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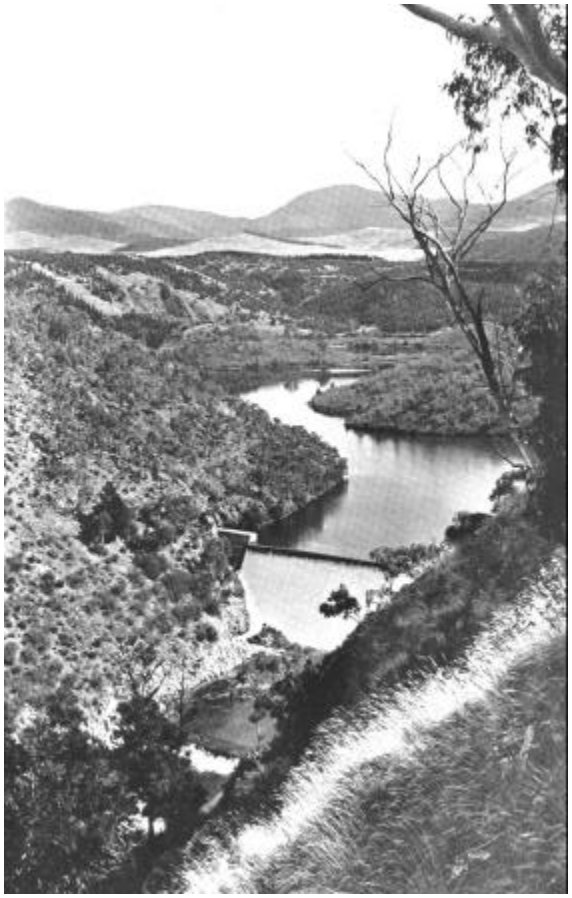
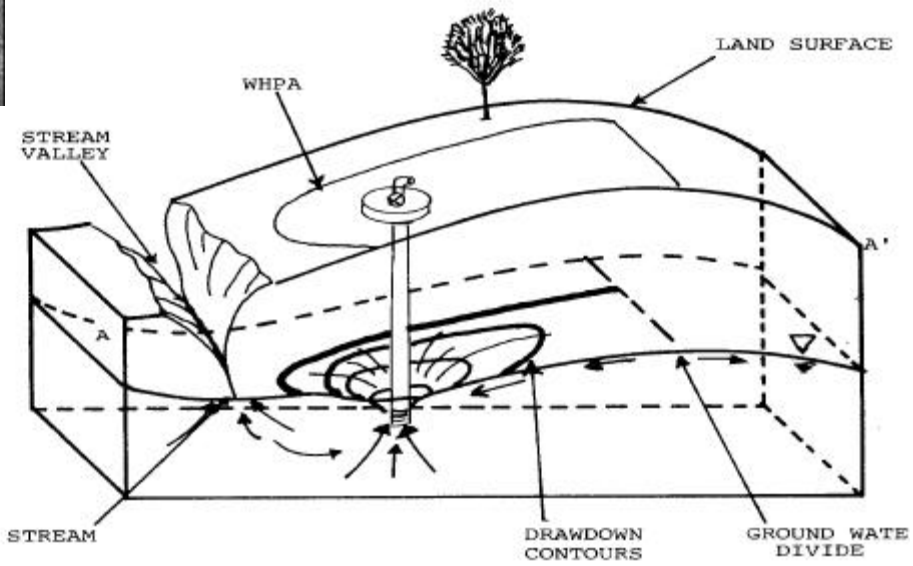


SOURCE WATER ASSESSMENT

PROGRAM PLAN



NORTH CAROLINA DEPARTMENT OF ENVIRONMENT & NATURAL RESOURCES

Division of Environmental Health - Public Water Supply Section

October 21, 1999

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Chapter 1 North Carolina=s Source Water Assessment Program

1.1 Introduction

Pollution prevention is becoming an increasingly important strategy for protection of the environment. Pollution prevention is also recognized as the most effective approach for ensuring a reliable, long-term, and safe supply of public drinking water at a reasonable cost to consumers. For the protection of public drinking water supplies relying on ground water in North Carolina, the state has an EPA approved, voluntary Wellhead Protection Program administered by the Public Water Supply Section of the Division of Environmental Health. North Carolina also has a Water Supply Watershed Protection program for the protection of public water systems relying on surface water. This program, administered by the Division of Water Quality, is implemented by local governments through zoning ordinances consistent with minimum statewide criteria. Watersheds designated as Water Supply (WS) are subject to comprehensive rules that protect the quality of that source of water. North Carolina's source water protection strategy is to build upon existing programs and activities with a program that is **non-regulatory**, state implemented, and incentives driven.

1.2 Safe Drinking Water Act Amendments of 1996

The Federal Safe Drinking Water Act (SDWA) Amendments of 1996 emphasize pollution prevention to ensure safe drinking water, focusing on the protection of both surface water and ground water sources. This approach relies upon two key elements: a clear state lead in program development and management, and a strong ethic of public participation. These elements are basic to the development of sound source water protection strategies. The amendments do not confer any new regulatory or enforcement requirements for drinking water source protection on the states.

1.3 Source Water Assessment Program Requirements

Section 1453 of the SDWA Amendments requires that all states establish Source Water Assessment Programs (SWAP), and submit a plan to the Environmental Protection Agency (EPA) by February 6, 1999 detailing how they will:

- delineate source water assessment areas,
- inventory significant contaminants in these areas, and
- determine the susceptibility of each public water supply to contamination.

EPA has published the state Source Water Assessment and Protection Programs Guidance to help states develop SWAP submittals. This guidance describes the required content of a SWAP submittal, federal funds available for completion of the assessments, requirements for public participation, and linkages to other federal programs. North Carolina has up to two years after EPA program approval, and is requesting an extension of an additional one and one-half years, to complete the source water assessments.

Source water assessments will allow the state to systematically address issues of potential contamination of public water supplies using existing data from established environmental programs. It is important to recognize that susceptibility determinations for public water supplies are not risk assessments. In this document, the term "risk" is meant as a descriptive term to indicate relative concern or potential for a contaminant to impact a PWS system.

The SWAP plan is intended to act as a "lens" through which the state can assess priorities in other programs while focusing on the protection of drinking water as a primary goal in water quality management.

1.4 North Carolina's Water Supply Watershed Protection Program

The Environmental Management Commission (EMC) and the Division of Water Quality have administered a Water Supply Protection Program since 1986 for surface water sources of drinking water. Initially, the program was administered voluntarily by counties and municipalities pursuing protective measures for their water supply watersheds. In time, it became apparent that minimum statewide water supply protection measures were necessary. In 1989, the North Carolina General Assembly ratified the Water Supply Watershed Protection Act that mandated the adoption of standards and the classification of all water supply watersheds.

Over 40 informational meetings and workshops were conducted across the state to present the requirements of the legislation and the proposed water supply watershed protection rules. Eight public hearings on the Rules were held across the state in August of 1990 and were attended by over 800 people, with 160 people providing verbal comments. In addition, over 1600 pages of written comments were received. The EMC adopted the Rules in December 1990 and postponed implementation until the watershed classifications were completed.

The state worked with local governments in determining the location of all surface water intakes and existing land use within the water supply watersheds. This information, in conjunction with information on the types and location of wastewater discharges, was used to determine the appropriate classification the 208 surface water intakes in the state. Twelve public hearings were held on the watershed reclassifications during 1991 to receive public comments. The EMC brought the Water Supply Watershed Protection (WSWP) Rules with proposed modifications back to public hearing. Over 2,400 people attended the public hearings with more than 400 making verbal comments. Over 3,000 written comments were received. The WSWP Rules were adopted in 1992. The state's administrative code section 15A NCAC 2B .0200 Classification and Water Quality Standards Applicable to Surface Water and Wetlands of North Carolina includes the complete WSWP rules. For a copy of these rules contact the Division of Water Quality, Water Quality Section at 919-733-5083.

The 1992 WSWP Rules require that all local governments having land use jurisdiction within water supply watersheds adopt and implement water supply watershed protection ordinances, maps, and a management plan. Over 40 statewide workshops in cooperation with the Division of Community Assistance were conducted. Additionally, in order to assist local governments, a model ordinance was approved by the Environmental Management Commission on July 9, 1992 This document suggests appropriate language for adopting an ordinance under the general

adoption powers; however, the language is useful for local governments adopting their ordinances as zoning overlay districts and also for local governments implementing the Rules by amending their subdivision regulations. All local governments subject to the regulations have submitted ordinances in compliance with the statutory deadlines.

State staff have met individually with local government officials and planners, and have conducted numerous public information sessions and workshops across the state. During this information exchange, many local governments expressed the need for more flexibility in the administration of the WSWP Program. The Division of Water Quality responded to these concerns by proposing amendments to the Water Supply Watershed Protection Rules to allow more flexibility in the local government watershed protection regulatory process. The amendments were approved by the EMC and became effective on August 1, 1995.

1.5 North Carolina's Wellhead Protection Program

North Carolinians withdraw more than 88 million gallons of ground water per day from more than 11,000 public water supply wells across the state. Ground water is susceptible to pollution from many sources, and, as this resource becomes contaminated, so can public ground water supplies. Many activities on or below the land surface can pollute ground water. Land disposal of wastes, storage and use of hazardous substances in industrial processes and agriculture, poorly designed septic systems, accidental spills, and under ground storage tanks are all sources of ground water pollution in North Carolina.

In 1986, Congress passed amendments to the Safe Drinking Water Act requiring states to develop wellhead protection programs. Wellhead Protection can be broadly defined as a program that reduces the threat to the quality of ground water used for drinking water by identifying and managing recharge areas to specific wells or wellfields. Wellhead Protection is accomplished in part by defining a Wellhead Protection Area. A Wellhead Protection Area is defined as "the surface and subsurface area surrounding a water well or wellfield, supplying a public water system, through which contaminants are likely to move toward and reach such water well or wellfield." In order to protect the wellhead, one must protect the recharge area which supplies the ground water to the well. This is accomplished by delineating a zone in which ground water contamination sources are regulated.

Establishing rules for ground water supply protection is the responsibility of the state in North Carolina. The state believes that the most appropriate level for Wellhead Protection Program (WHP) implementation is at the County level. This level is preferred because counties are authorized to have jurisdiction over land use activities throughout their area including incorporated as well as unincorporated areas. In addition, local governments can adopt appropriate management strategies to reduce potential risks threatening well sites in their areas. Although the County is the preferred agency to develop WHP programs, the state understands that other agencies may also need the authority to develop WHP programs. Agencies that may establish WHP programs include municipalities, water supply systems, and the state.
For those local governments and public water supply systems that choose to establish Wellhead Protection Programs, the Public Water Supply (PWS) Section provides technical assistance in WHP program development and implementation. Assistance includes establishment of WHP

Program criteria and a WHP Program approval process. Assistance also takes the form of guidance and training provided to local governments and public water suppliers. In addition, the Section will review WHP program submittals and issue letters of approval when these submittals meet the requirements of the North Carolina Wellhead Protection Program. Two ground water technician positions with the North Carolina Rural Water Association, and funded by the DWSRF, provide support for wellhead protection activities. Additionalinformation regarding North Carolina's WHP Program may be found in **The North Carolina Wellhead Protection Guidebook** available from the Public Water Supply Section, Division of Environmental Health.

Steps Required to Implement the North Carolina Wellhead Protection Program

Planning for Wellhead Protection

A local planning team must be established. It is the responsibility of the planning team to determine how much protection local well systems need. The planning group will usually make recommendations to "owner/operators" of public water supply systems, assist in the development of water supply plans, and propose contingency plans for contamination incidents.

Delineating Wellhead Protection Areas

An area around the well is set aside that will provide protection of each public water supply well. Several methods are available for determining the size and shape of the area.

Inventory of Potential Contamination Sources

Once a protection area around the well is determined, a contaminant source inventory must be taken. The inventory catalogues all potential sources of well contamination found within the protection area.

Managing the Wellhead Protection Area

Potential sources of contamination found within the wellhead protection area must be managed or eliminated. The planning team must decide what methods will be used to protect the Wellhead Protection Area. A broad range of methods, both regulatory and non-regulatory, are available for the management of potential contamination sources.

Administration of the Wellhead Protection Program

Once a Wellhead Protection Program is in place, continued administration of the program is necessary in order for it to be successful. Administration includes the establishment of Wellhead Protection Areas for new wells, periodic well and well site inspection, periodically updating contaminant source inventories, and the review and revision of Wellhead Protection management strategies.

1.6 Coordination of Source Water Assessment Program with Existing Regulatory Programs

SWAPs are not intended to replace existing programs in North Carolina addressing pollution sources. Instead, the assessments will enhance existing programs focusing on safe drinking water

supplies. The integration of SWAP with the wellhead protection program, comprehensive state ground water protection programs and sole source aquifer designations, as well as watershed, nonpoint source, pesticide, waste and other established programs, will help states and localities develop the most effective source water protection plans to avoid costly contamination. In the development of this plan the Public Water Supply Section, as the lead agency for SWAP plan development, established a steering committee with representation from the following regulatory agencies within the Department of Environment and Natural Resources (DENR):

- Division of Waste Management
- Division of Pollution Prevention
- Division of Water Resources
- Division of Water Quality (Water Quality and Groundwater Sections)
- Division of Land Resources
- Division of Soil and Water

During the development of the SWAP plan weekly meetings were held to obtain guidance from a broad perspective. During the implementation of the SWAP the PWS Section will continue to depend on the expertise provided by other agencies within DENR. One specific role of these agencies will be to guide the PWS Section's use of existing DENR databases to characterize potential contaminant sources (PCSs).

1.7 Expected Benefits of Source Water Assessment

One of EPA's reasons for including a significant public participation component in the SWAP development process was providing the interested public with an opportunity to define what they believe to be the potential benefits of source water assessments to consumers. A facilitated discussion of expected benefits of source water assessments took place during the initial Technical and Citizens' Advisory Committee meeting. In general, three types of comments were expressed: 1) benefits to the general public, 2) benefits to local government planning efforts, and 3) benefits to the state's environmental regulatory agency (i.e., DENR). Some examples of comments are included below:

- The SWAP process will increase public awareness of the relationship between human activities and protection of public water supplies. It will help the public understand that they have a role in protecting water supplies.
- The SWAP will enhance understanding by consumers of why protection and treatment strategies are implemented and how they affect water supply pricing/rates.
- The assessments will help local governments make good decisions to improve public health.
- Compiling data into one place can assist DENR and other agencies in improving regulations and programs.
- The data developed and compiled for source water assessments should be treated as a strategic resource.

