

# **HEALTH CONSULTATION**

**Kelly Air Force Base**

**Current Air Emissions Exposure  
of On-base Personnel**

**San Antonio, Bexar County, Texas**

**EPA FACILITY ID: TX2571724333**

**Prepared by**

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICE**

**Public Health Service**

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## Foreword

This document is a public health consultation that describes ATSDR's evaluation of potential health impacts of current air emissions from Kelly Air Force Base (AFB). The focus of the evaluation was non-occupational air exposures to on-base personnel. The current document represents one of several evaluations in Phase II of a three phase public health assessment process for Kelly AFB.

1. Phase I is represented by the original Public Health Assessment document (released August 1999) and consists of ATSDR's evaluation of community concerns involving environmental contamination from Kelly AFB and health outcome data, which addressed issues identified in the original petition.
2. Phase II addresses those issues identified in Phase I as warranting further evaluation, including the evaluation of current air emissions exposure to on-base non-occupational personnel. This health consultation provides an evaluation of on-base non-occupational exposures. Other Phase II issues will be addressed in other documents (past air emissions and health outcome data).
3. Phase III will address issues identified outside the purview of the original petition, but expressed as concerns by the community. Phase III will include an evaluation of the potential environmental contamination of East Kelly and an evaluation of the potential contamination of on-base drinking water.

## **Introduction**

ATSDR completed Phase I of the Kelly Air Force Base (AFB) public health assessment (PHA) in August 1999 [1]. ATSDR recommended further investigation of potential exposures to environmental air contamination from Kelly AFB be performed during Phase II.

This health consultation is a part of Phase II. It represents an evaluation of the public health implication of estimated inhalation exposure of on-base personnel to current air emissions from stationary sources at Kelly AFB. These on-base personnel are those not covered by the regulations of the Occupational Safety and Health Administration (OSHA). ATSDR concludes that potential inhalation exposures of on-base personnel to current air emissions from stationary sources are not likely to result in adverse health effects. This conclusion is based on air dispersion modeling of 1995 air emission data from the Kelly AFB air emissions inventory [2].

## **Background**

The late Congressman Frank Tejeda petitioned ATSDR to investigate environmental contaminant releases from Kelly AFB and the community reports of adverse health effects among residents in neighborhoods north and southeast of the base [3]. ATSDR publicly released findings during Phase I of the public health assessment on August 24, 1999, and also described activities to be performed during Phase II [1]. During Phase I, ATSDR performed an air dispersion screening model of air emissions from stationary sources to estimate possible air contaminant concentrations in the community. Results of the air dispersion model predicted the highest estimated contaminant concentrations may be present on base, resulting in exposure to on-base personnel [1]. These potential exposures are considered environmental exposures and not occupational exposures because the emissions of interest were not associated with their individual jobs.

ATSDR concluded from the Phase I evaluation that adverse health effects would be unlikely due to current air exposures to off-base populations. However, the results of the screening model and risk analysis performed during the Phase I evaluation indicated that the estimated increase in the risk for developing cancer by inhalation may have been highest in some areas on base. ATSDR recommended that a refined air dispersion model be performed during Phase II to reduce uncertainty in the initial air dispersion modeling. Current exposures are defined by ATSDR for purposes of this document as those occurring from 1995 to base closure, which occurred during 2001.

## **Discussion**

ATSDR questioned whether on-base personnel were being exposed to contaminants in ambient air that were emitted by on-base processes (stationary sources) at Kelly AFB. As described in the initial PHA, over 200 individual chemicals were released from over 1400 stationary sources. Air emissions were reported for all stationary sources including industrial operations such as electroplating, jet fuel testing, degreasing, painting, and fuel storage. These source emissions included metals, volatile organic carbons, solvents, and fuel components. OSHA regulates the

workplace environment and protects workers from exposure to chemicals to which there is foreseeable exposure. Usually workers are protected from chemicals that they work with and chemicals that are generated during the industrial process. For example, a worker may be required by OSHA to wear a respirator for protection from solvent fumes. Another worker from a different occupation which does not involve solvents may not be required to wear a respirator. If solvent fumes are emitted from one work environment and enter another work environment, these workers may not be protected from this secondary exposure. It is this secondary exposure that ATSDR addresses in this consultation.

ATSDR performed an air dispersion model of stationary sources to estimate the concentration of contaminants in the ambient air on base. ATSDR used the Environmental Protection Agency's Industrial Source Complex Short Term - 3 (ISCST-3) to model the air dispersion of the 1995 air emissions data from Kelly AFB. A computer model estimated the effect meteorological parameters such as air speed, wind direction, and temperature may have had on the contaminant dispersion. The computer modeling estimated the dispersion pattern and concentration of contaminants released from the source.

