United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R03-88/039
December 1987

EPA

Superfund Record of Decision:

Middletown Air Field, PA

DECLARATION FOR THE RECORD OF DECISION

Site Name and Location

[redacted], Drinking Water Supply Operable Unit, Middletown, Pennsylvania.

Statement of Purpose

This decision document represents the selected remedial action for this Site developed in accordance with CERCLA, as amended by SARA, and to the extent practicable, the National Contingency Plan.

The State of Pennsylvania has concurred on the Selected Remedy.

Statement of Basis

This decision is based upon the Administrative Record (index attached). The index identifies the items which comprise the Administrative Record upon which the selection of a remedial action is based.

Description of the Selected Remedy

This is an interim remedy which focuses on the drinking water supply as an operable unit. The remainder of the site is under investigation and will be addressed at a later date.

The selected remedy consists of providing a potable water supply to those served by the Harrisburg International Airport system. This will be accomplished by constructing a central treatment plant. Water from 10 of the on-site wells will be collected and then treated via a 2-tower air stripping unit.

Declaration

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate, and is cost-effective. This remedy satisfies the preference for treatment that reduces toxicity, mobility, or volume as a principal element. Finally, it is determined that this remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

Date 12/30/87

James M. Seif
Regional Administrator

ROD DECISION SUMMARY

I. SITE NAME, LOCATION, AND DESCRIPTION

The Middletown Air Field Site covers what is now the Harrisburg International Airport (HIA), and is located between the towns of Middletown and Highspire, in Dauphin County, Pennsylvania, on the east bank of the Susquehanna River (Figure 1 & 2). Geographically it is located at latitude 40° 12' N and longitude 76° 45' W.

Prior to its use as a commercial airport, the Middletown Air Field site was used from the early 1900s to 1962 by the Federal Government a military property. It was assigned the name Olmsted Air Force Base in 1947. The former location of the base is now occupied by the HIA and several other entities, including the Fruehauf Truck Trailer Manufacturing facility, Penn State University Branch Campus, and several small manufacturing facilities. The airport is owned and operated by the Commonwealth of Pennsylvania, Department of Transportation (PennDOT). The area surrounding the base is characterized as mixed residential/industrial. Middletown, located southeast of the Site, has a population of approximately 10,200.

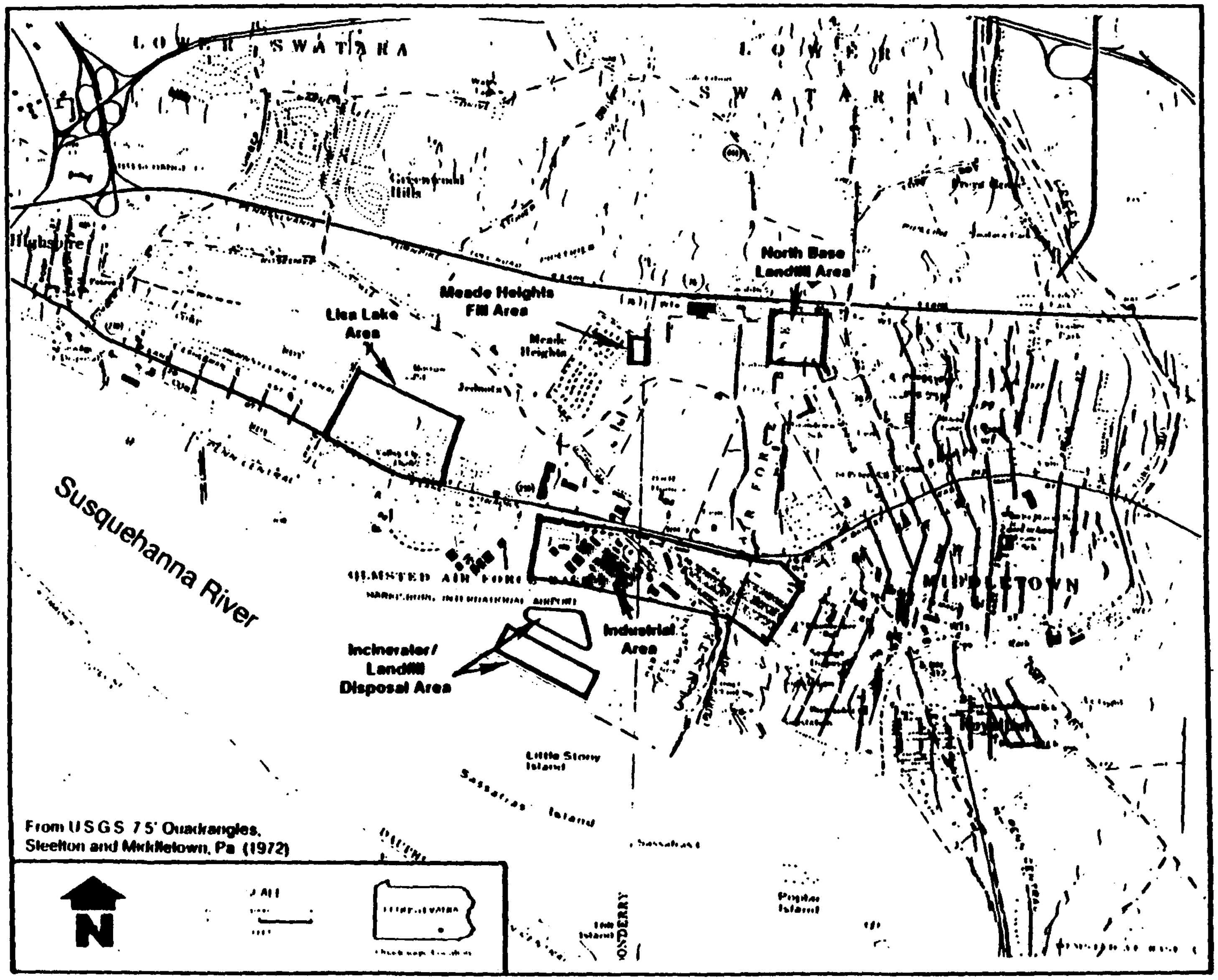
II. SITE HISTORY

The property formerly occupied by Olmsted was initially established by the Army as a basic training camp in 1898. Within that same year, following the Spanish-American War, the land was reverted back to farmland. In May 1917, the Army Signal Corps established a storage depot on 47 acres of this area, which was known an the Aviation General Depot. Warehouses, open sheds and garages were constructed on the site beginning in 1918 for materiel storage. The depot was renamed in 1921 as the Middletown Air Intermediate Depot.

Flying activities at the base began in 1918 with Curtis-M-4 aircraft and balloons. At that time, a canvas hanger housed the aircraft maintenance activities. The airfield was named the Olmsted Field for Lt. Robert S. Olmsted following his death in a balloon race in 1923.

The functions of the base were increased following World War I to include aircraft and accessory repair. Aircraft overhaul facilities were expanded and made permanent to accommodate increasing activity, which by 1931 had reached a peak of one plane per day.

From 1931 to 1939, the Middletown Air Depot operations remained stable, and the main functions were supply and maintenance of Army Air Corps materiel. During World War II, facilities were expanded. In 1943, the facility was assigned to the Middletown Air Depot Control Area Command. The Command was redesignated the Middletown Air Technical Service Command in 1944 and was changed again in 1946 to Middletown Air Materiel Area (MAAMA). Activities during World War II included overhaul of P-40, P-38, and B-25 type aircraft. To accommodate the extreme increase in the load of aircraft overhaul activities,



SITE LOCATION MAP

FIGURE 1

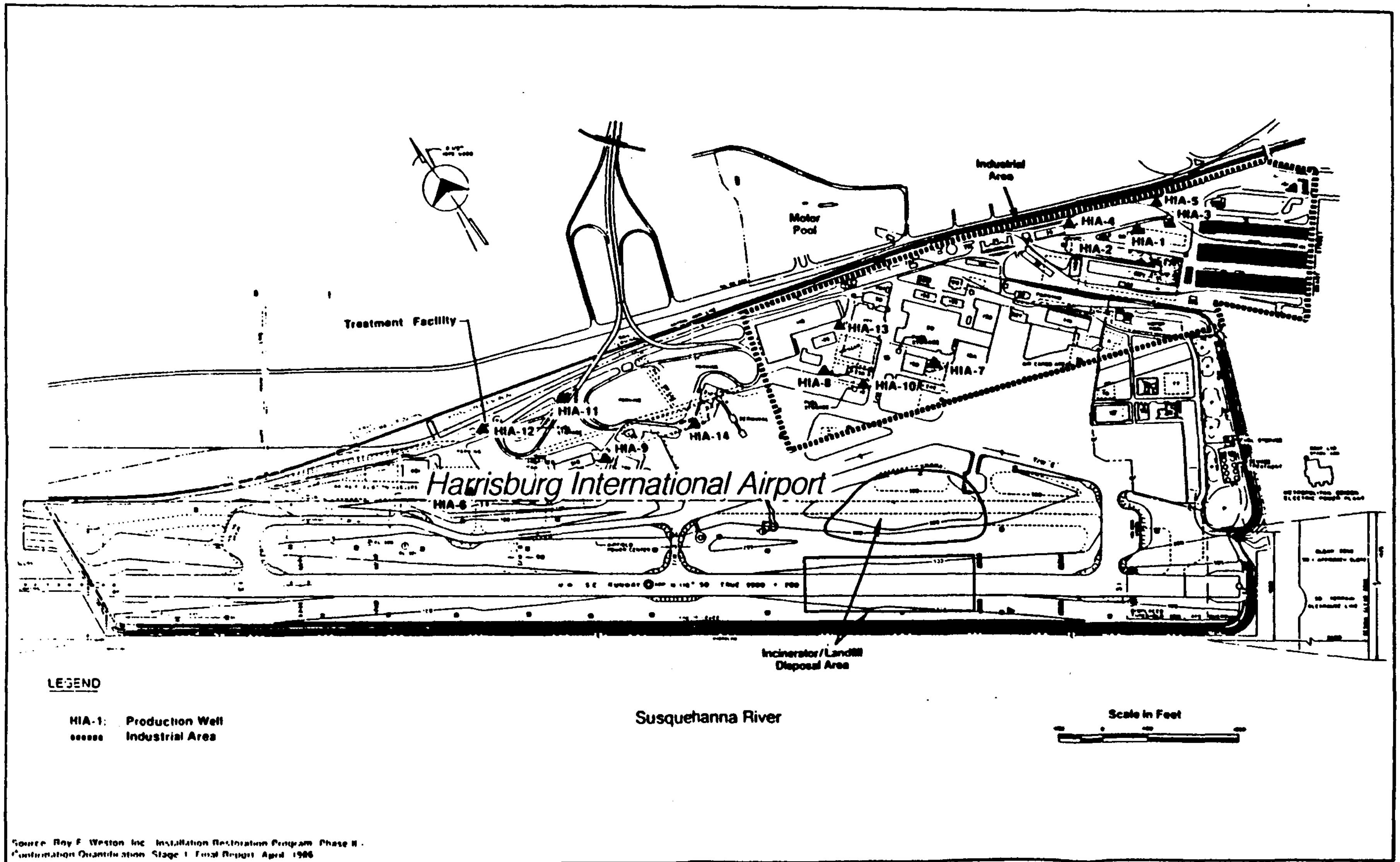


FIGURE 2 GENERAL SITE MAP SHOWING INDUSTRIAL AREA AND PRODUCTION WELLS

activities, the base used the Farm Show Building in Harrisburg, Pennsylvania, for aircraft engine repair between 1943 and 1945. In 1945, building T-160 was converted to a POW camp; it was deactivated in February 1946.

