Public Health Assessment for

PETITIONED PUBLIC HEALTH ASSESSMENT
ANCLOTE FLORIDA POWER PLANT
TARPON SPRINGS, PASCO COUNTY, FLORIDA
CERCLIS NO. FL0001760917
OCTOBER 19, 1999

. DEPARTMENT OF HEALTH AND HUMAN SERVICES
LIC HEALTH SERVICE
ıcy for Toxic Substances and Disease Registry

nment Period Ends:

DECEMBER 2, 1999

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CERCLIS NO. FLD001760917

Prepared by:

Petition Response Section
Exposure Investigation and Consultation Branch
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment-Public Comment Release was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6)), and in accordance with our implementing regulations (42 C.F.R. Part 90). In preparing this document, ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate. This document represents the agency's best efforts, based on currently available information, to fulfill the statutory criteria set out in CERCLA section 104 (i)(6) within a limited time frame. To the extent possible, it presents an assessment of potential risks to human health. Actions authorized by CERCLA section 104 (i)(11), or otherwise authorized by CERCLA, may be undertaken to prevent or mitigate human exposure or risks to human health. In addition, ATSDR will utilize this document to determine if follow-up health actions are appropriate at this time.

This document has previously been provided to EPA and the affected state in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. Where necessary, it has been revised in response to comments or additional relevant information provided by them to ATSDR. This revised document has now been released for a 30-day public comment period. Subsequent to the public comment period, ATSDR will address all public comments and revise or append the document as appropriate. The public health assessment will then be reissued. This will conclude the public health assessment process for this site, unless additional information is obtained by ATSDR which, in the agency's opinion, indicates a need to revise or append the conclusions previously issued.

Use of trade names is for identification only and does not constitute endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

Please address comments regarding this report to:

Agency for Toxic Substances and Disease Registry
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You May Contact ATSDR TOLL FREE at
1-888-42ATSDR
Visit our Home Page at: http://atsdr1.atsdr.cdc.gov:8080/

FOREWORD

The Agency for Toxic Substances and Disease Registry, ATSDR, was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act, also known as the *Superfund* law. This law set up a fund to identify and clean up our country's hazardous waste sites. The Environmental Protection Agency, EPA, and the individual states regulate the investigation and clean up of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Public health assessments are carried out by environmental and health scientists from ATSDR and from the states with which ATSDR has cooperative agreements. The public health assessment program allows the scientists flexibility in the format or structure of their response to the public health issues at hazardous waste sites. For example, a public health assessment could be one document or it could be a compilation of several health consultations - the structure may vary from site to site. Nevertheless, the public health assessment process is not considered complete until the public health issues at the site are addressed.

Exposure: As the first step in the evaluation, ATSDR scientists review environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, ATSDR does not collect its own environmental sampling data but reviews information provided by EPA, other government agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

Health Effects: If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists evaluate whether or not these contacts may result in harmful effects. ATSDR recognizes that children, because of their play activities and their growing bodies, may be more vulnerable to these effects. As a policy, unless data are available to suggest otherwise, ATSDR considers children to be more sensitive and vulnerable to hazardous substances. Thus, the health impact to the children is considered first when evaluating the health threat to a community. The health impacts to other high risk groups within the community (such as the elderly, chronically ill, and people engaging in high risk practices) also receive special attention during the evaluation.

ATSDR uses existing scientific information, which can include the results of medical, toxicologic and epidemiologic studies and the data collected in disease registries, to determine the health effects that may result from exposures. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is not available. When this is so, the report will suggest what further public health actions are needed.

Conclusions: The report presents conclusions about the public health threat, if any, posed by a site. Whe health threats have been determined for high risk groups (such as children, elderly, chronically ill, and people engaging in high risk practices), they will be summarized in the conclusion section of the report. Ways to stop or reduce exposure will then be recommended in the public health action plan.

ATSDR is primarily an advisory agency, so usually these reports identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions of ATSDR. However, if there is an urgent health threat, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, full-scale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

Community: ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its impact on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near a site, including residents of the area, civic leaders, health professionals and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All the comments received from the public are responded to in the final version of the report.

Comments: If, after reading this report, you have questions or comments, we encourage you to send them to us.

Letters should be addressed as follows:

Attention: Chief, Program Evaluation, Records, and Information Services Branch, Agency for Toxic Substances and Disease Registry, 1600 Clifton Road (E-56), Atlanta, GA 30333.

