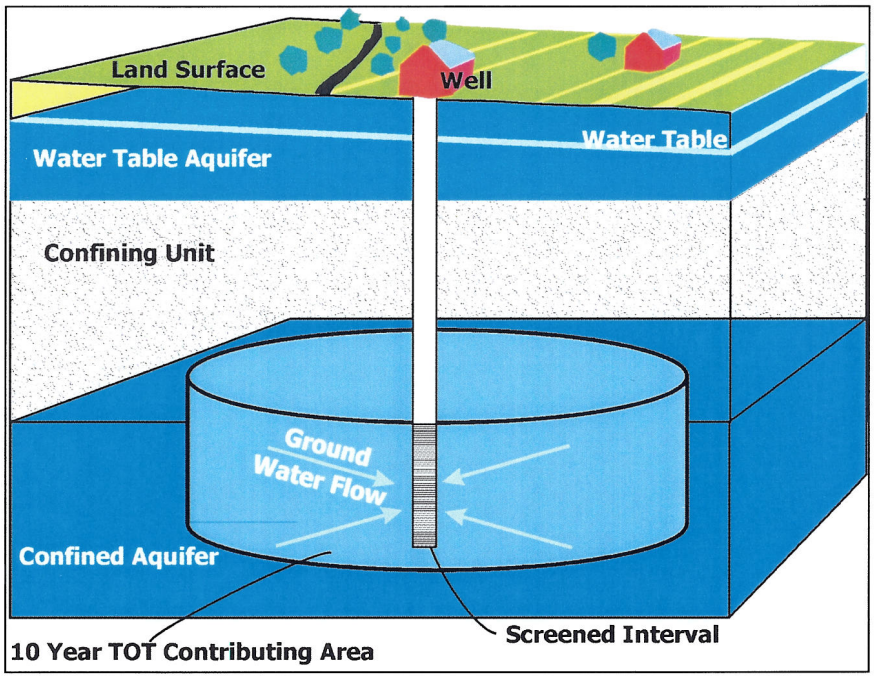
SOURCE WATER ASSESSMENTS

FOR TWELVE NONTRANSIENT NONCOMMUNITY WATER SYSTEMS IN DORCHESTER COUNTY, MD



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SUMMARY

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for twelve nontransient noncommunity water systems in Dorchester County. The required components of this report as described in Maryland's Source Water Assessment Program (SWAP) are 1) delineation of an area that contributes water to each source, 2) identification of potential sources of contamination within the areas, and 3) determination of the susceptibility of each water supply to contamination. Recommendations for protecting the drinking water supplies conclude this report.

The water supply sources of eleven systems in this report are naturally protected, confined, Coastal Plain aquifers. These water systems are currently using twenty-six wells that draw from the Piney Point Formation, and the Federalsburg aquifer of the Calvert Formation respectively. Two other wells, one at Warwick Manor Behavioral Health, and the other at South Dorchester School, are to be put into service in the near future. The Bloch & Guggenheimer Company (B&G Foods) is the only water system in this report that utilizes an unconfined, Coastal Plain aquifer to obtain its water supply. The two supply wells at this facility are completed in the Quaternary System sediments. The Source Water Assessment areas were delineated by the WSP using EPA approved methods specifically designed for confined and unconfined aquifers in the Coastal Plain.

Potential point sources of contamination were identified within the assessment areas from field inspections, and contaminant inventory databases. The Maryland Office of Planning's 2002 Land Use Map for Dorchester County was used to identify potential non-point sources of contamination at the B&G Foods unconfined water system. Wells drawing from unconfined aquifers are generally vulnerable to any activity on the land surface that occurs within the respective wellhead protection areas. Therefore, managing these areas to minimize the risk to the aquifer and continued routine monitoring of contaminants is essential in assuring a safe drinking water supply. In confined aquifer settings, sources of contamination at the land surface near the wells are generally not a threat unless there is a pathway for direct injection into the deeper aquifer such as through unused wells or along well casings that have no grout seal. Well information and water quality data were also reviewed. Figures showing well locations, potential contaminant sources within and near the wellhead protection areas, and land use in the B&G Foods WHPAs are enclosed at the end of the report.

The susceptibility analysis is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the eleven confined water systems are not susceptible to contaminants originating at the land surface due to the protected nature of confined aquifers. Some naturally occurring contaminants pose a risk to the water supplies that have detected these elements at levels of concern. It was determined that the Cambridge Dorchester Airport,

and Preston Autoplex water systems are susceptible to arsenic (based on the new EPA standard). The B&G Foods unconfined water system was determined to be susceptible to contamination by nitrate and VOCs. The system is not susceptible to synthetic organic compounds, regulated inorganic compounds other than nitrate, and microbiological pathogens. Sufficient data is not available to evaluate the susceptibility of the twelve systems to radionuclides, as nontransient noncommunity water systems are currently not regulated for these naturally occurring contaminants.

The sanitary integrity of the twelve water supply systems may be maintained by following the well improvements recommendations at the end of this report. These recommendations include the inspection of old well casings for possible integrity issues, installing insect-proof and flood-proof well caps on wells in need of them, extending the casings of wells that are currently near or below ground surface, and properly abandoning and sealing wells with no planned future use.

INTRODUCTION

The Water Supply Program has conducted a Source Water Assessment for twelve selected nontransient noncommunity water systems in Dorchester County. An individual assessment report was prepared in 2000 for the Allen Family Foods facility in Hurlock MD, which is also designated as a nontransient noncommunity water system. Nontransient noncommunity water systems are defined as public water systems that regularly serve at least 25 of the same individuals over 6 months per year. The twelve water systems assessed in this report serve a combined estimated population of 2,710 (Table 12). Dorchester County is located on the Delmarva Peninsula along the eastern shore of Maryland. The county is bounded on the north by the Choptank River and Caroline County, on the east by the Nanticoke River, and the State of Delaware, and by the Chesapeake Bay to the south and west. Based on July 2001 data, the total population of Dorchester County is 29,500 persons (MD Assoc. of Counties, 2001/2002). The systems include seven privately owned and operated facilities, a public airport, one private, and two public schools, and an environmental science laboratory owned and operated by the University of Maryland. Ten of the facilities are considered "small" systems, defined in Maryland's Source Water Assessment Plan (MDE, 1999) as water systems that have a ground water appropriation permit of less than 10,000 gallons average daily use. The Bloch & Guggenheimer Company (B&G Foods), and Horn Point Lab both use an average of greater than 10,000 gallons per day (gpd), and are therefore referred to as "large" nontransient noncommunity water systems (MDE, 1999). The twelve systems in this report obtain their water supply from wells completed in unconsolidated Coastal Plain sediments. The locations of the twelve water systems are shown on Figure 1.

WELL INFORMATION

Well information for each system was obtained from the Water Supply Program's database, site visits, well completion reports, sanitary survey inspection reports, and published reports. A total of twenty-eight wells are used by the twelve systems assessed in this report. Twenty-three of the wells were drilled in or after 1973 and should comply with Maryland's well construction regulations for grouting and casing. Five wells that were drilled prior to 1973, when current regulations went into effect, may not meet the current construction standards. Future wells were drilled in 2004 at South Dorchester School, and in 2005 at the Warwick Manor Behavioral Health facility respectively. Neither of these two wells has been placed into service to date. Future Well 2 at South Dorchester School was drilled in response to persistent coliform contamination of Well 1 after flooding from Hurricane Isabel (Appendix A). The school now uses chlorination treatment for Well 1, and a new aboveground water treatment plant has recently been constructed. Some wells are prone to flooding due to low topographic relief and poorly drained areas common to Dorchester County. Table 1 contains a summary of well information for each of the water systems assessed in this report.

Based on site surveys, the supply wells are generally in good to fair condition. Some of the older wells should have a two-piece well cap installed to prevent contamination from insects through unscreened vents and electrical conduits (Appendix A). Additionally, the casings of the older wells should be inspected for possible integrity issues. A review of the Public Drinking Water Information System (PDWIS) database and field surveys indicate single unused wells at the Preston Autoplex, and Horn Point Lab facilities, respectively (Figures 2a & 2e). Unused wells that are not exercised regularly, have no pumps, or that are no longer connected to the system may provide a direct pathway for ground water contamination to the aquifers. These wells should be properly abandoned and sealed by a licensed well driller according to the current State regulations.

The supply wells at Preston Autoplex are located below ground surface beneath the parking lots in manhole vaults (Appendix A). In November 2004, the three well pits were excavated, and about 3 feet of stone was installed around the wellheads for drainage purposes around the well casings. Additionally, the manhole covers were sealed with caulk to inhibit surface water drainage from entering the well vaults. South Dorchester School Well 1 and the Ian Center Well at Horn Point Lab are located in pits within enclosed structures (Appendix A). The South Dorchester Well 1 casing extends above grade, but the pit bottom was under water at the time of the site survey. The casings of the B&G Foods Well 2, the Warwick Manor Behavioral Health Well 1, and the Morning Star Youth Academy Well 1 extend only to about three to six inches above ground surface (Appendix A). Wells cased at or below ground surface are more likely to be subject to flooding during heavy rains. This may allow contaminated surface water to enter through or around the casings and ultimately may reach the aquifers.

Daily use, and month of maximum use averages reported from 1994 - 2004 indicate that the B&G Foods, and Horn Point Lab "large" nontransient noncommunity water systems are all within the allocated Water Appropriation Permit limits.

HYDROGEOLOGY

Ground water flows through pores between gravel, sand, and silt grains in unconsolidated Coastal Plain formations that are used by the nontransient noncommunity water systems in Dorchester County. An aquifer is any formation that is capable of yielding a significant amount of water. Transmissivity is a measure of the amount of water that an aquifer is capable of producing, and is the product of hydraulic conductivity and aquifer thickness. Confining layers are composed of fine-grained clay and silt material that have very small pore spaces and therefore transmit very little water. Confined aquifers are those formations that are overlain by one or more confining layers. Ground water is isolated from the atmosphere at the point of discharge by these confining layers, and the aquifer is subject to pressures higher than atmospheric pressure (Driscoll, 1986). The aquifers are recharged very slowly from the water stored in the confining layers above, and from precipitation that infiltrates into the formation where it reaches the ground surface, referred to as the outcrop area. Unconfined aquifer conditions exist when

the water table is exposed to the atmosphere through openings in the overlying weathered material (Driscoll, 1986).

Dorchester County is underlain by unconsolidated sediments of the Coastal Plain Physiographic Province. The sediments were deposited in a southeasterly thickening wedge extending from the Fall Line (roughly the area east of Interstate 95) to the Continental Shelf. They consist of layers of clay, silt, sand, and gravel that form a regular banded sequence of interbedded aquifers, and confining layers that gently dip to the southeast. The unconsolidated sediments overlie a complex assemblage of crystalline bedrock. The age of the deposits (from oldest to youngest), range from Cretaceous, just above the crystalline basement rocks, to Tertiary, to Quaternary near the land surface (Mack, Webb, & Gardner, 1971). A generalized description of the water bearing properties and lithology of the major aquifers and confining units of Dorchester County is shown on Table 2. B&G Foods is the only water system in this report that utilizes an unconfined aquifer (the Quaternary System sediments) to obtain its water supply. The remaining eleven systems utilize confined aquifers for their water supply sources. The confined aquifers used by these systems include the Eocene Series Piney Point Formation, and the Chesapeake Group's Federalsburg aquifer of the Calvert Formation respectively. Confining clay units of low permeability that inhibit the infiltration of contaminants from the land surface overlie confined aquifers. General descriptions of each aquifer as they increase in depth are shown below. The reader may refer to the referenced reports for additional information.

Quaternary System Sediments (Unconfined Aquifer)

The Quaternary sediments in Maryland are of fluvial and estuarine origin and are composed predominately of sand and gravel with some layers of silty clay and clay (Setzer et al, 1987). Recharge occurs by precipitation that infiltrates through these unconsolidated sediments. At the B&G Foods plant at Hurlock, the thickness of the Quaternary aquifer is approximately 75 feet. Based on an aquifer test conducted in Hurlock (Rasmussen et al, 1957), the transmissivity of the Quaternary aquifer was determined to be 150,000 gallons per day per foot (20,053 ft^2 / day). The ground water flow direction is towards the southeast at an average gradient of 0.00015. The porosity of the aquifer was estimated to be 30% (Wilson, 1993).

Calvert Formation (Federalsburg Aquifer)

Warwick Manor Behavioral Health Well 1, and the unused well at Preston Autoplex are completed in the Federalsburg aquifer, which is the uppermost aquifer of the Calvert Formation. The thickness of the Calvert Formation beneath Dorchester County is approximately 200 feet. The formation consists of gray diatomaceous silts and clays with interspersed sand lenses. The sands are fine-to-medium-grained, with shell fragments. The top of the Calvert Formation ranges from 100 feet to about 250 feet below sea level in Dorchester County (Rasmussen & Slaughter, 1957). Transmissivity values are moderately low. A test conducted at Easton in Talbot County yielded a transmissivity of 3,500 gpd per foot (Mack, Webb, & Gardner, 1971). The aquifer is overlain by the Choptank Formation where the clayey portions function as a leaky confining unit.

Piney Point Formation

The Piney Point aquifer is used by the remaining ten nontransient noncommunity water systems in this report. The thickness of the Piney Point Formation is variable, and ranges from a few feet to about 160 feet (Mack, Webb, & Gardner, 1971). The formation consists of medium to course grained olive-green to black slightly glauconitic sand with interbedded clayey layers. The top of the Piney Point Formation ranges from about 300 feet below sea level in the northwest to about 600 feet below sea level in the southwestern areas of Dorchester County, and is about 340 feet below sea level at Cambridge (Figure 4). Transmissivity values in Cambridge range from 25,000 to 45,000 gpd per foot (Mack, Webb, & Gardner, 1971). The Piney Point aquifer is overlain by the Chesapeake Group Formations that function as multiple confining and leaky confining beds to this aquifer. The Piney Point aquifer does not outcrop at the ground surface, and therefore is not directly recharged by precipitation. Recharge is derived from lateral and vertical leakage through adjacent beds.

SOURCE WATER ASSESSMENT AREA DELINEATION

For ground water systems, a Wellhead Protection Area (WHPA) is considered to be the source water assessment area for the system. The nontransient noncommunity systems in this report utilize both confined and unconfined aquifers for their water supplies. As per Maryland's Source Water Assessment Plan (MDE, 1999), separate methodologies are used to delineate WHPAs for each aquifer type as follows:

Confined Aquifer Delineations (see Figures 2a-2h)

Wells drilled into confined aquifers in the Coastal Plain pumping an average of 10,000 gallons per day (gpd) or greater are to be delineated using a volumetric equation referred to as "The Florida Method". The method is used to calculate the volume of aquifer needed to store the quantity of water pumped from the well for a ten-year period. Initially, all eleven confined aquifer systems in this report were calculated by this method to obtain actual WHPA radiuses for each well as shown on Table 3. The equation is as follows:

$$r = \sqrt{\frac{Qt}{\pi n H}}$$

where: r = calculated fixed radius (ft)
Q = pumping rate of well (ft^3 / yr)
t = time of travel in years (yr)
n = aquifer porosity (dimensionless)
H = length of well screen (ft)

A porosity (n) of 25% was assumed for the aquifers based on published reports (Fetter, 1988). The pumping rate (Q) is generally the permitted daily average from water appropriation permit information. At the Horn Point Laboratory "large" system utilizing multiple wells, the average pumpage was based on the percentage of use for each well from 2005 pumpage data provided by Maintenance Manager, Mr. Blaise Brown. The

lengths of well screens (H) were obtained from well completion reports and published reports. The volumetric equation was solved for each well using the pertinent data as shown on Table 3. The resulting WHPAs are radial zones of transport based on a ten-year time of travel.

The Wellhead Protection areas for the ten public water systems using an average of less than 10,000 gpd whose wells are completed in confined Coastal Plain aquifers is a fixed radius of 600 feet around each well (MDE, 1999). This radius is based on the volumetric equation from the previous page assuming a minimum aquifer thickness of 20 feet, a porosity of 25%, and an average daily pumpage of 10,000 gpd. Since the calculated volumetric radiuses for each of the "small" systems was less than the 600 foot minimum established assessment area, the WHPAs for these ten systems were delineated using this fixed radius method for conservative purposes (Table 3).

Systems with multiple wells that share the same aquifer and whose radial areas overlap were combined to form one larger WHPA. The WHPAs for each of the eleven confined aquifer systems are shown on Figures 2a-2h. The protection areas for assessment purposes are located within the aquifer below the confining layers at depths below the land surface. Diagram 1 is a conceptual illustration of a WHPA in a confined Coastal Plain aquifer setting.

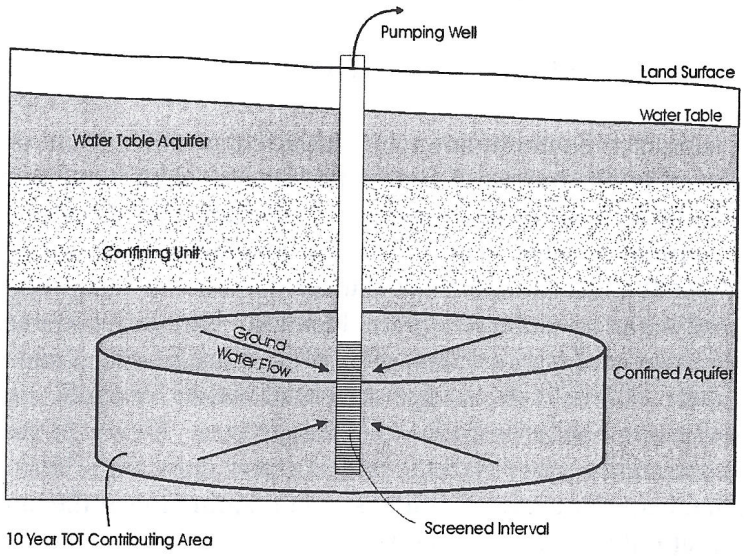


Diagram 1. Conceptual Illustration of a Zone of Transport for a Confined Aquifer

Unconfined Aquifer Delineations (see Figures 3a & 3b)

According to Maryland's Source Water Assessment Plan (MDE, 1999), systems using > 10,000 gallons per day (gpd) located in unconfined Coastal Plain aquifers are to be delineated using the EPA's WHPA Code ground water model. The total pumpage used for the delineations was 200,000 gpd or 26,738 ft^3/day. This amount is based on the daily average quantity from the current Water Appropriation and Use Permit. Based on information provided by Plant Operator, Mr. Jim McConnell, the two wells alternate with each other and are pumped equally throughout any given work day. Therefore, the model

was run by dividing the pumpage equally among the two wells (100,000 gpd each) to obtain the entire average appropriation limit based on simulation times of one and ten years. As shown in Appendix B, the values used for transmissivity, porosity, flow direction, and gradient in the WHPA Code model were obtained from MGS Report of Investigations No. 17 (Mack & Webb, 1971). These values were also used in the Source Water Assessment for the Town of Hurlock (MDE, 2000).

Delineation Zones (see Appendix B and Figures 3a & 3b)
Zone 1: Zone 1 is the WHPA delineated using a 1year time-of-travel (TOT) criterion. Zone 1 serves as the first zone of protection. The one-year criterion was selected based on the maximum survival times of microbial organisms in ground water. The resulting capture zone is oval-shaped and has an area of 11.1 acres.

Zone 2: Zone 2 is the WHPA delineated using a 10-year TOT criterion. It would take any chemical contaminant present at the Zone 2 boundary 10 years to reach the well (if it moves at the same rate as the ground water), using the permitted quantity. Zone 2 provides adequate time for facilities outside the WHPA to address chemical contamination before it reaches the wells. The resulting capture zone for both wells is a larger oval-shaped WHPA. The total area of Zone 2 is 52.7 acres. The 10-year WHPA Zone indicates a general ground water flow direction toward the southeast and Marshyhope Creek (Figures 3a & 3b).

POTENTIAL SOURCES OF CONTAMINATION

Potential sources of contamination are classified as either point or non-point sources. Examples of point sources of contamination are leaking underground storage tanks, controlled hazardous substance generators, discharge permit sites, and known ground water contamination sites. These sites are generally associated with commercial or industrial facilities that use chemical substances that may, if inappropriately handled, contaminate ground water via a discrete point location. Non-point sources of contamination are associated with certain types of land use practices such as the use of pesticides, application of fertilizers, sludge or animal wastes, or septic systems all that may lead to ground water contamination over a larger area. Eleven of the twelve nontransient noncommunity water systems in this report draw water from confined aquifers. In confined aquifer settings, sources of contamination at the land surface are generally not a threat unless there is a pathway for direct injection into the deeper aquifers such as through unused wells that have not been properly abandoned, or along well casings that have no grout seal. The B&G Foods facility is the only system in this report that draws water from an unconfined aquifer. Wells drawing from unconfined aquifers are generally vulnerable to any activity on the land surface that occurs within their respective WHPA.

Ground water contamination (GWC) sites are facilities with known soil and ground water contamination issues from past or on-going practices that are registered with the MDE Waste Management Administration. Underground storage tank (UST) sites are facilities that store petroleum in underground tanks registered with the MDE

Waste Management Administration. Leaking underground storage tanks (LUSTs) are tanks and lines that have had integrity issues that may have resulted in soil and/or ground water contamination. Controlled hazardous substance generators (CHS) are facilities that may use or store any hazardous substance on-site. Ground water discharge permits (GWDP) are issued by the MDE Water Management Administration for discharge of wastewater to ground water. General Permit (GP) sites are facilities that were issued general industrial storm water, oil operations, or terminal discharge permits. Miscellaneous sites (MISC) such as auto-body and repair shops, machine shops, and other commercial facilities that use, handle and store chemicals were also identified during the site surveys.

The contaminants associated with the types of facilities are based on generalized categories and often the potential contaminant depends on the specific chemicals and processes being used or which had been used at the facility. The potential contaminants may not be limited to those listed in Table 4. Potential contaminants are grouped as Volatile Organic Compounds (VOC), Synthetic Organic Compounds (SOC), Metals (M), Heavy Metals (HM), Nitrate/Nitrite (NN), and Microbiological Pathogens (MP).

The WSP met with representatives from each of the twelve water systems on October 17th and 18th, 2005 to discuss water quality concerns, and to observe the integrity of the wells. Also, data was collected regarding the locations of the wells using Global Positioning System (GPS) equipment, and windshield surveys were conducted on October 24th, 2005 using the GPS to locate and map potential sources of contamination within and near the WHPAs.

Confined Aquifer WHPAs (see Figures 2a-2h)

Potential contaminant sources were identified within or near the confined WHPAs for awareness purposes and to ensure that the deep aquifers do not become affected by unused wells or poorly constructed wells completed in the aquifers used by the water suppliers. Table 4 lists the facilities identified from MDE databases and site surveys as potential sources of contamination and their locations are shown on Figures 2a-2h.

Facilities located within and near the WHPAs are being inspected by MDE staff to determine the potential for contamination to the aquifers of any unpermitted ground water discharges (e.g. open floor drains), to the aquifers. No violations have been reported to date. The reader may contact the MDE Ground Water Permits Program for information regarding the specific inspections performed. Ground water discharges to the shallow unconfined aquifers should not pose a threat to the deeper confined aquifers. These aquifers are naturally protected from land use activities originating from the ground surface unless there is a pathway for direct injection (e.g. unused wells) into the confined aquifer. Two of the nontransient noncommunity water systems from this report have one unused well each located within their respective WHPA. No other unused wells were reported from inspections conducted by MDE staff. However, there may be others (e.g. unused residential wells) that are currently not inventoried, due to limitations in database, and inspection staff resources.

The former Eastern Shore Hospital Center located near the Johnson Diversey Equipment WHPA was identified as having historical or potential soil and ground water contamination concerns. The site is listed in Table 4, and its location is mapped on Figure 2d. Appendix C provides general site information and a fact sheet for this facility.

None of the sites within or near the confined aquifer WHPAs should present a water quality threat to these supply wells due to the natural confining clay layers that protect the aquifers from contamination that occurs near the ground surface. Contamination from these sites may threaten the water quality of the shallow unconfined aquifers only. The mapped sites are for awareness purposes only.

Unconfined Aquifer WHPA for B&G Foods (see Figures 3a & 3b)

Point Sources

Potential point sources of contamination within the Bloch & Guggenheimer WHPA zones include the wastewater lagoons and LUST on the B&G property. The site had liquid petroleum constituent releases from an old underground storage tank leak resulting in elevated levels of petroleum hydrocarbons below ground surface. It was recently discovered after liquid petroleum product permeated to the ground surface. The Hurlock Goose Creek Citgo (formerly Hurlock Quik Shop) located outside and to the southwest of the B&G Foods WHPAs had kerosene and heating oil underground tank leaks on-site (Figure 3a). These open cases are currently under investigation by the MDE Oil Control Program. Summaries of the cases can be found in Appendix D. The reader may contact the Oil Control Program for additional information.

A ground water contamination site (MD-342) is located to the northwest of the B&G Foods WHPA (Figure 3a). The site was a former manufacturer of cans and can ends for the tomato industry from 1929 through 1992. The buildings are currently being used as warehouses and office space. The manufacturing of cans and can ends had generated residual resin compound waste and solvent wastes until this operation was discontinued in 1990. There is no record of any contaminant releases at this facility. A site visit by MDE Waste Management staff on May 29, 1997 indicated no evidence of an existing or a potential environmental hazard at this facility. General site information and a fact sheet for this facility can be found in Appendix C.

Other potential contaminant sites located near the B&G Foods WHPA are listed on Table 4 and mapped on Figure 3a. The reader may contact the specific programs within the MDE Waste Management Administration for additional information regarding any of these potential contamination sites. The storage of heating oil in residential underground tanks, and spills during the transportation of chemical products on MD Route 392 and Harper Road are also potential point sources of contaminants that could reach the water supply (Figures 3a & 3b).

Non-Point Sources

The Maryland Office of Planning's 2002 digital land use map for Dorchester County was used to determine the predominant types of land use in the B&G Foods WHPA zones (Figure 3b). The breakdown of land use types for each WHPA zone is shown on Tables 5a and 5b. Note that industrial followed by commercial lands (B&G) make up the largest percentages of the WHPA Zone 1 (Table 5a). Cropland makes up the largest portion of land use in Zone 2 followed by industrial then residential (Table 5b & Figure 3b). Commercial, open urban land, and forested areas make up the remaining land use types within the WHPA Zone 2 (Table 5b).

Cropland is commonly associated with nitrate loading of ground water and also represents a potential source of SOCs depending on farming practices and use of pesticides. Residential areas may be a source of nitrate loading or microbial pathogens to ground water from formerly used private septic systems. Additionally, residential areas may be a source of nitrate or SOCs depending on gardening and lawn care practices.

A review of the Maryland Office of Planning 1994 Dorchester County Sewerage Coverage Map indicates that the WHPA zones are completely served by public sewerage from the Town of Hurlock. Process water from the pickling operation is aerated and treated in lagoons at the B&G Plant prior to being discharged to the Town of Hurlock's Wastewater Treatment Plant.

A ground water discharge permit was issued to Ruf's Potato Company on Nealson Street to release treated potato wash water onto a nearby field located to the northwest of the B&G Foods WHPA (Figure 3a). The dirty potato wash water flows to a holding tank and then is pumped to spray fields for irrigation onto crops. The facility operates six days a week from July through September only. Database summaries of this and other discharge permit sites located within and near unconfined and confined WHPAs from this report are found in Appendix E. The reader may contact the specific programs within the MDE Water and Waste Management Administrations for additional information on any of these permits.

Storm water runoff is also a concern in an unconfined aquifer setting since it may contain various contaminants that could infiltrate into the ground near the supply wells. The application of de-icing chemicals on MD Route 392, and other roads within the B&G Foods WHPA during the winter months may be a source of sodium and chlorides to the water supply.

WATER QUALITY DATA

Water Quality data was reviewed from the Water Supply Program's database and system files for Safe Drinking Water Act contaminants. The State's SWAP defines a threshold for reporting water quality data as 50% of the Maximum Contaminant Level (MCL). If a monitoring result is at or greater than 50% of a MCL, this assessment will describe the sources of such a contaminant and, if possible, locate the specific sources which are the cause of the elevated contaminant level. The data reported is from finished

(treated) water unless otherwise noted. Eight of the systems currently do not use water treatment. The treatment methods currently used at the water treatment plants for the remaining four systems included in this report are summarized in Table 6.

A review of the monitoring data since 1991 indicates that the water supplies for the twelve systems in this report meet the drinking water standards with a few exceptions as detailed in the following paragraphs (Table 7). Tables 8a-8f provide a list of all detections above 50% of the respective or proposed MCLs. Results exceeding an MCL are shown in bold.

Inorganic Compounds (IOCs)

A review of the available data shows that nitrate, arsenic, and thallium were the only IOCs detected at or above 50% of their respective MCLs (Tables 8a – 8c). Thallium was detected in one sample only at Cambridge Dorchester Airport in 1998, and was not detected again in four subsequent sampling events.

Arsenic was detected above the 50% MCL threshold in two of the twelve systems in this report (Table 8b). The arsenic standard was recently lowered from 0.050 ppm to 0.010 ppm by the USEPA. Arsenic was detected in wells drawing from the Piney Point Formation only. It was detected intermittently from two of the four sampling events at Cambridge Dorchester Airport, and from the latest round of arsenic testing at the Preston Autoplex Plants 1 and 2.

Nitrate was detected above 50% of the MCL of 10 ppm in 6 samples collected from 1994 to 1996 at the North Dorchester Middle & High School Water System (Table 8a). During that time, the water was withdrawn from a shallow well at the Middle School drilled into the unconfined Quaternary System sediments. This well is now disconnected from the system and no longer used. A new well was drilled in late 1996 and completed in the confined Piney Point Formation. The schools have had no nitrate concerns since the new well has been in use. Nitrate was detected repeatedly above 50% of the MCL of 10 ppm in samples collected at the Bloch & Guggenheimer Pickling Plant since 1995 (Table 8a). The average nitrate level at the plant since 1993 is 5.2 ppm.

Iron was detected at or above 50% of the secondary MCL from samples collected at five systems in this report (Table 8d). None of the twelve systems have treatment for iron removal (Table 6). Iron is an unregulated IOC with a secondary MCL of 0.3 ppm. No other regulated IOCs were detected at levels of concern for the twelve nontransient noncommunity systems.

Radionuclides

Nontransient noncommunity water systems are currently not regulated for radionuclides.

