs from groundwater is known and forms the basis for phytoremediation as a means of treating VOC groundwater plumes.
- Although fuel is listed as a contaminant of concern for this pathway of exposure, ATSDR provides no information on the possibility that garden plants may be contaminated by compounds derived from fuel, such as benzene, xylene, and toluene. Although these may also not accumulate to concentrations of concern, it would be prudent to sample garden produce, especially leafy vegetables, grown in areas where the surficial aquifer is near the surface and where well water from the surficial aquifer is used for irrigation purposes.

(4) Inhalation and dermal exposure to jet fuel due to the jettisoning of fuel from aircraft flying overhead. ATSDR's conclusion that health effects are unlikely due to this type of exposure is based on information provided by the Air Force on their policy governing fuel jettisoning over populated areas. There was no knowledge of emergency jettisoning of fuel near Kelly AFB except for one newspaper article reporting an incident that occurred at a distance away from the base. In addition, studies by the Air Force indicate that JP-4 fuel evaporates before it reaches the ground and fuel jettisoned as low as 750 meters was not detected by ground observers.

Comments

- It is difficult to establish for sure whether or not fuel was jettisoned by aircraft landing at Kelly AFB in the late 60s and early 70s. Records were not kept until it was required by the Air Force in 1973 and one might suspect that the reason for their study to determine the nature, extent and environmental impact of fuel jettisoning was due to the fact that this practice was not well controlled. The important issue is that this practice is not allowed at the present time, so it is not an ongoing exposure pathway. Possible past

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exposures by this route should be kept in mind when health outcome data for the community are examined for possible causes.

(5) Exposure to noise from aircraft activity at levels sufficiently high to cause hearing damage in residents close to the Kelly boundary near the Quintana Road neighborhood. ATSDR's analysis of this problem was based on noise levels calculated by an Air Force Noise Exposure Model. Results indicated that noise levels near the base are not sufficiently high for long enough periods of time to cause hearing loss, however they do reach levels at times that can be annoying and could interfere with conversations and sleep. ATSDR also examined noise levels at schools near Kelly AFB (calculated from the Air Force Exposure Model) and concluded that levels were not high enough to cause disturbances in learning.

Comments

- Although ATSDR listed no recommendations regarding this concern in the Recommendations Section for this exposure pathway, they do acknowledge within the discussion of this concern that there are conditions under which site-specific maintenance operations could cause noise levels to exceed recommended levels at off-base locations. They recommend that the Air Force consider institutional controls to insure that the worse-case conditions that would give rise to these exceedances do not occur. There should be assurance that this recommendation has been followed. All efforts on the part of Kelly AFB to reduce noise levels would be beneficial to neighboring communities. ATSDR looked at noise levels at schools, but they did not consider day care centers and preschool aged children. Signal to background noise ratios determine the audibility of sounds, which is critical in the speech and language development of young children. Also, effects of loud noise on hearing are cumulative. Thus chronic exposure to high noise levels in children should be limited.
- Noise levels experienced by people on base should also be examined to determine whether auditory effects are occurring.

(6) Inhalation exposure to soil gas from groundwater contaminated with VOCs and fuel. The conclusions presented by ATSDR for this exposure pathway were based on the results of a 1990 health and risk assessment study conducted by NUS Corporation (5) which found that although exposure to VOCs and JP-4 fuel components (such as benzene, toluene, and xylene) was occurring in homes in the Quintana Road neighborhood, the exposure levels were below those considered to be a health concern by EPA. This study directly measured indoor air concentrations of VOCs, benzene, toluene and xylene, in addition to other compounds. The possibility that exposure levels might be higher in the North Kelly Gardens neighborhood was dismissed, based on the fact that groundwater concentrations of VOCs and fuel-related compounds are lower in this area, that there is no evidence that jet fuel is present in a non-dissolved form in the groundwater in this area as it is in the Quintana Road area, and that soil conditions are similar to the Quintana Road area. In addition, a soil gas vapor survey conducted

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by Kelly AFB (6) indicated that areas with elevated concentrations of VOCs and fuel components in soil gas samples did not correspond to locations with elevated groundwater concentrations of these chemicals. ATSDR thus concluded that volatile chemicals from groundwater migrating into homes in North Kelly Gardens or Quintana Road neighborhoods do not pose a health concern. The third neighborhood considered by ATSDR in this analysis was East Kelly. Since characterization studies of the contamination present in East Kelly were not complete at the time of this assessment, ATSDR will complete the evaluation of this area as part of its Phase III health assessment report.

Comments

- There are a number of key issues identified in this assessment of the health effects of exposure to soil gas through indoor air exposures that should be followed up on. Since the soil vapor study by Kelly AFB indicates that soil vapor concentrations appear to be related to soil contamination rather than groundwater contamination by the VOCs and fuel components of concern (6), then in future examinations of this pathway, groundwater profiles should not be relied on as the only basis for identifying areas of concern. Soil vapor measurements appear to be a much more direct measure of the potential that chemicals may be present in indoor air, whether it be homes or office buildings. This should also be an exposure pathway of concern in buildings on base. Also, the presence of a "slick" of JP-4 fuel off base in the Quintana Road neighborhood raises the concern that this type of contamination could be present in other neighborhoods surrounding the base. A complete soil vapor study of the neighborhoods surrounding the base would be a good means by which to screen the area for off-site contamination. Indoor air sampling could then be targeted to buildings in areas of concern. This is an important exposure route to consider further because of the potential for long term, chronic exposure to both carcinogenic and non-carcinogenic chemicals. Benzene, in particular, is a well established carcinogen in humans and the primary cancer associated with benzene exposure is acute myeloid leukemia (7). Since the incidence of leukemia is increased in areas near the base (see health outcome data section below), possible exposure pathways for benzene should be seriously investigated.

(7) Exposure to VOCs, fuel and metals through drinking water from wells in surficial aquifer. ATSDR concluded that there has been no known exposure of residents living in the Quintana Road and North Kelly Gardens communities to groundwater contaminants due to the fact that the public drinking water in these neighborhoods comes from a non-contaminated aquifer. They recommend that steps should be taken to prevent the movement of contaminants from the shallow aquifer into the deeper Edwards aquifer. Due to a lack of sufficient data at this time, a review of the East Kelly area was not completed. ATSDR's Phase III report will characterize this exposure pathway in East Kelly residents.