In September 1947, Olmsted Field was renamed Olmsted Air Force Base to coincide with the designation of the Air Force as a separate Department of Defense establishment.

In 1948, four engine test cells were converted for overhaul of jet engines, marking the introduction of jet aircraft to the base. From 1950 to 1955, improvements were made to maintenance hangars, engine test cells, and other maintenance and test buildings to properly handle engineering of jet engine accessories, and radio and electronic components.

In 1951, MAAMA materiel storage operations included 28 different buildings at Olmsted and were supported by 6 locations remote to the base, using a total of 1,739,000 square feet space.

In 1956, a major expansion of the existing runways to handle jet aircraft was undertaken. As part of this program, a tract of land encompassing Sunset Hill (i.e., Sunset Golf Course) was purchased. Additional property was purchased in 1956 to accommodate facility expansion, including property for military housing (Meade Heights), property west of the facility for runway expansion, and property north of U.S. Route 230 for additional bulk warehousing.

By the early 1960s Air Force operations at Olmsted began to decrease. The industrial portion of the installation was declared excess to the Air Force in November 1964, and all Air Force operations were ceased by 1966.

The primary mission of the former Olmsted AFB was to provide support to the MAAMA in conducting its procurement and production assignments. Logistical support of Air Force operations for 11 northeast states consisted primarily of supply services and engineering maintenance. Activities at Olmsted throughout its history included:

- Warehousing and supply of parts, equipment, general supplies, and petroleum, oil and lubricants (POL) for the northeast procurement district

- Complete aircraft overhaul, including stripping, repainting, engine overhaul, reassembly, and equipment replacement

- Engine and aircraft testing

- General base support maintenance and operation

III. CURRENT SITE STATUS

This Record of Decision (ROD) focuses on the provision of a safe drinking water supply for the HIA. The remainder of the site is being investigated, and the findings of the complete Remedial Investigation/Feasibility Study will be presented at a later date.

In March 1983, trichlorethylene (TCE) contamination caused six of the ten onsite production wells supplying HIA to be taken out of service. Because of the Air Force's past involvement with the installation, the Air Force initiated investigations at the Middletown Air Field Site under the Department of Defense Installation Restoration Program (IRP). In accordance with the IRP, Phase I investigations were completed in April 1984 (JRB Associates, 1984) and Phase II studies were completed in April 1986 (Roy F. Weston, 1986). Additional studies were also completed for PennDOT in April 1984 (R.E. Wright Associates Inc., 1984). These studies identified six areas of potential concern. These were:

Lisa Lake
Landfill/Runway Area
North Base Landfill
Meade Heights
Industrial Area
Fire Training Pit

The findings of these confirmation studies indicate that while volatile organic compound contamination of ground water resources exists, the exact source(s) of contamination cannot be clearly defined. The results indicate contamination of the ground water (which feeds the production wells) by volatile organic compounds (VOCs) from one or more, possibly current, sources in the "Industrial Area" (Figure 2).

One of the recommendations of the Phase II study (Weston, 1986) was the development and implementation of a ground water withdrawal and treatment system for the industrial area to remove volatile organic compounds from the HIA drinking water supply wells. The Phase II study also contained a number of recommendations concerning the other sites at HIA (Lisa Lake, Meade Heights, North Base Landfill, and the Incinerator/Landfill Disposal Area).

To date, HIA has been able to temporarily meet the water requirements of the facility by taking the most contaminated well off-line as a potable water source and by blending potable water from a number of wells. The well taken off-line is now a dedicated purge well pumped for cooling water supply only. However, in view of the water supply contamination problem, long-term remedial action is necessary to assure a continued and reliable potable water supply.

The VOCs detected in the airport wells are listed in Table 1. Shown are the highest average concentrations of each VOC at each well over the sampling period from March 1983 to June 1985 along with the well in which the highest average concentrations occurred. In addition, Table 1 shows the concentration of two additional VOCs that were detected in Well No. 13 during the sampling for Hazardous Substances List (HSL) compounds on May 26, 1987. Non-volatile organics have not been detected in the ground water, based on the sampling and analysis of Wells No. 2, 3, 4, 5, 6, 9, 11 and 13 on May 26, 1987, for the HSL compounds.

TABLE 1

VOCS DETECTED IN AIRPORT WELLS

VOC	Highest average influent concentrations (µg/L)	Highest single concentration (µg/l)	Well number
Chloromethane	2.0	4.0	12
Carbon Tetrachloride	0.25	1.0	13
1,1-Dichloroethane	3.35	5.3	13
trans-1,2-Dichloroethene	73.3	140	13
1,1,1-Trichloroethane	4.46	19	6
Vinyl Chloride	1.20	2.6	13
1,1-Dichloroethene	1.74	1.74	13
Trichloroethene	81.67	311	13
Tetrachloroethene	6.25	25	11
Benzene	4.80	4.80	2
Chlorobenzene	8.2	15	13
Toluene	17.0	17	2

Source: Buchart-Horn, Inc. and Malcolm Pirnie, Ground Water Remediation at Harrisburg International Airport, Draft Engineering Report, March 1986.

cis-1,2-Dichloroethene[1]	149.3	149.3	13
1,2-Dichlorobenzene	189	189	13
1,4-Dichlorobenzene	27	27	13

Source: USEPA, Region III, Analytical Results from Ground Water Samples Collected on May 26, 1987 at Harrisburg International Airport.

[1] cis-1,2-Dichloroethene was tentatively identified in the nontarget compound report

The most prevalent volatile organics in the airport wells are trichloroethylene (TCE) and tetrachloroethylene (PCE), which have been found in all the wells sampled. Although TCE and PCE are the most common VOCs, the other VOCs shown in Table 1 are also being addressed. Well No. 13 has consistently had the highest concentrations of many of the volatiles (see Table 1). VOCs have also been detected in Wells No. 2, 3, 4, 5, 6, 9, 11 and 12.

Present EPA and Pennsylvania Department of Environmental Resources standards and guidelines for the volatile organics are given in Table 2.

The volatile organic compounds for which final Maximum Contaminant Level Goals (MCLGs) and final Maximum Contaminant Levels (MCLs) have been adopted by EPA are shown in Table 2. Of the eight MCLs, only 1,2-dichloroethane has not been detected in the airport wells. Six other organic compounds (chloromethane; 1,1 dichloroethane; 1,2-dichlorobenzene; trans-1,2-dichloroethylene; chlorobenzene; and toluene) have also been detected in the airport wells. Of these six compounds, proposed MCLGs have been published by EPA for toluene (2,000 ug/l), 1,2-dichlorobenzene (620 ug/l), chlorobenzene (60 ug/l), and trans-1,2-dichlorethylene (70 ug/l). These are shown in Table 2. Tetrachloroethylene is carcinogenic and has been included in Table 2; 1,1-dichloroethane and chloromethane are non-carcinogenic.

The carcinogenic risk from consumption of volatile organic chemicals is the major health risk at the site. Potential receptors are the customers of the HIA Water Supply System. Using maximal ground water contamination values for six volatile organic carcinogens found in the airport HIA wells (assuming no blending of water) the carcinogenic risk to users of that water assuming no remedial action is conducted, is as follows.

CARCINOGENIC RISK

Chemical	Concentration (ppb)	10^{-6}*	ppb/10^{-6}
Trichloroethylene	311	1.84	169
Tetrachloroethylene	25	1.0	25
Carbon tetrachloride	0.47	0.27	2
Vinyl chloride	4.1	0.015	273
Benzene	4.8	0.66	7
1,1-Dichloroethylene	1.74	0.033	53
	Total carcinogenic risk x 10^{-6} =		529

$529 \times 10^{-6} = \underline{5.3 \times 10^{-4}}$

*ppb which gives risk for one cancer per million lifetime consumers

TABLE 2

GUIDELINES AND STANDARDS FOR SELECTED VOLATILE ORGANICS

Contaminant	USEPA MCL (ug/l)	USEPA MCLG (ug/l)	USEPA 10-6 level (ug/l)
1. Chloromethane	-	-	-
2. Carbon Tetrachloride	5.0	0	0.27
3. 1,1-Dichloroethane	-	-	-
4. trans-1,2-Dichloroethene	-	70	-
5. cis-1,2-Dichloroethene	-	70	-
6. 1,1,1-Trichloroethane	200	200	-
7. Vinyl Chloride	2.0	0	0.015
8. 1,1-Dichloroethene	7.0	7.0	0.033
9. Trichloroethene	5.0	0	1.84
10. Tetrachloroethene	-	-	1.0
11. Benzene	5.0	0	0.66
12. Chlorobenzene	-	60	-
13. Toluene	-	2000	-
14. 1,2-Dichlorobenzene	-	620	
15. 1,4-Dichlorobenzene	75	75	1.8

The risk which derives is 5.3×10^{-4} lifetime risk for developing cancer, assuming consumption of 2 liters per day for 70 years.