Volatile Organic Compounds (VOCs)

The only VOCs detected at levels above 50% of their respective MCLs from two systems in this report are benzene, and tetrachloroethylene (Table 8e). Benzene was detected at 3.1 parts per billion (ppb) from a sample collected at the B&G Foods lab sink tap on 1/25/91. It was not detected from a subsequent confirmation sample collected on 5/3191. The compound has been periodically detected again from samples collected in 1997, 2000, and 2005. The latest detect of 1.6 ppb on 5/18/05 was from a raw water sample collected from Well 2. The MCL for Benzene is 5 ppb. Other VOCs detected at the B&G Foods plant since 2000 at levels well below their respective MCLs are xylenes and tetrachloroethylene. Xylenes were detected at 1.9, 1, and 9 ppb respectively from samples collected in 2000, 2001, and 2005. The MCL for total xylenes is 10,000 ppb. Tetrachloroethylene was detected at 0.7 ppb from one raw water sample collected on 1/8/2002 at Well 2. It was not detected again from 3 subsequent data sets. The MCL for tetrachloroethylene is 5 ppb. This compound was also detected once at 10 ppb at the North Dorchester Middle & High Schools water system on 4/30/96. The sample was taken from the shallow, unconfined well at the Middle School that is no longer in use. Tetrachloroethylene was not detected again from four subsequent data sets at the schools.

Toluene was detected once at the Cambridge Dorchester Airport at 0.6 ppb in 1995, well below its MCL of 1,000 ppb. It was not detected again in 5 subsequent data sets. Toluene and tetrachloroethylene were detected at levels well below their respective MCLs from raw water samples collected at Preston Autoplex Plants 1 and 2 on 2/10/2004. Four subsequent tests at Plant 2 showed no VOC detects. The three wellheads at this facility have since been rehabilitated in November 2004 as discussed earlier in the Well Information section. The next round of VOC testing for both plants is scheduled for the end of this month (December 2005). No other VOCs were detected from available sampling results of the remaining eight systems.

Synthetic Organic Compounds (SOCs)

Di(2-ethylhexyl phthalate) was the only SOC detected above 50% of its respective MCL from the twelve systems in this report. As shown in Table 8f, it was detected at 3.73 ppb in 1995 at the North Dorchester Middle & High Schools water system. The MCL for di(2-ethylhexyl phthalate) is 6 ppb. It was also detected at low levels in sampling results at B&G Foods, Countryside Christian School, Cambridge Dorchester Airport, and Preston Autoplex respectively. Phthalate was detected in the laboratory blank samples accompanying these data sets, and therefore the results are not interpreted to represent actual water quality.

Pentachlorophenol and 2,4-D were detected at 0.04 ppb, and 0.21 ppb respectively from one set of sampling results taken in May 2003 at Countryside Christian School. The MCL for these compounds is 1 ppb and 70 ppb respectively. Neither compound was detected again from a repeat sample collected in September 2003. No other SOCs were detected from available sampling results for the remaining 7 systems.

Microbiological Contaminants

Wet and dry weather ground water under the influence of surface water (GWUDI) testing was completed for the unconfined aquifer wells at the Bloch & Guggenheimer Company. As shown on Table 9, the test results for each well were negative for the presence of total and fecal coliform bacteria.

GWUDI testing is not required for the remaining eleven systems in this report since their supply wells draw from confined aquifers. However, each of the systems has quarterly or monthly routine bacteriological samples that are collected as required by the Safe Drinking Water Act. Three of the twelve water systems disinfect their water at the treatment plants, and therefore the finished water data is not indicative of the quality of raw water directly from the well. The other nine systems currently do not use disinfection treatment and therefore the results may be indicative of raw water (Table 6). Total coliform bacteria are not pathogenic, but are used as an indicator organism for other disease-causing microorganisms. Six systems had positive total coliform results in at least one sample, but several repeat samples were found to be free of total coliforms after the issues responsible for these positive hits were resolved. No other positive total or fecal coliform results were reported for the remaining six systems in this report from samples collected quarterly or monthly since 1996 (Table 10).

SUSCEPTIBILITY ANALYSIS

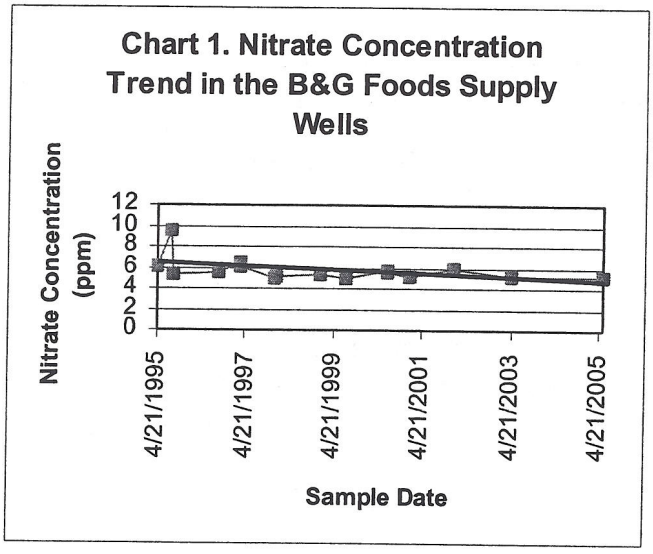
The wells serving eleven of the twelve nontransient noncommunity water systems in this report draw water from confined aquifers. Confined aquifers are naturally protected from land use activities at the ground surface due to the confining layers that provide a barrier for water movement from the surface into the aquifers below. A properly constructed well with the casing extended to the confined aquifer and with sufficient grout should be well protected from contamination at the land surface. A contaminant released in a confined WHPA setting must travel through either the annular space of a poorly grouted well, an unused improperly abandoned well, or an underground injection well drilled into the confined aquifer to potentially contaminate the aquifer. Confined aquifers are recharged very slowly from the water stored in the confining unit above, and from precipitation that infiltrates into the formation where it reaches the ground surface. Generally, water stored in confined aquifers has traveled great distances from its origin at the ground surface. Some contaminants like arsenic and iron are naturally occurring in the aquifers, and may reach concentrations that pose a risk to the water supply. This is generally more problematic in confined aquifer settings than contaminants at the land surface.

By contrast, the wells that supply the Bloch & Guggenheimer Company obtain water from an unconfined Coastal Plain aquifer. Wells drawing from unconfined aquifers are generally vulnerable to any activity on the land surface that occurs within the respective WHPAs. Therefore, managing these areas to minimize the risk to the aquifers and continued routine monitoring of contaminants is essential in assuring a safe drinking water supply.

The susceptibility analysis of the individual water supplies to each group of contaminants has been completed based on the following criteria: (1) available water quality data, (2) presence of potential contaminant sources within and near the WHPAs, (3) aquifer characteristics, and (4) well integrity. Table 11 summarizes the susceptibility of each of the twelve systems covered in this report to each of the contaminant groups.

Inorganic Compounds

Nitrate is present in the B&G Foods ground water supply above 50% of its MCL of 10 ppm. The available data shows that the trend of nitrate levels has been decreasing slightly over the past ten years (Chart 1).



Sources of nitrate can generally be traced back to land use. Fertilizer applied to agricultural fields, residential lawns, and effluent from residential and commercial on-site septic systems are all non-point sources of nitrate loading in ground water. As shown in Table 5a and 5b, the B&G Foods plant has some percentage of cropland within their WHPA Zones 1 and 2. Cropland makes up 30.1% of the overall land use in Zone 2 (Table 5b). A review of the Maryland Office of Planning 1994 Dorchester County Sewerage Coverage Map indicates that the WHPA zones are completely served by public sewerage from the Town of Hurlock. However, process water from the pickling operation is aerated and treated in lagoons on facility property prior to being discharged to the Town of Hurlock's Wastewater Plant.

Excess nitrate from manure and fertilizer that is not used by crops or lawns leaches into the shallow ground water during recharge periods. The Bloch & Guggenheimer Company **is** susceptible to nitrate due to the levels and persistence of this contaminant found, the vulnerability of the unconfined aquifer to land activity, and the presence of nitrate sources in the wellhead protection area zones. Nitrate is generally not detected in the water supplies of confined aquifers that are naturally

protected from land use activities originating at the ground surface. Detections above 50% of the MCL from 1994-1996 at the North Dorchester Middle & High Schools were from the formerly used Middle School Well completed in the shallow, unconfined Quaternary System sediments (Table 8a). From 1996 to present, a deep well drilled into the confined Piney Point Formation has been used, and the water system has had no nitrate concerns since. Based on available water quality data, and confined aquifer conditions, the remaining eleven water systems in this report are **not** susceptible to nitrate contamination (Table 11).

EPA lowered the MCL for arsenic from 0.050 ppm to 0.010 ppm on February 22, 2002. Arsenic is a naturally occurring element that is present in aquifer material of two systems at levels greater than 50% of this new MCL standard (Table 8b). In this report, arsenic was detected in samples collected from the Piney Point Formation only. Based on the natural occurrence of arsenic and its presence above 50% of this newly established MCL, the Cambridge Dorchester Airport, and Preston Autoplex water systems **are** susceptible to arsenic. With the exception of one detect at 0.002 ppm at Horn Point Lab in December 2004, arsenic was not detected in sampling results of the remaining ten systems in this report. Therefore these systems are **not** susceptible to arsenic contamination (Table 11).

Thallium is a naturally occurring element present in aquifer material. It was detected in only one sample at 0.015 in 1998 at Cambridge Dorchester Airport above 50 percent of its MCL of 0.002 ppm, and was not detected again in four subsequent samples (Table 8c). The single thallium detect is considered an anomaly, and therefore, the airport was determined **not** to be susceptible to this contaminant.

Iron is a naturally occurring element that was detected in aquifer material near, at, or above the secondary standard from single samples collected at five of the water systems in this report (Table 8d). Excessive iron levels can cause taste, color, and odor problems in drinking water as well as iron bacteria build-up around well screens. Iron is an unregulated constituent with a secondary MCL of 0.3 ppm

The low levels of other inorganic constituents detected in the wells likely represent the naturally occurring levels present in the aquifers from dissolving minerals in the unconsolidated sediments. Therefore, the twelve water supplies in this report are **not** susceptible to regulated inorganic compounds other than nitrate and arsenic based on available water quality data (Table 11).

Radionuclides

Nontransient noncommunity water systems are currently not regulated for radionuclides. Sufficient data is not currently available to evaluate the susceptibility of the twelve systems to radionuclides.

Volatile Organic Compounds

Tetrachloroethylene (PCE), and benzene are the only VOCs that were detected above 50% of their respective MCLs of 5 ppb in two of the systems in this report

(Table 8e). PCE is an industrial and commercial solvent used in factories and dry cleaning. Benzene is a component of gasoline that may be leached from underground storage tanks, or discharged from industrial plants. The detection at the North Dorchester Schools was from a sample collected from the shallow, unconfined well at the Middle School that is no longer in use. Tetrachloroethylene was not detected again from four subsequent data sets at the schools. Other VOCs were periodically detected at low levels at the B&G Foods plant as detailed in the Water Quality Section. Potential VOC sources are present within and near the B&G Foods WHPA zones as shown in Table 4, and Figure 3a. There are two open cases located within and near the B&G Foods WHPAs currently being investigated by the MDE Oil Control Program (Appendix D). Leaking home heating fuel tanks located within the WHPA zones may also have the potential to contaminate shallow ground water. Additionally, the major transportation lines (including railroads) are a concern in the event of a petroleum or chemical spill that occurs within the WHPAs. The B&G Foods wells draw water from a shallow, unconfined aquifer in the Coastal Plain. Available water quality data indicates VOC detects, even though the concentrations have not exceeded allowable drinking water standards. Therefore, based on this analysis, the B&G Foods water supply **is** susceptible to VOC contamination.

The single toluene detect at the Cambridge Dorchester Airport in 1995 well below its MCL of 1,000 ppb is considered an anomaly since it was not detected again in 5 subsequent data sets, and since the wells are completed in a confined aquifer. The confined wellheads at the Preston Autoplex were rehabilitated after February 2004 sampling results indicated low-level detects of toluene and tetrachloroethylene at Plants 1 and 2. Four subsequent data sets showed no VOC detects.

VOCs were not detected from available sampling results of the remaining eight systems in this report even though there are potential point sources of VOCs (e.g. USTs) located within or near some of the WHPAs (Figures 2a-2h). Based on sampling results, none of these sites should present a water quality threat to the supply wells unless there is a potential for direct injection into the aquifer from unused, or improperly abandoned wells. This is due to the natural confining clay layers that protect the aquifers from contamination that occurs near the ground surface. Contamination from these sites should threaten the water quality of the shallow, unconfined aquifers only. Based on the water quality data, well integrity, and confined aquifer characteristics, eleven systems from this report were determined **not** susceptible to VOCs (Table 11).

Synthetic Organic Compounds

The sources of SOCs to ground water include point and non-point sources. Non-point sources include pesticides, and herbicides applied to agricultural fields, and residential lawns.

The only contaminants detected in this group were di (2-ethylhexyl) phthalate, pentachlorophenol, and 2,4-D (see Water Quality section). The phthalate detects were attributed to its presence in laboratory blank samples, and therefore do not

represent actual water quality. Pentachlorophenol and 2,4-D were detected at low levels from one set of sampling results taken in May 2003 at Countryside Christian School. These compounds are herbicides used on wheat, corn, rangelands, and residential lawns. Pentachlorophenol is also used as a wood preservative, and is a by-product of cooling tower wastes. Neither compound was detected again from a repeat sample collected in September 2003, nor were they detected from a previous round of SOC testing conducted in October 1997. The single detects of these compounds are therefore considered anomalous since the well at this school is completed in a confined aquifer, which is naturally protected from land use activities such as herbicide applications at the ground surface.

A photo taken of the Horn Point Lab Classroom Well reveals stressed vegetation around its well casing, which indicates the possibility that an herbicide (e.g. Roundup®) may have been applied to the ground to prevent the growth of grass and weeds around the wellhead (Appendix A). Even though the well is drilled into a confined aquifer, this practice should not be followed, as it introduces a potential SOC source that could travel along the well casing and eventually reach the aquifer.

No SOCs relating to water quality were detected from two sets of available sampling data at B&G Foods, the only system in this report utilizing an unconfined aquifer for its water supply. This indicates that synthetic chemicals are generally not being over-applied to agricultural, residential, and commercial lands within its WHPAs.

A confined aquifer waiver has been issued to ten of the twelve systems in this report for synthetic organic compounds. The waiver allows confined systems to reduce the sampling frequency of SOCs to once every 12 years. Based on the available water quality data, and aquifer characteristics, the twelve systems in this report were determined **not** susceptible to SOC contamination (Table 11).

Microbiological Contaminants

Based on wet and dry weather raw water bacteriological data, the B&G Foods unconfined supply wells were determined not to be under the direct influence of surface water (Table 9). Raw water monitoring for microbiological contaminants is not required for the eleven confined aquifer water systems because they are considered naturally protected from sources of pathogens at the land surface.

Water stored in confined aquifers has traveled great distances through the naturally filtering sands, and is considered "very old". Microbial organisms in ground water generally have a maximum survival time of one year, and therefore they would have long since perished in a confined aquifer setting. Additionally, confined aquifer wells are generally well protected from microbiological contaminants originating at the ground surface due to the overlying protective confining layers. Five of these systems had routine positive total coliform results in at least one sample (Table 10). However, several repeat samples showed no positive coliform detects. Positive coliform results in confined aquifer wells are likely to be the result of well construction or integrity issues, and are unlikely to be representative of the source

water quality of the aquifer. In these instances, the wellheads should be inspected, and any deficiencies should be corrected. As an example, the supply wells at Preston Autoplex are cased below ground surface, which make them prone to flooding during heavy rains, and contaminated surface water may enter through or around the casings and ultimately reach the aquifer (Appendix A). These wells were rehabilitated in 2004, and the system has not had any positive coliform detects in the latest twelve rounds of routine bacteriological sampling.

Based on available sampling data, and aquifer characteristics, the source water at each of the twelve nontransient noncommunity systems in this report is **not** susceptible to any microbiological contaminant present at the surface including *Giardia & Cryptosporidium* (Table 11).

MANAGEMENT OF THE SOURCE WATER ASSESSMENT AREA

The information contained in this report provides a basis for understanding the risks to contamination of the water supplies for the twelve nontransient noncommunity water systems in Dorchester County. As most of the systems use confined aquifers, maintaining proper well construction is most critical for future water quality protection. Recommendations for the Bloch & Guggenheimer Company, however, encompass land use issues, as the water quality from these wells is sensitive to surrounding land activity. Specific management recommendations for consideration are listed below.

Local Planning Team

- B&G Foods should be a member of the Town of Hurlock's Wellhead Protection team. Since the Town, Allen Family Foods, and B&G Foods use the same aquifer, a unified management strategy for the WHPAs will help to protect the water supplies.

Public Awareness and Outreach

- Conduct educational outreach to businesses and residents within the WHPAs focusing on potential contaminant sources. Important topics include: (a) compliance with MDE and federal guidelines for gasoline and heating oil USTs, (b) proper hazardous material disposal and storage, and (c) well abandonment regulations and procedures.
- Being aware of the WHPA boundaries will assist employees and others at commercial facilities to use "common sense" practices with regard to the handling, placement and proper storage of chemicals, petroleum and other contaminants on facility grounds. Common sense practices can go a long way in protecting the aquifers from contamination.

Cooperative Efforts with Other Agencies

- B&G Foods should develop a plan with Hurlock's fire department and other emergency response personnel concerning proper spill response to protect ground water, particularly along MD Route 392, Harper Road, and the nearby railroad lines.
- The twelve water systems should work with the Dorchester County Health Department to ensure that there are no other unused wells within their respective

WHPAs. An improperly abandoned well may provide a direct route for ground water contamination to an aquifer.

Monitoring

- Systems should continue to monitor for all Safe Drinking Water Act contaminants as required by MDE.
- B&G Foods should stay in contact with the MDE Oil Control Program for the latest updates regarding open cases within and near the WHPA zones.
- Due to the close proximity of cropland in the WHPAs, it is recommended that B&G Foods consider semi-annual sampling for nitrates. Annual monitoring is required under the Safe Drinking Water Act.
- Annual raw water bacteriological testing is a good check on well integrity for all water systems.

Contaminant Source Inventory Updates/ Inspections

- Water system owners should conduct its own survey of their wellhead protection areas to ensure that there are no additional potential sources of contamination. Updated records of new development within the WHPAs should be maintained.
- Water system operators should have a program for periodic inspections and maintenance of the supply wells to ensure their integrity and to protect the aquifers from contamination.

Changes in Use

- Water system owners are required to notify the MDE Water Supply Program if new wells are to be added or if they wish to increase their water useage. The addition of new wells or an increase in pumpage of the existing wells may require revisions to the WHPAs.

Well Improvements

- Wells drilled prior to 1973 that do not meet current construction standards should be upgraded to protect them from contamination associated with poor or outdated construction. The casings of the Johnson Diversey Equipment Well 1, Cambridge Technology Well 1, Morning Star Youth Academy Well 1, South Dorchester School Well 1, and the Horn Point Lab Ian Center Well respectively should be inspected for possible integrity issues and replaced if necessary. Also, these wells should be upgraded with grout seals around their respective casings.
- Two-piece insect-proof well caps should be installed on the Warwick Manor Behavioral Health Well 1, the Morning Star Youth Academy Well 1, and the North Dorchester Middle & High Schools Well 1 respectively. Wells susceptible to flooding such as the Preston Autoplex Supply Wells, and the South Dorchester School Wells should have flood-proof well caps installed.
- B&G Foods, Warwick Manor Behavioral Health, Morning Star Youth Academy, Horn Point Lab, and Preston Autoplex should consider extending the casings of the wells discussed in the Well Information section to above or further above grade. Wells cased at or below ground surface are more likely to be subject to flooding

during heavy rains. This may allow contaminated surface water to enter through or around the casings and ultimately may reach the aquifers.

- The unused well at Preston Autoplex and the unused Horn Point Lab Hatchery Well should be properly abandoned and sealed by a certified well driller according to current State well construction standards if there are no plans for future use (Appendix A). Unused wells may provide a direct route for ground water contamination to an aquifer.
- Protective bollards should be installed around the Cambridge Technology Well 2 since it is located in the facility's parking lot (Appendix A). The well casing is currently prone to damage in the event of a vehicular collision.
- The ground surface around wellheads should be graded such that positive drainage away from the wells is maintained at all times to prevent surface water ponding that may occur after precipitation events, and for wells in lowland areas that are common in Dorchester County. This will help prevent any surface water infiltration into the wells. Depressions around the North Dorchester Middle & High School Well 1 were observed during the field survey (Appendix A).

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OTHER SOURCES OF DATA

Water Appropriation and Use Permits
Public Water Supply Sanitary Survey Inspection Reports
MDE Water Supply Program Oracle® Database
MDE Waste Management Sites Database
MDE Environmental Permits Database
MD Dept. of Planning 2002 Dorchester County Digital Land Use Maps
MD Dept. of Planning 1994 Dorchester County Digital Sewerage Coverage Maps
ADC® Digital Maps for Dorchester County
USGS Topographic 7.5-Minute Series Quadrangles for Federalsburg and Rhodesdale
MD State Highway Administration Digital Road Maps

Tables

PWSID [1]	PWS NAME	PLANT ID [2]	SRC. ID [3]	USE CODE [4]	SOURCE NAME	WAPID [5]	AVE. AMT. (gpd)	WELL PERMIT NO.	WELL DEPTH (ft.)	CASING DEPTH (ft.)	YEAR DRILLED	AQUIFER
1090001	BLOCH & GUGGENHEIMER CO.	01	01	P	WELL 1	DO1954G001	200000	DO731436	75	55	1981	QUATERNARY SYSTEM
		01	02	P	WELL 2	DO1954G001	200000	DO810229	76	56	1983	QUATERNARY SYSTEM
1090002	JOHNSON DIVERSEY EQUIPMENT	01	01	P	WELL 1	DO1977G001	1500	DO026604	446	404	1957	PINEY POINT FORMATION
1090004	COUNTRYSIDE CHRISTIAN SCHOOL	01	01	P	WELL 1	DO1977G007	4000	DO880914	485	250	1992	PINEY POINT FORMATION
1090007	CAMBRIDGE TECHNOLOGY, INC	01	01	P	WELL 1	DO2005G006	1500	DO680023	400	n/a	1967	PINEY POINT FORMATION
		01	02	P	WELL 2	DO2005G006	1500	DO941339	381	223	2005	PINEY POINT FORMATION
1090008	WARWICK MANOR BEHAVIORAL HEALTH	01	01	P	WELL 1	DO1985G002	4500	DO810138	183	169	1982	FEDERALSBURG AQUIFER
		01	02	F	WELL 2	DO1985G002	4500	DO941287	460	200	2005	PINEY POINT FORMATION
1090009	MORNING STAR YOUTH ACADEMY	01	01	P	WELL 1	DO1969G005	5600	DO690093	355	336	1969	PINEY POINT FORMATION
		01	02	P	WELL 2	DO1969G005	5600	DO940359	365	160	2001	PINEY POINT FORMATION
1090010	N. DORCHESTER MIDDLE & HIGH SCHOOLS	01	01	P	WELL 1	DO1974G006	8800	DO881854	585	530	1996	PINEY POINT FORMATION
1090014	SOUTH DORCHESTER SCHOOL	01	01	P	WELL 1	DO2004G001	1200	n/a	378	345	1951	PINEY POINT FORMATION
		01	02	F	WELL 2	DO2004G001	1200	DO940977	438	258	2004	PINEY POINT FORMATION
1090018	HORN POINT LAB. - CTR. FOR ENVIRON. SC.	01	01	P	LAB/CLASSROOM WELL	DO1974G007	100000	DO731318	332	322	1980	PINEY POINT FORMATION
		01	02	U	HATCHERY WELL	DO1974G007	100000	DO730297	369	342	1974	PINEY POINT FORMATION
		n/a	03	P	MAINTENANCE WELL	DO1974G007	100000	DO731453	345	325	1982	PINEY POINT FORMATION

Table 1. Well Information

PWSID [1]	PWS NAME	PLANT ID [2]	SRC. ID [3]	USE CODE [4]	SOURCE NAME	WAPID [5]	AVE. AMT. (gpd)	WELL PERMIT NO.	WELL DEPTH (ft.)	CASING DEPTH (ft.)	YEAR DRILLED	AQUIFER
1090018	HORN POINT LAB. - CTR. FOR ENVIRON. SC.	n/a	04	P	MUSEUM WELL	DO1974G007	100000	DO880324	360	200	1990	PINEY POINT FORMATION
		n/a	05	P	DAY CARE WELL	DO1974G007	100000	DO810606	360	320	1985	PINEY POINT FORMATION
		01	06	P	MARINE SCIENCE WELL	DO1974G007	100000	DO880396	375	336	1990	PINEY POINT FORMATION
		02	07	L	ENVIRON. ED. WELL	DO1974G007	100000	DO810981	384	198	1987	PINEY POINT FORMATION
		n/a	08	P	CTR. OPS. / ACORN DORM WELL	DO1974G007	100000	DO880302	380	198	1989	PINEY POINT FORMATION
		n/a	09	P	IAN CENTER WELL	DO1974G007	100000	n/a	400	215	1948	PINEY POINT FORMATION
		n/a	10	P	AREL BLDG. WELL 1	DO1974G007	100000	DO940759	400	350	2003	PINEY POINT FORMATION
		n/a	11	P	AREL BLDG. WELL 2	DO1974G007	100000	DO940874	396	336	2003	PINEY POINT FORMATION
		n/a	12	P	AREL BLDG. WELL 3	DO1974G007	100000	DO940875	397	337	2003	PINEY POINT FORMATION
1090019	S K S AUTO PARK	01	01	P	WELL 1	DO1987G002	1000	DO810958	460	300	1987	PINEY POINT FORMATION
1090020	CAMBRIDGE DORCHESTER AIRPORT	01	01	P	WELL 1	DO1974G004	3600	DO730158	476	456	1973	PINEY POINT FORMATION
		01	02	P	WELL 2	DO1974G004	3600	DO940639	438	408	2003	PINEY POINT FORMATION
1091170	PRESTON AUTOPLEX	00	01	U	UNUSED WELL	DO1987G009	300	DO811125	290	270	1987	FEDERALSBURG AQUIFER
		01	02	P	FORD WELL	DO2002G004	300	DO940442	460	440	2002	PINEY POINT FORMATION
		02	03	P	MAZDA & CARNET WELL	DO2002G004	300	DO940622	460	200	2002	PINEY POINT FORMATION
		03	04	P	HYUNDAI WELL	DO2002G004	300	DO940976	460	200	2004	PINEY POINT FORMATION

Table 1 (continued). Well Information

[1] PWSID = Public Water System Identification

[2] PLANT ID = Plant Identification. The water point of entry to a system from each well

[3] SRC. ID = Source Identification. Each well is considered a unique water source

[4] P = Production Well, F = Planned/Proposed Well, L = Seasonal Well, U = Unused Well

[5] WAPID = Water Appropriation Permit Identification

n/a = not available

Table 2. Geologic formations and their water-bearing properties in Dorchester and Talbot Counties.[1, 2]

System	Series or Group	Formation (range in depth to top of formation, in feet)		Approximate thickness (feet)	Lithologic character	Water-bearing properties
Quaternary	Holocene	0		0–10	Loam soil, alluvial sand and silt, dune sand and peat.	Provides water to a few shallow wells of small yield.
	Pleistocene [3]	Salisbury Formation	Beaverdam facies	0–100+	Unconsolidated, stratified, lenticular deposits of buff sand and silt, gravel and clay. The deposits contain a few erratic boulders; stabilized dunes; thinly stratified crossbedded channel fill; massive, well-sorted beach sands; and possibly marine sands.	An important aquifer which locally contains the most permeable sands in the area. Highly variable yields ranging up to 1,500 gpm. Transmissibility varies from 95,000 to 175,000 gpd per foot where tested.
			Red gravelly facies	0–45+	Slightly cemented, red, orange, and brown gravelly sand. Locally contains hard ledges, a few inches to 2 feet thick, usually at the base. Occurs chiefly as channel fill.	
Tertiary	Upper and middle Miocene (Chesapeake Group)	Manokin aquifer		0–50	Gray sands with gray or blue clayey silt. Occurs only in the southern end of the area beneath Elliott Island and Bishops Head.	Not known to yield water in this area. The sands lie under a marsh cover, and the water may be of undesirable quality.
		St. Marys Formation		0–110+	Predominantly clayey silt and silty clay with some very fine sand and shells.	An aquiclude. A few wells derive water locally from stringer sands in eastern Dorchester county.
		Choptank Formation		0–130	Gray and brown sand and clay, containing shells.	Yields small to moderate quantities of water to wells in eastern Dorchester County. The water is moderately hard and may be irony.
		Calvert Formation		20–300	Gray diatomaceous silts and clays, containing lenses and thin sheets of gray sand and shell beds.	Largely an aquiclude, but contains two or three aquifers which locally yield large quantities of water at Easton, Federalsburg, Hurlock, and Vienna. The quality ranges from usable for some purposes to usable only for limited purposes.
	Eocene	Piney Point Formation (70–620)		2–191	Olive-green to black quartz sand, slightly to moderately glauconitic, predominantly medium to coarse grained, with some lenses of fine sand, silt, and clay, containing foraminifera.	The most important artesian aquifer in the area, yielding over 3 mgd of ground water in Dorchester County and lower Talbot County. Has yielded 1,200 gpm to an individual well at Cambridge. Transmissibility is 15,000 to 45,000 gpd per foot. The quality of water is suitable for most purposes. The water level has been lowered over 90 feet below sea level at Cambridge in a widespread cone of depression which has extended out into Dorchester County and into Talbot County.
		Nanjemoy Formation (75–510)		0–294	Blackish-green, highly glauconitic sand, silt and clay.	A leaky aquiclude in the northwest: probably a tighter confining formation in the southeast.
	Paleocene	Aquia Formation (250–600)		0–231+	Green glauconitic quartz sand, with a few lenses of clay, containing shell fragments, foraminifera, and hardbeds. Limited to western Talbot County and northwestern Dorchester County with an impermeable boundary passing northeastward through Trappe.	An important aquifer, capable of providing moderate quantities of water to many wells. Transmissibility is from 2,000 to 5,000 gpd per foot at sites tested. Yields of wells vary from about 5 to 250 gpm.

