

COMMUNITY HEALTH CONCERNS

The community surrounding WAFB has expressed several health concerns. Some of these have already been discussed in the preceding section of this PHA. Other health concerns expressed by the community include:

Concern: Could Volatile Groundwater Contaminants Migrate into Subsurface Structures?

The water table at and around WAFB is relatively shallow (approximately 20 feet below ground surface). Some community members have expressed concern about the potential for certain contaminants to volatilize through the soil and into subsurface structures (e.g., basements) (NCIBRD 1995). *In the absence of actual indoor air measurements, indoor air levels were estimated using conservative mathematical models. The results suggested that indoor air levels were too low to be of health concern.*

Three plumes are currently located under structures (some with basements some without): (1) the Mission Drive Plume, (2) the Pierce's Point Plume, and (3) the Northern Landfill Plume. While no indoor air samples have been collected from the buildings that overlie these plumes, ATSDR looked at the likelihood of significant amounts of vapors migrating to indoor air. Several factors come into play when evaluating this possibility: the distance between the groundwater and the structure floor, the concentration and volatility of the groundwater contaminants, the condition of a structure's foundation, the infiltration rate, and the air exchange rate of the building, among others. Using site-specific information and making certain assumptions, it is possible to roughly predict indoor air concentrations.

In the mid 1990s, a remedial investigation was performed on the Mission Drive Plume. As part of this effort, investigators used a conservative model to predict indoor air concentrations that could result from TCE volatilizing from the Mission Drive Plume into on-base housing units (those with basements and those built on slabs) (AFCEE 1996c). The model used was conservative. That is, it assumed no degradation of the chemicals over time and assumed a relatively large flow of contaminants through building structures. Only TCE was evaluated because it was the most volatile chemical detected at the highest concentrations in shallow groundwater (110 ppb) and among the more toxic. Although ATSDR prefers actual data to modeled data when evaluating health concerns, we concur that the approach used in the modeling exercise was conservative and probably overpredicted indoor air concentrations. Even though the modeled concentrations were inflated, the predicted air concentrations of TCE were lower than those thought to result in any adverse health effects. Furthermore, many of the basements are crawl-spaces or are not areas in which people spend extended time (AFCEE, 1996c).

Similar modeling was not performed as part of the remedial investigations that were performed for the Pierce's Point Plume and the Northern Landfill Plume. ATSDR reviewed the contaminant

levels of the most shallow groundwater in the off-base areas (i.e., areas with residences and campgrounds) that overlie these two plumes. TCE, benzene, vinyl chloride, and a few other volatile organic contaminants have been detected at varying concentrations. Using the same conservative model described above for the Mission Drive Plume, ATSDR estimated indoor air concentrations. Even assuming exposure to maximum detected concentrations, ATSDR found that predicted indoor air levels were too low to be of health concern.

Concern: Is There an Increased Incidence of Cancer in the Community?

During ATSDR's site visit, several community members expressed their belief that cancer rates are high in the area surrounding WAFB. According to base representatives and county and state health officials, no health outcome studies are available to refute or validate this claim (AFBCA 1999c; District 1999a; MCDH 1999). Based on ATSDR's analysis of exposure pathways, the only people who might be at an increased risk of developing cancer are those who were exposed to USAF's main water supply wells or the well at 6504 West Shore Drive prior to 1980. As discussed in detail in the "Evaluation of Environmental Contamination and Potential Exposure Pathways" section and in Appendix D, however, there are many uncertainties about whether TCE was present in wells for long enough to pose health hazards and whether the chemical actually causes cancer in human populations. (As noted previously, EPA is currently reviewing scientific literature to determine TCE's cancer classification.)

Concern: Could Exposures to Vinyl Chloride Cause Cancer?

A community member asked ATSDR whether vinyl chloride causes cancer, and whether this chemical was found at concentrations that would have posed health hazards to individuals drinking from on-base water supply wells or swimming in Van Etten Lake (ATSDR 1997b).

It is true that at least some studies have shown that occupational exposures to vinyl chloride are associated with an increased risk of developing cancer of the brain and central nervous system, the lung and respiratory tract, and the lymphatic/hematopoietic system (ATSDR 1997c). Based on data collected from WAFB, no evidence indicates that vinyl chloride was present at concentrations high enough to cause health hazards.

