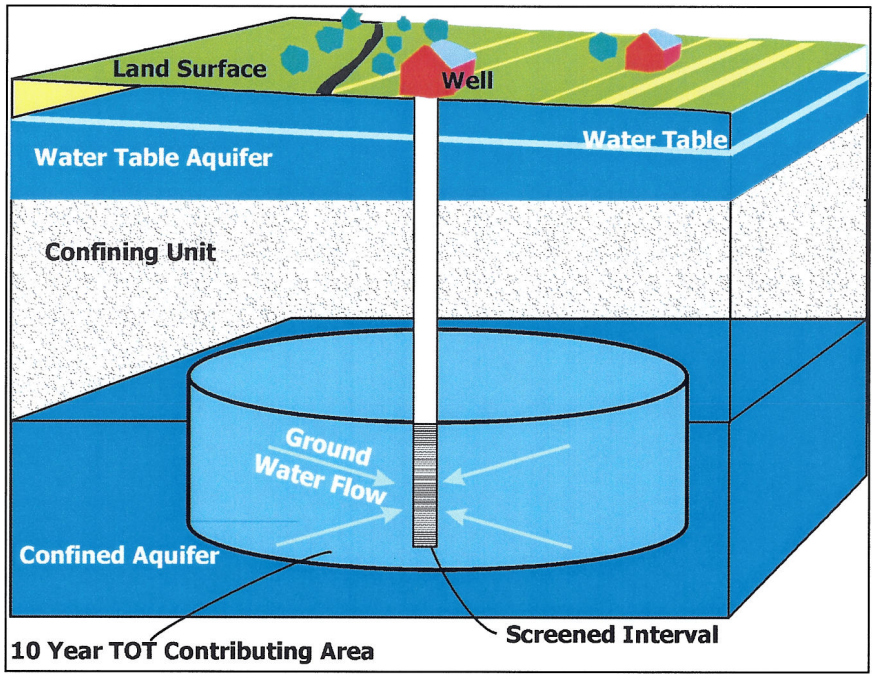
SOURCE WATER ASSESSMENTS

FOR TEN NONTRANSIENT NONCOMMUNITY WATER SYSTEMS IN SOMERSET COUNTY, MD



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SUMMARY

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted Source Water Assessments for ten nontransient noncommunity water systems in Somerset 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 source of seven systems in this report is the Manokin aquifer, which is a naturally protected, confined, Coastal Plain aquifer. The Marion Sarah Peyton Elementary School, Somerset Community Services, and Holly Grove Christian School water systems from this report utilize the unconfined, Pocomoke aquifer to obtain their water supplies. 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 Department of Planning's 2002 Land Use Map for Somerset County was used to identify potential non-point sources of contamination for the three unconfined water systems. Wells drawing from an unconfined aquifer 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 uses in the unconfined 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 ten water systems in this report are not susceptible to contaminants originating at the land surface. Some naturally occurring secondary constituents pose a risk to the water supplies that have detected these elements at levels of concern. Based on available water quality data, and systems that have installed treatment, the Deal Island School, Eden Head Start, Marion Sarah Peyton Elementary School, Robert Johnson Health Center, Somerset Community Services, Holly Grove Christian School and Lankford-Sysco Food Services water systems are susceptible to iron. Eden Head Start is also

susceptible to naturally occurring manganese since it was detected above its secondary maximum contaminant level. The J M Tawes Career & Vo-Tech Center, and Somerset 6th & 7th Intermediate School water systems are susceptible to chloride. Sufficient data is currently not available to evaluate the susceptibility of the ten systems to radionuclides, as nontransient noncommunity water systems are currently not regulated for these naturally occurring contaminants.

The sanitary integrity of the ten water supply systems may be maintained by following the well improvement recommendations at the end of this report. These recommendations include the inspection of well casings for possible integrity issues, installing insect-proof and flood-proof well caps on wells in need of them, and extending the casings of wells that are currently below ground surface.

INTRODUCTION

The Water Supply Program has conducted a Source Water Assessment for ten nontransient noncommunity water systems in Somerset County. 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 ten water systems assessed in this report serve a combined estimated population of 2,049 (Table 11). The Marion Sarah Peyton Elementary School is scheduled for closure in September 2006, as its students, and personnel will be moving to Woodson Middle School, which is served by public water supplied by the City of Crisfield. Somerset County is located on the Delmarva Peninsula along the lower Eastern Shore of Maryland. The county is bounded on the north by the Wicomico River and Wicomico County, on the east by Worcester County and the Pocomoke River, on the southeast by Virginia, and by the Chesapeake Bay to the south and west. Based on July 2005 data, the total population of Somerset County is 26,100 persons (MD Assoc. of Counties, 2005/2006). The systems include three privately owned and operated facilities, one private, and four public schools, and two county-owned and operated facilities. All of these 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 ten systems in this report obtain their water supply from wells completed in unconsolidated Coastal Plain sediments. The locations of the ten 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 sixteen supply wells are used by the ten systems assessed in this report. Four additional wells at the Lankford-Sysco Food Services and two others at the Somerset Community Services water systems respectively are designated as "other use" wells (Table 2). Somerset Community Services Wells 3 and 4 are used for the building's ground water heat pump system, and are not connected to the system's potable water supply. Twenty of the wells were drilled in or after 1973 and should comply with Maryland's well construction regulations for grouting and casing. The completion report for the Marion Sarah Peyton Elementary School Well 1 that was drilled in 1971 also indicates a grout seal around its respective casing. The Deal Island School Well 1 drilled in 1968 is the only well in this report with no record of a grout seal, and therefore it may not meet the current construction standards. Some wells are prone to flooding due to low topographic relief and poorly drained areas common to Somerset County. Table 2 contains a summary of well information for the ten water systems assessed in this report.

Based on site surveys, the supply wells are generally in good condition. The casing of the Deal Island School Well 1 should be inspected for integrity issues due to its age and construction, which could make it more susceptible to contamination. The casing of the Eden Head Start Well 1 is tilted at an angle from a vehicular collision

(Appendix A). Subsequent bacteriological testing of this well was negative for the presence of coliform bacteria. Bollards have since been installed around the wellhead to help protect it from any further collision damage. The Lankford-Sysco Food Services Wells 2 and 3 are located below ground surface beneath the asphalt in manhole vaults (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. The Deal Island School Well is located inside a pump house and is therefore protected from storm water runoff. The other supply wells in this report are located outside with casings extending at least one foot above ground surface (Appendix A).

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 Somerset 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 material (Driscoll, 1986).

Somerset 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 (Rasmussen, W.C. & Slaughter, T. H., 1955). A generalized description of the Geologic and Hydrogeologic Units in Somerset County is shown on Table 1. The Marion Sarah Peyton Elementary School, Somerset Community Services, and Holly Grove Christian School water systems utilize the Pocomoke aquifer to obtain their water supplies. Based on the depths of the wells, lithology, and recharge area maps from the Maryland Geological Survey, the Pocomoke aquifer for these three water systems is considered unconfined. The remaining seven systems utilize the confined Manokin aquifer for their water supply sources. Confining units of low permeability that inhibit the infiltration of contaminants from the land surface overlie confined aquifers. General descriptions of the

two Miocene Series aquifers as they increase in depth are shown below. The reader may refer to the referenced reports for additional information.

Pocomoke Aquifer

The Pocomoke aquifer is present only in the southeastern two-thirds of the county. It consists primarily of gray, fine to medium grained fossiliferous sand with stringers of small gravel and coarse sand and thin lenses of brown or blue clay. Thickness of the aquifer is variable and ranges from zero at its northwestern limit to more than seventy-five feet in the southeastern part of the county. Recharge to the aquifer is mainly from downward leakage from where it directly contacts the overlying surficial aquifer (Werkheiser, 1990). In recharge areas, the Pocomoke aquifer is generally unconfined and water chemistry is influenced chiefly by the composition of precipitation, aquifer mineralogy, land use, soil type, and position in the ground-water-flow system. The amount of dissolved constituents, especially calcium and bicarbonate, increases as water moves from subcrop areas to the confined parts of the aquifer. Hardness of water from recharge areas ranges from 11 to 100 parts per million (ppm) and has a median value of 33 ppm. The pH of the water from recharge areas ranges from 4.5 to 6.4, and has a median of 5.1. Dissolved-solids concentrations of water from recharge areas range from 90 to 177 ppm, and have a median of 131 ppm. Overall, water in the recharge areas is more acidic, softer, and contains lower concentrations of dissolved solids than water in confined portions of the aquifer. The most common quality problems in water from the Pocomoke aquifer are excess iron and manganese concentrations (Werkheiser, 1990).

Manokin Aquifer

The Manokin Aquifer is the primary aquifer used for water supplies in Somerset County. It consists principally of gray, fine to medium grained sand, and contains some shell material. The Manokin aquifer subcrops beneath the Chesapeake Bay west of Deal Island. The thickness ranges from zero, where the aquifer becomes finer grained, to more than 80 feet in the northeastern corner of the county. There is a marked difference in the chemical quality of water from the Manokin aquifer. North of Westover, the water is a sodium-bicarbonate type, dissolved solids range from 173 to 620 ppm, and hardness ranges from 2 to 97 ppm. South of Westover, the water is a sodium-chloride type, dissolved solids range from 807 to 1,860 ppm, and hardness ranges from 76 to 260 ppm. Dissolved iron is a problem in the Manokin aquifer in the northern part of the county, where concentrations in water samples have reached 4.1 ppm. Iron concentrations are generally greatest in the northeastern corner of the county and progressively decrease toward the south. In Somerset County, pH tends to increase in the northeast to west to southwest directions probably because bicarbonate is brought into solution from mineral dissolution (Werkheiser, 1990). Contour maps depicting the altitude top and thickness of the Manokin aquifer are shown on Figures 4 and 5.

A confining unit consisting of silt, clay and fine-grained sand overlies the Manokin aquifer. The thickness ranges from less than 40 feet near Eden to more than 100 feet near Princess Ann. In the Crisfield area the lithology of the confining unit changes from predominantly silt and clay to one characterized by more interbeds of sand (Werkheiser, 1990). Figure 6 depicts the thickness of the confining unit overlying the Manokin aquifer

in Somerset County.

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-2d & 2f)

The Wellhead Protection areas for the seven public water systems using an average of less than 10,000 gallons per day (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 a volumetric equation assuming a minimum aquifer thickness of 20 feet, a porosity of 25%, and an average daily pumpage of 10,000 gpd. The fixed radius represents a 10-year zone of transport from the supply wells providing the largest protection area for conservative purposes.

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 seven confined aquifer systems are shown on Figures 2a-2d, and 2f. 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.

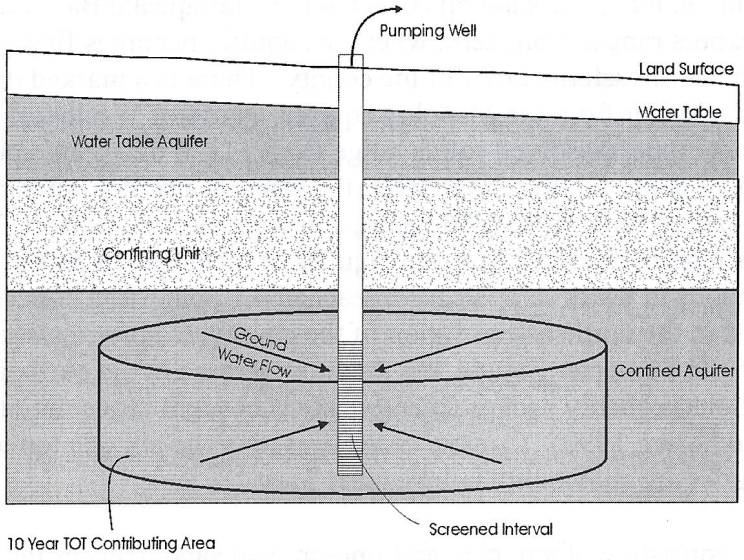

Diagram 1. Conceptual Illustration of a Zone of Transport for a Confined Aquifer

Unconfined Aquifer Delineations (see Figures 2e & 2g)

Based on well depths, lithology, and recharge area maps, the Marion Sarah Peyton Elementary School, Somerset Community Services, and Holly Grove Christian School wells are completed in unconfined parts of the Pocomoke aquifer. As defined in Maryland's SWAP, the wellhead protection areas for "small" unconfined public water systems using an average of less than 10,000 gpd are to be delineated by using a simplified variable-shape based on annual recharge. The localized ground water flow direction for each well is to be inferred based on topographic relief. The resulting "wedge" shape is to be oriented in the predominant ground water flow direction for each well (MDE 1999). However, in the case of these three unconfined water systems, a localized ground water flow direction could not be determined due to the extremely low topographic relief in these areas. Therefore, a fixed radius of 1,000 feet around each well was used for conservative purposes. These areas account for the uncertainty in the direction of ground water flow towards the supply wells. Holly Grove Christian School has two wells spaced close together that are completed in the Pocomoke aquifer. Since the 1,000-foot radiuses around each well overlap, they were combined to form one larger WHPA for this water system (Figure 2e). The radiuses around each well at the Somerset Community Services water system were also combined to form one larger WHPA for conservative purposes (Figures 2g).

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, pesticide dealers, discharge permit sites, and sites with known or possible ground water contamination concerns. 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. Seven of the ten 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 Marion Sarah Peyton Elementary School, Somerset Community Services, and Holly Grove Christian School draw 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 WHPAs.

Ground water contamination (GWC) sites are facilities with known or possible 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. Ground water discharge permits (GWDP) are issued by the MDE Water Management Administration for discharge of wastewater to the ground. General Permit (GP) sites are facilities that were issued general industrial storm water permits. Ground water remediation permit sites (GWRP) are issued to facilities that are using remediation techniques for the removal of petroleum contamination from ground water. Pesticide dealers (PD) are facilities that sell or store large quantities of these chemicals on-site. Miscellaneous sites (MISC) such as salvage yards, county roads and volunteer fire departments, golf courses, 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 3. 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 conducted field surveys of the ten water systems on December 12th and 13th, 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 completed using the GPS to locate and map potential sources of contamination within and near the WHPAs.

Confined Aquifer WHPAs (see Figures 2a-2d & 2f)

Potential contaminant sources were identified within or near the confined WHPAs for awareness purposes and to ensure that the Manokin aquifer does not become affected by unused wells or poorly constructed wells used by the water suppliers. Table 3 lists the facilities identified from MDE databases and site surveys as potential sources of contamination and their locations are shown on Figures 2a-2d and 2f.

Facilities located within and near the WHPAs are being inspected by MDE staff to determine the potential for contamination 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. No unused wells were reported from database reviews, and 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 Westover Goose Creek Exxon on U.S. Route 13 located to the east of the Custom Pak, Inc. WHPA, had high levels of petroleum product detected in the soils and shallow ground water beneath the underground storage tanks that were removed. A

preliminary subsurface investigation of the former Richard's Exxon across the street revealed soil and shallow ground water contamination on this property also (Figure 2c). These open cases are currently under investigation by the MDE Oil Control Program Remediation Division. Summaries of the cases can be found in Appendix B. The reader may contact the Oil Control Program for additional information. The MDE Waste Management Administration issued a general oil contamination ground water remediation permit to the Westover Goose Creek facility. A database summary of this permit can be found in Appendix D.

The former Chesapeake Wood Treating Site (now called Smurfit-Stone Pocomoke City Chip Mill) located about a mile southeast of the Lankford-Sysco Food Services WHPA was identified as having possible soil and ground water contamination concerns. The site is listed on Table 3, and its location is mapped on Figure 2f. A fact sheet providing general information about this facility is shown in Appendix C.

The Lankford-Sysco Food Services Water System has a ground water discharge permit to release an average of 8,400 gpd of vegetable processing wastewater and truck wash to the subsurface (Figure 2f). The facility has approximately 250 employees and operates 24 hours per day, and 7 days per week, with the exception of some weekends. Database summaries of this and other industrial discharge permit sites located within and near the confined WHPAs from this report are found in Appendix D. The reader may contact the specific programs within the MDE Water and Waste Management Administrations for additional information on any of these permits.

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.

Unconfined Aquifer WHPAs (see Figures 2e, 2g, 3a, & 3b)

Point Sources

The Marion Volunteer Fire Department UST located to the west of the Marion Sarah Peyton Elementary School WHPA was mapped as a potential VOC point source (Figure 2g). Other potential point sources of contamination that could impact the unconfined Pocomoke aquifer water supplies are residential underground heating oil tanks, and spills during the transportation of chemical products along MD Routes 413 and 667, Tulls Corner Road, Mennonite Church Road, Boggs Schoolhouse Road, and nearby railroad lines, respectively (Figures 2e & 2g).

Non-Point Sources

The Maryland Department of Planning's 2002 digital land use map for Somerset County was used to determine the predominant types of land use in the Holly Grove Christian School, Marion Sarah Peyton Elementary School, and Somerset Community Services WHPAs respectively (Figures 3a & 3b). The breakdown of land use types for each WHPA zone is shown on Tables 4a- 4c. Note that cropland followed by forested

areas make up the largest percentages of the Holly Grove Christian School, and Somerset Community Services WHPAs respectively (Tables 4a & 4c). Cropland followed by commercial land makes up the largest portion of the Marion Sarah Peyton Elementary School WHPA (Table 4b). Low and medium density residential, and pasturelands make up the remaining land use types within the WHPAs (Tables 4b-4c).

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 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 Department of Planning 1991 Somerset County Sewerage Coverage Map indicates that there are no plans for public sewerage service within the WHPAs of the three unconfined water systems in this report.

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 Routes 413, 667, Tulls Corner Road, Mennonite Church Road, and Boggs Schoolhouse Road within the WHPAs during the winter months may be a source of sodium and chlorides to these water supplies.

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. Four of the systems currently do not use water treatment. The treatment methods currently used at the water treatment plants for the remaining six systems included in this report are summarized on Table 5.

A review of the monitoring data since 1991 indicates that the water supplies for the ten systems in this report meet the drinking water standards (Table 6). Tables 7a-7c provide a list of all detections above 50% of the respective or proposed MCLs and secondary MCLs. Results exceeding an MCL or secondary MCL are shown in bold.

