City of Titusville
Crawford County, Pennsylvania

WELLHEAD PROTECTION PLAN

November 2001

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1.0 INTRODUCTION

Approximately half of Pennsylvania's residents rely on ground water as a source of drinking water. It should also be noted that land acquisition costs and treatment requirements generally associated with surface water supplies, are more expensive then an adequate supply of ground water. However, the clean up costs associated with the remediation of contaminated groundwater (i.e., to comply with current drinking water standards) can be very expensive and once ground water is polluted, it remains contaminated for a long period of time. Even if groundwater remediation is undertaken, it is a long and difficult process to attempt to restore water quality to the affected aquifer(s).

Section 1428 of the Federal Safe Drinking Water Act (SDWA) requires each State to submit a plan to the U.S. Environmental Protection Agency (USEPA) that describe how they will protect ground water sources used by public water systems from contamination. The Wellhead Protection Program (WHPP) is a proactive effort designed to apply proper management techniques and various preventive measures to protect ground water supplies thereby ensuring public health and preventing the need for expensive treatment of wells to comply with drinking water standards. The underlying principle of the program is that it is much less expensive to protect ground water than it is to try to restore it once it becomes contaminated. Pennsylvania's WHPP was approved by EPA in March 1999 and it is the cornerstone of the Source Water Assessment Program which is also required under the SDWA. The Department of Environmental Protection (DEP) is the primacy agency for the Safe Drinking Water Act and the Division of Drinking Water Management in the Bureau of Water Supply Management is responsible for administering the WHPP and other drinking water source protection efforts in the Commonwealth of Pennsylvania.

2.0 STATE WELLHEAD PROTECTION PROGRAM OVERVIEW

2.1 Introduction

The responsibilities for wellhead protection (WHP) in Pennsylvania are shared among many stakeholders. Public water suppliers are responsible for assuring the continuous supply of safe and potable water to the consumer. The authority to regulate land use is primarily seated in the local governments whereas the Commonwealth has primary responsibility in regulating public water supplies and most discharges of potential contaminants. Other interested parties may include facility operators, landowners, local agencies and the public. Recognizing the need to balance the interests of all stakeholders, the WHPP emphasizes technical, financial and educational assistance to facilitate the development of voluntary local WHP programs. Pennsylvania's Safe Drinking Water Regulations (25 Pa. Code § 109) incorporate aspects of wellhead protection including new community water system well permitting requirements, a three-tiered approach for wellhead protection areas and minimum elements for DEP approval of voluntary local WHP programs. Strategies for the delineation of wellhead protection areas have been developed based on hydrogeologic investigations conducted by the U.S. Geological Survey for the Division of Drinking Water Management. Funding for local WHP program development is available through DEP's Source Water Protection Grant Program. Although WHP is voluntary at the local level, a growing number of municipalities and water systems across the state are already implementing local WHP programs in order to protect public health and safety by ensuring the quality of their drinking water sources. In addition to the public health and economic benefits associated with preventing costly contamination of ground-water sources, an effective local WHP program may help to secure a monitoring waiver for certain synthetic organic chemicals, thereby reducing analytical costs to a water system. Wellhead protection also promotes sound land-use planning and complements the principles of pollution prevention.

A comprehensive local WHPP consists of several discrete and vital components.

2.2 Designation of Responsibilities (Steering Committee)

A Steering Committee composed of the necessary representatives to designate responsibilities for planning and implementing wellhead protection activities should be formed. Objectives should be defined and methods to achieve goals should be stated.

Sources of information/Organizations potentially involved.

- USEPA: guidance, information, and support.
- DEP (Division of Drinking Water Management & Regional Office): state coordination, technical oversight / guidance, and financial grants
- County Planning Commission: coordination of land use issues.
- Municipalities: implementation of land use tools.
- Water Supplier: implementation, administration, and coordination of the local WHPP, and public education.
- Other organizations that could be involved include: Conservation Districts, agricultural groups, potentially affected industries/businesses, local universities, civic groups, concerned citizens, etc.

2.3 Public Participation

Public participation and education activities are critical to the success of a local WHP program. If the public and local officials understand the adverse health and economic effects associated with contaminated ground-water sources, they will be more willing to support protection measures designed to safeguard their drinking water supply.

