

Comments received during the public comment period for ATSDR's Draft Health Consultation for the Woonasquatucket River (March 10, 1999).

Commentor #1

(1) The consult should clearly differentiate between the potential for current (acute) health risks and future (chronic) health risks. This is unclear in the document and is, I believe, important in terms of whether the appropriate response is to be a time critical or non-time critical response.

Response: There have only been a few instances (industrial accidents) where acute exposure to massive doses of dioxin have resulted in adverse human health effects. Acute exposure to environmental levels of dioxin contamination would not pose a health hazard. The exposures of greatest concern would be from chronic consumption of dioxin-contaminated fish or chronic exposure to dioxin contaminated surface soils. Such exposures would have to occur over prolonged periods of time to pose a health hazard.

(2) It is difficult to evaluate the recommendations presented in this report without seeing the actual calculations which led to the conclusions. Please provide the calculations to EPA. Such information will also facilitate an understanding between EPA and ATSDR of the potential differences in Agencies' exposure and toxicity assumptions and perhaps health conclusions. In addition, the rationale behind the conclusions and recommendations presented in this health consult would be better understood if the calculations, including the assumptions about exposure, were presented in the health consult.

Response: In assessing the health impact of environmental contamination, ATSDR adopts a broad approach that encompasses quantitative risk assessment as well as consideration of human epidemiological data derived from occupationally- and environmentally-exposed populations, biomonitoring results from exposed populations, and experience gained from evaluating the health impact of dioxin exposure in other environmentally-exposed populations.

Therefore, ATSDR does not rely solely on quantitative algorithmic determinations. For dioxin contamination in residential surface soil, ATSDR has traditionally used an Action Level of 1 ppb. (ATSDR's Action Level is identical to the Preliminary Remediation Goal that the EPA, itself, has adopted for cleanup of hazardous waste sites.)

A health based guideline of 1 ppb for dioxin in residential soil was originally proposed by CDC in 1984 (R. Kimbrough, H. Falk, and P. Stehr; Health implications of 2,3,7,8-tetrachlorodibenzodioxin (TCDD) contamination of residential soil; J. Toxicol. Env. Health 14 47-93 (1984). Since then, new information has become available that warrants revision of some of the assumptions used in the derivation of the CDC guideline value. Nevertheless, quantitative risk assessments still provide support for the original 1 ppb value (D. Paustenbach, H. Shu, and F. Murray; A critical examination of assumptions used in risk assessments of dioxin contaminated soil; Reg. Toxicol. Pharmacol 6 284-307 (1986). Additional information and supporting documentation for ATSDR's soil dioxin Action Level is presented in *Dioxin and Dioxin-Like Compounds in Soil, Part 1: ATSDR Interim Policy Guideline*. This document is

available on ATSDR's web site at www.atsdr.cdc.gov/dioxindt.html. This document defines ATSDR's position and has undergone extensive internal and external peer review.

Additional relevant information on 1 ppb dioxin in soil as a level of concern is discussed by Gough (M. Gough; Human exposures from dioxin in soil - A meeting report; *J Tox Env Health* 32 205-245 (1991)). This article summarizes the deliberations of 50 experts who used a multifaceted approach to assess human exposure to dioxin-contaminated soil.

(3) Although this report compares media-specific benchmark concentrations for dioxin to site-specific concentrations (i.e. FDA advisory level for dioxins in fish, ATSDR Action Level), there is no discussion of the toxicity of dioxin or other toxic compounds in fish. This seems like an essential part of a health consult.

Response: It is beyond the scope of the health consultation to review the extensive literature on the health effects of dioxin exposure in humans or laboratory animals. However, to provide some background information, a brief discussion of the health effects of dioxin was added to the health consultation. Readers who want additional information on the health effects of dioxin are referred to the following review documents:

- (1) ATSDR; *Toxicological Profile for Chlorinated Dibenzo-p-Dioxins (update)*; December 1998.
- (2) EPA; *Health Assessment Document for 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Related Compounds*; Review Draft; Volumes 1 and 2; June 1994.