SUMMARY

This public health assessment addresses concerns raised by community members about air emissions and foamy wastewater discharges from the Anclote power plant in Holiday, Florida. These concerns related to potential adverse health effects for local residents, as well as children enrolled in the nearby Gulfside Elementary School. ATSDR reviewed available environmental sampling and permit compliance data and evaluated it to determine if there is evidence of a public health hazard.

Mercury emissions were identified as a community concern, although releases of airborne mercury are not typically associated with oil-fired power plants. However, ATSDR evaluated available ambient air sampling data collected from 1994 through 1998 near the Anclote facility. These data indicated that the levels of particulates and sulfur dioxide were unlikely to cause adverse health effects except in the most sensitive populations. These sensitive populations include people with asthma and pre-existing medical conditions such as emphysema.

Analyses of particulate samples collected from gardens in residential areas near the site showed the presence of vanadium. However, the vanadium levels found are unlikely to pose a public health hazard for ingestion of any affected fruits and vegetables.

ATSDR reviewed sampling data associated with contaminant releases to soil and groundwater at the facility. Although there was an environmental impact from these releases, there are no known pathways of exposure to nearby residents.

ATSDR also reviewed environmental permits for air emissions and wastewater discharges as well as the annual air compliance inspection reports from 1996 through 1998. These compliance inspection reports indicate that the facility met permit requirements for air emissions. While the permit allows the facility to burn waste oil in addition to fuel oil, there are no environmental or emissions data to evaluate the levels of contaminants that might be emitted as a result of used oil combustion. Likewise, analytical results from a sample of the foamy discharge are not currently available for ATSDR's review.

Although the available data for sulfur dioxide and particulate emissions from the Anclote power plant do not indicate the existence of a public health threat, there were no data on other potential emissions and releases. Therefore, ATSDR classified this site as an indeterminate public health hazard.

PURPOSE AND STATEMENT OF HEALTH ISSUES

On August 11, 1998, the Agency for Toxic Substances and Disease Registry (ATSDR) was petitioned by a concerned citizen to conduct a health assessment of the Anclote Florida Power plant in Holiday, Florida. The petitioner stated that the power plant is a source of air pollution and mercury, and that "black and sooty" emissions may cause adverse health effects in children enrolled at the Gulfside Elementary School, located approximately one mile from the power plant. Another concern is the periodic release of thick foam from the facility's outfall canal into the Anclote River.

BACKGROUND

Site Description and History

ATSDR personnel met with the petitioner on November 10, 1998, and toured the Anclote facility with representatives of the Florida Department of Environmental Protection (FDEP) on November 11, 1998. The facility is located on the Anclote River near its entry into the Gulf of Mexico. Formerly used as a government radar site, the power plant has operated there since the mid-1970's [1]. Currently, the plant operates two steam generators fired by fuel oil and natural gas. Each generator has a utility boiler and both units share a common 500-foot exhaust stack [2].

The Anclote facility operates under an FDEP Title V air permit for emissions from the exhaust stack. The permit includes limits for sulfur dioxide and particulate emissions and requires the facility to perform continuous emissions monitoring for sulfur dioxide, nitrogen oxides, oxygen, and opacity (plume visibility). The air permit also requires that shipments of fuel oil for the boilers undergo an analysis for sulfur and ash content as well as heating content [3].

While the air permit allows the use of used (waste) oil to fuel the boilers, it specifies that the maximum annual amount of used oil burned cannot exceed 10% of the total heat input. Oil companies delivering the used oil to the facility have to provide laboratory analyses to document that the oil is within acceptable limits for polychlorinated biphenyls (PCBs); total organic halides; and metals, including arsenic, cadmium, chromium, and lead [2].

In 1995, there were numerous citizens' complaints about particulate fallout from the Anclote plant. As a result of operational modifications, FDEP officials report that the amount of fallout has decreased significantly. For example, pollution control devices were installed in May 1996, resulting in a substantial decrease in the levels of particulate matter. The new equipment included a set of internal steam coils to heat the gas produced by the plant's oil-burning furnace before it flows into the emissions stack [4]. This heating process takes the temperature above the "acid dew point", where water vapor combines with sulfates to make a sticky residue.

Previously, the fallout, consisting of oily soot and ash, had a tendency to become acidic when exposed to moisture. The acid mist caused the finer particles to agglomerate together in the duct work during low load conditions. These particles would then be blown out of the stack during higher load conditions [4].