2.4 Wellhead Protection Area (WHPA) Delineation

A WHPA is defined as the surface and subsurface area surrounding a public water supply well, well field, spring, and/or infiltration gallery through which contaminants are reasonably likely to move toward and reach the water source. Chapter 109 (25 Pa. Code) currently establishes three zones of protection. **Zone I** is the immediate area surrounding the source, which may range from a radius of 100 to 400 feet depending on site-specific source and aquifer characteristics. **Zone II** is a radius of 1/2 mile, unless a more detailed delineation is established to identify the surface area overlying the portion of the aquifer through which water is diverted to a well or flows to a spring or infiltration gallery (capture zone for a well; note that this is not the same as the zone of influence). **Zone III** is an area, which contributes surface water or ground water to Zone II, which may be significant to protecting the source. Collectively, Zone II and Zone III constitute the contributing area of the source.

WHPA delineation initially involves the formulation of a conceptual ground-water flow model followed by stepwise refinement based on the availability of site-specific data. The level of delineation should be commensurate with the level of the WHPA management approach. Delineation methods include:

- Fixed Radii Methods,
- Simplified Variable Shapes,
- Fixed Radii Methods,
- Hydrogeologic Mapping,
- Numerical Modeling, and
- Analytical Methods

2.5 Identification of Contaminant Sources

Within each WHPA, all man-made sources that may adversely impact public health or prevent compliance with the SWDA should be identified.

2.6 Development of WHPA Management Approaches

Implement appropriate ground water protection tools to manage existing sources of contamination within the WHPA and to ensure that future land use activities do not pose a threat to ground water. Regulatory management approaches will require a rigorous WHPA delineation.

Various regulatory or non-regulatory tools are available; examples include:

- Zoning,
- Public Education,
- Health Regulations,
- Technical/Financial Assistance,
- Transfer of Development Rights,
- Implementation of Best Management Practices,
- Subdivision Control,
- Purchase/Donation of Property/Land Trusts
- Transfer of Development Rights,
- Ground Water Monitoring, and
- Household Hazardous Waste Collection Programs.

2.7 Contingency Planning

Develop provisions for alternate water supplies in the event of well or well field contamination and emergency responses to environmental incidents that may impact the well or wells within the well field area.

2.8 New Water Supply Source Protection

Review potential sources of contamination for new wells and carefully site new wells.

3.0 STUDY AREA BACKGROUND

Wellhead protection is simply the protection of the areas surrounding a well or well field. This WHPA is defined as the surface and subsurface areas, surrounding a well or well field that supplies a public water system, through which contaminants are likely to pass and eventually reach the well or well field. The size and shape of the WHPA are dependent of such factors as pumping rates, time-of-travel of ground water flowing to a well, aquifer characteristics and the geologic setting of the aquifer.

The City of Titusville is located in southeast Crawford County, and is bordered by Oil Creek Township to the east, north, and west, and Venango County to the south. The area is underlain by Pennsylvanian Age Pottsville Group and Mississippian Age Shenango Formation, Cuyhoga Group, Corry Sandstone, and Riceville Formation Bedrock. These formations primarily consist of interbedded shales and sandstones. Extensive unconsolidated glacial deposits are also found in the buried valley of Oil Creek.

The City of Titusville operates a municipal pubic water supply system. The Titusville water supply system is presently served by ten wells, which are reported to be approximately 60 to 80 feet deep and are completed in unconsolidated sand and gravel deposits near Oil Creek. The well field is located in Oil Creek Township. The wells are reported to pump an average of 1,421,000 gallons per day (1.42 MGD), with a maximum pumping rate of 5.0 MGD.

4.0 PROGRAM COORDINATION

The City of Titusville's local committee for wellhead protection is comprised of the following members:

Mr. Brian Sanford**	Mayor, City of Titusville (Phone: 814/827-5300)
Mr. Jon Bromley*	Public Works Director
Mr. Paul Hesse	City Engineer
Mr. Timothy Clark	WWTP Supervisor
Mr. Christopher Cout	University of Pittsburgh
Mrs. B. J. Engleka	Board of Health
Mr. Raymond Kuzmich	Emergency Management Coordinator
Mr. William Lupher	Titusville Municipal Authority
Mr. Robert Morris	Oil Creek Township Supervisor
Mr. Richard Motter	Weyerhauser
Mr. Spencer Sines	Water Plant Supervisor
Mr. Kenneth Winger	Superintendent of Schools – City of Titusville

**Committee Chairman, *Committee Co-Chairman

The local committee will be responsible for getting the wellhead protection plan formally adopted. This committee, in conjunction with any other affected municipalities or agencies, will implement the management strategies, and will ensure that the wellhead protection program is carried into the future. The committee meets the third Wednesday of each month. The agenda for each meeting contains review of the management plan implementation including posting of signs; grant and funding programs; public education and information; and hazardous waste collection program. Further discussion in Section 7.0 Management of Wellhead Protection Area details the management implementation to date.

