

Letter Health Consultation

Indoor Air Evaluation

ALLIANT TECHNOLOGIES FACILITY
COLORADO SPRINGS, COLORADO

FEBRUARY 17, 2009

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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LETTER HEALTH CONSULTATION

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COLORADO SPRINGS, COLORADO

Prepared By:

Colorado Department of Public Health and Environment
Under a cooperative agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

LETTER HEALTH CONSULTATION

TO: COLLEEN BRISNEHAN (HMWMD/CDPHE)
FROM: SHANNON ROSSITER, MPH (CCPEHA/DCEED/CDPHE)
SUBJECT: ALLIANT TECHNOLOGIES - INDOOR AIR EVALUATION
DATE: 2/17/2009
CC: RAJ GOYAL, PHD (CCPEHA/DCEED/CDPHE)

The Hazardous Materials and Waste Management Division (HM&WMD) requested that Colorado Cooperative Program for Environmental Health Assessments (CCPEHA) evaluate any potential for public health implications to future employees of and visitors to the Lifetime Fitness Facility resulting from exposures to volatile organic compound (VOC)-contaminated indoor air within the future new building on the former Alliant Techsystems (Alliant) property.

The former Alliant facility was built in 1957 and purchased by Honeywell in 1962. Honeywell purchased the facility at 4800 Dry Creek Road to produce electronic equipment. In 1990, Honeywell spun off its defense-related businesses and created an independent defense company, called Alliant Techsystems. When Alliant assumed ownership of the property, it was determined that industrial solvents had apparently been discarded on the property in the 1950s and 1960s.¹ Subsequently, contamination was identified in the shallow aquifer and on-site soils. Additionally, shallow groundwater contamination was found in very low concentrations beneath some nearby private homes in the Heritage Greens development.²

The shallow groundwater containing dissolved VOCs created a concern for potential VOC exposure via vapor intrusion into homes and businesses. Indoor air quality has been measured both in the original, "source" building on the former Alliant property, and in 49 nearby homes. The sampling done in the nearby homes did not detect levels of contamination that required any further action.³

¹ Alliant Technologies. *Dry Creek Road Property Cleanup*. Available on the Internet at: <http://www.atk.com/littleton/default.htm>, last accessed September 2008.

² Alliant Technologies. *Dry Creek Road Property Cleanup*. Available on the Internet at: <http://www.atk.com/littleton/default.htm>, last accessed September 2008.

³ Alliant Technologies. *Dry Creek Road Property Cleanup*. Available on the Internet at: <http://www.atk.com/littleton/default.htm>, last accessed September 2008.

Much remediation has already taken place on-site. With the approval of the CDPHE, Alliant implemented an interim corrective measure consisting of a high-vacuum treatment system to aspirate soil vapor and shallow groundwater from the source area of contamination, remove the contaminants, and return clean water for surface drainage to Big Dry Creek. The most recent groundwater monitoring data indicate that contamination levels are decreasing. For example, groundwater levels of trichloroethene were around 430.0 µg /L in sampling conducted in 2001.⁴ The sampling conducted in 2007 indicates that these contaminant concentrations have been reduced to 120.0 µg /L.⁵

Currently, the area surrounding the site is under construction and re-development. Lifetime Fitness has purchased the site and is in the process of building a fitness facility to meet the recreational needs of the surrounding community. The original, “source” building used by Alliant has been demolished and the area will largely be covered by asphalt parking lot. To date, no paving has occurred. Although the new fitness facility will not be located in the same position on the site as the Alliant “source” building, it will still be located over the plume of VOC contaminated groundwater.

Assessment of vapor intrusion in this scenario is difficult because no building exists at this time. There are three options for estimating indoor air levels of VOCs. The first option is to apply the Johnson-Ettinger Model (JE Model), however, the level of uncertainty associated with the JE Model has lead to CDPHE policy that favors the use of site-specific data in order to avoid these uncertainties. Consequently, it is very difficult to rely on the JE model as the sole basis to determine indoor air concentrations. The second option is to sample a newly constructed building, however, there are sampling limitations in a newly constructed building mainly due to VOC contamination of indoor air from indoor sources such as newly installed carpet, paint, and other building materials. The third option is to use historical indoor air monitoring data. For the purposes of this health consultation, historical indoor air monitoring data from the Alliant “source” building is used as one line of evidence to conservatively evaluate potential health risk from vapor intrusion into the future new Lifetime Fitness Facility building.