The amount of water being pumped from each well is shown below:

WELL #	RATE (GPM))	DESCRIPTION	DEPTH (FT)	COMMENT
2	270	Domestic/Potable	450	Used Sparingly
3	130	Domestic/Potable	450	Used Sparingly
4	140	Domestic/Potable	459	Used Sparingly
5	170	Domestic/Potable	776	Used Sparingly
6	500	Domestic/Potable	500	Used 24 hours/ day, 7 days a week
9	150	Domestic/Potable	451	Used Sparingly
11	600	Domestic/Potable	600	Not Used
12	700	Domestic/Potable	600	Used 24 hours/ day, 7 days a week
13	430	Non Pota./Indust. Use	800	United Piece Dye Well
14	340	Non Pota./Indust. Use	800	Passenger Terminal HVAC

In the current distribution system, water is pumped from the wells directly into the distribution system. The distribution system is a complex network of approximately 21 miles of pipe, varying in size from 6 to 18 inches. If water is not required by a customer, it is stored in one of the three elevated storage tanks (65,000 gallons, 200,000 gallons, and 400,000 gallons) in the low pressure area. A 1-million gallon tank located in the area north of the airport is supplied with water by a pumping station located on the eastern end of the airport. This tank supplies water to Fruehauf Corp., Pennsylvania State University at Harrisburg, and the Odd Fellows Home. The approximate daily consumption of water at the airport ranges between 1,400,000 gpd to 1,800,000 gpd. United Piece Dye uses a large percentage of this amount for manufacturing purposes. The HIA new passenger terminal building also uses 500,000 gpd of the foregoing amount for the HVAC system. The water system is interconnected with Middletown Royalton water system at one operable location. The interconnection is normally closed, and designated for use only in the event of an emergency. It is a one-way connection with the airport being the supplier.

IV. ALTERNATIVES EVALUATION

This ROD recommends the appropriate remedial actions for the water supply contamination problem found in the Industrial Area of HIA through a process of screening, developing, and evaluating applicable control measures. The selection of the preferred remedial action is based on its ability to satisfy the primary objective.

The primary objective is to provide a potable water supply (i.e., one that meets federal and state standards) to HIA that can satisfy present and future needs. A collateral and ancillary benefit of achieving this objective is to remediate ground water contamination in the industrial area by reducing volatile organic compound concentrations and controlling contaminant migration.

A. Screening Of Alternatives

The following Table 3 lists all the control technologies which were screened in the focused feasibility study for development as remedial action alternatives. The focus of the screening is to determine which control measures have the potential for satisfying the primary objective, i.e., to provide a potable water supply. Only those measures which have this potential were retained for development as remedial action alternatives. Control measures are screened on the basis of technical feasibility, cost, environmental impacts, and public health effects.

The National Contingency Plan (NCP) requires that, to the extent possible and appropriate, at least one remedial alternative be developed as a part of a feasibility study in each of the following categories:

(1) Alternatives for treatment or disposal at an off-site facility

(2) Alternatives that attain applicable or relevant and appropriate Federal public health and environmental requirements

(3) Alternatives that exceed those requirements

(4) Alternatives that do not attain the requirements above, but will reduce the likelihood of present or future threat and that provide significant protection to public health, welfare and the environment

(5) No action

The only potential alternative that involves disposal at an off-site facility that could be a candidate for further evaluation is excavation of the contaminated soil followed by transportation and disposal at a RCRA landfill. This alternative would involve the excavation of a potentially large and deep area through existing pavement, and would not be cost effective because of the large amounts of material to be transported and disposed, coupled with the relatively low concentrations of contaminants that would be removed. Accordingly, no alternative in this category is judged to be appropriate for further analysis.

A centralized treatment plant using either activated carbon adsorption or air stripping can meet or exceed Federal requirements.

Because the no-action alternative involves continuing to pump well HIA-13 to waste, it reduces the likelihood of present or future threat. However, in the long term, the no-action alternative will not attain the applicable Federal requirements in times of mechanical failure or increased demand.

Therefore, based on the technology screening evaluations, the following remedial action alternatives have been selected for development and detailed evaluation:

TABLE 3

COMPARISON OF CONTROL TECHNOLOGIES

Technology	Time to Achieve Primary Objective	Difficulty in Implementation and Operation	Ability to Satisfy Quantity Demand	Proven Technology	Relative Cost	Envmt'l Impact	Public Health Protection	Result of Initial Screening
Ground Water Control								
Capping	Will not achieve objective	Low	Low	Yes	Low	Low	Poor	Eliminated--will not provide potable water
Pumping (w/o treatment)	Will not achieve objective	Low	Low	Yes	Low	Moderate	Poor	Eliminated--will not provide potable water
Containment Barrier	Will not achieve objective	Low	Low	Yes	Low	Low	Poor	Eliminated--will not provide potable water
Soil and Sediment Control								
Excavation and Removal	2-4 yrs	High	Low	Yes	High	High	Poor	Eliminated--poor technical feasibility
In-Situ Treatment of Soil	Could be many yrs.	High	Low	No	High	Moderate	Poor	Eliminated--unproven technology
Direct Water Treatment								
Separation								
o Air Stripping	2 years	Low	High	Yes	Moderate	Low	Good	Consider further
o Activated Carbon Adsorption	2 years	Low	High	Yes	High	Low	Good	Consider further
o Polymeric (Resin) Adsorption	2-3 years	Moderate	Low	No	High	Moderate	Good	Eliminated--not proven at this scale
Destruction								
UV-Catalyzed Ozonation	2-3 years	High	High	No	High	Low	Fair	Eliminated--unproven technology
Detoxification								
Dye-Sensitized Photo Oxidation	2-3 years	Moderate	High	No	High	Low	Fair	Eliminated--unproven

TABLE 3 (cont.)

COMPARISON OF CONTROL TECHNOLOGIES

Technology	Time to Achieve Primary Objective	Difficulty in Implementation and Operation	Ability to Satisfy Quantity Demand	Proven Technology	Relative Cost	Envmt'l Impact	Public Health Protection	Result of Initial Screening
Simple Chemical Addition	Will not achieve objective	Low	High	No	Low	High	Poor	Eliminated--will not remove VOC's
Management Methods								
Existing Water Supply								
o Central Treatment	2 years	Low	High	Yes	Moderate	Low	Good	Consider further
o Well Head Treatment	3-4 years	High	High	Yes	High	Low	Good	Eliminated--high cost and poor feasibility
o Point-of-Use Treatment	1 year	High	High	Yes	Moderate	Low	Fair	Eliminated--unreliable performance and monitoring problems
Alternative Water Supply								
o Connection to Public System	3-4 years	Low	Low	Yes	Moderate	Low	Good	Eliminated--adequate public supply not available
o Susquehanna River	4-6 years	Moderate	High	Yes	Moderate	Moderate	Fair	Eliminated due to cost, raw water quality and time to implement
o New Ground Water Supply Wells	4-6 years	Moderate	Low	Yes	High	Moderate	Good	Eliminated due to lack of available sites for development
o Bottled Water	<1 year	Low	High	Yes	High	Moderate	Fair	Eliminated due to economic, and practical considerations

Category	Alternative
Attains Federal requirements	Centralized plant using air stripping
	Centralized plant using activated carbon adsorption
Exceed Federal requirements	Centralized plant using air stripping
	Centralized plant using activated carbon adsorption
Does not attain Federal requirements	No action
No action	No action

B. Detailed Analysis of Alternatives

After screening the alternatives, three emerged as warranting further consideration: central treatment plant, air stripping treatment, and carbon adsorption treatment. The no-action alternative is also evaluated. For the purpose of this analysis, treatment via air stripping or carbon adsorption assumes treatment at a central facility. The alternatives will be compared in relation to the following factors: engineering feasibility, cost, environmental impact, public health effects, and regulatory compliance.

1. CENTRAL TREATMENT PLAN

A central treatment facility is technically feasible and implementable. The 10 affected wells would have to be manifolded to a central location and then hydraulically redistributed after treatment. Treatment with air stripping or granulated activated carbon (GAC) can readily be accomplished in this manner. If more of the existing wells developed unacceptable levels of volatile organics they would be automatically treated. Public health would be protected on a continuous basis with only nominal monitoring required.

The cost for a central treatment facility including pipelines and well pump renovation should be competitive with the other identified alternatives for using the existing supply. The environmental impact of this option relates to construction of the treatment building and waste by-products generated in the treatment process. Environmental impact from construction should be nominal since the plant can be built on airport property at a location which is presently cleared and level. The plant by-products, depending on treatment process selected, could be a moderate atmospheric discharge from an air stripping system or spent granular activated carbon which would have to be handled and reactivated or disposed of appropriately. Both treatment technologies are in common use and waste by-products are not considered a major problem except at very contaminated sites.

2. AIR STRIPPING

Air stripping relies upon the natural volatility of volatile organic compounds to remove compounds from the water into an air stream. A high removal efficiency (99 percent) is required to remove VOCs found at maximum concentrations observed in the well field to date. To achieve this removal efficiency, a packed tower air stripper would be required. In the packed tower configuration, water and air are brought into contact in a column packed with one of several commercially available packing materials. Water trickles down through the packing, while a counter-current flow of air is forced upward.

Figure 3 shows a conceptual diagram for a typical packed tower air stripper. The installation of air stripping will consist of pumps, clearwell, packed towers and chlorination equipment. Water would be pumped directly from the wells to the top of the tower where it would cascade over the packing as forced air carries the volatiles from the water. After stripping, the water would enter an intermediate clearwell where booster pumps would provide system pressure. The water would be chlorinated in the clearwell. In the future, softening could be added to the system, if desired. There are many operating air stripping systems in Pennsylvania removing the same type and level of organics.

The estimated capital cost for a complete air stripping installation is about $3,700,000 including 30 percent for contingencies and 13 percent for engineering. Air stripping operating costs would average $161,000 per year or $0.15 per thousand gallons. Capital cost for a six contactor carbon system would be about $8,900,000 including the same contingency and engineering percentages. The capital costs for both technologies are much higher than normally expected for a plant of this size because more than $2,000,000 (including contingency) is needed to repipe the wells.

The environmental and public health impacts from the air stripping towers relate to construction activities and air emissions. The plant site is level and cleared. Construction activities would be typical and normal for a water plant and generally confined to the immediate limit of work with the exception of the pipelines conveying water from the wells.

3. GRANULAR ACTIVATED CARBON ADSORPTION

Activated carbon has been successfully used to remove VOC contaminants from drinking water supplies. Granular activated carbon can reduce organics in drinking water to immeasurable levels. However, the mechanism by which GAC removes organics is molecular adsorption to the surfaces of the internal micropores. Consequently, the capacity of GAC is finite and limited by the type, concentration, and mixture of organics compared to available adsorption sites.