A complete summary of the discussion is included in Appendix C of this document.

Chapter 2 Source Water Assessments

2.1 SWAP Plan Content

In order to be approved, a state plan needs to contain the following four sections:

- A description of the approach the state will take to implement a SWAP, including the goals for the state SWAP plan consistent with the national goals of protecting and benefiting public water supplies.
- A description of how the state achieved public participation in developing the SWAP plan.
- A description of how the state will make the results of assessments available to the public.
- A description of how the state will implement its chosen approach to the SWAP.

2.2 Description of North Carolina's SWAP Approach

In North Carolina, to meet the requirements of the SDWA Amendments an estimated 8,000 public water supply systems with over 11,000 intakes will undergo a source water assessment. Because of the scope of this task and recognizing the limited time and resources available for completion of the work, source water assessments will be completed in a tiered approach as described in this section. North Carolina's SWAP program efforts will rely heavily on Geographic Information Systems (GIS) to use information effectively. GIS allows databases to be linked to points on a map and overlaid on top of one another, such as public water supply intakes, streams, geology, land use, roads, permitted waste disposal sites, Superfund sites, etc.

All PWS intakes have already been delineated or will be delineated according to the procedures described in Section 2.5 of this chapter. A contaminant inventory will be completed for all PWS intakes as described in Section 2.6. Finally, a determination of susceptibility will be completed as described in Section 2.7. These PWS intakes include community, non-transient non-community, and transient non-community systems as defined and described in Section 2.3.

2.3 Scope of North Carolina's SWAP Efforts

As previously stated all PWS systems in North Carolina will have source water assessments performed. For a water supply system to be considered a public water supply it must serve 15 or more connections or 25 or more people more than 60 days out of the year. If the people served are year-round residents it is a community water system (e.g. towns, subdivisions, mobile home parks, rest homes, prisons) and the state requires approval of the well site and of plans and specifications. If the system does not serve year round residents then the system is a non-community water system. If the same 25 or more people on the water system are served for six months or more then the system is a non-transient non-community (NTNC) water system (e.g. schools, factories, workplaces) and the state requires approval of the well site and of plans and specifications. If the population served by the water system changes more frequently, then the system is a transient non-community (TNC) system (e.g. restaurants, welcome centers, churches) and the state does not require well site and plans and specification approval.

2.3.1 Inventory of Public Water Supply Systems

At the time of submitting this SWAP plan for public comment and review the PWS Section's Inventory of public water supply systems was listed as follows:

Type of PWS System	No. of Systems Surface Water	No. of Systems Ground Water
Community	140	1,940
Non-transient non-community	6	629
Transient non-community	5	5,359
Total	151	7,928

The approximate number of PWS surface water intakes is 245. The approximate number of ground water PWS wells is 11,500. The number of PWS systems and intakes in North Carolina will be verified during the implementation of the SWAP plan.

2.4 North Carolina's Drinking Water State Revolving Fund Intended Use Plan Phase I: Set-Aside Accounts

North Carolina received the full ten percent of its Drinking Water State Revolving Fund (DWSRF) allotment for development and implementation of a SWAP program. The state has completed an Intended Use Plan - Phase I: Set-Aside Accounts, which describes the use of the funds for development and implementation the SWAP plan. The set asides funded by DWSRF but not construction related include: Program Administration, Technical Assistance to Small Systems, Administration of the Public Water Supply Supervision Program, and Local Assistance and Other State Programs (including funding for Wellhead Protection and SWAP activities).

The PWS Section involved stakeholders in a detailed process to determine the priorities for the DWSRF. The five issues determined to have the highest priority for current action in the state are 1) technical assistance, 2) capacity development, 3) delineation and assessment of source water protection areas, 4) transient system compliance, and 5) wellhead protection.

2.5 Delineation of Source Water Assessment Areas

For the purpose of performing source water assessments delineation means defining what land area constitutes the area contributing water to a public water supply intake. Also, this delineated source water area contains the contaminant sources that may potentially be a threat to a drinking water supply. EPA's source water assessment guidance suggests that states with approved Wellhead Protection programs delineate source water areas for ground water PWS systems using methods described in that program. EPA's source water assessment guidance suggests for surface water PWS intakes that states delineate the topographic boundary of the entire watershed area upstream of a PWS system's intake. North Carolina's Water Supply Watershed

Protection rules classify all water supply watersheds. Further explanation of ground and surface water delineation methods is provided in the following two sections of this plan.

2.5.1 Delineation of Surface Water Public Water Supply Sources

As described previously, the state worked with local governments in determining the location of all surface water intakes and existing land uses within the water supply watersheds. This information, in conjunction with information on the types and location of wastewater discharges, was used to determine the appropriate classification of the over 200 surface water intakes in the state.

All surface water intakes were located on the ground and on US Geological Survey topographic quads. The water supply watershed boundaries were delineated (except WS-V waters as previously noted) and the boundaries of the critical and protected areas were delineated and digitized. These data are included in the NC Corporate Database maintained by the Center for Geographic Information and Analysis (See Appendix I, Figures 1,2, and 3). The source water delineations for surface water supplies will include the entire watershed as delineated in the WSWP program for all water supply watersheds.

For protection of the surface water PWS intakes in North Carolina, a segmentation of the water supply watersheds was implemented through the WSWP rules. A critical area (See Appendix H) and protected area (see Appendix H) are delineated for each surface water intake. Within these delineated areas local governments adopt ordinances that limit land uses. For WS-I watersheds, all of the area is considered critical area and the WSWP rules prohibit development in these watersheds. Critical Areas for all other water supply watersheds are defined as the area within mile of the water supply intake measured from the normal pool of elevation for a reservoir or mile and draining to a river intake. For WS- II, and III watersheds the Protected Area is defined as rest of the watershed. However, Protected Areas for WS-IV watersheds are defined as the area within 5 miles and draining to water supplies as measured from the normal pool of elevation for a reservoir or 10 miles upstream and draining to a river intake. In 1995, the state allowed local governments to request that the 10 mile Protected Area of a WS-IV watershed be measured run-of-river rather than a 10 mile arc measurement.

Five surface water PWS intakes in North Carolina are classified as WS-V by the WSWP rules. These WS-V waters are used by industry to supply their employees with drinking water or are waters formerly used as water supply. The WS-V waters are protected as water supplies and are generally upstream of and draining to Class WS-IV waters. There are no categorical restrictions on watershed development or treated wastewater discharges required by the WSWP rules and local governments are not required to adopt watershed protection ordinances. The state has not performed any watershed delineation for these PWS intakes. The PWS Section will be responsible for the delineation of these source waters using the method for delineation of WS-IV watersheds as a model.

2.5.2 Delineation of Ground Water Public Water Supply Sources

For PWS intakes relying on ground water, the delineation of source water assessment areas will be in accordance with North Carolina's EPA approved Wellhead Protection Program. The calculated fixed radius method will be the principal method employed to delineate SWAP assessment areas (A_{SWAP}) around each ground water intake. The calculated fixed radius method

will serve as the minimum or baseline delineation method for the SWAP plan (See Appendix I, Figure 4). More sophisticated methods defined in the Wellhead Protection Program may be employed by the state, local governments or PWS systems in an effort to more accurately define the area contributing water to the well system. The state will review delineations provided by local governments or PWS systems that employ acceptable alternative delineation methods. Resulting alternative delineation areas will be incorporated into the SWAP if the state concludes that the use of the more sophisticated method was appropriate.

The calculated fixed radius method is a simplified method employed in North Carolina's Wellhead Protection Program for calculating the wellhead protection area surrounding a well or wellfield. For the purposes of the SWAP, these assessment areas (A_{SWAP}) are synonymous with wellhead protection areas as defined in the state's Wellhead Protection Program.

Size of the Contributing Area (A_C)

The first step in calculating the SWAP assessment areas is to determine the size of the contributing area (A_C) to the well or wellfield. The contributing area is the land area from which water pumped from the well is derived, and is sometimes referred to as the capture zone. This is also the area through which contaminants can be reasonably expected to move toward and reach the water well or wellfield. The calculated fixed radius method requires only the pumping rate (Q) and the recharge rate (W) for the pumping well in order to calculate the size of the contributing area. The contributing area is calculated as follows:

$$A_C = \frac{Q}{W}$$

where: A_C = contributing area in square miles,
Q = maximum daily pumping rate in gallons per day, and
W = average recharge rate in gallons per day per square mile.

The maximum daily pumping rate in gallons per day is determined from information on well yield and maximum daily length of operation of the well. State regulations require that all public water-supply wells have 24-hour drawdown tests to determine well yield, or the maximum sustained pumping rate possible for a well. Also, state regulations require that the yield of the well provide the average daily demand in 12 hours. The well yield in gallons per minute determined from the drawdown test is multiplied by 720 (number of minutes in 12 hours) to determine the maximum permitted yield in gallons per day. This is equal to the maximum daily pumping rate (Q), assuming that the well is pumped at its yield 12 hours per day. Information regarding average recharge rates will be derived from published information.

Size of the SWAP Assessment Area (A_{SWAP})

Estimates of the size of the contributing area can be obtained using the equation given above. However, because of the complex nature of ground water flow and contaminant transport, it is not be possible to define exact contributing area boundaries around each well. Two factors that affect the shape of the contributing area and its position and orientation with respect to a pumping well are the hydraulic gradient and aquifer transmissivity. The variation in aquifer

transmissivity is important in determining the shape of the contributing area for a supply well. In areas where the hydraulic gradient and the aquifer transmissivity are essentially the same in all directions, as in most of the Coastal Plain, the shape of the contributing area depends primarily on the hydraulic gradient. Where the water table is nearly flat,as near the water-table divide in broad interstream areas of low relief, the contributing area is approximately circular. Where the hydraulic gradient is moderate to steep, the contributing area is approximately elliptical, being oriented in the direction of ground water movement.

Determining the shape of the contributing area in the Piedmont and Mountains is more difficult because transmissivity is generally not the same in all directions and hydraulic gradients tend to be steep. Under non-pumping conditions, hydraulic gradients and ground water movement are controlled primarily by the land-surface topography. Under pumping conditions, orientation of the contributing area is controlled primarily by the orientation of the dominant vertical fracture set, which may or may not be parallel to the topographic slope. Where the bedrock in the Piedmont and Mountains is distinctly foliated, or has a layered structure due to mineral segregation into parallel layers, the principal vertical fractures are commonly oriented in the same direction as the foliation. Differences in transimissivity in different directions result in elliptically shaped contributing areas in the Piedmont and Mountains. Transmissivity tends to be largest in the direction parallel to the dominant vertical fracture set. Where transmissivity is twice as great in the direction of the dominant vertical fracture set as at right angles to it, the contributing area will be an ellipse twice as long in the direction of the fracture set as in the short axis. In some areas, the transmissivity parallel to the dominant fracture set may be five or more times that at right angles, resulting in contributing area ellipses with lengths five or more times their widths. Due to the limited availability of this type of information, a 2-to-1 ratio of transmissivity is assumed for all PWS wells.

Incorporating a 2 to 1 ratio of transmissivity values will result in an elliptically shaped contributing area twice as long as wide (i.e., an elliptical contributing area with the semimajor axis twice as long as the semimajor axis). To compensate for not knowing the orientation of the ellipse, a circle with radius equal to the semimajor axis of the ellipse is drawn around the well. The area of the resulting circular SWAP assessment area is two times the contributing area, or:

$$A_{SWAP} = 2\,A_C = \frac{2Q}{W}$$

More sophisticated delineation methods acceptable under the state's Wellhead Protection Program may be employed by the state, local governments or PWS systems. The state, within time constraint and budgeted resources, will review delineations provided by local governments or PWS systems that employ acceptable alternative delineation methods. Resulting alternative delineation areas will be incorporated into the SWAP if the state concludes that the use of the more sophisticated method is appropriate and more accurately defines the area contributing water to the well or well system. Information concerning North Carolina's approved Wellhead Protection Program can be found in Section 1.5 of this plan and in **The North Carolina Wellhead Protection Guidebook** available from the Division of Environmental Health, Public

Water Supply Section. A discussion of ground water in North Carolina is included in Appendix A.

Step-by-Step Procedure for the Calculated Fixed Radius Method

Locate the position of the well using a global positioning system (GPS) accurate to 5 meters.

Determine the maximum daily pumping rate (Q) in gallons per day. The maximum daily pumping rate in gallons per day isdetermined from information on well yield and daily length of operation of the well. Refer to the Well-Construction Record form prepared by the well driller, or other record, to determine the yield of the well. State regulations require that all public water-supply wells have 24-hour drawdown tests to determine well yield, or the maximum sustained pumping rate possible for a well. The well yield in gallons per minute determined from the drawdown test is multiplied by 720 (number of minutes in 12 hours) to determine the maximum permitted yield in gallons per day.

Using published information, determine the ground water recharge rate (W) in gallons per day per square mile for the area in which the well is located. If the well is on a boundary between areas having different recharge rates, use the smaller rate.

Use the maximum daily pumping rate (Q) and the recharge rate (W) to calculate the size of the contributing area (A_C) in square miles using the following equation:

$$A_C = \frac{Q}{W}$$

Multiply the contributing area (A_C) in square miles by 2.0 to determine the area of the SWAP Assessment Area, (A_{SWAP}).

$$A_{SWAP} = 2\,A_C = \frac{2Q}{W}$$

Determine the radius (r_{SWAP}) of the SWAP Assessment Area calculated in Step 5 with the following equation:

$$r_{SWAP} = \sqrt{\frac{A_{SWAP}}{p}} = \sqrt{\frac{2Q}{pW}}$$

Plot the circle on a well-location map generated in a geographic information system (GIS). The area within this circle is the designated SWAP assessment area.