In performing this evaluation, ATSDR used an approach which considers all of the available health and environmental evidence to evaluate potential health effects [4]. The estimated contaminant concentrations were compared to inhalation exposure levels that would not be expected to result in adverse health effects (i.e., comparison values). Those contaminants exceeding their screening values are further evaluated. On the basis of this initial screening, acute (short term) and chronic (long term) exposures are further evaluated by comparing levels of exposure to levels associated with noncancer health effects identified in animal toxicity studies or human epidemiological studies. Chronic exposures are also evaluated for potential cancer health effects by performing a risk assessment using site specific exposure scenarios rather than the general assumptions used to develop screening values. Further, risk assessment results were reviewed in the context of available toxicological and environmental data. Health conclusions were based on these analyses.

#### Short term exposures

Short term (acute) exposures to estimated levels of air contaminants, other than formaldehyde, are unlikely to result in adverse health effects. Laboratory and occupational human exposure studies have been conducted with both normal and asthmatic individuals to determine potential effects from formaldehyde exposure [5-8]. The maximum 1- hour formaldehyde concentration over a 5- year period is estimated to be 1223  $\mu\text{g}/\text{m}^3$ , which is near the lowest levels (492  $\mu\text{g}/\text{m}^3$  for a similar duration) that have been associated with acute eye, nose, or upper respiratory irritation [9]. Most individuals cannot tolerate formaldehyde concentrations above 6000  $\mu\text{g}/\text{m}^3$  and symptoms may become severe above 12,000 - 24,000  $\mu\text{g}/\text{m}^3$ [10]. Based on the results of air modeling and estimates of exposure, it may be possible for individuals who are sensitive to formaldehyde and are within 300 meters downwind of the jet engine testing facility (see Figure 2) during the 1-hour maximum concentration emission to experience mild to moderate eye irritation. It is estimated that these conditions could occur on the average of once per week.

## Long term exposures

Potential long term (chronic) exposures for noncancer health effects would be unlikely because all estimated contaminant levels are below screening values for long term noncancer health effects.

ATSDR also evaluated potential long term exposures for cancer health effects. The results of screening and subsequent risk assessment are presented in Table 1. The contaminants listed (hexavalent chromium, hydrazine, arsenic, formaldehyde, 1,3-butadiene, benzene, acetaldehyde, tetrachloroethylene or PCE, and cadmium) are those that exceeded the screening values. The estimated concentrations were below levels at which cancer outcomes have been reported in ATSDR's Toxicological Profiles or scientific literature [11,12,13,14,15,16,17,18,19]. A risk assessment was then performed to estimate the increase in the risk for developing cancer from chronic exposure to the contaminant. Results of the risk assessment indicate that there is no apparent increase in risk for developing cancer from the estimated exposure level by inhalation. The exposures to on-base personnel are much different than continuous exposures used in calculating screening values. On-base exposures are less frequent, shorter duration, and allow opportunity for clearance between exposures. Maximum annual average concentrations are below levels where health effects in humans have been reported due to chronic exposures.

ATSDR evaluated whether adverse health effects might be likely from simultaneous exposure to a number of chemicals. ATSDR calculated a risk from estimates of exposure to each of the chemicals (see Table 1) and added the risk from all of the chemicals at points over the base. ATSDR assumed an occupational exposure to characterize on-base exposures for purposes of risk assessment for the period of time until base closing. Exposure conditions used in the risk assessment were an individual with a 70 kilogram (kg) body weight, exposed for a frequency of 8 hours/day, 5 days/week, 50 weeks/year for a duration of 7 years. Seven years was used for current exposures because of the base closing in 2001 (1995-2001 inclusive). The estimated level of risk for developing any type of cancer from exposure to all of the chemicals (cumulative risk) and the location of the estimated cumulative risk is shown in Figure 1. The maximum cumulative risk estimated from exposure anywhere on base is 8/100,000 (or 1 case of any cancer for every 12,500 workers exposed). ATSDR considers this conservative estimate of risk as representing no apparent public health hazard because it represents an additive risk from all source emissions at the most concentrated dispersion location on base. While unlikely, ATSDR also conservatively assumes continuous occupational exposure at the maximum cumulative risk value.

The individual contaminant contributing the greatest amount of risk was hexavalent chromium with an estimated increase in risk of 6/100,000. It is unlikely that adverse health effects would be observed in this population from this level of exposure. The level of hydrazine is over reported, but included because the actual level of relevant emission was not available. While the Air Force uses diesel fuel instead of hydrazine in planes constructed in recent years, the exact number of each type plane on base at any time can vary [20, 21]. ATSDR assumed a worst-case scenario and included all hydrazine as ground level fugitive emissions. The estimated risk at this level is 2/100,000 and unlikely that adverse health effects would be observed in this population. The

contaminants arsenic, formaldehyde, 1,3-butadiene, benzene, acetaldehyde, PCE, and cadmium did not contribute significantly to the overall increase in risk.