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- Surficial groundwater contamination is one of the most important potential sources of chemical exposure to both on and off base workers and residents in the Kelly AFB area due to the high level of contamination of this environmental media by VOCs, metals and fuel components and the widespread distribution of the groundwater plumes. Fortunately, the Edwards aquifer appears to be well protected from contamination from the surficial aquifer. The recommendation by ATSDR that all Edwards aquifer wells be plugged or sealed to prevent infiltration of contaminants is well founded and should be followed up on immediately.
- It is questionable as to whether ATSDR's conclusion that no public exposure to contaminants occurred through the domestic use of groundwater in the past is correct. This conclusion was based on the determination that groundwater contamination did not migrate off base before all residents were provided with public water from the Edwards aquifer. Review of supporting documents (8,9) suggests that this assessment was based on very minimal information. The 1988 USGS study (8) referenced by ATSDR was not a comprehensive study; it sampled only 35 shallow groundwater wells on and in the vicinity of Kelly AFB. The off base wells were scattered in areas north, east and south of the base. VOCs were detected in two off base wells, one north of East Kelly Field; the other southeast of the base near SW Military Drive. These wells did not contain detectable concentrations of fuel compounds (benzene, toluene and xylene), however high concentrations of benzene (460 ppb) were detected in a well right at the boundary of the base near Quintana Road. There were no off base wells sampled in this immediate area to provide information on whether the benzene contamination had moved off base at this time. These reports (8,9) referenced by ATSDR do not make conclusions as to when groundwater contaminants migrated off base.
- Another issue associated with groundwater contamination that should be noted is the need to be sure that any on-going or future use of water from this surficial aquifer does not result in human exposures. Although the surficial aquifer in the immediate area around Kelly AFB is not used as a public drinking water source, and residents have been warned that private wells in the areas drawing from the shallow aquifer should not be used, the Shallow Aquifer Assessment, Phase II Technical Report (9), indicates that three public water systems in South Bexar County do produce drinking water from shallow alluvial sediments. Water supplied by these wells must be carefully monitored for the contaminants known to be present in the Kelly AFB groundwater plume. Because changes in pumping rates can alter groundwater flow both in magnitude and direction, any proposed changes in water use patterns from the shallow aquifer should consider the impacts they will have on the movement of the contaminants.

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(8) Exposure to metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and pesticides through contact with water and sediments or consumption of fish from Leon Creek. Based on risk assessments using EPA Region III Risk-Based Comparison values, ATSDR concluded that recreational swimming, wading and eating fish from off-base segments of Leon Creek would not be expected to cause health effects. Polycyclic aromatic hydrocarbons (PAHs) and VOCs were present in water samples taken from the lower two segments of the creek (Segment 3 from Military Drive south to the southern boundary of the base and Segment 4 which extends from the boundary southward), however the combined cancer risk for the five chemicals identified was below 10^{-6} (one in a million).

Analysis of sediment samples from the four segments of Leon Creek identified the presence of PAH compounds, the pesticide, DDT, and PCBs at concentrations above comparison values in different areas of the creek. Estimated risks based on the measured concentrations were all lower than 10^{-5} , however, which is consistent with ATSDR's conclusion that health effects are unlikely from incidental ingestion of sediments from the creek.

ATSDR also concluded that the presence of PAHs, PCBs, and the pesticide DDT and its breakdown products, DDE and DDD, in fish tissues from Leon Creek do not pose a health threat to recreational fishermen since concentrations were below levels of concern.

Comments

- The presence of VOCs in surface water samples from Leon Creek at concentrations greater than comparison values suggests that contaminated groundwater does, indeed, discharge to Leon Creek. According to the 1996 *Kelly Air Force Base and Leon Creek Environmental Perspectives* report (3), detected concentrations of VOCs in the creek were 10-50 fold higher in 1989-1991. The report suggests that the decrease was due to the groundwater treatment system that began operating in 1993. Continued monitoring of water in the creek is needed to confirm this downward trend. Cadmium and lead concentrations, however, did not decrease between 1989 and 1994, indicating that there is not a unilateral decrease in contaminant loading to the creek.
- Although fish tissue concentrations of PAHs and PCBs were relatively low and most likely do not pose a health concern to people eating fish from Leon Creek on an occasional basis, risk calculations by ATSDR did indicate a cumulative risk of over 10^{-4} when the risks of the individual contaminants were summed. According to ATSDR guidelines, this would indicate a "low increased risk" if fish from Leon Creek were eaten on a consistent basis. Thus, subsistence fishing in Leon Creek would not be advisable.
- Another contaminant that should be monitored for in fish, but does not appear to be so, is radioactivity. Since landfills up gradient of Leon Creek are known to contain radioactive waste, it would be prudent to monitor sediments and fish samples for at least gross alpha and gross beta activity.

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(9) Inhalation exposure to VOCs, fuel components and metals due to current air emissions. ATSDR concluded that exposure to chemicals by this pathway is not likely to be causing health effects in off-base residents because modeling studies indicate that exposure concentrations would be too low to cause health effects. On-base populations, however, do face a cumulative cancer risk of up to 3×10^{-4} .

Comments

- The main difficulty in assessing the accuracy of this assessment is the lack of detail given regarding the air emissions data used in the modeling of present exposure concentrations. It is clear that permitted emissions are included, as well as emissions from aircraft activity (takeoffs and landings), however it is not clear whether other emissions from sources not requiring permits were included. Some of these may be localized to areas near the boundaries of the base. For instance, truck exhaust emissions could contribute significantly to exposures for residents in North Kelly Gardens near the fuel tank farm. It doesn't appear that local contributions were factored into the results presented in Figure 2 of the Phase I report. The fuel tank farm was discussed specifically as a possible source of VOCs and truck exhaust, but this source apparently wasn't incorporated into the model to look at localized areas around the base. Are there other, similarly non-regulated sources of air emissions that were not included in the calculation of health hazards from present air exposures? Because of these uncertainties, ATSDR's conclusion that current air emissions from Kelly AFB are not causing health effects is not well founded. Additional studies should be under taken to test the current model to determine how well it is predicting air concentrations of key chemicals, and to consider the impact of local, non-permitted sources on specific neighborhoods surrounding the base.
- Even based on the modeling results presented in this report, the conclusion that current air emissions do not represent a health hazard is unwarranted, for a number of reasons. First of all, in Appendix D, the results of air modeling indicate that the estimated increase in cancer risk from hexavalent chromium is 4/100,000 which is above the "No Apparent Increased Risk" category. To completely dismiss this finding because ATSDR does not know whether their assumption that "hexavalent chromium represents 85% of the total chromium emissions reported" is not appropriate. They should at least conclude that this should be further examined to determine the percentage of hexavalent chromium versus trivalent chromium in the air.
- Another factor which might increase the risk calculated by ATSDR in its modeling studies is the completeness of this assessment. ATSDR performed an initial screening to determine which chemicals exceeded ATSDR's comparison values. These were the only chemicals included in the final risk assessment. To what extent does ATSDR have comparison values for all of the different combustion products present in jet engine

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emissions? Since there may be chemicals with undetermined health effects in this major emission source at Kelly AFB, risks associated with this exposure pathway should be examined in greater depth or at least the uncertainty should be acknowledged.