Example:
Consider a well with a reported value for well yield of 200 gallons per minute determined during a drawdown test. The maximum daily pumping rate (Q) is equal to well yield of 200 gallons per minute multiplied by 720, or 144,000 gallons per day. Assume an average recharge rate (W) of 300,000 gallons per day per square mile. The size of the contributing area (A_C) determined is 0.48 square miles. The size of the SWAP assessment area (A_{SWAP}) is twice the contributing area, or 0.96 square miles. The radius (r_{SWAP}) of the circular SWAP assessment area is 0.55 miles or 2,919 feet.

2.5.2.a Delineation of Recharge Areas Not Adjacent to Ground Water Intakes

In some situations water pumped from a well may originate in recharge areas located many miles from the well or well field rather than the immediately surrounding area. For example, in addition to leakage through overlying confining units, recharge to confined Coastal Plain aquifers may originate in the aquifers' outcrop areas located many miles to the west. Another example would be deep fractures that are connected to sources of water which are great distances from the pumping well. For the purpose of conducting the SWAP it is neither technologically nor economically feasible to accurately define non-adjacent recharge areas. Additionally, the distances and travel times required for contaminants originating in an aquifers' outcrop area to reach a water supply well should be sufficient to allow for attenuation of the contaminants. Therefore, non-adjacent recharge areas will not be considered in the source water assessment of ground water sources of drinking water.

2.5.2.b Conjunctive Delineation for Source Water Assessments

There are hydrogeologic settings where there is a significant hydraulic connection between a stream or lake and an underlying aquifer. Alluvial sand and gravel deposits within the flood plains and terraces of river valleys may function as high yield aquifers and are sometimes used to produce municipal supplies. Ground water in these deposits typically exhibits a strong degree of hydraulic connection with the stream. Ground water that occurs in fractured rocks in mountainous areas is also typically strongly connected to streams. Most of the flow in a mountain stream results from ground water discharge. Most of the water that infiltrates into fractured rocks above the stream valley will eventually discharge to the stream.

In North Carolina, streams are normally areas of ground water discharge. The water table slopes toward the stream, so that the hydraulic gradient of the aquifer is toward the stream. However, under certain conditions, water may move from the stream to the aquifer. The hydraulic gradient

in an aquifer next to a stream may be reversed during floods resulting in water flowing from the stream into the aquifer. The pumping of wellsin the vicinity of a surface water body may also reverse the natural hydraulic gradient and thereby induce infiltration of the surface water into the aquifer and subsequently into the pumping well. A well whose WHPA intersects a surface water body in good hydraulic connection with the surficial aquifer may have a surface water component.

To establish a source water protection area to protect public water supplies (PWSs) from all significant potential contaminant sources, it is important to determine if the PWS is providing water from both ground water and surface water sources. Conjunctive delineation of source water protection areas is the integrated delineation of the zone of ground water contribution and the area of surface water contribution to a public water supply. Conjunctive delineations for public water supply intakes supplied by ground water but which have a surface water component will be as described in the following two subsections of this report.

Ground Water Under the Direct Influence of S urface Water (GWUDI)

The realization that ground water supplied by a PWS well may include a surface water component is recognized in the term ground water closely connected to surface water,? which is used in some water protection programs. This term is similar to the term ? ground water under the direct influence of surface water, which is a performance standard indicating that water withdrawn from a well contains a specific indicator or indicators, for example, giardia, of the presence of a surface water component. In North Carolina's SWAP plan a conjunctively delineated area for a PWS well classified as a GWUDI well will be the combined area of a circle based on the calculated fixed radius method and the resulting upgradient watershed of the intersected surface water. Most of these wells are located in the western part of the state and are located in WS-I, II, and III watersheds so the segmentation will be as described in Section 2.7.2 of the plan.

Springs

Springs can be defined as an area where the water table intersects the ground surface. Ground water may have flowed many miles before appearing on the surface to form a particular spring. A conjunctively delineated source water protection area for a PWS system using a spring as its source will include the entire watershed area upgradient of the spring.

2.6 Inventory of Significant Potential Contaminant Sources

A complete discussion of SWAP data management strategy is outlined in Chapter 3 of the plan. A brief summary of the state's approach to the inventory of PCSs follows.

As a first step each Source Water Assessment Program needs to conduct a review of relevant, available sources of existing data at federal, state and local levels. Given that over 11,000 intakes are subject to the requirements of the SWAP, this averages out to approximately 14 intakes per day over 3-1/2 years for which delineation, contaminant inventory, and susceptibility analysis must be done. It is apparent from this, and supported in the guidance, that existing data will be the primary data source for this program. Appendix F contains a summary of the databases that will be utilized to identify PCSs.

The EPA's Source Water Assessment Program guidelines call for states to identify regulated contaminants within each delineated area to determine the susceptibility of public water intakes to those identified contaminants. North Carolina also needs to identify what potential sources of contaminants of concern will be considered significant. The guidelines allow the state to exercise its discretion in selecting unregulated contaminants. Raw water contaminants regulated under the Safe Drinking Water Act (those with a Maximum Contaminant Level and those regulated by Surface Water Treatment Rules, Cryptosporidium) must be included in the inventory. Additionally, North Carolina may include contaminants that the state has determined may present a threat to public health.

2.7 Susceptibility Determination - North Carolina's Overall Approach

The state has determined that the overall susceptibility determination for each PWS intake should be based on two key components; a contaminant rating and an inherent vulnerability rating. Inherent vulnerability refers to the physical characteristics and existing conditions of the watershed or aquifer. A contaminant rating refers to an evaluation of the density and location of potential sources of contamination. For a public water supply to be determined susceptible, a potential contaminant source must be present and the existing conditionsof the PWS intake location must be such that a water supply could become contaminated.

North Carolina will determine susceptibility of a public water supply in two stages. First, an evaluation of the inherent vulnerability of an intake will be completed based on a matrix of source water characteristics. Then an evaluation of the density of potential sources of contamination, their relative risk potential to cause contamination, and their proximity to the water supply intake within the delineated assessment area will be completed to determine a contaminant rating. Therefore, the state will determine the susceptibility of each public water supply intake will be based on an "inherent vulnerability rating" and a "contaminant rating."

The state intends to conduct susceptibility determinations by individual intake. However, on a case-by-case basis where assessment areas overlap, the state will consider the percentage and configuration of the overlap area. The state may determine that the aggregate assessment area of multiple intakes/wells will be more appropriate and conservative for conducting source water assessments.

A more detailed description of the susceptibility determination procedure for both surface and ground water sources of public water supply is outlined in Section 2.7.1 and 2.7.2 respectively. PWS intakes designated as 'springs' will be delineated and assessed in accordance with the methodology described for a WS-I watershed. However, all springs shall be given an inherent vulnerability rating of higher.

To provide for evaluation of the susceptibility determination procedure early in the SWAP implementation process, several PWS intakes will be selected to represent different physiographic regions of the state and different types of water intakes (surface/ground water sources, large/small systems, etc.). An evaluation of the adequacy of the susceptibility determinations for Phase I and Phase II assessments will be completed by regional office PWS Section staff based on professional knowledgeand experience and any relevant historical monitoring data or system operational information. Based on the results of this pilot study the susceptibility determination approach may be refined. Furthermore, as the SWAP

implementation evolves there will be the opportunity for more detailed evaluations of susceptibility to occur for some water intakes if better inherent vulnerability rating or contaminant rating data becomes available within the constraints of program resources and deadlines.

2.7.1 Ground Water Intakes Susceptibility Determination Procedure

The following process will be followed for susceptibility determination of all community, non-transient non-community, and transient non-community public water supply intakes in North Carolina relying on ground water:

Ground Water Phase I - Step 1: Delineation

Delineate the area contributing water to the well or well field using the calculated fixed radius method acceptable under North Carolina's EPA approved Wellhead Protection Program (See Section 2.5.2).

Ground Water Phase I - Step 2: Inherent Vulnerability

Determine the **Inherent Vulnerability Rating** of the ground water public water supply intakes according to the vulnerability matrix in Table 2. The inherent vulnerability refers to the geologic/hydrogeologic characteristics or existing conditions of the delineated area of the PWS intake. The intake characteristics included are: a) aquifer rating, b) unsaturated zone rating, and c) well integrity/well construction rating. A brief description of each factor follows:

Aquifer Rating

The aquifer rating (Table 1) involves a qualitative assessment of the water transmitting characteristics of the aquifer. The aquifer rating is determined by assigning to each aquifer supplying a PWS a relative rating of higher, moderate, or lower vulnerability. Relative differences in aquifer vulnerability are based on a review of relevant literature, expert opinion from the SWAP Steering and Advisory Committees, and confirmed with historical data. Factors considered in rating aquifer vulnerability include hydraulic conductivity, degree of confinement, dilution, and sorption potential. The attenuative capacity of the unsaturated zone is not considered in the determination of aquifer ratings.

Table 1. Aquifer Rating Based on Water Transmitting Characteristics

Aquifer/Ground Water Source	Rating
Coastal Plain Aquifers:	
Deep Confined (e.g. Kinston area)	Lower
Shallow Confined (e.g. Pamlico Co.)	Moderate
Unconfined (e.g. Castle Hayne Outcrop area)	Higher
Piedmont and Mountain Aquifers:	
Triassic Basins (e.g. Sanford-Durham)	Moderate
Fractured Rock Aquifers	Higher
Other:	
Metamudstones and meta-argillites of the Carolina Slate Belt	Higher
Areas with Wells Cased to Less Than 20 Feet	Higher
Ground water under the direct influence of surface water	Higher
Sand Hills Area	Higher

Unsaturated Zone Rating

The state plans to determine the unsaturated zone rating in cooperation with the USGS under a joint funding agreement beginning in February 1999. As described in the USGS proposal titled Rating of Unsaturated Zone and Watershed Characteristics of Public Water Supplies in North Carolina, the unsaturated zone rating will be based on the combination of selected factors that contribute to the likelihood that contaminants from surface and shallow sources will follow the path of aquifer recharge and reach the water table. Contributing factors, in the form of GIS spatial data layers, will include land use/land cover, vertical hydraulic conductance of the unsaturated zone, land-surface slope. Land cover influences the amount of precipitation that infiltrates into the subsurface. Land use describes the activities that take place on the surface or in the shallow subsurface and the type of contaminants that may be present as a result of those activities. This factor will represent nonpoint source contaminants in the overall inherent vulnerability rating scheme for North Carolina's SWAP plan.

Well Integrity/Construction Rating

Rules governing the location, construction, repair and abandonment of wells were adopted by the state in 1976. However, since that time there has been no active statewide inspection program to monitor compliance with the rules. There are 22 counties in the state with local well construction ordinances that are required to be equivalent to the state standards. However the counties have different levels of resources available for program

implementation and oversight. Additionally, the inspections that were conducted often involved examination of the well after construction was complete. Construction details such as casing depth, grouting depth and screened interval are often not available

For the SWAP, the state will assume that well construction/integrity for all wells is not adequate. Therefore, all wells will be assigned a higher vulnerability well integrity factor, in Phase I of the assessments. The state intends to ask each PWS system owner to voluntarily provide documentation on well integrity/construction for possible refinement of the Phase I assessments. If adequate information to document good well construction/integrity is submitted by the system, the state will revise the well construction/integrity rating accordingly.

Table 2 includes the intake characteristics that will be evaluated and rated for the inherent vulnerability for each PWS intake that relies on ground water:

Table 2. Inherent Vulnerability Rating of Ground Water Public Water Supply Intakes

Intake Characteristics*	Higher Vulnerability	Moderate Vulnerability	Lower Vulnerability
Aquifer Rating	***10*** **	***5***	***- 1***
Unsaturated Zone Rating	***10***	***5***	***1***
Well Integrity/Construction Rating	***5***	***3***	***1***
Totals	***25-18***	***17-15***	***14-1***

Ground Water Intake **Inherent Vulnerability Rating**:_____

* Relative ratings are based on SWAP Steering and Advisory committees' expert opinion.
** The scoring may need to be adjusted during SWAP plan implementation to obtain results that accurately represent differences in inherent vulnerability for ground water intakes. These adjustments will be based on pilot study results and initial assessment results reviews.The purpose of the adjustments is to ensure meaningful source water assessment results which can be translated into benefits to the systems and the general public. The state is not going to adjust the assessments results to fit a pre-determined distribution (e.g. normal or even).

The determination of the aquifer ratings and the unsaturated zone ratings of higher, moderate, or lower was based on a review of relevant literature, expert opinion from the SWAP Steering and Advisory Committees, and confirmed with historical data.
The Aquifer Rating and the Unsaturated Zone rating are generally deemed to be of equal importance and independent of one another. However, in the case of a deep confined aquifer

setting, the unsaturated zone rating is deemed to be of significantly less relevance to the overall inherent vulnerability of the ground water supply. Therefore, in Table 2 the combination of a lower aquifer rating (See Table 1, Coastal Plain, deep confined aquifer) with any unsaturated zone rating and well integrity/construction rating always results in a lower inherent vulnerability rating.

Ground Water Phase I - Step 3: Contaminant Rating

Complete the contaminant inventory statewide using known, available electronic databases (See Section 2.6). Databases containing information about known PCSs include but are not limited to those listed in Table 3.

Table 3. Databases Containing Information about Known Potential Contaminant Sources

RCRA Generators	NC Inactive Hazardous Waste Sites
PIRF (Pollution Incident Database)	Underground Storage Tanks
Non-Discharge Permitted Facilities	Animal Waste Operations
CERCLA NPL Sites	Solid Waste Landfills
SARA Title III Sites	RCRA TSDF? s
Transportation - Roads - Rail facilities	Leaking Underground Storage Tanks

Assign each PCS contained within these and other identified applicable databases to a risk category of higher, moderate, or lower risk. PCSs for which an existing regulatory program has been established will receive a rating of **higher** risk. A list of PCSs such as the list included in Appendix B will be used to assign a risk rating to acceptable non-regulated PCS databases identified during the development and implementation of the SWAP.