The locations of the maximum annual average concentrations of the individual contaminants of greatest concern are depicted in Figure 2. The associated increases in risk are reported in Table 1. Air dispersion of each contaminant was simulated at 5100 points in and around Kelly AFB with the points 300 meters apart, covering an area of approximately 117 square miles. The points identified in Figure 2 represent emissions that were located within a 300 meter radius of the point. Contaminant emissions of concern are primarily located in two areas where painting, plating, and degreasing or jet engine repair is performed.

Many Air Force industrial operations have already been reduced or eliminated and using the 1995 emissions data is an appropriate conservative worse-case scenario for current emissions. Past emissions (prior to 1995) are currently being investigated and will be reported when complete. ATSDR cannot predict future emissions from potential future tenants. These future emissions can be addressed with the Texas Natural Resource and Conservation Committee (TNRCC).

### **Conclusions**

Environmental exposures (long term) to estimated current air emissions from stationary sources at Kelly AFB would not be expected to result in adverse health effects by inhalation to on-base personnel.

Persons sensitive to formaldehyde may experience mild to moderate eye irritation if they come in contact with the maximum estimated levels emitted from the jet engine test facility. These 1-hour maximum levels are estimated to occur on the average of once per week.

### **Recommendations**

None.

## References

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19. ATSDR Toxicological Profile for Cadmium. US Health and Human Services. July 1999.
20. Kelly Air Force Base. 1998. "Hydrazine Emissions - Building 1150, Kelly Air Force Base." Memo from Kelly Air Force Base to David Fowler.
21. Personal telephone conversations. 1998. Telephone calls to David Fowler from Kelly AFB and Air Force personnel: CAPT Mike McGee, CAPT Brian Sassaman, Mr. Larry Bailey, and Mr. Charles Weir.



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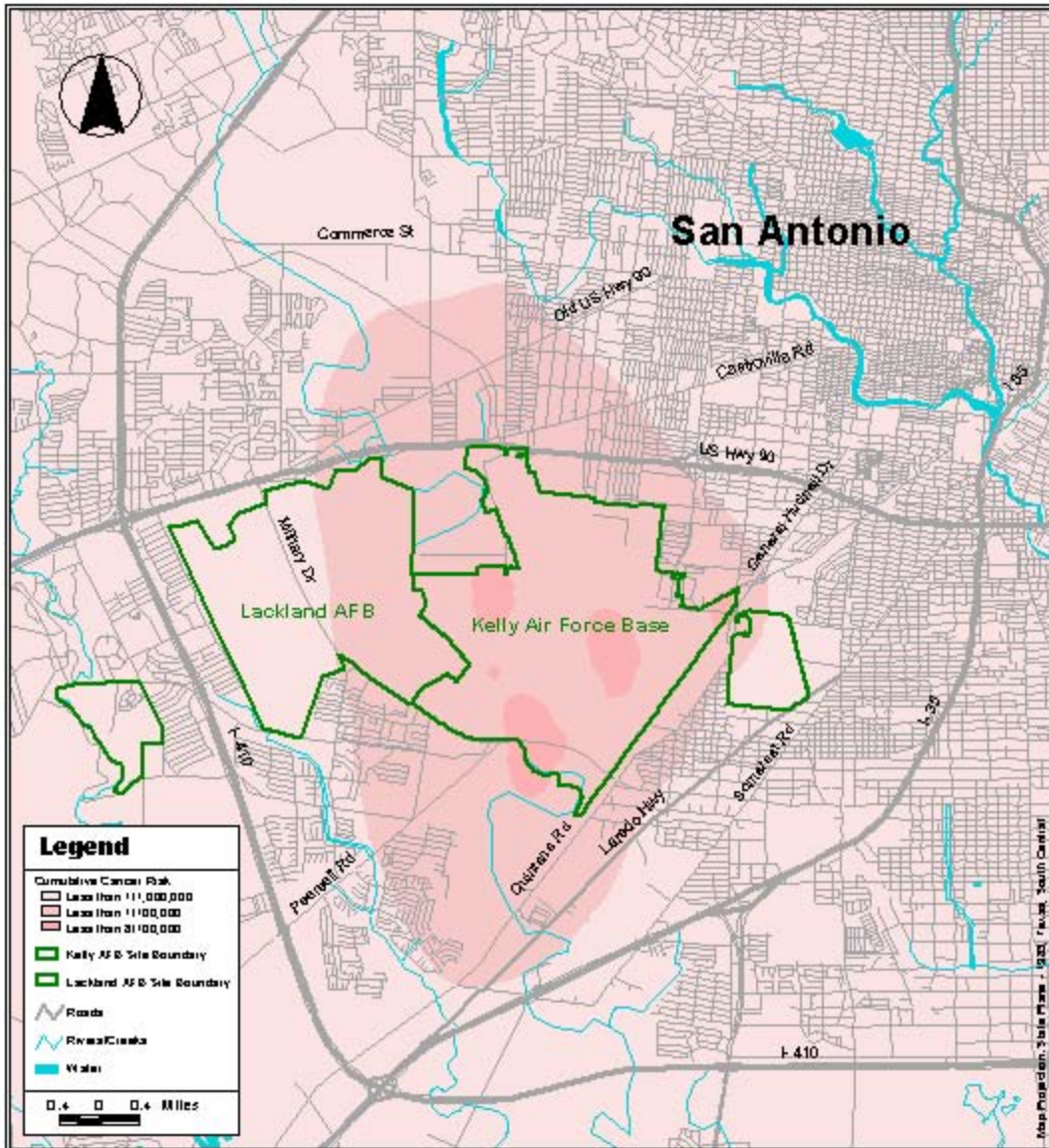
**Table 1.  
Contaminants Exceeding Screening Values**