5.0 DELINEATION OF WELLHEAD PROTECTION AREA (WHPA)

The following section is an excerpt from the June 1997 Moody & Associates report which is attached in Appendix A. In addition the October 2001 report from Moody & Associates delineating Zone I and III is attached in Appendix B.

5.1 GENERAL BACKGROUND

In Pennsylvania, WHPA's are defined as consisting of three zones. Zone I is defined as the area immediately surrounding a well and may range from a radius of 100 to 400 feet depending on the pumping rate and geologic setting of the well. Zone II is the surface area overlying the portion of the aquifer through which water is diverted to a well or flows to a spring. The default size of a Zone II delineation is a one-half mile radius, unless a more detailed delineation is established through more precise methods. Zone III is the area, which contributes surface or ground water to Zone II, which may be significant to protecting the quality of the water supply.

5.2 ZONE DELINEATION

In addition the October 2001 from Moodys Associates Zone I and III is attached in Appendix B. The permitted capacity of the Titusville wellfield, 5 million gallons per day, was utilized to determine the Zone I WHPA. Since pumping data is not available from each individual well, it is assumed that each of the ten wells produces 500,000 gallons per day. The "Recommended Wellhead Protection Area Zone I Delineation Methodology" Compliance Assistance Document, published by the Pennsylvania Department of Environmental Protection in May 1996, was used to determine the Zone I WHPA for the Titusville wells. Based on a geologic setting of high porosity, a screened interval in the wells of less than 200 feet and an average pumping rate per well of approximately 350 gallon per minute, the Zone I WHPA radius is 260 feet. The individual well Zone I WHPAs was plotted on a base map as ten circles, with the centers at each well with a radius of 260 feet. The total Zone I WHPA would consist of the union of the area delineated by the ten individual Zone I WHPA would consist of the union of the area delineated by the ten individual Zone I WHPAs at each well. The Zone I map is attached as Figure 1.

The Zone III WHPA for the City of Titusville Wellfield extends both to the north and to the south of Oil Creek. The delineated Zone III area shown on the attached map as Figure 2, comprises the bedrock uplands with surface drainage directly into the Zone II WHA. The watersheds of several intermittent streams discharging onto the valley floor within the Zone II WHPA are included in Zone III WHPA. Streams in buried valley settings are commonly a source of ground water recharge once they reach the unconsolidated valley-fill deposits. Due to the location of these streams, and the potential for this water to recharge the area ground water aquifer, any adverse water quality of the surface waters of these streams could potentially impact the Titusville water supply.

Theoretically, the Zone III WHPA for the City of Titusville's water supply wellfield would include the entire Oil Creek watershed upstream of the City's wellfield. Any degradation of the water quality of Oil Creek could impact the wellfield through the induced recharge from Oil Creek in the are of the wellfield. The surface waters of Oil Creek, from the point where the Creek enters and flows within the Zone II WHPA, should be considered as part of the Zone III WHPA of the Titusville water supply wellfield.

The WHPA Zone II delineation for the City of Titusville well field is shown on Figure 3. This delineation was calculated using the United States Geological Survey numerical models MODFLOW and MODPATH. The delineation shown would constitute a Zone II WHPA. Information on the aquifer supplying the Titusville well field was gathered from technical reports containing pumping test and performance test data on wells completed in the sand and gravel deposits of the Oil Creek valley. The WHPA falls within the boundaries of Oil Creek Township, with a small portion extending in the Borough of Hydetown.

The valley fill aquifers of the Oil Creek valleys within Crawford County are fluvial-glacial in origin. The aquifers are primarily composed of sand and gravel deposits emplaced on the bedrock valley floor. These sand and gravel aquifers average approximately 60 feet in depth. The unconsolidated sediments located above the sand and gravel aquifers range in lithography from clay to sand and gravel, and also include man-made fill.