From MGS Report of Investigations No. 17 (Mack, Webb, & Gardner, 1971)

Table 2. Geologic formations and their water-bearing properties in Dorchester and Talbot Counties.[1, 2]

System	Series or Group	Formation (range in depth to top of formation, in feet)	Approximate thickness (feet)	Lithologic character	Water-bearing properties
Cretaceous	Upper Cretaceous	Monmouth Formation (450–1,100)	34–230	Dark-green glauconitic sand and lead-gray clay containing shells and foraminifera.	An aquiclude. A small quantity of water is obtained from a few wells at Easton.
		Matawan Formation (650–1,200)	98–176	Black micaceous glauconitic clay and brown glauconitic sand.	An aquifer in Talbot County but an aquiclude in Dorchester County.
		Magothy Formation (650–1,400)	43–139	White, yellow, and gray sand interlaminated with gray and brown shale, containing lignite and carbonaceous matter, but no animal fossils.	An aquifer at Cambridge and Easton. Transmissibility ranges from 6,500 to 15,000 gpd per foot. Yields up to 600 gpm to individual wells.
	Potomac Group	Raritan and Patapsco Formations, undifferentiated (900–1,600)	600–1,700	Intercalated thin sands and shales. The sands are generally gray, fine-grained, micaceous, and lignitic. The shales are mottled pale gray, brown, and red in the upper section and gray-brown in the lower.	An aquifer with transmissibility greater than 16,000 gpd/ft. at Cambridge. Sand beds from 1,100 to 1,500 feet deep in four other test holes are probably aquifers.
		Patuxent Formation (1,600–3,300)	600–800	Not explored in this area, but presumed to be extensively present because of its occurrence in deep oil tests in Wicomico and Worcester Counties, and in the outcrop in Cecil County and on the Western Shore.	A potential aquifer. Water quality is unknown but water temperatures may exceed 100° F and water may be mineralized.
Paleozoic and Precambrian		Crystalline complex (2,200–4,200)	unknown	Not penetrated in Dorchester and Talbot Counties, but presumed to be igneous and metamorphic rocks.	Hard crystalline rocks that contain and transmit very little ground water.

[1] Modified from table 10 (Rasmussen and others, 1957).
[2] Geologic nomenclature used in this report is that of the Maryland Geological Survey and differs somewhat from that of the U.S. Geological Survey.
[3] This term includes those deposits termed Pleistocene and Pliocene (?) by Rasmussen and others, (1957). There may be some deposits of Pliocene age included in this category in some areas.

From MGS Report of Investigations No. 17 (Mack, Webb, & Gardner, 1971)

PWSID	SYSTEM NAME	WELLS INCLUDED IN WHPA	AVE. WELL PUMPAGE (gpd)	AVE. WELL PUMPAGE (ft^3/year)	[1] SCREENED INTERVAL (H) (in feet)	[2] CALCULATED WHPA RADIUS (ft)	[3] DELINEATED WHPA RADIUS (ft)	ACREAGE OF WHPA	COMMENTS
1090002	JOHNSON DIVERSEY EQUIPMENT TECHNOLOGIES	WELL 1	1500	73185	42	149	600	25.8	
1090004	COUNTRYSIDE CHRISTIAN SCHOOL	WELL 1	4000	195161	20	352	600	25.8	
1090007	CAMBRIDGE TECHNOLOGY, INC	WELL 1	1500	73185	10	305	600	28.5	Two cirles merged
		WELL 2	1500	73185	20	216	600		
1090008	WARWICK MANOR BEHAVIORAL HEALTH	WELL 1	4500	219556	14	447	600	25.8	Federalsburg Aq.
		WELL 2	4500	219556	20	374	600	25.8	Piney Point Fm.
1090009	MORNING STAR YOUTH ACADEMY	WELL 1	5600	273226	19	428	600	26.6	Two cirles merged
		WELL 2	5600	273226	20	417	600		
1090010	N. DORCHESTER MIDDLE & HIGH SCHOOLS	WELL 1	8800	429354	50	331	600	25.8	
1090014	SOUTH DORCHESTER SCHOOL	WELL 1	1200	58548	10	273	600	28.6	Two cirles merged
		WELL 2	1200	58548	30	158	600		
1090018	HORN POINT LAB. - CTR. FOR ENV. SCIENCE	MAINTENANCE WELL	290	14149	20	95	600	25.8	
		MUSEUM WELL	860	41960	20	163	600	25.8	
		LAB/CLASSROOM WELL	7500	365927	10	683	700	112.1	Three circles merged
		DAY CARE WELL	5650	275665	40	296	600		
		MARINE SCIENCE WELL	34400	1678385	20	1034	1100		
		ENVIRON. ED. WELL	50	2440	20	39	600	19.0	Truncated at Choptank River
		CTR. OPS./DORM WELL	6350	309818	50	281	600	52.2	Five cirles merged. Truncated at Choptank River
		IAN CENTER WELL	200	9758	10	111	600		
		AREL BLDG. WELL 1	14900	726975	50	430	600		
		AREL BLDG. WELL 2	14900	726975	60	393	600		
		AREL BLDG. WELL 3	14900	726975	60	393	600		

Table 3. Parameters Used for Confined WHPA Delineations

PWSID	SYSTEM NAME	WELLS INCLUDED IN WHPA	AVE. WELL PUMPAGE (gpd)	AVE. WELL PUMPAGE (ft^3/year)	SCREENED INTERVAL (H) (in feet)	[2] CALCULATED WHPA RADIUS (ft)	[3] DELINEATED WHPA RADIUS (ft)	ACREAGE OF WHPA	COMMENTS
1090019	S K S AUTO PARK	WELL 1	1000	48790	20	176	600	25.8	
1090020	CAMBRIDGE DORCHESTER AIRPORT	WELL 1	3600	175645	20	334	600	25.8	
		WELL 2	3600	175645	30	273	600	25.8	
1091170	PRESTON AUTOPLEX	FORD WELL	300	14637	20	97	600	51.7	Three circles merged
		MAZDA/CARNET WELL	300	14637	20	97	600		
		HYUNDAI WELL	300	14637	20	97	600		

Table 3 (continued). Parameters Used for Confined WHPA Delineations

[1] For conservative purposes, a total well screen length of 10 feet was assumed when screen data was not available

[2] A porosity of 25% was assumed for each of the aquifers based on lithology and as a conservative estimate (Fetter, 1988)

[3] A fixed radius of 600 ft. was used for conservative purposes when the calculated radius is < 600 ft. (MDE, 1999)

ID[1]	Type[2]	Facility Name	Address	[1]Reference Location	WHPA System Name	[3]Potential Contaminants
1	MISC	Valley Berkely Pumps	7102 East New Market-Ellwood Rd.	Figure 2a	Preston Autoplex	VOC, HM
2,3	UST	Preston Autoplex	4313 Preston Rd.	Figure 2a	Preston Autoplex	VOC
4	UST	North Dorchester High School	5878 Cloverdale Rd.	Figure 2b	N. Dorchester Middle & High Schools	VOC
5	UST	North Dorchester Middle School	5745 Cloverdale Rd.	Figure 2b	N. Dorchester Middle & High Schools	VOC
6	GWDP, CHS	Schaefer & Strohminger	3132 Airey's Rd. Spur	Figure 2d	S K S Auto Park	VOC, HM, M
7	MISC	Dorchester Memorial Park	5391 Airey's Rd.	Figure 2d	S K S Auto Park	VOC, SOC, MP
8	MISC	Adkins Cars	Ocean Gateway, South Side	Figure 2d	S K S Auto Park	VOC, HM, M
9	MISC	Vernon's Garage	3106 Ocean Gateway	Figure 2d	S K S Auto Park	VOC, HM, M
10	MISC	Custom Welding & Fabricating	3104 Ocean Gateway	Figure 2d	S K S Auto Park	VOC, HM, M, SOC
11	CHS	Johnson Diversey Equipment	5455 Moose Lodge Rd.	Figure 2d	Johnson Diversey Equipment	VOC, SOC, HM
12	UST	Cambridge Moose Lodge #1211	5446 Moose Lodge Rd.	Figure 2d	Johnson Diversey Equipment	VOC
13	MISC	POK of North America	5461 Moose Lodge Rd.	Figure 2d	Johnson Diversey Equipment	VOC, M, HM
14	GWC	Hyatt Regency (formerly Eastern Shore Hospital Center)	100 Heron Blvd.	Figure 2d	Johnson Diversey Equipment	VOC, HM
15	GP	Cambridge Dorchester Airport	5223 Bucktown Rd.	Figure 2d	Cambridge Dorchester Airport	VOC, M, HM
16	MISC	Saw Mill	Bucktown Rd. (West Side)	Figure 2d	Cambridge Dorchester Airport	VOC, HM
17	MISC	J.F. Automotive Machine Shop	Bucktown Rd. (West Side)	Figure 2d	Cambridge Dorchester Airport	VOC, HM, M, SOC
18	MISC	Brook's Barrel Co.	5228 Bucktown Rd.	Figure 2d	Cambridge Dorchester Airport	VOC, SOC, HM
19	UST	Countryside Christian School	5333 Austin Rd.	Figure 2d	Countryside Christian School	VOC
20	CHS	Horn Point Lab-Ctr. For Environ. Science	2020 Horns Point Rd.	Figure 2e	Horn Point Lab-Ctr. For Environ. Sc.	VOC, SOC, HM, MP
21	CHS	Cambridge Technology, Inc.	1959 Church Creek Rd.	Figure 2f	Cambridge Technol.	VOC, SOC, HM
22	GWDP	South Dorchester School	3485 Golden Hill Rd.	Figure 2h	S. Dorchester School	MP, NN

Table 4. Potential Contaminant Point Sources within or near Wellhead Protection Areas

ID[1]	Type[2]	Facility Name	Address	[1]Reference Location	WHPA System Name	[3]Potential Contaminants
23	MISC	Logging Operation	Golden Hill Rd. (East Side)	Figure 2h	S. Dorchester School	VOC, HM
24	LUST, MISC	Bloch & Guggenheimer Co.	4715 Harrison Ferry Rd.	Figure 3a	Bloch & Guggenheimer Co.	HM, VOC, M, MP
25	MISC	Allen's Fleet Maintenance Center	4809 Harrison Ferry Rd.	Figure 3a	Bloch & Guggenheimer Co.	VOC, HM, M
26	MISC	C & C Auto Repair	204 Delaware Ave.	Figure 3a	Bloch & Guggenheimer Co.	VOC, HM, M
27	GP	Tri-Gas & Oil Co.	204 Delaware Ave.	Figure 3a	Bloch & Guggenheimer Co.	VOC
28	UST, LUST	Hurlock Goose Creek / Citgo (formerly Hurlock Quik Shop)	105 Delaware Ave.	Figure 3a	Bloch & Guggenheimer Co.	VOC
29	UST	Nasr's Exxon	104 Pine St.	Figure 3a	Bloch & Guggenheimer Co.	VOC, M
30	MISC	Ruf's Potato Co.	200 Nealson St.	Figure 3a	Bloch & Guggenheimer Co.	HM, VOC, M, MP
31	GWC, CHS	Former Continental Can Co.	1 Railroad Ave.	Figure 3a	Bloch & Guggenheimer Co.	VOC, HM, M
32	GP, MISC	Allen's Family Foods	274 Nealson St.	Figure 3a	Bloch & Guggenheimer Co.	HM, VOC, M, MP
33	GWDP	Ruf's Potato Co.	Field NE of Allen's Family Foods	Figure 3a	Bloch & Guggenheimer Co.	SOC, MP

Table 4 (continued). Potential Contaminant Point Sources within or near Wellhead Protection Areas

[1] See referenced figure for location

[2] UST = Underground Storage Tanks, GWDP = Ground Water Discharge Permit Sites, CHS = Controlled Hazardous Substance Generators
LUST = Leaking Underground Storage Tanks, GWC = Ground Water Contamination Sites, GP = General Permit Sites, MISC = Miscellaneous Sites

[3] VOC = volatile organic compounds, SOC = synthetic organic compounds
M = Metals, HM = Heavy Metals, NN = nitrate / nitrite, MP = Microbiological Pathogens

LAND USE TYPE	TOTAL AREA (acres)	PERCENTAGE OF WHPA
Commercial	3.75	33.91
Industrial	6.96	62.93
Cropland	0.35	3.16
Total Area	11.06	100.00

Table 5a. Land Use in the Bloch & Guggenheimer Co. WHPA Zone 1 (See Figure 3b)

LAND USE TYPE	TOTAL AREA (acres)	PERCENTAGE OF WHPA
Low Density Residential	1.73	3.29
Medium Density Residential	8.88	16.87
Commercial	5.78	10.98
Industrial	13.11	24.90
Open Urban Land	2.15	4.08
Cropland	15.87	30.14
Forest	5.13	9.74
Total Area	52.65	100.00

Table 5b. Land Use in the Bloch & Guggenheimer Co. WHPA Zone 2 (See Figure 3b)

PWSID	SYSTEM NAME	PLANT ID	TREATMENT METHOD	PURPOSE
1090001	BLOCH & GUGGENHEIMER CO.	01	NO TREATMENT	
1090002	JOHNSON DIVERSEY EQUIPMENT TECHNOLOGIES	01	NO TREATMENT	
1090004	COUNTRYSIDE CHRISTIAN SCHOOL	01	NO TREATMENT	
1090007	CAMBRIDGE TECHNOLOGY, INC	01	NO TREATMENT	
1090008	WARWICK MANOR BEHAVIORAL HEALTH	01	HYPOCHLORINATION, POST	Disinfection
1090009	MORNING STAR YOUTH ACADEMY	01	NO TREATMENT	
1090010	N. DORCHESTER MIDDLE & HIGH SCHOOLS	01	NO TREATMENT	
1090014	SOUTH DORCHESTER SCHOOL	01	HYPOCHLORINATION, POST	Disinfection
1090018	HORN POINT LAB. - CTR. FOR ENV. SCIENCE	01	HYPOCHLORINATION, POST	Disinfection
		02	NO TREATMENT	
1090019	S K S AUTO PARK	01	FILTRATION, CARTRIDGE	Particulate Removal
1090020	CAMBRIDGE DORCHESTER AIRPORT	01	NO TREATMENT	
1091170	PRESTON AUTOPLEX	01	NO TREATMENT	
		02		
		03		

Table 6. Treatment Methods

PWSID	SYSTEM NAME	PLANT ID	IOCs (except nitrate & arsenic)		NITRATE		ARSENIC		VOCs		SOCs	
			No. of Samples	No. of samples > 50% MCL	No. of Samples	No. of samples > 50% MCL	No. of Samples	No. of samples > 50% MCL	No. of Samples	No. of samples > 50% MCL	No. of Samples	No. of samples > 50% MCL
1090001	BLOCH & GUGGENHEIMER CO.	01	7	0	37	16	2	0	25	2	2	0
1090002	JOHNSON DIVERSEY EQUIPMENT TECHNOLOGIES	01	7	0	15	0	4	0	7	0	0	
1090004	COUNTRYSIDE CHRISTIAN SCHOOL	01	7	0	16	0	3	0	7	0	3	0
1090007	CAMBRIDGE TECHNOLOGY, INC	01	4	0	12	0	1	0	3	0	0	
1090008	WARWICK MANOR BEHAVIORAL HEALTH	01	7	0	16	0	5	0	12	0	0	
1090009	MORNING STAR YOUTH ACADEMY	01	4	0	13	0	1	0	6	0	0	
1090010	N. DORCHESTER MIDDLE & HIGH SCHOOLS	01	8	0	32	6*	4	0	10	1*	6	1**
1090014	SOUTH DORCHESTER SCHOOL	01	9	0	19	0	5	0	7	0	0	
1090018	HORN POINT LAB. - CTR. FOR ENV. SCIENCE	01	6	0	29	0	3	0	5	0	0	
		02	0		1	0	0		0		0	
1090019	S K S AUTO PARK	01	4	0	17	0	1	0	8	0	0	
1090020	CAMBRIDGE DORCHESTER AIRPORT	01	6	1	16	0	4	1	8	0	1	0
1091170	PRESTON AUTOPLEX	01	5	0	8	0	3	1	2	0	0	
		02	3	0	2	0	2	1	5	0	1	0
		03	0		0		0		0		0	

Table 7. Summary of Water Quality Results

* Samples taken from North Dorchester Middle School unconfined aquifer well now out of service

** Phthalate also detected in blank sample and is therefore not indicative of actual water quality

PWSID	PWS NAME	PLANT ID	CONTAMINANT	MCL (ppm)	SAMPLE DATE	RESULT (ppm)
1090001	BLOCH & GUGGENHEIMER CO.	01	NITRATE	10	21-Apr-95	6.1
		01	NITRATE	10	15-Aug-95	9.6
		01	NITRATE	10	28-Aug-95	5.3
		01	NITRATE	10	12-Sep-96	5.5
		01	NITRATE	10	12-Mar-97	6.4
		01	NITRATE	10	13-Mar-97	6.1
		01	NITRATE	10	23-Dec-97	5
		01	NITRATE	10	8-Jan-98	5.2
		01	NITRATE	10	5-Jan-99	5.3
		01	NITRATE	10	27-Jul-99	5
		01	NITRATE	10	5-Jul-00	5.8
		01	NITRATE	10	6-Jul-00	5.6
		01	NITRATE	10	3-Jan-01	5.1
		01	NITRATE	10	8-Jan-02	5.9
		01	NITRATE	10	16-Apr-03	5.08
		01	NITRATE	10	18-May-05	5.1
1090010	N. DORCHESTER MIDDLE & HIGH SCHOOLS	01	NITRATE	10	8-Mar-94	6
		01	NITRATE	10	20-Dec-94	5.8
		01	NITRATE	10	24-Mar-95	5.2
		01	NITRATE	10	12-May-95	5
		01	NITRATE	10	7-Feb-96	5.5
		01	NITRATE	10	30-May-96	6

Table 8a. Nitrate Results Detected above 50% of the MCL

PWSID	PWS NAME	PLANT ID	CONTAMINANT	MCL (ppm)	SAMPLE DATE	RESULT (ppm)
1090020	CAMBRIDGE DORCHESTER AIRPORT	01	ARSENIC	0.010	17-Jan-01	0.006
1091170	PRESTON AUTOPLEX	01	ARSENIC	0.010	18-Aug-04	0.005
		02	ARSENIC	0.010	18-Aug-04	0.005

Table 8b. Arsenic Results Detected above 50% of the MCL

PWSID	PWS NAME	PLANT ID	CONTAMINANT	MCL (ppm)	SAMPLE DATE	RESULT (ppm)
1090020	CAMBRIDGE DORCHESTER AIRPORT	01	THALLIUM	0.002	18-Mar-98	0.0015

Table 8c. Other Regulated IOCs Detected above 50% of the MCL

PWSID	PWS NAME	PLANT ID	CONTAMINANT	SMCL (ppm)	SAMPLE DATE	RESULT (ppm)	COMMENTS
1090001	**BLOCH & GUGGENHEIMER CO.**	**01**	**IRON**	**0.3**	**5-Jul-00**	**0.52**	**Finished**
1090002	JOHNSON DIVERSEY EQUIPMENT	01	IRON	0.3	21-Dec-04	0.16	Raw (Well 1)
1090018	HORN POINT LAB-CTR. FOR ENVIRON. SC.	01	IRON	0.3	15-Jan-98	0.3	Finished
1090020	CAMBRIDGE DORCHESTER AIRPORT	01	IRON	0.3	17-Jan-01	0.25	Raw
1091170	PRESTON AUTOPLEX	01	IRON	0.3	10-Feb-04	0.3	Raw (Ford Well)

Table 8d. Iron Detected Above 50% of its Secondary MCL

PWSID	PWS NAME	PLANT ID	CONTAMINANT	MCL (ppb)	SAMPLE DATE	RESULT (ppb)
1090001	BLOCH & GUGGENHEIMER CO.	01	BENZENE	5	25-Jan-91	3.1
		01	BENZENE	5	1-Feb-00	2.7
1090010	**N. DORCHESTER MIDDLE & HIGH SCHOOLS**	**01**	**TETRACHLORO ETHYLENE**	**5**	**30-Apr-96**	**10**

Table 8e. Volatile Organic Compounds Detected Above 50% of their Respective MCLs

PWSID	PWS NAME	PLANT ID	CONTAMINANT	MCL (ppb)	SAMPLE DATE	RESULT (ppb)
1090010	N. DORCHESTER MIDDLE & HIGH SCHOOLS	01	DI(2-ETHYLHEXYL) PHTHALATE	6	12-Oct-95	3.73

Table 8f. Synthetic Organic Compounds Detected Above 50% of the MCL

Note: Results in bold are greater than their respective MCLs

PWSID	SOURCE NAME	RAIN DATE	RAIN AMOUNT (inches)	REMARK	SAMPLE DATE	TEMP. (^{0}C)	pH	TURBIDITY (NTU)	TOTAL COLIFORM (col/100 ml)	FECAL COLIFORM (col/100 ml)
1090001	WELL 1	26-Dec-02	0.5	WET	27-Dec-02	13	5.4	7.4	-2.2	-2.2
	WELL 1	6-Jan-03	0	DRY	8-Jan-03	15.4	5.95	57.4	0	0
	WELL 2	26-Dec-02	0.5	WET	27-Dec-02	14	5.2	3.8	-2.2	-2.2
	WELL 2	6-Jan-03	0	DRY	8-Jan-03	15.5	5.44	8.12	0	0

Table 9. Raw Water GWUDI Test Results for the Bloch & Guggenheimer Co. Wells

PWSID	PWS NAME	No. of Samples	No. of Positive Samples	Disinfection Treatment?
1090001	BLOCH & GUGGENHEIMER CO.	38	2	NO
1090002	JOHNSON DIVERSEY EQUIPMENT TECHNOLOGIES	38	3	NO
1090004	COUNTRYSIDE CHRISTIAN SCHOOL	31	0	NO
1090007	CAMBRIDGE TECHNOLOGY, INC	24	0	NO
1090008	WARWICK MANOR BEHAVIORAL HEALTH	80	0	YES
1090009	MORNING STAR YOUTH ACADEMY	18	0	NO
1090010	N. DORCHESTER MIDDLE & HIGH SCHOOLS	54	0	NO
1090014	SOUTH DORCHESTER SCHOOL	40	1	YES
1090018	HORN POINT LAB. - CTR. FOR ENV. SCIENCE	39	4	YES
1090019	S K S AUTO PARK	46	3	NO
1090020	CAMBRIDGE DORCHESTER AIRPORT	38	0	NO
1091170	PRESTON AUTOPLEX	20	6	NO

Table 10. Routine Bacteriological Monitoring Results from System Distributions Since 1996

PWSID	SYSTEM NAME	Is the Water System Susceptible to....					
		Regulated Inorganic Compounds (except nitrate & arsenic)	Nitrate	Arsenic	Volatile Organic Compounds	Synthetic Organic Compounds	Microbiological Contaminants
1090001	BLOCH & GUGGENHEIMER CO.	NO	YES	NO	YES	NO	NO
1090002	JOHNSON DIVERSEY EQUIPMENT	NO	NO	NO	NO	NO	NO
1090004	COUNTRYSIDE CHRISTIAN SCHOOL	NO	NO	NO	NO	NO	NO
1090007	CAMBRIDGE TECHNOLOGY, INC.	NO	NO	NO	NO	NO	NO
1090008	WARWICK MANOR BEHAVIORAL HEALTH	NO	NO	NO	NO	NO	NO
1090009	MORNING STAR YOUTH ACADEMY	NO	NO	NO	NO	NO	NO
1090010	N. DORCHESTER MIDDLE & HIGH SCHOOLS	NO	NO	NO	NO	NO	NO
1090014	SOUTH DORCHESTER SCHOOL	NO	NO	NO	NO	NO	NO
1090018	HORN POINT LAB-CTR. FOR ENV. SCIENCE	NO	NO	NO	NO	NO	NO
1090019	S K S AUTO PARK	NO	NO	NO	NO	NO	NO
1090020	CAMBRIDGE DORCHESTER AIRPORT	NO	NO	YES	NO	NO	NO
1091170	PRESTON AUTOPLEX	NO	NO	YES	NO	NO	NO

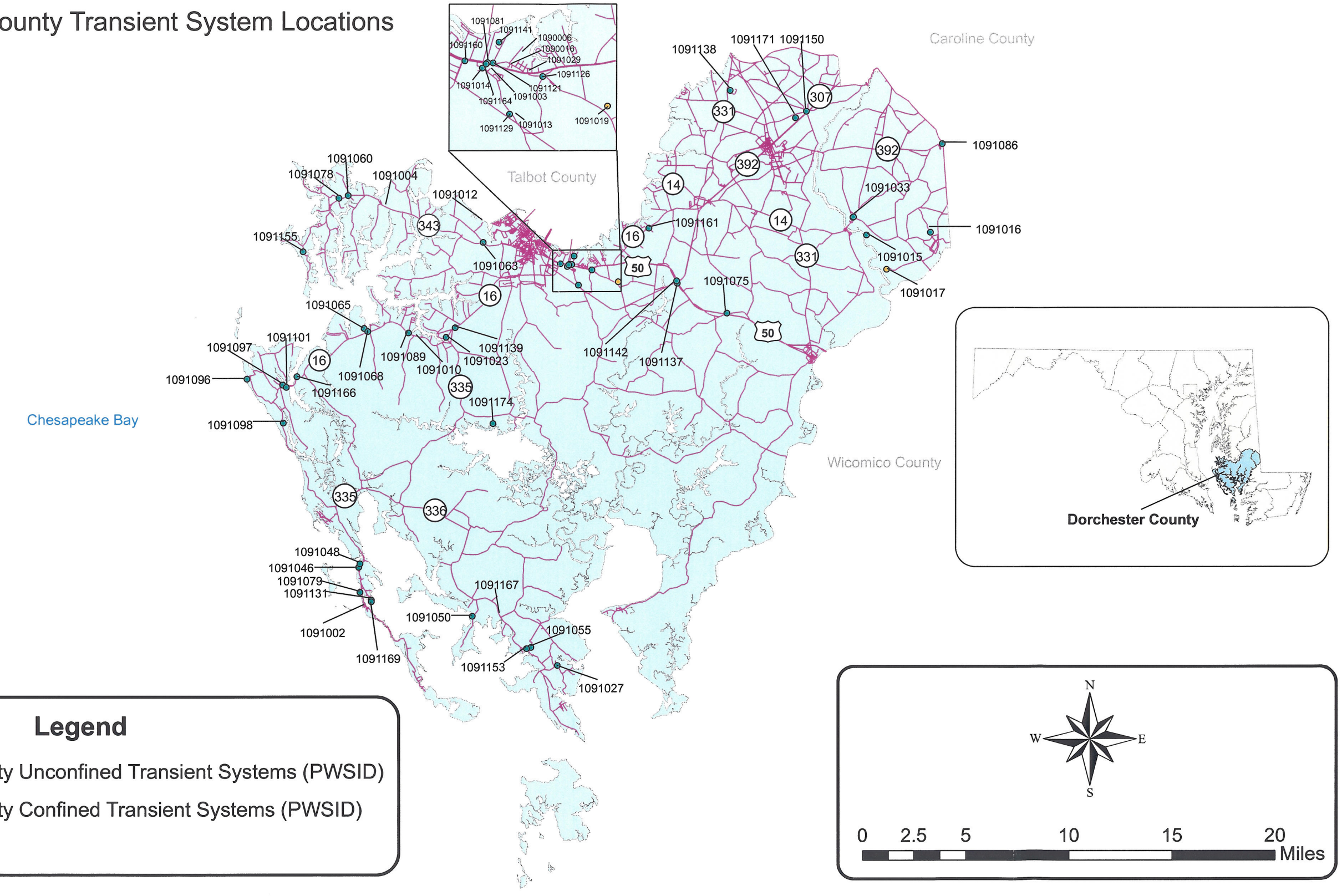
Table 11. Susceptibility Analysis Summary

PWSID	SYSTEM NAME	POPULATION
1090001	BLOCH & GUGGENHEIMER CO.	250
1090002	JOHNSON DIVERSEY EQUIPMENT	48
1090004	COUNTRYSIDE CHRISTIAN SCHOOL	225
1090007	CAMBRIDGE TECHNOLOGY, INC	41
1090008	WARWICK MANOR BEHAVIORAL HEALTH	43
1090009	MORNING STAR YOUTH ACADEMY	84
1090010	N. DORCHESTER MIDDLE & HIGH SCHOOLS	1500
1090014	SOUTH DORCHESTER SCHOOL	207
1090018	HORN POINT LAB. - CTR. FOR ENV. SCIENCE	60
1090019	S K S AUTO PARK	26
1090020	CAMBRIDGE DORCHESTER AIRPORT	26
1091170	PRESTON AUTOPLEX	200
	TOTALS	2710

Table 12. System Population Estimates

Figures

Figure 1. Dorchester County Transient System Locations



Legend

- Dorchester County Unconfined Transient Systems (PWSID)
- Dorchester County Confined Transient Systems (PWSID)
- Major Roads