Contaminant	Maximum Annual Average Concentration <sup>a</sup>	Screening Value <sup>b</sup>	Estimated Risk <sup>c</sup>
Hexavalent Chromium	0.034	0.00008	6/100,000
Hydrazine	0.159 <sup>d</sup>	0.00039 <sup>e</sup>	2/100,000
Arsenic	0.024	0.0002	2/1,000,000
Formaldehyde	7.	0.08	2/1,000,000
1,3-Butadiene	0.84	0.004	5/1,000,000
Benzene	0.91	0.1	2/10,000,000
Acetaldehyde	2.2	0.5	1/10,000,000
PCE	8.36	3.3 <sup>e</sup>	1/10,000,000
Cadmium	0.0024	0.0006	9/100,000,000

Table 1 is a comparison of the maximum annual average concentrations of estimated air emissions with chronic screening values which are considered by ATSDR to be levels at which adverse health effects would not be expected. Maximum concentrations which exceeded screening values are further evaluated by risk assessment to estimate the relative degree of hazard.

- a All units are in  $\mu\text{g}/\text{m}^3$  (micrograms per cubic meter). The maximum annual average concentration is the maximum of the annual average estimates of all locations on base that occur during the defined five-year period. Concentrations from 1995 air emissions data were modeled with EPA's Industrial Source Concentration Short Term 3 (ISCST3) air dispersion model.
- b Screening Values are ATSDR's Cancer Risk Evaluation Guide (except where indicated) which assumes a daily exposure for a lifetime (70 years).
- c Estimated risk calculated using Environmental Protection Agency (EPA) Region 6 Inhalation Slope Factors, assuming a body weight of 70 kilograms (kg), for an exposure of 8 hours/day, 5 days/week, 50 weeks/year for 7 years.
- d Hydrazine concentration is over-reported, see text.
- e EPA Region 6 Human Health Medium-Specific Screening Level for ambient air were used where an ATSDR screening value was not available.

