HEALTH CONSULTATION

PUBLIC HEALTH EVALUATION

OF

PRIVATE WELL SAMPLING DATA

IN

THE

TUTTLE ROAD AREA,

DURHAM,

MIDDLESEX COUNTY, CONNECTICUT

August 12, 2011

Prepared by
The Connecticut Department of Public Health

SUMMARY

INTRODUCTION

In the fall of 2010, the Connecticut Department of Energy and Environmental Protection (CT DEEP) requested that the Connecticut Department of Public Health (CT DPH) evaluate the public health significance of private well sampling data in the Tuttle Rd area of Durham, Connecticut.

In November/December 2010, 9 private wells in the Tuttle Rd. community were found to have elevated trichloroethylene (TCE) levels. Immediately following the positive well results, all of these residences were given whole house filters.

CT DEEP will continue to monitor these contaminated wells and maintain the whole house filters. They will also monitor nearby wells in the immediate area to ensure that the contamination has not become more widespread in the neighborhood.

CONCLUSION

CT DPH evaluated past exposures to trichloroethylene in the well water. CT DPH reached the following conclusion in the health consultation:

In the past, residents who had elevated levels of TCE in their well water were exposed to this contaminant by drinking, bathing and showering, and by breathing household air. Residents whose private well water with lower levels of TCE were not exposed to amounts of TCE that could harm their health. Residents whose private well water with the highest levels of TCE were exposed to amounts of TCE that could have harmed their health. Exposure to high levels of TCE can damage the liver, kidneys, and impact the immune system. In pregnant women, it can impair fetal development. Over time, exposure may lead to increased risk of kidney and liver, leukemia, and lymphohematopoietic cancers.

Basis for Conclusion

Maximum exposure doses for TCE were well above the safe dose and estimated lifetime cancer risk is moderate. In addition, maximum TCE exposure dose exceeds cancer effect levels in human toxicology studies. The average exposure dose for TCE does not exceed cancer effect levels.

Next Steps

The town and CT DEP will continue to monitor and maintain whole house filters in the residences with contaminated well water. In addition, they will also continue to monitor nearby wells to ensure that the groundwater contamination has not become more widespread.

The conclusions and recommendations in this health consultation are based on the data and information made available to the Connecticut Department of Public Health (CT DPH). CT DPH will review additional information when received. The review of additional data could change the conclusions and recommendations listed in this document. This report was supported by funds from a cooperative agreement with the Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services. This document has neither been reviewed nor cleared by ATSDR.

BACKGROUND AND STATEMENT OF ISSUE

In the fall of 2010, the Connecticut Department of Energy and Environmental Protection (CT DEEP) requested that the Connecticut Department of Public Health (CT DPH) evaluate the public health significance of private well sampling data in the Tuttle Road (Rd.) area of Durham, Connecticut. The main focus of this health consultation will be evaluating private well sampling data from the Tuttle Rd. area (the site).

The Tuttle Rd area of Durham, Connecticut is located in the north central section of Durham, CT. Wallingford Road (Route 68) intersects Tuttle Road just south of where it crosses over the Coginchaug River. Tuttle Road turns into Dunn Hill Road when it crosses over Route 68. Clear Ridge Road and Old Wallingford Road are located east and southwest of Tuttle Road, respectively. The Durham Meadows Superfund Site is located a few miles from the Tuttle Road area. The site is in a residential area.

In the fall of 2010, CT DEEP received well water sampling data from 9 private wells from the Tuttle Road area site as part of an outreach program in the area near Brewster School whose well was contaminated with elevated levels of arsenic.

These nine wells were found to have TCE concentrations above state drinking water action levels (AL). ALs are health-based concentrations for private well water above which, CT DEEP is authorized to provide drinking water treatment or bottled water to residents. The source of the contamination is unknown at this time. When the contamination was reported, CT DEEP provided these 9 residences with bottled water and within a few weeks, installed whole house filter systems in all of the homes. CT DEEP will continue to monitor these wells quarterly and maintain the whole house filter systems regularly.

Demographics

The site is in Durham, Connecticut whose population is approximately 2,933. The town's total area is approximately 22.3 square miles (United States Census Bureau 2010).

According to 2010 census data, 96% of Durham's residents are Caucasian and approximately 2% are Hispanic and 2% Asian.

Environmental Contamination and Health Comparison Values

Private Well Sampling Data

As stated previously, in 2010, CT DEEP and the Durham Health Department received reports of elevated levels of TCE in 9 private wells in the Tuttle Rd. area.

Eight of the 9 private wells have TCE concentrations that exceeded the AL of 5 parts per billion (ppb). The maximum TCE concentration was 613 parts per billion (ppb) and approximately 120 times above the AL. The average TCE concentration in the 9 wells was 121 ppb.

Table 1. Summary of Private Well Sampling Data Results from 9 Residences in the Tuttle Rd Area of Durham, Connecticut, October and November 2010.

Contaminant	Concentration Range (ppb^)	Number of Wells That Had One or More Exceedances of the Comparison Value/Number of Wells	Comparison Value (ppb)	Comparison Value Source
TCE	4.2-613	8/9	5	CT AL*

^parts per billion
*Draft Connecticut Action Level (Expected to be final in fall 2011)

DISCUSSION

Exposure Pathway Analysis

To evaluate potential exposures to private well contaminants from the site, CT DPH evaluated the environmental data and considered how people might come into contact with contaminants in private well water. The possible pathways of exposure are dermal, inhalation, and ingestion. In other words, in order to be exposed to contaminants in private well water, one must come into contact with the water by touching it, breathing vaporized water particles, or drinking the water.

Past Conditions

Eight of the nine homes had wells whose water contained TCE levels that exceeded the AL. Since all of the homes were immediately provided with bottled water in the fall of 2010 and a few weeks later, whole house treatment systems, ingestion is evaluated only as a past exposure pathway. Thirty years is assumed to be the past exposure duration, although the actual exposure duration is unknown.

In addition, adults and children were exposed to TCE during normal household activities (bathing and showering). Therefore, inhalation and dermal exposure during these regular household activities as well as daily exposure to household air are considered a complete

pathway in the past. Thirty years is also assumed to be the past exposure duration for inhalation and dermal exposure, although the actual exposure duration is unknown. Ingestion, dermal exposure and inhalation of TCE through private well water in the past are evaluated further in the next section.

Current Conditions

Because residents with these contaminated private wells are all on whole house treatment systems and thus, are no longer drinking the contaminated well water or using it for cooking purposes, ingestion is not considered a current pathway of exposure. In addition, since residents are no longer bathing or showering in contaminated well water or breathing contaminated household air, dermal and inhalation exposures are no longer considered a complete exposure pathway and are not evaluated further in the next section.

Public Health Implications for Adults and Children

When determining the public health implications of exposure to hazardous contaminants, CT DPH considers how people might come into contact with contaminants and compares contaminant concentrations with health protective comparison values. When contaminant levels are below health-based comparison values, health impacts from exposure to those levels are unlikely. Contaminant levels exceeding comparison values do not indicate that health impacts are likely but instead warrant further evaluation. In this health consultation, CT DPH used established ALs as health protective screening values. As stated previously, AL are health-based concentrations for private well water above which, CT DEEP is authorized to provide drinking water treatment or bottled water to residents. CT DPH only evaluated completed exposure pathways where private well contamination exceeded the ALs. General toxicology information on TCE is provided in Appendix B.

Table 1 indicates that TCE was detected in 8 private wells at levels above the AL in the Tuttle Rd area. Exposure to private well water in the past is a complete exposure pathway. Since there was a sufficient number of private well samples, CT DPH used the average TCE concentration (instead of a 95% Upper Confidence Limit) as well as the maximum TCE concentration found in the private well sample results to estimate risk. A child/adult, aged 1-30, was assumed to be exposed to average (121 ppb) and a more conservative, but realistic maximum level of 613 ppb of TCE for 30 years CT DPH assumed that contact with private well water occurred daily (365 days/year) through normal routine activities like bathing, showering, and drinking and that children ingested 1 L/day and adults ingested 2 L/day of private well water. Bathing and showering duration was assumed to be 15 minutes.

CT DPH calculated risk estimates based on the maximum TCE concentration found in the private wells. This approach was selected because it is important to give a broader perspective of the potential for health risks. The TCE concentrations in the 9 wells vary widely (4.9-613 ppb). The potential health risk for residents who were exposed to lower levels of TCE from private well water will have lower risk for health effects than residents exposed to private well water with the maximum level of TCE.

Uncertainties

It is important to note that there is some uncertainty with regard to exposure duration assumptions in our risk estimate for both non-cancer and cancer effects. We do not know how long residents living in the Tuttle Road area were exposed to TCE in their private well water. True exposure duration maybe less than 30 years however, at least one third of the residents in the homes have lived there for about 30 years. TCE doses and risk calculations are found in Appendix C.

One must also emphasize that there is a large degree of uncertainty in the non-cancer and cancer risk calculations because of the lack of historical data on TCE in private well water in the Tuttle Rd area. A single measurement may not be representative of past water concentrations. Average TCE concentrations in private well water could be greater or less than the concentration used in this risk assessment.

Non-cancer Effects

Scenario 1. Average TCE concentration of 121 ppb

Assuming that total exposure from dermal contact and inhalation was 3 times the ingestion dose (Ginsberg, 2011) and the average concentration of 121 ppb as the exposure level, the total average daily dose from ingestion, dermal, and inhalation exposure is 28 ug/kg/day. This dose greatly exceeds the US EPA's proposed reference dose (RfD) of 0.3 ug/kg/day (EPA 2001). RfDs are estimates of daily exposure to humans that are likely to be without harmful non-cancer effects. Because the estimated average daily dose from the site exceeded the RfD, non-cancer effects from past exposure to TCE in private well water from the site can not be ruled out. Dose and risk calculations are provided in Appendix C.

To provide further perspective on non-cancer risk calculations, CT DPH compared the estimated average daily dose from the site with effect levels from toxicology literature (Table 2). The site dose is much lower than the effect level for adverse health effects in reported rodent toxicology studies. Because of this, non-cancer effects from exposure to TCE are not likely.

Scenario 2. Maximum TCE concentration of 613 ppb

Using the maximum concentration of 613 ppb as the exposure level, the average daily dose from the site is 144 ug/kg/day. This dose greatly exceeds the US EPA's proposed reference dose (RfD) of 0.3 ug/kg/day (EPA 2001). Because the average dose from the site greatly exceeded the RfD, non-cancer effects from past exposure to TCE in private well water from the site can not be ruled out. Dose and risk calculations are provided in Appendix C.

To provide further perspective on non-cancer risk calculations, CT DPH compared the estimated dose from the site with effect levels from toxicology literature (Tables 2 and 3). Even using the maximum TCE concentration detected in well water, the estimated dose from the site is much lower than the effect level for adverse health effects reported rodent toxicology studies. Because of this, non-cancer effects from exposure to TCE are not likely.

Tables 2 and 3. Estimated Doses for TCE: A Comparison of Average Daily Doses (ADD) from Drinking Contaminated Water in the Tuttle Road area of Durham, CT to Noncancer and Cancer Effect Levels From Toxicology

Table 2

TCE Dose from drinking water in the Tuttle Rd. Area in Durham, CT (ug/kg/day)	Comments
8	Estimated LADD* for cancer effects using average private well concentration
36	Estimated LADD for cancer effects using highest private well concentration
28	Estimated ADD for non-cancer effects using average private well concentration
144	Estimated ADD for non-cancer effects using highest private well concentration

Table 3

Effect Level from the Literature (ug/kg/day)	Comment
33000-67000	Human equivalent LED_{01} # based on kidney tumors, (EPA 2001) in rats exposed by ingestion.
500-3100	Range of human equivalent LED_{01} values based on liver tumors in mice by ingestion and inhalation (EPA 2001)
3950	Human equivalent LED_{10} for testicular tumors in rats
2800	LED_{01} for renal cell carcinoma in human workers (Charbotel 2006)
5000	LED_{01} for kidney cancer in German cardboard workers exposed by inhalation (EPA 2001)
14-1400	Range of LED_{01} values for cancer (non-Hodgkin's lymphoma, liver cancer, kidney cancer) in Finnish workers exposed to TCE and other solvents (EPA 2001).
250,000-1,160,000	LOAEL^ for renal effects in rats and mice (ASTDR 1997)

*Lifetime Average Daily Dose

^Lowest Adverse Effect Level

#Lower 95% Confidence Limit on the effective dose to 1% of the population

Cancer Effects

CT DPH also estimated lifetime cancer risks from exposure to TCE for community members drinking, bathing and showering, and breathing air with contaminated well water from the Tuttle Rd. area. CT DPH assumed that total exposure from dermal contact and inhalation was 3 times the ingestion dose (Ginsberg, 2011).

CT DPH uses the draft cancer slope factor of 0.05 $(mg/kg/day)^{-1}$ when evaluating theoretical cancer risk for exposure to trichloroethylene. This draft cancer slope factor was derived by the US EPA in 2009 and is based upon recent human data (mainly renal and liver cancer) and is consistent with other human studies such as leukemia, lymphohematopoietic in community drinking water and occupational studies and the animal cancer bioassay database (Ginsberg 2011, US EPA 2009). This value is 8.5 fold greater than the California Office of Environmental Health Hazard Assessment (OEHHA 2009) determination (0.0059 $(mg/kg/day)^{-1}$) which is based on dose response in animals. While the California OEHHA determination has the advantage of being a final value that is actually in use in California, the draft US EPA value has the advantage of being derived from human toxicology data. While the US EPA intends on making this cancer slope factor final in 2011, it is currently a draft value.

Scenario 1. Average TCE concentration of 121 ppb

If a community member was exposed to the contaminated well water every day for 30 years at the average detected concentration of 121 ppb, it would result in a lifetime average daily dose of 7.8 ug/kg/day. Using the US EPA's draft oral cancer slope factor, the maximum theoretical risk would be 4 in 10,000. This means that there might be 4 excess cancers in a population of 10,000 exposed to the contaminated well water every day for 30 years. This theoretical cancer risk estimate indicates low increased lifetime incremental cancer risk from exposure to TCE. When a theoretical cancer risk is greater than 1×10^{-4}, or one excess cancer risk in 10,000 cases, then it is thought to be low increased risk of possible cancer related to that chemical exposure.

Background rates of cancer in the United States are 1 in 2 or 3 (NCI 2001). This means that in a population of 10,000, background numbers of cases would be approximately 3,333 to 5,000.

To provide further perspective on cancer risk calculations, CT DPH compared the estimated dose with effect levels from toxicology literature (Table 2). The estimated average dose is lower than the effect level for cancer health effects reported both human and rodent toxicology studies. Because of this, cancer effects from exposure to TCE are not likely.

Scenario 1. Maximum TCE concentration of 613 ppb

If a community member was exposed to the contaminated well water from the site every day for 30 years at the average detected concentration of 613 ppb, it would result in a dose of 36 ug/kg/day. Using the US EPA's draft oral cancer slope factor, the maximum theoretical risk would be 2 in 1,000. This means that there might be 2 excess cancer case in a population of 1,000 exposed to the contaminated well water every day for 30 years. This theoretical cancer risk estimate indicates moderate increased lifetime incremental cancer risk from exposure to TCE. If

a theoretical cancer risk is greater than 1 x $10^{-3,}$ or one excess cancer risk in 1,000 cases, then it is thought to be a moderate increased risk of possible cancer related to that chemical exposure.

Background rates of cancer in the United States are 1 in 2 or 3 (NCI 2001). This means that in a population of 1,000, background numbers of cases would be approximately 333 to 500.

To provide further perspective on cancer risk calculations, CT DPH compared the estimated dose with effect levels from toxicology literature (Tables 2 and 3). The estimated dose is lower than the effect level for human and rodent health effects reported in a range of toxicology studies. However, it should be noted that there is one study that reported cancer health effects in humans (non-Hodgkin's lymphoma, liver cancer, and kidney cancer) at a dose lower than the dose estimated from exposure to private well water at the site.

One must also re-emphasize that there is a large degree of uncertainty in the cancer risk calculation because of the lack of historic data on TCE in private well water. A single measurement is not enough data to base a decision about whether TCE (or any other contaminant) in a private well is likely to result in adverse cancer health effects. Nevertheless, since the maximum dose exceeds one effect level from toxicology literature, one cannot rule out risk for cancer effects.

EVALUATION OF COMMUNITY CONCERNS

1) Residents of the homes with contaminated private well water are concerned about health effects from drinking the contaminated water for an extended period of time.

   It is unknown how long trichloroethylene has been present in the drinking water in the Tuttle Rd area. Over a long period of time, exposure to higher levels (613 ppb) of TCE through the private well water, may result in adverse health effects. Exposure to high levels of TCE can damage the liver, kidneys, and impact the immune system. In pregnant women, it can impair fetal development. Over time, exposure may lead to increased risk of kidney, liver, leukemia, and lymphohematopoietic cancers.

2) Residents of the home with contaminated private well water are concerned that the whole house filters will not adequately filter out all of the TCE in the private well water.

   The contaminated wells in the Tuttle Road area of Durham, Connecticut are being addressed under 22a-471 of the Connecticut General Statutes which calls for a plan, overseen by CT DEEP, which provides for immediate delivery of bottled water, along with treatment or an alternate water supply for long-term use.

With proper maintenance and monitoring, the 9 whole house filters will effectively remove all of the TCE from the private well water. The CT DEEP is responsible for the maintenance and quarterly monitoring of the 9 whole house filters in the Tuttle Rd area. In addition, a recent round of monitoring in January showed that the whole house filters effectively removed all of the TCE from the 9 contaminated wells in the Tuttle Rd area.

CONCLUSIONS

Several private wells in the Tuttle Rd area had TCE concentrations that exceeded federal drinking water standards and state drinking water action levels. Some of these homeowners and their families may have been ingesting this contaminated water for a long period of time. They are presently being provided with whole house filters.

In the past, residents were exposed to TCE in their well water from drinking the water, as well as from showering, bathing, and breathing household air. Exposure to average levels of this contaminant is not expected to harm people's health. However, exposure to the highest levels of TCE may harm people's health. Exposure to TCE can damage the liver, kidneys, and impact the immune system. In pregnant women, it can impair fetal development. Over time, exposure may lead to increased risk of kidney, liver, leukemia, and lymphohematopoietic cancers.

RECOMMENDATIONS

1. CT DPH recommends that CT DEEP continue to monitor the 9 contaminated private wells as well as any nearby private wells that are vulnerable to contamination from the site and provide those results to CT DPH and the Durham Health Department for evaluation of public health risk.

2. CT DPH recommends that community members who live in the affected area consult with their physicians if they have questions about health issues that could be related to exposure to the contaminated private well water.

PUBLIC HEALTH PLAN

Actions Taken

1. CT DPH, with the assistance of the Durham Health Department and CT DEEP, contacted all of the 9 residents whose private wells contained TCE and answered health related questions about TCE exposure. In addition, CT DPH distributed health related information via a TCE Fact Sheet to several residents (Appendix B).

Actions Planned

1. CT DPH will make this health consultation available to residents of the Tuttle Road area of Durham, CT.

2. CT DPH will continue to work with CT DEEP and the town of Durham to respond to health questions and concerns regarding private well contamination from the site.

3. CT DPH will review any additional private well data for this site and update this health consultation, if necessary.

REFERENCES

[ATSDR 1997] Agency for Toxic Substances and Disease Registry. 1997. Toxicological Profile for TCE. Atlanta: US Department of Health and Human Services.

[Charbotel 2006] Charbotel, B; Fevotte, J; Hours, M. Case-control study on renal cell cancer and occupational exposure to trichloroethylene. Part II: Epidemiological aspects. Ann Occup Hyg 50(8):777−787.

[EPA 1997] United States Environmental Protection Agency. August 1997. Exposure Factors Handbook.-Available at: http://www.epa.gov/ncea/pdfs/efh/front2.pdf. Accessed on February 24, 2006.

[EPA 2001] Trichloroethylene Risk Assessment: Synthesis and Characterization. External Review Draft. August 2001 Available At: http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=23249#Download. Accessed on August 11, 2011.

[EPA 2009] Toxicological Review of Trichloroethylene. In Support of Summary Information on the Integrated Risk Information System (IRIS). External Review Draft. Available at: http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=215006. Accessed on June 9, 2011.

[Ginsberg 2011] Connecticut Department of Public Health, Environmental and Occupational Health Assessment Program. June 2011. Draft Drinking Water Determination for Trichloroethylene.

[NCI 2001] National Cancer Institute. Cancer statistics review, 1973-1998; lifetime probability of developing or dying from cancer. National Cancer Institute SEER Program. Available at: http://seer.cancer.gov/csr/1973_1998/index.html. Accessed on August 9, 2011.

[OEHHA 2009] State of California. Office of Environmental Health Hazard Assessment. July 2009. Public Health Goals for Chemicals in Drinking Water: Trichloroethylene.

[United States Census Bureau 2010] American Fact Finder. Census 2010 Summary. Available at: http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk. Accessed on August 9, 2011.

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Appendix A
Map of the Tuttle Road area. Durham, CT

Appendix B
ATSDR Trichloroethylene Fact Sheet

Appendix C
Risk Calculations

TCE

NONCANCER RISK (Assuming average TCE concentration of 121 ppb)

Ingestion, Ave Concentration, child, aged 1-6 years

Ing Rate (L/day)	[Conc] (ug/L)	ED (yr)	1/BWc (1/kg)	1/Atnc (1/yr)	ADDi (ug/kg/day)	RfD (ug/kg/day)	Total ADDing (ug/kg/day)	HI
1.00	121.00	6.00	0.06	0.17	7.12	0.30	28.47	95

CANCER RISK (child/adult age 1-30) (Assuming average TCE concentration of 121 ppb)

Ingestion, Ave Concentration, child, aged 1-6 years

Ing Rate (L/day)	[Conc] (ug/L)	ED (yr)	1/BWc (1/kg)	1/Atc (1/yr)	ADDi (ug/kg/day)	Total ADDing	Total ADD	Conv to mg/kg/day	CSF	ELCR
1.00	121.00	6.00	0.06	0.01	0.61	1.80	7.18	0.00718	0.05	0.00036

Ingestion, Ave Concentration, child/adult, aged 6-30 years

Ing Rate (L/day)	[Conc] (ug/L)	ED (yr)	1/BWa (1/kg)	1/Atc (1/yr)	ADDi (ug/kg/day)
2.00	121.00	24.00	0.01	0.01	1.19

NONCANCER RISK (Assuming max TCE concentration of 613 ppb)

Ingestion, Max Concentration, child, aged 1-6 years

Ing Rate (L/day)	[Conc] (ug/L)	ED (yr)	1/BWc (1/kg)	1/Atnc (1/yr)	ADDi (ug/kg/day	RFD (ug/kg/day)	Total ADDing	HI
1.00	613.00	6.00	0.06	0.17	36.06	0.30	144.24	481

CANCER RISK (child/adult age 1-30) (Assuming max TCE concentration of 613 ppb)

Ingestion, Max Concentration, child, aged 1-6 years

Ing Rate (L/day)	[Conc] (ug/L)	ED (yr)	1/BWc (1/kg)	1/Atc (1/yr)	ADDi (ug/kg/day)	Total ADDIng	Total ADD	Conv to mg/kg/day	CSF	ELCR
1.00	613.00	6.00	0.06	0.01	3.09	9.10	36.38	0.03638	0.05	0.00182

Ingestion, Ave Concentration, child/adult, aged 6-30 years

Ing Rate (L/day)	[Conc] (ug/L)	ED (yr)	1/BWa (1/kg)	1/Atc (1/yr)	ADDi (ug/kg/day)
2.00	613.00	24.00	0.01	0.01	6.00

WHERE:

ADD_i	= Average daily dose from ingestion (ug/kg/day)
AT_{nc}	= Averaging time for non-cancer risk: 6 years
AT_c	= Averaging time for cancer risk: 70 years
Bw	= Child 50^{th} %tile body weight for age 1-6 yrs; 17 kg ; adult, 70 kg (EPA 1997).
[Conc]	= TCE concentration, (average): 121 ug/L; (maximum):613 ug/L
CSF	= Cancer slope factor, TCE: 0.05 $(mg/kg/day)^{-1}$ (Ginsberg 2011, US EPA 2009)
ED	= Exposure duration; 6 years (child, age 1-6 years), 24 year (child/adult)
ELCR	= Estimated Lifetime Cancer Risk
HI	= Hazard index
Ing Rate	= Ingestion rate, child: 1L/day, adult: 2 L/day
RfD	= EPA reference dose trichloroethylene; 0.3 ug/kg/day (EPA 2001)
Total ADD	= Total average daily dose from ingestion, inhalation (from bathing/shower and from household air), and from dermal contact (ug/kg/day)