Inorganic Compounds (IOCs)

A review of the available data shows that iron, manganese, and chloride were the only IOCs detected at or above 50% of their respective secondary MCLs (Table 7a). These elements are considered secondary drinking water constituents. Iron was detected above 50% of the secondary MCL from samples collected at six systems in this report (Table 7a). Two of the ten systems in this report have treatment for iron removal (Table 5). The secondary MCL for iron is 0.3 ppm. The Eden Head Start

water system had a single raw water manganese detect on 2/24/03 above its secondary MCL of 0.05 ppm. Chloride was detected above its secondary MCL of 250 ppm in February 2005 from the latest round of sampling at the J M Tawes Career & Vo-Tech Center, and the Somerset 6th & 7th Intermediate Schools respectively (Table 7a). No other regulated IOCs were detected at levels of concern for the ten nontransient noncommunity systems.

Radionuclides

Nontransient noncommunity water systems are currently not regulated for radionuclides. Radon-222 was detected from limited sampling data at the Deal Island School and Eden Head Start water systems respectively (Table 7b). However, there is no MCL established for radon-222 in drinking water at the present time.

Volatile Organic Compounds (VOCs)

No VOCs were detected at levels of concern from any of the sampling events conducted at the ten systems since 1991. Xylenes were detected in 1995 from a single sample collected at Lankford Sysco Food Services at 2 part per billion (ppb). The MCL for total xylenes is 10,000 ppb. It was not detected again in 4 subsequent samples. Methyl-tert-butyl-ether (MTBE) was detected at 0.52 ppb from the latest round of sampling at the Somerset Community Services on 7/19/05. MTBE is an oxygenate additive that makes gasoline burn cleaner. Due to its high solubility and mobility, it can enter an unconfined aquifer and may contaminate a ground water supply. MTBE is currently an unregulated VOC that has no MCL. EPA's advisory to avoid unpleasant taste and odor is 20-40 ppb. 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 one set of sampling results at the J M Tawes Career & Vo-Tech Center, and Custom Pak, Inc (Table 7c). The MCL for di(2-ethylhexyl phthalate) is 6 ppb. It was also detected at low levels in sampling results of the remaining systems in this report with the exception of Marion Sarah Peyton Elementary School. Phthalate was also detected in the laboratory blank samples accompanying these data sets, and therefore the results are not interpreted to represent actual water quality.

The SOC 2,4-D was detected at 0.32 ppb from one set of sampling results taken in August 2003 at Lankford-Sysco Food Services. The MCL for this compound is 70 ppb. It was not detected again from a subsequent sample collected in October 2004. No other SOCs were detected from available sampling results.

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 Marion Sarah Peyton Elementary, and the Holly Grove Christian Schools respectively. As shown on Table 8, the test results for each well were negative for the presence of total and fecal coliform bacteria.

GWUDI testing is not required for seven systems in this report since their supply wells draw from confined aquifers. However, each system has quarterly routine bacteriological samples that are collected as required by the Safe Drinking Water Act. Three of the ten 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 seven systems currently do not use disinfection treatment and therefore the results may be indicative of raw water (Table 9). Total coliform bacteria are not pathogenic, but are used as an indicator organism for other disease-causing microorganisms. Seven 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 positive total or fecal coliform results were reported for the remaining three systems in this report from samples collected quarterly since 1996 (Table 9).

Formal GWUDI testing was not completed at the Somerset Community Services unconfined water system. However, since this system does not use any type of water treatment, routine bacteriological results are representative of raw water. As shown in Table 9, the system has had no positive coliform results in 37 samples collected quarterly since 1996. Therefore, it was concluded that the Somerset Community Services supply wells are not susceptible to surface water influence.

SUSCEPTIBILITY ANALYSIS

The wells serving seven of the ten nontransient noncommunity water systems in this report draw water from the confined Manokin aquifer. 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 iron and manganese are naturally occurring in the aquifers, and may reach concentrations that cause taste, color, and odor problems in the drinking water supply. This is generally more problematic in confined aquifer settings than contaminants at the land surface.

By contrast, the wells that supply the Marion Sarah Peyton Elementary School, Somerset Community Services, and Holly Grove Christian School obtain water from unconfined parts of the Pocomoke 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 10 summarizes the susceptibility of the ten water systems covered in this report to each group of contaminants.

Inorganic Compounds

Iron is a naturally occurring element that was detected in aquifer material near, or above the secondary standard from samples collected at six of the water systems in this report (Table 7a). 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. Based on the data shown on Table 7a, and systems that have installed treatment, the Deal Island School, Eden Head Start, Marion Sarah Peyton Elementary School, Robert Johnson Health Center, Somerset Community Services, Holly Grove Christian School, and Lankford-Sysco Food Services water systems **are** susceptible to this unregulated IOC. Two of these water systems have treatment for iron removal (Table 5). However, the iron softener at Marion Sarah Peyton Elementary School is in need of repair, and was recently disconnected. Eden Head Start **is** also susceptible to naturally occurring manganese since it was detected above its secondary MCL of 0.05 ppm (Table 7a). Manganese is also an unregulated secondary constituent in drinking water.

Chloride was detected above its secondary MCL of 250 ppm in February 2005 from the latest round of sampling at the J M Tawes Career & Vo-Tech Center, and the Somerset 6th & 7th Intermediate Schools respectively (Table 7a). The Manokin aquifer subcrops beneath the Chesapeake Bay, and therefore, a natural interface between freshwater in the aquifer and brackish water of the bay exists. This interface is likely to be a zone of diffusion where brackish water and freshwater mix (Werkheiser, W.M., 1990). Zones of incomplete flushing may occur north of Crisfield, where the aquifer becomes less permeable. This low permeability area north of Crisfield restricts ground water flow, and may result in localized stagnation zones where saltwater trapped during times of higher sea level has not been completely flushed from the system. Regional ground water flow in the county is generally toward the north, and ground water containing elevated chloride concentrations may be migrating toward the Princess Anne area (Werkheiser, W.M., 1990). The isochlors shown in Figure 7 are generally consistent with the levels detected at the intermediate school, and vo-tech center wells. Based on this data, the J M Tawes Career & Vo-Tech Center, and Somerset 6th & 7th Intermediate School water systems **are** susceptible to this unregulated IOC.

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 ten water supplies in this report are **not** susceptible to regulated inorganic compounds, including arsenic and nitrate based on available water quality data (Table 10).

Radionuclides

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

Volatile Organic Compounds

The single xylenes detect at Lankford-Sysco Food Services in 1995 at 2 ppb well below its MCL of 10,000 ppb may have been from the underground, vaulted well pits flooding, thereby allowing contaminated surface water containing VOCs to enter through or around the well casings and ultimately reaching the aquifer. Total xylenes were not detected again from 4 subsequent data sets at this facility. The MTBE detect of 0.52 ppb in July 2005 at the Somerset Community Services water supply discussed in the water quality section is well below EPA's advisory to avoid unpleasant taste and odor. The MDE Oil Control Program investigates areas for potential sources when MTBE levels exceed 10 ppb. After the MTBE detection, the Water Supply Program increased the monitoring of VOCs to annual at this water system. Additional sampling is necessary in order to monitor increasing trends of this compound in the unconfined aquifer water supply.

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 2b, 2c, 2f, & 2g). Based on sampling results, none of the Manokin aquifer 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 aquifer from contamination that occurs near the ground surface. Contamination from these sites should threaten the water quality of the shallow, unconfined aquifers only. A review of the available VOC data indicates that the UST located west and northwest of the Marion Sarah Peyton Elementary School and Somerset Community Services unconfined WHPAs does not appear to have any significant impact on the wells. As discussed, additional MTBE testing is necessary at Somerset Community Services to fully evaluate the risk of this compound to the drinking water supply. Based on available water quality data, well integrity, or confined aquifer characteristics, the ten systems from this report were determined **not** susceptible to VOC contamination (Table 10).

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, 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. The SOC, 2,4-D was detected at 0.32 ppb from one set of sampling results taken in August 2003 at Lankford-Sysco Food Services. This compound is an herbicide used on wheat, corn, rangelands, and residential lawns. It was not detected again from a subsequent sample collected in October 2004. The single detect of this compound is considered anomalous since the supply wells at this facility are completed in the confined Manokin aquifer, which is naturally protected from land use activities such as herbicide applications at the ground surface.

A photo taken of the Custom Pak Well 2 reveals stressed vegetation around and near 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 sets of available sampling data at the Marion Sarah Peyton Elementary School, Somerset Community Services, and Holly Grove Christian School systems that utilize the unconfined, Pocomoke aquifer for their water supplies. This indicates that the use of synthetic chemicals is not impacting measured water quality parameters at these systems.

A confined aquifer waiver has been issued to the seven confined systems in this report for synthetic organic compounds. The waiver allows these systems to reduce the sampling frequency of SOCs to once every 12 years. Based on the available water quality data, and aquifer characteristics, the ten systems in this report were determined **not** susceptible to SOC contamination (Table 10).

Microbiological Contaminants

Based on wet and dry weather raw water bacteriological data, the Marion Sarah Peyton Elementary, and Holly Grove Christian Schools unconfined supply wells were determined not to be under the direct influence of surface water (Table 8). Formal GWUDI testing was not completed for the Somerset Community Services unconfined wells. However, this system does not use any type of water treatment including disinfection, and quarterly routine bacteriological samples collected since 1996 showed no positive coliform results. Therefore, it was concluded that the Somerset Community Services supply wells are not susceptible to surface water influence. Raw water monitoring for microbiological contaminants is not required for the seven 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 9). However, several repeat samples showed no positive coliform detects. Positive coliform results in confined aquifer wells are likely to be the result of system equipment or well integrity issues, and are unlikely to be representative of the source water quality of the aquifer. In these instances, the treatment equipment, distribution piping, and wellheads should be inspected, and any deficiencies should be corrected. As an example, the positive coliform detects at the Holly Grove Christian School are believed to be from bacterial growth in the water softeners. Collected samples bypassing the softeners were found to be negative for the presence of total and fecal coliform bacteria. According to a recent Sanitary Survey Inspection Report, the Somerset Well Drilling Company now maintains the treatment system, and the sediment filters are changed every two months.

Based on available sampling data, and aquifer characteristics, the source water at each of the ten nontransient noncommunity systems in this report is **not** susceptible to any microbiological contaminant present at the surface including *Giardia & Cryptosporidium* (Table 10).

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 ten nontransient noncommunity water systems in Somerset County. For the seven systems using the confined Manokin aquifer, maintaining proper well construction is most critical for future water quality protection. Recommendations for the Marion Sarah Peyton Elementary School, Somerset Community Services, and Holly Grove Christian School water systems, 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.

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

- The three systems utilizing the unconfined Pocomoke aquifer should develop a plan with local fire departments and other emergency response personnel concerning proper spill response to protect ground water, particularly along MD Routes 413 and 667, Tulls Corner Road, Mennonite Church Road, Boggs Schoolhouse Road, and nearby railroad lines respectively.
- The ten water systems should work with the Somerset County Health Department to ensure that there are no unused wells within their respective WHPAs. Improperly abandoned wells 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.
- 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

- The casing of the Deal Island School Well 1 should be inspected for possible integrity issues due to its age and construction, which could make it more susceptible to contamination. The school should consider upgrading this well to current construction standards with grout seals around its casing or replacement if necessary. The Eden Head Start Well casing should also be inspected (e.g. video camera down the inside of the casing) to ensure its integrity since it was displaced from a vehicular collision (Appendix A).
- The Lankford-Sysco Food Services should consider extending the casings of Wells 2 and 3 to above grade. Wells cased 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. Wells susceptible to flooding should also have flood-proof well caps installed.
- A two-piece insect-proof well cap should be installed on the Somerset 6^{th} & 7^{th} Intermediate School Well 1 (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 Somerset County Digital Land Use Map
MD Dept. of Planning 1991 Somerset County Digital Sewerage Coverage Map
ADC® Digital Map for Somerset County
DNR DOQQs: Eden SE, Deal Island SW & SE, Princess Anne SW, Kingston NW & NE, Pocomoke City NW, & Marion SE, 1998
MD State Highway Administration Digital Road Maps

Tables

TABLE 1
GEOLOGIC AND HYDROGEOLOGIC UNITS IN SOMERSET COUNTY
[correlation of units shown in each column under previous investigations not implied]

System	Series	Previous investigations						This report	
		Geologic units					Hydrogeologic units	Geologic units	Hydrogeologic units
		Rasmussen and Slaughter (1955)	Hansen (1978)	Hansen (1981)	Owens and Denny (1984)	Mixon (1985) southern Somerset County	Hansen (1967) Crisfield area		
Quaternary	Holocene	Undifferentiated	Not studied	Shoreline Complex	Alluvium, swamp, and tidal marsh deposits	Estuarine marsh deposits	Undifferentiated	Alluvium, swamp, and tidal marsh deposits	Surficial aquifer system
	Pleistocene	Parsonsburg Sand Talbot and Pamlico Formations Walston Silt Beaverdam Sand	Not studied	? Beaverdam Sand	Parsonsburg Sand Kent Island Formation Omar Formation	Pocomoke River alluvium point-bar deposits Kent Island Formation		Parsonsburg Sand Kent Island Formation Omar Formation	
Tertiary	Pliocene	Brandywine, Bryn Mawr, and Beacon Hill gravels (Red Gravelly Sand)	Not studied	"Red Gravelly Sand" facies	Beaverdam Sand Yorktown Formation	Yorktown Formation	Not present	Beaverdam Sand --?-------?------ Yorktown Formation and	--?-----?--------- Confining unit Pocomoke aquifer
	Miocene	Yorktown and Cohansey Formations (?): Upper aquiclude / Pocomoke aquifer / Lower aquiclude / Manokin aquifer St. Marys Formation Choptank Formation Calvert Formation	Undifferentiated	Upper Miocene aquifer complex St. Marys (?) Formation Not studied	Yorktown (?) and Cohansey (?) Formations Not studied	Eastover Formation Not studied	Confining unit Pocomoke aquifer Confining unit Manokin aquifer Confining unit Choptank aquifer Confining unit	--?-----?------ Eastover Formation (undifferentiated) St.Marys Formation Choptank Formation Calvert Formation	Miocene series undifferentiated: Confining unit / Manokin aquifer / Confining unit Choptank aquifer Confining unit
	Oligocene	Not present	Not present	Not studied	Not studied	Not studied	Not present	Not present	Not present
	Eocene	Chickahominy Formation Piney Point Formation Nanjemoy Formation Aquia Greensand	Piney Point Formation Nanjemoy Formation	Not studied	Not studied	Not studied	Piney Point aquifer	Piney Point Formation	Piney Point aquifer Confining unit
	Paleocene	Brightseat (?) Formation	Aquia Formation Brightseat Formation	Not studied	Not studied	Not studied	Confining unit "Paleocene" aquifer Confining unit	Undifferentiated	Paleocene aquifer system Confining unit
Cretaceous	Upper Cretaceous	Monmouth Formation Matawan Formation Magothy Formation Raritan Formation Patapsco and Arundel Formations	Not present Potomac Group (undifferentiated)	Not studied Not studied	Not studied Not studied	Not studied Not studied	Confining unit Magothy aquifer Confining unit "Upper Raritan" aquifer Confining unit Not studied	Not present Potomac Group (undifferentiated)	Not present Potomac aquifer system
	Lower Cretaceous	Patuxent Formation							

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.)	DATE DRILLED	AQUIFER
1190007	DEAL ISLAND SCHOOL	01	01	P	WELL 1	SO1968G004	3300	SO680101	144	124	9/25/1968	MANOKIN AQUIFER
1190009	EDEN HEAD START	01	01	P	WELL 1	SO1985G007	2400	SO810724	255	225	9/16/1985	MANOKIN AQUIFER
1190011	MARION SARAH PEYTON ELEMENTARY	01	01	P	WELL 1	SO1965G001	1000	SO710073	75	65	7/19/1971	POCOMOKE AQUIFER
1190018	ROBERT JOHNSON HEALTH CENTER	01	01	P	WELL 1	SO1975G005	2000	SO920305	145	120	9/12/1995	MANOKIN AQUIFER
1190019	SOMERSET COMMUNITY SERVICES	01	01	P	WELL 1	SO1991G014	4800	SO920280	138	118	9/20/1995	POCOMOKE AQUIFER
		01	02	P	WELL 2	SO1991G014	4800	SO920281	95	75	9/14/1995	POCOMOKE AQUIFER
		01	03	H	WELL 3 (G.W. HEAT PUMP)	SO1995G008	5000	SO920279	97	57	9/18/1995	POCOMOKE AQUIFER
		01	04	H	WELL 4 (G.W. HEAT PUMP)	SO1995G008	5000	SO920282	90	50	9/18/1995	POCOMOKE AQUIFER
1190021	J M TAWES CAREER & VO-TECH CENTER	01	01	P	WELL 1	SO1975G004	1800	SO811885	145	115	7/27/1990	MANOKIN AQUIFER
1190022	SOMERSET 6TH & 7TH INTERMEDIATE SCHOOL	01	01	P	WELL 1	SO1974G001	4500	SO730181	230	200	3/13/1973	MANOKIN AQUIFER
1190023	HOLLY GROVE CHRISTIAN SCHOOL	01	01	P	WELL 1	SO1998G011	2000	SO810098	85	70	7/5/1982	POCOMOKE AQUIFER
		01	02	P	WELL 2	SO1998G011	2000	SO940381	115	95	12/30/1998	POCOMOKE AQUIFER
1190024	LANKFORD-SYSCO FOOD SERVICES, INC.	01	01	P	WELL 2	SO1981G012	3200	SO920012	285	255	1/4/1994	MANOKIN AQUIFER
		01	02	P	WELL 1	SO1981G012	3200	SO811923	285	255	10/1/1990	MANOKIN AQUIFER
		01	03	P	WELL 3	SO1981G012	3200	SO920348	270	250	11/22/1995	MANOKIN AQUIFER
		00	90	H	SHOP WELL	SO1981G112	300	SO880119	50	40	10/8/1991	POCOMOKE AQUIFER
		00	91	H	FUEL BAY WELL	SO1981G012	3200	SO920376	270	250	3/21/1996	MANOKIN AQUIFER