The conceptual model constructed of this aquifer system consists of one layer, with a bottom surface corresponding to the bedrock valley floor and a thickness set to the average thickness of high yielding sand and gravel deposits found in the study area.

Potential sources of ground water flow in the aquifer system are aerial recharge, recharge from the underlying bedrock, and recharge through the beds of the creek and its tributaries. Potential sinks or discharge locations for ground water flow are pumping wells and the creek.

Date described in the aquifer and ground water flow characteristics was collected for the study area. Some of the sources of information include; geologic maps, water supply system, and private records of well construction and lithology logs, pumping, and step pumping tests, physical descriptions of the water supply system, and other relevant reports provided by the water system and private water supply systems. Other sources of data are geological reports on valley-fill aquifers both in Crawford County and in other similar settings and Moody and Associates, Inc., in-house records and reports.

Once the conceptual model is constructed, the numerical model is chosen and constructed to simulate the conceptual model. After the model is calibrated using observed, actual system behavior, the numerical model is used to determine the capture zones or zones of diversion for wells within the aquifer system. The capture zones were calculated using the United States Geological Survey MODFLOW (McDonald and Harbaugh, 1988) and MODPATH (Pollock 1989) numerical modeling packages.

In the numerical model construction, the aquifer is divided into cells by superimposing a grid over the study area. The physical and hydrogeologic parameters for each cell or node are then determined. The numerical model used for this study consists of one layer. The layer is one cell thick, with the lower boundary being the bedrock valley basement. The cell thickness varied over the study area depending on the thickness of the sand and gravel deposits.

The cells within the study area are assigned as active or inactive. Active cells contain valley fill aquifer sands and gravels. The inactive cells designate area outside the aquifer that area underlain by bedrock. No flow is assumed in the inactive cells. Also all boundaries within the system must be explicitly described. The flow from the underlying bedrock into the aquifer system was assumed to be negligible, thus boundary between active and inactive cells and the lower boundary of all active cells, representing the contact between the aquifer and the underlying bedrock, was set as a no flow boundary. The inflow and outflow areas are designated as constant head cells, meaning that these cells will act as infinite sources or sinks of water to the flow system. Variable grid spacing was used in the model to allow greater precision n the areas of ground water withdrawal.

Once the study area grid cells are defined, the potential sources and sinks found within the area are described. The sources and sinks found within the study area are aerial recharge, pumping wells, and the creek. Aerial recharge is a source of water, and is set at 0.004 feet per day over each study area. This value is approximately nine inches of aerial recharge per year, which is one fourth of the total average precipitation for this area, The pumping wells are ground water sinks, and are located in the cells containing the actual existing wells.

The creek system is simulated by designating cells containing the creek as river cells. A cell is described as a river cell by assigning a positive riverbed conductance, an elevation of the riverbed and the head of the river to the cell. The riverbed conductance of a cell is a factor of the hydraulic conductivity of the riverbed sediments, the thickness of the sediments, and the length and width of the river segment contained by the cell. Direct measurement of the riverbed conductance is beyond the scope of this project, and our data collection efforts have not discovered any existing studies, which quantify the conductance. The riverbed conductance is estimated by using the ratio of conductance to the sediment thickness. The model was run three times, using ratios of 0.1, 1.0, and 10.0 of riverbed conductivity to sediment thickness. This variation is assumed to cover the range of reasonably expected values. A river cell can act as both a source and a sink to flow within the aquifer system. Under normal, non-pumping conditions, ground water would discharge to the creek. In creek reaches near areas of extensive ground water withdrawal, the creek will act as a source of water if the hydraulic head is lowered to an elevation below the creek surface. If as a result of pumping, the hydraulic head beneath the creek is lowered to an elevation below the creek bed, ground water flow is induced to pass under the creek from the aquifer underlying the opposite bank.