Category III: Indeterminant Health Hazard

(10) Inhalation exposure to past air emissions from industrial processes and aircraft activity. This exposure pathway was designated "indeterminant" because ATSDR concluded that there were insufficient data available on past emissions at the time that this report was finalized. However, ATSDR has continued to work with Kelly AFB on this issue, in order to obtain better data, and will report the results of further work on this possible pathway of exposure in the Phase II report.

(11) Exposure of non-occupational on-base employees to contaminants released by industrial processes and aircraft activity. ATSDR concluded that environmental exposure of on-base employees to airborne chemicals is possible based on modeling studies but this exposure pathway is an "indeterminant health hazard" because a refined air dispersion model is needed to provide better evaluation of exposure concentrations near the source. This conclusion seems warranted given the results presented in Figure 2 in the summary section of the Phase I report, however there is minimal detail given regarding the basis for this figure. Information presented in the main report and Appendix D is apparently just for off-base communities, as only a single cancer risk value is given for each chemical. There is no mention of the distance from the sources. It would be helpful to know if the same chemicals were responsible for both the on-base and off-base risks. The value of an investigation of health effects in on-base/exposed populations for predicting health problems off base would be increased if the exposure chemical profiles were similar. Air monitoring on base to directly measure ambient concentrations of suspect chemicals should also be conducted for two reasons: to 1) validate the models upon which these health assessments are based, and 2) to obtain a direct measure of exposure concentrations to strengthen risk calculations.

(12) Lead exposure from soil transport from S-1 area (Building 1592) to North Kelly Gardens. ATSDR concludes that exposure to lead from contaminated soil from Kelly AFB is not likely to be the cause of low test scores in neighborhood schools based soil samples collected by residents, however this exposure pathway is designated "Indeterminant." Lead may be present in the neighborhood due to the use of lead-based paint in the area. ATSDR recommended health education and promotion activities to inform residents about lead hazards.

Comments

- Additional sampling studies could be conducted to determine whether soil from the S1 area has migrated into the North Kelly Gardens area. Measuring lead concentrations is a difficult parameter to use to examine migration since there are many sources of lead in the community. PCBs, however, are also present in S1 samples. These compounds could

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be used as a tracer for soil movement.

- Since the concern of the community was the low test scores of at neighborhood schools, exposures to other chemicals known to cause neurological problems such as VOCs should be examined in this area. As mentioned above, soil gas measurements might be a good way to screen the area for VOCs and BTEX compounds.

Health Outcome Data

The second approach ATSDR takes in its health assessment studies is the evaluation of disease incidence data and birth defect information to determine whether abnormal distributions of health problems are present in exposed communities. The extent to which this approach is useful is dependent upon the quality and quantity of data available for the region. The completeness of health outcome databases and the degree of detail incorporated into these databases can vary enormously from region to region. Additional health data may have to be collected for a good assessment.

The health outcome evaluation presented in this Phase I report is not complete. ATSDR has conducted additional assessments and results of this more in-depth assessment will be presented in the Phase II report, which is due to be released in the near future.

The initial assessments of available health data for the regions surrounding Kelly Air Force Base that are presented in this Phase I report are based on a review of cancer data provided by the Cancer Registry Division of the Texas Department of Health. This data base contains cancer incidence and mortality data for the state of Texas. The incidence of cancers of the liver, lung, cervix, bladder, kidney and leukemia in zipcode areas around Kelly AFB were compared to Texas statewide incidence data. Data analysis indicated that liver cancers were significantly elevated from 1.8 to 7.5 fold in 8 out of 13 zipcode areas surrounding Kelly AFB; kidney cancers were elevated in four zipcode areas, lung cancer was elevated in two zipcode areas; and leukemia was elevated in three of the 13 zipcode areas.

Birth defects data were provided by the Texas Department of Health Birth Defects Monitoring Division and the Bureau of Vital Statistics. The number of "excess" birth defects was defined as the number of cases reported in each category of birth defect for the zipcode area of concern compared to the number of cases reported for the entire state. Only three zipcodes (78211, 78228 and 78237) were examined. No increase in the number of birth defects in any specific category was found in these three areas when data from 1990-1995 birth certificate and fetal death certificate data were examined. However, analysis of data from infant death certificates for zip code 78237 indicated an excess number of cases reported for three categories of heart and circulatory system-related defects for 1990-1995. This observation did not change significantly when the data were adjusted for race and ethnicity. Adjusting for mother's age increased the observed/expected ratio for each of the three defects.

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The prevalence of low birth weight babies was also examined in the three zipcodes: 78211, 78228 and 78237. An excess number of low birth weight babies was found in zip code area 78237.

Comments

- Although not complete, the evaluations of cancer incidence and birth defects data presented in this Phase I report indicate that further investigations are absolutely necessary. If the data are available, the cancer incidence should be analyzed in more detail to determine whether specific types of liver cancers and leukemias differ in their incidence ratios. Also, studies should be developed to identify specific populations at risk within these geographic areas.

As discussed by ATSDR in this report, there are many factors that can increase a person's risk for developing specific diseases. Lifestyle factors such as diet, smoking, and alcohol consumption, are risk factors for a number of cancers. In addition genetic differences can increase or decrease a person's susceptibility to diseases. For this reason, race/ethnicity is an important factor that should be examined in detail. There are a number of genetic polymorphisms that are more frequent in people of different races that alter the way chemicals are metabolized in the body. These differences in metabolism can alter a person's sensitivity to a chemical carcinogen, thus making them more (or less) susceptible to the development of cancer. If possible, health studies in the Kelly AFB area should determine the incidence of these polymorphisms in the study populations. Results can then be analyzed for associations between the incidence of specific cancers, sensitivity to chemical carcinogens, and exposure to carcinogens, either from air emissions, soil gas emissions, or occupational exposures (especially for residents that work at Kelly AFB). Recent studies have also shown that exposure to chemicals can increase the risk of developing liver cancers associated with chronic hepatitis C infections. All of these factors may play a role in the increased incidence of cancers observed in the ATSDR review.