Table 2. 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.)	DATE DRILLED	AQUIFER
1190024	LANKFORD-SYSCO FOOD SERVICES, INC.	00	92	H	WASH BAY WELL	SO1981G012	3200	SO940982	130	110	2/20/2003	POCOMOKE AQUIFER
		00	93	H	CASH & CARRY WELL	SO1981G012	3200	SO810027	280	250	12/29/1981	MANOKIN AQUIFER
1191125	CUSTOM PAK INC.	01	01	P	WELL 1	SO1959G002	1300	SO940778	235	195	7/2/2001	MANOKIN AQUIFER
		02	02	P	WELL 2	SO1959G002	1300	SO940167	235	195	7/29/1997	MANOKIN AQUIFER
		02	03	P	WELL 3	SO1959G002	1300	SO920246	235	195	6/5/1995	MANOKIN AQUIFER

Table 2 (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, H = Other Use Wells

[5] WAPID = Water Appropriation Permit Identification

ID[1]	Type[2]	Facility Name	Address	[1]Reference Location	WHPA System Name	[3]Potential Contaminants
1	MISC	Deal Island Chance Volunteer Fire Dept.	10090 Deal Island Rd.	Figure 2b	Deal Island School	VOC, HM
2	LUST	Richard's Exxon (now Cato Oil)	8976 Ocean Highway	Figure 2c	Custom Pak, Inc.	VOC
3	UST, LUST, GWRP	Westover Goose Creek Exxon	9010 Ocean Highway	Figure 2c	Custom Pak, Inc.	VOC, SOC, MP, NN, M
4	PD	Somerset Landscape, Inc.	30295 Sam Barnes Rd.	Figure 2c	Custom Pak, Inc.	SOC, NN
5	UST, GWDP, MISC	Somerset Co. Roads Dept. & Borrow Pit	8981 Sign Post Rd.	Figure 2c	Somerset 6th & 7th Intermediate School	VOC, HM, M, SOC
6	UST	Dash In Shell Station	8910 Crisfield Hwy.	Figure 2c	Somerset 6th & 7th Intermediate School	VOC
7	PD	Growmark F.S. Inc.	8761 Old Westover Rd.	Figure 2c	Somerset 6th & 7th Intermediate School	SOC, NN
8	MISC	Somco Towing & Salvage	Fairmount Rd.	Figure 2c	Somerset 6th & 7th Intermediate School	VOC, HM, M
9	MISC	Great Hope Golf Course	8380 Crisfield Hwy.	Figure 2d	J M Tawes Career & Vo-Tech Center	SOC, NN, HM, M
10	GWDP	Lankford-Sysco Food Services	33239 Costen Rd.	Figure 2f	Lankford-Sysco Food Services, Inc.	VOC, HM, M, MP
11	GWDP	Big Apple Seafood/Meat Company	7280 Hayward Rd.	Figure 2f	Lankford-Sysco Food Services, Inc.	VOC, HM, M, MP
12	MISC	John Deere Atlantic Tractor	U.S. Rt. 13	Figure 2f	Lankford-Sysco Food Services, Inc.	VOC, HM
13	GWC, GP	Smurfit-Stone Pocomoke City Chip Mill	33677 Costen Rd.	Figure 2f	Lankford-Sysco Food Services, Inc.	VOC, SOC, M, HM
14	UST	Marion Volunteer Fire Dept.	28390 Crisfield Marion Rd.	Figure 2g	Marion Sarah Peyton Elementary School	VOC

Table 3. 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, GWRP = Ground Water Remediation Permit Sites, PD = Pesticide Dealers
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	14.00	18.82
Cropland	37.60	50.55
Forest	22.78	30.63
Total Area	74.38	100.00

Table 4a. Land Use in the Holly Grove Christian School WHPA (See Figure 3a)

LAND USE TYPE	TOTAL AREA (acres)	PERCENTAGE OF WHPA
Low Density Residential	9.61	13.39
Commercial	20.72	28.88
Cropland	27.83	38.79
Pasture	1.75	2.44
Forest	11.84	16.50
Total Area	71.75	100.00

Table 4b. Land Use in the Marion Sarah Peyton Elementary School WHPA (See Figure 3b)

LAND USE TYPE	TOTAL AREA (acres)	PERCENTAGE OF WHPA
Low Density Residential	13.62	15.49
Medium Density Residential	3.07	3.49
Commercial	9.28	10.55
Cropland	33.69	38.31
Pasture	4.32	4.91
Forest	23.97	27.25
Total Area	87.95	100.00

Table 4c. Land Use in the Somerset Community Services WHPA (See Figure 3b)

PWSID	SYSTEM NAME	PLANT ID	TREATMENT METHOD	PURPOSE
1190007	DEAL ISLAND SCHOOL	01	HYPOCHLORINATION, POST	Disinfection
1190009	EDEN HEAD START	01	NO TREATMENT	
1190011	MARION SARAH PEYTON ELEMENTARY	01	ION EXCHANGE	Iron Removal
		01	ION EXCHANGE	Inorganics Removal
1190018	ROBERT JOHNSON HEALTH CENTER	01	HYPOCHLORINATION, POST	Disinfection
1190019	SOMERSET COMMUNITY SERVICES	01	NO TREATMENT	
1190021	J M TAWES CAREER & VO-TECH CENTER	01	INHIB., POLYPHOSPHATE	Corrosion Control
1190022	SOMERSET 6TH & 7TH INTERMEDIATE SCHOOL	01	NO TREATMENT	
1190023	HOLLY GROVE CHRISTIAN SCHOOL	01	ION EXCHANGE	Iron Removal
		01	ION EXCHANGE	Inorganics Removal
1190024	LANKFORD-SYSCO FOOD SERVICES, INC.	01	HYPOCHLORINATION, PRE	Disinfection
		01	ION EXCHANGE	Softening
1191125	CUSTOM PAK INC.	01 & 02	NO TREATMENT	

Table 5. Treatment Methods

PWSID	SYSTEM NAME	PLANT ID	IOCs (except nitrate)		NITRATE		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
1190007	DEAL ISLAND SCHOOL	01	6	0	13	0	7	0	1	0
1190009	EDEN HEAD START	01	6	0	23	0	4	0	2	0
1190011	MARION SARAH PEYTON ELEMENTARY	01	7	0	16	0	9	0	3	0
1190018	ROBERT JOHNSON HEALTH CENTER	01	12	0	17	0	7	0	2	0
1190019	SOMERSET COMMUNITY SERVICES	01	8	0	19	0	7	0	1	0
1190021	J M TAWES CAREER & VO-TECH CENTER	01	7	0	16	0	7	0	2	1*
1190022	SOMERSET 6TH & 7TH INTERMEDIATE SCHOOL	01	7	0	16	0	7	0	1	0
1190023	HOLLY GROVE CHRISTIAN SCHOOL	01	5	0	13	0	8	0	4	0
1190024	LANKFORD-SYSCO FOOD SERVICES, INC.	01	6	0	25	0	7	0	2	0
		02	5	0	15	0	4	0	2	0
1191125	CUSTOM PAK INC.	01	2	0	6	0	5	0	1	1*
		02	2	0	4	0	5	0	1	0

Table 6. Summary of Water Quality Results

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

PWSID	PWS NAME	PLANT ID	CONTAMINANT	SMCL (ppm)	SAMPLE DATE	RESULT (ppm)	COMMENTS
1190007	**DEAL ISLAND SCHOOL**	**01**	**IRON**	**0.3**	**22-Jan-98**	**1.33**	**Finished**
1190009	**EDEN HEAD START**	**01**	**IRON**	**0.3**	**4-May-00**	**1.55**	**Raw (Well 1)**
		01	**IRON**	**0.3**	**24-Feb-03**	**1.34**	**Raw (Well 1)**
		01	**MANGANESE**	**0.05**	**24-Feb-03**	**0.06**	**Raw (Well 1)**
1190011	MARION SARAH PEYTON ELEMENTARY	01	**IRON**	**0.3**	**4-Nov-96**	**0.78**	**Finished**
		01	IRON	0.3	17-Mar-99	0.17	Finished
		01	**IRON**	**0.3**	**2-Feb-05**	**4.41**	**Raw (Well 1)**
1190018	ROBERT JOHNSON HEALTH CENTER	01	IRON	0.3	4-Dec-95	0.21	Raw (Well 1)
		01	IRON	0.3	21-May-98	0.25	Finished
		01	IRON	0.3	2-Mar-99	0.22	Finished
		01	IRON	0.3	10-Jul-02	0.17	Raw (Well 1)
1190019	**SOMERSET COMMUNITY SERVICES**	**01**	**IRON**	**0.3**	**21-May-98**	**0.31**	**Raw**
		01	**IRON**	**0.3**	**2-Feb-05**	**0.55**	**Raw**
		01	**IRON**	**0.3**	**19-Jul-05**	**3.35**	**Raw**
1190021	**J M TAWES CAREER & VO-TECH CENTER**	**01**	**CHLORIDE**	**250**	**2-Feb-05**	**276.9**	**Raw (Well 1)**
1190022	**SOMERSET 6TH & 7TH INTERMEDIATE SCHOOL**	**01**	**CHLORIDE**	**250**	**2-Feb-05**	**376.3**	**Raw (Well 1)**
1190024	LANKFORD-SYSCO FOOD SERVICES, INC.	02	IRON	0.3	27-May-03	0.17	Finished

Table 7a. Unregulated IOCs Detected Above 50% of their Respective Secondary MCLs

PWSID	PWS NAME	PLANT ID	CONTAMINANT *	Lower Proposed MCL (pCi/L)	SAMPLE DATE	RESULT (pCi/L)
1190007	DEAL ISLAND SCHOOL	01	RADON-222	300	14-May-03	220
1190009	EDEN HEAD START	01	RADON-222	300	26-Mar-03	295
		01	RADON-222	300	14-May-03	350

Table 7b. Radon-222 Results above 50% of its Lower Proposed MCL

PWSID	PWS NAME	PLANT ID	CONTAMINANT	MCL (ppb)	SAMPLE DATE	RESULT (ppb)
1190021	**J M TAWES CAREER & VO-TECH CENTER**	**01**	**DI(2-ETHYLHEXYL) PHTHALATE**	**6**	**22-Sep-03**	**11.2**
1191125	CUSTOM PAK INC.	01	DI(2-ETHYLHEXYL) PHTHALATE	6	7-Dec-04	3.5

Table 7c. Synthetic Organic Compounds Detected Above 50% of the MCL

Note: Results in bold are greater than their respective MCLs

* Nontransient noncommunity water systems are currently not regulated for radionuclides including radon-222

PWSID	PWS / 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)
1190011	MARION SARAH PEYTON ELEMENTARY WELL 1	19-Dec-02	0	DRY	19-Dec-02	16	6.9	12	-2.2	-2.2
1190023	HOLLY GROVE CHRISTIAN SCHOOL WELL 1	20-Dec-02	0.5	WET	20-Dec-02	14	7	8.9	-2.2	-2.2
	HOLLY GROVE CHRISTIAN SCHOOL WELL 2	20-Dec-02	0.5	WET	20-Dec-02	15	6.3	8.9	-2.2	-2.2

Table 8. Raw Water GWUDI Test Results for Unconfined Aquifer Wells

PWSID	PWS NAME	No. of Samples	No. of Positive Samples	Disinfection Treatment?
1190007	DEAL ISLAND SCHOOL	40	0	YES
1190009	EDEN HEAD START	61	1	NO
1190011	MARION SARAH PEYTON ELEMENTARY	38	1	NO
1190018	ROBERT JOHNSON HEALTH CENTER	42	2	YES
1190019	SOMERSET COMMUNITY SERVICES	37	0	NO
1190021	J M TAWES CAREER & VO-TECH CENTER	38	1	NO
1190022	SOMERSET 6TH & 7TH INTERMEDIATE SCHOOL	38	1	NO
1190023	HOLLY GROVE CHRISTIAN SCHOOL	39	3	NO
1190024	LANKFORD-SYSCO FOOD SERVICES, INC.	39	1	YES
1191125	CUSTOM PAK INC.	9	0	NO

Table 9. Routine Bacteriological Monitoring Results from System Distributions Since 1996

PWSID	SYSTEM NAME	Is the Water System Susceptible to….			
		Regulated Inorganic Compounds (including arsenic & nitrate)	Volatile Organic Compounds	Synthetic Organic Compounds	Microbiological Contaminants
1190007	DEAL ISLAND SCHOOL	NO	NO	NO	NO
1190009	EDEN HEAD START	NO	NO	NO	NO
1190011	MARION SARAH PEYTON ELEMENTARY	NO	NO	NO	NO
1190018	ROBERT JOHNSON HEALTH CENTER	NO	NO	NO	NO
1190019	SOMERSET COMMUNITY SERVICES	NO	NO	NO	NO
1190021	J M TAWES CAREER & VO-TECH CENTER	NO	NO	NO	NO
1190022	SOMERSET 6TH & 7TH INTERMEDIATE SCHOOL	NO	NO	NO	NO
1190023	HOLLY GROVE CHRISTIAN SCHOOL	NO	NO	NO	NO
1190024	LANKFORD-SYSCO FOOD SERVICES, INC.	NO	NO	NO	NO
1191125	CUSTOM PAK INC.	NO	NO	NO	NO

Table 10. Susceptibility Analysis Summary

* Based on the lower proposed MCL of 300 pCi/L for radon-222

PWSID	SYSTEM NAME	POPULATION
1190007	DEAL ISLAND SCHOOL	152
1190009	EDEN HEAD START	200
1190011	MARION SARAH PEYTON ELEMENTARY	280
1190018	ROBERT JOHNSON HEALTH CENTER	65
1190019	SOMERSET COMMUNITY SERVICES	105
1190021	J M TAWES CAREER & VO-TECH CENTER	215
1190022	SOMERSET 6TH & 7TH INTERMEDIATE SCHOOL	419
1190023	HOLLY GROVE CHRISTIAN SCHOOL	278
1190024	LANKFORD-SYSCO FOOD SERVICES, INC.	250
1191125	CUSTOM PAK INC.	85
	TOTALS	2049