ATSDR's health consultation focused on dioxin since it was the environmental contaminant that posed the greatest potential health concern. The very limited sampling of fish from the Woonasquatucket River documented the presence of PCBs, mercury, and other contaminants. Dioxin was the contaminant that posed the greatest health hazard, and the levels of dioxin contamination in the fish were high enough to warrant the fishing advisory. Consideration of the other contaminants would only strengthen the justification for the existing fishing advisory.

(4) EPA's position is that any evaluation of exposure to dioxin should include an examination of how the site-specific situation adds or compares to existing background exposures. This is important in evaluating the significance of specific risks posed by the site and also in judging the risk reduction potential of remedial options.

Response: Using EPA default exposure parameters, human exposure to soil contaminated with dioxin at a concentration of 1 ppb could result in exposure doses within the reported range of background dioxin exposures in the general population (1-3 pg dioxin TEQs/kg/day). The relative contribution of such soil exposures to background exposures would depend on the frequency and duration of exposure. However, there is no evidence that background levels of dioxin cause adverse health effects in humans. The EPA has stated that, "Clearly adverse effects, including perhaps cancer, may not be detectable until exposures exceed background by one or two orders of magnitude." (EPA; *Health Assessment Document for*

2,3,7,8-Tetrachlorodibenzo-p-dioxin and Related Compounds; Review Draft; Volumes III; June 1994).

(5) Page 1, under "Background and Site Description," 3rd paragraph: The Health Advisory for fish in the W. River was jointly issued by the RIDOH and EPA and was based on not only the dioxin contamination in the fish but also on PCB and mercury contamination. Please clarify this here and provide the date of the health advisory. Also describe the limits of the advisory, (i.e., south of the Smithfield line.)

Response: The commentor's information was incorporated into the health consultation.

(6) Page 2, 1st paragraph, 3rd sentence: For sunfish three composite samples (each consisting of 5 individual fish were evaluated). This results in a total of 15 sunfish, not 5.

Response: The health consultation was revised to reflect this information.

(7) Page 2, 4th paragraph, 1st sentence: These tissue concentrations are not consistent with what was presented in A. Burke's 10/8/96 "Human Health Risk Screening Analysis for a Subsistence Fisherman in the W. River." For sunfish, offal + fillet = 400 ppt and fillet alone = 41 ppt. For eel, offal + fillet = 130 ppt and fillet only = 120 ppt. Please check these values, cite the reference for these and clarify whether the concentration stated represents fillet or offal or both.

Response: As stated in the draft health consultation, the TCDD concentrations quoted were from the National Health and Environmental Effects Laboratory (reference provided in the health consultation). In ATSDR's meeting with the EPA on January 26, 1999, EPA staff recommended that these values be used.

(8) Page 3, 1st paragraph, 3rd sentence: Soil samples were not collected from the top 0-3 inches in the September, 1998 sampling effort. Instead soil samples were composited over the following depths:

Sample Location	Depth of sample (inches)
SS-1	3-12
SS-2	0-16
SS-3	30-42
SS-4	0-18
SS-5	0-18
SS-6	0-24

See Table 1 of the Final Summary Report for Expanded Site Inspection, Centredale Manor Site, March 9, 1999.

Response: The statement in the health consultation was revised to reflect the commentor's information.

(9) Page 4, 3rd full paragraph: The FDA fish advisory for dioxin was written specifically for the Great Lakes and is not applicable to other sites. If ATSDR leaves this reference in, it should be caveated that

FDA utilized different cancer slope factors, different levels of protection (i.e., target risk range) and different exposure parameters than are typically applied by EPA (or ATSDR?) and that make sense for this site.

Response: The health consultation gives the fish consumption rates that the FDA advisory applies to. The health consultation also notes that the advisory levels may not be protective of subsistence fisherman or other individuals who consume large quantities of fish.

The commentor notes that the FDA and the EPA utilized different cancer slope factors, etc. However, EPA concluded that dioxin contamination in fish from the Woonasquatucket River posed a health hazard for subsistence fishermen (defined as 70 g/day). (Anne-Marie Burke; Human Health Risk Screening for a Subsistence Fisherman in the Woonasquatucket River; October 8, 1996) Therefore, regardless of the assumptions, similar conclusions are reached.