- The increased incidence of heart and circulatory system-related birth defects identified by the ATSDR analysis also requires follow-up, particularly in light of the fact that associations between organic solvent exposure and cardiovascular malformations are well documented in the epidemiologic literature (10,11). Genetic polymorphisms in solvent-metabolizing enzymes also appear to alter the susceptibility of certain heart defects to prenatal solvent exposures (11). These findings need to be incorporated into follow-up health studies.

Summary

Due to the complexity of the contamination issues at Kelly AFB, this study is not complete, however, ATSDR has done a good job of examining twelve different possible routes

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by which off-base residents could be exposed to chemicals from the base. These have been categorized as to whether or not they are likely to be causing health effects in the communities. In most instances, low level exposure to chemicals is occurring, however doses appear to be low enough that it is unlikely that they are causing health effects. Other routes of exposure, however, require a more thorough analysis to determine whether they represent a hazard to the community.

This report also does an excellent job of identifying health problems that exist in areas of San Antonio near Kelly AFB. Birth defects, as well as specific cancers (liver, kidney and leukemia) are statistically increased in zipcode areas adjacent to the base. The basis for these disease clusters need to be evaluated, so better control measures can be sought. Possible causes include past air emissions both on base and in communities surrounding the base. Groundwater and soil contamination with volatile chemicals may also play a role. The results presented in the Phase II and Phase III reports will be critical in establishing whether chemicals from Kelly AFB are playing a role in making people sick. New health studies designed specifically to answer questions regarding the causative roles of chemicals in disease incidence in the area are also needed.

The primary shortcoming of this Phase I report is the general approach ATSDR took in assessing both exposures and disease incidence. Local sources near the boundary of the base should be examined in more detail, and specific subsets of people should be identified within the general health outcome data used in this report. Some critical issues that should continue to be addressed include:

- Past exposures from air emissions need to be determined to support the evaluation of health studies in the communities.
- Calculations of present exposures from air emissions need to be tailored for specific communities around the base.
- Populations at increased risk of cancer or birth defects due to genetic polymorphisms or exposure to other risk factors such as chronic hepatitis C infections need to be identified.
- Studies should be conducted to determine the relative impact of air emissions from Kelly AFB now and in the past on air quality in San Antonio relative to other emission sources in the area.
- Chemical exposures and health assessments need to be conducted for on-base personnel. Noise exposure and auditory effects also need to be addressed.
- Off-base exposure to volatile chemicals from contaminated groundwater needs to be better characterized, with special attention to identifying local fuel spills.

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6. Soil Vapor Survey. Zone 5. North Kelly/North Kelly Gardens Area. Remedial Investigation. CH2M HILL, Inc. 1995.
7. ATSDR. Toxicological Profile for Benzene. U.S. Department of Health and Human Services. September, 1997.
8. Ozuna, G.B. and Stein, W.G. Quality of the Shallow Ground Water in Southwest Bexar County, Texas. Water-Resources Investigation Report. U.S. Geological Survey. 1990.
9. Shallow Aquifer Assessment, Technical Report. Final. Science Applications International Corporation. July, 1994.
10. Cordier, S., Ha, M.-C., Ayme, H., and Goujard, J. Maternal occupational exposure and congenital malformations. Scand. J. Work Environ. Health 18: 11-17.
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SITE S-1 UPDATE

Technical Review Subcommittee
14 Dec 99

GOAL

Prevent further groundwater contamination by removing contaminants in the soils above the groundwater table.

BACKGROUND

- Former storage site for Defense Property Disposal Office (DPDO)
- Used 1960s to 1973
- Waste oils, solvents, cleaning compounds, transformers
- Historical spillage from above ground storage tanks accumulated in a sump

BACKGROUND

- Contaminated soil in sump area and smear zone
- Smear zone
 - Water table fluctuation
 - Surrounding and downgradient of the sump
- Interim groundwater system
 - Six recovery wells
 - Air stripping system

WORK COMPLETED

- 2-9 Nov 99 - Removed top 7' soil
- 15 Nov 99 - Started removal of soil >7' depth
- 1 Dec 99 - Excavation complete
- 5 Dec 99 - Backfill complete

OPERATIONS

- Excavation
- Landfill disposal
- Fill with existing and imported soil
 - Top 7 feet reused
 - Clean gravel in groundwater layer
 - Clean clay from landfill
- Install dual phase recovery and treatment system

OPERATIONS

- Soil Sampling
 - In situ before excavation
 - 1 sample per 50 CY
 - Class 1 Non-hazardous waste (TPH)
- Air Monitoring
 - Perimeter and within excavation
 - On site organic vapor detector
 - On site Gas Chromatograph (GC)
 - SUMMA® canister/lab analysis