Table 11. System Population Estimates

Figures

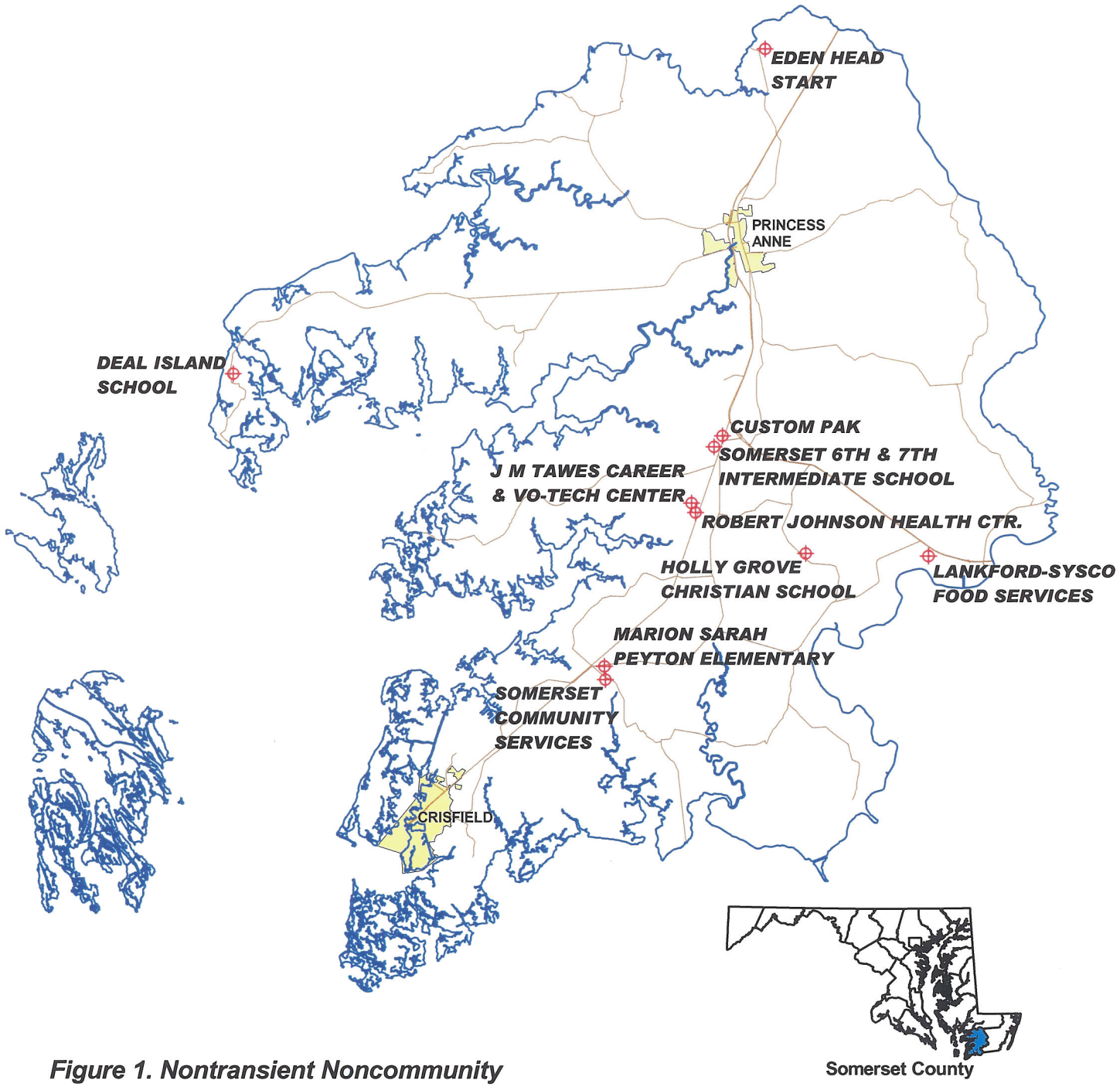


Figure 1. Nontransient Noncommunity Water Systems in Somerset County, MD

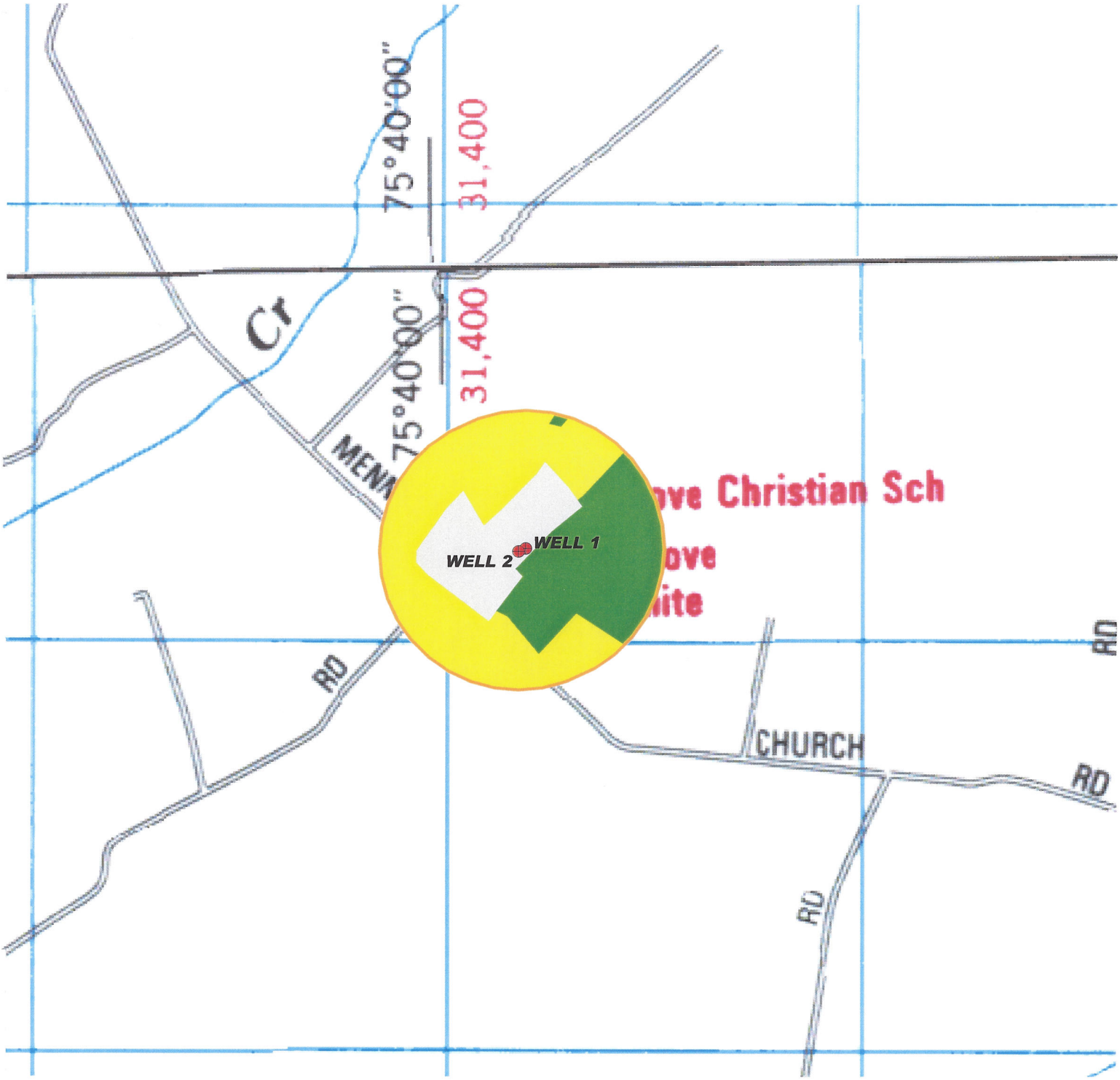


Figure 3a. Land Use in the Holly Grove Christian School Wellhead Protection Area

LEGEND

- Supply Wells
- Wellhead Protection Area (Pocomoke Aquifer)

Somerset County Land Use

- Commercial
- Cropland
- Forest

N

1000 0 1000 Feet

Base Maps: MD Dept. of Planning 2002 Land Use Map, and ADC Digital Map for Somerset County

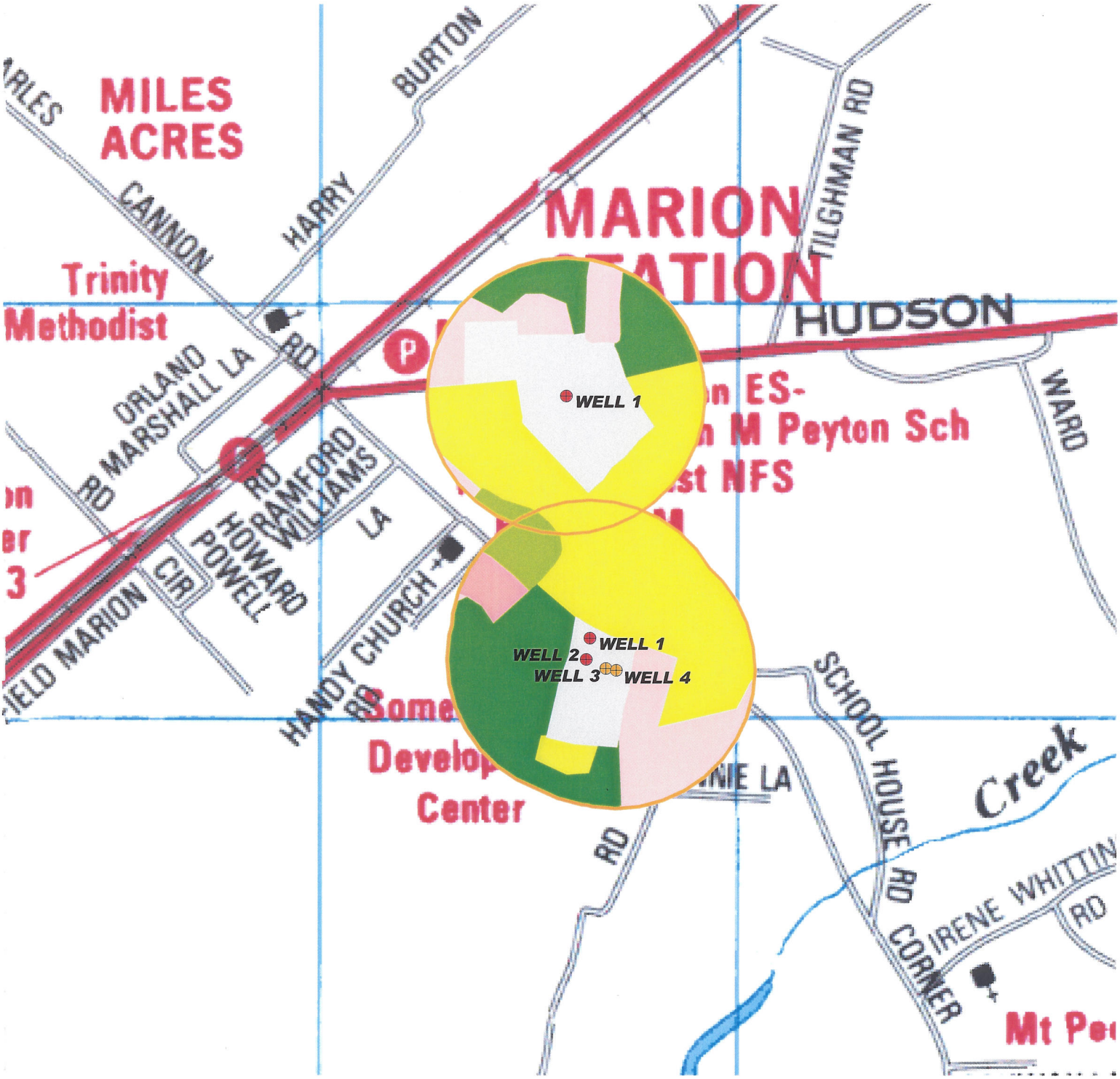


Figure 3b. Land Use in the Marion Sarah Peyton Elementary School & Somerset Community Services Wellhead Protection Areas

LEGEND

Wells

- Other Use Wells
- Supply Wells
- Wellhead Protection Areas (Pocomoke Aquifer)

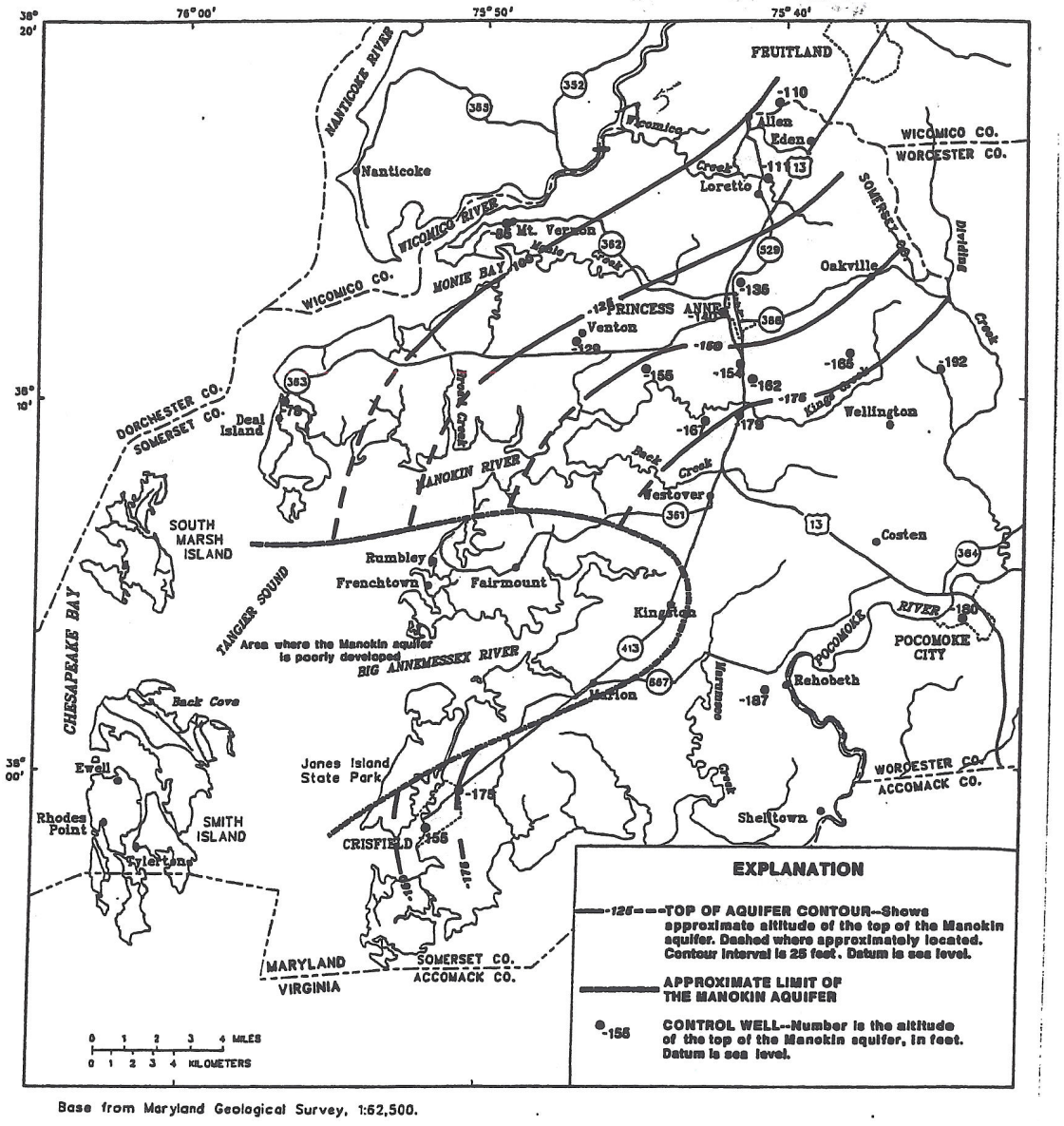
Somerset County Land Use

- Low Density Residential
- Medium Density Residential
- Commercial
- Cropland
- Pasture
- Forest

N

1000 0 1000 Feet

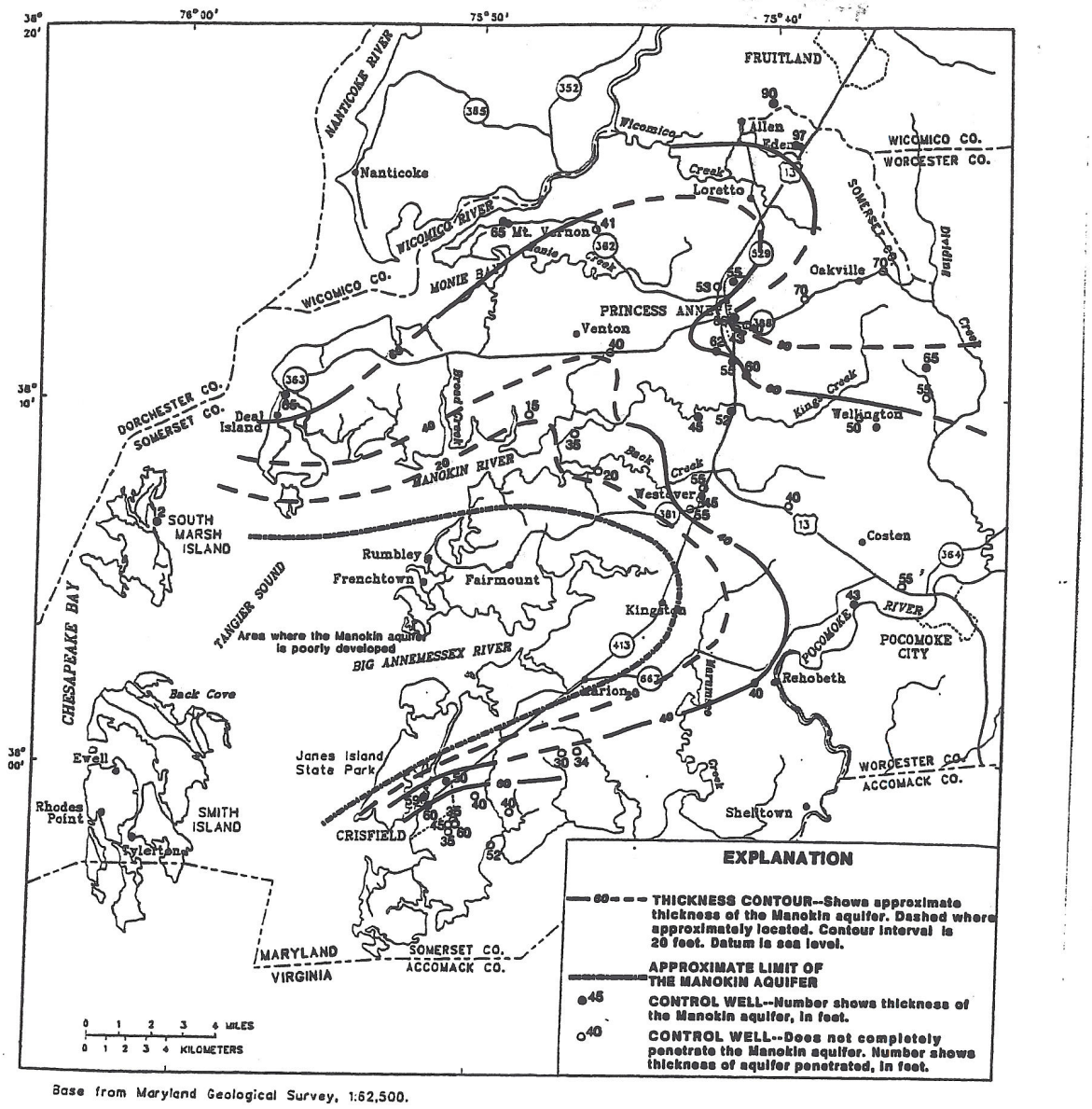
Base Maps: MD Dept. of Planning 2002 Land Use Map, & ADC Digital Map for Somerset County



Base from Maryland Geological Survey, 1:62,500.

Figure 4. Altitude of the top of the Manokin aquifer

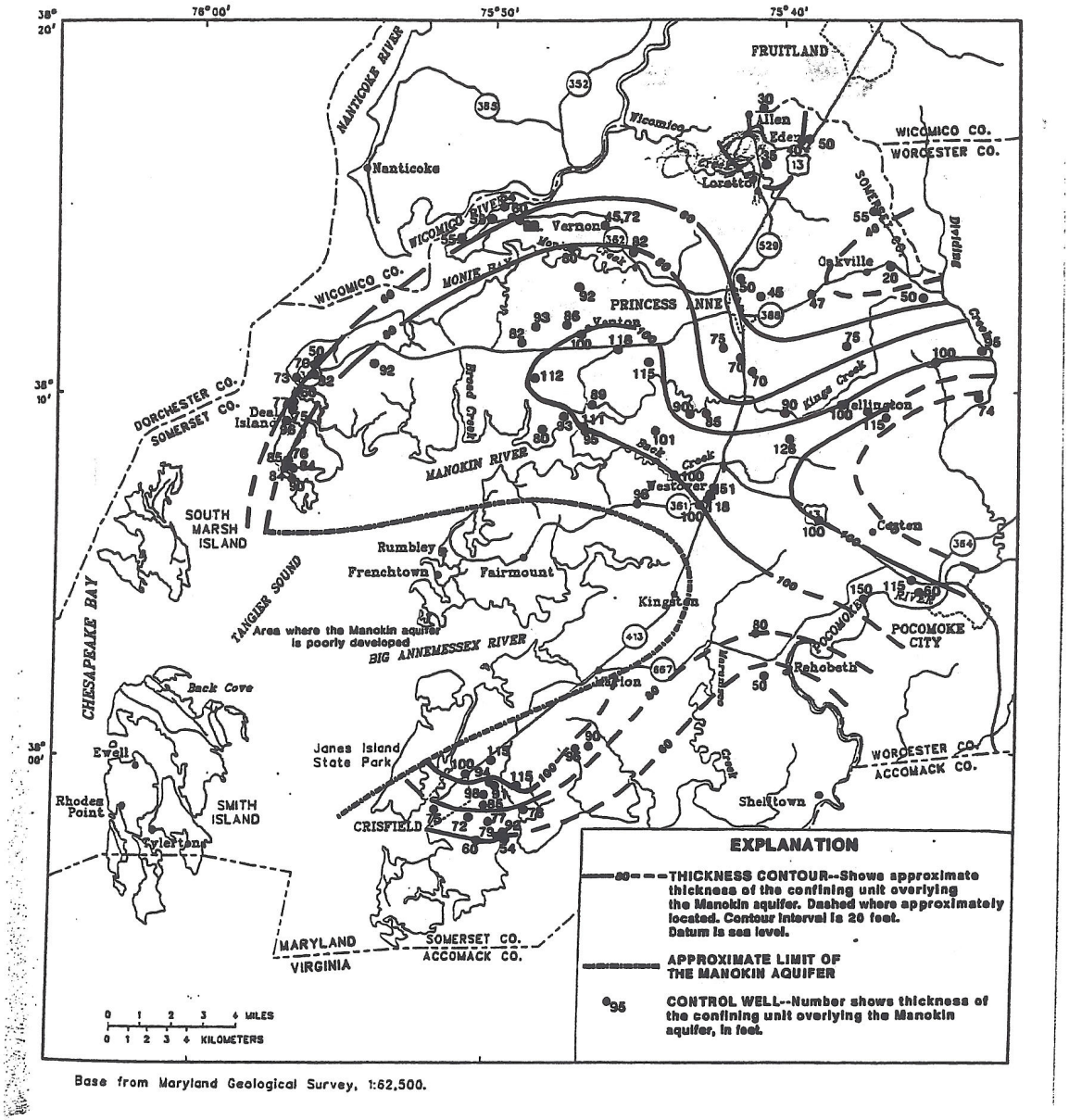
MGS BUL 35



Base from Maryland Geological Survey, 1:62,500.