AIR STRIPPING UNIT
(PACKED TOWER)

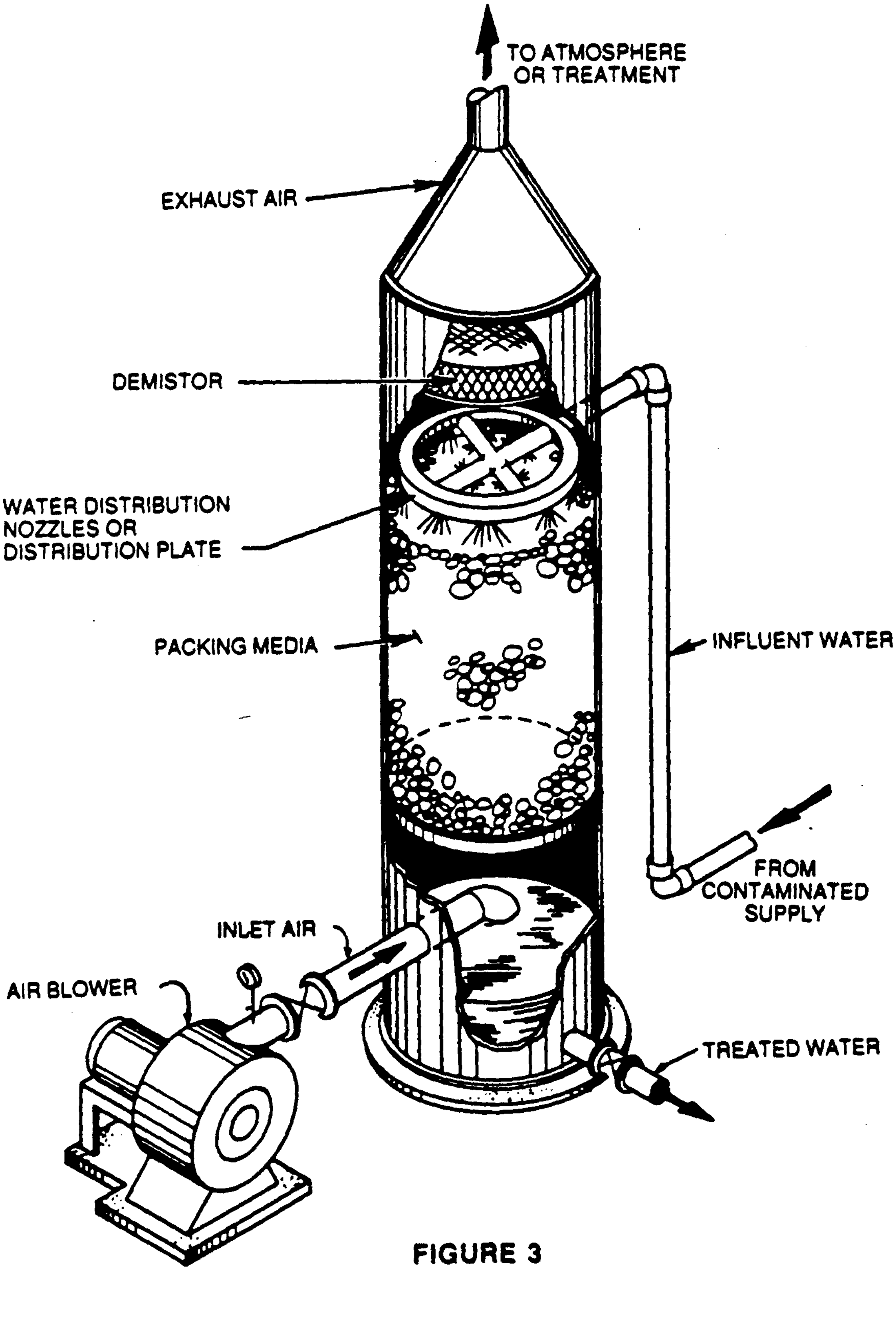


FIGURE 3

The cost of such treatment is mostly determined by the quantity of carbon required to achieve the desired removal. The annual carbon consumption at 3.0 mgd is estimated at 1,643,000 pounds per year. At an approximate cost of $1.54/kg for virgin carbon ($9.70/lb), this translates to $1.15 million per year in carbon replacement cost alone. Power, labor, and maintenance would be additional costs, but insignificant compared to that for carbon replacement.

A GAC facility at Harrisburg would consist of six pressure contactors. Each pressure contactor would contain 20,000 pounds of carbon. In order to meet the projected quality guideline, the GAC would require replacement every 28 to 30 days (calculated for design influent conditions). Replacing carbon this frequently is generally considered excessive. Using the carbon for 6 months is more practical. However, to achieve a 6-month replacement schedule would require installation of 36 contactors (containing a total of 720,000 pounds of carbon). This is an impractical number of contactors.

Operating and maintenance costs for the GAC system based on constant influent VOCs at design levels are estimated at $1,300,000 per year or $1.18 per thousand gallons. Even a cursory review of the cost breakdown supports the air stripping towers as being considerably less expensive to build and operate than the carbon contactors. However, a major factor in the operating cost for the carbon is the actual VOC influent levels. As the levels decrease, and ultimately they should, replacement cost for the carbon should decrease proportionately. Since the levels of VOCs will not directly affect the stripping tower operating costs, as the influent levels decrease the carbon will tend to be more competitive with the air system. However, information is not presently available that will allow a reasonable prediction of aquifer cleanup duration.

Construction of the carbon contactors would require more land area (perhaps 10,000 ft^2) than the strippers. The pipeline construction would remain the same. There would be no atmospheric discharge from the GAC but the spent carbon along with the adsorbed volatile organics would have to be handled and disposed of in an appropriate manner, either by thermal regeneration or by land disposal. Backwash water from the carbon contactors would have to be disposed of in an approved manner as would the carbon transport water. Discharge of backwash water to the Susquehanna River, without treatment, could have an adverse impact on river water quality.

GAC treatment will result in two discharge streams: backwash water from the carbon contactors and carbon transport water. Backwash is water that is produced daily during routine filter maintenance to keep the filters from becoming clogged. Carbon transport water is the water that is used to produce a slurry with the spent activated carbon in order to flush the spent carbon from the contactors. This process is carried out every six months. Since this system is not proposed to be operated in combination with air stripping, contaminated carbon will be present in the carbon transport water.

Compared to the air stripping alternative, GAC treatment is slightly more desirable from the standpoint that there would be no atmospheric emissions at all. However, disposal, regeneration, and transportation of the spent carbon is a potential public health concern.

Air stripping is sometimes followed by carbon adsorption to increase carbon longevity and reduce costs. Air stripping, followed by carbon adsorption, is typically effective when the influent water contains a mixture of volatile and nonvolatile organics. The advantage of using these treatments together is that air stripping can remove VOCs at a low cost and carbon can adsorb the remaining VOCs as well as non-VOCs. Combining air stripping and carbon adsorption at Harrisburg would not prove economically beneficial since no non-volatiles have been reported in the well water, the air stripping towers do not require air emission control, and two-stage air stripping can meet the proposed EPA MCLs and Pennsylvania DER guidelines.

4. NO ACTION ALTERNATIVE

The no action alternative would continue current (May 1986) water supply operations at HIA. HIA wells No. 8, 10, 14, 16, 17, and 18 would remain closed. HIA well No. 7 would remain plugged and abandoned. HIA well No. 13, which is the most productive well in the system, would continue to be used as an interceptor/purge well pumped for cooling water supply only. HIA wells No. 2, 3, 4, 5, 6, 9, and 12 would continue to be blended to meet the water requirements of the facility (wells No. 11, 13 and 14 not used). In the no action alternative, no treatment for volatile organic compound removal would occur. Instead, reliance would be placed on the ability to continue blending water from the production wells in use to meet state and federal drinking water standards for VOCs. Water from the potable supply wells would continue to be chlorinated prior to general use.

In terms of engineering feasibility, the main concern with the no-action alternative is the effectiveness of this alternative in satisfying the primary or secondary objectives. Currently, the seven wells in use are able to meet facility supply requirements and the blended water meets drinking water standards with chlorination. However, future contaminant migration could cause an increase in VOC levels in one or more of these wells. If the level is high enough to cause even one well to be taken off line, available water supply could fall below demand. Or, if future demand increases substantially or in a drought condition, the unavailability of well No. 13 for potable supply could cause a potable supply quantity problem.

Additionally, HIA No. 13 is a productive operable well in the Harrisburg International Airport system. Presently it is used as a purge well; the water is used for industrial cooling. This constitutes waste of a valuable water resource. This could be avoided through treatment.

Since the no action alternative is defined as current operations, i.e., pumping, blending and chlorination, compared to the action alternatives, there are no capital costs associated with this alternative. Annual operation and maintenance costs over and above current levels are approximately $12,000. This cost reflects additional monitoring and analysis that would be prudent if the current system were to be implemented indefinitely. Note that O&M costs such as chlorination which are common to both the action alternatives and the no action alternative have not been included in this comparison. Annual chlorination costs under the no action alternative would be slightly higher than the action alternatives because of the greater operating and maintenance requirements of ten individual chlorination systems compared to a central chlorination system.

Because the no-action alternative does not reasonably assure continued potable water supply from the HIA wells, a potential exists for environmental (socioeconomic) impacts should the wells have to be abandoned and emergency alternative supplies have to be provided.

If the wells were abandoned, the volatile organic contaminants in the ground water would be expected to migrate with the general ground water flow and eventually discharge to the Susquehanna River. The impact on the Susquehanna River would be slight because of the relatively small quantities of contaminant involved and the type of contaminants (i.e., volatile organics susceptible to river aeration). Continuation of the pumping of well No. 13 as cooling water supply has air quality (cooling tower) and river water quality (cooling water discharge) impacts due to the VOCs present in the water.

As long as the current method of blending produces water that meets drinking water standards, no unacceptable health effects should result.

In assessing the risk of the no-action alternative for providing safe drinking water to the 3500 personnel presently served by the system the exposure route is ingestion. Using the EPA protocol (Superfund Public Health Evaluation Manual, 1986) for the presence of two carcinogenic compounds (TCE and PCE) and assuming a 2 liter/day consumption by a 70 kg male, the 10^{-6} cancer risk level was calculated. The target concentrations that correspond to a cancer risk level of 10^{-6} for TCE and PCE from the same source are 2.1 ug/l and 0.3 ug/l, respectively. By reviewing the data, it is apparent that at some point in time each well has exceeded not only the 10^{-6} cancer risk level but also the enforceable standards. It is apparent that the public health would be best served by an alternative that assured a potable water supply that met the enforceable standards. The two action alternatives will accomplish this. The lack of certainty regarding the future ability to meet drinking water standards through blending is a potentially significant public health disadvantage of the no action alternative compared to the alternatives of treating water with known, proven technology. In particular the ability to dilute current levels of TCE and PCE to acceptable concentrations on a continuous basis is tenuous. The risks of downtime of the least contaminated wells, dry years and increased demand will increase the likelihood of more contamination in the potable water. Either action alternative will assure a drinking water supply that meets federal and state standards.