FIGURE 1



**Estimated Cumulative Cancer Risk  
from Current Air Dispersion Modeling  
Kelly Air Force Base**

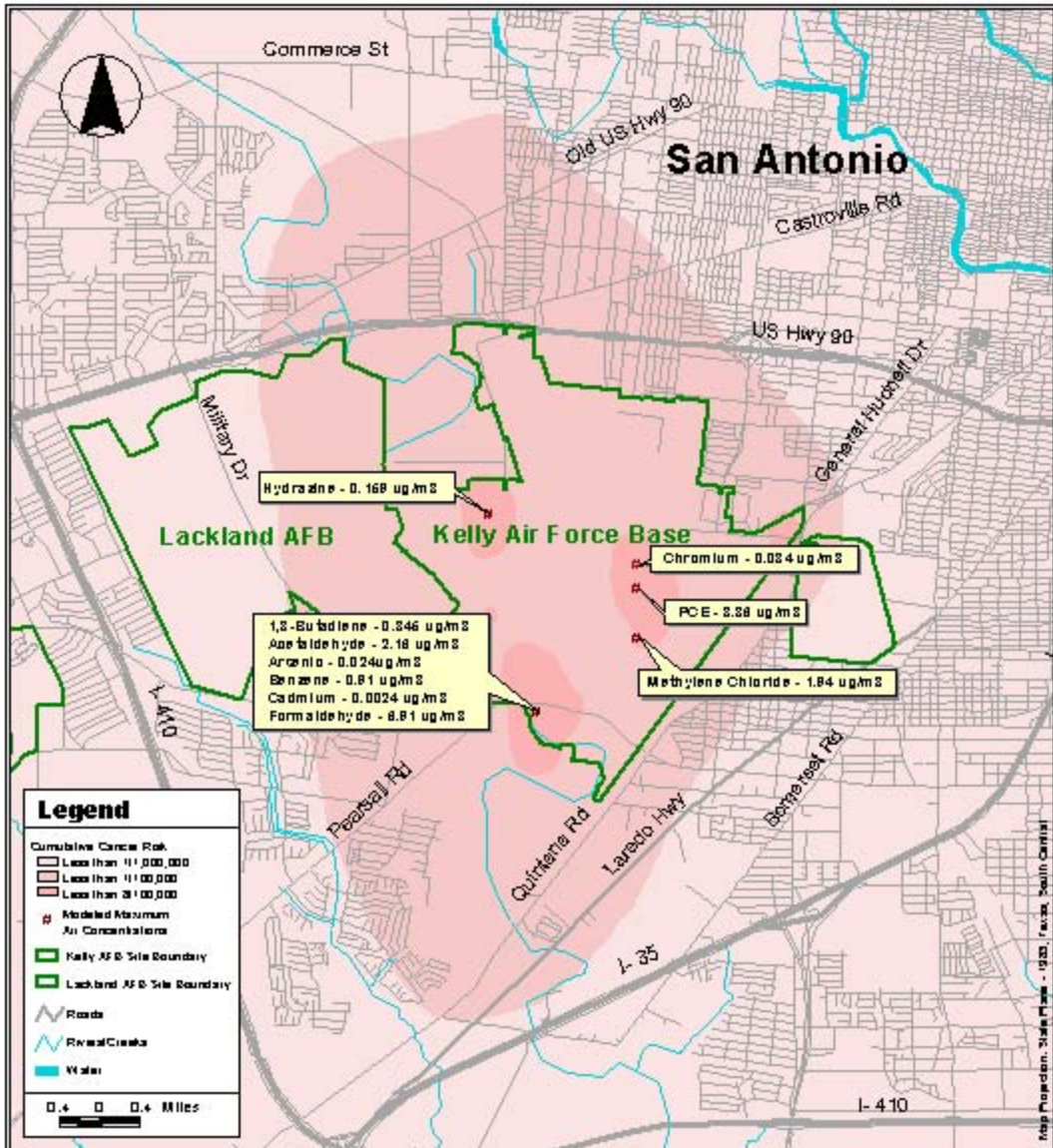
San Antonio, Texas

CERCLIS No. TX2571724333

Base Map Source: 1996 TIGER/Line Files, Site Boundary Source: Kelly AFB, 1996 Emissions Location and Amount Source: Kelly AFB, Health Risk Source: ATSDR (D,HAC). Emissions were modeled with EPA's ISC3D air model and Inhalation slope factors from U.S. EPA Region 6 were applied to output to arrive at final risk.



FIGURE 2



**Current Air Dispersion Modeling - Estimated Cumulative Cancer Risk and Maximum Air Concentrations**

**Kelly Air Force Base**

CERCLIS No. TX2571724333



Base Map Source: 1996 TIGER/Line Files, Site Boundary Source: Kelly AFB, 1995 Emissions Location and Amount Source: Kelly AFB, Health Risk Source: ATSD R(0)HAC. Emissions were modeled with EPA's ISC3D air model and Inhalation Slope Isodose on U.S. EPA Region 6 were applied to output to arrive at health risk.

**Attachment A**  
**Response to Public Comments**

## **Public Comments.**

### *Comment:*

The final ATSDR Public Health Assessments should clearly and prominently state that many events that could adversely affect public health were not considered by ATSDR due to a lack of information. Thus, the actual health risks associated with Kelly AFB may be greater than reported. Examples of events that may affect health but were not considered by ATSDR include:

- Accidental spills of fuels and solvents.
- The intentional and repeated dumping of thousands of gallons of spent solvents as described in the affidavit of Philip E. Keil, Sr. and reported in the November 22, 1998 edition of the San Antonio Express-News. The dumping occurred at the "Green Worm" site, adjacent to the base's south east boundary.
- Misting of fuel or other liquids by aircraft landing at Kelly AFB. Residents report that fine droplets used to settle on the North Kelly Gardens Neighborhood. They believe these droplets came from aircraft landing at Kelly AFB.
- Incineration of cyanide wastes.

### *Response:*

Accidental spills of fuel and solvents, intentional dumping of spent solvents from the "Green Worm" site, the misting of fuel and other liquids by aircraft, and the incineration of cyanide wastes were not addressed in the original PHA, released in 1999, because it only addressed current air emissions to off-base receptors. Sufficient information for past air emissions was not available. ATSDR requested that Kelly AFB collect the needed information which ATSDR is currently addressing in a health consultation about past air emissions (Health Consultation, Kelly Air Force Base, Past Air Emissions -projected to be released 2003).

### *Comment:*

In September 1999 Dr. Katherine Squibb of the University of Maryland submitted formal comments on ATSDR's 1999 Public Health Assessment. This work was done for the Kelly AFB Restoration Advisory Board (RAB). Has ATSDR prepared a formal response to Dr. Squibb's comments? If so, is the response available to the public? Dr. Squibb or another expert selected by the RAB may submit formal comments on ATSDR's most recent Public Health Assessments. Will ATSDR prepare a formal public response to these comments?