Other equipment changes included the installation of spargers in the fuel oil tanks to facilitate better mixing of the fuel oil. In addition, the burners for one of the generator units were replaced in late 1996, resulting in greater operating efficiency [4].

Although there has been an overall decrease in the amount of fallout from the facility, frequent shutdowns and start-ups along with running the plant at less than full power may periodically increase the particulate fallout. In addition, the federal Clean Air Act now requires that power plants blow soot from stacks on a daily basis [4]. As a result, Anclote personnel can no longer wait for winds to blow west toward the Gulf (and away from residential areas) before releasing the soot.

FPC officials report that, to help alleviate these soot emissions, the facility recently converted both boilers to allow partial fueling (up to 40%) from natural gas. Because natural gas burns more cleanly than fuel oil, the amount of soot is expected to decline in the future.

Other Agencies' Activities

FDEP personnel conduct periodic inspections of the Anclote facility to ensure compliance with several environmental permits. The FDEP regulates the facility for hazardous waste storage and handling operations under the provisions of the Resource Conservation and Recovery Act. In addition, the FDEP regulates the discharge of cooling water into the outfall canal leading to the Anclote River as part of the National Pollutant Discharge Elimination System (NPDES) requirements of the Clean Water Act.

Beginning in 1995, the FDEP conducted an extensive investigation into the numerous complaints from local residents about damage resulting from the particulate fallout. Neighborhood residents complained that fallout from the facility damaged paint on their homes and automobiles, creating the need for special cleaning and sometimes repainting. The FDEP collected samples of the suspected fallout from nearby residences and arranged for the samples to be analyzed [5]. These analytical results are discussed on page 10.

The FDEP also investigated residents' complaints about the periodic releases of a thick foamy discharge from the plant into the outfall canal. This discharge has been attributed to the natural foaming action of sea water and becomes worse when the organic content of the water is high. In addition, the foaming may be worsened by the presence of small amounts of bromine and chlorine used to remove algae from the cooling towers. Although the foam is not believed to be a public health problem, it is classified as a "nuisance" discharge and is considered a violation of

the NPDES permit [6]. The FDEP is working with the facility to identify ways to reduce the amount of foam and keep any foam generated from entering the Anclote River. The facility collected a sample of the foam and ATSDR will review the analytical data when it becomes available.

Previous ATSDR Activities

ATSDR previously reviewed data associated with the nearby Stauffer Chemical Company Superfund site (Stauffer), which is located less than one mile from the facility. From 1947 until 1981, the Stauffer Chemical plant made phosphorus from phosphate ore. Radioactive slag that may have originated from the site has been found in the roads and homes of north Pinellas and south Pasco counties. On August 4, 1993, ATSDR issued a preliminary public health assessment for Stauffer identifying various public health hazards on the site, but none in areas surrounding the site [7]. On December 20, 1995, ATSDR issued a follow-up health consultation to evaluate data from sulfur dioxide air monitoring from 1977 through 1981. The health consultation concluded that adverse health effects from exposure to sulfur dioxide from the operating Stauffer facility were unlikely except in especially sensitive people [8]. In addition, ATSDR issued a health consultation on July 28, 1998 for the Gulfside Elementary School. This consultation addressed citizens' concerns about chemical and radiological contaminants in the soil, construction materials, and air that may pose a health risk to the students and staff at the school [9]. ATSDR concluded that exposure to contaminants in the surface soils, aggregate, and air at the school are unlikely to cause any illnesses in adults or children [9].

More recently, on August 6, 1999, ATSDR issued a public health assessment for properties surrounding Stauffer to address concerns about health problems that might be associated with exposure to radium and heavy metals leaching from phosphate slag used in nearby roads and buildings [10]. ATSDR concluded that the phosphate slag does not pose a public health hazard. On August 13, 1999, ATSDR also issued a health consultation concluding that residents near Stauffer are not likely to be exposed to harmful levels of contaminants in water from private wells [11].

Demographics

There are 348 people living within one mile of the Anclote facility. This number includes 21 children aged six years or younger [12]. In addition, there are about 700 children enrolled at the Gulfside Elementary School, ranging in age from 3 to 11 years [13]. Gulfside Elementary School is located about 1.3 miles from the Anclote facility.

Geographic Information

The property surrounding the 440-acre facility includes residential and recreational properties, as well as the previously mentioned elementary school. The facility itself is fenced and has a 24-hour security guard. During the site visit, ATSDR personnel saw no evidence of trespassing.