(10) Page 4, 4th full paragraph: Were there any exposure calculations to support the conclusion that fish in the W. River should not be eaten or was the FDA advisory level the only basis? If there were calculations, EPA would like to see them.

Response: ATSDR did not perform a quantitative algorithmic determination to estimate the risks associated with eating fish from the Woonasquatucket River. Rather, ATSDR relied on the cited FDA advisory for Great Lakes fish consumption by sports fishermen and the EPA Human Health Risk Screening.

(11) Page 5, 4th paragraph: Please provide EPA with the calculations which support the conclusion that sediments do not present a hazard to exposed receptors at any location. This information is necessary if we are to understand potential differences in Agency health evaluations.

Response: As previously discussed, ATSDR does not base its judgements solely on quantitative algorithmic determinations. Our assessment of the risks posed by contact with contaminated sediments was derived by comparison to the risk posed by contact with dioxin-contaminated soils, for which ATSDR's Action Level is 1 ppb. ATSDR assumes that contact with contaminated sediments would occur less frequently than contact with residential soil. ATSDR further assumes that infants and young children (1-6 years old) are unlikely to have frequent contact with contaminated sediments. ATSDR also assumes that human exposure to contaminated sediments would occur mainly by dermal contact with little exposure by ingestion or inhalation of contaminated sediments.

(12) Page 7, 1st full paragraph: EPA does not base exposure assessments on the arithmetic average of accessed area. This is because there is usually not enough information to estimate the arithmetic average per exposure area. Instead EPA utilizes an upper confidence limit on the arithmetic mean (i.e. 95th UCL).

Response: If there is not enough information to estimate the arithmetic average concentration, then it must follow that there is also not enough information to calculate the 95th percentile concentration.

As stated in the health consultation, ATSDR supports further characterization of dioxin contamination at

the site. This would help to resolve the question of whether contamination exists as hot spots or whether the contamination is more uniformly distributed over the site. The EPA has written a Phase One - Soil Sampling Plan, which proposes that an additional 280 soil samples be collected at the Centredale Manor site. Once this information becomes available, a more accurate characterization of contamination at the site will be possible.

In assessing human exposure to an area, it seems unlikely that a child would preferentially go to the hot spot (i.e., the 95th percentile) every day and ingest soil. It is more logical to assume that over a prolonged period of time, the child would be exposed to the average dioxin concentration of the area.

(13) Page 7, 2nd paragraph, 3rd sentence: "Since future activities or the use of the land cannot be predicted, it would be prudent public health policy to implement actions to remediate or prevent further contact with contaminated areas." Which contaminated areas are being referred to here? What action level is being applied for defining contaminated areas that need action, 1 ppb for dioxin? What are the assumptions about exposure which determine this action level? What about other contaminants that may be in these areas but have not been sampled for?

Response: The statement refers to the contaminated areas around Centredale Manor. An Action Level of 1 ppb dioxin TEQs is recommended as being protective of public health. As stated in the health consultation, this Action Level would apply to the site if land use changed such that more frequent contact with the area occurred. This could occur if the property were converted to a greenway or other recreational area with unlimited public access. If further investigations reveal additional contaminants at the site, further evaluation would be necessary.

(14) Page 7, Last paragraph: It should be pointed out that these levels are well within urban background levels for dioxins in soils and pose no special health threat.

Response: A reference to background levels of dioxin in soil was added to the health consultation. The health consultation does state that the dioxin levels detected at the Romano Ballfield do not pose a public health hazard.

(15) Page 8, conclusion #1: It is too early in the investigative process to definitively state that Centredale Manor is the source of dioxin contamination in the W. River. Recommend eliminating this sentence. If this statement is left in, then ATSDR should acknowledge the possibility that further studies may find additional sources.

Response: The distribution of contaminated sediments in the river is consistent with the Centredale Manor property being the source of dioxin contamination. However, ATSDR acknowledges that there may be other, yet unidentified, secondary sources of dioxin contamination. Therefore, the conclusion statement was deleted.