ATSDR evaluated available data to determine whether vinyl chloride was present in WAFB's on-base water supply wells. Investigators started analyzing water samples for this contaminant starting in 1983, and continued to do so on a sporadic basis through 1997 (AFBCA 1993; Air Force 1990; MDEQ 1999). These data indicate that vinyl chloride was not present in the on-base drinking water wells at concentrations that would have been expected to pose health hazards. *Thus, people exposed to on-base water supplies during or after 1983 are not expected to be at an increased risk of developing adverse health effects due to vinyl chloride exposures.* ATSDR cannot determine whether people who were drinking the water prior to 1983 would have been

exposed to vinyl chloride at higher concentrations. By the time the contaminant was being evaluated, groundwater treatment efforts had already been initiated and contaminated wells had been taken offline. Thus, it is possible that groups who were exposed before these initiatives were undertaken drank water more contaminated than the 1983–1997 data would reflect.

ATSDR also evaluated available databases to determine whether vinyl chloride was present in samples that were collected from Van Etten Lake. Starting in the 1990s, water samples collected from the lake have been analyzed for vinyl chloride. With rare exception, results indicate that the chemical was not present above laboratory detection limits. When the chemical was detected in surface water samples, it was only present at concentrations of 1.0 ppb (AFCEE 1996d). Such low levels are not expected to cause harm to swimmers who use the lake during the summer or to ice fishers who use it during the winter.

Concern: Did On-base Residents Have an Increased Miscarriage Rate?

During ATSDR's site visit, one community member expressed concern that many on-base residents experienced miscarriages during the time when on-base drinking water supply wells were contaminated. As indicated in the "Evaluation of Environmental Contamination and Potential Exposures Pathways" section and Appendix D, several organic compounds (e.g., benzene, 1,2-dichloroethene, chloroform, chlorodibromomethane, dichlorobromomethane, and TCE) were detected in on-base water supplies. As discussed previously, TCE was the only contaminant detected at levels of potential health concern.

In light of the community concern regarding past miscarriages, ATSDR performed a literature search to specifically evaluate whether a link could be established between the reported miscarriages and the detected levels of TCE as well as the other contaminants reported in on-base water supplies. No definitive conclusions can be drawn because few studies are available that study pregnancy outcomes and quantify exposures to people drinking water containing these contaminants.

ATSDR did identify some studies that showed possible links between occupational exposure to certain solvents (e.g., TCE, PCE, paint thinners) and miscarriages, primarily associated with inhalation exposures (Windham et al. 1991; McMartin et al. 1998; Doyle et al. 1997; Schenker et al. 1995; Khattak et al. 1999). ATSDR also identified some studies that looked at exposures to contaminated drinking water and miscarriages. For example, an increased rate of spontaneous abortions were observed in residents drinking from wells contaminated with solvents (Deane et al. 1992; Wrensch et al. 1992; Swan et al. 1998). Another study suggests increased miscarriage rates among women drinking water containing trihalomethanes (e.g., chloroform, chlorodibromomethane, dichlorobromomethane) (Swan et al. 1998; Waller et al. 1998). These findings, however, were not conclusive. The greatest limitation in all of the available studies is the lack of meaningful exposure data. That is, even in cases where elevated miscarriage rates

were reported, it is not clear what exposure levels or doses were associated with the adverse outcomes. This makes it impossible to draw comparisons to the exposure levels estimated for past on-base water supply consumption. All that these studies tell us is that a plausible link exists between solvent exposures and miscarriages, but it is not clear at what levels of exposure.

ATSDR also examined laboratory animal studies (e.g., rats/mice) to gain some perspective on dose levels that might be associated with adverse pregnancy outcomes for the chemicals that were detected in the on-base water supplies. Available studies indicated that adverse reproductive or developmental effects (including measured effects such as histological changes, decreased survival, "resorptions," and/or malformations) occurred only at doses that were about 200 to 50,000 times greater than the doses estimated for past drinking water exposures at WAFB.

Concern: Could Community Members Be Eating Contaminated Fish?

Community members use Van Etten Lake and the Au Sable River for recreational fishing. ATSDR evaluated available data to determine whether fish that live in these water bodies could be contaminated.