Other potential sources of environmental contamination in the area include Stauffer, which is located less than one mile away. In addition, the U.S. Environmental Protection Agency (EPA) Toxic Release Inventory database shows three other facilities reporting air emissions in the Holiday/Tarpon Springs area. These facilities are listed in Table 1 in the appendix.

COMMUNITY HEALTH CONCERNS

Community Health Issues

The petitioner's primary concerns about the Anclote power plant include frequent emission clouds, lack of air pollution control devices on the boiler exhaust stack, and exposures potentially affecting people at the nearby school and residences. The petitioner also expressed concerns about emissions of mercury vapor and contaminants in the oil used to fire the power plant generators.

Beginning in 1995, the FDEP documented community complaints associated with the Anclote power plant. Local residents expressed concern about dark plumes, odors, and resulting sore throats, as well as breathing problems and respiratory illnesses. In addition, residents complained about the periodic appearance of black residue and ash on lawns, homes, vehicles, outdoor furniture, and boats, as well as garden vegetables.

Health Information

ATSDR has not identified any existing analyses of health data or similar studies for the Anclote site or the Tarpon Springs area. However, based on discussions with a faculty member at the University of South Florida, there is local interest in conducting a health study associated with Stauffer.

Health and safety issues for on-site workers primarily include exposure to plant emissions and high levels of noise. Most operations at the plant require that personnel wear hard hats and steel-toed boots as well as ear plugs. However, certain specialized activities such as cleaning deposits out of the boilers require that a tyvek (protective) suit and respirator also be worn.

ENVIRONMENTAL DATA

Air Emissions

The air emission standards that apply to the Anclote and other, older power plants cover only particulates (soot) and sulfur dioxide. Based on the most recent FDEP annual air compliance test results (1996 through 1998), the measured particulate emissions, visible emissions, and sulfur dioxide levels for both generators at Anclote are within established permit compliance limits [14-16].

Ambient Air

From approximately 1986 until 1998, Florida Power Corporation (FPC) owned and operated three air sampling stations to measure ambient air levels of sulfur dioxide and particulates near the Anclote plant [17]. Each station was equipped with a continuous monitoring device to measure sulfur dioxide. In addition, the stations had high volume samplers to measure Total Suspended Particulates (TSP) and particulate matter with a diameter of 10 micrometers or less (PM10).

One sampling station, placed in an area known as the Goat Lot, was located southeast of the plant along the Anclote River. Another station, known as the Subdivision, was located east of the facility and adjacent to the Holiday Lake Estates subdivision [17,18]. The third sampling station was located northeast of the facility in an area known as Bailey's Bluff [18]. ATSDR evaluated the annual summaries from 1994 through 1998 for air sampling data collected from each of the three sampling stations.

Particulates

TSP

TSP is made up of particles of various sizes. Only a small portion of the TSP is inhaled; the remainder is usually swallowed. There are no EPA air quality standards for TSP. The largest TSP measurement reported near the Anclote facility for any one day from January 1994 through May 1998 was 167 micrograms per cubic meter ($\mu g/m^3$) [18-22]. The largest annual average calculated for any one year during that time was 31.1 $\mu g/m^3$. Although the average TSP level for 1998 was 35.9 $\mu g/m^3$, it was based on only five months of data [19].

PM10

ATSDR is concerned primarily about those particles that are small enough to be inhaled. The smaller particles such as PM10 are more likely than larger particles to be inhaled into the upper respiratory system. EPA's National Ambient Air Quality Standards (NAAQS) for PM10 are

50 $\mu g/m^3$ when measured as an annual average and 150 $\mu g/m^3$ when measured as a daily average [23]. Adverse health effects are not likely to occur from exposure to these levels.

At the sampling stations near the Anclote facility, for the years 1994 through 1998, the annual average (annual arithmetic mean) for PM10 ranged from 15.4 to 20.3 $\mu g/m^3$. These levels are well within the state and federal air quality standards and are similar to those levels found in rural areas across the United States [24].

The maximum daily average PM10 level reported during the period 1994 through 1998 near the Anclote facility ranged from 34 to 95 $\mu g/m^3$ [18-22]. These levels are also significantly less than the state and federal ambient air standards.