Figure 5. Thickness of the Manokin aquifer

MGS BUL 35



Base from Maryland Geological Survey, 1:62,500.

Figure 6. Thickness of the confining unit overlying the Manokin aquifer

MGS BUL 35

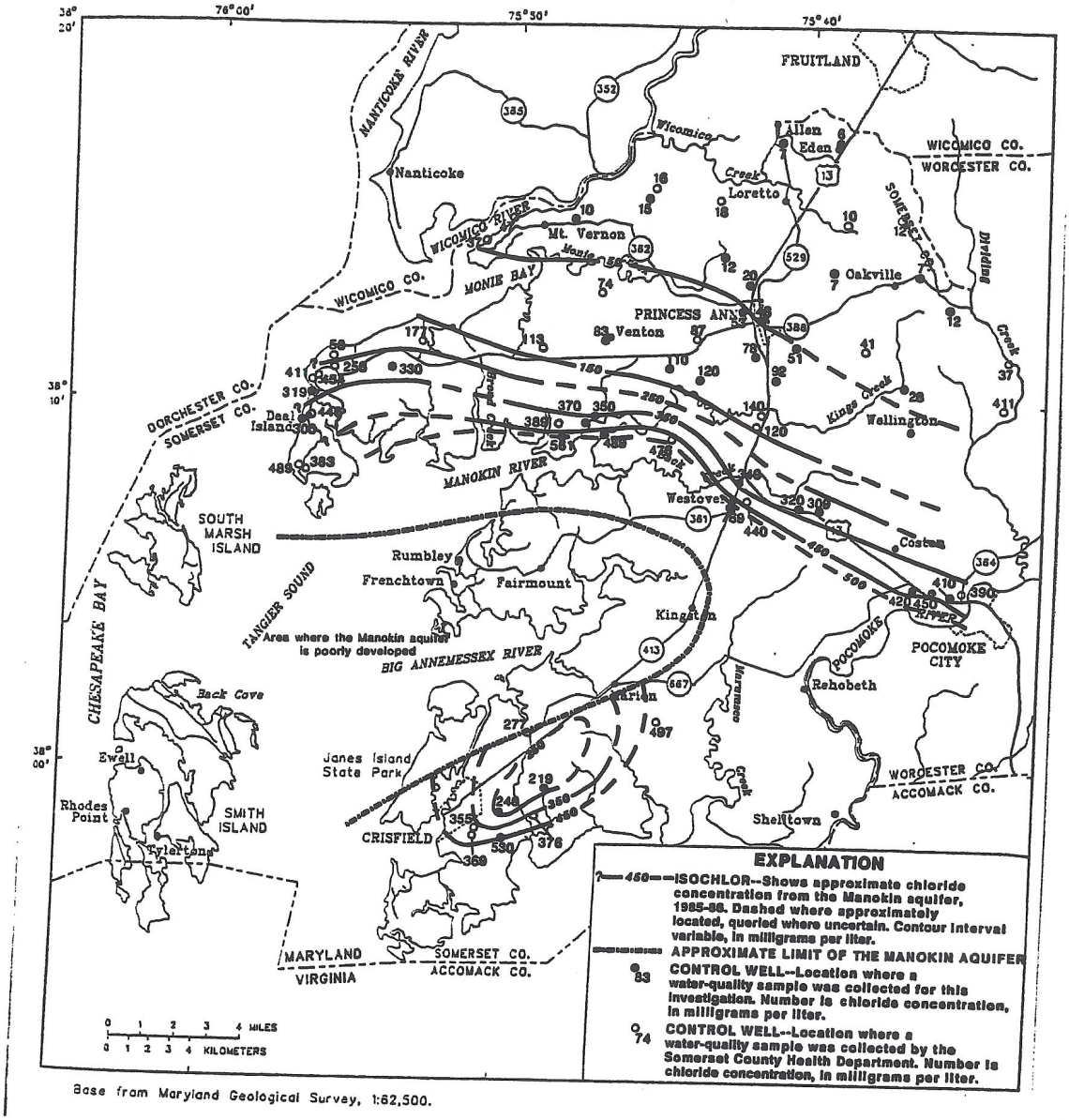


Figure 7. Chloride concentration in water from the Manokin aquifer, 1985-86

MGS BUL 35

APPENDICES

Appendix B

Summaries of open cases near the Somerset County Nontransient Noncommunity WHPAs from the MDE Oil Control Program

CASE NO.	NAME	LOCATION	STATUS AS OF FEBRUARY 2006
05-0651SO	Westover Goose Creek Exxon (a.k.a. Cato Oil)	9010 Ocean Highway	Toluene and chloroform were detected in the supply well at this facility. A preliminary site investigation revealed extremely high levels of petroleum product in the soils and shallow ground water beneath the USTs that were removed. This is indicative of tank leaks, and/or overfills. The case is now under investigation by the MDE Oil Control Program's Remediation Division, who will be requiring a detailed site assessment.
06-0435SO	Richard's Exxon	8976 Ocean Highway	Cato Oil recently purchased the property from Richard's Exxon, and had a preliminary independent investigation of the subsurface performed. Borings revealed soil and shallow ground water contamination on the property. The case was re-opened and is now being reviewed by the Oil Control Program's Remediation Division to determine what course of action to take.

MDE Oil Control Program Open Cases near Somerset County NTNC Wellhead Protection Areas

Appendix C

General information of sites with possible soil, and shallow aquifer ground water contamination concerns near the Somerset County Nontransient Noncommunity WHPAs from the MDE Waste Management Administration

MD-453
Somerset County

1965	Chesapeake Bay Plywood purchased the site.
mid-1970s	Purported disposal of hard resin waste.
1985-1986	Purported disposal of hard resin waste.
1987	Plywood facility closed with RCRA oversight.
	Final disposal of hard resin waste at landfill.
1988	Chesapeake Wood Treating Company purchased inactive site.
1990	MDE apprized of buried drums of CCA waste.
1991	New chip mill erected.
1992	MDE requested EPA to place facility on the Comprehensive Environmental Response, Compensation and Liability Information System list.
1993	Universal Companies, Inc. purchased the wood treatment facility.
	Preliminary Assessment prepared; MDE found no on-site contaminated soils or significant waste disposal areas and identified no sources of groundwater or surface water contamination.

CHESAPEAKE WOOD TREATING SITE
Pocomoke, Maryland

Site Location

The inactive Chesapeake Plywood facility was one of three modules comprising the original Chesapeake Wood Treating site. The site is located in Pocomoke City in southern Somerset County on the Eastern Shore of Maryland. The site covers approximately 2.0 acres on the west side of U.S. Route 13, just north of the Pocomoke River. Pocomoke City lies just across the river to the southeast.

The site consisted of: (a) a 1-story steel structure approximately 200 feet by 250 feet that housed a plywood production operation, (b) a series of concrete bins that housed logs to be made into plywood, (c) a series of non-contact cooling water holding ponds, (d) paved and gravel parking lots and roadways, and (e) associated sheds housing groundwater recovery pumps.

Site History

Before 1965, the Chesapeake Wood Treating site was used for residential and farming purposes. In 1965, Chesapeake Bay Plywood, Inc. purchased the site from private parties, constructed a chip mill and began operating a plywood facility soon after. The mill received tree-length stems by truck, cut off peeler logs for the wood plant and chipped the rest. The chipped material was moved by barge to a paper mill in West Point, Virginia. On the return trip, the barges brought peeler logs to Pocomoke when they were available. A new chip mill was erected on the site in 1991.

The plywood facility generated waste phenolic formaldehyde resin glue that hardened into a solid form. During the period it operated (1965 to 1987), the plywood facility purportedly disposed of the hard resin three times: in the mid 1970s, in 1985-1986 and when the operation closed in 1987. The last disposal consisted of 42 cubic yards of waste material placed in a municipal landfill.

Resource Conservation and Recovery Act (RCRA) documents indicate that wastes generated by closure of the plywood facility in 1987 were properly disposed. Asbestos and all electrical equipment containing or contaminated with polychlorinated biphenyls were properly removed from the site. Underground storage tanks were removed in coordination with the Maryland Department of the Environment's (MDE) Oil Control Program.

In 1988, the Chesapeake Wood Treating Company purchased the inactive Chesapeake Plywood, Inc. site. Thus Chesapeake Corporation, the parent company, owned and operated three adjacent facilities: the plywood operation, the wood chipping operation, and the copper chromated arsenic (CCA) wood treating operation.

In November 1990, the MDE was apprized that drums of CCA waste reportedly were moved from the wood treatment area to the wood chipping area and buried as a means of disposal when the wood treatment plant ceased operations. The wood treatment plant and the potential burial of CCA waste are being addressed by RCRA enforcement officials.

Universal Companies, Inc. of Grand Rapids, Michigan purchased the wood treatment facility from Chesapeake Corporation in 1993 and planned at that time to close the plant.

Environmental Investigations

On March 27, 1992, MDE's Waste Management Administration requested that the U.S. Environmental Protection Agency (EPA), as a result of a Comprehensive Environmental Response, Compensation and Liability Act site discovery efforts, place the Chesapeake Wood Treating Company on the Comprehensive Environmental Response, Compensation and Liability Information System list.

In November 1993, MDE's Waste Management Administration conducted a *Preliminary Assessment* of the plywood facility to collect sufficient information about the site to evaluate the potential for release of hazardous waste from the site. On the basis of the Preliminary Assessment, MDE concluded that there were significant targets associated with the site. Over 6,000 people relied on groundwater within four miles of the site. Over 25 miles of wetlands frontage on the surface water pathway contained several endangered species, a unique ecosystem, a state forest, and known fisheries and hunting grounds.

MDE reported, however, that no actual sources were identified that could contribute to groundwater or surface water contamination and noted that no contaminated soils or significant waste disposal areas were found on the site. MDE reported that it suspected no release of hazardous substances to the air from the Chesapeake Plywood site. MDE concluded that no evidence was found that suggested a release of the resin glue, the primary potential contaminant, to the environment, although the burial of the primary waste could not be ruled out entirely because the adjoining sister facility was suspected of questionable waste disposal practices.

Current Status

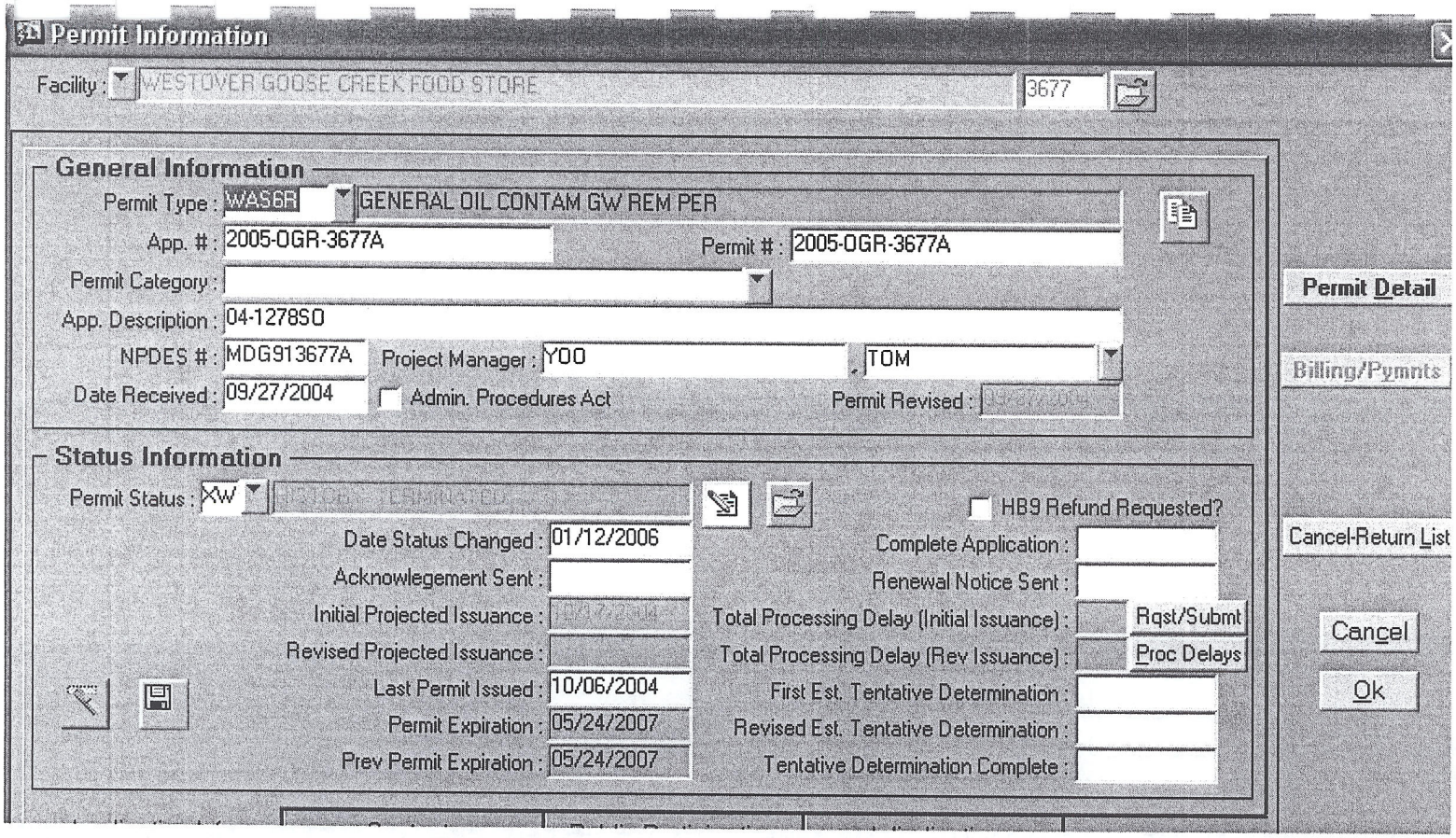
This site is on the State Master List that identifies potential hazardous waste sites in Maryland. The Master List includes sites currently identified by the EPA's Comprehensive Environmental Response, Compensation and Liability Information System. EPA has given the site a designation of No Further Remedial Action Planned. The designation of No Further Remedial Action Planned 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	410-537-3493