Van Etten Lake

Recreational fishermen use Van Etten Lake year-round to fish for rainbow trout, brown trout, walleye, crappie, bluegill, freshwater drum, large-mouthed bass, small-mouthed bass, northern pike, muskellunge, yellow perch, white bass, red-horse sucker, white sucker, channel catfish, and American eel. Community members have expressed concern regarding the safety of eating these fish. In particular, community members have expressed concern about the possibility of TCE bioaccumulating in fish (NCIBRD 1995). Although no fish tissue have been analyzed for TCE, ATSDR does not consider this chemical to pose potential health hazards because its tendency for bioaccumulating is low (ATSDR 1997a). In June 1990, MDNR sampled fish from Van Etten Lake. Polychlorinated biphenyls were detected in several fish, at concentrations averaging 0.65 ppm. Because this average did not exceed the Michigan Department of Public Health's fish consumption advisory for this contaminant, no advisory was issued against fishing in the lake (MDNR 1992). Although available data indicate that consuming fish is not expected to pose health hazards, ATSDR recommends that additional fish sampling be conducted at Van Etten Lake because samples have not been collected in several years and only a few chemical constituents were analyzed for during the 1990 sampling event.

Au Sable River

The Au Sable River is designated as a coldwater trout stream (MDNR 1992). Based on the types of contaminants that are present in the river's surface water and sediment (see Tables 6 and 7), ATSDR concluded that adverse health effects are not expected to result from eating the river's

fish. (TCE, 1,1,2,2-tetrachloroethane, and arsenic were detected in surface water above ATSDR's drinking water CVs. Arsenic was also detected in sediment samples at concentrations that exceeded ATSDR's soil CVs. TCE and 1,1,2,2-tetrachloroethane are not thought to have a high tendency for bioaccumulating in fish [ATSDR 1996b, 1997a]. Arsenic can be absorbed by fish and accumulate in their tissues, but the concentrations detected in surface water and sediment appear to be too low to pose health hazards.) No fish tissue sampling data are available, however, to confirm ATSDR's conclusion. Therefore, ATSDR recommends that fish tissue samples be analyzed for arsenic.

Concern: Could Community Members Be Eating Contaminated Deer and Turkey?

Some concern has been expressed about consuming deer and turkey that live near or in the wetland that is located south of LF-27. ATSDR acknowledges that deer and turkey may be exposed to the wetland area south of LF-27. In fact, deer may use some of the plants (e.g., white cedar, silver maple, willows, and swamp dewberry) that are located in the wetland as food sources. No samples have been collected from the game animals to determine whether the wetland's contaminants have accumulated within their tissues. Thus, ATSDR cannot make any definitive conclusions about whether people could be eating contaminated game animals. To put the issue in perspective, however, ATSDR thinks it is important to note that it is unlikely that deer and turkey would be continuously exposed to the wetland's contaminants. While some of the animals might make the wetland their home, they would probably not spend all of their time in this small area. It is also unclear whether the animal's food sources (i.e., plants) would be impacted by the wetland's contaminants. (In general, research shows little evidence of organic compounds, such as VOCs and pesticides, accumulating within plant tissues. Evidence does suggest, however, that some metals do accumulate in plants.) Because no plant tissue samples have been analyzed, ATSDR cannot determine whether the game animals are eating contaminated food. Also, hunting is considered a recreational sport and community members do not rely on game animals for subsistence. Assuming that hunters probably only kill and eat a limited number of animals a year, they would not be expected to eat large quantities of meat that came from animals exposed to the wetland area.

Concern: Will the Remediation Plan for the Northern Landfill Plume Be Protective of Public Health?

In 1998, community members informed ATSDR that USAF was planning to use enhanced bioremediation to clean the Northern Landfill Plume. Community members expressed displeasure for this remedial approach, noting that a consultant informed them that the efficacy of the technology has not been well proven (ATSDR 1998a). ATSDR contacted base representatives to learn more about the technology. Base representatives said that enhanced bioremediation is no longer being considered as a remedial option. This remedial approach was abandoned after a treatability study indicated that subsurface conditions were too anoxic (void of oxygen) to support aggressive microbial degradation (AFBCA 1999c). After re-examining remedial options and performing a Feasibility Study, base representatives decided to use a dual system, consisting of pump-and-treat and air sparging, to remediate the plume (AFBCA 2000a). (The public was invited to comment on this selected alternative.) Installation activities were initiated in August 2000 and will be completed by June 1, 2001 (AFBCA 2000b; USAF 2001).

Concern: Could Seeps Cause Public Health Hazards and Aesthetic Problems?