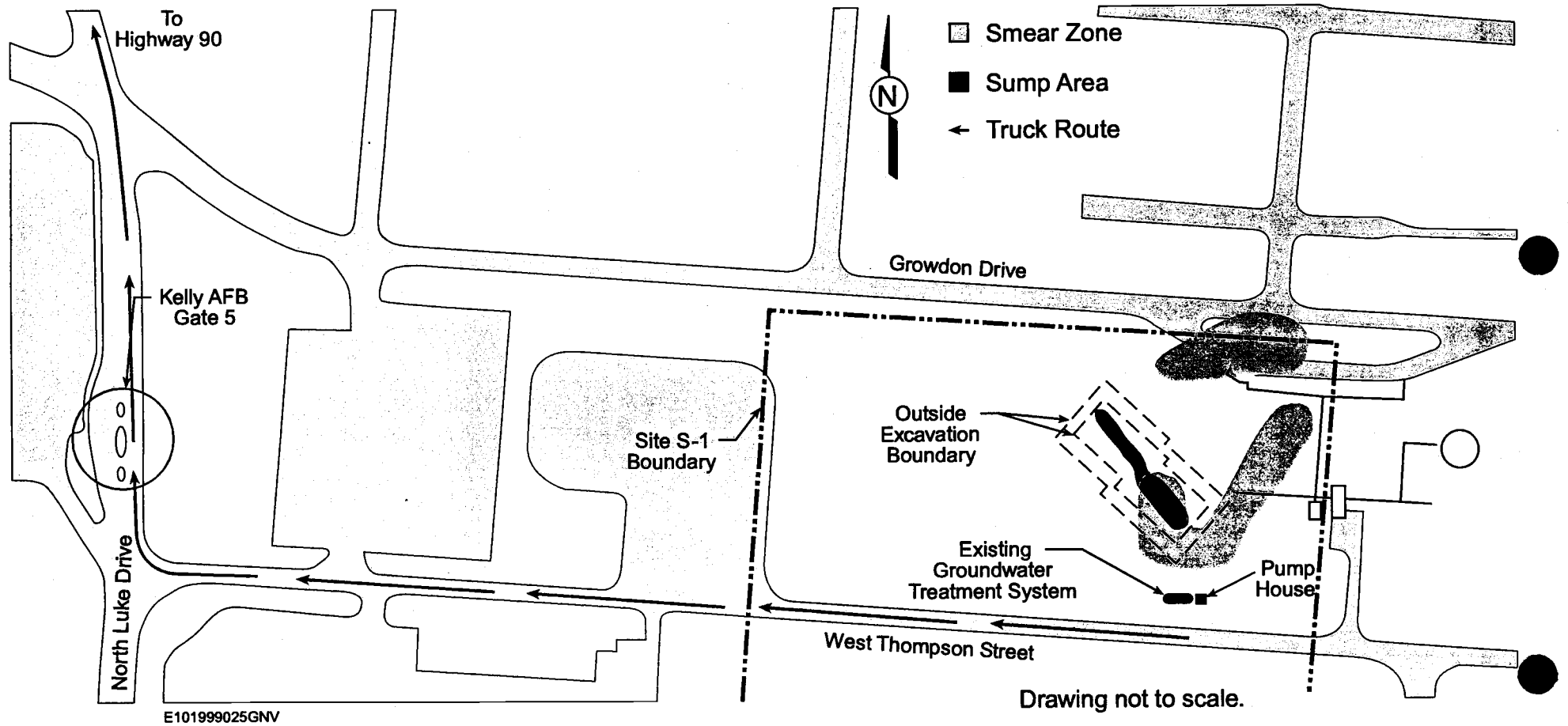
OPERATIONS

- Recovery system
 - Soil vapor and groundwater extraction
 - Treatment of vapors (activated carbon)
 - Groundwater to existing treatment system

WORK REMAINING

- 15 Dec 99 - Start installation of dual phase recovery and treatment system
- 31 Jan 00 - Installation complete
- 1 Feb 00 - System startup and testing
- 15 Feb 00 - System operation

Affected Soils at Site S-1



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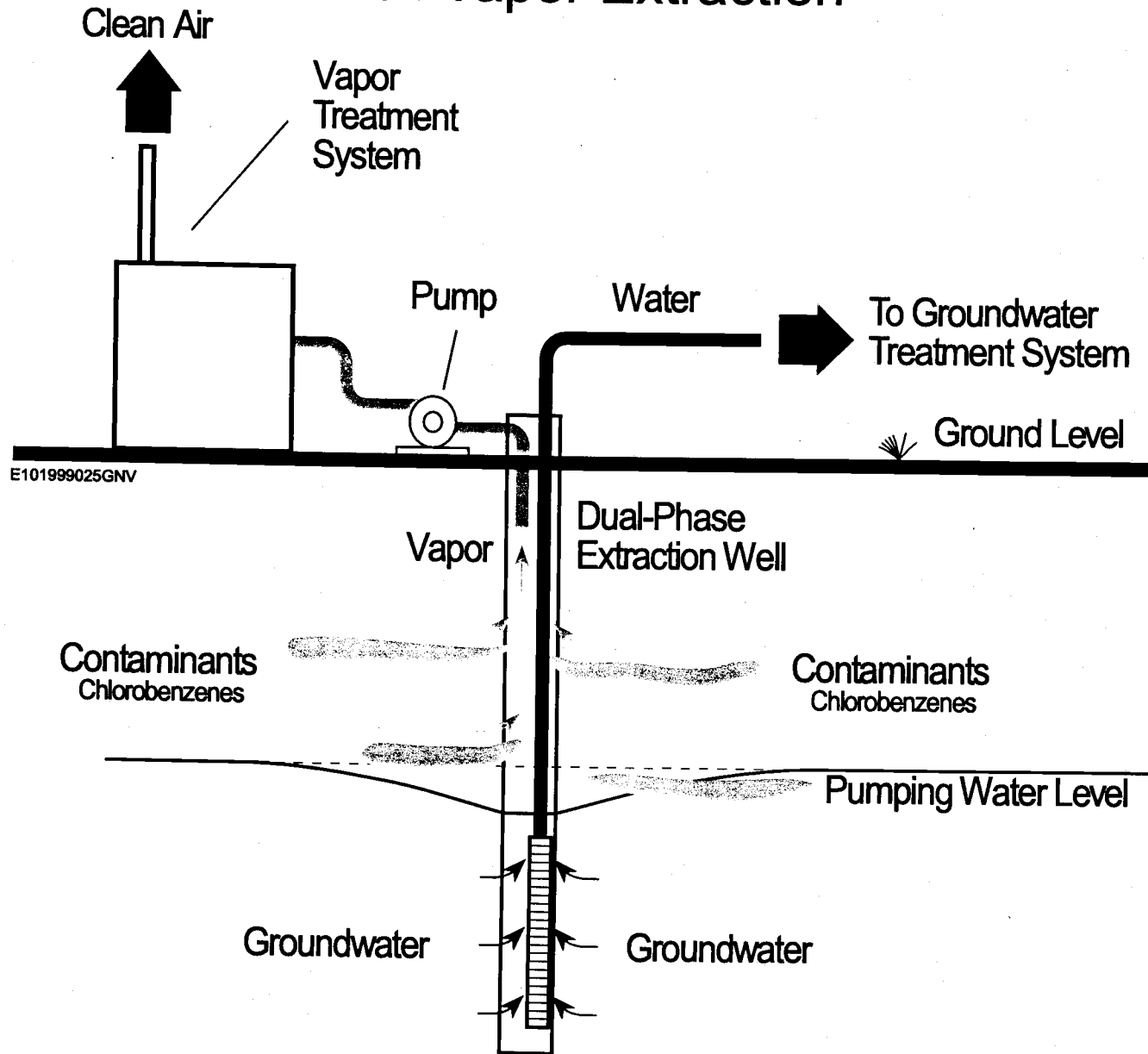
The contaminant of greatest concern at Kelly AFB Site S-1 is chlorobenzene. The highest concentrations of chlorobenzene were detected in the area designated on the map above as the "Sump Area." Before it was filled in several years ago, the sump was a depression in the bottom of a gravel pit which contained leaks or spills from the waste solvents collected at the site.