### *Response:*

ATSDR has formally responded to Dr. Squibb's comments and the responses will be included in the final release of the Public Health Assessment (projected to be released 2003). If other comments are provided, ATSDR will appropriately respond.

## **Air Force Comments.**

### *Comment:*

Page 2, Second paragraph. This paragraph refers to OSHA as the "Occupational Safety and Health Association." OSHA is the "Occupational Safety and Health Administration."

### *Response:*

Changed as suggested.

### *Comment:*

Page 4. Paragraph that starts with " ATSDR evaluated whether health effects might occur " - This paragraph states "The maximum cumulative risk estimated from exposure anywhere on base is 8/100,000 or 1 case per 12,500." This section should also state that this figure is a very conservative estimate. It should also state the most likely level of increased risk.

### *Response:*

ATSDR evaluates exposures in a tiered approach. The first tier screens according to a worst-case scenario, using maximum values, etc. If estimated exposures do not exceed appropriate screening values, ATSDR does not continue to evaluate other scenarios. If the worst-case scenario identifies the need for further evaluation, ATSDR performs a more in depth analysis that utilizes a variety of toxicologic, medical and human data and information. Through this later process, ATSDR makes a judgement about the likelihood that adverse effects might actually have occurred.

### *Comment:*

Page 4. Paragraph 4, Line 5 Request you identify the focused use of diesel and hydrazine and reference your source of information.

### *Response:*

Information about the use of hydrazine and diesel fuel was provided by Kelly AFB in a document entitled "Hydrazine Emissions - Building. 1150, Kelly AFB". Other information was provided by CAPT Mike McGee, CAPT Brian Sassaman, Mr. Charles Weir, and Mr. Larry Bailey. The reference has been added.

## **EPA comments.**

### *Comment:*

Background - page 2. This section states, "The results of the screening model and risk analysis performed during the Phase I evaluation indicated that the estimated increase in the risk for developing cancer may have been highest in some areas on base." EPA requests that the exposure route for this increase in developing cancer be included.

### *Response:*

The inhalation exposure route was included on page 3.

### *Comment:*

Table 1. It is not clear how ATSDR developed their risk assessment to conclude "no apparent increase in risk for developing cancer from the estimate exposure level." Table 1 lists contaminants exceeding screening values. For example the maximum annual average concentration for hexavalent chromium is 0.034 µg/m<sup>3</sup>. The ATSDR screening value is

0.00008  $\mu\text{g}/\text{m}^3$  and Region 6's is 0.000023  $\mu\text{g}/\text{m}^3$  (not listed in document). Just a quick glance would yield a 1 in a 1000 risk. The risk listed in Table 1 is 6 in 100,000. Even accounting for 7 years vs. 70 still doesn't get one in the risk range calculated by ATSDR. The equations used in this evaluation should be provided as well as the inhalation slope factors used.

*Response:*

In the ATSDR health assessment process, risk assessments are not rote algorithmic determinations, such as one performs when one simply multiplies unit risk by unit concentrations. A health assessment must use site specific conditions to adjust for the frequency and duration of exposure, as well as different receptor populations, activity, etc.

The maximum annual average on-base concentration is 0.034  $\mu\text{g}/\text{m}^3$  for the described five-year meteorological period. Continuous exposure means 24 hours per day, 365 days per year. ATSDR's CREG is a continuous lifetime exposure (70 years, 24 hours per day, 365 days per year - see footnote b, page 10). This consultation concerns exposures to on-base personnel. Therefore, the exposure must be adjusted from a lifetime exposure screening value to reflect the actual exposure conditions, as noted in footnote c, page 10, concerning Estimated Risk. Footnote c describes the exposure scenario used for an on-base exposure. (ATSDR's CREG of 0.00008  $\mu\text{g}/\text{m}^3$  is equivalent to a 1 in 1,000,000 risk). ATSDR used the EPA generic risk assessment equation for inhalation with the stated assumptions and the Region 6 slope factor for inhalation of 2.9 E+02/mg/kg/dy, resulting in a 6E-05 risk. Note that formulas and slope factors are in units of mg, not  $\mu\text{g}$ .

*Comment:*

General. It seems arbitrary to develop a health consultation on anyone who has worked at Kelly AFB only for the last 7 years. This document does suggest, however, that if one worked at Kelly for 25 years based upon the concentrations for the last 7 years, they would be at a greater risk of developing cancer than is acceptable.

*Response:*

This health consultation was developed in response to community concern that present air emissions were causing health effects. It addresses current air emissions from 1995 until base closure (estimated to be 7 years), not the last 7 years. Because the base was projected to be open until 2001, ATSDR addressed the remaining time also. It would be inappropriate to address lifetime exposures to current conditions if those conditions would be different in the future, as different tenants will occupy present industrial space occupied by Kelly AFB. Past exposures (before 1995) to air emissions are being addressed in another consultation (Past Air Emissions). This separation is most appropriate as past exposures may have involved different emissions of different contaminants for a different duration and frequency.