N
W
E
S

0 2.5 5 10 15 20 Miles

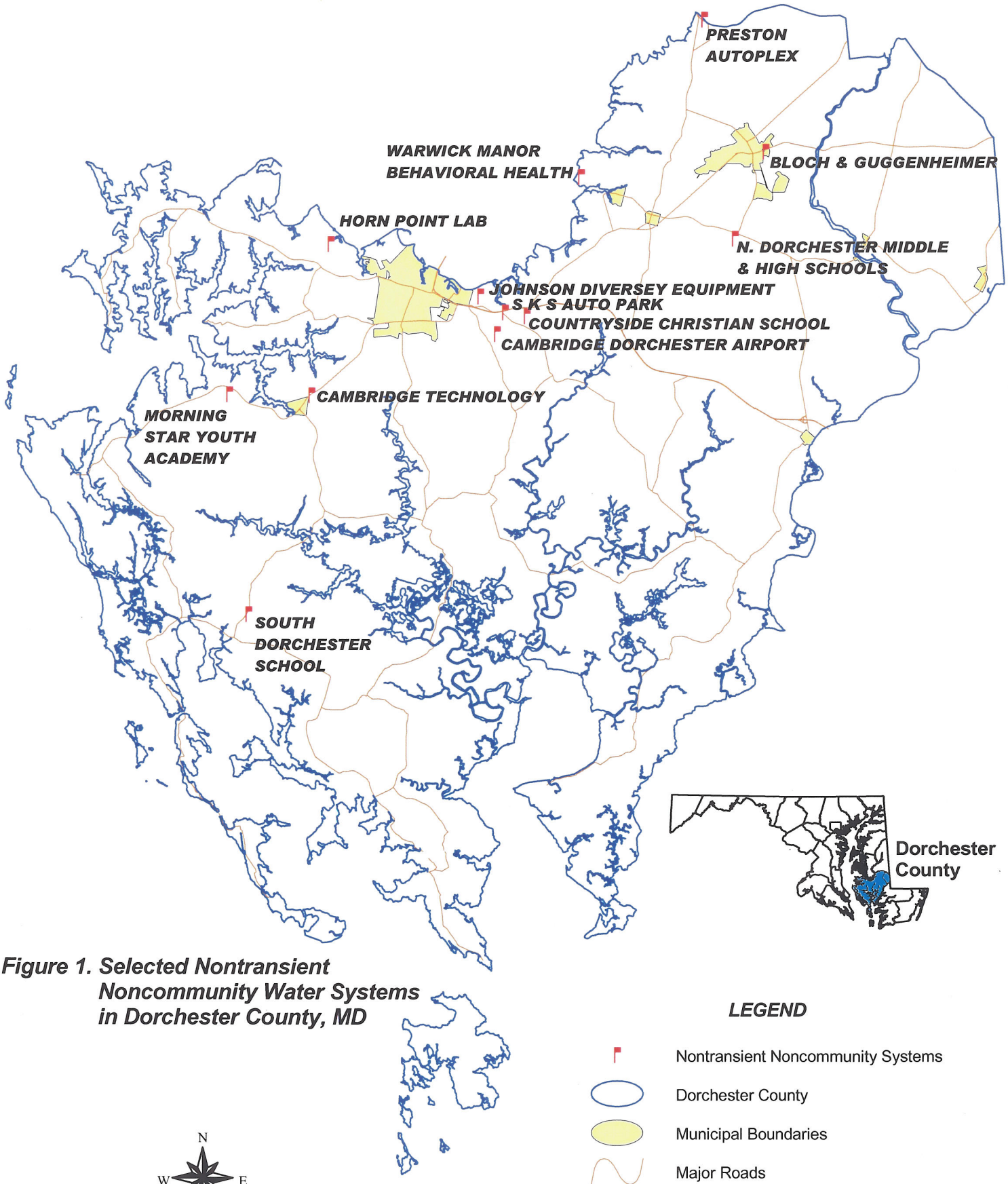


Figure 1. Selected Nontransient Noncommunity Water Systems in Dorchester County, MD

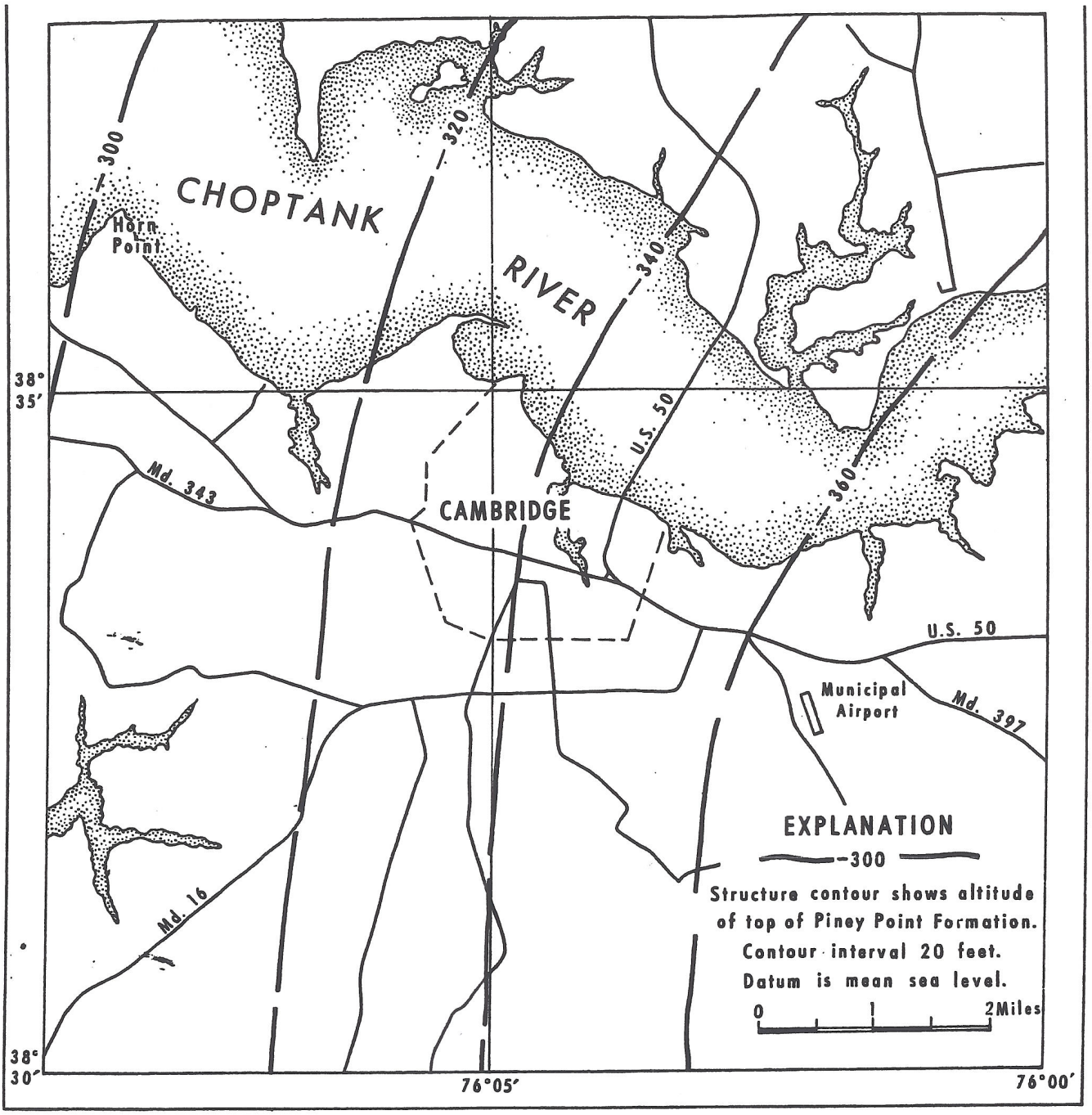


Figure 4 –Map showing the altitude of the top of the Piney Point Formation at Cambridge.

From MGS Report of Investigations No. 17 (Mack, Webb, & Gardner, 1971)

APPENDICES

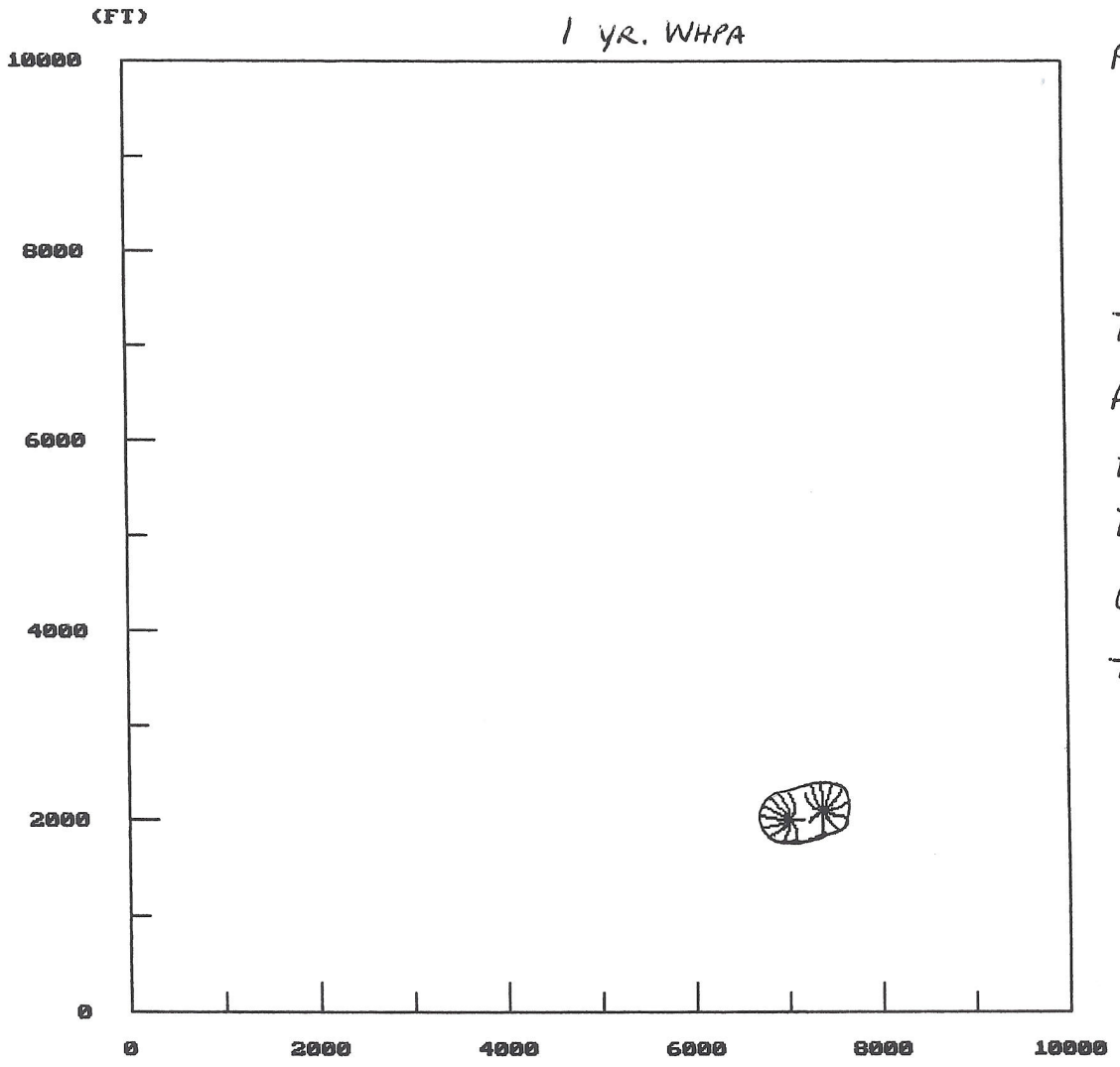
Appendix B

EPA WHPA Code model input parameters for B&G Foods unconfined aquifer delineations

BLOCH & GUGGENHEIMER CO. — 109-0001

EPA WHPA CODE

1 YEAR WHPA



INPUT PARAMETERS

	TOTAL	
PUMPAGE	200,000 gpd	WELL 1 — 100,000 gpd WELL 2 — 100,000 gpd
		WELL 1 — 13,369 ft^3/day
		WELL 2 — 13,369 ft^3/day

TRANSMISSIVITY — 150,000 gpd = 20,053 ft^2/day

AQUIFER THICKNESS — 75 ft.

POROSITY — 0.30 (30%)

FLOW DIRECTION — 315° (SE)

GRADIENT — 0.00015

TIME OF TRAVEL — 365 days

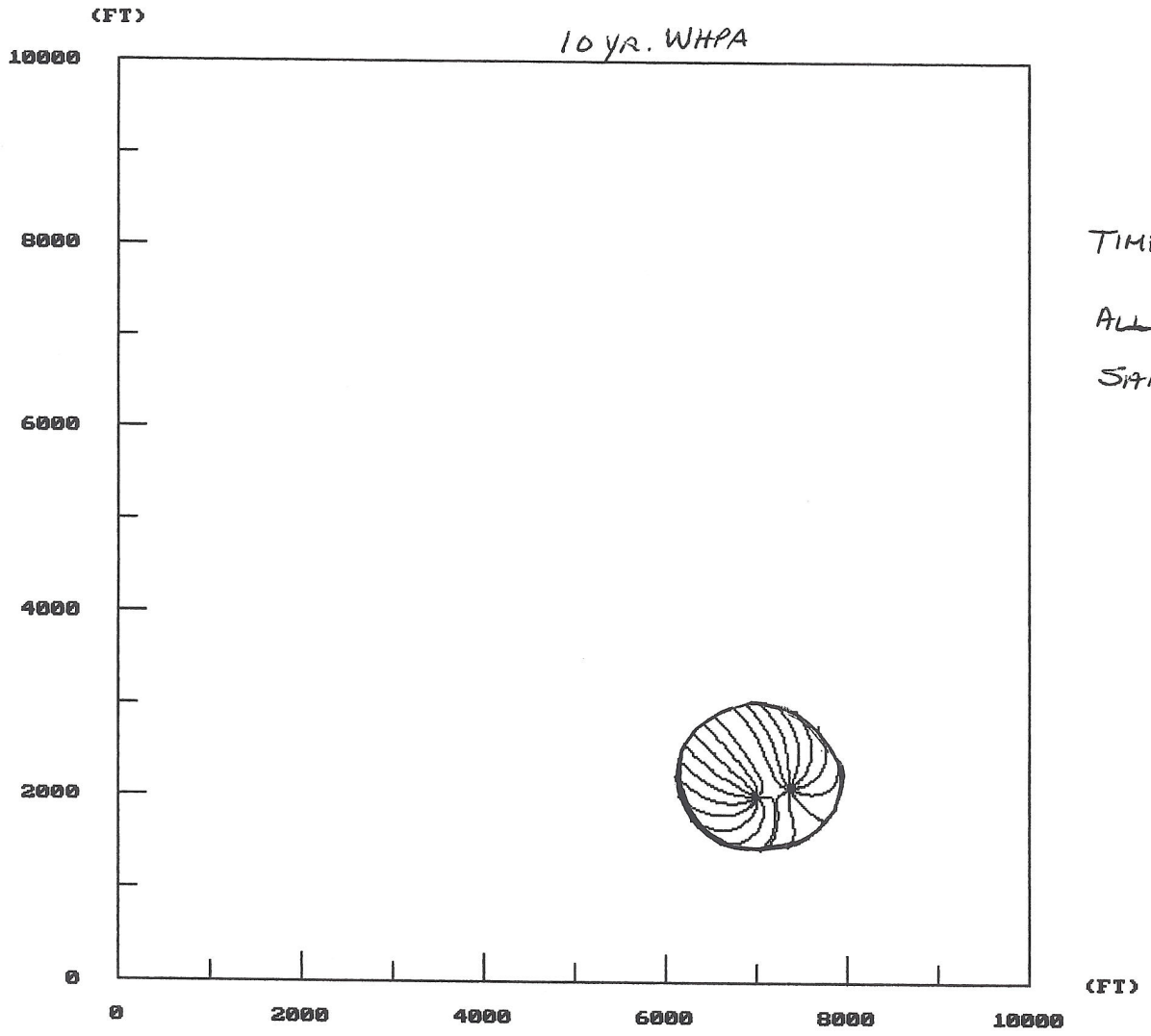
WELL DIAMETER — WELL 1 = 10 in.
WELL 2 = 12 in.

DATA SOURCES: MGS R.I. 17, 1971 and MDE SOURCE WATER ASSESSMENT FOR THE TOWN OF HURLOCK, 2000

BLOCH & GUGGENHEIMER CO. — 109-0001

10 YEAR WHPA

EPA WHPA CODE



INPUT PARAMETERS

TIME OF TRAVEL ---- 3,650 days

ALL OTHER PARAMETERS ARE THE SAME AS THE 1 YEAR WHPA

Appendix C

General information of sites with known or possible soil, and shallow aquifer ground water contamination concerns near Dorchester Co. nontransient noncommunity WHPAs from MDE Waste Management Administration

Eastern Shore Hospital Center (Now Hyatt Regency Resort)
Route 50
Cambridge, Maryland
(Voluntary Cleanup Program)

Dorchester County

Pre-1912	Two farms operated on the property.
1915	The original hospital was constructed.
1915-late 1990s	The hospital operated at the property. Portions of the property were used for farming.
3/1999	Three applicants applied to VCP seeking inculpable person status.
4/1999	Maryland Department of the Environment (MDE) approved the three VCP applications.
7/1999	MDE approved a response action plan for the property.
8/1999-10/1999	Soil excavation activities conducted. Contaminated soils disposed of off-site.
10/12/1999	MDE issued a Certificate of Completion.

Site Description

This 351-acre property was operated by the State of Maryland, Department of Health and Mental Hygiene as a psychiatric hospital since 1915. Approximately thirty-eight buildings were located on the property, including administrative buildings, dormitories, maintenance facilities, and single family residences, along with farmed land, woodlands, wetlands, and streams.

The Choptank River borders the property to the north. A residential community is located east of the site. Commercial businesses located along Route 50 border the property to the south. Shoal Creek, the Cambridge Wastewater Treatment Plant and a shopping center are located west of the property. Municipal water is available, but residences to the east rely on groundwater for potable water.

Site History

Two farms operated at the property until it was purchased by the State of Maryland in 1912. The original hospital was constructed in 1915, including English Hall, Unit 1, Unit 2, and the power plant. Until recently, portions of the site had been farmed by patients or local farmers.

Dredge spoils from the Choptank River were piled on the property until discontinued in approximately 1988. The spoils were contained within a six foot high bermed area on the southwest portion of the property.

Environmental Concerns

Environmental investigations at the property identified several areas of concern, including heavy metal contamination in soil, groundwater, and surface water; polycyclic aromatic hydrocarbon (PAH) contamination in soil near the power plant; and volatile organic compound (VOC) contamination in soil and groundwater.

Analysis of painted surfaces at the site identified lead-based paint on interior and exterior surfaces of many buildings. Based on the results of the lead-based paint survey, soil samples were collected in the vicinity of thirty buildings. Laboratory analysis of the soil samples revealed elevated concentrations of lead in the vicinity of five of the buildings.

Heavy metals, including lead, selenium, cadmium, arsenic, and manganese were identified in surface water samples collected from Shoal Creek. These substances were present at concentrations above the Toxic Substances Criteria for Ambient Surface Waters, which are intended for the protection of aquatic life.

Elevated concentrations of PAHs were identified in a surface soil sample collected in the vicinity of the smoke stack at the power plant. Consequently, eight additional surface and subsurface soil samples were collected in this area to determine the extent of the contamination. The analytical results indicate that the PAH contamination is confined to the surface soils in an area adjacent to the eastern wall of the power plant.

Elevated concentrations of VOCs were identified in the vicinity of the maintenance building. Contamination in this area was determined to be the result of a former leaking underground storage tank used for gasoline.

Localized areas of contamination were also identified in other areas of the property. Minor petroleum hydrocarbon contamination and heavy metal contamination were identified in some areas in association with aboveground storage tanks, current and former underground storage tanks, a debris pile, and a burn pit (used to dispose of unusable paint).

Voluntary Cleanup Program (VCP) Status

On March 10, 1999, separate applications were submitted to the VCP by Chesapeake Resort, LLC, Chesapeake Communities, LLC, and the Maryland Economic Development Corporation (MEDCO). The application packages indicated that Chesapeake Resort, LLC would purchase the entire Eastern Shore Hospital Center property. Chesapeake Communities, LLC would purchase portions of the property from Chesapeake Resort, LLC for development of residential units. MEDCO would lease portions of the property for development and operation of a golf course, marina, hotel, and related facilities.

The Department approved the three applications on April 8, 1999 with inculpable person status for each. The Department also notified the applicants that a response action plan had to be developed for remediation of the contamination at the site.

A proposed response action plan was submitted on behalf of the applicants on May 3, 1999. The plan proposed excavation and off-site disposal of contaminated soils in areas of the property that could pose an unacceptable risk to human health or the environment. The Department approved the response action plan on July 27, 1999.

All site excavation activities and off-site disposal of drummed hazardous wastes and electrical transformers were completed by October 4, 1999. A final report documenting the removal activities was submitted to the Department.

On October 12, 1999, the Department issued a Certificate of Completion to each of the three participants. The certificates were conditioned on the use of the property for limited residential purposes, defined as unrestricted use of the property, except for groundwater. Shallow groundwater beneath the property may not be used for any purpose. Use of deep groundwater at the property is unrestricted. Deep groundwater at the property will be monitored for a minimum of five years.

MD-342
Dorchester County

1902 Eastern Shore Can Company began operations.

1919 W.H. Neal & Sons, Inc. purchased the property.

1929 Continental Can Co. purchased the property.

1982 Manufacturing changed from cans to can ends.

1990 Crown Cork & Seal purchased the property.

1992 Crown Cork & Seal terminated operations.

MDE prepared an *Environmental Priorities Initiative Preliminary Assessment* report and recommended NFRAP status.

CONTINENTAL CAN
Hurlock, Maryland

Site Location

The 6-acre Continental Can site is located at 1 Railroad Avenue, Hurlock, Dorchester County, Maryland. The facility consisted of four buildings and several smaller structures bounded on the west by railroad tracks. The site vicinity is mixed residential and commercial. The geographic coordinates of the site are 38° 38' 5" North and 75° 51' 37" West.

Site History

Eastern Shore Can Company began operations in 1902, sold the company in 1919 to W.H. Neal & Sons, Inc., who, in turn, sold the company to Continental Can Company in 1929. On July 15, 1990 Continental Can sold the company to Crown Cork & Seal Company, Inc. The facility has had different designations. Continental Can referred to the facility as Plant #24, while Crown Cork & Seal referred to it as Plant #39.

From 1902 to approximately 1982, the facility manufactured cans for the tomato industry. In 1982, the facility changed to manufacturing various sizes of can ends. The manufacturing of cans and can ends generated residual resin compound wastes and solvent wastes. The equipment cleaning process used rags and solvents to remove the resin compound from the machinery. The use of sealant compounds was discontinued in 1990 when Continental Can moved from the site. No evidence or records of a release were reported at this facility.

The facility was rented to different companies after Crown Cork & Seal terminated operations at the plant in 1992. As of May 1997, the Hurlock Police Department occupied the former office building and B&G, a food products company, used one of the warehouses.

Environmental Investigations

In June 1992, the Maryland Department of the Environment, Hazardous and Solid Waste Management Administration (MDE) prepared an *Environmental Priorities Initiative Preliminary Assessment* report of the Continental Can Company Plant #24. The report showed that small quantities of sealant compound were spilled within the facility and that migration was of limited areal extent. The site was recommended for No Further Remedial Action Planned (NFRAP) under the Comprehensive Environmental Response, Compensation and Liability Act.

Current Status

This site is on the State Master List that identifies potential hazardous waste sites in Maryland. The Master List includes sites currently identified by the Environmental Protection Agency's (EPA)

A publication of the Maryland Coastal Zone Management Program, Department of Natural Resources, pursuant to National Oceanic and Atmospheric Administration Award No. NA97OZ0164.

Comprehensive Environmental Response, Compensation and Liability Information System. EPA has given the site a designation of NFRAP. The designation of NFRAP by EPA does not mean that MDE has reached the same conclusion concerning further investigation at the site. The information contained in the fact sheet presents a summary of past investigations and site conditions currently known to MDE.

Facility Contact

Arthur O'Connell, Chief, Site and Brownfields Assessments/State Superfund Division
Maryland Department of the Environment
410-631-3493

A publication of the Maryland Coastal Zone Management Program, Department of Natural Resources, pursuant to National Oceanic and Atmospheric Administration Award No. NA97OZ0164.

Appendix D

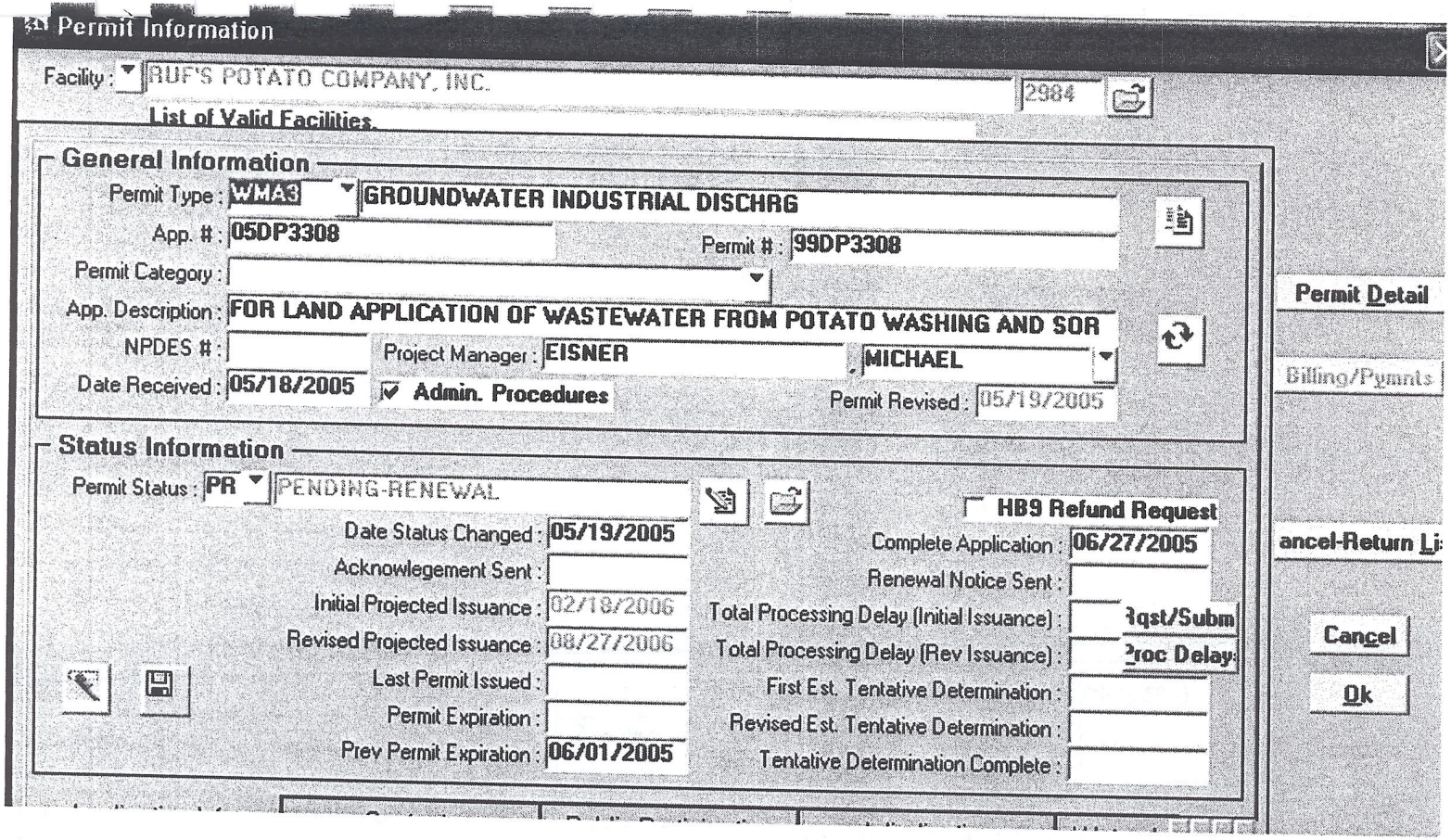
Summaries of open cases within or near B&G Foods WHPAs from MDE Oil Control Program

CASE NO.	NAME	LOCATION	STATUS AS OF DECEMBER 2005
05-1118DO	B & G Foods, Inc.	4715 Harrison Ferry Rd., Hurlock	Liquid petroleum hydrocarbons were discovered on the ground surface near the plant. The area was excavated, and a previously unknown leaking UST was discovered. No monitoring wells have been installed to date. The Oil Control Program is currently investigating this case.
04-1297DO	Hurlock Goose Creek/Citgo (Formerly Hurlock Quik Shop)	105 Delaware Ave., Hurlock	Underground kerosene tank leak was remediated using a soil vapor recovery system and ground water pumping. Six monitoring wells were installed at various locations on-site. According to the Oil Control Program, the recovery systems have effectively removed the kerosene constituents from contaminated soil and ground water on-site. Oil Control Program is also investigating an underground heating oil tank located to the south of the store that was found to have elevated levels of diesel organics below ground. The case is still open to date.