Assessments of the degree of risk (i.e. higher, moderate, lower) associated with each PCS identified on the list included in Appendix B of this report can be assigned based on the following factors: 1) toxicity of the contaminants, 2) overall threat to public health (acute versus chronic health effects), 3) potential for human exposure and the characteristics of the population exposed, and 4) degradability of the contaminant if released to the environment (i.e. fate and transport).

For each ground water PWS intake, define an inner Zone A with an area equal to half the area of the delineated assessment area. Using Table 4, determine the number of PCSs that occur within each risk category and according to their location, either in Zone A or the remaining delineated area. Determine the **Contaminant Rating** for each ground water PWS system by summing the totals for each risk category.

Table 4. Phase I Determination of Contaminant Rating for Ground Water Intakes

Contaminant Sources in :	Number of Higher Risk PCSs	Cumulative Number of Higher and Moderate Risk PCSs	Cumulative Number of Higher, Moderate and Lower Risk PCSs
Zone A (the inner ? of the delineated area)	(No. of sources_____) **≥ 1** Score: *(1 or 0)*	(No. of sources_____) **> 5** Score: *(1 or 0)*	(No. of sources_____) **> 50** Score: *(1 or 0)*
Delineated Area (Zone A plus the remaining delineated area)	(No. of sources_____) **> 10** Score: *(1 or 0)*	(No. of sources_____) **> 100** Score: *(1 or 0)*	(No. of sources_____) **> 500** Score: *(1 or 0)*

For each category, score "1" if the number of contaminants exceeds the indicated threshold or score "0" if the number of contaminants is less than the threshold. Total all the scores (1 or 0) for each category. Note, the highest possible score is 6.

Contaminant Rating:

Higher	*(6 - 4)*
Moderate	*(3 - 2)*
Lower	*(≤ 1)*

Upon completion of Step 3, there will be a final **Contaminant Rating** of higher, moderate, or lower for each ground water PWS intake.

The determination of the thresholds in Table 4 for the number of sources was based on best professional judgement pertaining to the expected density of contaminant sources in delineated source water areas. The thresholds for the number of sources may need to be adjusted during SWAP plan implementation to obtain results that represent actual differences in contaminant ratings for PWS intakes. These will be based on pilot study results and initial assessment results reviews. The purpose of the adjustments is to ensure meaningful source water assessment results which can be translated into benefits to the systems and the general public. The state is not going to adjust the assessments to fit a pre-determined distribution (e.g. normal or even). Adjustments may be made so that ratings are not inconsistent with site specific knowledge of PWS Section Field Engineers and Hydrogeologists.

There was consideration given to the potential significance of a single higher risk PCS in close proximity to a PWS system's intake. In recognition of this potential significance a score of "1" is included in the contaminantrating scheme for a single higher risk PCS in close proximity to the intake. The Contaminant Rating score is based on the cumulative number of higher, moderate, and lower risk PCSs.

Ground Water Phase I - Step 4: Susceptibility Determination

Combine the results of Step 2 (**Inherent Vulnerability Rating**) and Step 3 (**Contaminant Rating**) to produce a **Phase I Susceptibility Rating** of higher, moderate, or lower **(H, M, or L)** for each ground water PWS intake. Use Table 5 to determine the Susceptibility Rating.

Table 5. Susceptibility Rating for Ground Water Sources of Public Water Supply by Combining the Inherent Vulnerability and Contaminant Ratings.

Contaminant Rating	Inherent Vulnerability Rating		
	Higher	Moderate	Lower
Higher	H	H	M
Moderate	H	M	M
Lower	M	M	L

The state determined that a moderate rating for Susceptibility would be assigned to the combinations of Lower Contaminant and Moderate Inherent Vulnerability ratings as well as Lower Inherent Vulnerability and Moderate Contaminant ratings. This Moderate Susceptibility rating was chosen as the more conservative combination.

Ground Water Phase I - Step 5: Distribution of Phase I Assessments

Provide each ground water PWS system with a draft map of their delineated assessmentarea(s) showing PCSs identified within these assessment areas. The information for each water system's source assessment(s) will be tabulated and summarized in a consistent format, or short report. This report will include information explaining the assessment and the PWS system's susceptibility rating. PWS systems will then have the opportunity to voluntarily correct and/or add to information contained in these maps. Specifically, PWS systems will be asked to review, verify, and add information on PCSs. The state will use the information received from the PWS systems to refine the Phase I source water assessments. Revised Phase I assessments will be provided to PWS systems.

Source Water Assessments for Ground Water Transient, Non -Community Public Water Supply Systems

There are more than 5,300 of Transient non-community ground water PWS systems in North Carolina. These systems are required to monitor for acute (immediate) contaminants not chronic (long term) contaminants since the same people do not typically drink the water over time. Because it may not be possible within budget and time constraints to assess source waters with the same level of exactness and detail, EPA's SWAP guidance encourages states to consider a tiered approach to assessments. Therefore, the state has determined that transient, non-community PWS systems will undergo Phase I assessments only.

Ground Water Phase II - Step 1: Priority Rating

The Phase I Susceptibility Determination procedure does not provide for a detailed examination of individual PCSs. In Phase II of the procedure, PCSs will be more thoroughly evaluated to refine their potential to contaminate ground water sources of drinking water. This review of the identified PCSs will include an examination of permit information and other required records of individual facilities. A result of this review process will likely be changes in risk categorization for some of the facilities identified as PCSs. The state considers this component in the development of Source Water Assessments to be valuable and useful to PWS system owners when allocating resources to source water protection activities.

It is the desire of the state to conduct a more detailed Susceptibility Determination for all community and non-transient non-community water intakes relying on ground water that were rated **higher** in the Phase I Susceptibility Determinations. However, at the time of the SWAP plan development, it is not known whether budget and time constraints will allow for a Phase II Susceptibility Determination to be completed for all of these intakes because it is not known how many will rate higher. Therefore, upon completion of the Phase I Susceptibility Determinations, community and non-transient non-community water intakes will undergo a Phase II Susceptibility Determination according to the following prioritization:

1. Any intake where a regulatory agency has determined that a contamination event has occurred and adversely affected the source water,

2. Intakes rated **higher** for **Inherent Vulnerability** *and* **higher** for **Contaminant Rating,**

3. Intakes rated **higher** for **Contaminant Rating** *and* **moderate** for **Inherent Vulnerability,** and

4. Intakes rated **higher** for **Inherent Vulnerability** *and* **moderate** for **Contaminant Rating**.

Additionally, for any ground water PWS intake where information becomes available indicating further evaluation is warranted, a Phase II Susceptibility Determination may also be performed.

If deemed necessary by the state in order to disaggregate the results, a ranking of all PWS ground water intakes rated higher susceptibility in Phase I will be conducted to establish a prioritization

for Phase II Susceptibility Determinations. A ranking of these intakes will be based on mathematically combining the inherent vulnerability and contaminant ratings received in the Phase I Susceptibility Determinations. If PWS ground water intakes are ranked, the Phase II assessments will be done for as many of the **higher** ranked intakes as budgeted resources and time will allow. However, the actual number of Phase II Susceptibility Determinations will depend on time constraints and budgeted program resources.

Ground Water Phase II - Step 2: Contaminant Rating

Phase II Susceptibility Determinations will incorporate information received from PWS systems for refinement of the Phase I assessments that will have been completed. Additionally, the PCSs risk categories will be refined by utilizing a more detailed contaminant source database analysis including an examination where available of the permit information, compliance history of the facility, types of contaminants, and quantity of materials or waste managed. Logical statutory or regulatory thresholds for lower, moderate, and higher classifications will be sought. Where they do not exist, such as with non-regulated potential contaminants, available database parameters such as quantity or number of contaminants will be ranked against similar facilities and lower, moderate, or higher classifications assigned according to the relative position on the ranked list.

This step will include an evaluation of the differences in the risk potential of the same types of facilities. For example, by examining available database information such a compliance history, type of contaminants, and quantity of contaminants, an individual facility may be placed in a higher, moderate, and lower risk category. Table 6 illustrates several additional examples of how PCSs may be separated into relative risk categories for contaminating ground water intakes.

During the implementation of the SWAP the PWS Section will continue to depend on the expertise provided by other state agencies within DENR and federal agencies. Specifically, these agencies will guide the PWS Section's use of existing state and federal databases to characterize potential sources of contamination.

Table 6. Examples of Potential Contaminant Sources Separated into Relative Risk Categories.

Potential Contaminant Sources (Higher Risk)	Potential Contaminant Sources (Moderate Risk)	Potential Contaminant Sources (Lower Risk)
RCRA Large Quantity Generators	RCRA Small Quantity Generators	RCRA Conditionally Exempt Small Quantity Generators
RCRA TSDF? s with multiple violations / known releases	RCRA TSDF? s violations of waste storage requirements / no known releases	RCRA TSDF? s in compliance / no known releases
CERCLA NPL sites Record of Decision - requires ground water, surface water, or soil remediation; not yet completed	CERCLA NPL sites Record of Decision - indicates potential for contamination of public water supplies is low	CERCLA NPL sites Clean-up completed. No further action required.

Ground Water Phase II - Step 3: Susceptibility Rating

As performed in the Phase I assessment procedure, combine the results of the **Inherent Vulnerability Rating** and the **Phase II Contaminant Rating** to produce a **Phase II Susceptibility Rating** of higher, moderate, or lower **(H, M, or L)** for each ground water PWS system assessed in the Phase II procedure (See Table 5).

Ground Water Phase II - Step 4: Distribute Assessment Results

Provide each ground water PWS system with a map of their delineated assessment area(s) showing modified risk ratings and locations of PCSs within these assessment areas. The information for each water system's assessment will be tabulated and summarized in a consistent format, or short report. This report will include information explaining the assessment and the PWS system's susceptibility rating. The results of the assessmentswill be made available to the public as described in the public participation portion of this plan (See Chapter 4).

2.7.2 Surface Water Intakes Susceptibility Determination Procedure

Over 200 public water supply intakes use surface water. The followingprocess will be followed for determining the susceptibility to contamination of these public water intakes relying on surface water in North Carolina:

Surface Water Phase I Step 1: Delineation

Through the existing Water Supply Watershed Protection Program surface water supplies have been located on USGS topographic quadrangle maps. The critical, protected, and watershed areas are delineated for each water supply watershed in the state.

Surface Water Phase I - Step 2: Inherent Vulnerability

Determine the **Inherent Vulnerability Rating** of all surface water intakes according to the vulnerability matrix in Table 7. The intake characteristic factors included are: a) water supply watershed classification, b) intake location, c) raw water quality, and d) watershed characteristics evaluation. A brief description of each factor follows:

Watershed Classification

In North Carolina all surface water PWS intakes are located in water supply watersheds that are classified in regulations as WS-I, II, III, IV, or V. The Water Supply Watershed Protection Rules adopted in 1992 required that all local governments having land use jurisdiction within water supply watersheds adopt and implement water supply watershed protection ordinances, maps, and a management plan. All local governments subject to the regulations have submitted ordinances in compliance with the statutory deadlines. The inherent vulnerability ratings for watershed classification are based on differences between watershed classes including: size of the watershed, development activities, and allowable waste treatment and disposal practices.

Intake Location

All surface water PWS intakes are located in streams, large multi-purpose impoundments (Class 3), or small water supply impoundments (Class 1 or 2). The inherent vulnerability ratings for intake location are based on differences between the reaction time for a water plant in the case of a contamination event or spill in a stream versus an impoundment and includes the allowable activities on surface water impoundments, e.g. single use versus multiple uses allowed.

Raw Water Quality

The water plants submit monthly data to the PWS Section Central Office that includes daily turbidity and total coliform analyses. From water treatment experience, it is known that there is an increased likelihood of the presence of Cryptosporidium and other water-borne microorganism with higher turbidity. Therefore, turbidity and total coliform bacteria are good indicators of raw water quality. In Subchapter 18C of the North Carolina Administrative Code, Rules Governing Public Water Systems, Section .0710 sets standards for sedimentation time required for raw water based on turbidity and coliform values. The higher the values for turbidity and total coliform the greater the sedimentation time required before the raw water can enter the water treatment plant. The seven highest daily values from each of twelve months will be averaged for both turbidity and total coliform. The averaged turbidity and total coliform values for each surface water intake will then be compared to the values in Table 7. This method of using the highest seven daily values in each month will allow for comparisons to be made that minimize the influence of the existence of on-site raw water storage facilities on turbidity.

Watershed Characteristics Evaluation

The state plans to determine the watershed characteristics ratings in cooperation with the USGS under a joint funding agreement beginning in February 1999. As described in the USGS proposal titled Rating of Unsaturated Zone and Watershed Characteristics of Public Water Supplies in North Carolina, the watershed characteristics ratings will be based on the combination of selected factors that may contribute to the likelihood that contaminants follow the path of overland flow and reach the public water supply system intake. Contributing factors, in the form of GIS spatial data layers, will include land cover, land use, and precipitation. The land cover categories provide information concerning the runoff characteristics within a watershed. The land use categories describe the type of contaminants that may be present due to activities that take place on the surface or in the shallow subsurface. This factor will represent nonpoint source contaminants in the overall "inherent vulnerability rating" scheme for North Carolina's SWAP plan. The amount of precipitation over a given watershed influences the amount of overland flow in that watershed.

Table 7 includes the intake characteristics that will be evaluated and rated for the inherent vulnerability for each PWS intake that relies on surface water:

Table 7. Inherent Vulnerability of Surface Water Intakes

Intake Characteristics*	Higher Vulnerability	Moderate Vulnerability	Lower Vulnerability
Watershed Classification	WS-IV, WS-V ***10***	WS-III, WS-II ***5***	WS-I ***1***
Intake Location	Direct Stream ***8***	Class 3 Impoundments ***4***	Class 1 and 2 Impoundments ***2***
Raw Water Quality (water plant data)	**T.U. > 100 or T coliform > 2000 ***5***	T.U. >25 or T coliform > 1000 ***3***	T.U. ≤ 25 and T coliform ≤ 1000 ***1***
Watershed Characteristics Evaluation	***10***	***5***	***1***
***DWQ Use Support Rating**	Use Threatened	Partially Supporting	Fully Supporting
Totals	***33 - 21***	***13 - 20***	***5 - 12***

Surface Water Intake **Inherent Vulnerability Rating**:_____

* Relative ratings are based on SWAP Steering and Advisory committees expert opinion.
** The thresholds for Turbidity units (NT) and Total coliform (colonies/100 ml) may need to be adjusted during SWAP plan implementationto obtain results that accurately represent differences in inherent vulnerability for surface water intakes. These adjustments will be based on pilot study results and initial assessment results reviews.