In conjunction with the model sources and sinks, the aquifer properties are described. Porosity, vertical aquifer extent, hydraulic conductivity, and an initial hydraulic head, or ground water potential elevation must be specified. A porosity of 0.2, or 20 percent was used over the active cells in each of the study areas. The initial hydraulic head was determined from the collected data, with the gradient of the piezometric surface set to reflect the valley bedrock floor gradient across the study area. The piezometric surface is the surface representative of the level to which water will rise in a well cased in the aquifer. This surface is also called the water table in an unconfined aquifer, which is an aquifer that is not covered by material of lower permeability, the piezometric surface is higher than the physical top of the aquifer. The hydraulic conductivities utilized within the study area were derived from pumping and step pumping test data collected from private area well fields. These values fall in the range of expected hydraulic conductivity found in glacial-drift, river valley aquifers which range from approximately 10 to 10,000 feet per day (Lyford and others, 1984).

Once the numerical model was constructed and calibrated, three simulation runs were performed using the three ratios of riverbed hydraulic conductance to sediment thickness. The first step in these simulation runs is to run the MODFLOW program using the parameters for each study area. The results from the MODFLOW consist of hydraulic head elevations over the study area. The MODPATH program was then used to construct a ground water velocity field within the study area. MODPATH takes the calculated hydraulic head distribution found across the study area, and the aquifer properties in to consideration when developing the velocity field. Particles are then placed in this ground water velocity field and traced either forwards or backwards through the aquifer flow system.

For the capture zone calculated in this study, particles were placed at the location of the wells and traced backwards. The capture zone s constructed by overlying the results of the three MODPATH simulations and drawing a capture zone containing all flow lines that terminate at the well field. The calculated zones are not time dependent. The particle paths are traced backwards from the well locations to the source of that particle, regardless of the time of travel necessary for the particle to move through the flow system.

Another measure of the relative error in a numerical model is the water balance error. The water balance error compares the total simulated inflows and outflows as computed by the water balance. The difference between total inflow and outflow is divided by either the inflow or the outflow to yield the error in the water balance. Ideally, the error in the water balance is less than 0.1%, however, an error of around 1.0% is usually considered acceptable. The water balance error for the Titusville study area was 0.00%.

6.0 CONTAMINANT SOURCE INVENTORY

Once the WHPA has been delineated, the potential sources of ground water contamination within this area are identified and located. Land use within the WHPA is generally a good indicator of the types of contaminant sources that may be present. For a discussion of potential sources of contamination associated with various land use, one can consult the reference material available from DEP and the USEPA. Appendix C in the appendices contains a summary copy of information currently available from DEP's website. Other sources of information on existing land uses and potential contamination problems include local Chamber of Commerce membership rosters, information maintained by the local police and/or fire departments and Federal, State, and County agency files. Existing potential contaminant sources in the City of Titusville's Zone II include:

- Hasbrook Mining (gravel pit),
- Agriculture (farming / animal husbandry),
- Automotive Dealer (car servicing w/ on-lot disposal),
- Industrial Facility - Weyerhauser,
- Industrial Facility – Allegheny Nuclear,
- Industrial Facility – Cabinet Shop,
- Marley's Veterinarian (on-lot disposal),
- Oil Creek Township (above ground brink tanks),
- Industrial Facility – Mattison Manufacturing,
- Industrial Facility – Mattison Tractor Sales/Service
- Industrial Facility – Trucking Terminal and Garage
- Industrial Facility – Autobody Shop / Repair
- Industrial Park
- Highways
- Rail Line
- Well Field
- Cemetery

Other examples of potential contaminant sources include, unidentified underground storage tanks, septic systems, unregulated/historical landfills, hazardous material storage sites within regulated facilities, and improperly closed/sealed, abandoned water wells.

An electronic database search of both Federal and State databases pertaining to potential contamination sources has been conducted. The report and a map from this electronic search is enclosed as Appendix D. The information contained in this report was used, along with field observations, to develop this Contaminant Source Inventory and the committee refined the list. Figure 4 – Contaminant Source Inventory Map, provides a Zone II overlay if all the potential contaminant sources.

7.0 MANAGEMENT OF WELLHEAD PROTECTION AREA

Management of the land contained within the wellhead protection area is vital to protecting the quality of the existing ground water. Management of the wellhead protection area should not be thought of as restrictive or exclusive of present activities and future growth. Rather, responsible management of this area will preserve a critical resource needed to sustain future growth and economic development.