(16) Page 8, conclusion #4: We disagree with this statement. There are two sediment areas which pose potential long-term health risks depending on the use of these areas. The first is a sediment area adjacent to a residential property near Allendale Dam (SD24/25), where the two samples adjacent to the property contain 5.2 and 5.8 ppb total TEQ dioxin. Additional nearby shoreline sediment samples

contain dioxin levels at 4.2 and 7.5 ppb. The residential property gently slopes to the water in this area and it is conceivable that a young child could receive regular exposure to these sediments. In fact toys and a playset were present on this property in the backyard near the river during a site visit. If an individual was regularly exposed to these sediments over a 30 year period, there would be a potential for public health concern. In addition, EPA's OSWER Directive 9200.4-26 regarding "Approach for Addressing Dioxin in Soil at CERCLA and RCRA sites" recommends that the preliminary Remediation goal of 1 ppb TEQ for dioxin in soils applies to sediments.

The second sediment area of potential concern is adjacent to the Lee Romano baseball field. Two sediment samples in shallow water adjacent to the field contained 8.0 and 0.2 total TEQ of dioxin. If an older (7-18) or younger (1-6) child was exposed occasionally to these sediments (i.e. 3 days/week for the three summer months and 2 days/week in May, September, and October), the sediments would not be expected to pose a significant health concern. However, if the frequency of exposure was much greater than this, then this area could pose a potential long-term health problem. More information is needed on who is exposed and how often, before it can be concluded that sediments in these areas do not pose a public health hazard.

Response: ATSDR assumes it is unlikely that unattended, young children (1-6 years old) would be allowed access to the river because of the risk of drowning. It is reasonable to assume that older children (7-18 years old) might occasionally play in the river. However, soil (or sediment) ingestion in children would parallel mouthing activity, which peaks at the age 2 or 3. By the time a child is old enough to have access to the river (7-18), mouthing activity and soil ingestion rates have dramatically decreased.

As stated in the consultation, if contaminated sediment washed up on dry land, or if the water receded and exposed dried sediments, then a different exposure scenario would apply. Such contamination should be evaluated as surface soil using a Action Level of 1 ppb.

ATSDR agrees that more site-specific information on the frequency and duration of exposure would allow for a more accurate characterization of risks. However, under realistic exposure scenarios, the reported levels of dioxin in sediment would not pose a health hazard.

Commentor #2

(17) In conclusion number 1, the ATSDR states that the Centredale Manor property is the major source of dioxin contamination in the Woonasquatucket River.

a. Has the actual source(s) of the dioxin contamination been identified? According to a memorandum from Richard J. Pruell, prepared on February 5, 1998, "The distributions of PCDD/F congeners is (sic) the Woonasquatucket River sediments are very unusual and do not appear to match any one source type. Instead, it appears that there may be two major source types contributing to these distributions."

b. Do you know if the source(s) is ongoing, historical, or both?

c. Has it been determined that the dioxins found downstream of Allendale Dam are from the same source? There is a level of dioxin at Olneyville Dam that is higher than at upstream sites in Providence. Is this significant? If so, what is the cause of this elevated level, which is adjacent to the Riverside Mills Brownfield site? Is it possible that a separate source may be located at the adjacent Brownfield site?

When will further tests be conducted at this and other sites downstream of the targeted action area?

Response: The chemical source of dioxin, where source is defined as the chemical processes or chemical substances from which the dioxin originated, has not been identified. The distribution of dioxin-contaminated sediments in the Woonasquatucket River and the presence of elevated dioxin concentrations in soil at Centredale Manor indicate that this property is a likely geographical source of contamination in the river. Chemical operations at the Centredale Manor property ceased in the 1970s, so no new dioxins are being produced. However, it is possible that flooding on the property may transport additional dioxin contaminated soil into the river.

Historically, the area along the river has been used for manufacturing and industrial operations. Therefore, it is possible that there may be other, yet unidentified, secondary sources of dioxin contamination. In recognition of this possibility, the conclusion statement was deleted from the health consultation.

See also response to comment 15.

(18) Recommendation number 1 is "Prevent further off-site migration of dioxin contaminated soil and sediment from the Centredale manor property."

a. What assessments are recommended to determine the extent of migration of the soil and sediments along the length of the Woonasquatucket River?

b. What recommendation do you have to monitor the migration of the dioxin until the sources of contamination are eliminated, and the off-site migration is stopped?