The purpose of the adjustments is to ensure meaningful source water assessment results which can be translated into benefits to the systems and the general public.

The state is not going to adjust the assessments results to fit a pre-determined distribution (e.g. normal or even). *** This factor will not be used in calculating the inherent vulnerability rating but is included for additional information for the water system and the general public.

The determination of the ranges for inherent vulnerability ratings of higher, moderate, or lower was based on best professional judgement. These ranges may need to be adjusted to accurately represent differences in inherent vulnerability for surface water intakes. These adjustments will be based on pilot study results and initial assessment results reviews. The purpose of the adjustments is to ensure meaningful source water assessment results which can be translated into benefits to the systems and the general public. The state is not going to adjust the assessments to fit a pre-determined distribution (e.g. normal or even). Adjustments may be made so that ratings are not inconsistent with site specific knowledge of PWS Section Field Engineers and Water Plant Consultants.

Surface Water Phase I - Step 3: Contaminant Rating

Complete the contaminant inventory statewide using known, available electronic databases (See Section 2.6). Databases containing information about known PCSs include but are not limited to those listed in Table 8.

Table 8. Databases Containing Information about Known Potential Contaminant Sources

RCRA Generators	NC Inactive Hazardous Waste Sites
NPDES Permitees	Underground Storage Tanks
NPDES Stormwater Permitees	Leaking Underground Storage Tanks
CERCLA NPL Sites	Solid Waste Landfills
SARA Title III Sites	RCRA TSDF's
Sanitary Sewer Systems - land application - treatment plant	Transportation - Roads - Rail facilities - Marinas
Animal Operations	

Assign each PCS contained within these and other identified applicable databases to a risk category of lower, moderate, or higher risk. PCSs for which an existing regulatory program has been established will receive a rating of **higher** risk. A list of PCSs such as the list included in Appendix B will be used to assign a risk rating to acceptable non-regulated PCS databases identified during the development and implementation of the SWAP.

Assessments of the degree of risk (i.e. higher, moderate, lower) associated with each PCS identified on the list included in Appendix B of this report can be assigned based on the following factors: 1) toxicity of the contaminants, 2) overall threat to public health (acute versus chronic health effects), 3) potential for human exposure and the characteristics of the population

exposed, and 4) degradability of the contaminant if released to the environment (i.e. fate and transport).
Using Table 9 for WS-II and III watersheds or Table 10 for WS-IV, and V watersheds determine the number of PCSs that occur within each risk category (i.e. lower, moderate, or higher risk) and within each delineated assessment area (e.g. critical area, protected area etc.). Determine the **Contaminant Rating** for each surface water PWS system by summing the totals for each risk category.

For WS-I watersheds, all of the area is considered critical area. Because the WSWP rules prohibit development in these watersheds, the existence of one PCS will result in a contaminant rating of higher.

Table 9. Phase I Determination of Contaminant Rating for WS - II, III Watershed Public Water Supply Intakes

Contaminant Sources in :	Number of Higher Risk PCSs	Cumulative Number of Higher and Moderate Risk PCSs	Cumulative Number of Higher, Moderate and Lower Risk PCSs
Critical Area	(No. of sources_____) **≥ 1** Score: *(1 or 0)*	(No. of sources_____) **> 5** Score: *(1 or 0)*	(No. of sources_____) **> 50** Score: *(1 or 0)*
Watershed Area **(within 1000 feet as measured from the streambank)**	(No. of sources_____) **> 10** Score: *(1 or 0)*	(No. of sources_____) **> 100** Score: *(1 or 0)*	(No. of sources_____) **> 500** Score: (1 or 0)
Watershed Area **(within the delineated watershed area beyond 1000 feet as measured from the streambank)**	(No. of sources_____) **> 100** Score: *(1 or 0)*	(No. of sources_____) **> 500** Score: *(1 or 0)*	(No. of sources_____) **> 1000** Score: *(1 or 0)*

For each category, score "1" if the number of contaminants exceeds the indicated threshold or score"0" if the number of contaminants is less than the threshold. Total the scores (1 or 0 for each category). Therefore, the highest possible score is a 9.

Determine the **Contaminant Rating** for each PWS intake in a Water Supply Watershed I, II, or III as follows:

Higher	*(9 - 6)*
Moderate	*(5 - 3)*
Lower	*(≤ 2)*

Table 10. Phase I Determination of Contaminant Rating for WS - IV and V Watershed Public Water Supply Intakes

Contaminant Sources in :	Number of Higher Risk PCSs	Cumulative Number of Higher and Moderate Risk PCSs	Cumulative Number of Higher, Moderate and Lower Risk PCSs
Critical Area	(No. of sources_____) **≥ 1** Score: *(1 or 0)*	(No. of sources_____) **> 5** Score: *(1 or 0)*	(No. of sources_____) **> 50** Score: *(1 or 0)*
Protected Area (within 1000 feet as measured from the streambank)	(No. of sources_____) **> 10** Score: *(1 or 0)*	(No. of sources_____) **> 100** Score: *(1 or 0)*	(No. of sources_____) **> 500** Score: *(1 or 0)*
Protected Area (within the delineated protected area beyond 1000 feet as measured from the streambank)	(No. of sources_____) **> 100** Score: *(1 or 0)*	(No. of sources_____) **> 500** Score: *(1 or 0)*	(No. of sources_____) **> 1000** Score: *(1 or 0)*
Watershed Area (in the watershed for the next 25 miles upstream from the protected area or to the first dam structure and within 1000 feet as measured from the streambank)	(No. of sources_____) **> 100** Score: *(1 or 0)*	(No. of sources_____) **> 500** Score: *(1 or 0)*	(No. of sources_____) **> 1000** Score: *(1 or 0)*

For each category, score "1" if the number of contaminantsexceeds indicated threshold. If the number of contaminants is less than the threshold score "0." Total all the scores (1 or 0 for each category). Therefore, the highest possible score is a 12.

Determine the **Contaminant Rating** for each PWS intake in a Water Supply Watershed IV or V as follows:

Higher	*(12 - 9)*
Moderate	*(8 - 4)*
Lower	*(≤ 3)*

The distance of 1,000 feet as measured from the streambank was chosen because it would include NPDES discharges within the watershed. The determination of the thresholds in Tables 9 and 10, for the number of sources was based on best professional judgement pertaining to the expected density of contaminant sources in delineated source water areas. The thresholds for the number of sources may need to be adjusted during SWAP plan implementation to obtain results that represent actual differences in contaminant ratings for PWS intakes. These adjustments will be based on pilot study results and initial assessment results reviews. The purpose of the adjustments is to ensure meaningful source water assessment results which can be translated into benefits to the systems and the general public. The state is not going to adjust the assessments to fit a pre-determined distribution (e.g. normal or even). Adjustments may be made so that ratings are not inconsistent with site specific knowledge of PWS Section field engineers and water plant consultants.

There was consideration given to the significance of one higher risk PCS in close proximity to a PWS system's intake. Therefore, in recognition of this significance a score of "1" is included in the contaminant rating scheme for one higher risk PCS in close proximity to the intake. The Contaminant Rating score is based on the cumulative number of higher, moderate, and lower risk PCSs. This decision was based on two factors, 1) most of the PCSs in Phase I may be rated higher risk, and 2) less evaluation of PCSs actual threat to drinking water supplies is proposed in the Phase I source water assessments.

Upon completion of Step 3, there will be a final **Contaminant Rating** of higher, moderate, or lower for each surface water PWS system.

Surface Water Phase I - Step 4: Susceptibility Rating

Combine the results of Step 2 (**Inherent Vulnerability Rating**) and Step 3 (**Contaminant Rating**) to produce a **Phase I Susceptibility Rating** of higher, moderate, or lower **(H, M, or L)** for each surface water PWS system. Use Table 11 to determine the Susceptibility Rating.

Table 11. Phase I Susceptibility Rating for Surface Water Sources of Public Water Supply by Combining the Inherent Vulnerability and Contaminant Ratings.

Contaminant Rating	Inherent Vulnerability Rating		
	Higher	**Moderate**	**Lower**
Higher	**H**	**H**	**M**
Moderate	**H**	**M**	**M**
Lower	**M**	**M**	**L**

The state determined that a moderate rating for Susceptibility would be assigned to the combinations of Lower Contaminant and Moderate Inherent Vulnerability ratings as well as

Lower Inherent Vulnerability and Moderate Contaminant ratings. This Moderate Susceptibility rating was chosen because it is more conservative.

Surface Water Phase I - Step 5: Distribution of Phase I Assessments

Provide each surface water PWS system with a draft map of their delineated assessment area(s) showing PCSs identified within these assessment areas. The information for each water system's assessment will be tabulated and summarized in a consistent format, or short report. This report will include information explaining the assessment and the PWS intake's susceptibility rating. PWS systems will then have the opportunity to correct and/or add to information contained in these maps. Specifically, PWS systems will be asked to voluntarily review, verify, and add information on PCSs. The state will use the information received from the PWS systems to refine the Phase I assessments. Revised Phase I assessments will be provided to PWS systems.

Source Water Assessments for Surface Water Transient, Non -Community Public Water Supply Systems

There are five transient, non-community surface water PWS systems in North Carolina. These systems are required to monitor for acute (immediate) contaminants not chronic (long term) contaminants since the same people do not typically drink the water over time. Because it may not be possible within budget and time constraints to assess source waters with the same level of exactness and detail, EPA's SWAP guidance encourages states to consider a tiered approach to assessments. Therefore, the state has determined that transient, non-community PWS systems will undergo Phase I assessments only.

Surface Water Phase II Step 1: Priority Rating

The Phase I Susceptibility Determination procedure does not provide for a detailed examination of individual PCSs. In Phase II of the procedure, PCSs will be more thoroughly evaluated to refine their potential to contaminate surface water sources of drinking water. This review of the identified PCSs will include an examination of permit information and other required records of individual facilities. A result of this review process will likely be changes in risk categorization for some of the identified PCS facilities. The state considers this component in the development of Source Water Assessments to be valuable and useful to PWS system owners when allocating resources to source water protection activities.

It is the desire of the state to conduct a more detailed Susceptibility Determination for <u>all</u> community and non-transient non-community water intakes relying on surface water that were rated **higher** in the Phase I Susceptibility Determinations. However, at the time of the SWAP plan development, it is not known whether budget and time constraints will allow for a Phase II Susceptibility Determination to be completed for all of these intakes because it is unknown how many will rate higher. Therefore, upon completion of the Phase I Susceptibility Determinations, community and non-transient non-community water intakes will undergo a Phase II Susceptibility Determination according to the following prioritization:

1. Any intake where a regulatory agency has determined that a contamination event has occurred and adversely affected the source water,

2. Community surface water intakes in WS- IV water supply watersheds.

3. Intakes rated **higher** for **Inherent Vulnerability** *and* **higher** for **Contaminant Rating,**

4. Intakes rated **higher** for **Contaminant Rating** *and* **moderate** for **Inherent Vulnerability,** and

5. Intakes rated **higher** for **Inherent Vulnerability** *and* **moderate** for **Contaminant Rating**.

Additionally, for any surface water PWS intake where information becomes available indicating further evaluation is warranted, a Phase II Susceptibility Determination may also be performed.

If deemed necessary by the state to disaggregate the results, a ranking of all PWS surface water intakes rated higher susceptibility in Phase I will be conducted to establish a prioritization for Phase II Susceptibility Determinations. A ranking of these intakes will be based on mathematically combining the inherent vulnerability and contaminant ratings received in the Phase I Susceptibility Determinations. If PWS surface water intakes are ranked, the Phase II assessments will be done for as many of the **higher** ranked intakes as budgeted resources and time will allow. However, the actual number of Phase II Susceptibility Determinations will depend on time constraints and budgeted program resources.

Surface Water Phase II - Step 2: Contaminant Rating

Phase II Susceptibility Determinations will incorporate information received from PWS systems for refinement of the Phase I assessments that will have been completed. Additionally, the PCSs risk categories will be refined by using a more detailed contaminant source database analysis including an examination of the permit information, compliance history of the facility, types of contaminants, and quantity of materials or waste managed. Logical statutory or regulatory thresholds for lower, moderate, and higher classifications will be sought. Where they do not exist, such as with non-regulated potential contaminants, available database parameters such as quantity or number of contaminants will be ranked against similar facilities and lower, moderate, or higher classifications assigned according to the relative position on the ranked list.

This step will include an evaluation of the differences in the risk potential of the same types of facilities. For example, by examining available database information such a compliance history, types of contaminants, and discharge volumes, an individual NPDES facility may be placed in a higher, moderate, and lower risk category. Table 6 (See Section 2.7.1) illustrates several additional examples of how PCSs may be separated into relative risk categories for contaminating surface water intakes.
During the implementation of the SWAP the PWS Section will continue to depend on the expertise provided by other state agencies within DENR and federal agencies. Specifically, these agencies will guide the PWS Section's use of existing state and Federal databases to characterize potential sources of contamination.

In the Phase II contaminant rating of any WS-IV intake, an evaluation of potential sources of contamination outside the Watershed Area defined in Table 10 may be included to account for

the characteristics of specific contaminants and thereceiving stream. For any PWS intake where information becomes available indicating further evaluation is warranted, additional work may be completed within the constraints of program resources and deadlines.

Surface Water Phase II - Step 3: Susceptibility Rating

As performed in the Phase I assessment procedure, combine the results of the **Inherent Vulnerability Rating** and the **Phase II Procedure Contaminant Rating** to produce a **Phase II Susceptibility Rating** of higher, moderate, or lower **(H, M, or L)** for each surface water PWS intake assessed in the Phase II procedure (see Table 11) .