Management techniques can be divided into two broad categories: regulatory and non-regulatory controls. Regulatory methods involve changing or adopting zoning regulations to limit potential contaminant sources within the WHPA. In the absence of established zoning regulations, ordinances governing land use can also be adopted. Subdivision control rules and regulations can be used to establish minimum lot sizes to reduce the threat from a high density of septic systems. Non-regulatory methods include water quality monitoring programs, land acquisition of areas within the WHPA, either by purchase or by techniques such as easements or conservation restrictions, and education. Education, both of the general public and the area business and agricultural establishments (farms), is a vital non-regulatory method of managing the WPHA. Input from the public and affected businesses has been sought throughout the development of the Titusville wellhead protection plan. This input is important to create an effective committee, generate an accurate contaminant source inventory, and to effectively manage the wellhead protection area. Educational programs, meetings, and workshops have been used to disseminate the importance and the selected methods of WHPA management. An excellent application of the education effort, as well as a management tool, is a well publicized household hazardous waste collection program.

Oil Creek Township has been made aware of the existence of the Titusville WHP area.
Oil Creek Township has a representative on the Titusville WHP committee. Efforts will continue to seek cooperation from Oil Creek Township in the protection of the WHPA for the Titusville Well Field.

The Wellhead Protection committee along with the City of Titusville and other state agencies had implemented the following measures to better manage the affected areas. The committee is dedicated to furthering public education and participation to ensure protection of the wellhead area. The City of Titusville passed Ordinance No. 2089, attached in Appendix E that prohibits any drilling activity in the aquifer underlying the City. This Ordinance was put in place to protect the public water supply an shows the commitment to the wellhead protection. The City of Titusville has issued water quality reports and notices about the public water supply to the residents and users to allow them to be informed. Copies of these documents are in Appendix E.

In addition, the committee has placed three signs notifying motorists that they are entering a protected water supply area and that they should call the emergency number to report any spills. The committee is working to place five additional signs. In addition the committee continues to promote the wellhead protection area at public events to educate the community. At these events, members of the committee display the wellhead protection capture zone and explain the importance of the area. They also have information of water quality at the information table along with an interactive groundwater display model. Events that the committee have participated in include:

- Business Fair (6/2001)
- Participation in Water Resources Forum in Edinboro, PA (May 23, 2001).
- Public Education – information table at Titusville's Chamber of Commerce Business Day at the Middle School
- Watershed Forum (9/2001)
- Titusville Fall Festival (10/2001)

In addition, the area schools use the groundwater model in the science program to show students how the groundwater moves and how surface water can affect it. The committee in the process of being trained on the various models and the different scenarios that can be modeled to further allow them to educate the public.

The wellhead protection plan will be available for review at the City Hall in Titusville, Oil Creek Township Building, and the Titusville Public Library once approval is received.

8.0 CONTINGENCY PLANNING

8.1 SITUATION / PURPOSE

The Titusville Water works provides potable water to both the City of Titusville and the Borough of Pleasantville. Individual private wells and/or springs serve all other areas of the community. The following Standard Operating Procedure (SOP) shall be enacted if a serious water shortage should occur as a result of equipment failure and/or well contamination.

8.2 EMERGENCY ACTION PLAN (Water Plant)

In the event of a water emergency the chief elected official of the effected community will notify the Emergency Management Coordinator (EMC) and together with the EMC will take the action steps required to provide potable water to those in severe need and to provide fire protection. The action to be taken in areas served by the Titusville Water Works and that to be taken in all other areas is described in the following:

A. Areas <u>not</u> served by the Titusville Water Works.

1. Potable Water

Since all consumers depend on individual private wells or springs, it is unlikely that any municipal action will have to be taken to supply potable water, but in the event action is required a tank truck filled with bacteria tested potable water will be located at a convenient location to dispense drinking water. The location of the tanker will be announced by radio and newspaper.

2. Fire Protection

Alert Fire Department but no special action will be taken.

3. Process Water

There is no provision to provide process water to industrial/commercial businesses.

B. Areas served by the Titusville Water Works.

Since water storage in the reservoirs (approximately 3.3 Million Gallons) is less than a one-day supply, for both the City of Titusville and the Borough of Pleasantville, a partial or complete failure of the pumping station will cause a water supply emergency.