**Attachment B**

**External Peer Review Comments**

## External Peer Review

### 1. Does the public health consultation adequately describe the nature and extent of contamination?

*Comment - Reviewer 1:*

Yes, the document presents a brief history of the consultation, the analyses, and the computed chemical findings. The findings are presented, not as a comprehensive listing of all chemicals analyzed, but as a listing of chemical whose estimated concentrations exceeded the ATSDR screening concentrations. In my opinion, this approach to data presentation facilitates the reading and comprehension of findings.

*Response -* No response needed.

*Comment - Reviewer 2:*

The purpose as described is to follow up on the results of an air dispersion screening model of air emissions from stationary sources to estimate possible air containment concentrations and secondary environmental exposure to the “on base” community - that is those individuals who would not be evaluated as a result of potential “workplace” exposure and OSHA oversight. The period of concern is defined as 1995-2001.

*Response -* No response needed .

*Comment - Reviewer 3:*

Nature of contamination - not adequately described.

The contamination was assumed to have been caused by past activities at the base. These sources were not described or detailed here but the reader is referred to the original Phase 1 PHA that presumably described the nature of the contamination. A brief statement here describing the nature of the contamination would help clarify the document.

Extent of contamination - “somewhat” adequately described

The extent of contamination was determined solely by application of a refined (over Phase 1) atmospheric model. No actual airborne concentrations were determined. It is not clearly stated whether any site validation of the model was considered or conducted. This should be addressed.

*Response:*

Additional information was added to describe the nature of source emissions.

The ISCST-3 air dispersion model has been previously validated by EPA. ATSDR did not consider sampling warranted unless the need was indicated by dispersion modeling because of the complexity and range of source emissions, consisting of over 1400 emission sources and over 200 individual chemicals. The levels conservatively estimated by air dispersion modeling did not indicate a need for further investigation.

### 2. Does the public health consultation adequately describe the existence of potential pathways of human exposure?

*Comment - Reviewer 1:*

It is clear that airborne chemicals represent the only pathway of human exposure considered for this analysis.

*Response - No response needed .*

*Comment - Reviewer 2:*

Short term exposures There is no description or discussion of the number of workers and/or proximity of other individuals in the modeled plume area subject to secondary environmental exposure.

Long term exposures - noncancer health effects There is no description or discussion of the number of workers and/or proximity of other individuals in the modeled plume area subject to secondary environmental exposure.

*Response:*

ATSDR agrees that this information would be necessary if a public health concern had been identified. ATSDR was providing this consultation as a follow-up to the Public Health Assessment, Kelly AFB, 1999. This consultation performed the same evaluation as the PHA, but using a refined air dispersion model to more accurately estimate on-base exposures. If the results of this consultation had indicated a public health concern, follow-up activities would have been recommended to identify workers or individuals subject to secondary exposures in areas where estimated levels of contaminant may have been of concern.

*Comment - Reviewer 3:*

Yes - the potential pathways are adequately described as “secondary exposure” of workers on site, by the inhalation route. The pathway described clearly warrants examination because, again as clearly stated, these workers are not ordinarily protected against such exposure from existing occupational safeguards.

*Response - No response needed .*

### **3. Are all relevant environmental and toxicological data (i.e., hazard identification, exposure assessment) being appropriately used?**

*Comment - Reviewer 1:*

To the best of my knowledge and understanding all relevant data and toxicological principles are appropriately used.

*Response - No response needed .*

*Comment - Reviewer 2:*

The relevant environmental and toxicologic data are being applied as described in appropriate federal guidelines.

*Response - No response needed .*

*Comment - Reviewer 3:*

Relevant environmental data - yes and no - These are appropriately identified and included in the input of the refined mode. Source of the hazard is not clearly indicated.

Hazard identification - the hazardous chemical are clearly identified but their sources are not. See comment #1, “nature of contamination” above for recommendation.

Exposure Assessment - yes - secondary exposure to onsite workers through the inhalation route is clearly identified and appropriately assessed. Conservative estimates, adjusted for site-specific conditions, seem adequate to estimate realistic, worst-case exposure concentrations. The document’s rebuttal to the EPA comment (top of p. 16) seems appropriate.

Toxicological Data - yes - both short term and long term exposures are clearly considered. Predicted 1-hr maximum formaldehyde levels are appropriately compared to values associated with acute irritations. Screening values that result in de minimum cancer risk are clearly presented in Table 1 and these are appropriately used as benchmarks.

*Response:*

Additional characterization of the nature of emission sources has been added.

#### **4. Does the public health consultation accurately and clearly communicate the health threat posed by the site?**

*Comment - Reviewer 1:*

The presentation accurately communicates the health implications of both short-term and longer-term exposures. The acute threat - or absence thereof - is clear and unequivocal. While scientifically, expression of the carcinogenic risk is clear and understandable, I am not certain it is completely clear to the intended audience. A risk of 2 extra cancers per 100,000 people may seem insignificant to you and I - but to some people the seriousness might depend on whether you are a member of the 2 or the 99,998. Perhaps another sentence emphasizing that these estimates are absolutely, ultra conservative worse case scenarios would be in order. But on the other hand, I do not feel adamant about it.