MDE Oil Control Program Open Cases within or near B&G Foods (Hurlock MD) Wellhead Protection Area

Appendix E

Database summaries of discharge permit sites within or near WHPAs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2984
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App. # : 05DP3308
Permit # : 99DP3308
Permit Category :
App. Description : FOR LAND APPLICATION OF WASTEWATER FROM POTATO WASHING AND SOR
NPDES # :
Project Manager : EISNER MICHAEL
Date Received : 05/18/2005
Admin. Procedures
Permit Revised : 05/19/2005
Status Information
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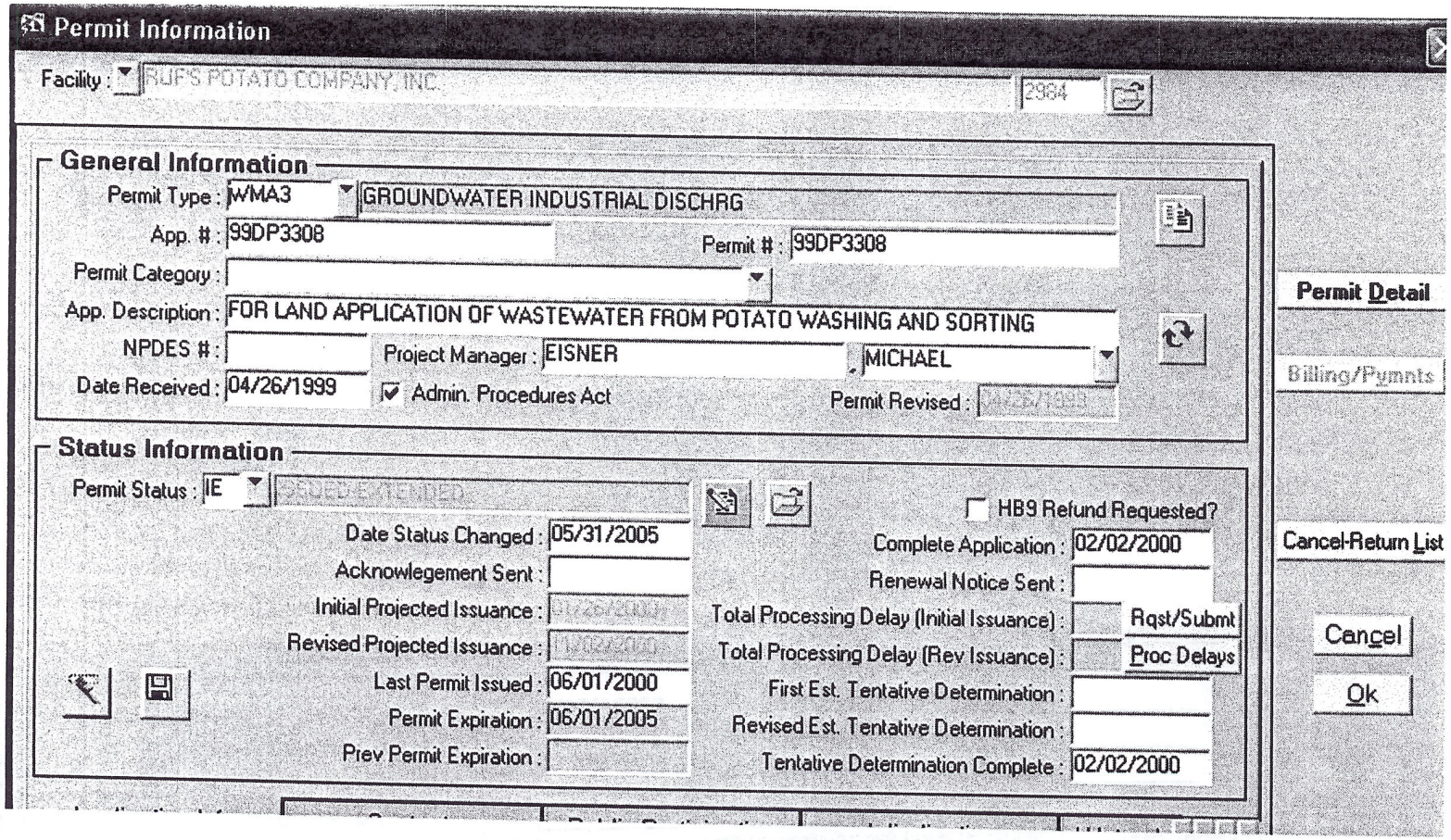
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NPDES # :
Project Manager : EISNER
MICHAEL
Date Received : 04/26/1999
Admin. Procedures Act
Permit Revised :
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Billing/Pymnts
Status Information
Permit Status : IE
ISSUED EXTENDED
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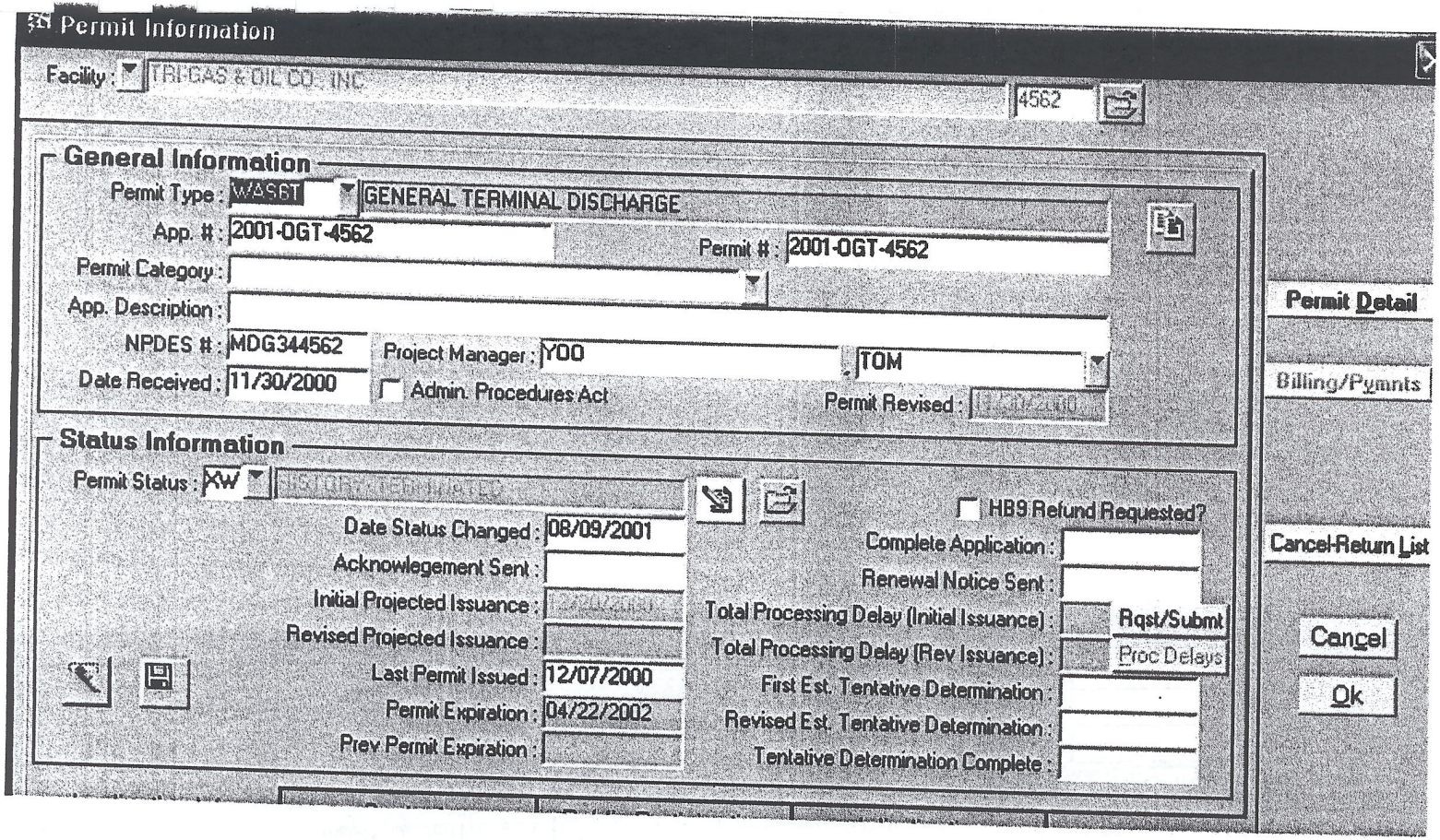
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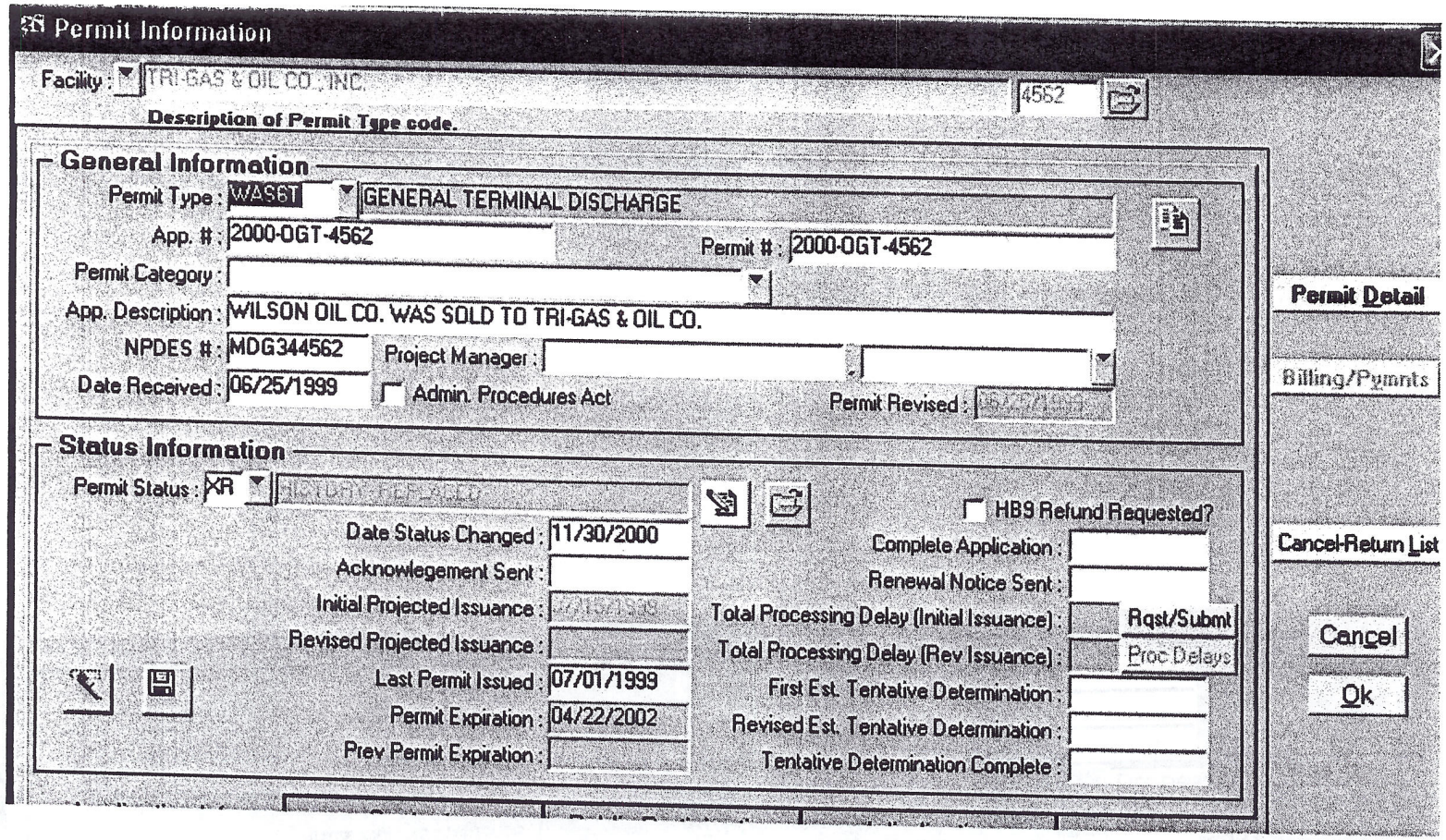
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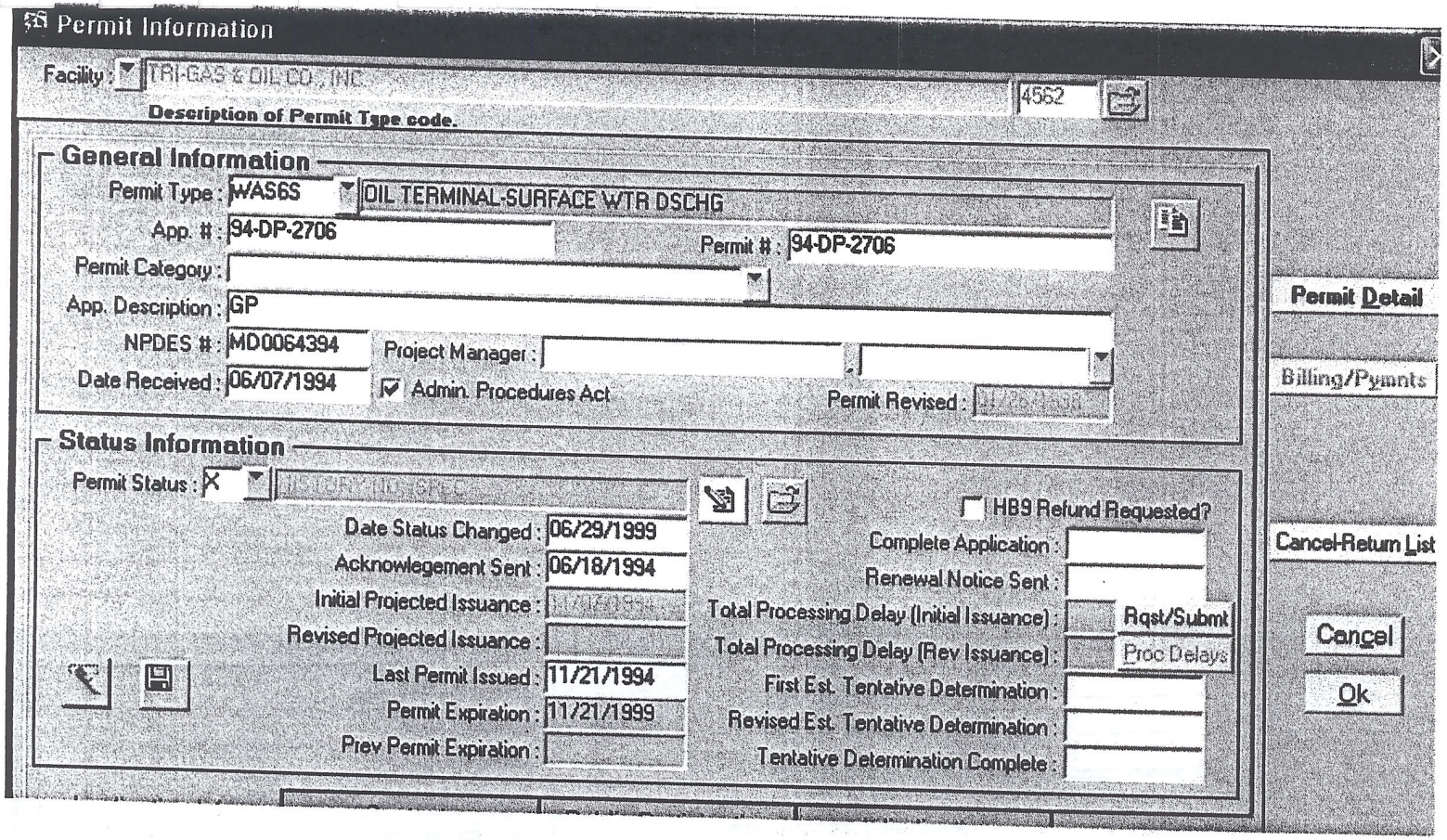
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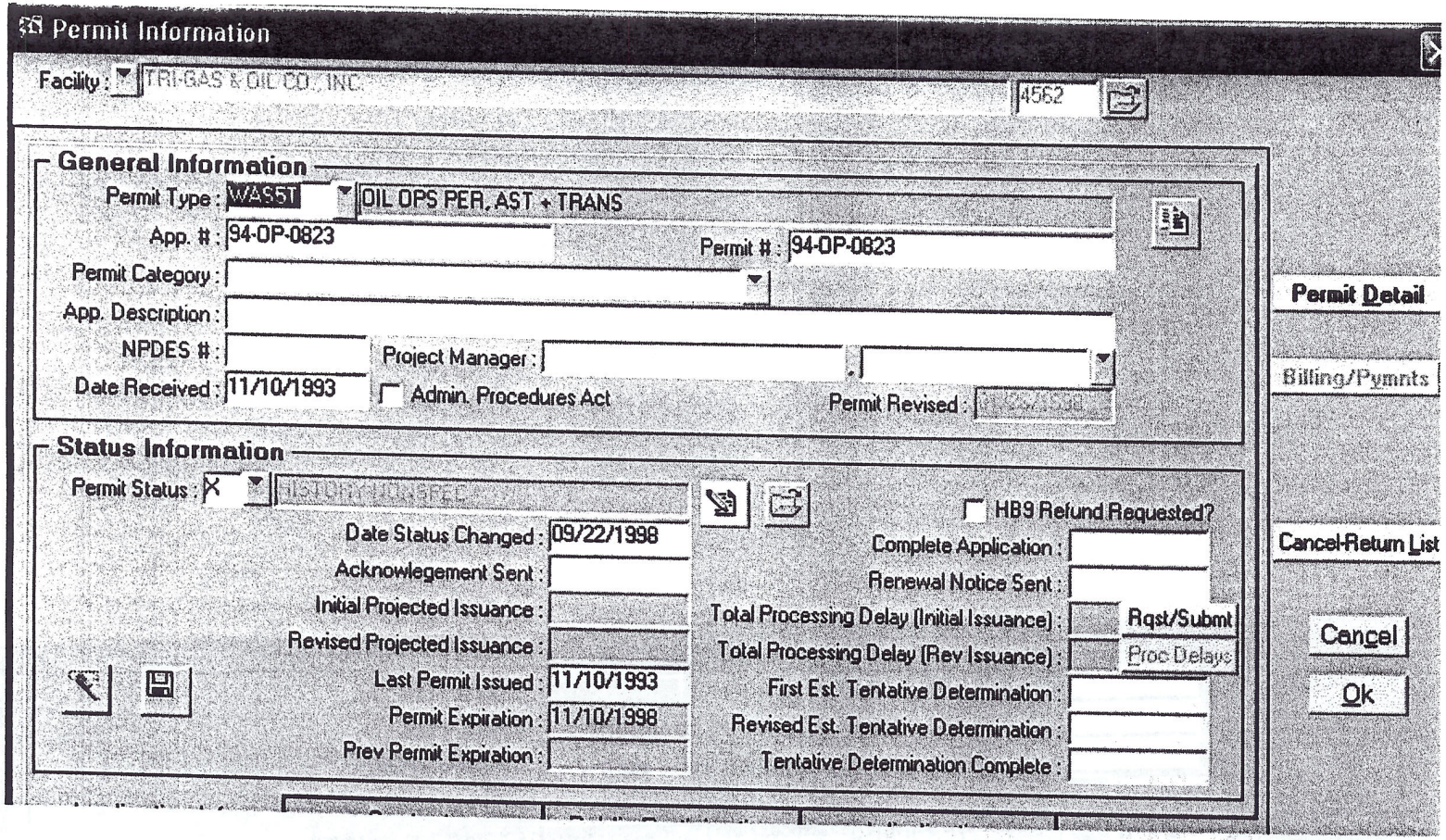
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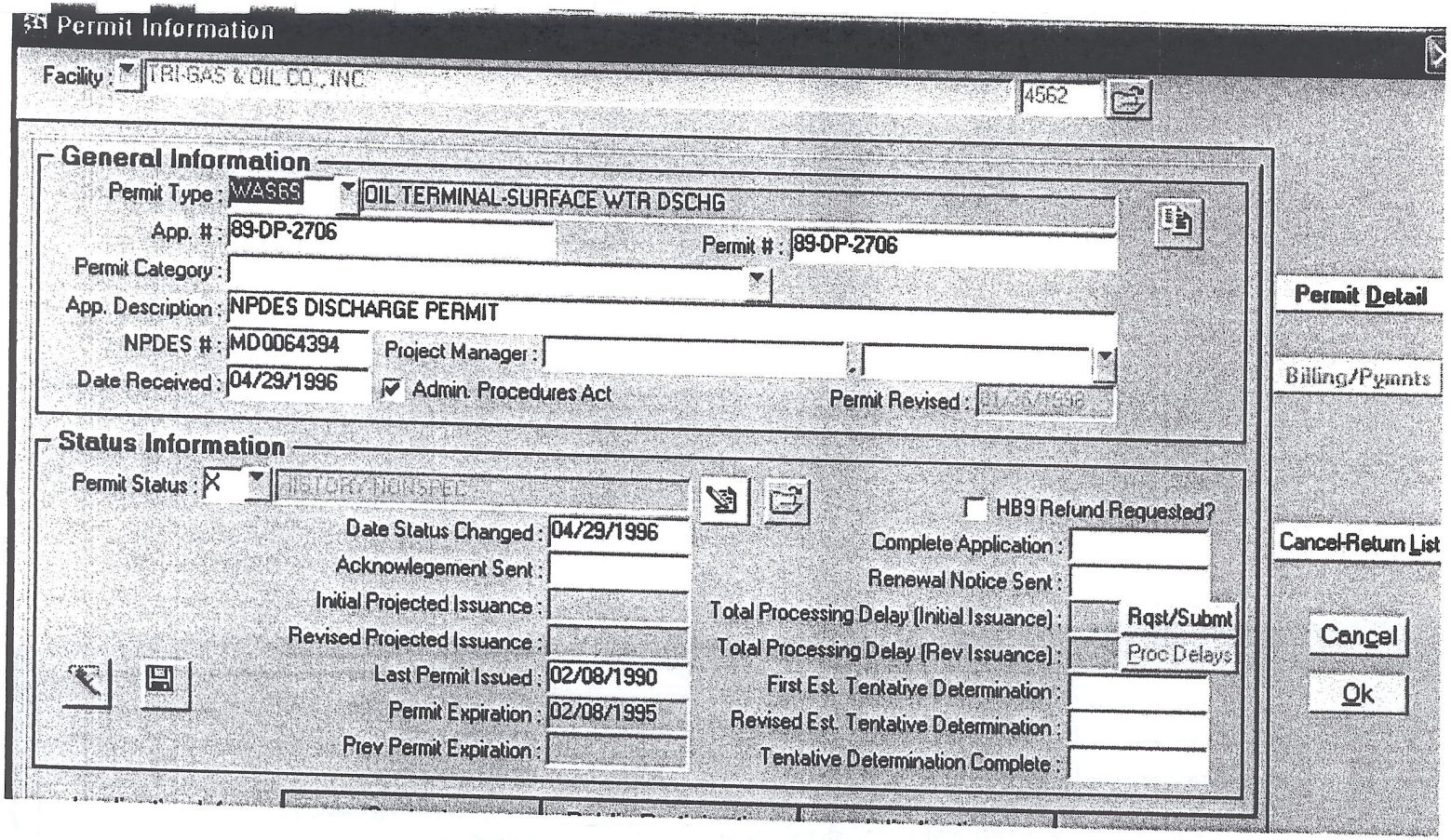
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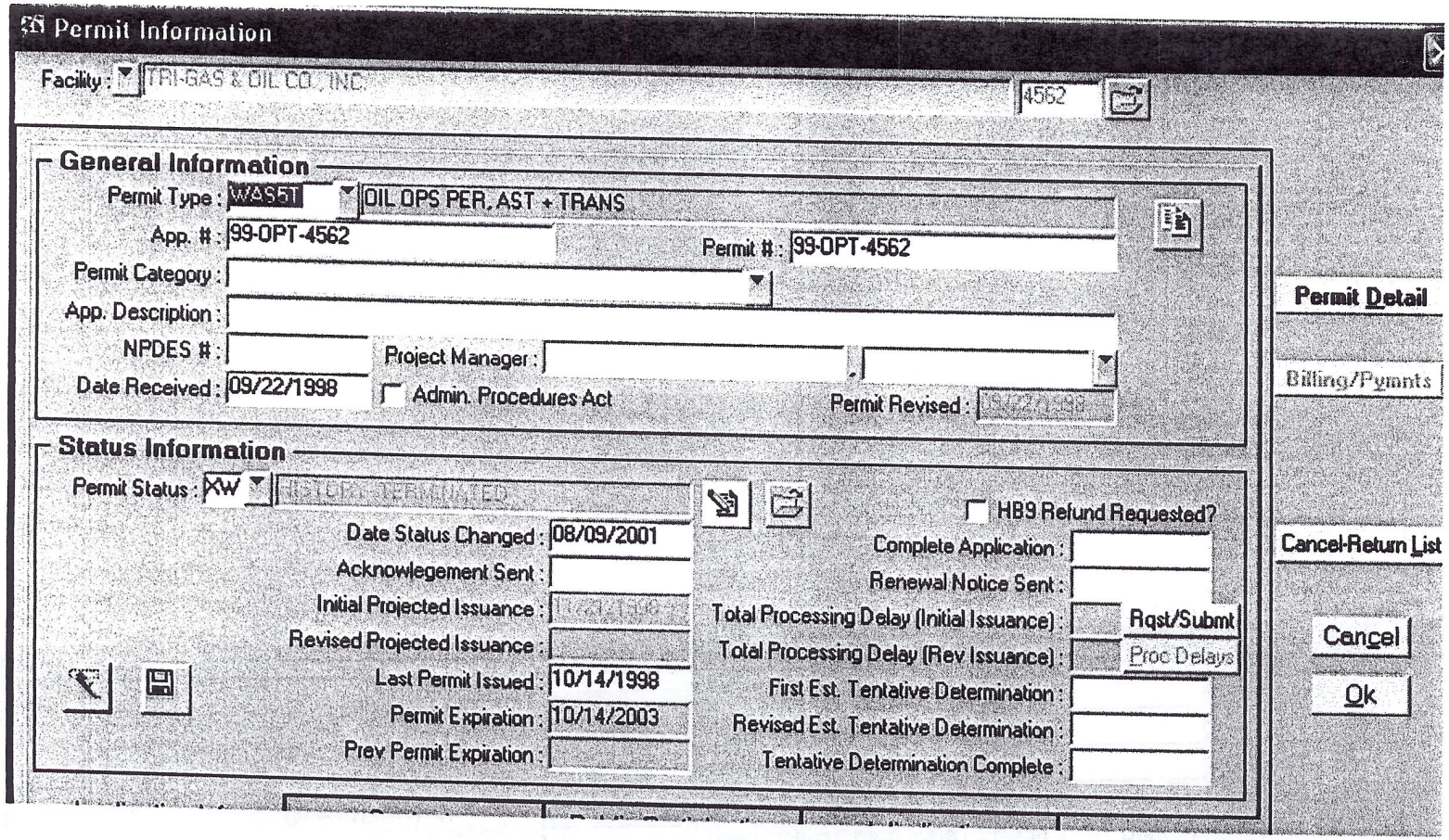
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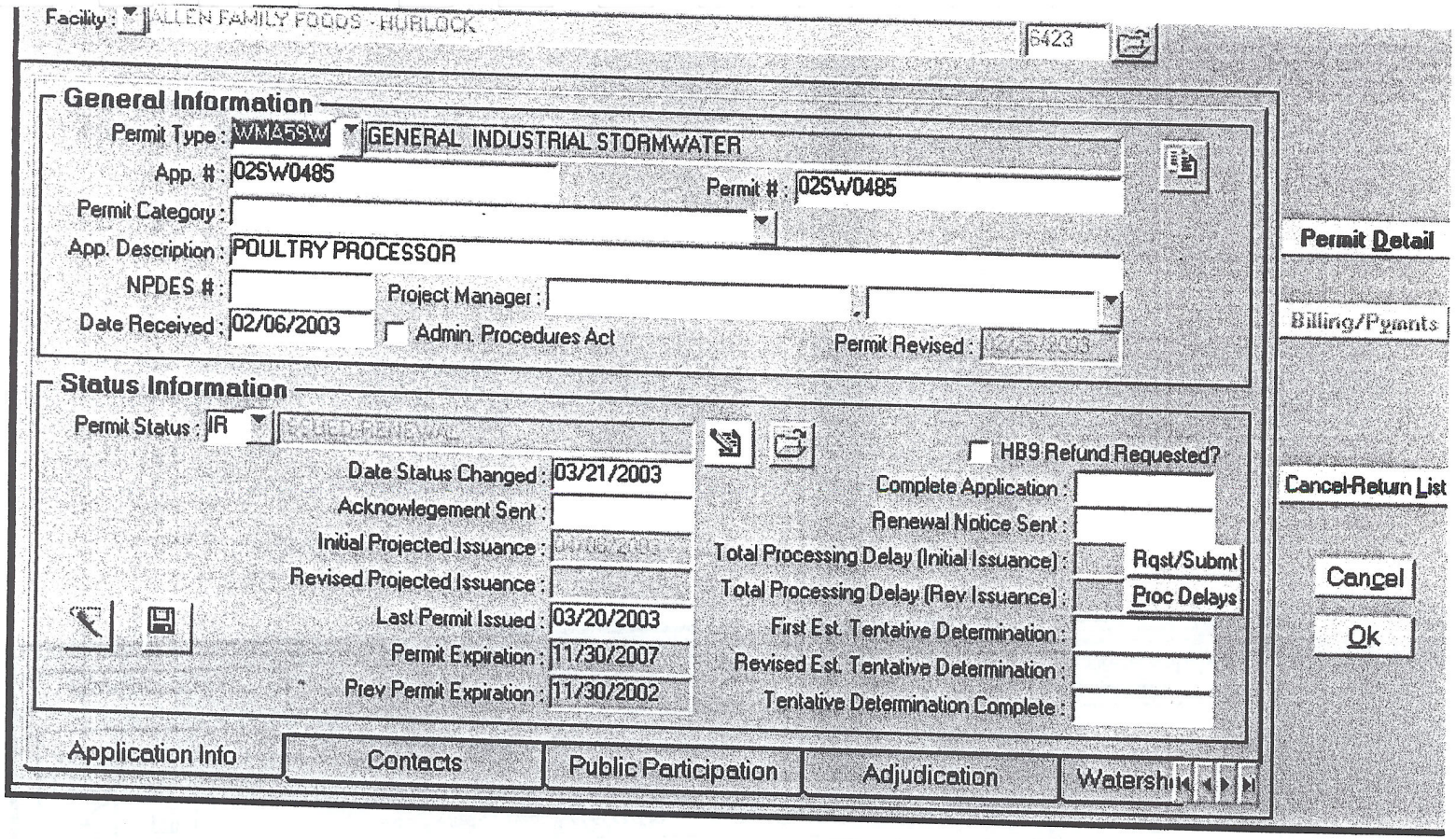
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Adjudication
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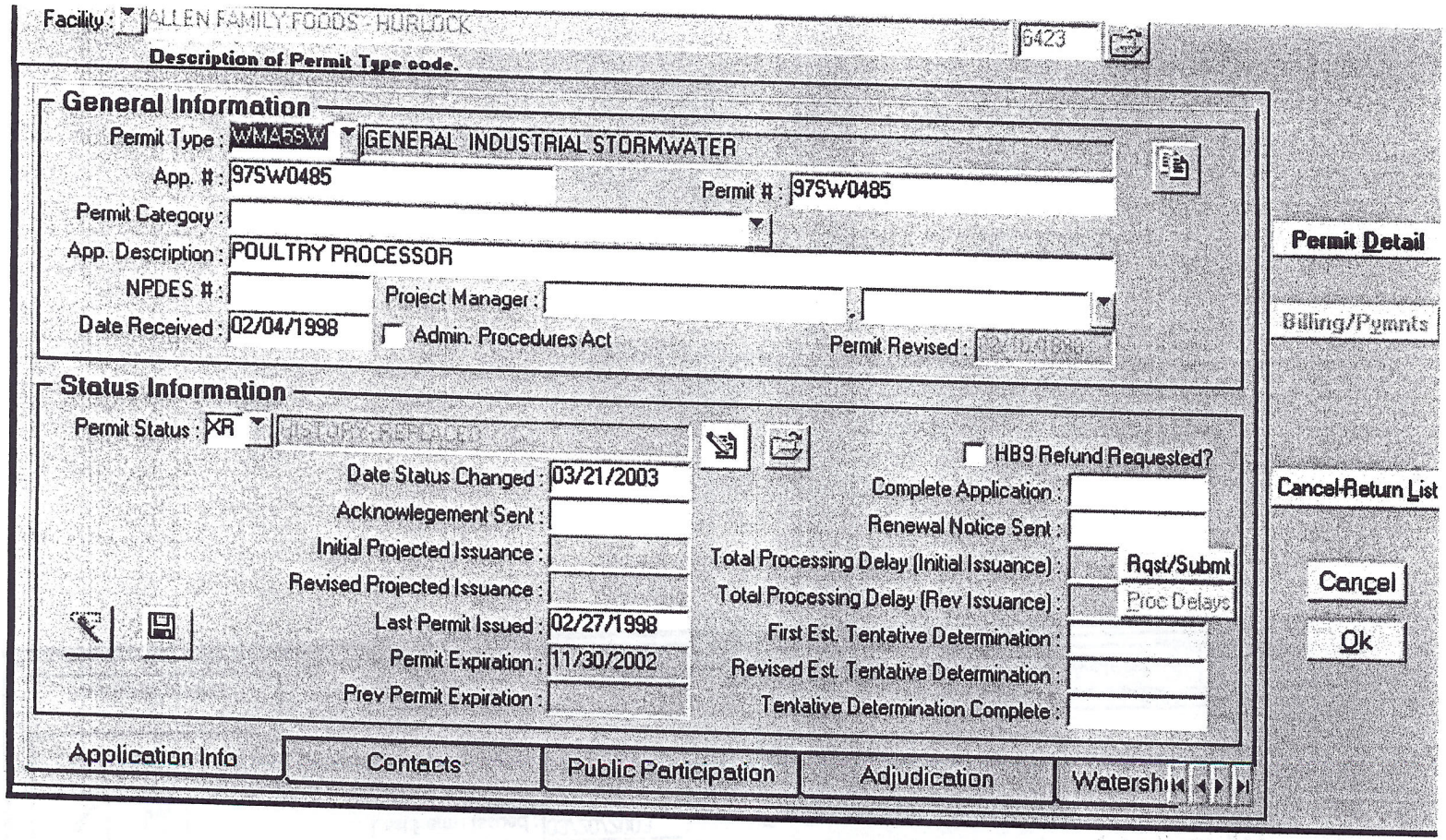
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Project Manager :
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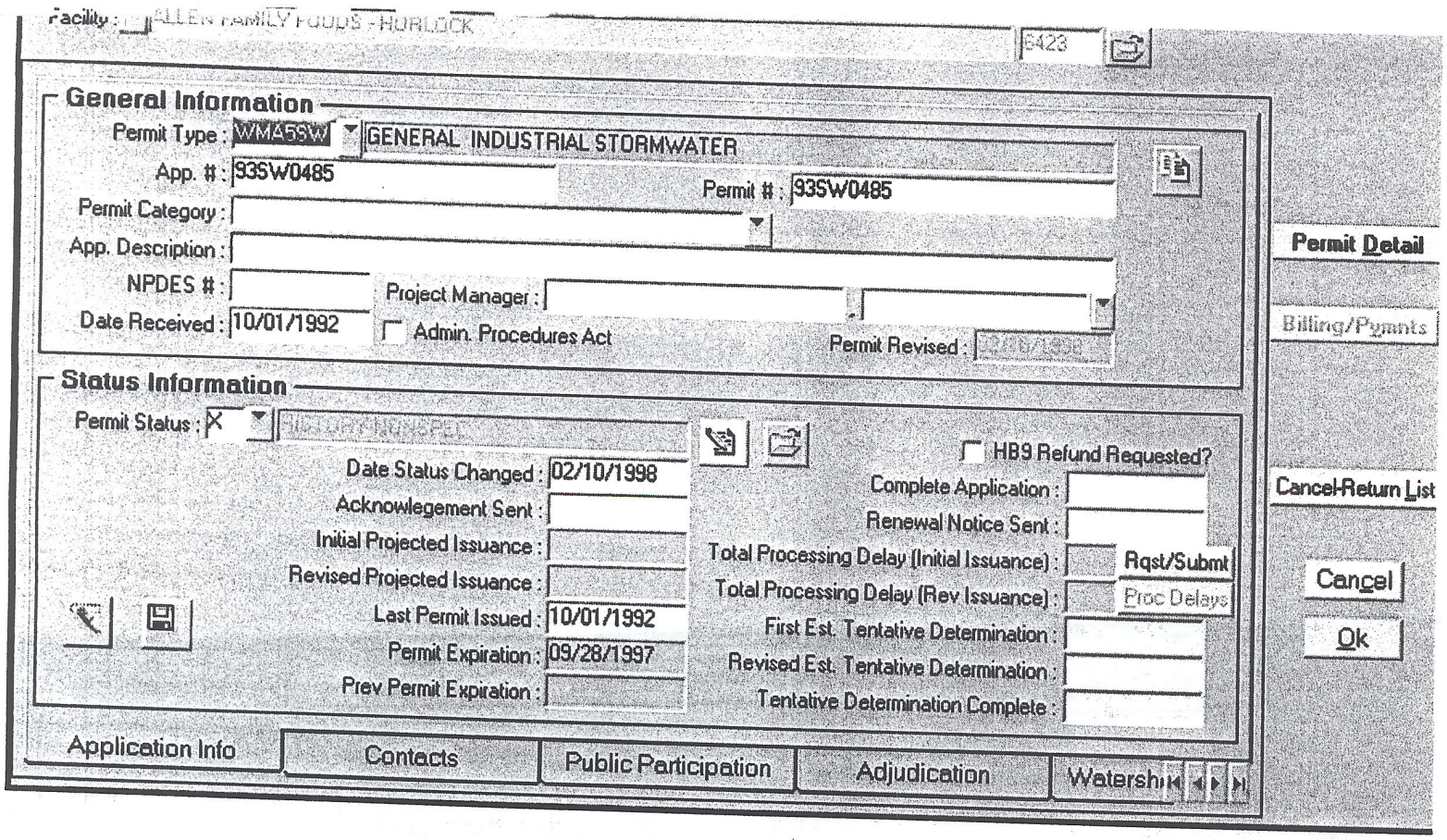
Contacts
Public Participation
Adjudication
Watershi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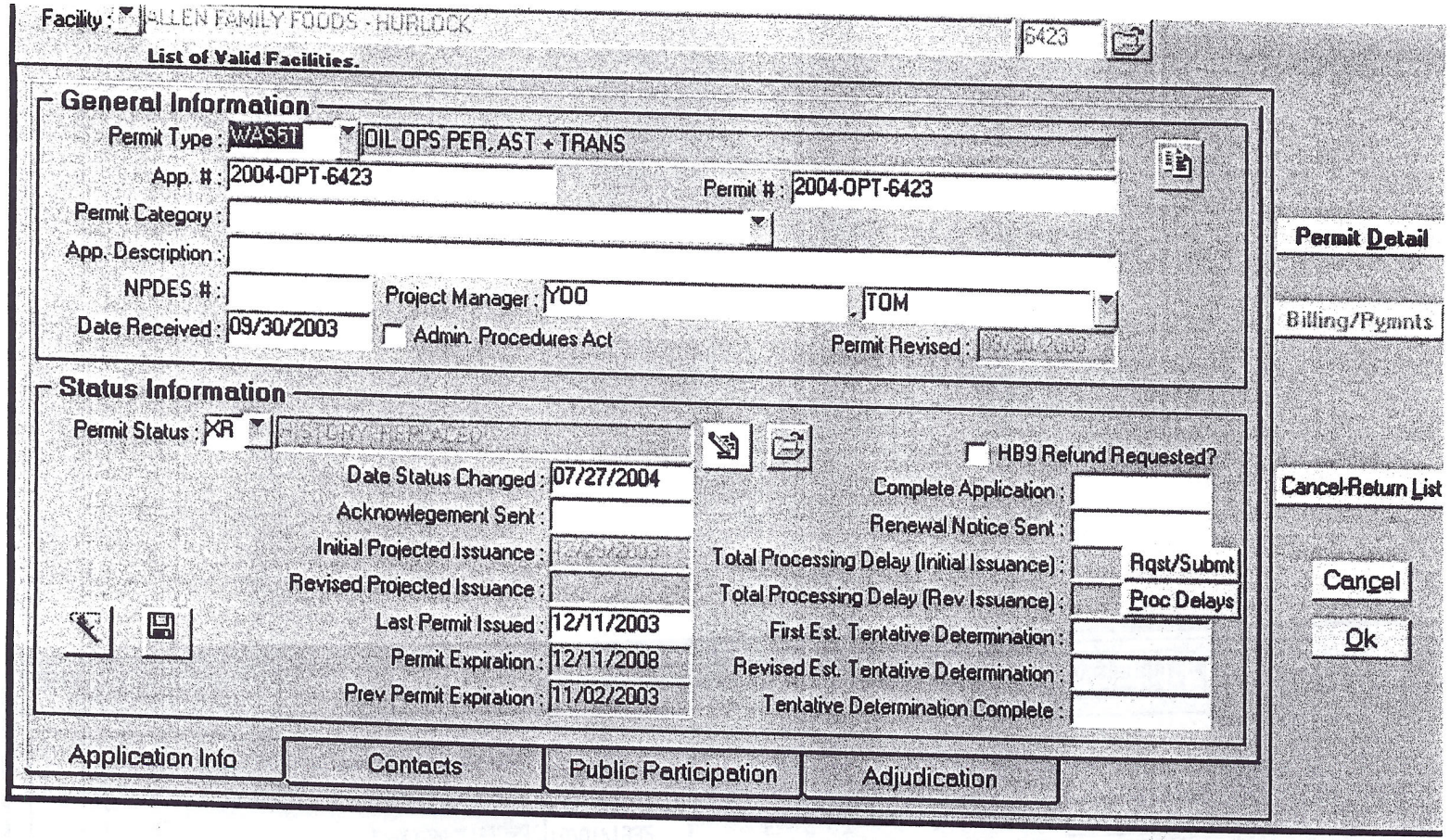
Public Participation
Adjudication
Watersh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ALLEN FAMILY FOODS - HURLOCK
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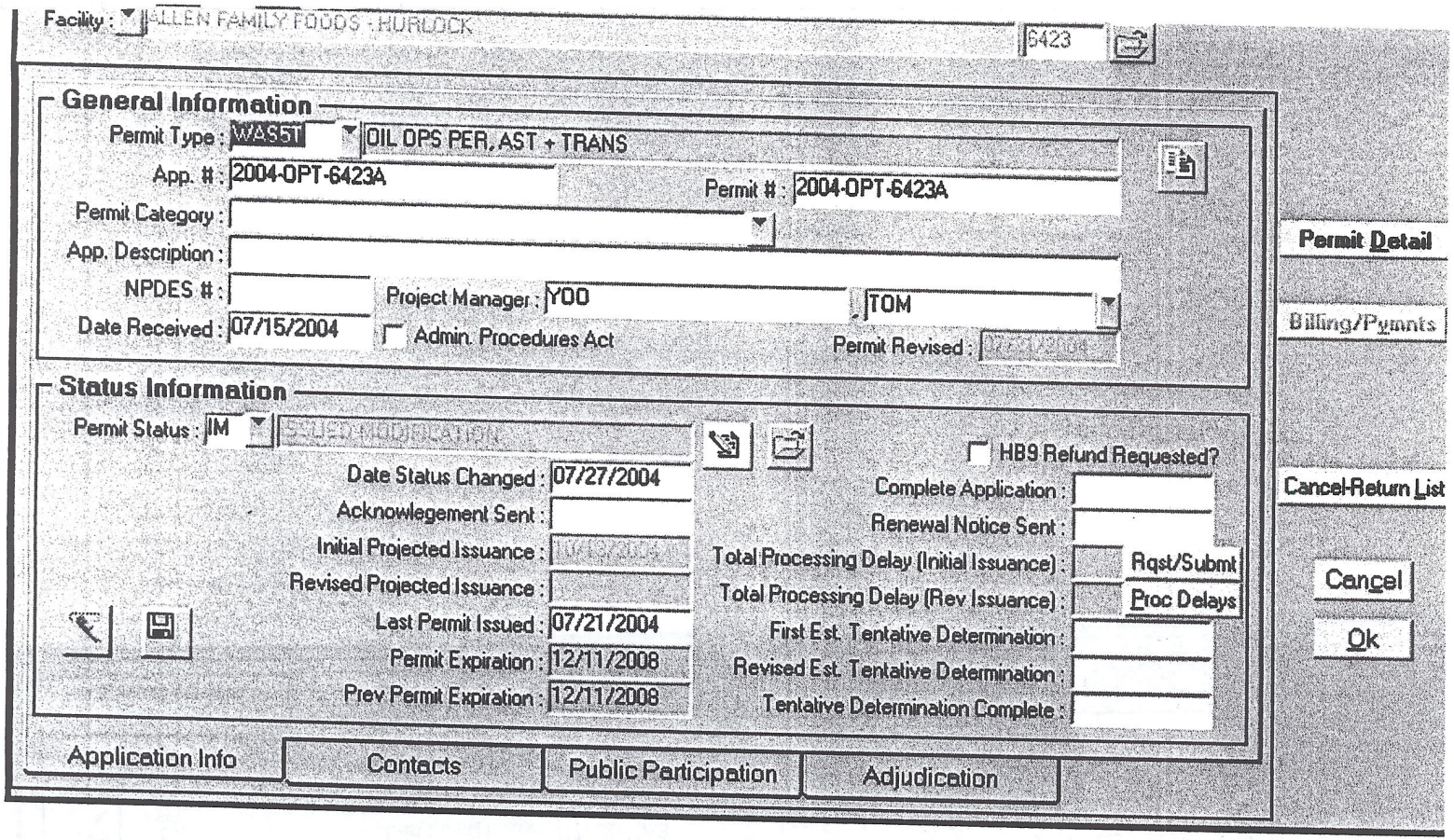
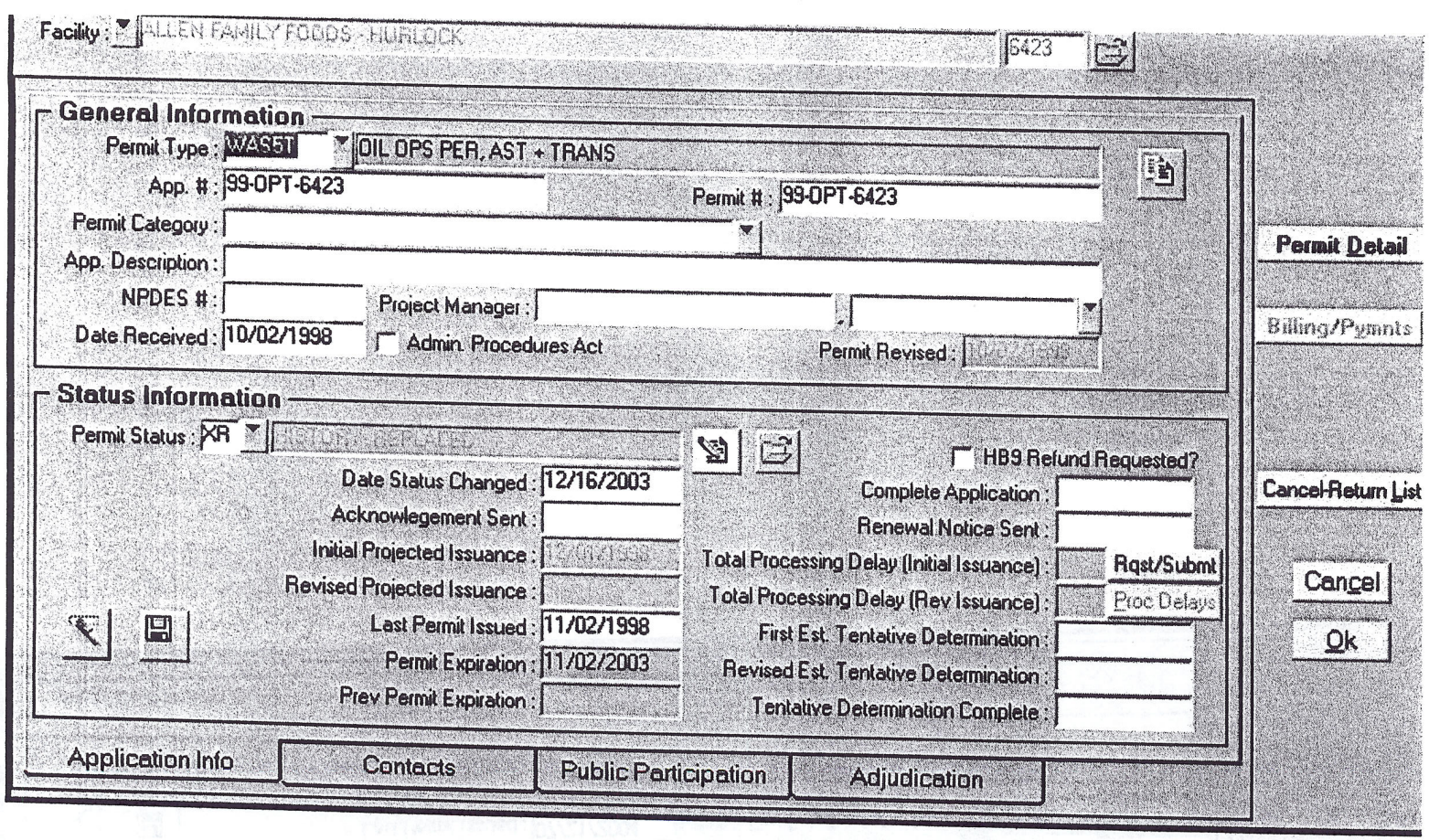
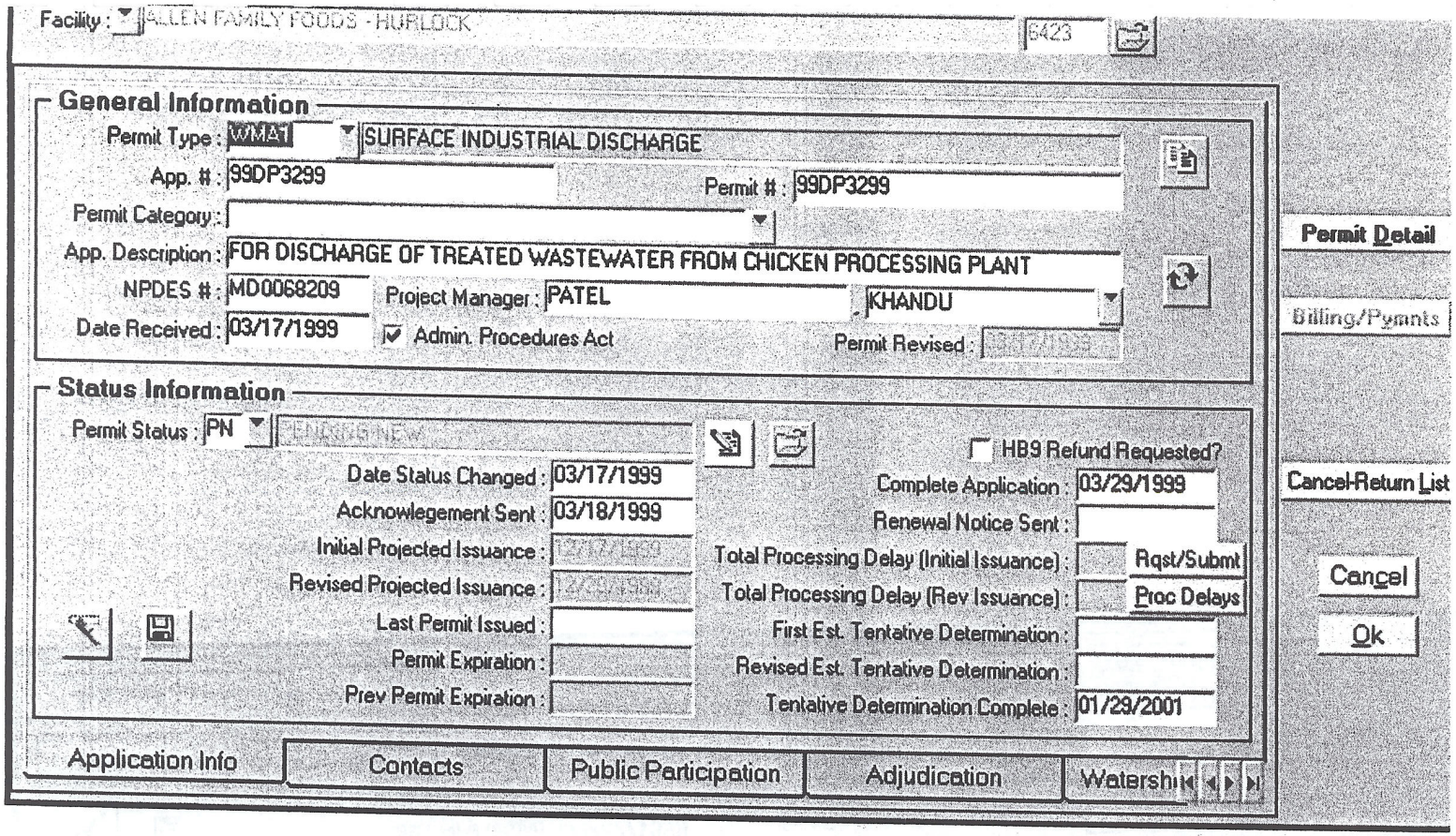
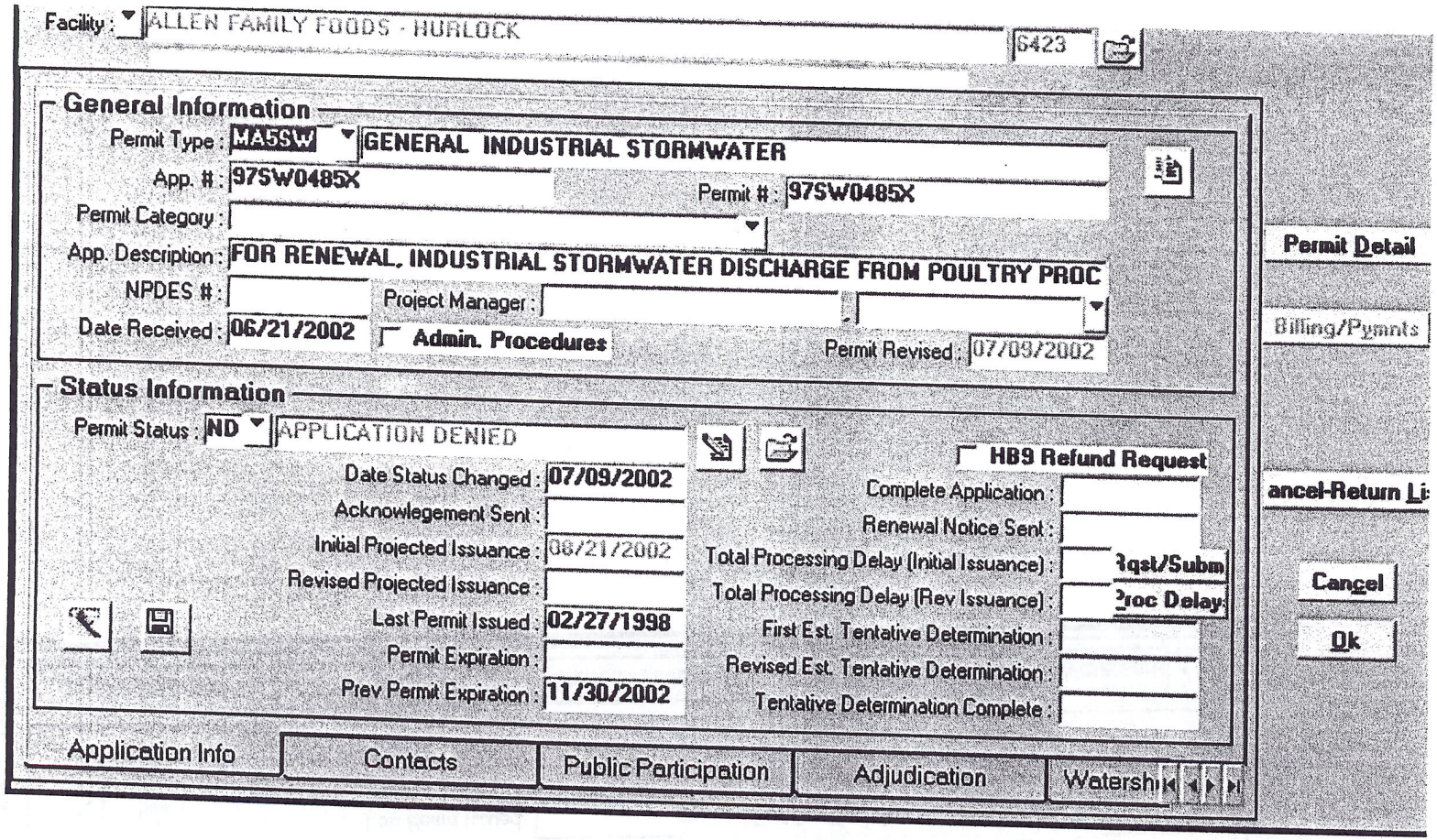
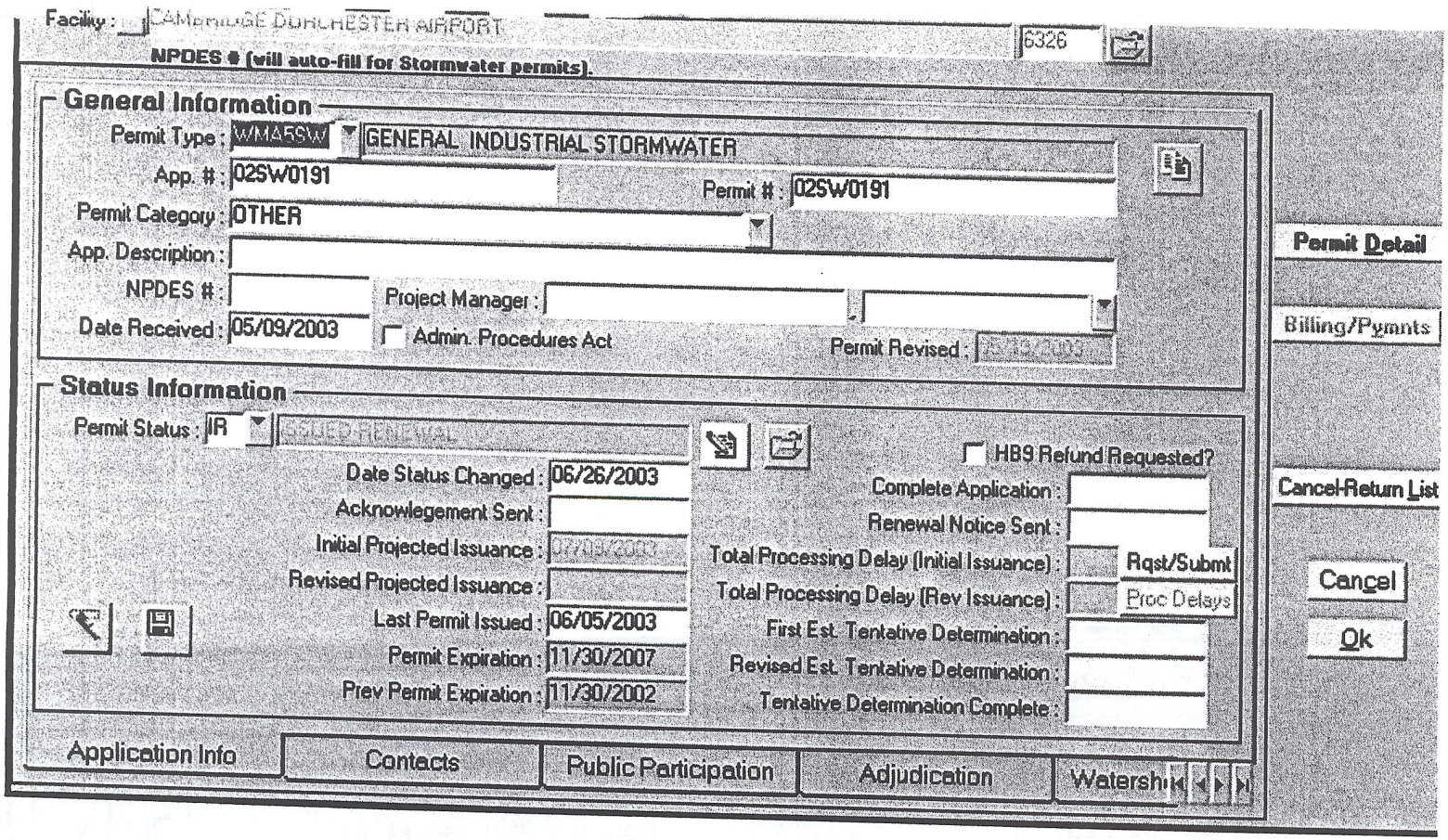
Permit # : 2004-OPT-6423
Permit Category :
App. Description :
NPDES # :
Project Manager : YOO
TOM
Date Received : 09/30/2003
Admin. Procedures Act
Permit Revised :
Permit Detail
Billing/Pymnts
Status Information
Permit Status : XR
HB9 Refund Requested?
Date Status Changed : 07/27/2004
Acknowlegement Sent :
Initial Projected Issuance :
Revised Projected Issuance :
Last Permit Issued : 12/11/2003
Permit Expiration : 12/11/2008
Prev Permit Expiration : 11/02/2003
Complete Application :
Renewal Notice Sent :
Total Processing Delay (Initial Issuance) :
Rqst/Submt
Total Processing Delay (Rev Issuance) :
Proc Delays
First Est. Tentative Determination :
Revised Est. Tentative Determination :
Tentative Determination Complete :
Cancel-Return List
Cancel
Ok
Application Info
Contacts
Public Participation
Adjudication