Appendix D

Database summaries of industrial discharge permit sites located within and near WHPAs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Permit Revised :
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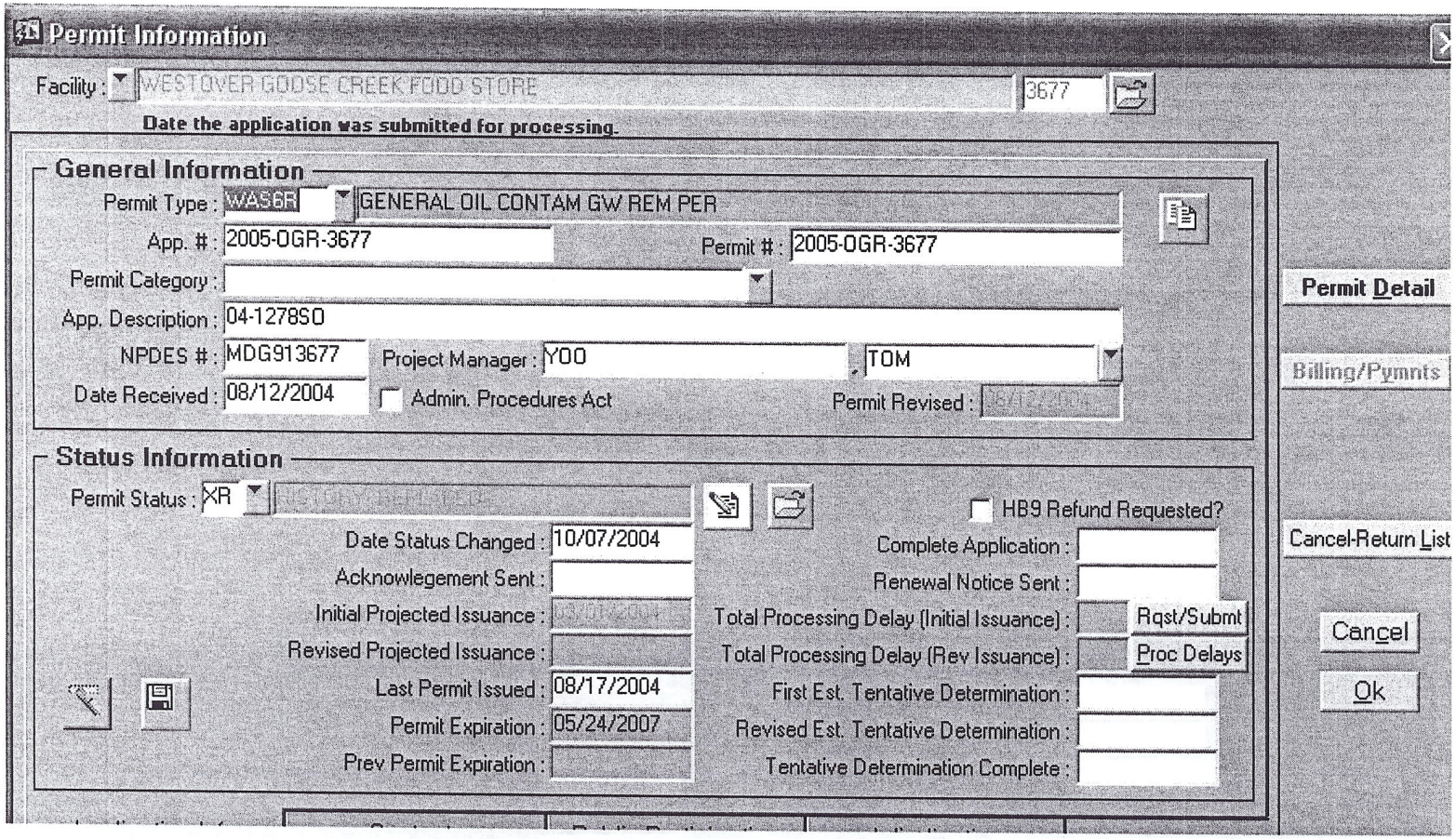
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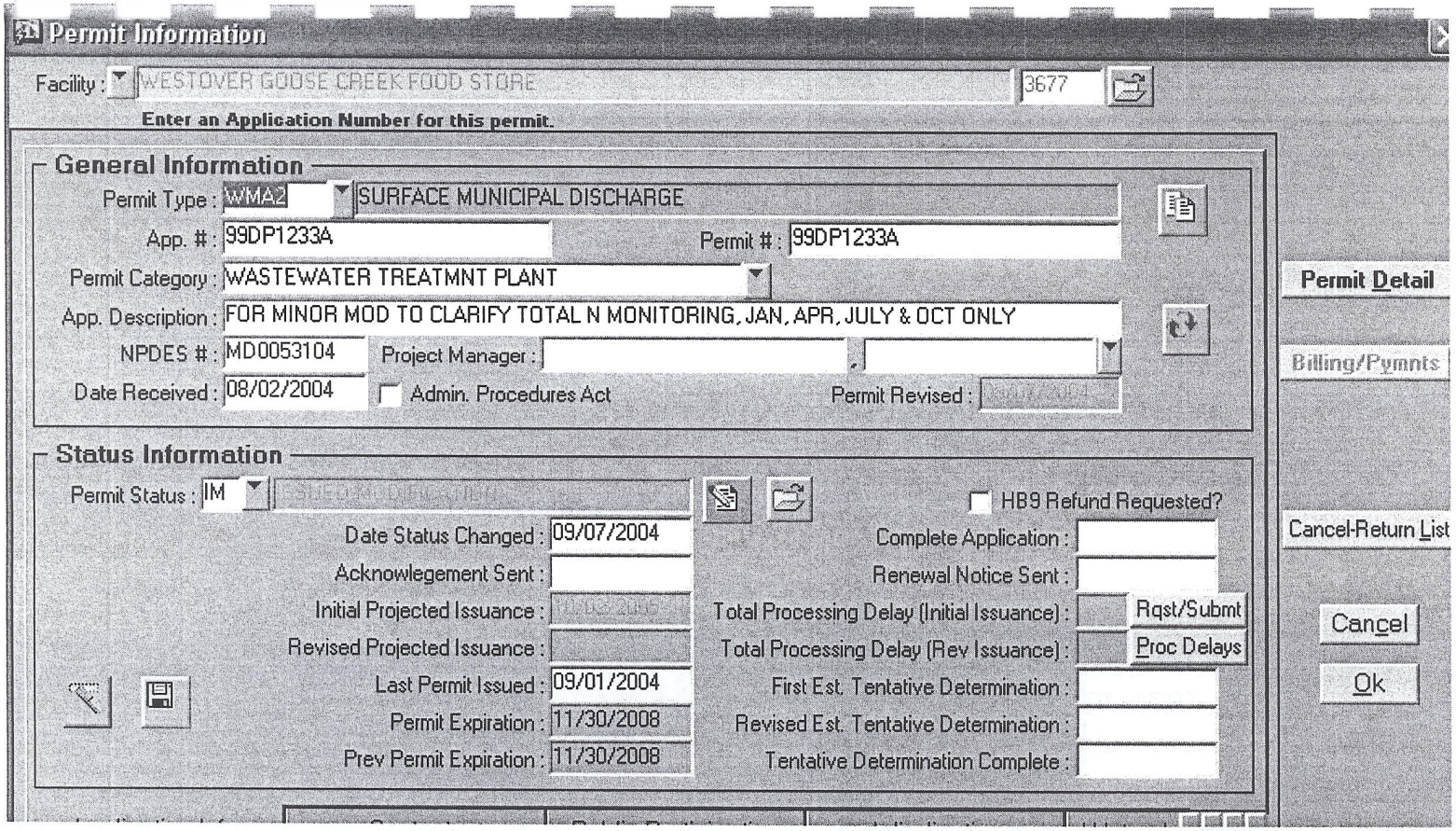

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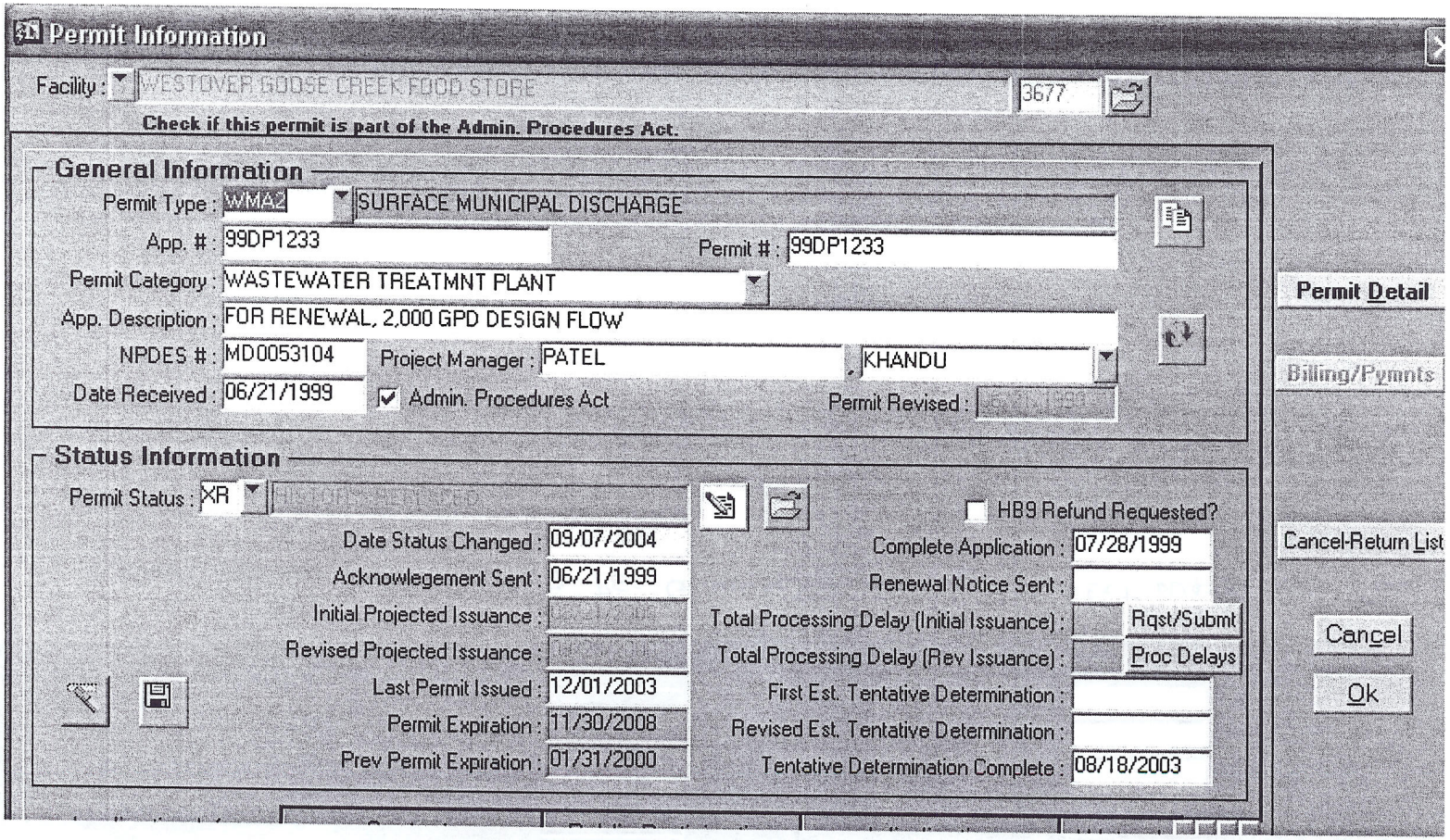
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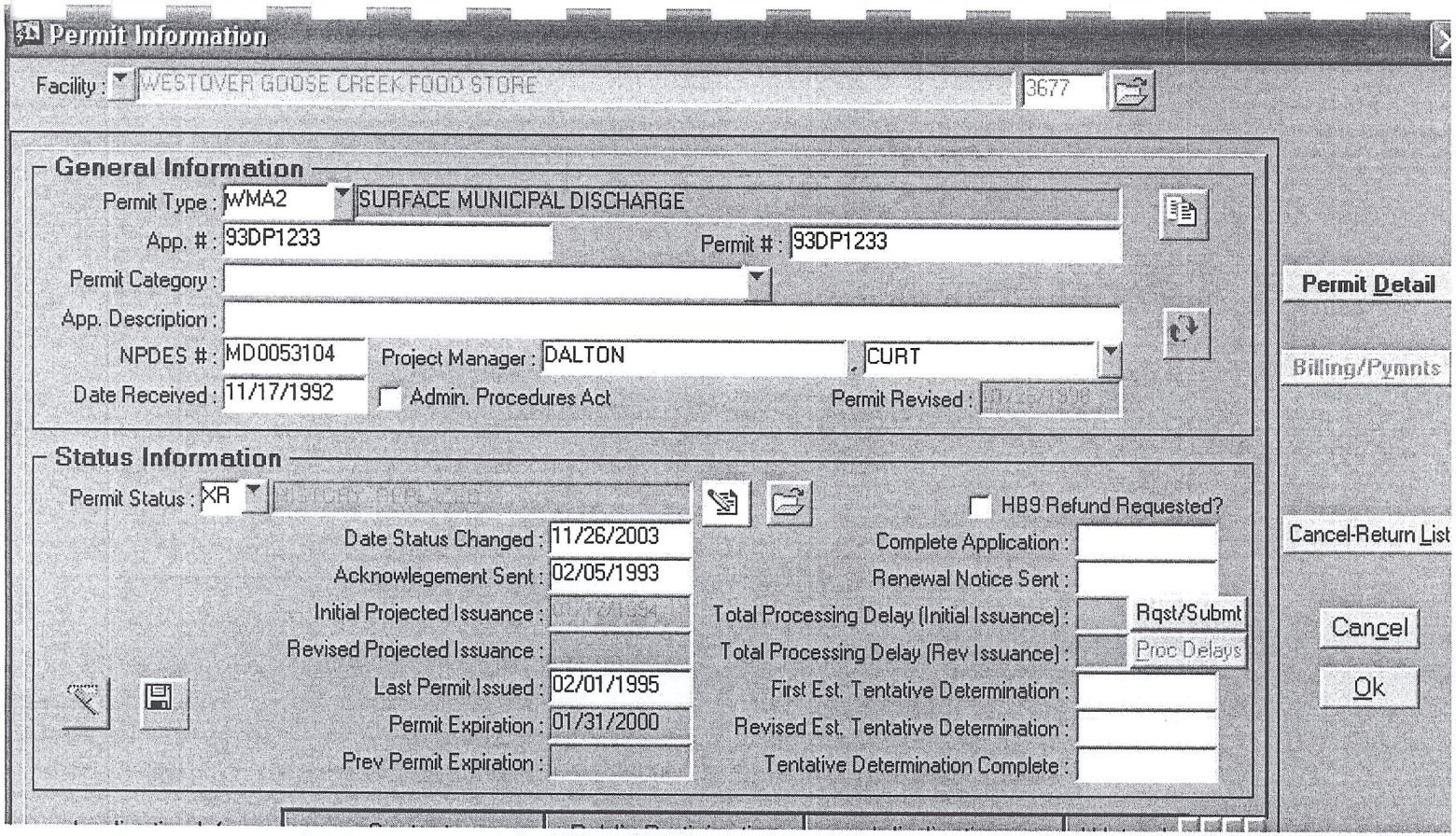
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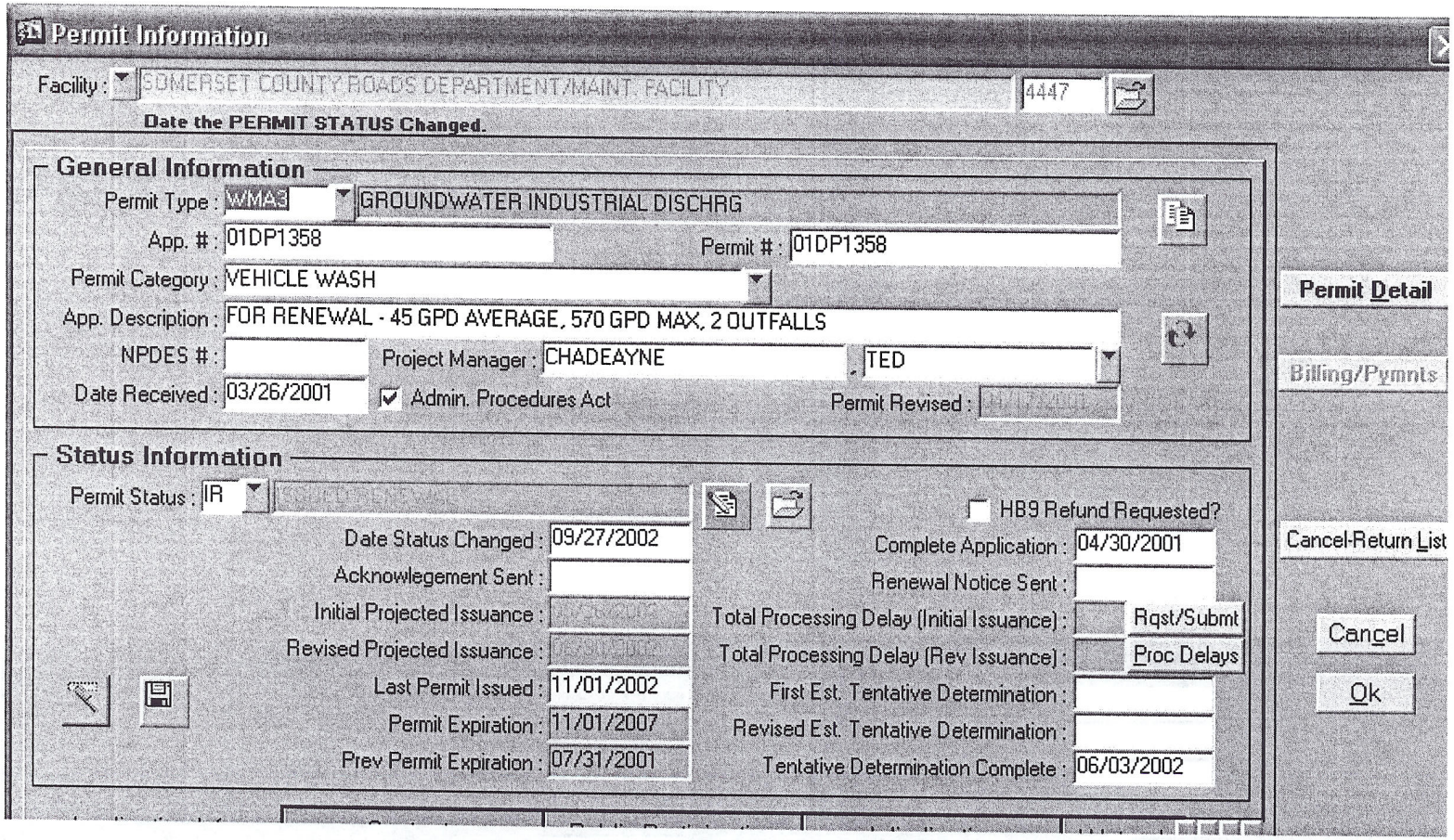