If in the future other contaminants are detected, potential public health impacts may have to be evaluated at that time.

Permits required for the no-action alternative are those associated with the current water system. Since this is an ongoing operation, no additional permits are necessary and, therefore, no time is required prior to implementation. However, should water quality conditions change, compliance with federal and state drinking water regulations could become a significant problem requiring some form of mitigation or response to maintain compliance.

Summary

Table 4 summarizes in chart form the evaluation of the alternatives.

TABLE 4

SUMMARY OF ALTERNATIVES EVALUATION

Alternative	Cost ($1,000) Capital	Cost ($1,000) Annual O&M	Engineering Feasibility	Environmental Impacts	Public Health Effects	Regulatory Compliance
No Action	0 (baseline)	12	Does not assure potable water supply to meet future needs	Loss of adequate potable water supply could have socio-economic impacts	Does not reasonably assure future supplies will meet drinking water standards	May Cause future non-compliance with state and federal drinking water standards
Central Treatment Plant with Air Stripping	3,700	160	Proven, effective technology	No unavoidable significant adverse effects	Provides high level of assurance of safe water supply	Meets all regulatory requirements
Central Treatment Plant with Granular Activated Carbon Adsorption	8,900	1,300	Proven effective technology	No unavoidable significant adverse effects	Provides high level of assurance of safe water supply	Meets all regulatory requirements

V. SELECTED REMEDY

The three alternatives that were included in the final analysis were no action, central treatment with air stripping, and central treatment with granular activated carbon. Treatment with granular activated carbon is considerably more expensive to construct and operate and does not have any clear environmental or public health advantages over air stripping. The no action alternative does not ensure future protection of public health and does not account for water supply quantity deficiencies which are already evident. Therefore, central treatment with air stripping is selected as the most effective, economical and environmentally sound alternative.

The operable unit which this Record of Decision addresses is only part of the total remedy for the site. It addresses provision of a potable water supply to users of the HIA system. The remainder of the site is being investigated as part of an RI/FS, the results of which will be presented at a later date. A Record of Decision which addresses this second phase of site evaluation will also be forthcoming.

A. Engineering Description

The air stripping facility would consist of two packed towers, three forced air centrifugal blowers (one standby), clearwell with 30-minute detention time, gas chlorination, small laboratory, booster pumps and associated pipelines. All the existing well pumps would have to be replaced with new low-lift equipment and a new booster station constructed downstream of the treatment plant.

The towers would be 10 feet in diameter, approximately 30 feet tall (28 ft. of packing) and constructed of either aluminum or fiberglass. Each tower would have a capacity of 3.0 mgd and could be operated in series or parallel. The packing would be 2-inch size and the volumetric air-to-water ratio would be 50 to 1. When the towers are operating in series the expected volatile organic removal would be in excess of 99.5 percent. This level of removal efficiency will handle the contamination levels found in the ground water to date and substantially higher levels (see Table 9). The operating range of VOC removal available with the dual towers would allow tie-in of additional purge wells that may be developed. The towers would sit directly on a baffled concrete clearwell designed for a minimum chlorine contact time of 30 minutes. Provision would be made to chemically clean the packing as necessary. Each tower would be equipped with demisters and redistribution rings as required.

Overall dimensions of the plant structure would be approximately 60 ft. by 80 ft. and would be constructed on airport property. The most likely location would be on a site between the airport circumferential road and the existing railroad tracks. Connection of the ten wells to the plant will require over 10,000 feet of ductile iron pipe. Centrifugal or vertical turbine pumps will lift the water from the plant clearwell to the system gradient. During operation, approximately 40 hours per week of routine operator attendance will be necessary to document performance, change charts and attend to the chemical feeders. Air emissions from the tower during routine operation at the average influent VOC level are expected to be minimal and within allowable Commonwealth of Pennsylvania guidelines.

B. Cost

The estimated project cost for construction is $3,750,000 including engineering and 30 percent contingencies. Of this estimate over half is required for the piping and new pumping equipment at the existing wells. Consequently, the cost for the 3.0 mgd towers is higher than might typically be expected. Projected operating costs for series towers is estimated at $160,000 per year or about $0.15 per 1000 gallons. The operating cost components are power for pumps and blowers, analytical monitoring (assuming monthly VOC samples at each well and at key plant check locations), chlorine and operating labor. The operating cost of $0.15 per 1000 gallons compares favorably with costs at other facilities of this type.

The duration of operation cannot be estimated at this time. However the duration will probably be on the order of years and, therefore, should be assumed as indefinite.

C. Public Health Evaluation

There are two potential health effects from the air stripping process. First, because an air stripper theoretically cannot remove 100 percent of contaminants from water, there is a need to estimate the ingestion health risk of the low concentrations remaining in the treated water. Second, because the contaminants are transferred from the water to the air, it is necessary to also estimate the inhalation health risk of the air discharge to potential receptors. In order for these risks to be estimated, a most probable and worst case contamination scenario consistent for both inhalation and ingestion was developed.

The worst case contamination scenario used the highest average effluent concentrations which provide a margin of conservatism over the most probable cases. Based on the projected performance of the facility established by Buchart-Horn and Malcolm Pirnie, a highest average effluent concentration was established as the worst case for both the inhalation and ingestion risk assessment (See Table 5).

TABLE 5

HIGHEST AVERAGE CONCENTRATIONS

Contaminant	Highest average influent conc. (µg/l)	Percent removal[1]	Highest average effluent conc. (µg/l)
Chloromethane	2.0	99.31	0.014
Carbon tetrachloride	0.25	99.44	0.001
1,1-Dichloroethane	3.35	97.24	0.093
cis-1,2-Dichloroethene	149.3	97.87	3.18
trans-1,2-Dichloroethene	73.3	97.87	1.56
1,1,1-Trichloroethane	4.46	99.20	0.036
Vinyl chloride	1.20	99.99	0.0
1,1-Dichloroethene	1.74	99.82	0.003
Trichloroethene	81.67	99.33	0.547
Tetrachloroethene	6.25	99.63	0.023
Benzene	4.80	99.64	0.017
Chlorobenzene	8.2	99.27	0.060
Toluene	17.0	99.28	0.122
1,2-Dichlorobenzene	189	96.74	6.16
1,4-Dichlorobenzene	27	97.45	0.689

[1] Percent removals taken from Buchart-Horn memorandum to William Koski of CDM, September 28, 1987.

Since the highest average effluent concentrations were taken prior to blending to represent a worst case scenario, a most probable (more realistic) scenario was also evaluated to identify potential risks associated with ingestion and inhalation. The projected average composite effluent concentrations for each of three operational well groupings were evaluated to identify the most probable potential risks that are likely to be present when the wells are blended. These groupings were selected on the basis that they met the projected demand for approximately 3 MGD of water based on their historic yields (See Table 6). Well 13 shows the highest concentration levels and has been included in all three well groupings to add an element of conservatism to the most probable cases.

HEALTH RISK FOR INGESTION OF WATER

The potential carcinogens identified as being present in the water are carbon tetrachloride, vinyl chloride, 1,1-dichloroethene, trichloroethene, tetrachloroethene, benzene and chloromethane. The lifetime cancer risk posed by ingestion of the potential carcinogens detected in the water are presented in Table 7. The total risk associated with ingestion of the water for the most probable case for the three pumping scenarios is 6×10^{-8} for pumping scenario one, 7×10^{-8} for pumping scenario two and 7×10^{-8} for pumping scenario three. The worst case scenario (assuming no blending of the water) poses a 3×10^{-7} lifetime cancer risk. These lifetime cancer risks are all less than 10^{-6} which is the recommended "safe" limit according to EPA guidelines.

The noncarcinogens detected in the water were 1,1-dichloroethane, trans-1,2-dichloroethene, cis-1,2-dichloroethene, 1,1,1-trichloroethane, chlorobenzene, toluene, 1,2-dichlorobenzene, and 1,4-dichlorobenzene. A chronic daily intake was calculated for the noncarcinogens and compared where available to the EPA acceptable intake for chronic exposure or risk reference dose (RFD). For the noncarcinogens which do not have an RFD, the maximum contaminant level goals (MCLGs) were compared to the effluent concentration. Evaluation of the noncarcinogens indicated the potential hazard to human health is unlikely, with an adequate margin of safety.

HEALTH RISK ASSOCIATED WITH AIR EMISSIONS

The total risk due to air exposure has been estimated assuming health risks from the various compounds are additive. The estimated worst case health risk is 2×10^{-7}, or two in 10 million, and 2×10^{-8}, or two in 100 million, for the most probable case air exposure (See Table 8).

In addition to the risks associated with inhalation of carcinogenic compounds, health impacts may occur due to exposure to noncarcinogens. As with carcinogens, chronic low-level exposure to noncarcinogens is the principal public health concern. Exposure calculations revealed no potential for significant health impact from exposure to noncarcinogenic contaminants is expected.

TABLE 6

COMPARISON OF WORST CASE INFLUENT CONCENTRATIONS TO MOST PROBABLE INFLUENT CONCENTRATIONS[1]

Volatile organic compound	Well Group 1 Wells 2, 3, 4, 6, 12, 13 Flow = 2,030 gpm Average composite influent conc.	Well Group 2 Wells 2, 3, 4, 5, 9, 11, 13 Flow = 1,980 gpm Average composite influent conc.	Well Group 3 Wells 6, 11, 12, 13 Flow = 2,060 gpm Average composite influent conc.	Highest average influent
Chloromethane	0.41	0	0.41	2.0
Carbon Tetrachloride	0.04	0.04	0.04	0.25
1,1-Dichloroethane	0.61	0.63	0.63	3.35
cis-1,2-Dichloroethene	29.42	30.16	29.00	149.3
trans 1,2-Dichloroethene	13.14	13.49	13.18	73.3
1,1,1-Trichloroethane	1.65	1.27	1.76	19.00
Vinyl Chloride	0.40	0.41	0.40	1.20
1,1-Dichloroethene	0.15	0.15	0.15	1.74
Trichloroethene	16.97	18.52	17.26	81.67
Tetrachloroethene	1.57	3.35	3.30	13.0
Benzene	0.44	1.02	0.52	4.8
Chlorobenzene	2.35	2.41	2.31	8.2
Toluene	2.21	3.64	1.80	17
1,2-Dichlorobenzene	37.24	38.18	36.70	189[2]
1,4-Dichlorobenzene	5.32	5.45	5.34	27[2]

NOTE: All Concentrations in g/l.

$$\text{Composite Concentration} = \frac{Q_1 C_1 + Q_2 C_2 + Q_3 C_3 + \ldots}{Q_1 + Q_2 + Q_3 + \ldots}$$

[1]Information prepared by Buchart-Horn, Inc., September 1987.