As noted previously, the Northern Landfill Plume discharges into Van Etten Lake. In recent years, community members identified two distinct discharge points along the lake's shores. These points, referred to as Seep #1 and Seep #2 (see Figure 8), have raised concern about:

- *Potential exposures.* The seeps represent the interface between groundwater and surface water. Thus, water samples that have been collected from Seeps #1 and #2 represent water that has not yet mixed with Van Etten Lake (AFBCA 2000b). This means that contaminant concentrations that are detected in seep samples are higher than what swimmers would be exposed to. ATSDR determined that no one would have direct contact with the seeps during the summer because groundwater from the Northern Landfill Plume discharges directly to the lake during this season, without "daylighting" upon the lake's shores first (AFBCA 2000a). In the winter, however, when the lake's water levels are lower, groundwater discharges to Van Etten Lake's shores before trickling into the lake (AFBCA 2000a). As a result, people could have direct contact with the seeps in the winter. ATSDR evaluated data, collected from the seeps between 1997 and 1999, to determine whether such contact could result in adverse health effects. The results, which are summarized in Table 8, indicate that three contaminants have been detected above ATSDR's drinking water CVs: 1,1-dichloroethene (nondetect to 2.0 ppb), vinyl chloride (nondetect to 2.0 ppb), and TCE (nondetect to 1,000 ppb) (AFBCA 2000c). *Even though contaminants are detected at elevated levels, ATSDR does not believe exposures to the seeps will result in public health hazards.* As noted above, the seeps are only exposed during the winter months, a time when Van Etten Lake's shores are not heavily used. Ice fishermen are the only people who frequent this area with any regularity

during this time of the year. This population, which wears heavy clothing and thick boots, is not expected to have extensive direct contact with the seeps (AFBCA 2000a).

Furthermore, the contaminants that have been detected in the seeps have not been shown to persist at high concentrations for extended periods of time. For example, while TCE was detected at 1,000 ppb in Seep #1 in February 1997, it dropped to 6 ppb in July 1997, was not detected at all in October 1997, registered at 131 ppb in September 1998, and was recorded as 76.1 ppb in December 1999 (AFBCA 2000c).

- *Aesthetic problems.* An orange precipitate has formed in the vicinity of the seeps and has stained the lake's shores. Representatives from Camp Nissokone have expressed concern over this aesthetic problem (MDEQ 2000a). In Michigan, aesthetic problems must be eliminated if they interfere with a waterbody's usage. Because Van Etten Lake is considered a recreational water body, the staining is considered a significant problem since it makes people unwilling to use the lake (MDEQ 2000b). Thus, USAF has agreed to address the problem. According to a base representative, the staining represents iron that has precipitated out of solution (AFBCA 2000a). Precipitation rates are high in the seep areas because the groundwater that is released at these locations is anoxic. When the anoxic groundwater encounters atmospheric oxygen or dissolved oxygen, iron precipitates out rapidly. Base representatives believe that this dramatic reaction will cease once the remedial system is installed to address the Northern Landfill Plume (AFBCA 2000a). (As noted above, this system will be installed by June 2001.) The remedial system should fix the discoloration problem by:

- *Oxygenating groundwater.* A pump-and-treat and an air sparging system will be installed in an effort to remediate the Northern Landfill Plume. The latter will oxygenate the groundwater. Thus, the water released to Van Etten Lake will not be as anoxic, and this should eliminate staining problems (AFBCA 2000a).
- *Depressing groundwater levels.* Groundwater levels in the vicinity of the seep areas are expected to drop once the pump-and-treat system is installed. As a result, groundwater will discharge further out into the lake rather than directly at its shores. This should eliminate staining problems (AFBCA 2000a).

Concern: Could the Public Have Been Exposed To Radioactive Materials?

Community members said that they have heard rumors that radioactive materials were stored on base during some point of WAFB's history (ATSDR 1998a). ATSDR contacted base representatives to determine whether this was true. Base representatives said that these materials are not currently located at the base, but that they might have been in the past (AFBCA 1999c). Because the military must keep the location of their radioactive weapons a secret, site documents do not state whether radioactive materials were located at the base. If they were located on site,

these materials would have been stored in secure igloos in the Weapons Storage Area. A radiologic survey was conducted in this area after the base closed; no radioactive contamination was detected (AFBCA 1999c).

ATSDR'S CHILD HEALTH INITIATIVE

ATSDR recognizes that infants and children may be more vulnerable to exposures than adults in communities faced with contamination of their air, water, soil, or food. This vulnerability results from the following factors:

- Children are more likely to play outdoors and bring food into contaminated areas. For example, children may contact and ingest soil particles at higher rates than adults.
- Children are shorter, which makes them more likely to breathe dust, soil, and heavy vapors that are close to the ground.
- Children are smaller, which can result in higher doses of chemical exposure per body weight.
- The developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages.