Surface Water Phase II - Step 4: Distribute Assessment Results

Provide each surface water PWS system with a map of their delineated assessment area(s) showing modifiedrisk ratings and locations of PCSs within these assessment areas. The information for each water system's assessment will be tabulated and summarized in a consistent format, or short report. This report will include information explaining the assessment and the PWS system's susceptibility rating. The results of the assessments will be made available to the public as described in the public participation portion of this plan (See Chapter 4).

Chapter 3 Contaminant Inventory And Data Management

3.1 Introduction

In order to determine the susceptibility of public water systems to contamination, EPA's Source Water Assessment Program guidance requires states to identify the origins of regulated contaminants within delineated assessment areas for each water supply intake. The SWAP guidelines allow states to exercise discretion in selecting unregulated contaminants that they have determined may present a threat to public health.

North Carolina must identify the contaminants of concern and the potential sources of contamination that will be considered significant. As a first step in the SWAP plan implementation, North Carolina will conduct a review of relevant, available sources of existing data at federal, state and local levels. An estimated 11,500 intakes are subject to the requirements of the SWAP for which delineation, contaminant inventory, and susceptibility analysis must be done (this averages out to approximately 14 intakes per day over 3-1/2 years). Therefore, in order to meet SWAP deadlines, existing databases that identify potential contaminants sources will be the primary data source. This approach is supported in the EPA's SWAP guidance.

North Carolina will conduct assessments within delineated areas for PWS intakes using a Geographic Information System to locate potential sources of contamination statewide.

3.2 Contaminants of Concern

Contaminants of concern for the SWAP will include those contaminants regulated under North Carolina's Drinking Water Act and the federal Safe Drinking Water Act [those with a Maximum Contaminant Level (MCL) and those regulated by Surface Water Treatment Rules, *Cryptosporidium*]. Chemical contaminant lists included in the SARA Title III and CERCLA (Superfund) regulations will also be considered. Within the constraints of time and resources, North Carolina may also include other contaminants that the state has determined may present a threat to public health.

3.3 Significant Potential Contaminant Sources

Typically, existing databases are not organized by contaminants of concern, but rather by type of facility or contaminant source. Therefore, North Carolina? s contaminant source inventory will focus on gathering statewide information by type of source and thus, indirectly obtain information about potential occurrences of contaminants of concern.

Databases expected to contain comprehensive information on PCSs for several of the contaminants of concern are listed in Appendix F. North Carolina will use these databases to effectively target potential sources of contaminants of concern.

3.4 Geographic Information System Use and Data Acquisition

Organization, manipulation, analysis and interpretation of pertinent data will be accomplished primarily through the use of a Geographic Information System (GIS). A GIS is an information management tool that can be used to manage, process and analyze spatial data and related attribute information. Much of the available information concerning PCSs is in GIS compatible databases. GIS software will be used to create maps showing the locations of PCSs. The GIS will allow PCSs to be linked electronically to a particular PWS intake thus allowing for more efficient revisions and updates to the databases as needed.

As previously stated, North Carolina? s SWAP will focus primarily on available electronic databases. The preferred format will be GIS data layers with geographic location of potential contaminant sources and descriptive information about these locations. Electronic databases convertible to GIS layers will also be used. Where feasible, hard copy data deemed useful may be employed to update or create electronic databases.

In order to complete the susceptibility analyses, information in addition to that contained in PCS databases will be required. This includes geographic information such as county boundaries, rivers and streams, soils, hydrology, geology and planning areas. Much of this data is currently available in electronic form.

Data such as well construction information (i.e., diameter, depth, screened intervals, casing depth) will require conversion to an electronic format from existing paper records maintained by the PWS Section and the Groundwater Section within DENR.

3.4.1 Potential Contaminant Source Inventory

Regulatory Databases

Databases containing information about regulated facilities are maintained by DENR, other state agencies, federal agencies (e.g. EPA), and local governments. Databases pertaining to facilities regulated under RCRA, CERCLA, SARA, CWA, TSCA, (see Appendix G, List of Acronyms) and sites on the Superfund National Priorities List, the North Carolina Inactive Hazardous Waste Sites list and the Toxic Release Inventory are examples of databases that may be used in the inventory. Appendix F lists these and other examples of databases that will be evaluated during the implementation of this SWAP plan. Those databases that are judged to contain useful and reliable PCS data will be used to develop the PCS inventory.

Ideally, each record in a database will contain a minimum of two discrete but complementary types of information. These are location (latitude and longitude, or street address) and information about the contaminant(s) from each source. As an example, the Toxic Release Inventory (TRI) database maintained by EPA contains information on chemical releases and transfers of 350 specific toxic chemicals. Facilities that manufacture or process more than 25,000 pounds of a chemical or use more than 10,000 pounds of the chemical during the year are included in the database. Each record includes the latitude and longitude of the facility, quantity of releases, specific chemical(s) released, whether the release was to air, land or water, and the Standard Industrial Classification (SIC) code for the facility.

Regulatory Agency Files

Several agencies within DENR perform inspections, evaluate regulatory compliance and issue permits for facilities included in the databases. Information from agency files may be reviewed to obtain attribute information on PCSs.

Other Databases

To identify additional PCSs, databases not created specifically for regulatory purposes may be included. The list of PCSs in Appendix B will be used to guide efforts to identify additional information concerning contaminant sources. An example of such a database is a listing of manufacturers within North Carolina that is searchable by SIC code, number of employees, address or zip code. Such listings are available commercially and contain information on individual businesses that may potentially allow a categorization of a particular manufacturing activity into a higher risk, moderate risk or lower risk category with regard to PCSs.

Nonpoint Sources

Currently no statewide geographic databases of non-point source activities that have the potential to impact water quality have been identified. Potential nonpoint sources of contamination such as agricultural operations, urban runoff, construction and mining projects may be included as potential contamination sources by using electronic geographic data such as land use and land cover information. The state recognizes the importance of nonpoint sources of contamination and has addressed this potential for contamination in the inherent vulnerability rating schemes for surface and ground water sources of drinking water as described in Sections 2.7.1 and 2.7.2 of this plan. Within the constraints of time and resources, efforts will be made to identify additional information on non-point sources of contamination occurring within the delineated assessment areas.

3.4.2 Field Acquisition of Data

For the purposes of the SWAP, North Carolina will locate all PWS well intakes using Global Positioning System (GPS) receivers. The data will have an accuracy of two to five meters. In order to quality check the GPS data, selected well intake locations will be compared with the location identifiable on digital images of aerial photographs (scale 1:12,000 with one meter horizontal resolution) produced by the United States Geological Survey.

Maps showing the delineated assessment areas and PCSs within them will be provided to the PWS systems. PWS systems will be asked to review and verify information on PCS locations and characteristics to guide necessary changes in the contaminant source inventory databases. Updated information received from the PWS systems will be used to refine the susceptibility assessments.

3.5 Data Quality - Limitations and Assumptions

Metadata, or information about the data in the database, for all databases used will be collected or generated with the assistance of the agency responsible for maintaining the data. The metadata will contain information concerning both locational and attribute characteristics. This information includes data accuracy, purpose for which data was originally collected, spatial resolution of the data, date the data was generated, and the agency responsible for its collection. The metadata will be made available along with the SWAP assessments.

Chapter 4 Swap Public Participation Component

4.1 Public Participation - North Carolina's Approach

Section 1428(b) of the SDWA requires that, to the maximum extent possible, each state shall establish procedures, including but not limited to the establishment of technical and citizens advisory committees, to encourage the public to participate in developing the protection program for wellhead areas and SWAPs under section 1453. Such procedures shall include notice and opportunity for public hearing on the state program before it is submitted to the Administrator. According to the EPA's guidance on SWAPs, Congress intended that a state's public participation process would build public support and responsibility for local water supplies. Therefore, for a SWAP to be approvable, a state needs to have used a public participation process for developing and implementing a SWAP. Additionally, North Carolina's SWAP plan needs to describe how the state ensured broad representation on advisory groups and wide public involvement in developing its plan. This chapter outlines the state's approach to the Public Participation component of North Carolina's Source Water Assessment Program.

4.1.1 Agency Steering Committee

The Public Water Supply Section, as the lead agency for SWAP plan development, requested that DENR? s Division Directors appoint members from each of their regulatory programs affecting water to serve on a Departmental Steering Committee. The role of this group is to foster agency discussions about the SWAP and assist in developing draft plans and information to bring to the required advisory committees. Weekly meetings were held to discuss progress on the development of the SWAP plan.

It is recognized that elements of this plan may need to be revised during the implementation process. To facilitate potential revisions the Steering Committee will continue to meet periodically through the implementation phases.

4.1.2 Technical and Citizens Advisory Committee

The PWS section created a list of 140 potential stakeholders and interested parties compiled from the mailing lists of the regulatory programs in DENR and with consultation with the Department of Health and Human Services. The stakeholder list from EPA's guidance manual was used as reference to ensure broad representation. All people on the list received a letter inviting their participation in the development of the SWAP. A copy of the mailing list and the letters soliciting their participation are included in Appendix D. The intent of the guidance is clearly toward heavy public involvement and participation, and although the potential existed for groups that were difficult to manage due to their large size, the consensus was that it was to the advantage of the state to allow all individuals who had interest in the plan development and a willingness to participate to do so. Therefore, all identified potential stakeholders and interested parties were given the opportunity to participate on a combined Technical and Citizens (TAC) Advisory Committee.

To facilitate logistical arrangements and fit within the time frame available for plan development, three meetings of the TAC Advisory Committee were held on September 3, October 2, and

November 5, 1998 in Raleigh. The advisory committee reviewed draft proposals prepared by PWS staff, and provided input, concerns, corrections, and direction on the development of the SWAP plan.

At each of the three meetings, some time was scheduled for informative presentations during whole group sessions. There was also discussion of common issues and some time was scheduled for ground water and surface water work groups at the first two meetings. The combined large group sessions also allowed all participants to hear summaries of and react to all the issues. The ground and surface water work groups allowed for detailed discussion to develop the state's strategy to complete the specific elements of the SWAP plan in an environment more conducive for productive discussion. It also allowed for people? s expertise to be focused on specific areas rather than requesting all individuals to provide the same level of input to all discussions and decisions. Although each person chose to participate on either the surface water or ground water work groups because they proceeded concurrently, all discussion summaries and proposed SWAP plan contents were made available for discussion, review, and comment by all participants. Included in Appendix D is a list of all TAC advisory committee participants who attended at least one of the three advisory committee meetings.

4.1.2.a Technical and Citizens Advisory Committee Meeting Summaries

After each of the TAC Advisory Committee meetings, a written summary was prepared and sent to each committee member to document the work completed. Copies of the meeting summaries are included in Appendix C.

4.1.2.b Additional Comments Received From Technical and Citizens Advisory Committee Participants

Throughout the advisory committee process the state solicited and received comments from the TAC Advisory committee participants. These comments are included in Appendix D.

4.1.3 Statewide Source Water Assessment Program Informational Public Meetings

Notice of the availability of this document for public review and comment and notice of public meetings held in four North Carolina cities was published November 29, 1998. A copy of the public meeting notice is included in Appendix E.

Public meetings were held in Asheville, Winston-Salem, Washington, and Raleigh the week of December 8, through December 14, 1998. Each of the public meetings consisted of a presentation on the goals, development and proposed implementation of the SWAP plan followed by a question and answer period. Over 35 people attended the meetings representing the following organizations: NC Watershed Coalition, Clean Water Fund - NC, Western North Carolina Alliance, Triad River Runners, Land Trust, Neuse River Foundation, NC Farm Bureau, Soil and Environmental Consultants, Tar River Environmental Awareness Group, Water Resources Research Institute, and Charlotte-Mecklenburg Utilities Department. In addition, at the request of the Northeastern Section of the North Carolina Waterworks Operators Association the same presentation on the SWAP plan was given as the program for the regularly scheduled meeting on December 10, 1998 in Washington, NC. Over 40 water system operators were in attendance for this presentation.

In general, the comments received during the public meetings were favorable about the content of the SWAP plan and implementation proposal. A comment was made concerning the relationship of the SWAP plan implementation with the DWQ basinwide planning efforts which the state intends to coordinate. The state hopes to affect the priorities of other environmental regulatory programs to reflect the goal of overall source water protection for a safe, reliable public drinking water supply. There was a concern expressed regarding the perceived exclusive use of the calculated fixed radius method for delineating ground water PWS system assessment areas. This concern was addressed in Section 2.5.2 of the SWAP plan that allows alternative delineation methods to be considered by the state. There was a comment about the use of DWQ ambient monitoring data in the consideration of surface water inherent vulnerability ratings. This was discussed during the TAC committee meetings and consensus was achieved. In summary, the ambient surface water monitoring program was not specifically designed to address water quality for drinking water sources but rather to assess overall surface water quality for a variety of uses. A better source of data for raw surface water quality could be obtained from the water plant operators who are required to collect analytical data from the surface water intake samples.

In addition to the verbal comments summarized in the preceding paragraph one individual submitted written comments during the public comment period. This individual expressed concern about nonpoint sources of contamination on the quality of public drinking water supplies; specifically forest management harvesting practices that are a source of sedimentation. The SWAP plan proposes an inherent vulnerability rating process for surface water PWS sources that includes an evaluation of raw water quality for turbidity. The state recognizes the importance of nonpoint sources of contamination and has addressed this potential for contamination in the inherent vulnerability rating schemes for surface and ground water sources of drinking water as described in Sections 2.7.1 and 2.7.2 of this plan.

4.2 Distribution of Source Water Assessment Results

The state recognizes the potential for the results of the assessments to be misinterpreted or misused by the public. In general, the results of the assessments for the surface water and ground water PWS systems cannot be compared because of the differences in the methodologies used to complete the assessments. Specifically, determining the inherent vulnerability of the intakes is different for surface water and ground water supplies. Furthermore, because each state has developed an individual approach to source water assessments the results cannot be compared from one state to another. The state will make every effort to ensure that the results of the assessments are reported to the public in an understandable and useful format so that the final product will be viewed as a useful tool in the protection of public sources of drinking water supplies.