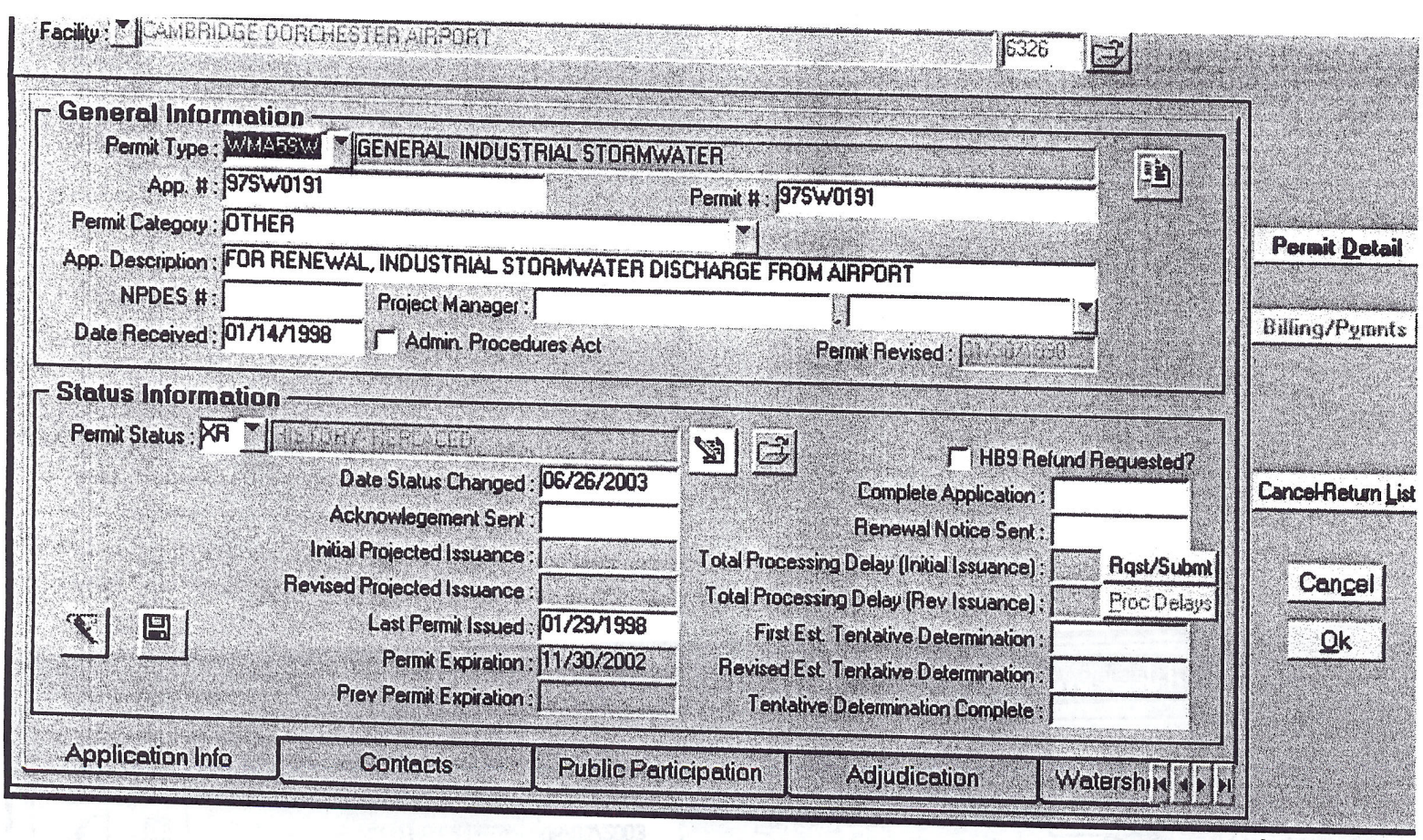

Facility : ALLEN FAMILY FOODS - HURLOCK
6423
General Information
Permit Type : WASST OIL DPS PER, AST + TRANS
App. # : 2004-OPT-6423A
Permit # : 2004-OPT-6423A
Permit Category :
App. Description :
NPDES # :
Project Manager : YOO TOM
Date Received : 07/15/2004
Admin. Procedures Act
Permit Revised :
Permit Detail
Billing/Pymnts
Status Information
Permit Status : IM
HB9 Refund Requested?
Date Status Changed : 07/27/2004
Complete Application :
Acknowlegement Sent :
Renewal Notice Sent :
Initial Projected Issuance :
Total Processing Delay (Initial Issuance) :
Rqst/Submt
Revised Projected Issuance :
Total Processing Delay (Rev Issuance) :
Proc Delays
Last Permit Issued : 07/21/2004
First Est. Tentative Determination :
Permit Expiration : 12/11/2008
Revised Est. Tentative Determination :
Prev Permit Expiration : 12/11/2008
Tentative Determination Complete :
Cancel-Return List
Cancel
Ok
Application Info
Contacts
Public Participation
Adjudication