Discussion

This evaluation used the data collected by Walsh Environmental Scientists and Engineers, LLC as part of the long term clean up being conducted on the

⁴ URS Corporation (2008). *November 2007 Groundwater Monitoring Event - Alliant Techsystems – Former Dry Creek Road Facility – Centennial, CO – Table 3-1.*

⁵ Walsh Environmental Scientists and Engineers, LLC (2001). *Alliant Techsystems (ATK) Dry Creek Road Facility – Revised Passive Soil Gas Pilot Study on First Quarter Results – Table 6.*

former Alliant site^{6,7}. To measure VOC concentrations, 15 indoor air samples were taken from 5 locations within the original Alliant “source” building in 2001-2002. The collected data is summarized in Appendix A, Table 1.

For the indoor air analyses, the maximum concentration was compared with ATSDR health based environmental guidelines or Comparison Values (CVs) to select contaminants of potential concern (COPCs) for further evaluation of potential health effects. Both chloroform and trichloroethene were retained for further analysis. Exposures to contaminants below the health risk-based environmental guidelines are not expected to result in adverse or harmful health effects and thus were not evaluated further.

Inhalation of indoor air by visitors and workers is considered a potential exposure pathway in this evaluation based on the future land use of the property. Eliminated exposure pathways include the drinking water pathway because the Lifetime Fitness Facility is connected to an established municipal water supply, and therefore there is no risk of exposure to VOCs in the groundwater on-site via ingestion. To estimate theoretical cancer risks and non-cancer hazards, it is assumed that workers and visitors would perform different levels of activities. For example, those with strenuous activities would have an inhalation rate of 20 cubic meters per day (m³/day) and others with a low/moderate level of activity would have an inhalation rate of 9.3 m³/day. The exposure duration for all workers and visitors is assumed to be 250 days/year for 25 years. This assumed exposure duration is very conservative for both workers and visitors, but especially for visitors to the fitness facility.

The theoretical cancer risks for chloroform and trichloroethylene are well within the US Environmental Protection Agency’s (EPA’s) acceptable risk range of 1 in a million to 100 in a million (Appendix A, Table 2) for both activity levels. However, the cumulative theoretical estimated cancer risks for both chloroform and trichloroethylene together are above the CDPHE long-term cancer risk goal (Appendix A, Table 2) for high and low activity levels. As a matter of prudent public health practice, CDPHE prefers that any exposures to potential carcinogens be reduced as much as possible and has established a policy goal of reducing potential long-term cancer risks to 1E-06. Significant non-cancer health effects are not likely from indoor air exposures to chloroform and trichloroethylene because the maximum detected concentrations for chloroform and trichloroethylene are below the ATSDR and/or EPA health guidelines.

⁶ Walsh Environmental Scientists and Engineers, LLC (2002). *Revised Air Sampling Report Phase I Third Quarter Alliant Techsystems (ATK) Dry Creek Road Site Littleton, CO.*

⁷ Walsh Environmental Scientists and Engineers, LLC (2002). *Revised Air Sampling Report 2000 to 2002 Results Alliant Techsystems (ATK) Dry Creek Road Site Littleton, CO.*

Conclusions and Recommendations

In conclusion, indoor air quality inside the proposed future Lifetime Fitness Facility building is considered to constitute an indeterminate public health hazard because of the uncertainties associated with predicting indoor air concentrations in any new building that does not exist at this time. These uncertainties include limitations of the JE modeling and indoor air sampling of a new building, as already discussed above.