Procedures for Making Assessments Available to the Public

Once the Phase I source water assessments are completed for all PWS systems, the information concerning availability and accessibility must be conveyed to the public. The information for each water system=s assessment will be tabulated and summarized in a consistent format, or short report. At a minimum the state plans to provide maps and a written report summarizing the results of the assessments which will include the inherent vulnerability ratings, contaminant inventory ratings, and susceptibility determinations for each system.

Once the presentation format for the assessment is developed, a draft will be provided to Technical and Citizens Advisory Committee members for feedback on clarity of the information. This should help ensure that the assessments will be understandable to the public. The following methods will be used for distributing this information: the Internet, consumer confidence reports, news releases, trade publications, public service announcements, and public meetings.

Notification of Availability

Internet

North Carolina will develop an Internet site for Source Water Assessments that will provide access to the assessment and the data behind the assessments. The page will also link to other related agency sites and the EPA Source Water page. People will be able to explore and download assessments and data from their home, work, or public library computers. Additionally, post cards with the URL for the North Carolina Source Water web page will be distributed to schools and other county organizations.

Consumer Confidence Reports

All utilities will be required to provide consumer confidence reports (CCR) to their customers starting in 1999. When the Phase I assessments are completed, public water systems will include in their CCR a notice of availability of the assessment for that system, a summary of the assessment results, and information about how the customer can view or get a copy. If PWS systems submit information for use in refining the Phase I assessments, the state will incorporate any information and release the refined Phase I assessments as a group once completed. In the intervening years, systems may use their CCR to educate people that the source water assessment process is occurring and the type of information that would be available in an assessment once completed. The state will draft a few sentences each year that systems can use in their CCR. In addition, the state will draft a notice suitable for a bill stuffer that systems can copy and distribute to their customers.

Newspapers, Trade Publications or Other Organization Publications

The state will issue press releases once the Phase I assessments are complete and available. In addition, there are a number of trade publications for organizations whose members would be interested in the results including but not limited to: water suppliers, local planning organizations (Council of Governments), NC American Planning Association, League of Municipalities, NC Medical Society, AARP, and AIDS services providers, Local Health Department Directors, and River Basin Organizations. The state will draft several articles and press releases for use by the news media and other organizations. This will get a wide distribution to affected individuals. The articles and press releases will discuss what the assessments are, why we have done them, and how they can get access to the results. A subsequent press release will be issued once the Phase II assessments are complete and available.

Other Public Notification Efforts

The state will draft public service announcements for broadcast on public radio and television stations once Phase I assessments are complete and available. The North Carolina State University Extension Service will be included in the press release distribution. An e-mail announcement will be drafted for distribution to different environmental list-servers. Organizations such as League of Municipalities and other groups that hold annual meetings will be solicited by the state for an opportunity to be included on the agenda to make presentations on the SWAP results.

Public Meetings

North Carolina will publicize and hold at least two public meetings in the state to share the strategies, methods and overall results with the general public. These meetings will be noticed in advance. If interest is high, additional meetings will be held. North Carolina will explore the interest in the development of a presentation kit to be used by public water suppliers for their council, commission, or board meetings. This kit could cover the general aspects of source water assessment and allow the system to easily customize a summary including their specific data.

Obtaining a Copy

We expect Phase I assessments to be completed for all PWS systems in North Carolina in a similar time frame. Because of this and in order to take advantage of press releases and newspapers in a cost effective manner, and to minimize the time and effort spent on data manipulation, the Phase I assessments will be released as a group once completed. The assessments will be provided to each water system and will be available on the Internet. For individuals wanting hard copies of the assessment who can not extract what they want from the Internet, they will be notified by all means above to contact the Center for Geographic Information and Analysis (CGIA). CGIA, under the Office of the Governor, is the state? s central data location for storage of this type of data and mapping. CGIA will impose their standard charges for copies of the material. If PWS systems submit information for use in refining the Phase I assessments, the state will incorporate any information and release the refined Phase I assessments as a group once completed.

Phase II source water assessments as described in this plan will be completed as the timeline presented in this plan indicates. The Phase II assessments will be released as a group once completed.

Chapter 5 Program Implementation

5.1 Source Water Protection Guidance

The state intends to develop guidance for PWS system owners to use in developing source water protection programs. This guidance will be accessible from the Internet and available in written form when the Phase II assessments are distributed (May 2003). The state will encourage PWS system owners to incorporate source water protection information in their Consumer Confidence Reports as appropriate.

The state will encourage all PWS system owners to implement efforts to manage identified sources of contamination in a manner that will protect drinking water supplies. The goal is to reduce or eliminate the potential threat to drinking water supplies through locally implemented and supported regulatory or statutory controls or by using voluntary measures supported by an involved local community. These efforts may include expanding the PWS system? s control over a larger portion of land identified as the delineated source water assessment area. This expansion of control could include zoning, easements, or land acquisition implemented by the local government.

5.2 Technical Assistance to PWS System Owners

Through future Drinking Water State Revolving Fund (DWSRF) set-aside accounts the state plans to offer technical assistance to local governments and other PWS system owners for development of source water protection strategies. The plan for providing funding for source water protection under "Local Assistance and Other State Programs" set-aside accounts will be included in future Intended Use Plans. Current DWSRF funding provides for three technical assistance positions. A Hydrogeologist II position is funded in the PWS Section for management of the state's Wellhead Protection Program. Two ground water technician positions with the North Carolina Rural Water Association, and funded by the DWSRF, provide support for wellhead protection activities.

5.3 Coordination With Other State SWAP Efforts

States that border North Carolina with common watersheds and aquifers include South Carolina, Georgia, Tennessee, and Virginia. North Carolina does not have any formal agreements with these states concerning SWAP efforts. However, during discussions held in July 1998, at an EPA Region IV sponsored SWAP development meeting and also in Dallas, Texas at the National SWAP convention in April 1998, it was informally agreed that all states would make source water assessment data available to adjoining states for completion of the required SWAP plan. This includes the necessary information for delineation, contaminant inventory, and susceptibility determination for each state's SWAP plan from available databases. This agreement should be sufficient to accomplish the program objectives.

5.4 Proposed Schedule of Completion for SWAP Activities

Because of the scope of the SWAP plan requirements and the number of PWS systems requiring assessment in North Carolina, the state is requesting an extension beyond the prescribed 2-year period. Therefore, the following schedule details proposed milestones for implementation of North Carolina's SWAP plan:

February 1999	Submit SWAP plan for EPA approval Initiate SWAP Pilot Study Activities Initiate Phase I Assessment Activities
October 1999	Complete Pilot Study Activities
November 1999	SWAP plan approval by EPA
December 2001	Complete Phase I Assessments Initiate Distribution of Draft Phase I Assessments to PWS systems for verification Begin Phase II Assessments
April 2002	Receive verification information from PWS systems
June 2002	Initiate Distribution of verified Phase I Assessments
January 2003	Complete Phase II Assessments
May 2003	Initiate Distribution of Phase II Assessments

5.5 SWAP Development and Implementation Progress Reporting

North Carolina intends to incorporate SWAP development and implementing progress reporting to EPA with the Intended Use Plan Annual Reporting process. North Carolina will develop a GIS database for the data used in the source water assessments. A goal is to develop this GIS database to facilitate future revisions and updates to the assessments. Subject to funding availability, the PWS Section will maintain the database such that updated source water assessments can be completed.

It is hoped and expected that the database links and ease of attaining digital information will lead to improvements throughout DENR regulatory programs to allow the impact on drinking water supplies full and priority consideration in agency decision-making. It is also expected that changes in data gathering, management, and availability may be recommended.

5.6 Source Water Petition Program in North Carolina

Section 1454 of the Safe Drinking Water Act establishes a new authority for a Source Water Petition Program. This is a voluntary, self-directed program for states to use to support grass-roots efforts for initiating source water protection activities. These source water protection activities would address the reduction or elimination of contaminant sources identified in the source water assessment procedure. The intent of a petition program would be to facilitate efforts to protect source waters by providing financial or technical assistance to PWS system owners. This assistance would be used to develop voluntary, incentive-based strategies for the long term protection of sources of public drinking water supplies. North Carolina plans to develop a source water petition program within the budgeted time and resource constraints.

APPENDIX A

GROUND WATER IN NORTH CAROLINA

Ground Water in North Carolina

North Carolina may be divided into two hydrogeologic zones pertaining to ground water occurrence, availability, and protection. One zone consists of the *Coastal Plain*, and the other consists of the *Piedmont Plateau* combined with the *Appalachian Mountains*. For this discussion, this zone is termed the *Piedmont and Mountains*.

Coastal Plain Ground Water System

The Coastal Plain includes nearly one-half of the area of the state and extends west from the Atlantic Ocean to the *fall line*. The fall line is a zone 30 to 40 miles wide that is marked by discontinuous rapids. Here, major streams have removed thin layers of unconsolidated Coastal Plain sediments where they overlap Piedmont rocks near the Piedmont-Coastal Plain boundary.

Ground water in the Coastal Plain occurs in layers of sand, silt, clay, and limestone. The layers comprising the Coastal Plain ground water system are primarily unconsolidated, consisting of loose aggregations of rock particles. Layers of sand and limestone serve as aquifers. Layers of clay and interbedded silt and clay are confining beds. Ground water occurs in the irregular-shaped pore spaces between rock particles. The layers of unconsolidated sediment increase in thickness eastward from the fall line to the coast, where they reach a thickness of about 10,000 feet at Cape Hatteras. From the fall line to the coast, the depth below land surface to the different rock layers in the Coastal Plain increases at about 15 feet per mile. The thickness of silt and clay layers also increases towards the coast so that the sand and limestone aquifers are covered by increasingly thick confining beds towards the coast.

With respect to source water protection, the most important unit of the Coastal Plain ground water system is the *surficial layer*. This is the layer of sediment that directly underlies the land surface. The surficial layer is the youngest rock layer and is also the layer through which all recharge and most contaminants enter the system. The surficial layer may consist of permeable sands such as those underlying the Sand Hills, Outer Banks, and other areas. It may also consist of clays and impermeable decomposed organic matter in the swamp areas of the outer Coastal Plain.

All of the Coastal Plain aquifers, and especially those below the Castle Hayne, contain numerous thin clay and silty clay layers that diminish vertical movement of water and contaminants. These relatively-impermeable layers within the aquifers combine with the confining beds to reduce the potential for

contamination of the deeper aquifers from pollutants originating on the land surface.

Piedmont and Mountains Ground Water System

The ground water system in the Piedmont and Mountain area differs in several important aspects from that in the Coastal Plain. In most of this area, it consists of a surficial layer of unconsolidated granular material overlying fractured consolidated rock. The surficial layer was formed during the chemical and physical disintegration (i.e. weathering) of the underlying consolidated rock. The term *regolith* is commonly used to refer to the surficial layer. The consolidated rocks that underlie the regolith are composed of igneous and metamorphic crystalline rocks having a very wide range in mineral composition which has been used to separate them into several dozen units for the purpose of mapping their occurrence. It is convenient to refer to all of these consolidated rocks as *bedrock* or *crystalline rocks*. Water-bearing openings in the bedrock consist of fractures which commonly occur in two nearly vertical sets that cross roughly at a right angle and a third set that approximately parallels the land surface.

Ground water in the Piedmont and Mountains occurs both in the pore spaces between the rock particles comprising the regolith and in the network of interconnected fractures in the bedrock. Because of the narrow width of the openings along the fractures and the relatively wide spacing of the fractures (several inches to several feet), the amount of water contained in the openings in the bedrock is relatively small. Conversely, the water in storage in the regolith is relatively large, amounting to about one-fifth of the saturated volume. Conceptually, the regolith serves as the reservoir of the Piedmont and Mountain ground water system, and the bedrock fractures serve as an intricate network of small pipes connecting the regolith reservoir to pumping wells.

Nearly all of the bedrock formations that underlie the Piedmont and Mountains contain feldspar and other minerals which tend to break down chemically to form clays. Because the regolith is formed from the underlying bedrock, the degree of breakdown of the minerals comprising the bedrock increases upward from the bedrock surface. Therefore, the soil zone developed in the upper part of the regolith tends to be clay-rich and relatively impermeable. The clay-rich soil zone, where it has not been removed by erosion or excavation, protects ground water by slowing contaminant movement from the land surface into the ground water system.

Below the clay-rich soil zone in the Piedmont and Mountains, the regolith retains many of the textural characteristics of the underlying bedrock from which it is derived. This zone is termed *saprolite.* It grades downward to the bedrock surface through a *transition zone* that is less chemically altered than the rest of the saprolite and, therefore, contains fewer clay-size particles. The transition zone is

more permeable than the remainder of the saprolite, and where it is sufficiently thick, it is the zone through which most of the lateral ground water movement in the regolith takes place. The relative ease with which water moves through the transition zone is important in water movement from the regolith into bedrock fractures.

The Triassic Basin Areas

The preceding discussion of the geology and ground water conditions in the Piedmont and Mountains does not apply to the three areas underlain by rocks of Triassic age. These rocks are mostly sandstones and shales that partially fill three down-faulted structural basins. The sandstones and shales originated as sediments delivered to the basins by streams flowing from the adjoining areas of crystalline rocks. The sandstone layers are brittle and therefore tend to be broken along relatively closely-spaced fractures. The interbedded shales, on the other hand, are relatively soft and do not tend to retain water-bearing openings along fractures. It is suspected that most water-bearing openings in the Triassic rocks consist of very small fractures developed along bedding planes between the sandstone and shale layers.