After the gravel pit was filled in, fluctuations in the water

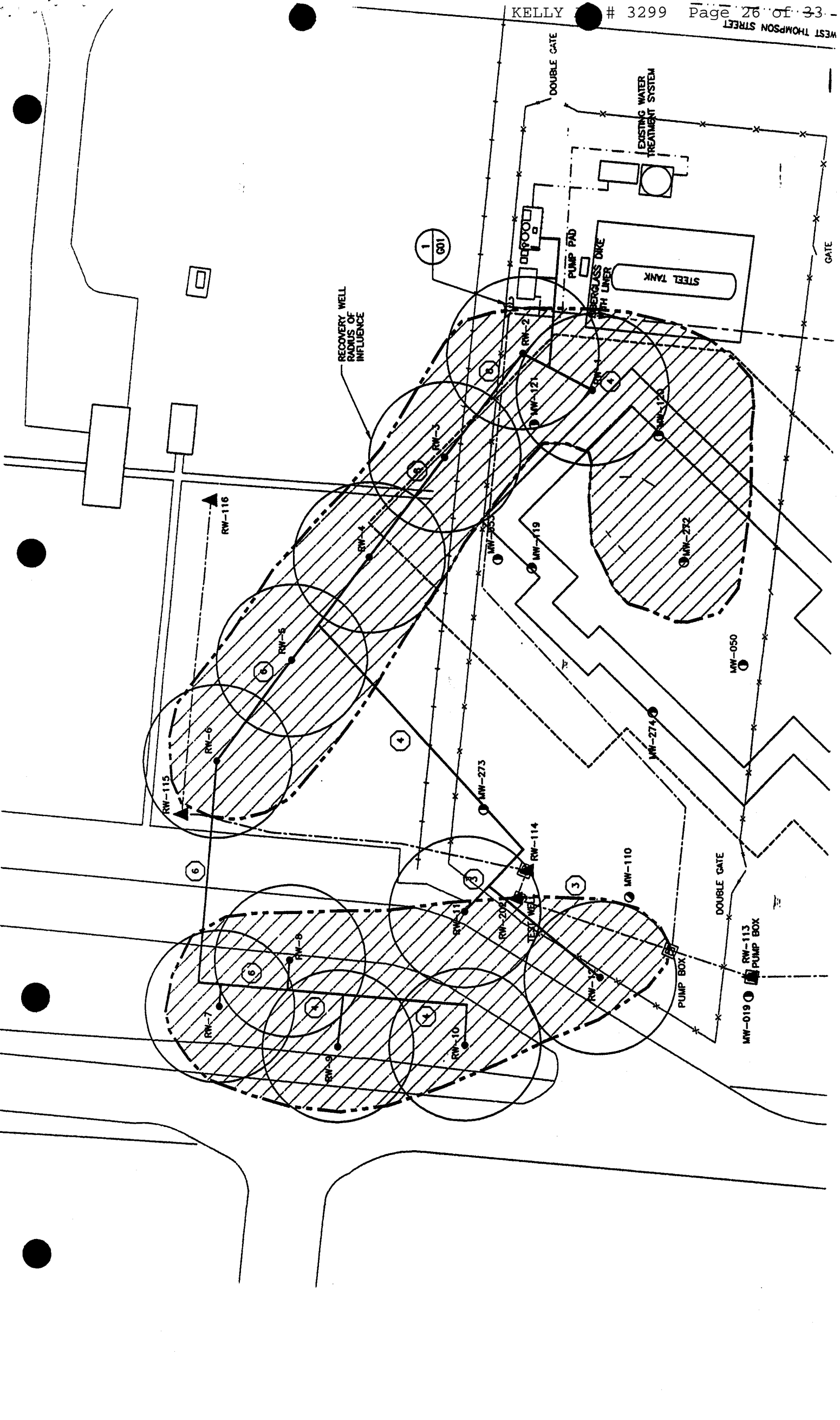
table spread the contamination into the "Smear Zone." Chlorobenzene concentrations are much lower in this area and will be cleaned up in place using soil vapor extraction.