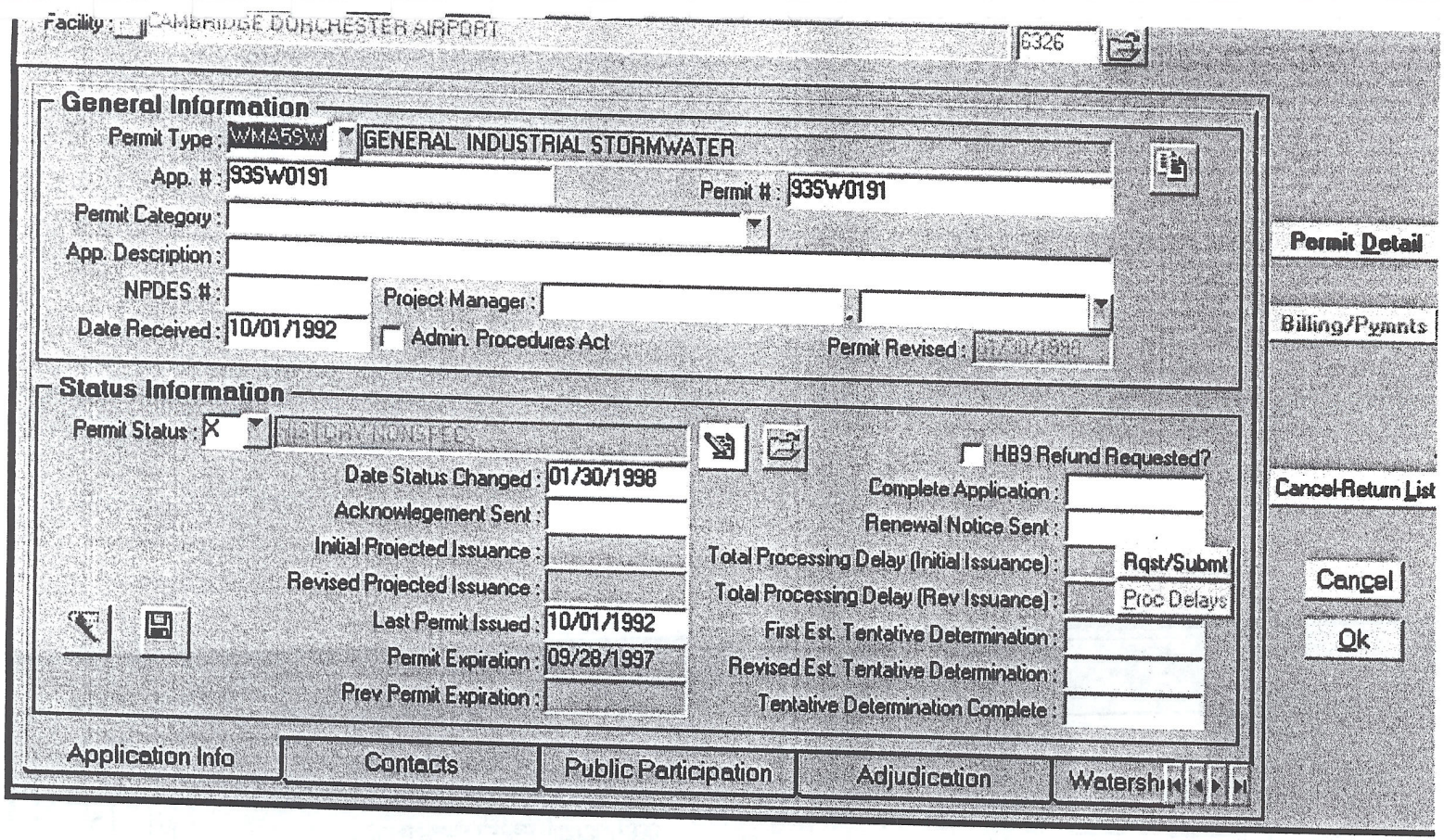

Facility :
ALLEN FAMILY FOODS - HURLOCK
6423
General Information
Permit Type :
WAS5T
OIL OPS PER, AST + TRANS
App. # :
99-OPT-6423
Permit # :
99-OPT-6423
Permit Category :
App. Description :
NPDES # :
Project Manager :
Date Received :
10/02/1998
Admin. Procedures Act
Permit Revised :
Permit Detail
Billing/Pymnts
Status Information
Permit Status :
XR
HISTORY, REPLACED
HB9 Refund Requested?
Date Status Changed :
12/16/2003
Complete Application :
Acknowlegement Sent :
Renewal Notice Sent :
Initial Projected Issuance :
Total Processing Delay (Initial Issuance) :
Rqst/Submt
Revised Projected Issuance :
Total Processing Delay (Rev Issuance) :
Proc Delays
Last Permit Issued :
11/02/1998
First Est. Tentative Determination :
Permit Expiration :
11/02/2003
Revised Est. Tentative Determination :
Prev Permit Expiration :
Tentative Determination Complete :
Cancel-Return List
Cancel
Ok
Application Info
Contacts
Public Participation
Adjudication

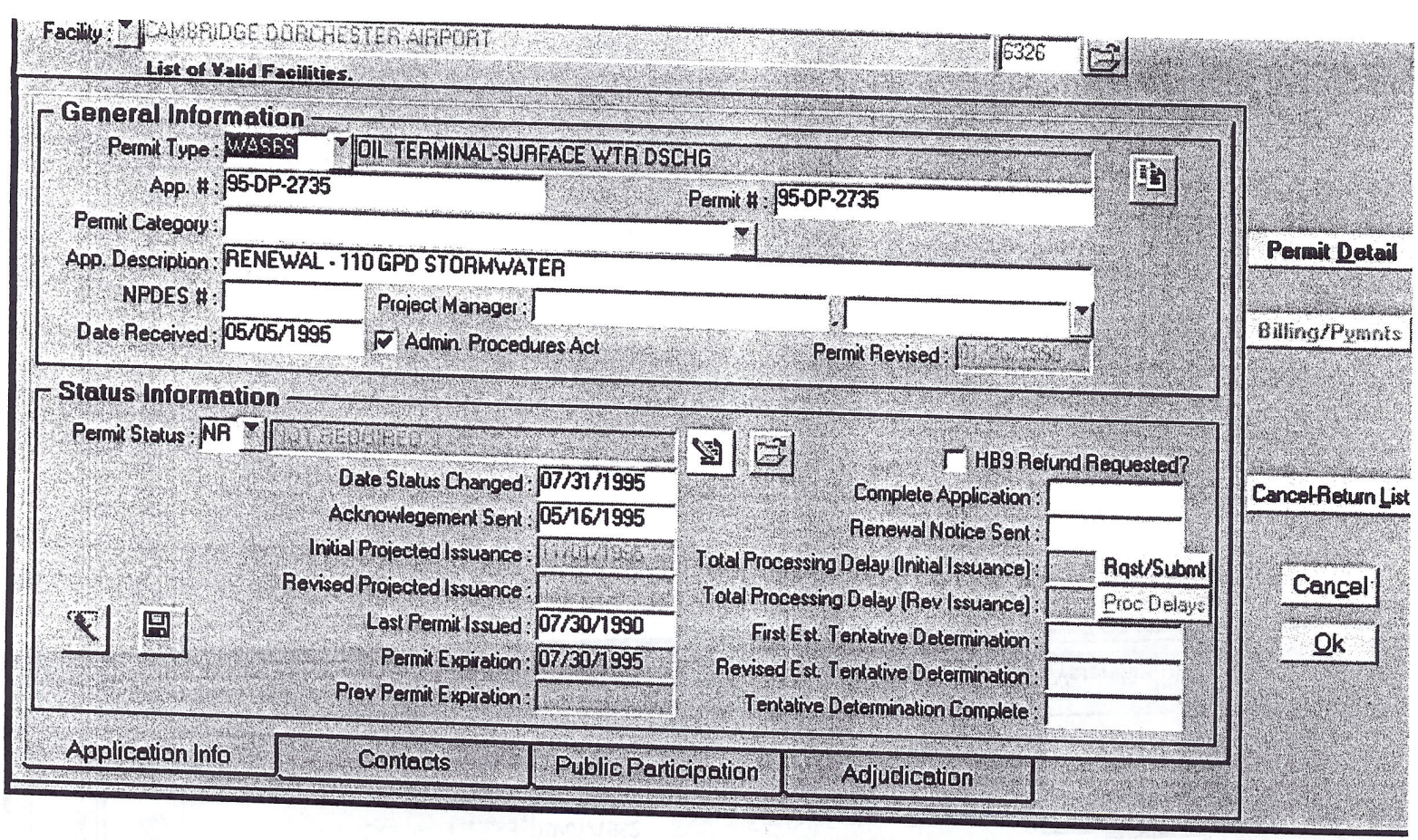

Facility : ALLEN FAMILY FOODS - HURLOCK
5423
General Information
Permit Type : WMAT SURFACE INDUSTRIAL DISCHARGE
App. # : 99DP3299
Permit # : 99DP3299
Permit Category :
App. Description : FOR DISCHARGE OF TREATED WASTEWATER FROM CHICKEN PROCESSING PLANT
NPDES # : MD0068209
Project Manager : PATEL KHANDU
Date Received : 03/17/1999
Admin. Procedures Act
Permit Revised :
Permit Detail
Billing/Pymnts
Status Information
Permit Status : PN PENDING NEW
HB9 Refund Requested?
Date Status Changed : 03/17/1999
Acknowlegement Sent : 03/18/1999
Initial Projected Issuance :
Revised Projected Issuance :
Last Permit Issued :
Permit Expiration :
Prev Permit Expiration :
Complete Application : 03/29/1999
Renewal Notice Sent :
Total Processing Delay (Initial Issuance) :
Rqst/Submt
Total Processing Delay (Rev Issuance) :
Proc Delays
First Est. Tentative Determination :
Revised Est. Tentative Determination :
Tentative Determination Complete : 01/29/2001
Cancel-Return List
Cancel
Ok
Application Info
Contacts
Public Participation
Adjudication
Watershi

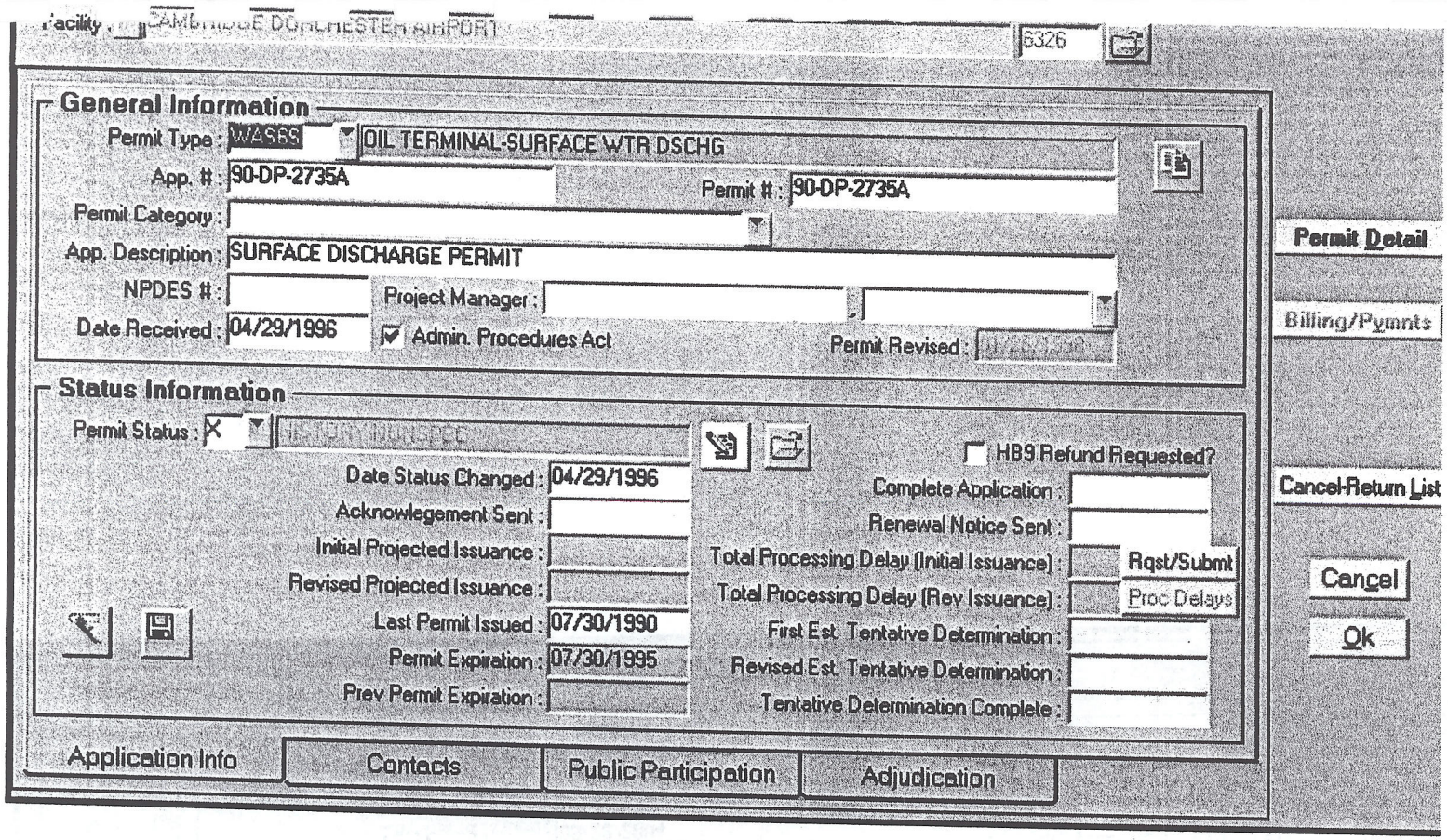

Facility : ALLEN FAMILY FOODS - HURLOCK
6423
General Information
Permit Type : MA5SW GENERAL INDUSTRIAL STORMWATER
App. # : 97SW0485X
Permit # : 97SW0485X
Permit Category :
App. Description : FOR RENEWAL, INDUSTRIAL STORMWATER DISCHARGE FROM POULTRY PROC
NPDES # :
Project Manager :
Date Received : 06/21/2002
Admin. Procedures
Permit Revised : 07/09/2002
Status Information
Permit Status : ND APPLICATION DENIED
Date Status Changed : 07/09/2002
Acknowlegement Sent :
Initial Projected Issuance : 08/21/2002
Revised Projected Issuance :
Last Permit Issued : 02/27/1998
Permit Expiration :
Prev Permit Expiration : 11/30/2002
HB9 Refund Request
Complete Application :
Renewal Notice Sent :
Total Processing Delay (Initial Issuance) :
Total Processing Delay (Rev Issuance) :
First Est. Tentative Determination :
Revised Est. Tentative Determination :
Tentative Determination Complete :
Application Info
Contacts
Public Participation
Adjudication
Watersh
Permit Detail
Billing/Pymnts
ancel-Return Li
Cancel
Ok

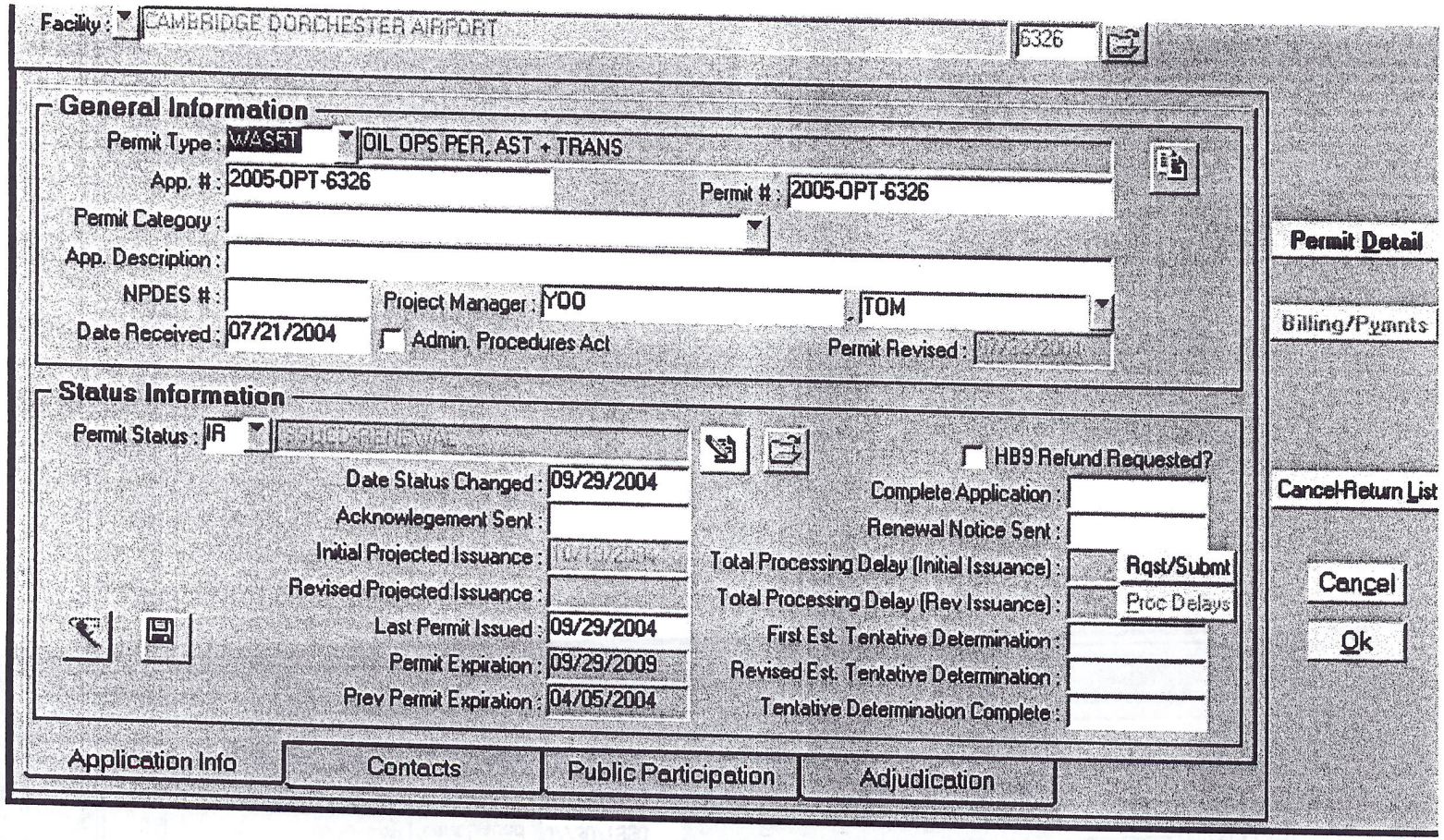

Facility :
CAMBRIDGE DORCHESTER AIRPORT
6326
NPDES # (will auto-fill for Stormwater permits).
General Information
Permit Type :
MMASW
GENERAL INDUSTRIAL STORMWATER
App. # :
02SW0191
Permit # :
02SW0191
Permit Category :
OTHER
App. Description :
NPDES # :
Project Manager :
Date Received :
05/09/2003
Admin. Procedures Act
Permit Revised :
Status Information
Permit Status :
IR
ISSUED RENEWAL
HB9 Refund Requested?
Date Status Changed :
06/26/2003
Complete Application :
Acknowlegement Sent :
Renewal Notice Sent :
Initial Projected Issuance :
Total Processing Delay (Initial Issuance) :
Rqst/Submt
Revised Projected Issuance :
Total Processing Delay (Rev Issuance) :
Proc Delays
Last Permit Issued :
06/05/2003
First Est. Tentative Determination :
Permit Expiration :
11/30/2007
Revised Est. Tentative Determination :
Prev Permit Expiration :
11/30/2002
Tentative Determination Complete :
Application Info
Contacts
Public Participation
Adjudication
Watersh
Permit Detail
Billing/Pymnts
Cancel-Return List
Cancel
Ok

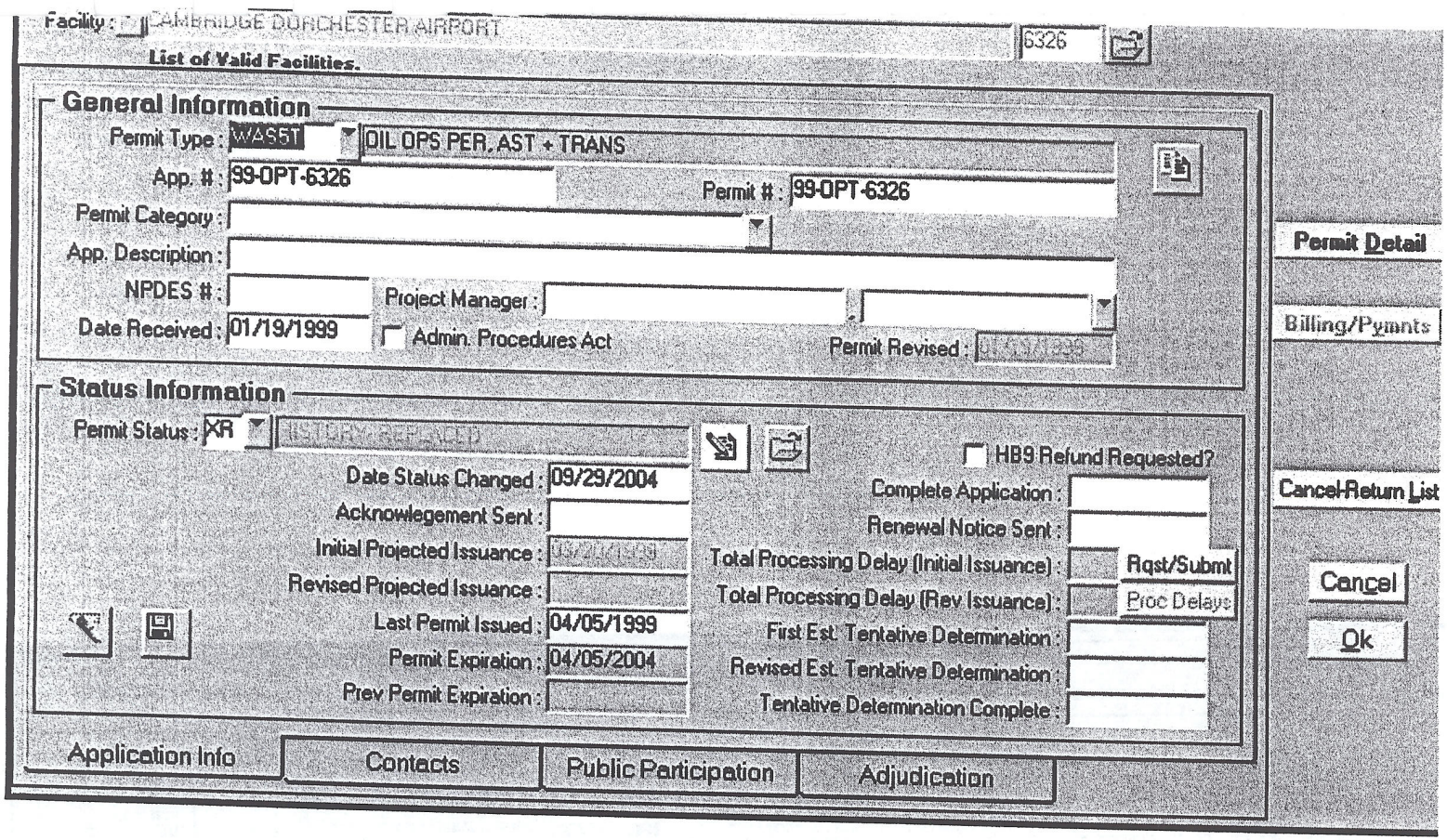

Facility : CAMBRIDGE DORCHESTER AIRPORT
6326
General Information
Permit Type : WMASSW GENERAL INDUSTRIAL STORMWATER
App. # : 97SW0191
Permit # : 97SW0191
Permit Category : OTHER
App. Description : FOR RENEWAL, INDUSTRIAL STORMWATER DISCHARGE FROM AIRPORT
NPDES # :
Project Manager :
Date Received : 01/14/1998
Admin. Procedures Act
Permit Revised :
Permit Detail
Billing/Pymnts
Status Information
Permit Status : XR HISTORY REPLACED
HB9 Refund Requested?
Date Status Changed : 06/26/2003
Acknowlegement Sent :
Initial Projected Issuance :
Revised Projected Issuance :
Last Permit Issued : 01/29/1998
Permit Expiration : 11/30/2002
Prev Permit Expiration :
Complete Application :
Renewal Notice Sent :
Total Processing Delay (Initial Issuance) :
Rqst/Submt
Total Processing Delay (Rev Issuance) :
Proc Delays
First Est. Tentative Determination :
Revised Est. Tentative Determination :
Tentative Determination Complete :
Cancel-Return List
Cancel
Ok
Application Info
Contacts
Public Participation
Adjudication
Watersh

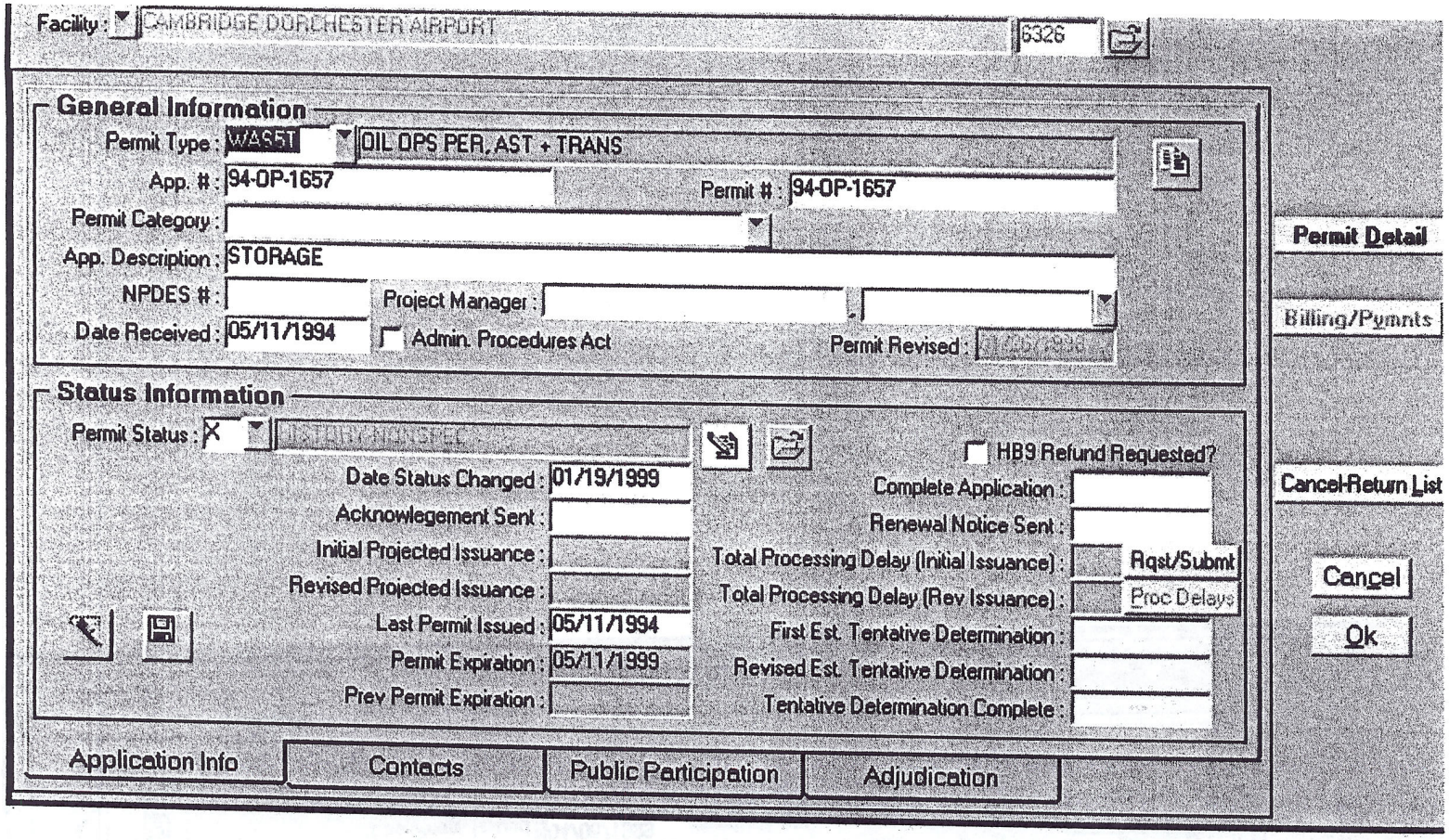

Facility : CAMBRIDGE DORCHESTER AIRPORT
6326
General Information
Permit Type : WMA9SW GENERAL INDUSTRIAL STORMWATER
App. # : 93SW0191
Permit # : 93SW0191
Permit Category :
App. Description :
NPDES # :
Project Manager :
Date Received : 10/01/1992
Admin. Procedures Act
Permit Revised :
Permit Detail
Billing/Pymnts
Status Information
Permit Status : X
HB9 Refund Requested?
Date Status Changed : 01/30/1998
Acknowlegement Sent :
Initial Projected Issuance :
Revised Projected Issuance :
Last Permit Issued : 10/01/1992
Permit Expiration : 09/28/1997
Prev Permit Expiration :
Complete Application :
Renewal Notice Sent :
Total Processing Delay (Initial Issuance) :
Rqst/Submt
Total Processing Delay (Rev Issuance) :
Proc Delays
First Est. Tentative Determination :
Revised Est. Tentative Determination :
Tentative Determination Complete :
Cancel-Return List
Cancel
Ok
Application Info
Contacts
Public Participation
Adjudication
Watersh