Response: ATSDR anticipates that the EPA will be conducting additional sampling to delineate the extent of on-site and off-site contamination. Upon request, ATSDR will provide comments on EPA proposals for further characterization of environmental contamination.

It is not within ATSDR's purview to engage in risk management or to recommend remedial strategies for cleaning up hazardous waste sites. However, upon request, ATSDR will review and comment on corrective action plans developed by federal or state regulatory agencies to ensure that they are protective of public health.

(19) Recommendation number 5 includes the suggestion to remediate surface soil dioxin concentrations that exceed 1 part per billion in residential, recreational, or other areas that could be frequently accessed.

a. What is the recommendation of ATSDR with regard to sediments that are contaminated above the 1 ppb level?

b. Will these recommendations reduce the dioxin contamination levels in the fish found in the Woonasquatucket River?

Response: As stated in the health consultation, occasional human contact with the reported concentrations of dioxin in river sediment would not pose a health hazard. However, dioxin contamination in the river could serve as a continuing source for uptake by fish and other biota in the river. Human consumption of dioxin-contaminated fish could pose a human health hazard.

ATSDR's health consultation did not attempt to identify a dioxin sediment concentration that would protect humans who eat fish from the river. It is not feasible to derive such a level because of spatial variation in sediment contamination, migratory behavior of fish, and variation in fish uptake of contamination as a function of species, age, season, etc. Therefore, ATSDR recommends that the fishing advisory be continued until post-remediation fish sampling indicates that contaminant levels in fish do not pose a health hazard.

(20) When will we have sufficient data to determine the cumulative impacts of chronic exposure to the TCDD concentrations of chromium, cadmium, copper, iron, lead, manganese, mercury, nickel, zinc, total PCBs, and total PAHs? All of these contaminants are found in the river at levels that exceed EPA and/or the Ontario Sediment Quality criteria (SEL and/or LEL).

Response: Chemicals with similar toxic effects at a molecular, cellular, or tissue level are sometimes assumed to have additive toxicity. Certain PCBs (e.g., co-planar, non-ortho substituted PCBs) have dioxin-like toxicity. Other PCBs are antagonists of dioxin toxicity. There is no evidence that the other metal contaminants listed would interact with dioxin toxicity.

(21) The goal of the EPA, DEM, and Woonquatucket River organizations is to have a fishable swimmable river. What impact will the recommendations of ATSDR have on achieving this goal? Will the recommendations proposed by ATSDR promote reductions in the dioxin contamination of the fish and the sediment to the extent that dioxin will no longer be a barrier to fishing and swimming? If not, what are the next steps that will be taken by ATSDR or other Federal and State agencies to remove dioxin as a contaminant which restricts full use of the river?

Response: Issues related to fishing in the river are discussed above. (comments 19 and 20)

ATSDR's mission is to protect the public from adverse health effects from exposures to hazardous substances in the environment. Ecological issues, although they are very important, are beyond the scope of ATSDR activities. ATSDR has no regulatory authority. However, ATSDR will continue to work with EPA and state environmental agencies to ensure that proposed actions to remediate contamination in the river are protective of public health.

Commentor #3

(22) I would recommend that the purpose of the document be stated in a short section before the Background and Site Description. The purpose of the document as stated in the cover letter is not entirely consistent with the document itself. The cover letter states that the ATSDR was asked to assess the human health impact of environmental contamination. It then states that the document assesses information collected by the EPA and RIDOH. The reader would have to know that this means dioxins in fish tissues, soils, and sediments. The document itself is really focused on the dioxin issue and not on a wider range of environmental contamination concerns associated with the river which may affect human health. No information on other toxicants or on pathogens is discussed.

Response: The purpose of the health consultation is stated in the first paragraph of the document, "... to

review environmental data for the Woonasquatucket River and determine if environmental contamination poses a public health hazard.” The consultation focuses on dioxin because this is the contaminant that has been the object of most of the environmental sampling.

(23) As a result of the fish tissue sampling, page 4 of the report concludes that "fish from the Woonasquatucket River should not be eaten...". The text in the conclusions section then limits this conclusion to the lower river. The area covered by the fishing advisory is not explicitly stated in the document, however it should be. I am wondering whether the fish advisory would apply to the reaches in and above Georgiaville Pond. Would it also apply to the consumption of blue crabs caught in the tidal reach of the river?