[2]USEPA, Region III, Analytical Results from Ground Water Samples Collected by May 26, 1987 at Harrisburg International Airport.

TABLE 7

COMPARISON OF PROJECTED RISKS FROM INGESTION OF WATER
FOR ALTERNATIVE EFFLUENT SCENARIOS

Contaminant	Worst case scenario	Pumping scenario one	Pumping scenario two	Pumping scenario three
Carbon tetrachloride	5×10^{-5}	8×10^{-10}	8×10^{-10}	8×10^{-10}
Vinyl chloride	8×10^{-9}	3×10^{-9}	3×10^{-9}	3×10^{-9}
1,1-Dichloroethene	5×10^{-8}	4×10^{-9}	4×10^{-9}	4×10^{-9}
Trichloroethene	2×10^{-7}	4×10^{-8}	4×10^{-8}	4×10^{-8}
Tetrachloroethene	3×10^{-8}	8×10^{-5}	2×10^{-8}	2×10^{-8}
Benzene	3×10^{-8}	2×10^{-5}	5×10^{-9}	3×10^{-9}
TOTAL RISK	3×10^{-7}	6×10^{-8}	7×10^{-8}	7×10^{-8}

TABLE 8

COMPARISON OF PROJECTED RISKS FROM INHALATION
FOR ALTERNATIVE INFLUENT SCENARIOS

	Most probable scenarios			
Contaminant	High average scenario	Pumping scenario one	Pumping scenario two	Pumping scenario three
Benzene	9.0×10^{-9}	8.3×10^{-10}	1.9×10^{-9}	9.8×10^{-10}
Carbon tetrachloride	2.4×10^{-9}	3.8×10^{-10}	3.8×10^{-10}	3.8×10^{-10}
Chloromethane	NA	NA	NA	NA
Vinyl chloride	2.2×10^{-9}	7.2×10^{-10}	7.4×10^{-10}	7.2×10^{-10}
1,1-Dichloroethene	1.5×10^{-7}	1.3×10^{-8}	1.3×10^{-8}	1.3×10^{-8}
Trichloroethene	2.7×10^{-8}	5.7×10^{-9}	6.2×10^{-9}	5.8×10^{-9}
Tetrachloroethene	7.7×10^{-10}	1.9×10^{-10}	4.1×10^{-10}	4.1×10^{-10}
Total risk	1.9×10^{-7}	2.0×10^{-8}	2.2×10^{-8}	2.0×10^{-8}

D. Adaptability of the Treatment System

Because the highest average concentrations used to assess risk have been defined as conservative, the technical judgment made for this evaluation is that the raw water concentrations are unlikely to exceed the highest average concentrations and extremely unlikely to exceed the design concentrations. Regardless, unexpectedly high raw water concentrations may be unlikely, but are not impossible.

As long as the actual influent concentration of contaminants to the proposed facilities remains at or below the design influent concentration, one tower would operate with the second tower serving as a stand-by unit. The parallel mode, with the flow equally split to each unit, would only be used if the system performance for a specific compound(s) needs to be enhanced over the performance of a single unit. The parallel mode can enhance performance for some compounds while saving the cost of repumping the entire process flow. This enhanced performance results from a doubling of the air-to-water ratio induced by having only half the design flow flowing through each tower. The series mode, requiring the repumping of all flow through the second tower, would only be used if the influent concentration to the facility for any compound increased to the point where a single unit or both units in the parallel mode were incapable of acceptable performance (Buchart-Horn, 1987). Therefore, the treatment system is adaptable and is capable of achieving higher levels of performance than in a conventional single unit operating mode. Table 9 summarizes the improved performance that could be expected from series and parallel operation and references this improved operation to the highest average concentrations used throughout this risk assessment and to a number of applicable standards.

E. Regulatory Compliance and Consistency with other Environmental Laws

On July 8, 1987, EPA published a final rulemaking pertaining to eight VOCs, seven of which have been found at Harrisburg International Airport. These regulations, otherwise known as Maximum Contaminant Levels (MCLs), are scheduled to have the force of law on January 9, 1989. Based on the air stripping tower design parameters and the worst case and most probable case influent concentrations, the air stripping tower should not have any foreseeable problems remaining in full compliance with the MCLs and therefore with the Safe Drinking Water Act. These MCLs are applicable to all public water systems in the United States of which the HIA treatment facility is an example. Therefore, once this facility is constructed, these MCLs are the standards by which the Owner, PennDOT, will be monitored by the Pennsylvania Department of Environmental Resources (PA DER). (See Table 9 for comparison of EPA standards and guidelines with effluent concentrations.) Air emissions will be within PA DER recommended guidelines.

TABLE 9

COMPARISON OF WORST CASE TREATMENT PERFORMANCE TO APPLICABLE GUIDELINES AND STANDARDS[3]

Contaminant	Highest average influent	Single Unit 3.0 MGD: Eff. conc. ug/l	Single Unit 3.0 MGD: % Removal	Parallel Units 1.5 MGD Each: Eff. conc. ug/l	Parallel Units 1.5 MGD Each: % Removal	Series Units[1] 3.0 MGD Each: Eff. conc. ug/l	Series Units[1] 3.0 MGD Each: Total % removal	Guidelines and Standards[2]: USEPA MCLs ug/l	Guidelines and Standards[2]: USEPA MCLG ug/l	Guidelines and Standards[2]: USEPA 10-6 level ug/l
1. Chloromethane	2	0.014	99.31	0.011	99.45	<0.001	>99.99	-	-	-
2. Carbon Tetrachloride	0.25	0.001	99.44	0.001	99.50	<0.001	>99.9	5.0	0	0.27
3. 1,1-Dichloroethane	3.35	0.092	97.24	0.069	97.95	0.004	99.90	-	-	-
4. trans-1,2-Dichloroethene	73.3	1.56	97.87	1.17	98.40	0.037	99.95	-	-	-
5. cis-1,2-Dichloroethene	149.3[4]	3.18	97.87	2.39	98.40	0.075	99.95	-	-	-
6. 1,1,1-Trichloroethane	4.46	0.036	99.20	0.027	99.40	<0.001	>99.99	200	200	-
7. Vinyl Chloride	1.2	<0.001	99.99	<0.001	>99.99	<0.001	>99.99	2.0	0	0.015
8. 1,1-Dichloroethene	1.74	0.003	99.82	0.002	99.86	<0.001	>99.99	7.0	7.0	0.033
9. Trichloroethene	81.67	0.547	99.33	0.466	99.43	0.004	>99.99	5.0	0	1.84
10. Tetrachloroethene	6.25	0.023	99.63	0.021	99.67	<0.001	>99.99	-	-	1.0
11. Benzene	4.8	0.017	99.64	0.010	99.80	<0.001	>99.99	5.0	0	0.66
12. Chlorobenzene	8.2	0.060	99.27	0.039	99.53	<0.001	>99.99	-	-	-
13. Toluene	17	0.122	99.28	0.078	99.54	<0.001	>99.99	-	2000	-
14. 1,2-Dichlorobenzene	189[4]	6.16	96.74	3.38	98.21	0.302	99.84	-	620	-
15. 1,4-Dichlorobenzene	27[4]	0.689	97.45	0.424	98.43	0.024	99.91	75	75	-

[1]Effluent concentrations shown for series units, the percent removal of the second air stripper tower is assumed equal to that of the first tower.

[2]Guidelines and standards presented were verified with Bruce Molholt, Ph.D., Toxicologist, Hazardous Waste Enforcement Branch, USEPA Region III.

[3]Table adapted from Buchart-Horn memorandum to William Koski of CDM, Sept. 28, 1987.

[4]USEPA, Region III, Analytical Results from Ground Water Samples Collected on May 26, 1987 at Harrisburg International Airport.

F. Operation and Maintenance

Under the Safe Drinking Water Act Amendments of 1986, EPA promulgated monitoring requirements for the MCLs pertaining to the volatile organic chemicals as part of its publication in the July 8, 1987, Federal Register:

> Ground water systems shall sample at points of entry to the distribution system representative of each well. Sampling must be conducted at the same location or a more representative location each quarter. Ground water systems must sample every three months for each entry point to the distribution system... (FR, Vol. 52, No. 130, p. 25712.)

Compliance is based on a yearly running average of the quarterly finished water samples. In addition, simultaneous with the collecting of the required finished water samples, air stripper influent samples will also be collected. Comparison of observed concentrations in the finished water and raw water will assist in monitoring the performance of the air stripper, assist in monitoring the air emissions, and assist in monitoring the aquifer.

Ultimately, the concentrations of contaminants will decline. Eventually the concentrations in the raw water may decline to a level that may indicate that treatment is no longer needed. The criteria for ceasing treatment would be evidence that the raw water contamination has declined to below the applicable MCLs for four consecutive quarterly samplings. Monitoring will be continued indefinitely in accordance with the Safe Drinking Water Act regardless of whether treatment for volatile organics continues to be provided.

Air emissions monitoring can be performed by a similar methodology as was used to generate the emissions data for this study. Essentially, air emission data can be based on a calculation from the water flowrate, air flowrate, and contaminants' concentration in the water.

RESPONSIVENESS SUMMARY

MIDDLETOWN AIR FIELD SITE
DAUPHIN COUNTY, PENNSYLVANIA

DECEMBER 29, 1987

This community relations responsiveness summary is required by the National Contingency Plan (NCP) to document, for the public record, any public concerns or issues expressed during remedial planning or the public comment period. It also documents the EPA's responses to the issues and concerns that were expressed. The document is divided into the following sections.

1.0 Overview

The public comment period for the Middletown Air Field Site, a hazardous waste site at the Harrisburg International Airport (HIA), began on November 25, 1987, and extended to December 25, 1987. During this time, the U.S. Environmental Protection Agency Region III (EPA) solicited comments regarding the Focused Feasibility Study (FFS) Report. The report was prepared to outline remedial alternatives for providing a safedrinking water supply to HIA and members of the community who are supplied by the HIA water system.

The preferred alternative is a combination of two of the options proposed in the FFS Report, 1) direct water treatment and 2) water supply management. If this alternative is selected, water from all of the HIA wells will be brought to one location on site and treated, using a two-tower air-stripping unit to reduce the concentration levels of volatile organics to safe levels.