Because children depend completely on adults for risk identification and management decisions, ATSDR is committed to evaluating their special interests at WAFB as part of the ATSDR Child Health Initiative.

Children were unlikely to have contacted the majority of WAFB's IRP sites while the base was operational because security measures were tight. However, children may have been exposed to:

- *Groundwater.* In the past, children were exposed to water that was supplied by:
 - *USAF's main water supply wells.* Children who lived in on-base residential housing and visited the base's Child Care Center were exposed to water that was supplied by USAF's main water supply wells.

- *Off-base wells.* Children who may have been exposed to water that was provided by off-base wells include those who lived in nearby residential areas, and those who visited Van Etten State Park or Camp Nissokone.

Based on available sampling data, groundwater wells at Camp Nissokone were not impacted by WAFB's contaminants and the wells at Van Etten State Park did not contain TCE at high enough concentrations to pose health hazards (See Table 5). Children exposed to USAF's main water supply wells or the well at 6504 West Shore Drive prior to 1980, however, might have been exposed to high concentrations of TCE and been at an increased risk of developing adverse health effects (see the "Evaluation of Environmental Contamination and Potential Exposure Pathways" section of this PHA and Appendix D). Whether adverse health effects occurred from past exposures is unknown because it is unclear how long exposures occurred and there is much controversy in the scientific community regarding TCE's ability to cause adverse health effects in humans. Current and future potential exposures to area groundwater are not expected to pose a public health hazard.

- *Surface Water.* Children have been swimming in Van Etten Lake and the Au Sable River for many years. In fact, Camp Nissokone's old swimming area used to be located in the area where the Northern landfill Plume enters Van Etten Lake. As indicated in the "Evaluation of Environmental Contamination and Potential Exposure Pathways" section of this PHA, contaminant concentrations detected in Van Etten Lake and the Au Sable River are too low to pose a public health hazard.

CONCLUSIONS

Based on an evaluation of environmental information, ATSDR has reached the following conclusions:

1. Past exposures to TCE in on-base and off-base water supplies could have posed a public health hazard to people who were exposed to the following water supplies before 1980: (1) USAF's main water supply wells and (2) the well located at 6504 West Shore Drive. Whether actual adverse health effects occurred, however, is unknown because there are many uncertainties about whether TCE was present for long enough durations to pose health hazards. Also, there is much controversy in the scientific community regarding TCE's ability to pose adverse health effects in humans. (TCE has been shown to cause cancer in laboratory animals who receive large doses, but EPA is currently reviewing the scientific literature to determine TCE's potential to cause cancer in humans.)
2. Contaminated groundwater plumes that originated at WAFB are not expected to pose a current or future public health hazard. Today, the vast majority of on-base and off-base facilities, residences, and camps receive their drinking water from the Huron Shores Regional Utility Authority, a source that is not located near WAFB and which meets all federal and state drinking water quality standards. A few wells are still in service, but exposure to this water is not expected to pose current or future health hazards because the wells do not contain high contaminant concentrations, they are only rarely used, and/or exposure durations are expected to be short. Institutional controls are in place to ensure that new wells are not drilled in contaminated areas in the future.
3. Exposures to surface water and sediment in Van Etten Lake, the Au Sable River, Duell Lake, and a wetland area located in the southern portion of the base are not expected to pose health hazards to the populations that use these water bodies for recreational purposes because contaminant concentrations are too low and/or exposures are too infrequent.
4. Some community members expressed concern about the possibility of groundwater contaminants volatilizing and migrating into subsurface housing structures (e.g., basements). ATSDR concluded that exposures to volatilizing materials are not expected to pose public health hazards. In the absence of actual indoor air measurements, indoor air contaminant levels were estimated using conservative mathematical models. The results suggested that indoor air levels were too low to be of health concern.