Sulfur Dioxide

Sulfur dioxide is another byproduct of the fuel-burning process. None of the levels reported for the three sampling stations from 1994 through 1998 exceeded any of the EPA or state of Florida standards. The following table presents these standards, along with the ranges of sulfur dioxide measurements collected near the Anclote facility.

The largest annual average reported during the 5-year span was 1.77 $\mu g/m^3$ (0.68 parts per billion [ppb]). This level was measured at the sampling station located near the Holiday Lake Estates subdivision.

Sulfur Dioxide Standards and Range of Measurements Near the Anclote Facility

Standard	National Ambient Air Quality Standards	Florida Ambient Air Quality Standards	Range of Measurements
Annual arithmetic mean (annual average)	80 $\mu g/m^3$* (30.5 ppb**)	60 $\mu g/m^3$ (22.9 ppb)	0.393 - 1.77 $\mu g/m^3$ (0.15 - 0.68 ppb)
Maximum 24-hour average	365 $\mu g/m^3$ (139.3 ppb)	260 $\mu g/m^3$ (99.2 ppb)	5.24 - 49.57 $\mu g/m^3$ (2.0 - 18.92 ppb)
Maximum 3-hour average	(None established)	1300 $\mu g/m^3$ (496.2 ppb)	43.75 - 268.99 $\mu g/m^3$ (16.7 - 102.67 ppb)

* micrograms per cubic meter

** parts per billion

While ATSDR has not established minimal risk levels (MRLs) for intermediate and chronic exposures to sulfur dioxide, the ATSDR MRL for acute exposure is 10 ppb [25]. The acute MRL is a conservative level that people can be exposed to for up to 14 days without adverse health effects. ATSDR considers MRLs to be protective of the more sensitive segments of the population, such as children and the elderly. Levels above an MRL, but below levels of reported health effects, are in an area of uncertainty that requires further evaluation.

To further evaluate sulfur dioxide exposures, ATSDR first looked at those instances in which the sulfur dioxide levels exceeded the acute MRL. For example, the largest daily average measured during the period from 1994 through 1998 was 18.92 ppb. Likewise, the largest 3-hour average measured during the same time span was 102.67 ppb. Both levels were observed in 1994 at the sampling station adjacent to the Holiday Lake Estates subdivision.

ATSDR reviewed the detailed data summaries available for 1994, 1995, and 1996. Sulfur dioxide measurements were collected every hour and the maximum measurement for each day was tabulated. In 1994, the highest reading of the day for at least one of the three sampling stations equaled or exceeded a level of 10 ppb nearly one-third of the time. However, there was only one day in 1994 (July 4th) in which the daily average was 10 ppb or more. On that day, the maximum daily average was 18.92 ppb [18].

In 1995, 17% of the days had a maximum sulfur dioxide measurement of 10 ppb or more. The highest daily average occurring in 1995 was 5.0 ppb [20]. Similarly, in 1996 20% of the days had a maximum reported measurement of 10 ppb or more. The 1996 highest daily average was 9.6 ppb [21].

ATSDR also reviewed the detailed data summaries (1994 through 1996) for each of the individual sampling stations. The Goat Lot station reported 14 days in which the 3-hour average exceeded 10 ppb. The measurements for 3-hour averages on these 14 days ranged from 11 to 74.33 ppb. The Subdivision station results showed 17 days in which the 3-hour average level of sulfur dioxide exceeded 10 ppb, ranging from 11.33 to 102.67 ppb. The Bailey's Bluff station reported 13 days in which the 3-hour averages for sulfur dioxide ranged from 11 to 47.67 ppb. The highest levels were recorded in 1994 [18,20,21].

Although daily and monthly data summaries for 1997 and 1998 were unavailable, ATSDR reviewed the annual summaries. In 1997, the maximum daily average sulfur dioxide level was 13.1 ppb [22]. In 1998, that level was 9.0 ppb [19]. The maximum 3-hour average during 1997 was 83.7 ppb and for 1998 was 30.3 ppb [19,22].

During all five years from 1994 through 1998, there were occasions in which the 3-hour average for sulfur dioxide exceeded 10 ppb at all three of the sampling stations [18-22]. However, the sulfur dioxide levels declined over that time span and have remained well below the NAAQS criteria.

Fuel Oil

Typically, fuel oil contains trace amounts (<1%) of metals, with the primary metals of concern being vanadium and nickel. In urban areas in which large quantities of heavy fuel oil are used for power generation, airborne concentrations of vanadium as high as 1.6 $\mu g/m^3$ have been recorded [26]. Although not necessarily attributed only to areas with power plants, urban levels of airborne nickel up to 0.3 $\mu g/m^3$ have been reported [29].