On December 8, 1987, the EPA conducted a public meeting at the Middletown Community Center; 60 West Emmaus Street; Middletown, Pennsylvania. EPA representatives explained that the FFS Report and the comment period were intended to address the drinking water supply, not long-term groundwater remediation. However, they stated that some of the options that were rejected as ways to provide safe drinking water in the long term will continue to be considered for use as potential groundwater remediation technologies.

Approximately twenty-five people attended the meeting. Of that number, most were present in official capacities, including representatives of the local news media, local government, and HIA. Also attending in official capacities were spokesmen for PennDOT and the USAF.

Following the EPA presentations, questions and comments were solicited from the audience. The question and answer session lasted approximately 35 minutes. Participants included a newsperson and a local, elected official. No questions were asked of the PennDOT or USAF representatives.

At the close of the meeting, the audience was reminded that site related documents are available locally at the Middletown Public Library on North Catherine Street. Those who are unable to devote time to actually reading the file materials were told that they may contact the EPA project manager, Laura Boornazian, or the EPA community relations coordinator, Ray Germann, for a summary of the FS and FFS reports.

2.0 Background of Community Involvement and Concern

When the groundwater problem at HIA was first brought to public attention in 1983, several public meetings and press conferences were held. In general, the meetings were well attended, particularly by local, state, and federal elected officials and by the news media. Private citizens were less involved, except for Londonderry Township residents, whose water supply wells were shown to be contaminated by the Sunset Golf Course site, and Pennsylvania State University Capitol Campus (PSU) students, who were also concerned about their water supply, which was provided by HIA.

By the spring of 1984, the EPA had extended a waterline from Middletown Borough to the Londonderry Township residents in need of a new water source, and HIA was blending water from its supply wells to achieve reduced contaminant levels that met established health standards. The USAF had agreed to reimburse the EPA for the waterline extension and had also removed exposed drums from an area near PSU student housing units. Two additional areas on site were the subjects of removal actions conducted by the Pennsylvania Department of Environmental Resources (PADER).

Since mid-1986, the EPA, the USAF, and PennDOT have cooperated to keep the public informed by holding three additional public meetings. Although the news media and officials from Middletown and Lower Swatara Township remain actively interested in the site, the general public's participation has been significantly reduced.

Throughout the site's history, the primary concerns expressed by residents and officials regarding the Middletown Air Field Site have been associated with securing safe drinking water and remediating the groundwater. As residents became satisfied that the drinking water supply they were receiving was within acceptable standards, the emphasis of concern shifted from safe drinking water to permanent groundwater remediation.

3.0 Summary of Major Public Issues and Concerns

Comments received during the public comment priod and the EPA's responses to them are summarized below.

1. Long-term remediation of the groundwater and the time frame to achieve it seemed to be a primary concern of people attending the December 8, 1987, meeting. The preferred alternative was labeled a "band-aid" by one speaker. Because the HIA wells supply several entities in Lower Swatara Township, including PSU, Fruehauf Trucking, the Odd Fellows Home, and HIA itself, and because many people located along Route 230 are, reportedly, concerned that contaminants will migrate to their wells, one speaker suggested the EPA focus on a permanent cleanup of the groundwater. He pointed out the main airport is not the only local site with groundwater contamination related to USAF activities at HIA, and asked whether the EPA will address the USAF dump sites at Lisa Lake, the Fruehauf property, and the supply well for Middletown and Londonderry, because these locations adjoin the HIA property. The same speaker inquired whether the community would have to deal with the USAF for the remediation of these locations if they are not part of the current remedial program. Also, it was pointed out that the groundwater has been contaminated for a long time. The speaker stated that the community deserves to know how long groundwater remediation will take; he suggested fifty years as a possibility.

   <u>EPA Response</u>: The FFS under discussion addresses a safe drinking water supply for HIA and the HIA water supply system, only. The other locations mentioned are not part of this operable unit remedy but will be investigated as part of the RI/FS for the entire site.

It is impossible to say how long groundwater remediation will take, because the present extent of contamination and its sources are not known. Thus, a full Remedial Investigation (RI) is required. If a pumping and treating alternative is eventually selected as the preferred alternative to remediate the groundwater, it could take a number of years; the FFS assumes indefinite operation.

2. A related concern was expressed by another speaker regarding the effects of HIA plans for future expansion upon long-term remedial efforts. The speaker reported that the HIA Master Plan includes the extension of the airport at the south end of the site (nearest to Middletown) by the turn of the century. The plan requires the property involved to be excavated to runway height. This creates concern that excavating to a depth of 25 feet to 35 feet may destroy EPA constructions, if groundwater containment barriers or surface caps are employed as remedial measures. It was pointed out that such measures are treatments for symptoms rather than cures and that, at the pace bureaucracies generally move, the technologies may barely be in place when HIA expansion begins.

   EPA Response: The objective at this time is to provide an acceptable drinking water supply for the public to use until the balance of the problem can be addressed. Eventually, EPA hopes contamination will be reduced or eliminated at its source.

   That bureaucracies take a long time to implement plans is a fact. However, a decision on an alternative to provide a short-term drinking water supply will be made within the next 30 days. Hopefully, that alternative will be in place within 1½ to 2 years, depending on the duration of construction.

3. Installing a safe drinking water supply is also a primary public concern, because consumers are worried about the long-term reliability of the current method of achieving acceptable drinking water standards by blending water from the various HIA wells. A speaker stated that if the Middletown Air Field Site is a priority site, as inclusion on the National Priorities List (NPL) suggests, there shouldn't be any delay in providing safe drinking water. The speaker wanted to know the expected time span required to install the preferred alternative and whether the HIA water supply is safe to use.

   EPA Response: If work can begin soon, the water treatment system can probably be in place in 1½ to 2 years. Every effort will be made to act as quickly as possible and to continue to progress with the long-term remedial program as well.

Water quality at some of the wells is below state drinking water standards. Water from 7 of the production wells is being blended to achieve acceptable concentration levels. Consequently, the water currently being provided by HIA is safe. There is no need, at this time, for immediate action, but if such a need becomes apparent, emergency action could be taken.

Since there is no health problem now, but groundwater contamination is present, a long-term solution is required. Over time, demands on groundwater supply will increase. The goal of the remedial program at the Middletown Air Field Site is to develop a reliable solution that willbe able to accomodate future airport expansion and other increases in need.

4. A task force, including representatives of local governments and commerce, is considering taking over the operation and ownership of HIA, but the biggest deterrent to a takeover is concern about the water supply. The task force wonders what guarantee they might have that the water is safe and whether the USAF will be required to pay operation and maintenance (O&M) costs for water treatment, if the task force takes over the airport.

<u>EPA Response</u>: It would be a good idea to read the Feasibility Study (FS) Report and the FFS Report. These documents contain a discussion of the risks involved in consuming HIA drinking water, assuming worst-case and most probable scenarios after the treatment system is in place. The system will be monitored on a quarterly basis.

In the worst-case, the risk will be about 10^{-7}. This is one order of magnitude lower than the 10^{-6} level which is generally established as the acceptable or "safe" level of cleanup.

In the interagency agreement being drafted by EPA, USAF, and PennDOT, USAF and PennDOT are responsible for O & M costs.

5. Several questions were asked about the air-stripping unit. The main concern regarding the unit was that it could discharge contaminants removed from groundwater into the air, possibly creating an increased health risk. It was pointed out that the area will have two locations venting contaminants into the air, if an air-stripper is installed: the Middletown Air Field Site and Three-Mile Island. One speaker asked to know the cost

of the air-stripper and its life expectancy. The speaker also asked whether it is a proven technology and how the safety of the treated water supply will be guaranteed.

EPA Response: Just as the FFS Report discusses the risks associated with water contamination, it also includes a risk assessment addressing the health effects of the air discharges. The potential risk was calculated to be 2×10^{-7}, which is an order of magnitude lower than the 10^{-6} level EPA sets as its goal.

The cost of installing the unit will be approximately $3.7 million, and estimated yearly operating costs are about $160,000. The USAF and PennDOT will assume these costs. Water quality and air quality related to the air-stripping unit will be monitored. The cost of monitoring is already reflected in the O & M estimate.

Air-strippers are considered state-of-the-art technology with a life expectancy of 30 to 50 years. A list of water suppliers currently using air-strippers can be made available upon request.

(At this point, two members of the audience spoke up, saying that air-strippers were operating in their communities.)

6. A local official strongly suggested that the EPA, the USAF, and PennDOT consider an additional alternative to provide safe drinking water to the public. The alternative would involve increasing the capacity of the local public water supplier by building a pumping station to draw water from the Susquehanna River, and then extending the waterline, as needed, to supply HIA and its supply users. It was suggested that the pumping station and waterline extension could be paid for by the USAF; the cost difference between this suggestion and the preferred alternative was requested. This speaker charged that not enough information had been provided to local water companies to allow them to prepare proposals for extending their services.

   EPA Response: When the local water suppliers were contacted, they indicated that they did not have the capacity to provide service to HIA and its consumers. The issue was not pursued any further. Generally, EPA does not upgrade existing utilities. However, this suggestion will be considered before a final decision is made.

7. An opinion was expressed that the public comment period is 'just a legal exercise required for the record. The commentor suggested that the EPA and PennDOT have already made their decision.

   EPA Response: The public comment period is not treated lightly by the EPA. The law requires that a responsiveness summary be prepared and that all comments received must be considered, and a response must be made to the comments. When the preferred alternative is presented to EPA management, it must be explained, and the rationale for selecting it must be given. Information regarding other alternatives, including any suggested during the comment period, must also be provided, and a case for or against each must be presented. There is always the possibility that an alternative other than the preferred alternative may be chosen.

   The alternative recommended by the FFS Report is the preferred alternative; EPA plans to make its decision after all public comments have been received.

8. A final comment was made by a local politician regarding the trust-worthiness of many government agencies. The speaker suggested that many promises were made to local communities in the aftermath of the Three-Mile Island accident (by unidentified government entities) and that most were broken. Consequently, the speaker said it was hard to trust the EPA now.

   EPA Response: Please continue to watch our performance,as you have all along, and see what is accomplished.

4.0 Remaining Concerns

No concerns related to the Superfund remedial activities at the Middletown Air Field Site remain unaddressed.

MIDDLETOWN AIR FIELD
SARA ADMINISTRATIVE RECORD *
INDEX OF DOCUMENTS

Site Identification

1) Report: Site Inspection of Olmstead Air Force Base, 8/10/84.

2) Letter to Lieutenant Colonel Robert A. Lombard from Mr. John B. Moyer re: consultant's suggestions for site, 5/31/84.