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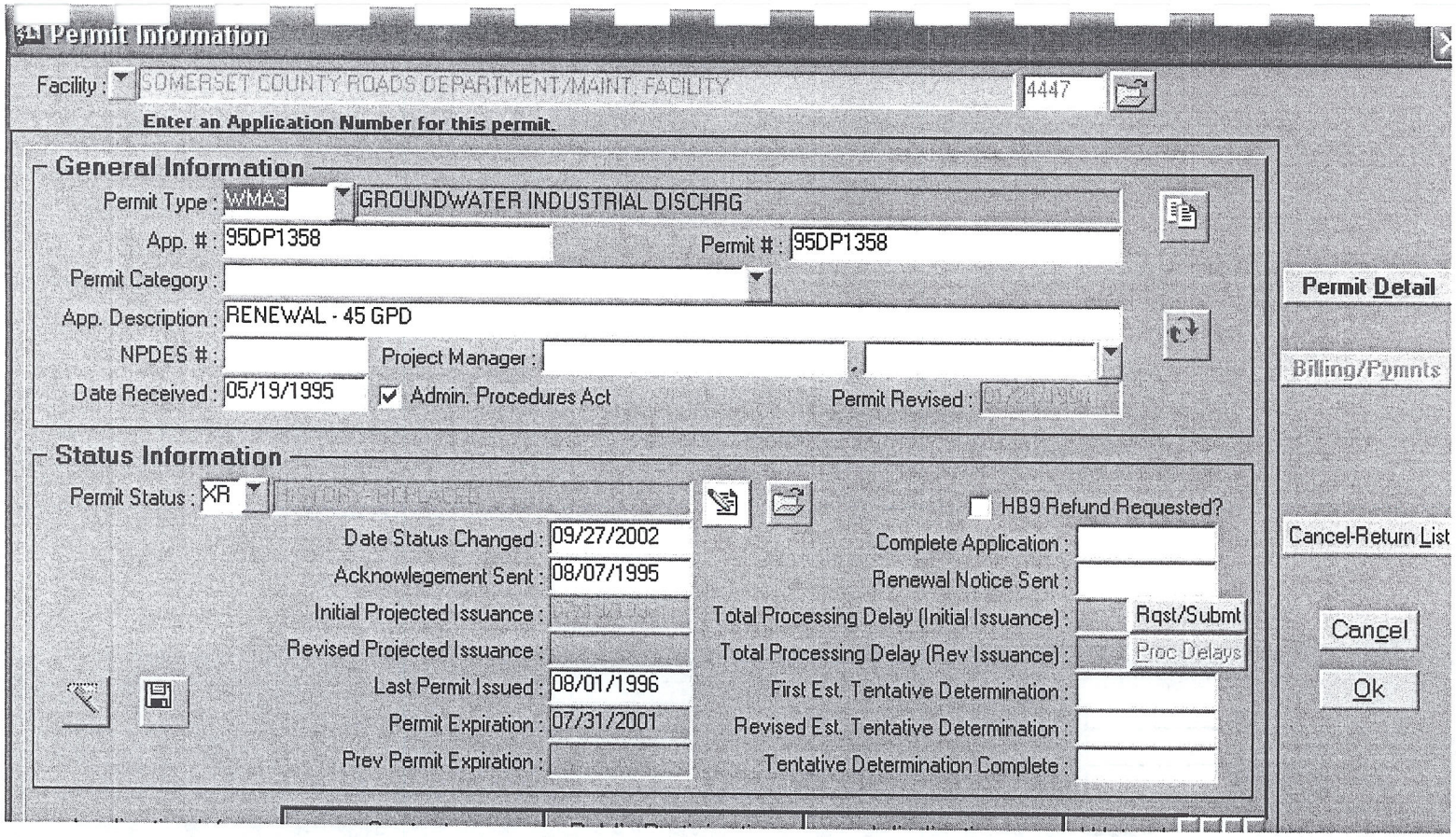
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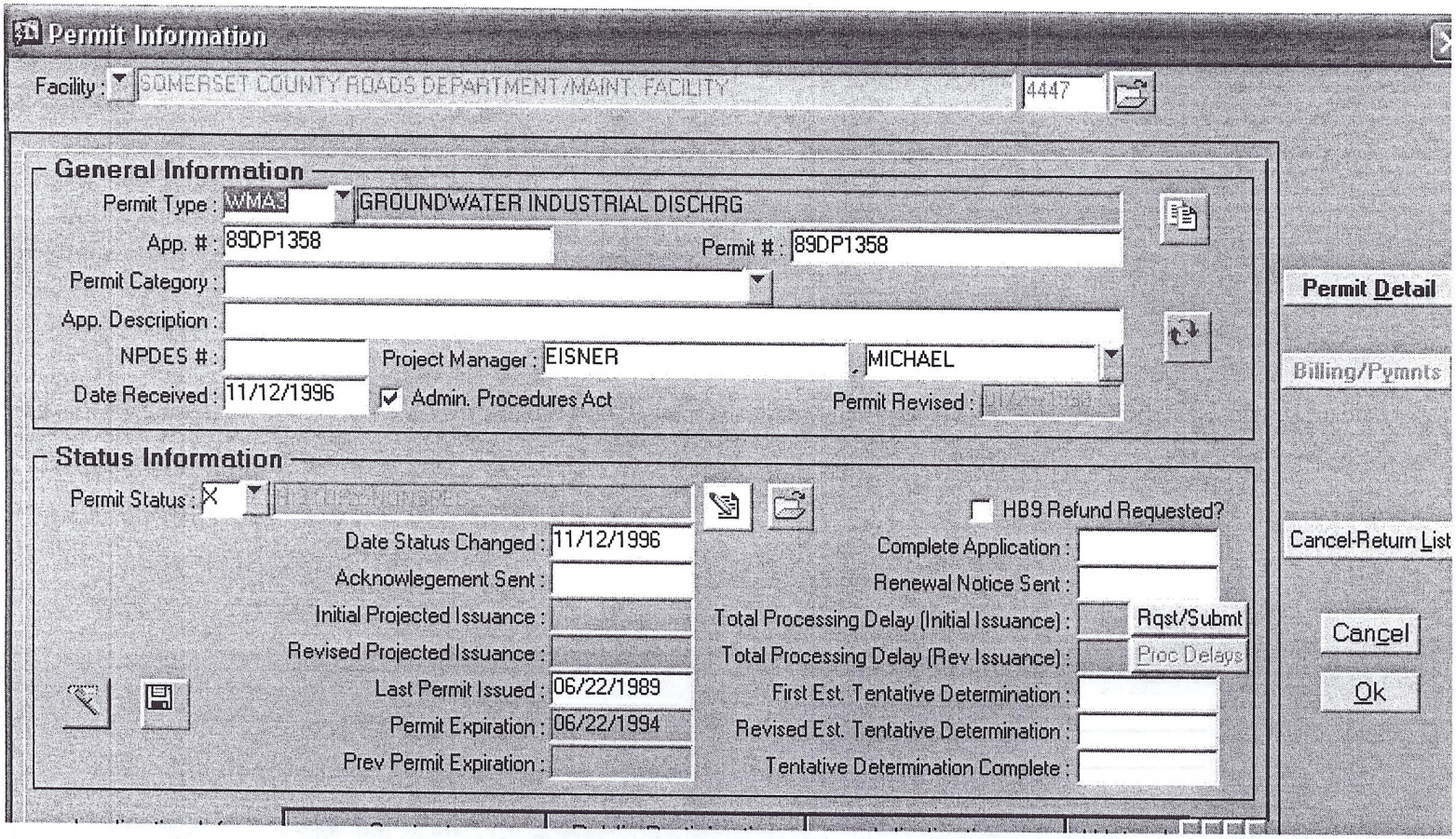
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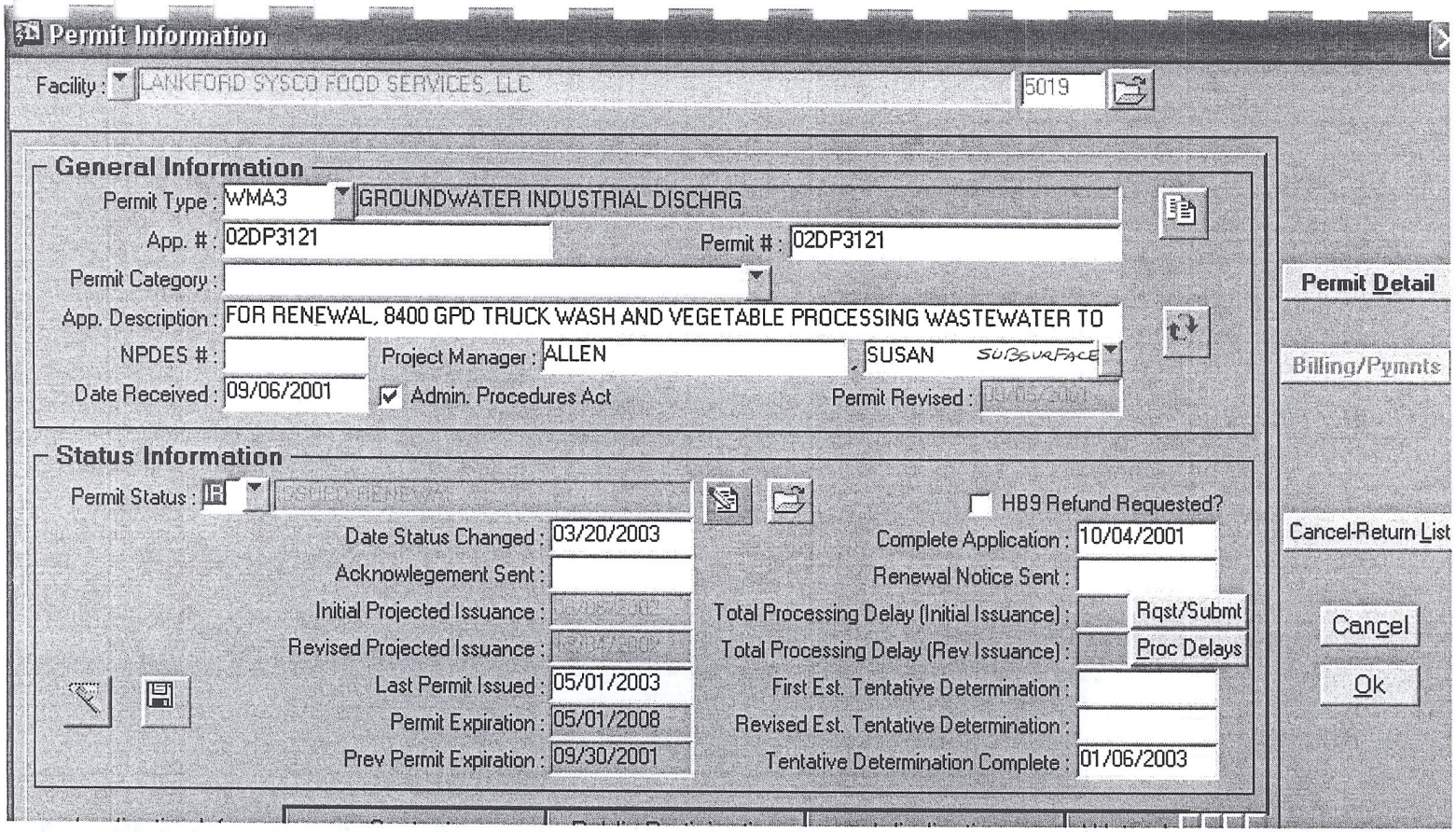