Response: See response to comment 5

(24) The paragraph at the top of page 6 states that wastewater discharges from the Smithfield WWTF and CSOs could cause microbiological contamination of the river. I would not dispute the impact of CSO's on the reach of the river below Manton Avenue. The authors, however, should at least add a reference to document the CSO impacts. They should not implicate the Smithfield WWTF unless information exists to support that point. The data available to the Urban Rivers Team and from the RIPDES program would not support this assertion. The ATSDR may be making this statement because the waters downstream of the WWTF outfall are classified by the State as B1, which denotes that "primary contact activities may be impacted due to pathogens from approved wastewater discharges". If so, they should qualify their statements.

The report's conclusions and recommendations regarding pathogens are therefore unsupported by any information contained in or referred to by the document. This is ironic because it is one of the two salient concerns raised by the document. Only one of the dioxin-related health issues, consumption of fish, is also of concern to the public. I would suggest that the pathogen issue either be covered in more depth or that the report focus solely on dioxin-related issues.

Response: It is not within ATSDR’s purview to evaluate microbiological contamination in the river. However, the Rhode Island Department of Health has issued statements to inform the public of health concerns related to microbiological contamination in the river. Since this contamination warrants restricted use of the river and poses a public health hazard, ATSDR believes it is appropriate to include this information in the health consultation. However, ATSDR has not investigated the source of the microbiological contamination, so the reference to the Smithfield wastewater treatment plant was deleted. To document fecal coliform contamination in the river, a reference provided by the commentor was added to the health consultation.

Commentor #4

(25) ATSDR indicates that "...sediment from the river may have washed up during flooding onto people's yards ..." Has ATSDR determined which properties may have been impacted by such flooding? Does ATSDR recommend additional testing of residential soils based on this assertion and should additional risk calculations be performed for child receptors (aged <6 yrs. old) at these

locations?

The EPA has collected some surface soil samples from residential lots along the river to determine if these properties have been impacted by the deposition of contaminated sediment from the river. Depending on the results of these tests, additional sampling might be indicated.

As stated in the Health Consultation, if dioxin contaminated sediment has deposited on dry land, then the contaminated area should be assessed as residential soil.

(26) Has ATSDR considered whether dioxin-contaminated soil/dust has migrated into Centredale Manor (i.e., as mud carried on people's shoes or dust carried by wind into open doors and windows)? Is this a plausible exposure pathway for residents/health care providers/janitorial staff at this location? Should indoor wipe samples, carpet samples or wastewater samples from laundering facilities be taken and tested for dioxin?

Response: The sampling conducted to date has demonstrated the presence of dioxin contaminated soil in the marshy, heavily-vegetated areas south and east of the manor. Senior citizen residents of the Manor, health care providers, and janitorial staff are unlikely to walk in these relatively inaccessible areas and track mud into the building. However, if future soil testing documents the presence of elevated concentrations of dioxin in readily accessed areas near the manor, then an evaluation of indoor contamination could be considered.

(27) Has ATSDR considered past landscape laborer or maintenance worker exposure to dioxin in and around the Centredale Manor?

Response: The areas around Centredale Manor where elevated levels of dioxin were found are not landscaped areas; therefore, landscape laborers or maintenance workers (e.g., workers who cut the lawns) would not be expected to work in these areas.

Limited soil testing in the grass-covered area west of the Manor has not detected elevated dioxin levels. If future soil testing documents the presence of elevated concentrations of dioxin in heavily accessed areas around the manor, then additional evaluation would be warranted.

(28) Regarding Recommendation (2), does ATSDR recommend a more focused risk communication effort for communities along the more highly contaminated areas of the river?

Response: Recommendation (2) states, "Continue the RI DOH Fishing Advisory for the Woonasquatucket River and disseminate the advisory to non-English speaking people."

ATSDR recommends that efforts be focused on populations that are most likely to fish in the river, rather than the most contaminated areas of the river because: (1) the most popular fishing spots may not coincide with the most contaminated areas (2) because of the migratory habits of fish, contaminated fish may be found in non-contaminated areas of the river, (3) many fishermen may not live along the river and travel from surrounding communities to get to it.