Used Oil

Used oil (or waste oil) can be defined as oil that, through use, has picked up foreign substances or contaminants. Typical examples of waste oils are lubricating oils, hydraulic fluids, metal working fluids, cooling oils, transformer oils, oily wastewater, and oily sludge. Activities that generate waste oils include cleaning engines and parts, replacing engine and transmission fluids, repairing and maintaining equipment, and replacing cutting oils. Used motor oil and industrial waste oil can be reprocessed into fuel that can then be used in utility boilers to generate electricity.

EPA does not regulate used oil as a listed hazardous waste. However, used oil can be considered a characteristic hazardous waste if tested and found to contain excessive levels of certain contaminants such as lead, arsenic, cadmium, or chromium.

Contaminants can originate from chemicals added to oils to improve their performance, from physical or chemical changes during use, or from mixing with other oily fluids or liquid wastes. Possible contaminants include metals, chlorinated solvents, products of incomplete combustion (PICs), and PCBs. Any metals contaminating the used oil would be emitted as particulates during combustion. Any organic contaminants, such as solvents, PICs, and PCBs, would either be combusted or emitted as vapors. In addition, the possibility exists that, at certain combustion temperatures, dioxins might be formed.

The Anclote air permit requires each batch of used oil delivered to FPC to be accompanied by analytical documentation showing that the used oil contaminants do not exceed the levels allowed for classification as "on-spec" used oil [2]. On-spec used oil contains less than 1000 parts per million (ppm) halogens (total chlorine); less than 5 ppm each of arsenic, cadmium, chromium, and lead; and less than 50 ppb PCBs.

ATSDR reviewed a total of 64 used oil analytical certificates with dates ranging from 8/5/96 to 1/25/99. The certificates showed that the used oil met the "on-spec" requirements with the following possible exceptions. Eight of the 64 certificates reviewed were missing information on either PCBs or one or more of the metals. In addition, analytical results from October 20, 1998 show that the total halogen level was 1399.9 [no units given].

The certificates do not include information about the original source of the used oil. However, according to FDEP officials, compliance inspections have been conducted on many of the oil distribution facilities supplying used oil to FPC.

Particulate Fallout

ATSDR reviewed the analytical data associated with the particulate fallout samples. In June 1995, vegetation samples collected at one residence were analyzed for vanadium. The analyses, measured the amount of vanadium deposited on the surface as well as inside the sample (from biological uptake). Vanadium was found in all eight of the samples at levels ranging from 0.7 to 16 ppm [5].

In a microscopic analysis performed on an ash sample from a residence in April 1995, the Hillsborough County Environmental Protection Commission's (HC-EPC) laboratory found only 2 to 3% unburned oil soot along with <1% fly ash. In May 1995, the HC-EPC laboratory results for vegetation samples stated that dark spots on the leaves did not appear to be caused by oily soot and that acid mist could not be confirmed as a cause. Another sample of fallout on a porch contained less than 1% oil soot and less than 1% fly ash [5].

Some of the samples collected by the FDEP indicated the presence of particulates from a source other than an oil-fired power plant. For example, an analysis of a dust sample from one resident's porch showed cellulose, synthetics, quartz, spores, and binders. A previous sample collected at that same residence showed only plant cellulose material. A dust sample from another residence showed hydrocarbons associated with diesel engines and automobiles. An analysis of samples of black spots on an automobile and a cactus indicated a biological origin, with no evidence of an industrial source. In addition, samples from a plastic boat cover appeared to be caused by the rusting in place of small metal particles possibly produced by metal cutting and sanding [5].

Soil and Groundwater

Two onsite percolation and evaporation ponds receive wastewater discharges from the facility. An FDEP industrial wastewater permit requires periodic groundwater monitoring near the pond for total dissolved solids, metals, and nitrates, as well as the proper removal of sludge from these ponds [28]. In November 1995, a fuel oil leak inside the plant contaminated some of the wastewater discharged to the ponds. Although the fuel oil subsequently contaminated the sludge in one of the ponds, it did not migrate offsite and the sludge was later removed [29].