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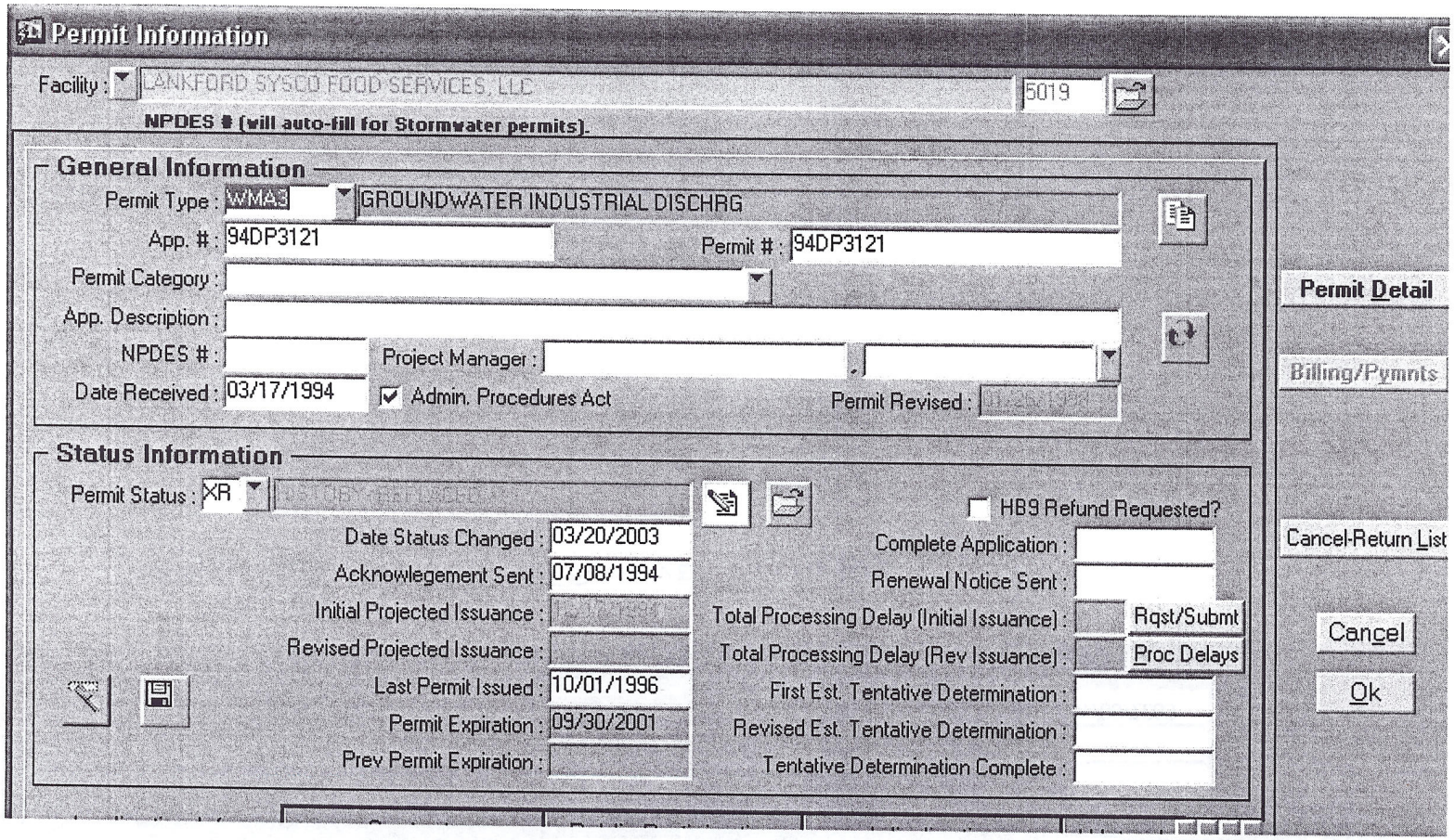
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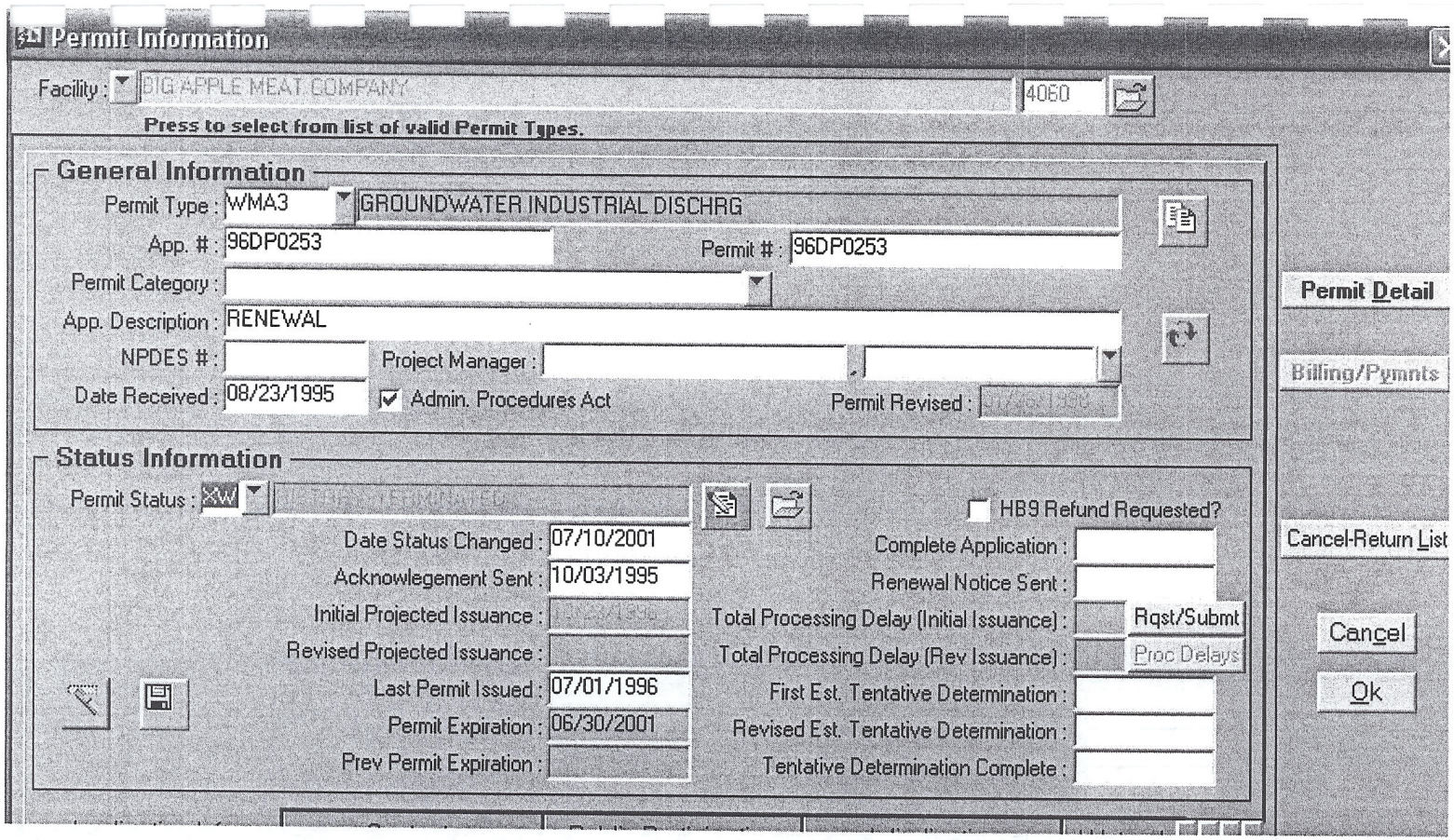
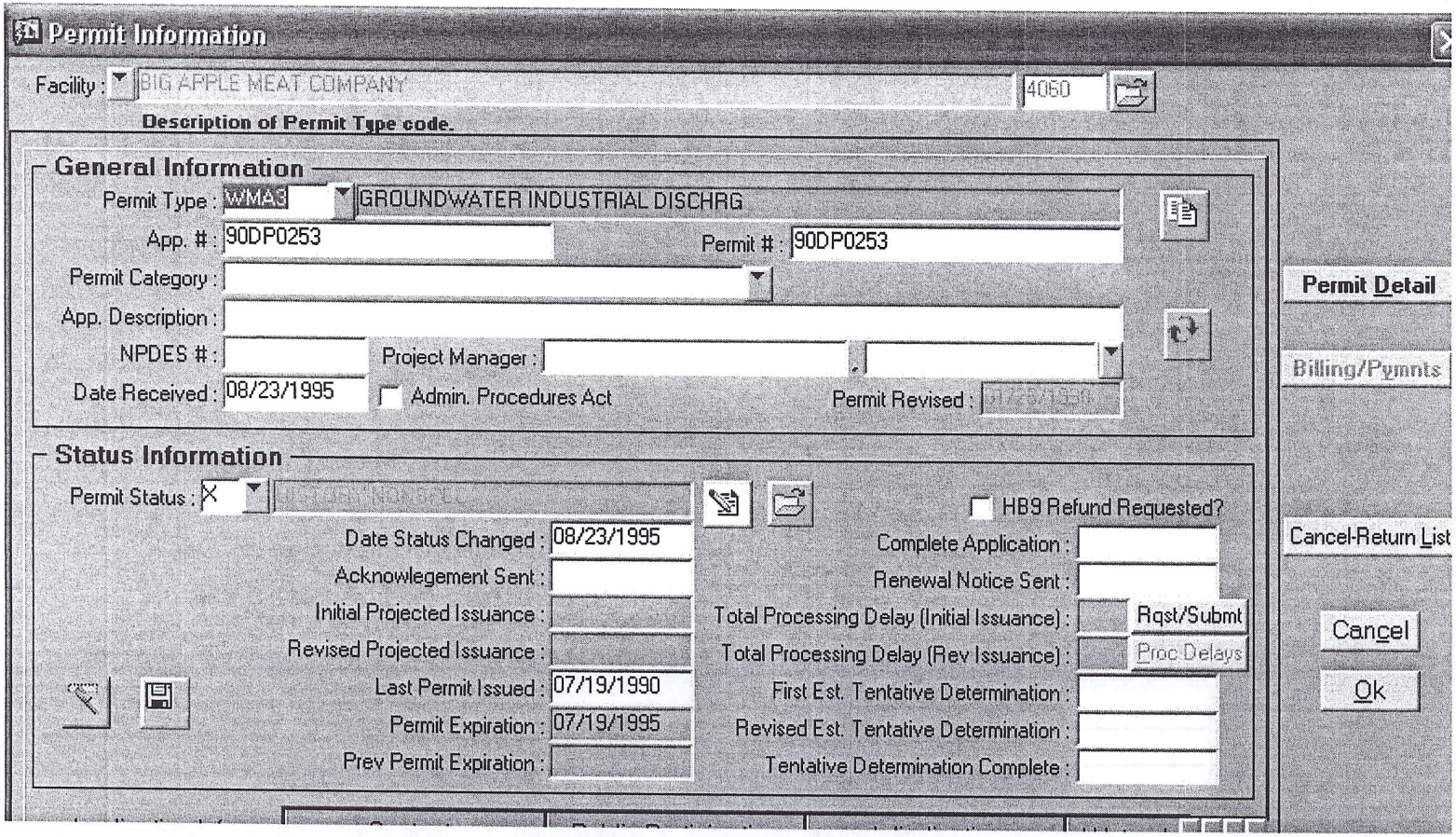
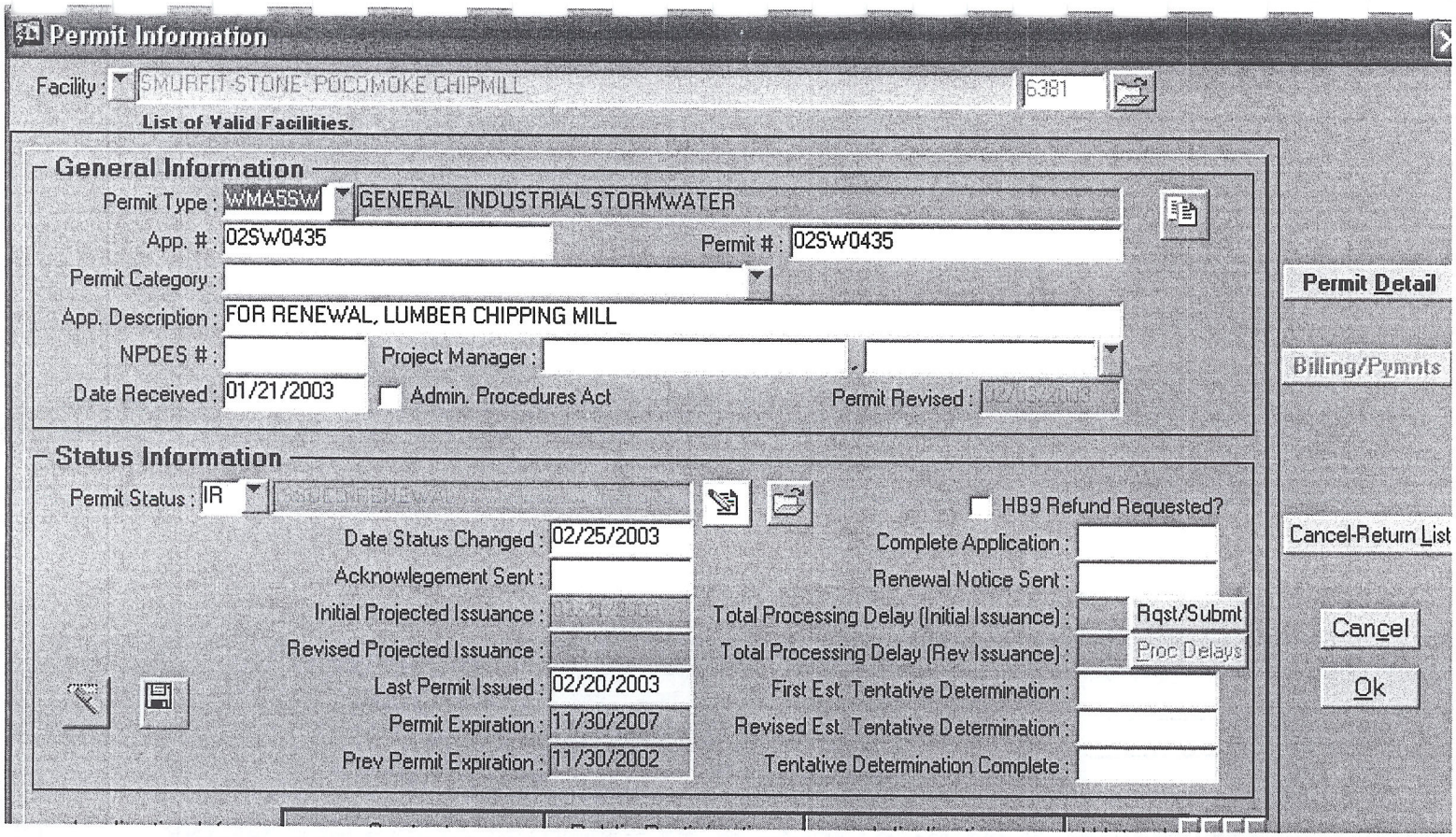
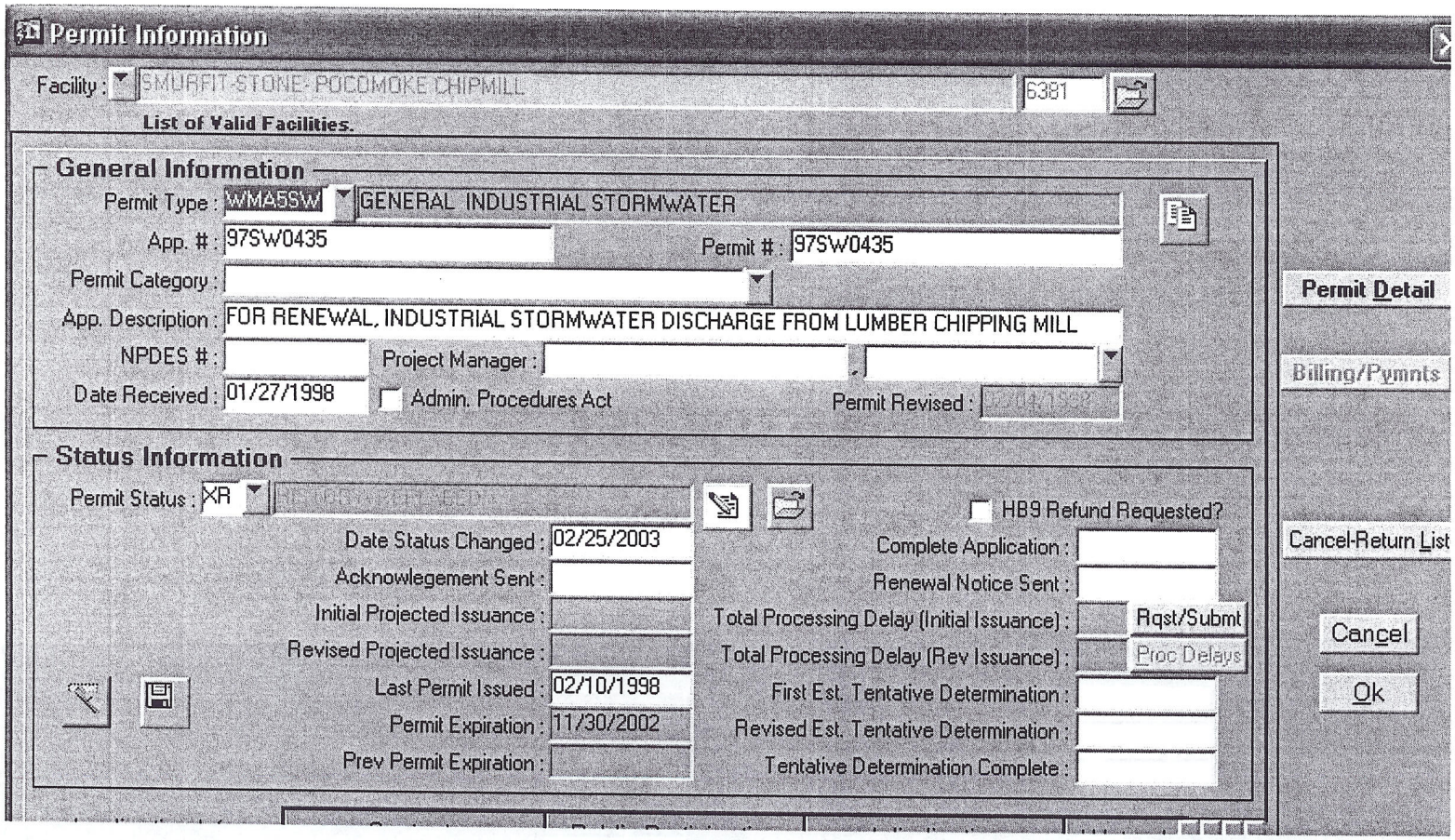
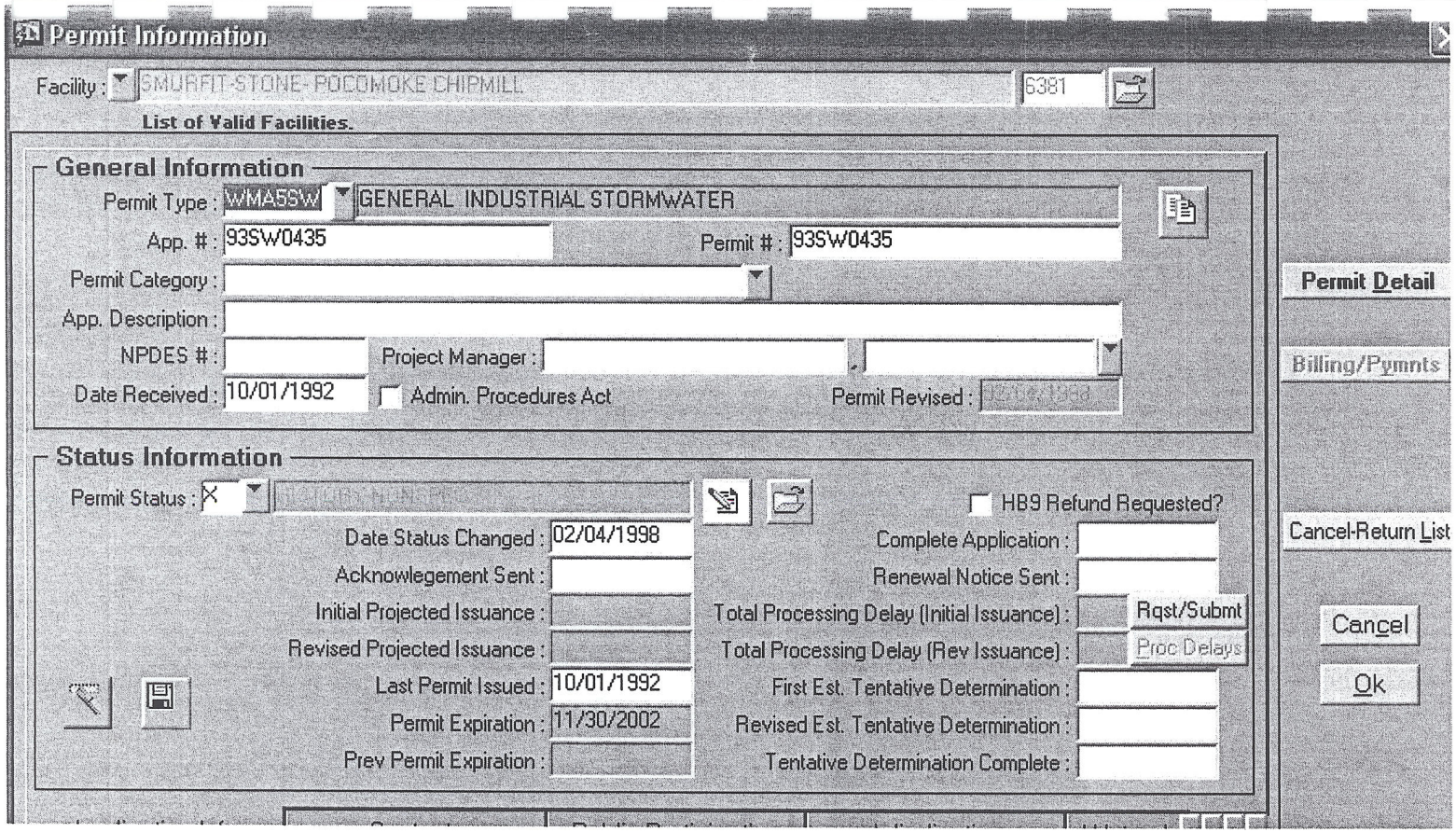
XR
HB9 Refund Requested?
Date Status Changed :
03/20/2003
Acknowlegement Sent :
07/08/1994
Initial Projected Issuance :
Revised Projected Issuance :
Last Permit Issued :
10/01/1996
Permit Expiration :
09/30/2001
Prev Permit Expiration :
Complete Application :
Renewal Notice Sent :
Total Processing Delay (Initial Issuance) :
Rqst/Submt
Total Processing Delay (Rev Issuance) :
Proc Delays
First Est. Tentative Determination :
Revised Est. Tentative Determination :
Tentative Determination Complete :
Permit Detail
Billing/Pymnts
Cancel-Return List
Cancel
Ok


Permit Information
Facility : BIG APPLE MEAT COMPANY
4060
Press to select from list of valid Permit Types.
General Information
Permit Type : WMA3
GROUNDWATER INDUSTRIAL DISCHRG
App. # : 96DP0253
Permit # : 96DP0253
Permit Category :
App. Description : RENEWAL
NPDES # :
Project Manager :
Date Received : 08/23/1995
Admin. Procedures Act
Permit Revised :
Permit Detail
Billing/Pymnts
Status Information
Permit Status : XW
HB9 Refund Requested?
Date Status Changed : 07/10/2001
Acknowlegement Sent : 10/03/1995
Initial Projected Issuance :
Revised Projected Issuance :
Last Permit Issued : 07/01/1996
Permit Expiration : 06/30/2001
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 Information
Facility :
BIG APPLE MEAT COMPANY
4060
Description of Permit Type code.
General Information
Permit Type :
WMA3
GROUNDWATER INDUSTRIAL DISCHRG
App. # :
90DP0253
Permit # :
90DP0253
Permit Category :
App. Description :
NPDES # :
Project Manager :
Date Received :
08/23/1995
Admin. Procedures Act
Permit Revised :
Status Information
Permit Status :
Date Status Changed :
08/23/1995
Acknowlegement Sent :
Initial Projected Issuance :
Revised Projected Issuance :
Last Permit Issued :
07/19/1990
Permit Expiration :
07/19/1995
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 :
Permit Detail
Billing/Pymnts
Cancel-Return List
Cancel
Ok


Permit Information
Facility :
SMURFIT-STONE- POCOMOKE CHIPMILL
6381
List of Valid Facilities.
General Information
Permit Type :
WMASSW
GENERAL INDUSTRIAL STORMWATER
App. # :
02SW0435
Permit # :
02SW0435
Permit Category :
App. Description :
FOR RENEWAL, LUMBER CHIPPING MILL
NPDES # :
Project Manager :
Date Received :
01/21/2003
Admin. Procedures Act
Permit Revised :
Status Information
Permit Status :
IR
HB9 Refund Requested?
Date Status Changed :
02/25/2003
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 :
02/20/2003
First Est. Tentative Determination :
Permit Expiration :
11/30/2007
Revised Est. Tentative Determination :
Prev Permit Expiration :
11/30/2002
Tentative Determination Complete :
Permit Detail
Billing/Pymnts
Cancel-Return List
Cancel
Ok


Permit Information
Facility : SMURFIT-STONE- POCOMOKE CHIPMILL
6381
List of Valid Facilities.
General Information
Permit Type : WMA5SW GENERAL INDUSTRIAL STORMWATER
App. # : 97SW0435
Permit # : 97SW0435
Permit Category :
App. Description : FOR RENEWAL, INDUSTRIAL STORMWATER DISCHARGE FROM LUMBER CHIPPING MILL
NPDES # :
Project Manager :
Date Received : 01/27/1998
Admin. Procedures Act
Permit Revised :
Status Information
Permit Status : XR
HB9 Refund Requested?
Date Status Changed : 02/25/2003
Acknowlegement Sent :
Initial Projected Issuance :
Revised Projected Issuance :
Last Permit Issued : 02/10/1998
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 :
Permit Detail
Billing/Pymnts
Cancel-Return List
Cancel
Ok


Permit Information
Facility :
SMURFIT-STONE- POCOMOKE CHIPMILL
6381
List of Valid Facilities.
General Information
Permit Type :
WMA5SW
GENERAL INDUSTRIAL STORMWATER
App. # :
93SW0435
Permit # :
93SW0435
Permit Category :
App. Description :
NPDES # :
Project Manager :
Date Received :
10/01/1992
Admin. Procedures Act
Permit Revised :
Status Information
Permit Status :
HB9 Refund Requested?
Date Status Changed :
02/04/1998
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 :
10/01/1992
First Est. Tentative Determination :
Permit Expiration :
11/30/2002
Revised Est. Tentative Determination :
Prev Permit Expiration :
Tentative Determination Complete :
Permit Detail
Billing/Pymnts
Cancel-Return List
Cancel
Ok