3) Letter to Mr. Don Bryan from Mr. John B. Moyer re: closure plans for building 267, 5/31/84.

4) Letter to Lieutenant Colonel Robert Lombard from Mr. Michael Steiner re: study and actions at Harrisburg International Airport, 5/30/84.

5) Memorandum to Mr. Edward Simmons from Mr. Timothy Alexander re: history and industrial waste activities at site, 4/9/84. History and diagrams are attached to the memorandum.

6) Memorandum to Mr. Joseph Kozlosky from Mr. Francis Fair re: inspection of Stanbaugh's Air Service, 3/21/84. Pick-up locations and map are attached to the memorandum.

7) Memorandum to all maintenance personnel from Mr. Ron Kaylor re: fluids in holding tank, 1/30/84.

8) Letter to Mr. Garth Glenn from Mr. L. W. Walsh re: site inspection and sampling plan, 12/15/83.

9) Site Safety Plan, 12/8/83.

10) Report: Potential Hazardous Waste Site Identification and Preliminary Assessment, 11/15/83.

11) Report: Potential Hazardous Waste Site Identification and Preliminary Assessment, 11/4/83.

12) Report: Field Trip Summary Report, 10/4/83. Sampling, data graphs, and maps are attached to the report.

13) Letter to Colonel Klingensmith from Mr. Michael Steiner re: private drinking well contamination, 8/9/83. Letter regarding citizens with temporary water storage bladders is attached to the letter.

14) EPA Notification of Hazardous Waste Site (undated).

*Administrative Record available 9/16/87.

Remedial Response Planning

1) Letter to Mr. Bruce Smith from Colonel Donald Kane re: final Focused Feasibility Study, 7/24/87.

2) Report: Harrisburg International Airport Focused Feasibility Study, 7/87.

3) Report: Harrisburg International Airport Focused Feasibility Study, Addendum I, 7/87.

4) Memorandum to Mr. J. Winston Porter from Mr. Stephen Wassersug re: delegation of remedy selection, 6/9/87. Delegation briefing is attached to the memorandum.

5) Sampling Plan for Middletown Air Field, 5/26/87.

6) Report: Quality Assurance Project Plan, 11/86.

7) Letter to Ms. Paula Luborsky from Mr. Andy Szilagzi re: transmittal of engineering report, 4/21/86. Report: Ground Water Remediation at Harrisburg International Airport, by Malcolm Pirnie is attached to the letter.

8) Report: Installation Restoration Program Phase II - Confirmation/Quantification Stage I Final Report for Harrisburg International Airport, by Roy F. Weston, 4/86.

9) Report: Joint Presentation to the United States Environmental Protection Agency, by the United States Air Force and Commonwealth of Pennsylvania Department of Transportation, 3/25/86.

10) Memorandum to Mr. Francisco Barba from Ms. Libby Rhoads re: impact on wetland areas, 3/21/86.

11) Report: Health and Safety Program Installation Restoration Program, by E. C. Jordan Co., 3/86.

12) Memorandum to Mr. Abraham Ferdas from Mr. Jeffrey Pike re: immediate removal consideration, 9/26/85.

13) Record of communication to Mr. Charley Samuels from Mr. Jeffrey Pike re: possible emergency condition, 6/3/85.

14) Letter to Mr. John Moyer from Mr. Robert Lombard re: statement of work, 8/29/84. Statement of work is attached to the letter.

15) Report: Hydrological Investigation into the Possible Contamination of Harrisburg International Airport Water Supply Wells by the Dump Located Under the Main Runway, by R.E. Wright Associates, Inc., 5/84.

16) Report: Installation Restoration Program Phase I - Records Search, by J. R. B. Associates, 4/84.

Community Involvement

1) Letter to Mr. Bruce Smith from Mr. Edwin Bedker re: response to a congressional inquiry, 7/21/87. Letter to Honorable John Heinz regarding action at the site is attached to the letter.

2) Memorandum to Ms. Carol Stokes from Mr. David Green re: public meeting, 8/19/86. Meeting attendance sheet is attached to the memorandum.

3) Letter to Senator Arlen Specter from Mr. James Seif re: contamination of well #3, 8/12/86.

4) Letter to Senator John Schumaker from Mr. James Seif re: contamination of well #3, 8/12/86.

5) Memorandum to Ms. Janet Viniski from Mr. Pete Bentley re: public meeting, 8/5/86.

6) Transcript of a public meeting, 7/31/86.

7) Letter to Mr. James Seif from Mr. John Shumaker re: request for a progress report, 7/25/86. Resolution Seeking Relief from Hazardous Substance Exposure for the Year 1986 is attached to the letter.

8) Communication to the U. S. EPA from Senator Arlen Specter re: inquiry from a constituent about detoxification, 7/24/86. Letter regarding detoxification and resolution for the year 1986 are attached to the communication.

9) Letter to Senator Arlen Specter from Mr. James Seif re: well sampling results, 6/30/86.

10) Communication to the U. S. EPA from Senator Arlen Specter re: inquiry from a constituent about well contamination, 6/18/86. Letter regarding contamination is attached to the communication.

11) Letter to Representative George Gekas from Mr. James Seif re: well contamination, 6/5/86.

12) Letter to Honorable John Heinz from Mr. Jack McGraw re: comments on the listing of the site on the National Priorities List, 7/29/85.

13) Letter to Honorable Lee Thomas from Senator John Heinz re: addition of the site to the National Priorities List, 7/2/85.

14) Letter to Senator John Heinz re: drinking water contamination, 6/25/85.

15) Letter to Mr. Don Welsh from Senator John Heinz re: concerns expressed by a constituent, 6/6/85. Letters regarding home well contamination are attached to the letter.

16) Letter to Mr. James Seif from Representative George Gekas re: well contamination, 5/14/85.

17) Letter to Ms. Susan Sides from Representative Rudy [sic] Dininni re: town meeting, 5/7/85.

18) Letter to Representative Rudolph Dininni from Ms. Susan Sides re: home well contamination, 4/30/85.

19) Letter to Mr. George Merkel from Mr. Bruce Smith re: drinking water for residents, 9/30/83.

20) Press release re: private well sampling (undated).

Data Summary Documents*

1) Memorandum to Mr. Gregg Crystall from Mr. Rick Dreisch re: analytical reports for sample numbers 870625-06, and 870625-07, 7/28/87. Further analyses and data regarding sample numbers 870625-06 and 870625-07 are attached to the memorandum.

2) Memorandum to Mr. Gregg Crystall from Mr. Rick Dreisch re: analytical reports for sample numbers 870527-06-12, 14-17, 6/9/87. Further analyses and data regarding sample numbers 870527-06-12 and 14-17 are attached to the memorandum.

3) Memorandum to Mr. Francisco Barba from Ms. Lori Davis re: sample analysis of well #13, 8/12/86. Laboratory analysis reports are attached to the memorandum.

4) Letter to Mr. Jerry Heston from Mr. Michael Shmookler and Ms. Catherine Ward re: sample numbers SR8644-1 to SR8644-11, 9/30/83.

5) Memorandum to Mr. Daniel Donnelly from Mr. Rick Dreisch re: sample numbers 830915-01-08, 9/21/83. Data analysis sheets and traffic reports are attached to the memorandum.

*Data supporting the Summary Sheets is located at the EPA Region III Central Regional Laboratory in Annapolis, Maryland.

GENERAL GUIDANCE DOCUMENTS *

1) "Promulgation of Sites from Updates 1-4," Federal Register, dated 6/10/86.

2) "Proposal of update 4," Federal Register, dated 9/18/85.

3) Memorandum to U. S. EPA from Mr. Gene Lucero regarding community relations at Superfund Enforcement sites, dated 8/28/85.

4) Groundwater Contamination and Protection, updated by Mr. Donald V. Feliciano on 8/28/85.

5) Guidance on Remedial Investigations under CERCLA, dated 6/85.

6) Guidance on Feasibility Studies under CERCLA, dated 6/85.

7) "Proposal of Update 3," Federal Register, dated 4/10/85.

8) Memorandum to U. S. EPA from Mr. Jack McGraw entitled "Community Relations Activities at Superfund Sites - Interim Guidance," dated 3/22/85.

9) "Proposal of Update 2," Federal Register, dated 10/15/84.

10) EPA Groundwater Protection Strategy, dated 9/84.

11) Memorandum to U. S. EPA from Mr. William N. Heckman, Jr. entitled "Transmittal at Superfund Removal Procedures - Revision 2," dated 8/20/84.

12) "Proposal of Update 1," Federal Register, dated 9/8/83.

13) Community Relations in Superfund: A Handbook (interim version), dated 9/83.

14) "Proposal of first National Priority List," Federal Register, dated 12/30/82.

15) "Expanded Eligibility List," Federal Register, dated 7/23/82.

16) "Interim Priorities List," Federal Register, dated 10/23/81.

17) Uncontrolled Hazardous Waste Site Ranking System: A User's Manual (undated).

18) Field Standard Operating Procedures- Air Surveillance (undated).

19) Field Standard Operating Procedures- Site Safety Plan (undated).

*Located in U. S. EPA Region III office.

Middletown Air Field-Water Supply Operable Unit

Enforcement Summary & Recommendations

Summary:

Provisions for a potable water supply for the Harrisburg International Airport became necessary due to increased airport usage and was aided by significant pressures from the PennDOT. Throughout the late 1970s and early 1980s, the U.S. Air Force, recognizing the potential for adverse environmental impacts from past practices at the site, initiated their Installation Restoration Program (IRP). The IRP was tailored in such a way that the development of a focused feasibility study for the water supply operable unit was quickly prepared from existing IRP reports.

Throughout ROD preparation, EPA has been negotiating an interagency agreement (IAG) with the Air Force and PennDOT to implement the ROD remedy, (i.e., the Air Force to fund construction, PennDOT to oversee construction and fund O&M of the air strippers).

Additionally, EPA is negotiating with the Air Force and PennDOT to conduct the "subsequent" RI/FS activities necessary to fully characterize the site and determine clean-up remedies. EPA wants to and expects that we will take the lead in this project. The Air Force and PennDOT feel the work will go along smoother and more expeditiously if EPA has the lead.

We are also conducting a thorough PRP search at the site since the Air Force and PennDOT have leased different buildings and areas of the site to industrial users who may have contributed to the contamination. This PRP search will coincide with the subsequent RI/FS project and we expect to be negotiating for clean-up with numerous other parties besides the Air Force and PennDOT after this work is done.

Recommendations:

It is recommended that the ROD be signed as presented to the RA. EPA will continue to negotiate an IAG for ROD implementation with the Air Force and PennDOT.