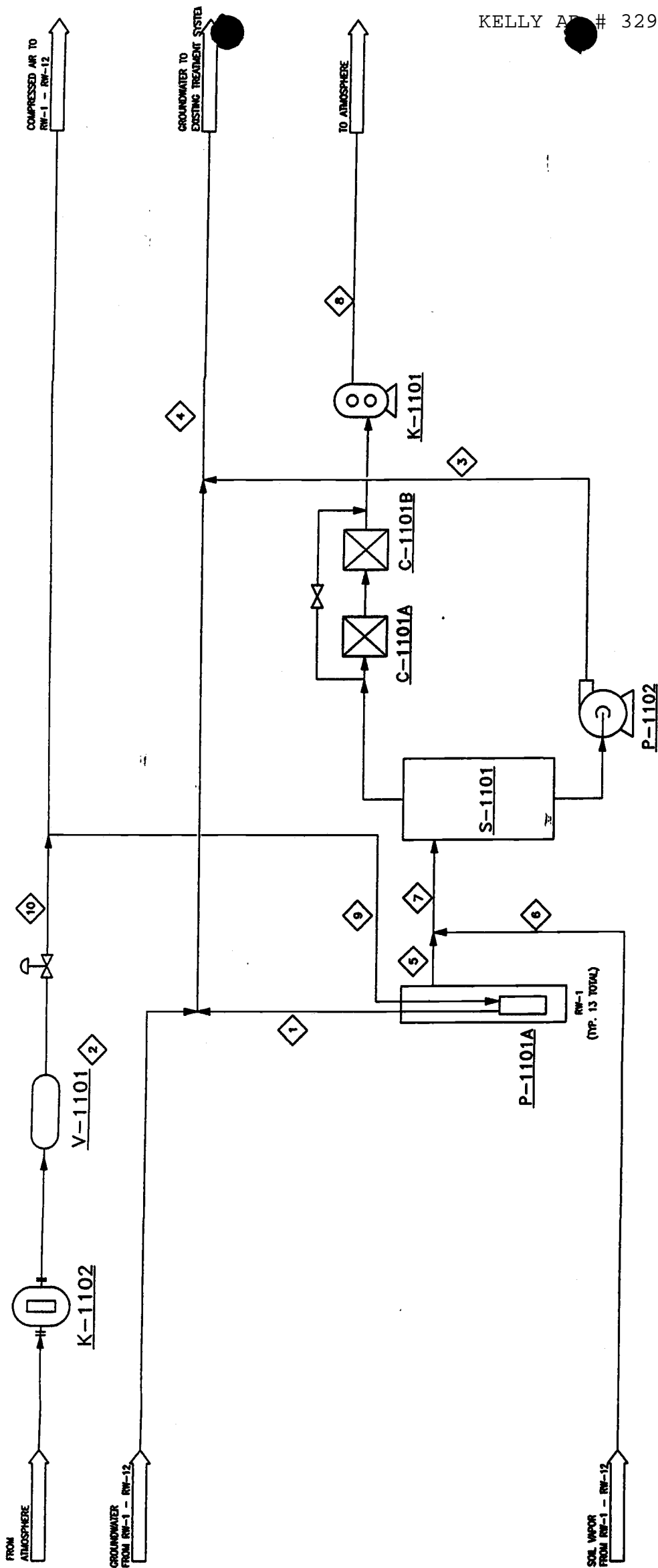
But first, the excavation now under way will remove the contaminated Sump Area soil within the area designated on the map as the "Outside Excavation Boundary." That soil will be trucked from the site west along Thompson Place to North Luke Drive and then to Highway 90.

Soil Vapor Extraction



A **Soil Vapor Extraction (SVE)** system, as a final step, will be installed to remove the remaining chlorobenzenes from the surrounding soil. The SVE creates a vacuum effect across the soil that captures the contaminated vapors and sends the vapors through an on-site treatment system.





STREAM NUMBER	1	2	3	4	5	6	7	8	9	10
LIQUID FLOWRATE (GPM)	2.0	24	0.5	26.5	0.0	0.0	0.0	0.0	0.0	0.0
VAPOR FLOWRATE (ACFM)	0.0	0.0	0.0	116.8	1492	1717	1498	0.45	5.91	0.0
VAPOR FLOWRATE (SCFM)	0.0	0.0	0.0	110	1320	1431	1431	2.0	26.0	0.0
PRESSURE (PSIA)	29.7	29.7	29.7	13.5	12.3	12.3	15.0	74.7	74.7	74.7
TEMPERATURE (°F)	55.0	55.0	60.0	55.0	55.0	55.0	68	104.0	150.0	150.0
MASS FLOWRATE (LB/HR)	1,001	12,013	250	11,540	496	5948	6,448	6448	9	117

**REPORTS
FOR
ST MARY'S**

REPORTS LISTED BELOW WERE TAKEN TO THE ST. MARY'S		Date	Status	ADM
LIBRARY - BCT ON 14 DEC 1999				
281A	Corrective Measures Study Addend Re-Eval of Select FS Prefer Alternatives Z2 GW	Nov 99	Final Draft	Inf
284A	RCRA Facility Investigation Site S-3	Dec 99	Final Draft	Inf
285A	RCRA Facility Investigation Former Building 522	Dec 99	Final Draft	Inf
612B	Ecological Risk Assessment for KAFB Zones 1, 2, 3 & 5 Addendum to Tier 1 Results	Nov 99		Inf
613B	Ecological Risk Assessment for KAFB Zones 1, 2, 3 & 5, Tier 2 Workplan	Nov 99	Final	Inf
614B	BRA GW Recovery System Performance Modeling	Nov 99	Final	Inf
765	DRMO Lot Z04 Closure Investigation Report	May 99	Final	Inf
Received by: <i>[Signature]</i>				
Date: <i>12/14/99</i>				
X				

BCT Minutes
14 December 1999

The meeting was held on 14 December 1999 at the WPI office in San Antonio, Texas.

Members Present and Support Personnel:

Name	Organization	Present	Absent
Brown, Leslie	KAFB		X
Buelter, Don	KAFB	X	
Callaway, Laurie	BCA (KPMG)	X	
Carrillo, Mike	EPA	X	
Landez, Norma	KAFB	X	
Meshako, Chuck	BCA	X	
Neff, Richelle	UNITEC	X	
Ortiz, Steve	TNRCC		X
Pavlo, Tina	GKDC (OpTech)		X
Power, Abigail	TNRCC	X	
Price, Lisa Marie	EPA	X	
Ryan, William	KAFB	X	
Sassaman, Captain Brian	KAFB	X	
Stankosky, Laura	EPA	X	
Underwood, Tim	BCA (KPMG)	X	
Weegar, Mark	TNRCC	X	

Lee Wille (UNITEC) facilitated.

Dates for upcoming meetings.

January 11, 2000
 February 8, 2000
 March 14, 2000
 April 11, 2000
 May 9, 2000
 June 13, 2000

