UNITED STATES AIR FORCE
INSTALLATION RESTORATION PROGRAM
KELLY AIR FORCE BASE
SAN ANTONIO, TEXAS

HEALTH AND SAFETY RISK ASSESSMENT QUINTANA ROAD NEIGHBORHOOD

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EXECUTIVE SUMMARY

The objective of this study was to determine whether a subsurface JP-4 jet fuel plume that had migrated close to the Quintana Road neighborhood posed safety and health risks to the residents of the neighborhood. No safety hazards associated with the Quintana fuel spill were identified. However, several natural gas leaks (not attributable to the fuel spill) were identified which represented potential risks to members of the community. Similarly, a risk assessment performed using the results of air monitoring conducted as part of this investigation revealed that, under the conditions prevailing at the time this study was conducted, the concentrations of chemicals found in the Quintana Road residences did not present an unacceptable risk, as defined by current EPA guidelines, to the health of the residents.

The neighborhood was divided into three zones based on proximity to the plume. In the first phase of the field investigation (air screening), portable hydrocarbon detectors were used to screen 81 residences in these zones. Residents were also asked to answer a series of questions regarding the use of chemicals on their property, any unusual symptoms of disease, etc. Other than several natural gas leaks, no fire or explosion (safety) hazards were identified at any of the 81 residences. However, hydrocarbon concentrations above background levels were noted at 24 of the 81 residences. At 13 of these 24 residences, sources within the residence or on the property likely accounted for these readings. At the remaining 11 residences, no apparent sources were noted. Subsequent to a review of the data obtained from the first phase of the investigation, a prioritized

listing of those residences in which a follow-up evaluation (air monitoring) would be attempted was developed.

Air monitoring was performed at 26 residences. A total of 13 chemicals were found at part per billion levels in one or more of these 26 residences. The greatest number and highest concentrations of these chemicals were found in residences closest to the plume. Six of the 13 chemicals, including benzene, were present at levels below those typically found in indoor air. Five chemicals were found at concentrations above typical indoor levels; four of these are likely related to the use of household products while one chemical could be related to the subsurface JP-4 plume. No indoor air quality data were available for two of the chemicals found in the Quintana Road residences.

The validated air monitoring results from the 26 residences were used as the basis for a risk assessment. The risk assessment considered the potential risks of long-term exposure to the contaminants found in the air samples. The results of the risk assessment showed that even under the most conservative scenario (i.e., residents in their homes 24 hours/day over an entire 70 year lifetime), the maximum potential incremental carcinogenic risk incurred by a resident is 7.3×10^{-5} (1 chance in 14,000 of developing cancer). This falls within the range that is generally considered to be acceptable by the U.S. Environmental Protection Agency, which is between 10^{-4} (1 chance in 10,000) and 10^{-6} (1 chance in 1,000,000).

The results of the air screening, air monitoring, and risk assessment are summarized in Table ES-1. Potential carcinogenic risks were roughly similar in all three zones. Benzene, methylene chloride, and tetrachloroethene were the major contributors to the carcinogenic risks. However, the presence of methylene chloride and tetrachloroethene is unlikely to be related to emissions from the JP-4 plume, and may result from either a solvent plume or the presence or use of household products containing these chemicals. Therefore, the percentage of the potential carcinogenic risk attributable to benzene (a component of JP-4) was also calculated. It should be noted that in a few residences, the storage or use of gasoline in the residence could possibly account for at least a portion of the benzene concentrations detected in this study.

The major contributor to the Hazard Indices (noncarcinogenic risk) was generally Freon 12, which is found in numerous aerosol products. However, in three homes in Zone 1, other noncarcinogens were the most significant contributors to the Hazard Index. The xylenes may be related to the JP-4 spill, but chlorobenzene and p-dichlorobenzene are not fuel constituents. Their ultimate source could either be household products or a solvent plume.

Five contaminants (Freon 11, Freon 12, xylenes, p-dichlorobenzene, and methylene chloride) were present in some homes at concentrations significantly greater than those typically found in indoor air. The observed concentrations of

benzene and tetrachloroethene (contaminants that constitute the majority of the carcinogenic risk) are similar to those found in many homes nationwide, and are not necessarily related to the JP-4 plume. The use of other household products (sprays, insecticides, gasoline, or other solvents) may account for the measured levels of these contaminants. In general, it appears that air quality in the study area compares favorably with that reported throughout the country, particularly with respect to benzene (a known human carcinogen).

In addition to the indoor air monitoring results, data from previous groundwater and soil gas investigations in the plume area were compiled to determine if other exposure routes present a potentially unacceptable risk to local residents. It was found that volatile emissions from measured soil gas concentrations present a lower risk than the indoor inhalation scenario, even when emissions from the maximum contaminant concentrations are modeled and outdoor exposure occurs continually over an entire lifetime. The maximum incremental risk in this case is 1.3x 10-5 (1-in-77,000). A short-term, construction exposure scenario was also examined in which excavation would occur and workers would therefore not receive the beneficial effects of an 8-foot thick soil cover prior to exposure. The maximum risk under this scenario is 4.7×10^{-6} (1-in-213,000).

As a final exercise, the potential exposures of residents who may construct domestic wells in this area were evaluated. These are purely hypothetical exposures because as best as could be determined, no domestic drinking water wells are currently in use in this area, and it is unlikely that in such a densely populated area that a well would ever be necessary or permitted. Nevertheless, under a worst-case scenario, the calculated risks (1.8×10^{-2}) exceeded the general EPA guidelines mentioned above, but a more realistic scenario resulted in a risk of 5.0×10^{-5}. These results indicate that groundwater use in this area should be prohibited.