5. A community member asked ATSDR whether vinyl chloride causes cancer, and whether this chemical was identified as a contaminant of concern in on-base water supply wells or Van Etten Lake. ATSDR concluded that it is true that some health studies suggest a link between occupational exposures to vinyl chloride and brain cancer. Data on vinyl chloride were collected from on-base drinking water wells and Van Etten Lake starting in 1983 and 1990, respectively. Based on these data, ATSDR concluded that vinyl chloride concentrations have not been high enough to pose health hazards to people exposed to on-base drinking water wells during or after 1983 or to Lake Van Etten during or after 1990.
6. Community members asked ATSDR whether past exposures to the on-base water supply could have caused increased rates of miscarriage. Few studies have been conducted in humans to determine whether exposures to chlorinated solvents in groundwater pose an increased risk of miscarriage. Thus, no definitive conclusions could be made about the community's concern. It should be noted, however, that studies in laboratory animals show some adverse reproductive outcomes (e.g., decreased survival rates), but at doses that are significantly higher than those which would have been present at WAFB.
7. Community members use Van Etten Lake and the Au Sable River for recreational fishing. Based on limited data, ATSDR does not believe that consuming fish from these water bodies will pose health hazards.
8. Community members hunt and eat game animals that live in or near a wetland that has been impacted by the base's contaminants. No samples have been collected from the animals to determine whether contaminants have accumulated within their tissues. Thus, ATSDR cannot make any definitive conclusions about whether people could be eating contaminated game animals. It should be noted, however, that game animals are not expected to spend all of their time in the wetland. In addition, hunters probably do not eat large quantities of meat from animals exposed to the wetland area.
9. The Northern Landfill plume discharges into Van Etten lake at Seep #1 and Seep #2. Because exposures to the seeps are extremely limited, ATSDR does not believe that these seeps pose a health hazard. The seeps have caused an aesthetic problem, but USAF plans to fix this in the near future.
10. Base representatives did not know if radioactive materials had been stored at WAFB. If they were, these materials would have been stored in secure igloos in the Weapons Storage Area. A radiologic survey was conducted in this area after the base closed; no radioactive contamination was detected.

PUBLIC HEALTH ACTION PLAN

The Public Health Action Plan (PHAP) for WAFB contains a description of actions taken and those planned by ATSDR, the USAF, and government agencies at and in the vicinity of the site subsequent to the completion of this PHA. The purpose of the PHAP is to ensure that this PHA not only identifies public health hazards, but also provides a plan of action designed to mitigate and prevent adverse health effects resulting from exposure to hazardous substances in the environment. The public health actions that have been implemented, are being implemented, are planned, or are recommended by ATSDR are as follows:

Completed Actions

1. Several of USAF's main water supply wells were taken off line when contaminants were detected in the tap water of on-base housing areas in 1977.
2. Bottled water was provided to off-base residents when contaminants were detected in off-base wells.
3. Municipal hookups have been established at WAFB and at most of the off-base properties located between WAFB and Van Etten Lake.
4. Cleanup activities have been completed at several IRP sites. For example, USTs, aboveground storage tanks, drywells, refueling systems, and contaminated soils have been removed. In addition, a landfill cap has been installed over a portion of the Northern Landfills.

Ongoing and Planned Actions

1. The District Health Department has asked a resident who lives on Pierce's Point to remove his well from service. The resident has not responded to these requests. Thus, the county prosecutor attorney has become involved.
2. Groundwater samples will be collected from Van Etten State Park's well CG#1 on a regular basis. If well CG#2 is brought back into service, MDNR will be required to sample the well monthly to make sure that TCE concentrations remain below Michigan's safe drinking water standards (i.e., 5 ppb).
3. Groundwater samples will be collected from well AF25 in spring 2001.
4. Environmental investigations are still ongoing at some IRP sites (e.g., Site SS-55).

5. Remediation activities are ongoing at several IRP sites. For example, three pump-and-treat systems (i.e., ASPTS, BPPTS, and MDPTS) are currently operational, soil vapor extraction and air sparging systems are operating at some of WAFB's sites, and natural attenuation is ongoing at several locations. Additional remedial activities will be initiated in the near future. For example, WAFB plans to install additional purge wells at OT-24 and to optimize the efficacy of some of the base's pump-and-treat systems. Additionally, a groundwater remedial system, consisting of pump-and-treat and air sparging, will be installed at the Northern Landfill Plumes (Sites LF30/LF31) by June 2001.
6. Groundwater monitoring is ongoing at several IRP sites. In addition, surface water monitoring activities are still being conducted at Van Etten Lake. Also, seeps that discharge to the wetland area south of LF-27 are being monitored.

Recommendations

1. ATSDR recommends that WAFB and MDNR coordinate in determining the most effective means of collecting and analyzing fish tissue samples from Van Etten Lake and the Au Sable River to address the community's concern about fish contamination.

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