Item #	Lead	Support	Discussion Topic	Comments	How will we know it's done?	Disposition
1.	Underwood, T.	BCT Members	PBA/EPCF/Joint Use SEIS Update	Update the BCT on the Lockheed Martin transition, the EPCF Transfer, and the Joint Use Runway SEIS.	Team receives update.	Closed. Today, 14 December, ends the PBA transition. Lockheed Martin will take over 1.5 million ft ² of usable space at Kelly AFB. All re-facilitation projects are done or will be done within a month.
2.	Landez, N.	Meshako, C. Price, L.	SWMU Site Close-out List	Kelly AFB will present a site close-out list based upon the criteria outlined in the October 99 letter to TNRCC.	Team receives list.	Open. List of SWMUs distributed, with status for each site. Team will review list next month. Action: Chuck Meshako, with assistance from Norma Landez and Laurie Callaway, will develop a tracking list of EBS sites. An update will be provided at the January BCT meeting.
3.	Landez, N.	Ebert, J.	Kelly/Lackland Transfer	Discuss transfer of Zones 1 & 5 from Kelly AFB to Lackland AFB.	Discussion is complete.	Closed. Lackland AFB, along with Kelly AFB, will set up a meeting with TNRCC and EPA personnel in January or February to discuss transferring cleanup responsibilities to Lackland at property transfer. Note: Mark Weegar requested that documents related to property transfer be sent to Gary Beyer (TNRCC). In some instances, documents will be sent to both Mr. Weegar and Mr. Beyer.
4.	Landez, N.		Risk Reduction Standards vs. TRRP	Discuss Risk Reduction Standards (RRS) and Texas Risk Reduction Program (TRRP) rules applicable to site closure.	Discussion is complete.	Open. Discussed pros and cons of closing under TRRP versus RRS at various sites. Kelly will notify TNRCC if they proceed under RRS. If no final closure report by 2006, Kelly will re-notify TNRCC that they are still under the RRS. Action: Mr. Weegar will clarify long term remedial options concerning RRS and TRRP at the January BCT meeting.
5.	Price, L.	Carrillo, M. Stankosky, L.	Public Participation Requirements	Discuss EPA view regarding public participation requirements for remedy selection process.	Discussion is complete.	Closed. EPA will send a letter to the Air Force asking for clarification of public participation procedures.
6.	Weegar, M.	BCT Members	Full Closure Model	Review public participation in model, in context of new rules, and suggest revisions.	Team reaches consensus on suggested revisions.	Open. A matrix relating the old and new TNRCC public participation model is being developed. Action: Mr. Weegar will bring the matrix to the January BCT meeting.
7.	Hampton, R.	Waterloo University	SITE Program	Waterloo University will provide a presentation on Potassium Permanganate DNAPL treatment.	Presentation is complete.	Closed. Presentation complete.
8.	Buelter, D.	Hampton, R.	Zone 2 RFIs	Provide overview of S-3, B522, and E-1 RFIs.	Team receives update.	Closed. Presentation complete.
9.	Meshako, C.	Whitley, A.	Historical Tank Sites on Disposal Property	Kelly AFB and AFBCA propose to excavate and investigate historical tank sites.	Team reaches consensus on approach.	Open. Mr. Meshako distributed a list of abandoned tank sites. Kelly will investigate the sites. In January, Mr. Meshako will return with proposed procedures for sampling and proposed responses to any releases discovered.
10.	Rohne, R.	Power, A. Carrillo, M.	Site S-1	Update team regarding project status.	Team receives update.	Closed. Team received Site S-1 update.
11.	Ryan, W.	Buelter, D. Rohne, R. Sassaman, B.	Zone Updates	Each month, provide team with update of current activities in Zones 1, 2, 3, 4 and 5.	Team receives update.	Closed. Team received zone updates.
12.	Ryan, W.	Weegar, M. Carrillo, M.	List of Future Deliverables (Regulators/RAB)	Each month, provide a list of upcoming documents for review.	Team receives list of upcoming documents for review.	Closed. List distributed.

Item #	Lead	Support	Discussion Topic	Comments	How will we know it's done?	Disposition
13.	Ryan, W.	BCT Members	BCT Teleconference Scheduling	Each month, establish the coming schedule of teleconferences.	Teleconference schedule adopted by the team.	Closed. Next teleconference cancelled.
14.	Ryan, W.	BCT Members	Begin January Agenda	Each month, begin to establish the next month's agenda at the end of the BCT meeting.	Team approves agenda items.	Closed. Open items will be moved to the January BCT agenda. Additional January agenda items include: <ul style="list-style-type: none"> • Zone 4 update and closure strategy (Sassaman, B. and Courtney, S.), • Zone 2 and 3 update and closure strategy (Hampton, R. and Landez, N.) • Re-development update (Tim).
15.	Wille, L.	BCT Members	BCT Surveys	Each month, through December 99, the team will complete surveys evaluating the BCT and the meeting facilitator.	Team completes surveys.	Closed. Surveys completed

Paleochannels

In recent technical reviews of Kelly AFB environmental cleanup documents the term paleochannels has been used. The question, 'what are paleochannels' has been asked. A paleochannel is simply a buried or abandoned stream channel. Paleochannels have been cut into the Navarro clay, but they also can be present in the overlying silt and clay deposits. Over time the streams shifted their course, abandoning older channels and depositing gravel, sand, silt, and clay. These abandoned channels are often discontinuous because the streams that formed them migrated back and forth across the landscape and commonly eroded or cut into the older abandoned channels. In many cases, the streams changed course so frequently that a large number of abandoned channels were formed resulting in a complex series of interconnected channels and a nearly continuous layer of gravel. The complexity and interconnected nature of these old channels can be seen in current braided stream systems like the one shown in the attached photo.

Paleochannels may act as paths of least resistance for groundwater flow because they contain abundant gravel and sand. Water within paleochannels may flow at an above average velocity. Conversely, other paleochannels are surrounded by clay and silt and groundwater movement is restricted because the silt and clays surrounding the paleochannel does not readily transmit water. Kelly AFB and its contractors have mapped some paleochannels, but the widespread presence of gravel resting on the Navarro clay has made it difficult to distinguish individual channels.

The area investigated by Kelly AFB has been found to contain layers of sand and gravel extending over large distances while other areas contain little or no gravel. Where the gravel layers occur, paleochannels are thought to be numerous and intimately interconnected. The abundance of gravel relative to the small amount of groundwater may suggest that, although paleochannels are worth consideration, they are not highly critical features except in a few isolated areas. The contaminant patterns in groundwater do not typically suggest that paleochannels strictly control groundwater and contaminant movement. The plume patterns suggest that groundwater and contaminants are controlled by the topography of the Navarro clay and by the presence or absence of gravel, rather than specific paleochannels.

The chlorinated solvents used at Kelly AFB were dense nonaqueous phase liquids (DNAPL). These solvents are denser than water. If released in sufficient quantity, they will move vertically through soil and water until they come to rest upon a dense and impermeable unit such as the Navarro clay. DNAPL is most likely to be present at the source. If sufficient DNAPL has accumulated at the Navarro contact it may migrate along the Navarro surface, but it does so in response to gravity, NOT groundwater flow. The presence of a paleochannel does not imply that DNAPL is present or that DNAPL will migrate along the paleochannel. The off base contaminant plumes contain dissolved contaminants, not DNAPL. Chlorinated solvents in the plumes do not "sink" because they are dissolved and behave in the same manner as the groundwater.

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE