

Name: Danversport Explosion Air Action Levels
ERS LOG #:

ATSDR Record of Activity

ROUTING:
J. Holler M. Schwartz
ERS FILES

UID #: RAN2 Date: 12/04/2006 Time: 1735 am pm

Site Name: Danversport Explosion – Air Action Levels City: Danvers Cnty: Essex State: MA

CERCLIS #: _____ Cost Recovery #: 10DT Region: 01

Site Status (1) NPL Non-NPL RCRA Non-Site specific Federal
(2) Emergency Response Remedial Other:

Activities

Incoming Call Public Meeting* Health Consult* Site Visit*
 Outgoing Call Other Meeting Health Referral Info Provided
 Conference Call Data Review Written Response Training
 Incoming Mail Other :

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Contacts and Affiliation

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|---------------|---------------|---------------|-----------------|---------------|
| 1-EPA | 2-USCG | 3-OTHER FED | 4-STATE ENV | 5-STATE HLT |
| 6-COUNTY HLTH | 7-CITY HLTH | 8-HOSPITAL | 9-LAW ENFORCE | 10-FIRE DEPT |
| 11-POISON CTR | 12-PRIV CITZ | 13-OTHER | 14-UNKNOWN | 15-DOD |
| 16-DOE | 17-NOAA | 18-OTHR STATE | 19-OTHR COUNTY | 20-OTHR CITY |
| 21-INTL | 22-CITZ GROUP | 23-ELECT. OFF | 24-PRIV. CO | 25-NEWS MEDIA |
| 26-ARMY | 27-NAVY | 28-AIR FORCE | 29-DEF LOG AGCY | 30-NRC |
| 31-ATSDR | | | | |

Program Areas

Health Assessment Health Studies Tox Info-profile Worker Hlth
 Petition Assessment Health Surveillnc Tox Info-Nonprofil Admin
 Emergency Response Disease Registry Subst-Spec Resch Other
 Health Consultation Exposr Registry Health Education

Narrative Summary:

As part of the continuing support to EPA Region I and the state, ATSDR was requested to work with the Massachusetts Department of Public Health (MaDPH) to provide chemical specific ambient air action levels for each compound identified so far in the air around the explosion site in Danvers, MA for both acute

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exposures and for the duration of the cleanup. For the purposes of this request, EPA requested that ATSDR consider acute exposure duration to be 1 hour or less, while the duration of the cleanup was estimated to last one month. The Massachusetts Department of Environmental Protection asked that the action levels be protective of the most sensitive individuals likely to be in the vicinity of the sites. In this case as is generally accepted, an action level is a concentration in air at which, if attained, some action by responders should be considered. In this instance, the actions to be considered could include but may not be limited to: additional more detailed characterization of the environment, such as additional air sampling at offsite locations; a qualitative assessment of the potential for human exposure to any detected hazard, especially offsite; modification of site work practices to reduce opportunities for migration of contaminants offsite; or, changes in protective measures for either workers, nearby residents, or both. The specific action necessary to protect human health and the environment will be identified and implemented by the federal On-Scene Coordinator and the Unified Command.

The compounds identified to date are listed in the following table.

Chemical	Chemical	Chemical
1,1,1-Trichloroethane	Ethylbenzene	Tetrachloroethylene
1,2,4-Trimethylbenzene	Heptane	Toluene
1,3,5-Trimethylbenzene	Hexane	Tetrahydrofuran
4-Ethyltoluene	Methyl Ethyl Ketone	Trichlorofluoromethane
Benzene	Methyl Isobutyl Ketone	Trichlorotrifluoroethane
Chloroform	Methylene Chloride	m/p-Xylene
Carbon Tetrachloride	Methyl t-Butyl Ether	o-Xylene
Dichlorodifluoromethane	Styrene	

Acute Exposure Action Levels

Several organizations have attempted to develop one hour exposure values despite significant scientific challenges. The three best known efforts are: Department of Energy's Brookhaven National Laboratory's Temporary Emergency Evacuation Levels (TEELs), the American Industrial Hygiene Association's Emergency Response Planning Guides (ERPGs), and the Acute Exposure Guidance Levels (AEGs) developed a consortium of public and private agencies working with the EPA. There are advantages and disadvantages to each of these values. Based on the agreed parameters and the compounds we were working with, ATSDR and MaDPH considered primarily the use of the TEELs. These values were compared with other available data and adjusted to meet the criteria of protecting the most sensitive populations. The majority of the action levels for the chemicals found at this site when adjusted in this manner were in the 1 to 5 ppm range. The health agencies concluded that it would be more efficient for EPA to monitor for total VOCs as suggested in the site specific air monitoring plan. When the 1 and 5 ppm action levels specified in that plan were exceeded, ATSDR and MaDPH would review the resulting laboratory data and provide a rapid response to EPA on the significance of any individual compounds detected.

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Longer Term Action Levels

For the longer term action levels within the parameters of this request, the default basis for each chemical was the Intermediate Minimal Risk Level (MRL) of ATSDR as published in the applicable Toxicological Profile. If an Intermediate MRL was not available, a Chronic MRL was chosen. If there were no MRLs, then the US EPA Reference Concentration (RfC) as listed in their on-line database – the Integrated Risk Information System (IRIS) - was chosen. If no MRLs or RfCs were found, then a search of various databases was done in order to identify an appropriate study of suitable duration. If there was more than one study of appropriate length, the more conservative value was selected. The concentrations reported in these studies were subjected to uncertainty values as described in Appendix F of the ATSDR Public Health Assessment Guidance Manual as described in detail below.

An MRL is an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse noncancer health effects over a specified duration of exposure. These substance specific estimates, which are intended to serve as screening levels, are used by ATSDR health assessors and other responders to identify contaminants and potential health effects that may be of concern at hazardous waste sites. It is important to note that MRLs are not intended to define clean up levels for ATSDR or other Agencies. In the case of an Intermediate MRL, the specified period of exposure is 14-365 days. For a Chronic MRL, the specified period of exposure is more than one year.

A RfC is an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. It can be derived from a NOAEL, LOAEL, or benchmark concentration, with uncertainty factors generally applied to reflect limitations of the data used. All of the RfCs for the chemicals identified to date assume a lifetime of exposure.

Both MRLs and RfCs are generally considered protective of the most sensitive populations.

Derived Values

For Heptane: A 1995 study reported in the Registry of Toxic Effects of Chemical Substances (RTECS) maintained by the National Institute for Occupational Safety and Health (NIOSH), part of the Centers for Disease Control and Prevention (CDC), indicates exposure of rats to 4000 parts per million (ppm) of heptane for 6 hours a day over a period of 28 days produces weight loss and some minor central nervous system effects. Modifying the daily exposure to a 24 hour exposure and dividing by uncertainty factors of 1000 yields an action level of 1 ppm. In this case, a standard uncertainty factor of 10 was used because this study was an animal study and not a human one; a second uncertainty factor of 10 was used to account for human variability; and a third uncertainty factor of 10 was used because health effects were reported in the study.

For 4-Ethyltoluene: A study published in 2000 in the International Journal of Occupational Medicine and Environmental Health was abstracted into the TOXLINE database of the Toxicology Data Network (TOXNET) maintained by the National Library of Medicine (NLM), part of the National Institutes of Health. Rats exposed to 477 milligrams of ethyltoluene per cubic meter of air (mg/m³) for 6 hours a day

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over a 20 day period did not suffer any adverse health effects. Converting to parts per million parts and applying similar uncertainty factors as described above yields an action level of 97 parts per billion (ppb).

For Tetrahydrofuran: In a 1982 study of rats published in the Japanese Journal of Industrial Health and reported in the Hazardous Substance Databank of the NLM's TOXNET, animals exposed to 100 ppm of tetrahydrofuran for 4 hours a day for 12 weeks suffered only nasal irritation. Applying the same uncertainty factors yields an action level of 100 ppb.

For Trimethylbenzene: A rat study from 2001 reported in RTECS indicates that animals exposed to 100 ppm 1,2,4-trimethylbenzene for 6 hours each day over a period of 20 days experience some nervous system effects. Adjusting for time and applying the uncertainty factors described above results in an action level of 25 ppb. No suitable studies meeting the parameters of the request were found for 1,3,5-trimethylbenzene. The difference between these two compounds is the geometric relationship of the three methyl groups with the benzene ring in the chemical structure. Compounds with the same formula but a different structure are often called isomers. A comparison of other toxicity information indicates a similarity between the 1,3,5 isomer and the 1,2,4 isomer, so the action level proposed for the 1,2,4 isomer will be applied to both compounds.

For the Chlorofluorohydrocarbons: The comparison value for all chlorofluorohydrocarbons (also known as CFCs or Freons) in the table is based on the EPA Reference Concentration for chlorodifluoromethane. In each case, the Reference Concentration of 50 mg/m³ was converted to ppb using the molecular weight of the individual CFC using the equation outlined in the introduction to the ACGIH Threshold Limit Value guide.

Action Required/Recommendations/Info Provided:

In response to this request, ATSDR listed the chemicals identified and provided them to EPA on Dec. 5. As operations continue, additional compounds may be identified in the environmental data. Therefore, the action levels are provided in a separate table. If other compounds are identified in subsequent samples, ATSDR and MaDPH will provide ambient air action levels as needed following similar methods as described here. This table of action levels may be the basis for the comparison values provided in the EPA environmental data tables. This AROA documents how these action levels were developed.

MaDPH and ATSDR conclude that, for the substances identified so far at this site, substance specific acute exposure action levels are not useful in assessing the potential human health implications of the site. If total VOCs as measured in the US EPA Air Monitoring Plan exceed the action levels specified in that plan, then additional characterization and appropriate response actions should be considered.

ATSDR and MaDPH conclude that the longer term action levels specified in the attached ambient air action level table would be protective of public health under the conditions specified in the EPA request. We recommend these values be used as comparison values for air sample data collected at this site.

If any ambient air action level is exceeded at this site, ATSDR and MaDPH recommends the incident

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If any ambient air action level is exceeded at this site, ATSDR and MaDPH recommends the incident command consider modifying the work on-site to reduce emissions, further characterize the environment near the point of exceedance, and/or institute protective measures to reduce exposures. Public health authorities will maintain resources available to assist in rapidly evaluating appropriate measures and advising on implementations

The conclusions and recommendations presented here are based on the information provided. If additional information becomes available or the situation at the scene changes, these conclusions and recommendations may need to be adjusted appropriately. ATSDR and MDPH are available to answer additional questions or concerns as the need arises.

Richard A. Nickle
Signature: Richard A. Nickle Date: 12/14/2006

Enclosures: Yes (X) No (); MIS entered: Yes (X) No ()

cc: ATSDR Region
State HA Coop. Coord.
DHAC/PERIS
ERS Reading File

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Ambient Air Comparison Values
CAI of Danvers
Danvers, MA

Chemical	Action Level (ppb)	Basis
1,1,1-Trichloroethane	700	Int. MRL
1,2,4-Trimethylbenzene	25	ATSDR
1,3,5-Trimethylbenzene	25	ATSDR
4-Ethyltoluene	97	ATSDR
Benzene	6	Int. MRL
Carbon Tetrachloride	30	Int. MRL
Chloroform	50	Int MRL
Dichlorodifluoromethane	10,100	ATSDR
Ethylbenzene	1000	Int. MRL
Heptane	1000	ATSDR
Hexane	600	Chr MRL
Methyl Ethyl Ketone	1700	RfC
Methyl Isobutyl Ketone	731	RfC*
Methylene Chloride	300	Int. MRL
Methyl-t-Butyl Ether	700	Int. MRL
Styrene	60	Chr MRL
Tetrachloroethylene	40	Chr MRL
Tetrahydrofuran	100	ATSDR
Toluene	80	Chr MRL
Trichlorofluoromethane	8897	ATSDR
Trichlorotrifluoroethane	6510	ATSDR
m/p-Xylene	600	Int. MRL
o-Xylene	600	Int. MRL

* - Some individuals may notice an odor at 100 ppb. Its odor has been described as "pleasant, camphor-like." However, not all chemicals are detectable by odor. The health-based comparison values used in this table have been selected to ensure that individuals (whether they notice an odor or not) will not experience adverse health effects.