It is, however, important to consider the likelihood of vapor intrusion in the new building due to high concentration of VOCs in the groundwater as indicated by historical indoor air samples from the “source” building. Thus, as a matter of prudent public health practice the following recommendations should be implemented for the future Lifetime Fitness Facility:

- Reduce exposure to VOCs from the vapor intrusion pathway in any newly constructed buildings, by implementing an air exchange system, vapor intrusion controls, or other types of mitigation. Installation of a vapor mitigation system would eliminate the need for any further indoor air monitoring.
- If a vapor intrusion mitigation system is not installed, conduct air monitoring inside any newly constructed building built above the plume of groundwater contamination. However, sampling in newly constructed building would be problematic due to indoor sources of VOCs, which could be quite high with newly installed carpet, paint, and other building materials.
- Limit the construction of any storm water detention ponds or any man-made water features to areas of the property with no VOC impacts to groundwater.
- Continue on-going groundwater monitoring.

Appendix A. Tables and Figures

Figure 1. Area map showing the concentration contours of TCE in groundwater near the former Alliant facility

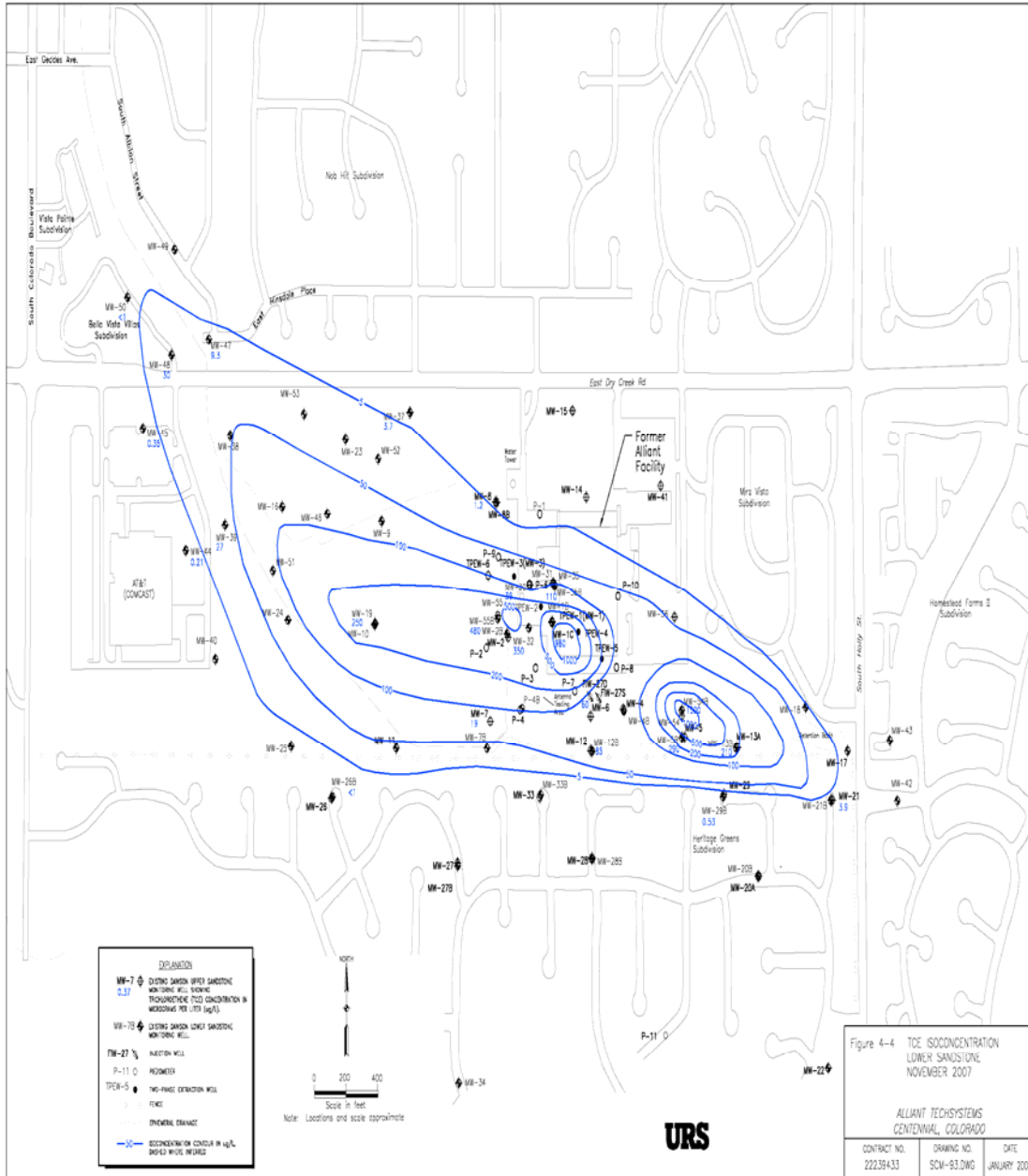


Table 1. Summary of Data Collected in the former Alliant “source” building, 2001-2002.