*Response:*

ATSDR has added additional emphasis to note the conservative nature of the assessment.

*Comment - Reviewer 2:*

The conclusions stated on page 6 are clear and unambiguous, given the parameters defined for this public health assessment.

*Response - No response needed .*

*Comment - Reviewer 3:*

Yes. While it is not possible to assess from the document that the model was applied correctly, yielding accurate results, it is reasonable to assume that it was. Assuming that the model outputs are accurate, the authors identified all contaminants of concern and addressed each in a quantitative manner. The consultation clearly indicated a potential acute health threat of “mild to moderate eye irritation” based on modeled 1-hr maximum formaldehyde levels. The consultation also addresses both individual and cumulative chemical exposures for potential cancer excesses. Using a combination of most conservative and site-specific values the resultant statement of “no apparent increase in risk” is clear and appropriate.

*Response - No response needed .*

**5. Are the conclusions and recommendations appropriate in view of the site's condition as described in the public health consultation?**

*Comment - Reviewer 1:*

The conclusion is that the only risk is that highly sensitive people might experience mild to moderate eye irritation. I agree with this conclusion so the absence of recommendations is justifiable.

*Response -* No response needed .

*Comment - Reviewer 2:*

I believe the conclusions and recommendations are appropriate in view of the defined scope of the assessment to current air emissions. I anticipate that the general public's response to the compartmentalization of potential risk in this manner may reflect negatively on ATSDR's efforts.

*Response -* No response needed .

*Comment - Reviewer 3:*

Conclusions - YES. These are clearly stated and seem relevant and appropriate. Both cancer and non-cancer health endpoints are discussed.

Recommendations - NO. Given the conclusion that sensitive individuals may experience adverse health outcomes as often as once per week (a relatively high frequency) some specific, technical, or behavioral recommendations for reducing exposure are in order.

*Response:*

It is not known if there were sensitive individuals outside of the jet engine test facility who would experience the 1-hour maximum during the once per week event. A recommendation is unnecessary because the base is now closed.

**6. Are there any other comments about the public health consultation that you would like to make?**

*Comment - Reviewer 1:*

No.

*Response -* No response needed .

*Comment - Reviewer 2:*

I struggle with the lack of any demographic information regarding on base workers in the defined areas and also the lack of discussion regarding the demographics of off base residents that may live adjacent to Kelly AFB. The compartmentalization of the exposure and risk assessments leads the public to not understand and therefore misinterpret the federal governments (the Air Force and ATSDR's) expensive efforts to describe the activities and potential hazards associated with industrial activities on Kelly AFB. Additionally, it is possible that some of the workers work(ed) on Kelly and live(d) in adjacent neighborhoods. So, again, the compartmentalization of health consultation reports and public health assessments may not be beneficial in improving the public's understanding of the potential for and/or lack of health risks associated with a particular location.

*Response:*

The demographics of off-base residents were addressed in the initial PHA. This consultation only addresses on-base exposures. ATSDR agrees that compartmentalization of health assessments and consultations may not improve the public's understanding of the potential for and/or lack of health risks associated with a particular location. However, at Kelly AFB the compartmentalization could not have been foreseen or avoided. The initial PHA was performed in response to a petition request to specifically assess the neighborhoods north (North Kelly Gardens) and southeast (Quintana Road) of the base. Additional requests were made at later dates by the community and additional activities occurred as recommended by the initial PHA. Upon completion of all ongoing activities by ATSDR, a summary of all assessments and consultations will be presented to the public and a unified public health action plan for resolution of remaining issues will be addressed with all involved stakeholders.

*Comment - Reviewer 3:*

The scope of the consultation is very limited and it seems that some of the comments did not consider that point. Nevertheless, additional explanation of the use of site-specific conditions to reach estimated intake values would probably improve the document.

*Response:*

Additional explanation of the use of site-specific occupational conditions have been added.

## **7. Are there any comments on ATSDR's peer review process?**

*Comment - Reviewer 1:*

As I have indicated many times in the past, I like the peer review process and cannot think of improvements unless it would be to hold more public sessions in Atlanta.

*Response - No response needed .*

*Comment - Reviewer 2:*

No.

*Response - No response needed .*

*Comment - Reviewer 3:*

The process seems fair and objective.

*Response - No response needed .*

## **8. Are there any other comments?**

*Comment - Reviewer 1:*

I felt the author's responses to the public comments were well reasoned and presented in a readable, understandable and coherent manner.

*Response - No response needed .*

*Comment - Reviewer 2:*

No.

*Response - No response needed .*

*Comment - Reviewer 3:*

No.

*Response - No response needed .*