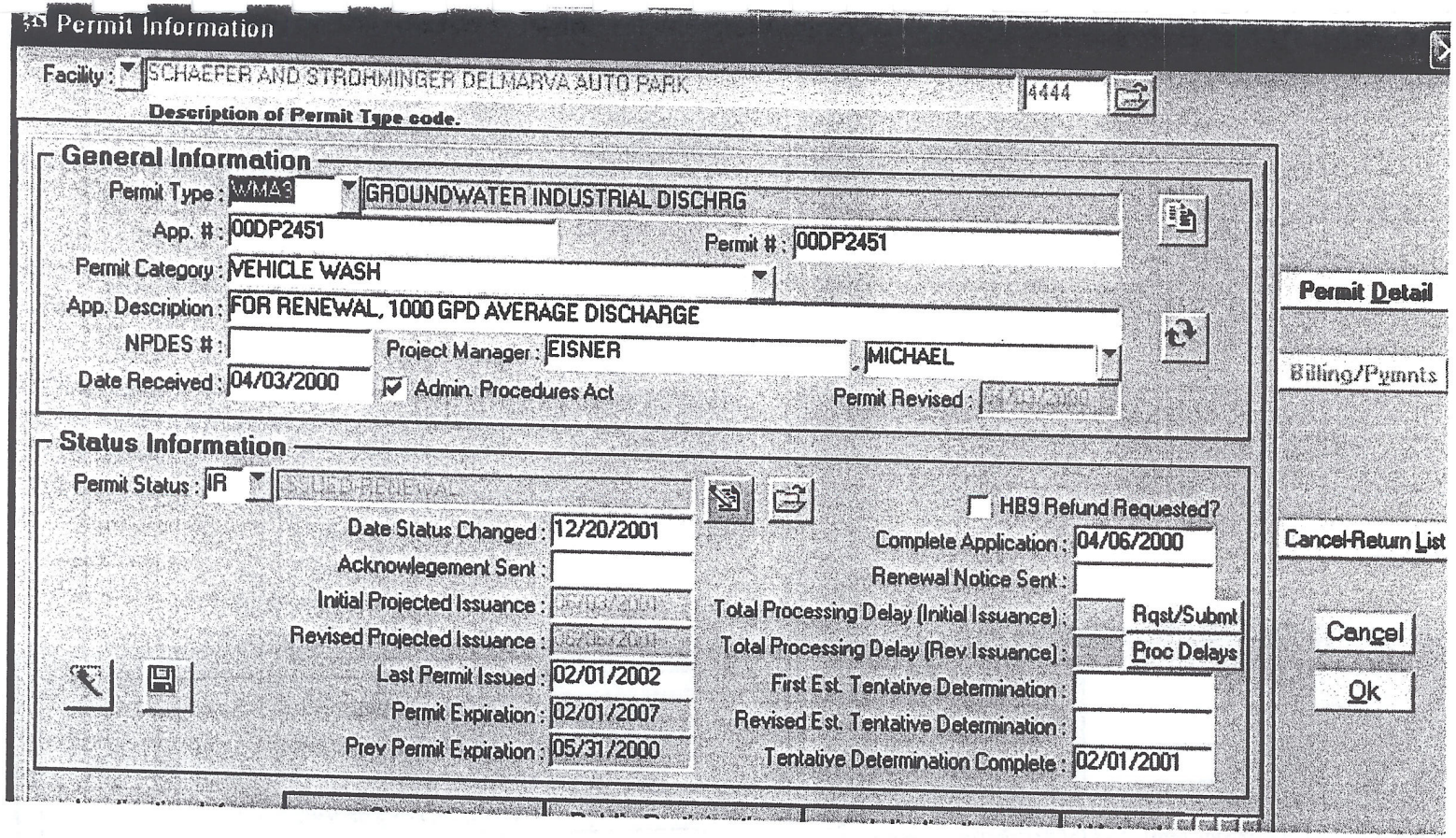

Facility :
CAMBRIDGE DORCHESTER AIRPORT
6326
List of Valid Facilities.
General Information
Permit Type :
WASES
OIL TERMINAL-SURFACE WTR DSCHG
App. # :
95-DP-2735
Permit # :
95-DP-2735
Permit Category :
App. Description :
RENEWAL - 110 GPD STORMWATER
NPDES # :
Project Manager :
Date Received :
05/05/1995
Admin. Procedures Act
Permit Revised :
Permit Detail
Billing/Pymnts
Status Information
Permit Status :
NR
NOT REQUIRED
HB9 Refund Requested?
Date Status Changed :
07/31/1995
Complete Application :
Acknowlegement Sent :
05/16/1995
Renewal Notice Sent :
Initial Projected Issuance :
Total Processing Delay (Initial Issuance) :
Rqst/Submt
Revised Projected Issuance :
Total Processing Delay (Rev Issuance) :
Proc Delays
Last Permit Issued :
07/30/1990
First Est. Tentative Determination :
Permit Expiration :
07/30/1995
Revised Est. Tentative Determination :
Prev Permit Expiration :
Tentative Determination Complete :
Cancel-Return List
Cancel
Ok
Application Info
Contacts
Public Participation
Adjudication

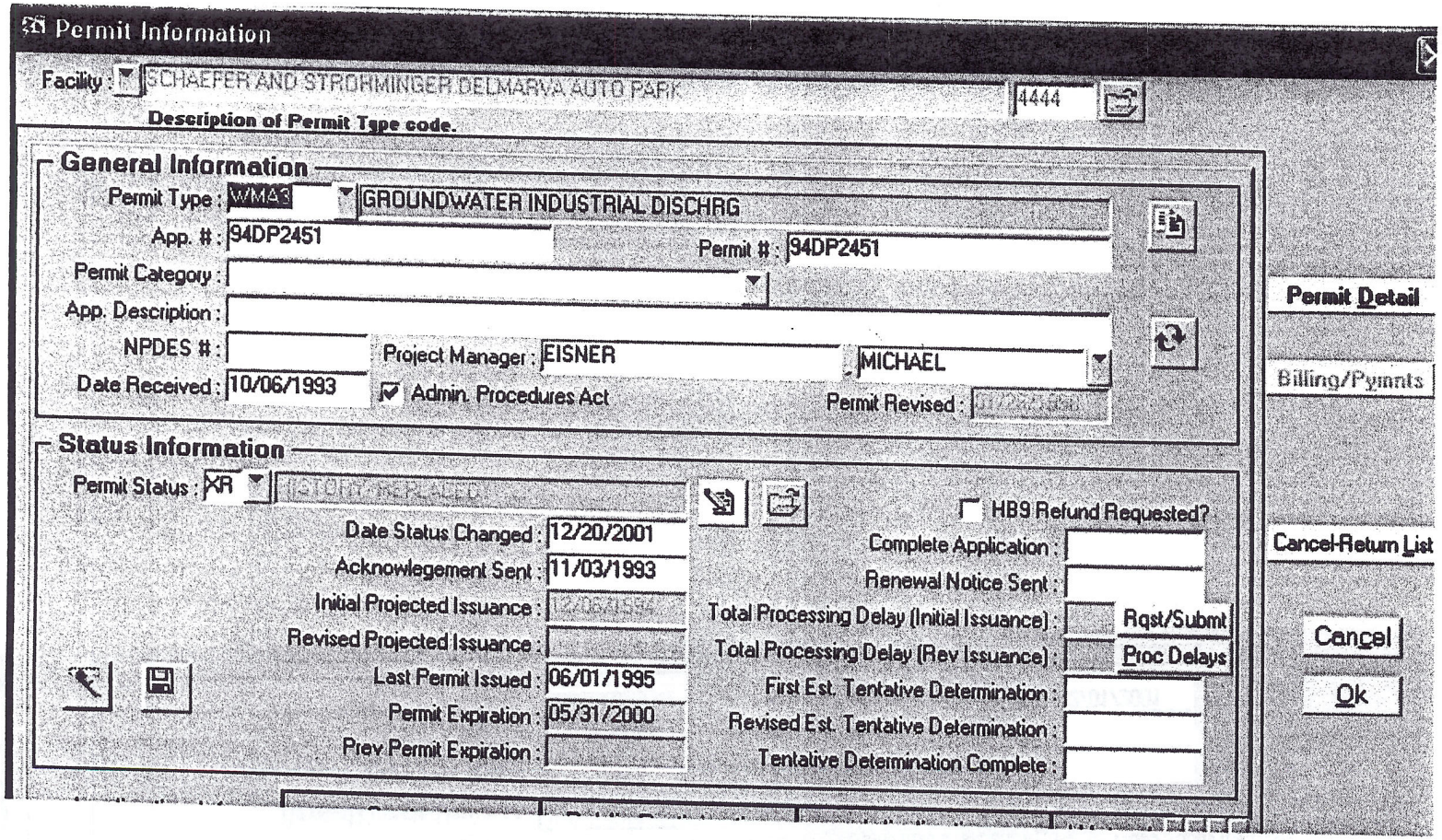

Facility :
6326
General Information
Permit Type :
OIL TERMINAL-SURFACE WTR DSCHG
App. # :
90-DP-2735A
Permit # :
90-DP-2735A
Permit Category :
App. Description :
SURFACE DISCHARGE PERMIT
NPDES # :
Project Manager :
Date Received :
04/29/1996
Admin. Procedures Act
Permit Revised :
Status Information
Permit Status :
Date Status Changed :
04/29/1996
Acknowlegement Sent :
Initial Projected Issuance :
Revised Projected Issuance :
Last Permit Issued :
07/30/1990
Permit Expiration :
07/30/1995
Prev Permit Expiration :
HB9 Refund Requested?
Complete Application :
Renewal Notice Sent :
Total Processing Delay (Initial Issuance) :
Rqst/Submt
Total Processing Delay (Rev Issuance) :
Proc Delays
First Est. Tentative Determination :
Revised Est. Tentative Determination :
Tentative Determination Complete :
Application Info
Contacts
Public Participation
Adjudication
Permit Detail
Billing/Pymnts
Cancel-Return List
Cancel
Ok

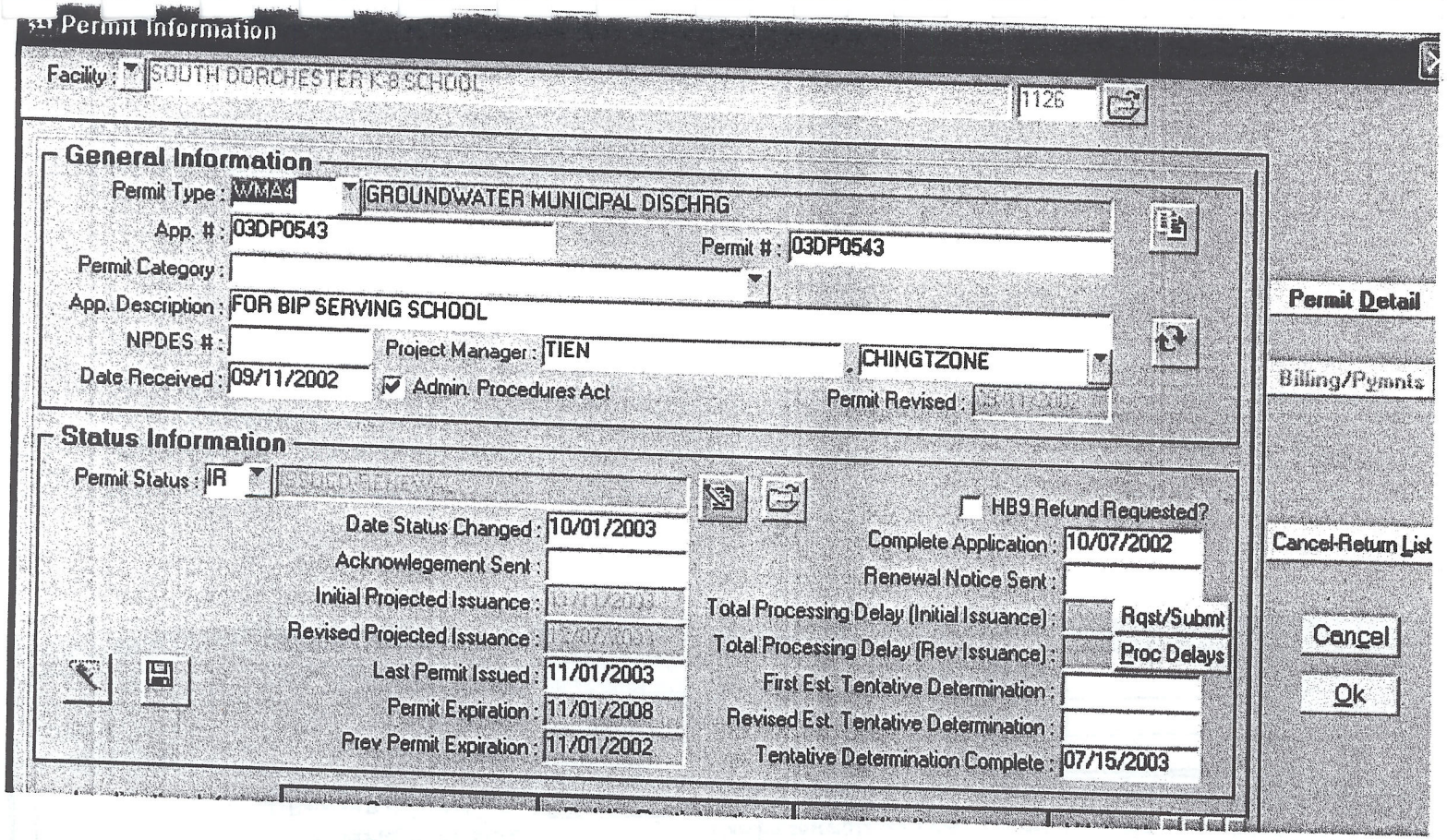

Facility : CAMBRIDGE DORCHESTER AIRPORT
6326
General Information
Permit Type : WASST
OIL OPS PER, AST + TRANS
App. # : 2005-OPT-6326
Permit # : 2005-OPT-6326
Permit Category :
App. Description :
NPDES # :
Project Manager : YOO
TOM
Date Received : 07/21/2004
Admin. Procedures Act
Permit Revised :
Status Information
Permit Status : IR
Date Status Changed : 09/29/2004
Acknowlegement Sent :
Initial Projected Issuance :
Revised Projected Issuance :
Last Permit Issued : 09/29/2004
Permit Expiration : 09/29/2009
Prev Permit Expiration : 04/05/2004
HB9 Refund Requested?
Complete Application :
Renewal Notice Sent :
Total Processing Delay (Initial Issuance) :
Rqst/Submt
Total Processing Delay (Rev Issuance) :
Proc Delays
First Est. Tentative Determination :
Revised Est. Tentative Determination :
Tentative Determination Complete :
Application Info
Contacts
Public Participation
Adjudication
Permit Detail
Billing/Pymnts
Cancel-Return List
Cancel
Ok


Facility :
CAMBRIDGE DORCHESTER AIRPORT
6326
List of Valid Facilities.
General Information
Permit Type :
WASST
OIL OPS PER, AST + TRANS
App. # :
99-OPT-6326
Permit # :
99-OPT-6326
Permit Category :
App. Description :
NPDES # :
Project Manager :
Date Received :
01/19/1999
Admin. Procedures Act
Permit Revised :
Permit Detail
Billing/Pymnts
Status Information
Permit Status :
XR
HB9 Refund Requested?
Date Status Changed :
09/29/2004
Complete Application :
Acknowlegement Sent :
Renewal Notice Sent :
Initial Projected Issuance :
Total Processing Delay (Initial Issuance) :
Rqst/Submt
Revised Projected Issuance :
Total Processing Delay (Rev Issuance) :
Proc Delays
Last Permit Issued :
04/05/1999
First Est. Tentative Determination :
Permit Expiration :
04/05/2004
Revised Est. Tentative Determination :
Prev Permit Expiration :
Tentative Determination Complete :
Cancel-Return List
Cancel
Ok
Application Info
Contacts
Public Participation
Adjudication

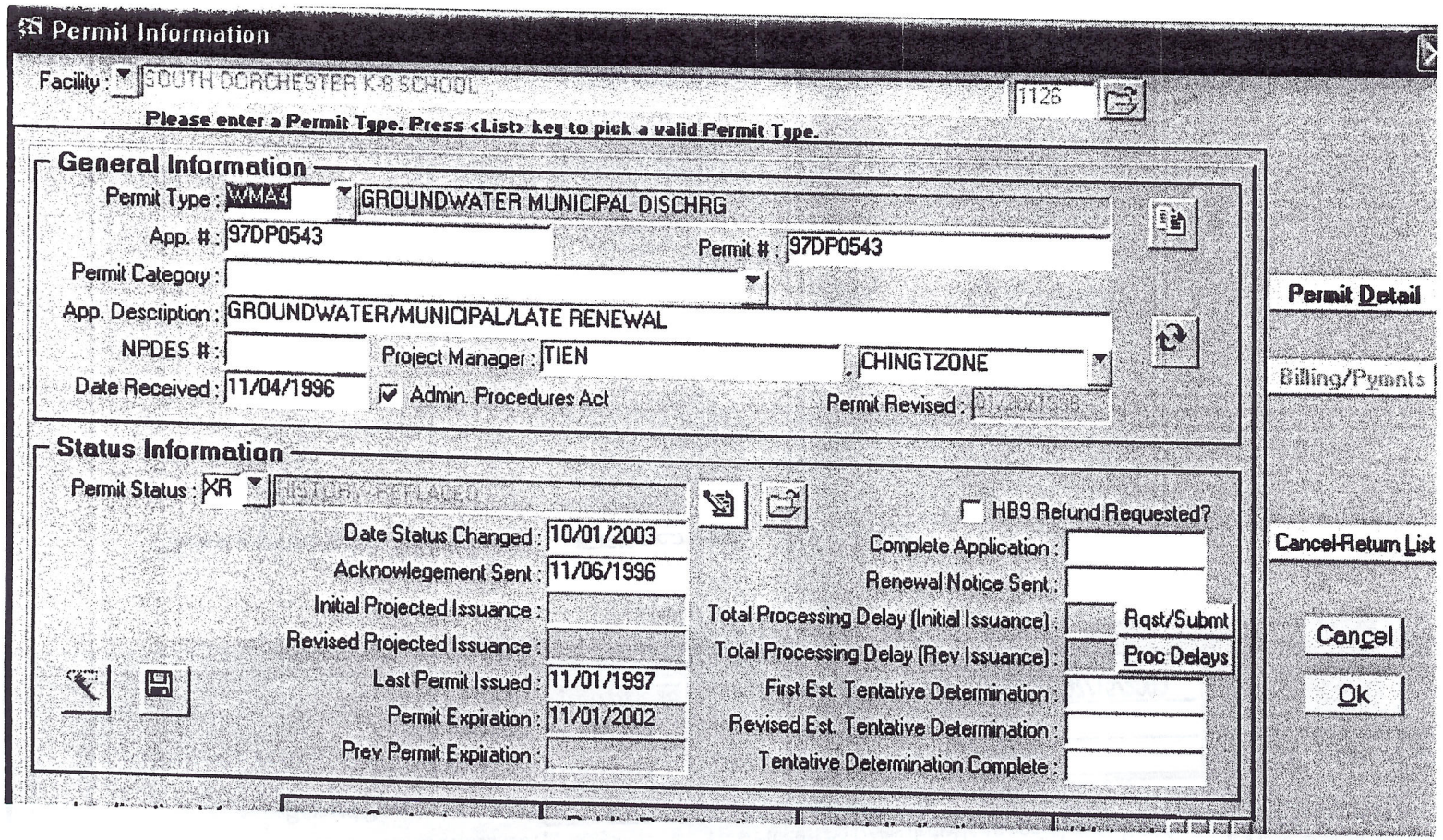

Facility : CAMBRIDGE DORCHESTER AIRPORT
6326
General Information
Permit Type : WASST
OIL OPS PER, AST + TRANS
App. # : 94-OP-1657
Permit # : 94-OP-1657
Permit Category :
App. Description : STORAGE
NPDES # :
Project Manager :
Date Received : 05/11/1994
Admin. Procedures Act
Permit Revised :
Permit Detail
Billing/Pymnts
Status Information
Permit Status : X
HB9 Refund Requested?
Date Status Changed : 01/19/1999
Complete Application :
Acknowlegement Sent :
Renewal Notice Sent :
Initial Projected Issuance :
Total Processing Delay (Initial Issuance) :
Rqst/Submt
Revised Projected Issuance :
Total Processing Delay (Rev Issuance) :
Proc Delays
Last Permit Issued : 05/11/1994
First Est. Tentative Determination :
Permit Expiration : 05/11/1999
Revised Est. Tentative Determination :
Prev Permit Expiration :
Tentative Determination Complete :
Cancel-Return List
Cancel
Ok
Application Info
Contacts
Public Participation
Adjudication

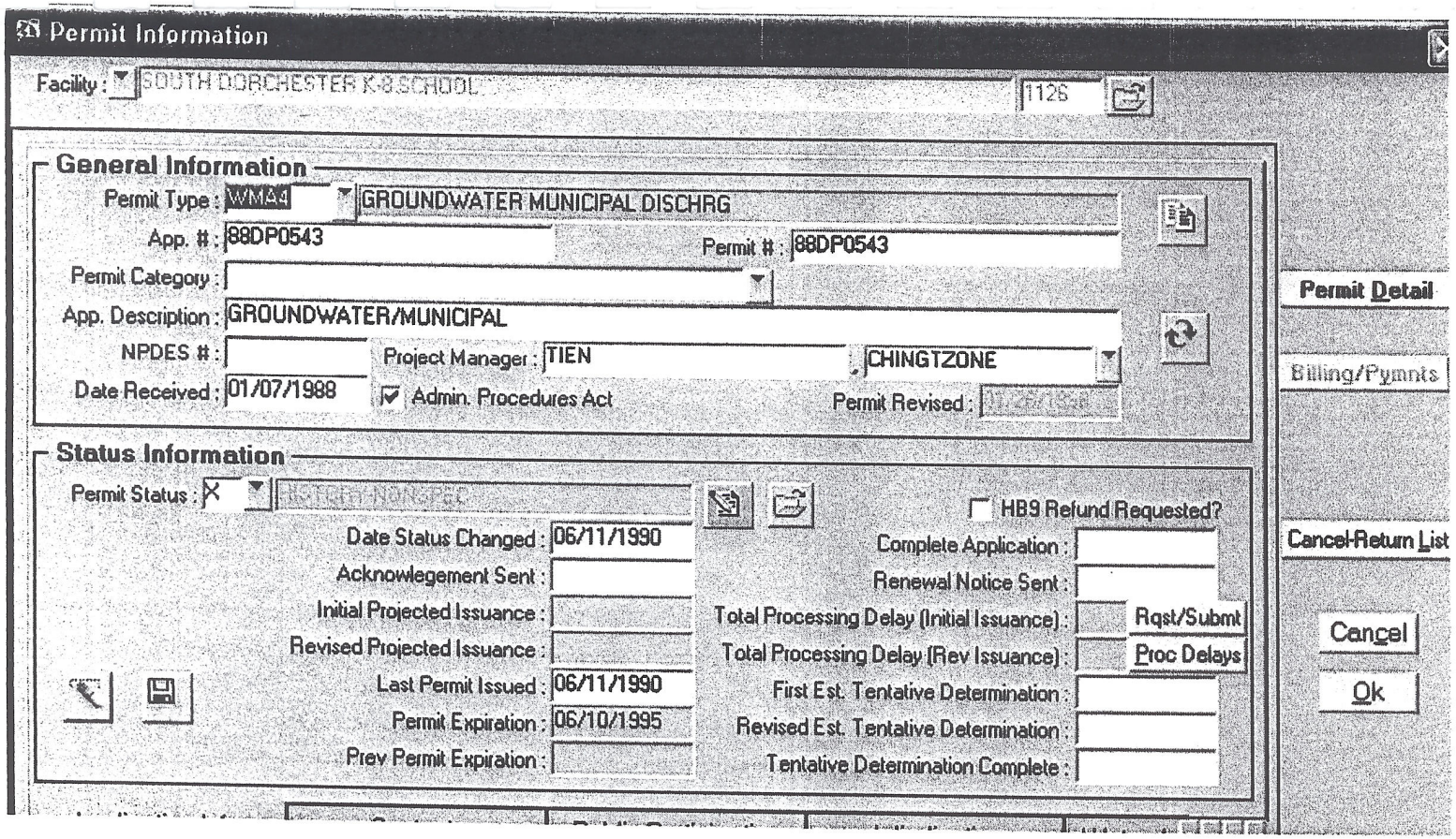

Permit Information
Facility : SCHAEFER AND STROHMINGER DELMARVA AUTO PARK
4444
Description of Permit Type code.
General Information
Permit Type : WMAG GROUNDWATER INDUSTRIAL DISCHRG
App. # : 00DP2451
Permit # : 00DP2451
Permit Category : VEHICLE WASH
App. Description : FOR RENEWAL, 1000 GPD AVERAGE DISCHARGE
NPDES # :
Project Manager : EISNER MICHAEL
Date Received : 04/03/2000
Admin. Procedures Act
Permit Revised :
Permit Detail
Billing/Pymnts
Status Information
Permit Status : IR
HB9 Refund Requested?
Date Status Changed : 12/20/2001
Complete Application : 04/06/2000
Acknowlegement Sent :
Renewal Notice Sent :
Initial Projected Issuance :
Total Processing Delay (Initial Issuance) :
Rqst/Submt
Revised Projected Issuance :
Total Processing Delay (Rev Issuance) :
Proc Delays
Last Permit Issued : 02/01/2002
First Est. Tentative Determination :
Permit Expiration : 02/01/2007
Revised Est. Tentative Determination :
Prev Permit Expiration : 05/31/2000
Tentative Determination Complete : 02/01/2001
Cancel-Return List
Cancel
Ok


Permit Information
Facility :
SCHAEFER AND STROHMINGER DELMARVA AUTO PARK
4444
Description of Permit Type code.
General Information
Permit Type :
WMA3
GROUNDWATER INDUSTRIAL DISCHRG
App. # :
94DP2451
Permit # :
94DP2451
Permit Category :
App. Description :
NPDES # :
Project Manager :
EISNER
MICHAEL
Date Received :
10/06/1993
Admin. Procedures Act
Permit Revised :
Permit Detail
Billing/Pymnts
Status Information
Permit Status :
XR
HISTORY REPLACED
HB9 Refund Requested?
Date Status Changed :
12/20/2001
Acknowlegement Sent :
11/03/1993
Initial Projected Issuance :
Revised Projected Issuance :
Last Permit Issued :
06/01/1995
Permit Expiration :
05/31/2000
Prev Permit Expiration :
Complete Application :
Renewal Notice Sent :
Total Processing Delay (Initial Issuance) :
Rqst/Submt
Total Processing Delay (Rev Issuance) :
Proc Delays
First Est. Tentative Determination :
Revised Est. Tentative Determination :
Tentative Determination Complete :
Cancel-Return List
Cancel
Ok



TRANSMITTED 9/29/03, EFFECTIVE 11/1/03.


Permit Information
Facility : SOUTH DORCHESTER K-8 SCHOOL
1126
Please enter a Permit Type. Press <List> key to pick a valid Permit Type.
General Information
Permit Type : WMA4 GROUNDWATER MUNICIPAL DISCHRG
App. # : 97DP0543
Permit # : 97DP0543
Permit Category :
App. Description : GROUNDWATER/MUNICIPAL/LATE RENEWAL
NPDES # :
Project Manager : TIEN CHINGTZONE
Date Received : 11/04/1996
Admin. Procedures Act
Permit Revised :
Permit Detail
Billing/Pymnts
Status Information
Permit Status : XR
HB9 Refund Requested?
Date Status Changed : 10/01/2003
Acknowlegement Sent : 11/06/1996
Initial Projected Issuance :
Revised Projected Issuance :
Last Permit Issued : 11/01/1997
Permit Expiration : 11/01/2002
Prev Permit Expiration :
Complete Application :
Renewal Notice Sent :
Total Processing Delay (Initial Issuance) : Rqst/Submt
Total Processing Delay (Rev Issuance) : Proc Delays
First Est. Tentative Determination :
Revised Est. Tentative Determination :
Tentative Determination Complete :
Cancel-Return List
Cancel
Ok



PERMIT RENEWAL NOT SUBMITTED. PERMIT EXPIRED.