Action to be taken in case of partial or complete failure of the Titusville Water Treatment Plant is covered in the following listings:

1. Failure of 200 HP electric motor drive to the 2,000 GPM pump.
   a. Start the diesel engine drive to the pump.
   b. Notify the Mayor and City Manager of Titusville.
   c. Ask news media (newspaper and radio) to request water conservation by public.
2. Partial failure of pumping capacity.
   a. Notify the Mayor, City Manager, and the Emergency Management Coordinator.
   b. Monitor water levels in the Petroleum Street Storage tank.
   c. Fill the Rockwood Drive storage tank to capacity.
   d. If the water level in the Petroleum Street storage tank <u>can</u> be maintained at 35 feet or above, no further action is required.
   e. If the water level in the Petroleum Street storage tank <u>cannot</u> be maintained at or above 35 feet, the action described for complete failure of pumping capacity will be initiated.
3. Complete Failure of pumping capacity.
   a. Notify the Mayor, City Manager, and the Emergency Management Coordinator.
   b. Notify Pleasantville Mayor and Borough Superintendent.
   c. Secure the water stored in the Rockwood Drive storage tank for fire protection.
   d. Notify Titusville and Pleasantville Fire Departments of situation.
   e. Ask news media (newspaper and radio) to discontinue water use by public.
   f. Shut down Pleasantville Pumping Station.
   g. Ask major industrial water customers to discontinue using City water.
   h. If required, arrange for the delivery of bacteria tested potable water by tank truck to convenient locations, to dispense water to the public.

8.3 EMERGENCY ACTION PLAN (Well Field)

The Contaminant Source Inventory (Section 6.0) lists potential contaminant sources within the Zone II portion of the wellhead protection area. These sources include both stationary sources (e.g., commercial, industrial, and municipal facilities) and other potentially mobile sources such as highway traffic and rail line operations.

This portion of the plan specifically addresses potential contaminant sources that may result from an accidental spill or the leakage as a result of an accident on highways and rail lines within the wellhead protection area.

In the event of a chemical and/or oil spill or other emergency in the wellhead protection area, the On-Scene Incident Commander at the accident site, shall notify the Emergency Management Coordinator (EMC). The EMC will work with emergency personnel at the accident site to:

1. Stop the leak and where possible reduce or eliminate further migration of the spill into the well field using absorbent materials, silt fences, and/or other temp barriers.
2. Determine the approximate amount of the spill. Record all spill related observations.
3. Concurrently with item No.2 above, determine the well(s), if any, which may have been contaminated by the spill / leak.

a. This can be done be direct observation of contaminant flow from the spill area in relation to the nearest wellhead. Relative topography may be used as a guide when spilled are readily absorbed by soils in the spill area.

b. This can be done by testing the potentially affected well(s) for elevated levels of the chemical and/or oil released at the spill site.

4. Begin site remediation to remove contaminant soils and/or resulting sludge.

Additional, periodic monitoring of the well(s) closest to the accident site may be necessary to ensure that spill contaminants are not present. Implementation of this additional testing requirement should only be initiated when there is a reasonable probability of spilled material entering and contaminating wells within the well field.

9.0 PLAN FOR THE FUTURE

A wellhead protection plan, once implemented, must be periodically reviewed and revised to meet changing conditions. The plan must also make provisions for future change and for emergency response.

Contingency plans for alternative water supplies, should the present water supply become contaminated, are an important part of the planning for future potable water requirement. A common response to contamination of an existing water supply is to develop a new ground water source. Wellhead protection issues, and the existing wellhead protection plan, will be considered when locating any new well, whether the well is replacing a contaminated will or simply adding capacity to an existing water supply system. Adding additional wells to a water supply system also provides an opportunity to mitigate problems associated with a contaminated water supply well. If, when adding wells to a system, the new wells are sited outside the existing well field wellhead protection area, the likelihood of one contaminant source impacting all of the wells of a system is greatly reduced.

Preliminary geological evaluation and consideration has been given to the location of future water supply wells as part of the contingency planning. Areas under consideration for a new well or wells are within the glaciated valleys of Oil Creek, both northwest of the existing well field and on the eastern side of the City of Titusville. These areas would be both upgradient and down gradient from the capture zones delineated on Figure 1.

Continuing education efforts also aid in the development of an active, effective, and responsive wellhead protection plan. Periodic programs, such as household hazardous waste collection programs, will greatly increase the effectiveness of the on-going education effort. Developing a ground water and wellhead protection curriculum, to be a part of the science instruction at the primary and secondary levels, will educate the future community members as to the importance of wellhead protection.

APPENDICES