In 1989, the FPC prepared a remedial action plan to clean up fuel-contaminated groundwater associated with a leaking underground fuel storage tank. The tank, located just north of the facility's shop building, was removed and the fuel floating on the underlying groundwater was

recovered. The remaining contaminated groundwater was treated using a recovery well, air stripping tower, and infiltration trench [30]. The FPC then began conducting quarterly monitoring for fuel-related compounds. Samples from the treatment system influent and effluent as well as four groundwater monitoring wells were collected and analyzed. ATSDR reviewed quarterly data from May 1993 to February 1995. These data indicate that the groundwater treatment system has been effective in reducing contaminant levels [31].

DISCUSSION

Pathway Analysis

Soot and ash are normal by-products of oil-fired plants such as the Anclote Power plant. While mercury is often a contaminant in coal and emitted by coal-fired power plants, oil-fired plants are typically not sources of airborne mercury. However, any contaminant in the fuel oil or waste oil is a potential emission concern.

Emissions from the Anclote facility combined with air dispersion, may expose nearby residents to particulates and sulfur dioxide via inhalation, dermal exposure, and ingestion of exposed fruits and vegetables. Inhalation poses the most likely exposure-related health risk, although the airborne levels of particulates and sulfur dioxide are not high enough to be health concerns for most people.

While there have been contaminant releases to soil and groundwater onsite, there are no indications that soil contaminants have migrated from the facility's property. In addition, residents are not exposed to the contaminated groundwater.

Public Health Implications

Particulates, Vanadium, and Nickel

Smaller particles such as PM10 are responsible for most adverse health effects associated with particulates because of their ability to reach the lower regions of the respiratory tract [32,33]. The PM10 levels found near the Anclote facility are well below state and federal ambient air standards. As a result, adverse health effects are not expected to occur in most people from exposure to the levels found near the facility. However, these PM10 levels may affect medically sensitive people, such as those with asthma and those with preexisting medical conditions (for example, chronic obstructive pulmonary disease or emphysema).

Airborne metals, including vanadium and nickel, are associated with the smaller PM10 particles and, therefore, target the respiratory system [26,27]. However, the primary effects associated with the inhalation of vanadium and nickel occur at occupational levels that are much higher than

those that are found in the air near the Anclote facility [27]. For example, the major adverse health effect in humans from vanadium has been seen in workers exposed to large amounts of vanadium pentoxide dusts. These people have coughs, chest pains, sore throats, and irritated eyes, but the symptoms disappear soon after exposure ceases [26].

Particles containing vanadium at up to 16 ppm were found on vegetation samples from a home garden near the site. In order to evaluate the potential ingestion exposure, ATSDR compared this level with the ATSDR intermediate Environmental Media Evaluation Guide (EMEG) for vanadium. The EMEG is an estimate of the level of vanadium exposure through ingestion (2000 ppm) that is unlikely to cause an appreciable risk of deleterious, noncancerous health effects after exposures of between 15 days and one year. Based on this comparison, ATSDR does not consider ingestion of vanadium at the levels found in vegetation near the Anclote facility to be a concern for adverse health effects. In addition, washing or peeling fruits and vegetables should effectively remove any metals or particulates that may fall on them.

Sulfur Dioxide

Existing federal and state daily and annual sulfur dioxide standards protect people against adverse health effects of breathing and respiratory illness as well as the aggravation of existing respiratory and cardiovascular disease. Asthmatic individuals, the elderly, and children are most susceptible to the adverse health effects of sulfur dioxide.

ATSDR's MRL for sulfur dioxide of 10 ppb was derived for acute-duration exposure (14 days or less). This MRL is a level that a person can be exposed to for up to 14 days without any appreciable risk of deleterious noncancer effects. Residents near the Anclote facility are not exposed to this sulfur dioxide level chronically. However, there have been some days and portions of days when the MRL has been exceeded. On those days, sensitive individuals with respiratory and other chronic health problems may be affected.

The sulfur dioxide MRL contains a safety factor of 10 and is based on the study in which exercising people with mild asthma were exposed to ≥100 ppb sulfur dioxide for 10 minutes [34]. The two most sensitive persons developed slight bronchoconstriction after inhaling 100 ppb sulfur dioxide. ATSDR then divided the 100-ppb figure by an uncertainty factor of 10 to account for uncertainty and human variability. It has been estimated that people with asthma represent approximately 4% of the population, although the true prevalence may be as high as 7 to 10% of the population [35]. Other studies also indicate that 100 ppb (262 $\mu g/m^3$) sulfur dioxide may be close to the threshold for bronchoconstriction in humans, although a few studies have not reported respiratory effects in people with asthma at 250 ppb (655 $\mu g/m^3$) [36-39]. Healthy people without asthma can show lung function changes following inhalation of sulfur dioxide concentrations above 1,000 ppb (2,620 $\mu g/m^3$) [35].