Compound	Max Value (µg/m ³)	CV Region 3 RBC (µg/m ³)	CV Chronic EMEG (µg/m ³)	CV Intermediate EMEG (µg/m ³)	CV CREG (µg/m ³)	COPC?
1, 1, 2-Trichloro-1,2, 2-trifluoroethane	0.77 J	31390	NA	NA	NA	N
1,1-Dichloroethene	0.061	219	NA	80	NA	N
Chloroform	1.5	0.08	100	200	0.04	Y
cis-1, 2-Dichloroethene	0.056	60.83	NA	NA	NA	N
Trichloroethene	0.72	0.02	NA	500	NA	Y
Trichlorofluoromethane	21	730	NA	NA	NA	N

Note:

- CV= Comparison value for screening COPCs
- ug/m³ = Micrograms per Cubic Meter of Air
- NA = Not Applicable
- RBC = Risk Based Concentration
- EMEG = Environmental Media Evaluation Guide
- CREG = Cancer Risk Evaluation Guide
- COPC = Contaminant of Potential Concern
- J = Results detected below the reporting limit or is estimated

Table 2. Theoretical Cancer Risks for Future Visitors and Workers based on Contaminants Detected in the indoor air of former Alliant “source” building

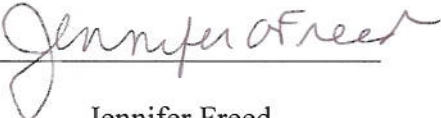
Contaminant	Air Max Value ($\mu\text{g}/\text{m}^3$)	Target Cancer Risk	Cancer Risk Low Exposure	Cancer Risk High Exposure
Chloroform	1.5	1.00E-06	3.95E-06	8.49E-06
Trichloroethylene	0.72	1.00E-06	9.36E-06	2.01E-05
Cumulative Cancer Risk			1.33E-05	2.86E-05

Note:

- $\mu\text{g}/\text{m}^3$ = Micrograms per Cubic Meter of Air
- m^3/day = Cubic Meters per day
- Max = Maximum
- High exposure = inhalation rate of 2.5 m^3/hour for 8 hours (20 m^3/day)
- Low exposure = inhalation rate of 1.16 m^3/hour for 8 hours (9.3 m^3/day)

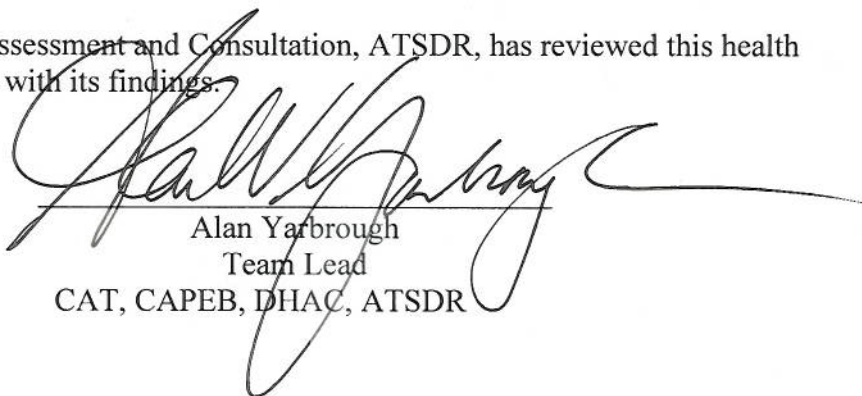
Certification

This health consultation was prepared by the Colorado Department of Public Health and Environment under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved methodology and procedures existing at the time, the health consultation was conducted. Editorial review was completed by the cooperative agreement partner.



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The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation, and concurs with its findings.



Alan Yarbrough
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