The medical literature supports an association between sulfur dioxide exposures and respiratory ailments in people with asthma. During the period 1994 through 1998, the average annual arithmetic mean for sulfur dioxide concentrations in air near the Anclote facility was 0.3 ppb. This level is well below the level (100 ppb for 10 minutes) known to affect people with asthma. The federal ambient air standard for the annual arithmetic mean of sulfur dioxide is 30.5 ppb (80 $\mu g/m^3$), while the state standard is 22.9 ppb (60 $\mu g/m^3$).

Although there is no federal standard for maximum 3-hour average emissions, the highest 3-hour average level recorded near Anclote was 102.67 ppb, which did not exceed the state standard of 496.2 ppb (1,300 $\mu g/m^3$). The highest daily average recorded (18.92 ppb at the Subdivision station), did not exceed either the daily federal standard (139.3 ppb or 365 $\mu g/m^3$) or daily state standard (99.2 ppb or 260 $\mu g/m^3$).

There is no definitive evidence linking increased cancer risk in humans with sulfur dioxide exposure [35]. As a result, ATSDR concludes that the sulfur dioxide levels measured near the Anclote facility pose no carcinogenic hazard to residents.

Used Oil Contaminants

ATSDR found no data to evaluate the ambient air levels of chromium, arsenic, lead, cadmium, organic halogens, PCBs, and mercury near the Anclote facility. Therefore, no conclusions can be drawn about the public health implications associated with the combustion of waste oil. However, waste oil makes up no more than 10% of the total amount of oil burned at the facility. In addition, the overall use of fuel oil, including waste oil, is expected to decline with the increasing use of natural gas.

CONCLUSIONS

ATSDR classifies the site as an **Indeterminate Health Hazard**. After evaluating the available information, ATSDR concludes the following.

1. The levels of sulfur dioxide and particulates found near the Anclote facility are not a public health concern, but may periodically affect sensitive individuals with respiratory and other chronic health problems.

2. A review of the analyses provided by the distributors for on-spec used oil indicates that the levels of total halogens, PCBs, and metals are generally within the prescribed regulatory limits. However, there are no environmental data to indicate the levels of these and other contaminants that may be emitted from the exhaust stack.

3. Although there have been contaminant releases to the soil and groundwater at the plant, there are no exposure pathways to nearby residents.

RECOMMENDATIONS

ATSDR makes the following recommendations:

1. If the stack testing should indicate an ongoing problem with elevated emissions of sulfur dioxide, the FPC should reinitiate monitoring the ambient sulfur dioxide concentrations surrounding the facility.

2. The need for stack testing of metals, PCBs, and dioxin should be evaluated for the upcoming air permit renewal, particularly if the usage of waste oil is expected to be at higher than existing levels.

3. Residents who grow fruits and vegetables in home gardens should wash them thoroughly before eating them to remove any particulates.

PUBLIC HEALTH ACTION PLAN

1 ATSDR will place this document in the site repository already established for the nearby Stauffer Chemical site in Tarpon Springs.

2. If requested, ATSDR will review any future environmental data for FPC releases that could potentially have an adverse effect on human health.

3. ATSDR has referred citizens' concerns about the source of the fuel oil and waste oil to officials at the FDEP.

4. ATSDR will review the analytical results from a recently collected sample of the foam released into the outfall canal. If there are public health issues arising from the results of the foam analysis, ATSDR will issue a health consultation to address them.

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Appendix

Table 1

Companies Reporting Air Emissions in Tarpon Springs, Florida

U.S. Environmental Protection Agency
Toxic Release Inventory Database

Facility Name	Address	Chemical Reported
Acme Sponge and Chamois Co, Inc.	855 E. Pine Street	Acid aerosols, tetrachloroethylene
Metal Industries, Inc.	955 Live Oak Street	Glycol ethers
Stamas Yacht, Inc.	300 Pampas Avenue	Acetone, styrene

Source: U.S. Environmental Protection Agency Envirofacts Warehouse Toxics Release Inventory.
Internet address: http://www.epa.gov:9966/envirodcd/owa/.

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