APPENDIX B

LISTS OF POTENTIAL CONTAMINANT

SOURCES BY RISK CATEGORIES

Potential Sources of Ground Water Contamination by Risk Category

Higher Risk Potential Contamination Sources for Ground Water PWS Systems

COMMERCIAL/INDUSTRIAL

- Automobile Body shops
  Gas stations
  Repair shops
- Chemical / petroleum processing / storage
- *Sewer lines
- Utility right-of-way / pesticide use
- Chemical / petroleum pipelines
- Wood / pulp / paper processing and mills
- Dry cleaners
- Electrical / electronic manufacturing
- Fleet / trucking / bus terminals
- Furniture repair / manufacturing
- Home manufacturing
- Junk / scrap / salvage yards
- Machine shops
- Metal plating / finishing / fabricating
- Mines / sand or gravel excavations
- Parking lots / malls (>50 spaces)
- Photo processing / printing
- Plastics / synthetics producers
- Research laboratories

OTHER

- Road salt storage areas
- Military installations (for classified risks not otherwise listed)

AGRICULTURAL/RURAL

- Farm machinery repair
- Rural machine shops
- *Intensive livestock operations; Lagoons, spray fields
- Fertilizer, pesticide, and petroleum storage, distribution, handling, mixing, and cleaning areas
- *Sewage sludge (biosolids) storage, handling, mixing and cleaning areas
- *Sewage sludge (biosolids) land application
- Unauthorized / illegal disposal of wastes / chemicals

RESIDENTIAL/MUNICIPAL

- Airports - maintenance / fueling areas
- Railroad yards / maintenance / fueling areas
- Landfills / dumps
- Utility stations - maintenance areas
- *Septic systems - high density (>1 / acre)
- *Sewer lines
- *Stormwater drains / discharges
- Fertilizer, pesticide, sewage sludge

Notes: 1. This is a list of potential sources of contamination not a list of known databases of contaminants.

2. Higher risk potential contaminant sources are considered to have a higher potential for drinking water contamination than those designated moderate risk or lower risk Facility-specific management practices are not taken into account in estimating risks and assigning these categories.

3. An asterisk [*] indicates activities that may be associated with microbiological contamination.

Ground Water PWS Systems

Moderate Risk PCSs

COMMERCIAL/INDUSTRIAL

- Car washes
- Cement/concrete plants
- Food processing
- Hardware/lumber/parts stores

AGRICULTURAL/RURAL

- *Auction lots
- *Boarding stables
- Crops, irrigated (berries, Christmas trees, hops, mint, orchards, vineyards, nurseries, greenhouses, vegetables, sod)

NOTE: Drip-irrigated crops are considered lower risks.

- Drinking water treatment plant residuals/sludge application

RESIDENTIAL/MUNICIPAL

- Drinking water treatment plants
- Golf courses
- Housing - high density (>1 house/.5 acres)
- Motor pools
- Parks
- Waste transfer/recycling stations

Wastewater treatment plants collection stations

OTHER

- Above ground storage tanks
- Construction/demolition areas
- Hospitals
- Transportation corridors

Freeways/state highways

Railroads, Right-of-way maintenance (herbicide use areas)

- Irrigation, water supply, or monitoring wells

Lower Risk PCSs

COMMERCIAL/INDUSTRIAL

- Office buildings/complexes
- RV/mini storage

AGRICULTURAL/RURAL

- Crops, non-irrigated (grains, grass seeds, hay)
- *Rangeland
- Managed forests/silviculture

RESIDENTIAL/MUNICIPAL

- Apartments and condominiums
- Campgrounds/RV parks
- Fire stations
- Schools
- Housing **B**low density (< 1 house/.5 acres)

OTHER

- Medical/dental offices/clinics
- Veterinary offices/clinics

SOURCE: Adapted from EPA (1993), and from the Oregon Wellhead Protection Program

Potential Sources of Surface Water Contamination by Risk Category

Higher Risk Potential Contaminant Sources for Surface Water PWS Systems

COMMERCIAL/INDUSTRIAL

- Automobile Body shops
  Gas stations
  Repair shops
- Chemical / petroleum processing / storage
- *Sewer lines
- Utility right-of-way / pesticide use
- Chemical / petroleum pipelines
- Wood / pulp / paper processing and mills
- Dry cleaners
- Electrical / electronic manufacturing
- Fleet / trucking / bus terminals
- Furniture repair / manufacturing
- Home manufacturing
- Junk / scrap / salvage yards
- Machine shops
- Metal plating / finishing / fabricating
- Mines / sand or gravel excavations
- Parking lots / malls (>50 spaces)
- Photo processing / printing
- Plastics / synthetics producers
- Research laboratories

AGRICULTURAL/RURAL

- Farm machinery repair
- Rural machine shops
- *Intensive livestock operations; Lagoons, spray fields
- Fertilizer, pesticide, and petroleum storage, distribution, handling, mixing, and cleaning areas
- *Sewage sludge (biosolids) storage, handling, mixing and cleaning areas
- *Sewage sludge (biosolids) land application
- Unauthorized / illegal disposal of wastes / chemicals

RESIDENTIAL/MUNICIPAL

- Airports - maintenance / fueling areas
- Railroad yards / maintenance / fueling areas
- Landfills / dumps
- Utility stations - maintenance areas
- *Septic systems - high density (>1 / acre)
- *Sewer lines
- *Stormwater drains / discharges
- Fertilizer, pesticide, sewage sludge

OTHER

- Road salt storage areas
- Military installations (for classified risks not otherwise listed)
- Recreational use of motorized watercraft on surface waters

Notes: 1. This is a list of potential sources of contamination not a list of known databases of contaminants.

2. Higher risk potential contaminant sources are considered to have a higher potential

for drinking water contamination than those designated moderate risk or lower risk Facility-specific management practices are not taken into account in estimating risks and assigning these categories.
3. An asterisk [*] indicates activities that may be associated with microbiological contamination.

Surface Water PWS Systems

Moderate Risk PCSs

COMMERCIAL/INDUSTRIAL
- Car washes
- Cement/concrete plants
- Food processing
- Hardware/lumber/parts stores

AGRICULTURAL/RURAL
- *Auction lots
- *Boarding stables
- Crops, irrigated (berries, Christmas trees, hops, mint, orchards, vineyards, nurseries, greenhouses, vegetables, sod)

NOTE: Drip-irrigated crops are considered lower risks.

- Drinking water treatment plant residuals/sludge application
- Managed forests/silviculture (logging operations)

RESIDENTIAL/MUNICIPAL
- Drinking water treatment plants
- Golf courses
- Housing - high density (>1 house/.5 acres)
- Motor pools
- Parks
- Waste transfer/recycling stations

Wastewater treatment plants/collection stations

OTHER
- Above ground storage tanks
- Construction/demolition areas
- Hospitals
- Transportation corridors

  Freeways/state highways
  Railroads
  Right-of-way maintenance (herbicide use areas)

Lower Risk PCSs

COMMERCIAL/INDUSTRIAL
- Office buildings/complexes
- RV/mini storage

AGRICULTURAL/RURAL
- *Rangeland
- Crops, non-irrigated (grains, grass seeds, hay)

RESIDENTIAL/MUNICIPAL
- Apartments and condominiums
- Campgrounds/RV parks
- Fire stations
- Schools
- Housing **B**low density (< 1 house/.5 acres)

OTHER
- Medical/dental offices/clinics
- Veterinary offices/clinics

SOURCE: Adapted from EPA (1993), and from the Oregon Wellhead Protection Program

APPENDIX C

TECHNICAL AND CITIZENS ADVISORY COMMITTEE

AGENDAS AND MEETING SUMMARIES

North Carolina Source Water Assessment Advisory Committee

Meeting Agenda

September 3, 1998

9:00 - 9:15	Welcome and Introductions - Jessica Miles, Chief, Public Water Supply Section	
9:15 - 9:30	Keynote - Linda Sewall Director, Division of Environmental Health	
9:30 - 9:45	Source Water Assessment and Protection Program, Background and Summary - Bob Midgette, Supervisor, Protection and Enforcement Branch	
9:45 -10:00	Overview of Public Water Supplies in North Carolina, Bob Midgette	
10:00 - 10:15	SWAP Plan Requirements, Elizabeth Morey, Hydrogeologist	
10:15 - 10:30	Wellhead Protection, Gale Johnson, Hydrogeologist	
10:30 - 10:45	Break	
10:45 - 11:00	North Carolina=s Water Supply Watershed Protection Program, Steve Zoufaly, Supervisor, Water Quality Section	
11:00 - 11:15	Public Participation, Jessica Miles	
11:15 - 11:45	SWAP Program Benefits and Uses, Jessica Miles Facilitated Discussion, Norma Murphy, Craig Deal	
11:45 - 12:00	Sign-up for Ground Water and Surface Water Work Groups, Questions, homework Assignment, Bob Midgette	
12:00 - 1:30	Lunch (on your own)	
1:30 - 4:30 Break Included	Session 1	Ground Water Assessment Approach Delineation, Contaminant Inventory, Susceptibility Determination FACILITATOR
	Session 2	Surface Water Assessment Approach Delineation, Contaminant Inventory, Susceptibility Determination FACILITATOR
4:30 Adjourn		

Summary of First Technical and Citizens Advisory Committee Meeting for North Carolina=s Source Water Assessment Program Plan Development

Introduction

The first of three planned North Carolina Source Water Assessment Program (SWAP) Technical and Citizens Advisory Committee meetings was held in Raleigh, NC in the Ground Floor Hearing Room of the Archdale Building on September 3, 1998. An agenda of the meeting is attached. The morning session consisted of a series of short presentations by Department of Environment and Natural Resources staff to introduce the SWAP plan development process and define the role of the Advisory committee in its development and implementation. The afternoon break-out groups were designated for discussions of ground water and surface water source water assessment delineation methodologies. Some discussion of contaminant inventory strategies was also held in both groups. A summary of the discussions and presentations is included in this report.

Brief Summary of Presentations from the Morning Session

Jessica Miles, Chief, Public Water Supply Section, Jimmy Carter, Deputy Assistant Secretary of Environmental Protection Department of Environment and Natural Resources, and Linda Sewall, Director, Division of Environmental Health, gave introductory remarks emphasizing the value of the SWAP for focusing the state=s program efforts on prevention of pollution of public water supplies. Additionally, they stressed the importance that the SWAP places on public involvement and stakeholder representation in program development and implementation.

Bob Midgette, Supervisor, Protection and Enforcement Branch, Public Water Supply Section, presented a background and overview of the SWAP highlighting 1) the goal of preventing pollutants from entering drinking water supplies, 2) the intent to integrate North
Carolina=s existing drinking water supply protection programs into the SWAP, and 3) the opportunity to use the SWAP as a Alens@ through which contaminant source information from existing environmental programs can be focused specifically to protect drinking water supplies. Also, a brief summary of the public water supply systems in North Carolina and how the state categorizes them was provided. Elizabeth Morey, Hydrogeologist, Public Water Supply Section, presented a brief overview of the requirements of an EPA approvable SWAP plan. Gale Johnson, Hydrogeologist, Public Water Supply Section, gave a summary of the Wellhead Protection Program in North Carolina, its relation to the SWAP and its role in protecting drinking water supplies that rely on ground water sources. Steve Zoufaly, Supervisor, Water Quality Section, presented a review of the North Carolina Water Supply Watershed Protection Program water supply classification scheme and the required local government ordinances for the protection of drinking water supplies that rely on surface water.

Jessica Miles gave an overview of the required elements of public participation in the SWAP development and the state=s plan of convening joint citizens and technical advisory committee meetings with breakout groups for discussions of surface water and ground water SWAP strategies. The role and responsibilities of the advisory committee was defined as providing feedback on proposed strategies as well as offering advice and making recommendations. Additionally, the importance of making the assessments available to the public in an easily understandable form was presented. The critical need for making the SWAP beneficial and useful to public water systems was emphasized. This led into a discussion led by trained DENR facilitators with all attendees. The participants were asked to share their ideas for potential benefits and uses of SWAPs. These are summarized at the end of this report.

Brief Summary of Ground Water Work Group Afternoon Session

The first meeting of the Ground Water Work Group was convened at 1:30 PM in the auditorium of the Highway Building at 11 S. Wilmington Street. The purpose of the meeting was to present the proposed methodology for delineating boundaries of assessment areas. These delineated assessment areas represent the area from which water supplying a public water supply well or well field is derived. The delineated area is also the area through which contaminants are reasonably likely to move towards and reach such water well or well fields. The state also elicited committee members= recommendations and advice regarding the technical feasibility and effectiveness of the proposed methodology.

Carl Bailey, Assistant Chief for Planning, Groundwater Section, opened the meeting with a presentation of the calculated fixed radius delineation method employed in the state=s EPA approved Wellhead Protection (WHP) Program. The state=s WHP Program was approved by EPA in 1995. This voluntary program provides guidance, training, and wellhead protection plan approval for public water supply systems. During this presentation it was proposed that the calculated fixed radius method be employed in the source water assessment program. Gale Johnson gave a presentation of other delineation methods acceptable under the WHP Program. This presentation included a discussion of the data availability, suitability and relative effort required by each method and the rationale supporting the use of the calculated fixed radius method.

Following the presentations, questions and comments were taken from the ground water work group. The work group was then asked if the proposed delineation method is sufficient for the source water assessment program. All were in agreement that the proposed method can serve as a minimum or baseline method with more sophisticated delineation methods acceptable under the state=s WHP Program potentially applied to specific water systems where time and data availability allow. It was agreed that the state would review site specific data provided by local governments or other PWS system owners. If it is determined that the supplied data can support a more sophisticated delineation method acceptable under the state=s WHP program, then

delineation may be conducted using this method. The work group also recommended that the shape of the calculated delineation area be modified, where appropriate, to take into account flow boundaries.

CONSENSUS FOR GROUND WATER DELINEATION METHODOLOGY:

The calculated fixed radius method in North Carolina=s established Wellhead Protection Program will serve as the minimum or baseline delineation method for the SWAP plan. More sophisticated methods defined in the Wellhead Protection Program may be employed by the state, local governments or PWS systems in an effort to more accurately define the area contributing water to the well system. It was agreed that the state, within time constraints and budgeted resources, will review delineations provided by local governments or PWS systems that employ acceptable alternative delineation methods. Resulting alternative delineation areas will be incorporated into the SWAP if the state concludes that the use of the more sophisticated method was appropriate.

In addition during the ground water work group session the following questions and comments were recorded by Craig Deal, DENR facilitator.

Do we know what percent of wells we have or can get the data for in order to pursue more analytic delineation methods?
How well do different agencies with data share that data - availability and compatibility?
Where the data exists for individual systems, wells, aquifers, etc, can the public, especially utilities, gain access to it to make good decisions about locating new wells?
Calculated, Fixed radius & simplified variable shape methods don't capture flow boundaries- needs to be considered; need feed back from local water supply owner/operators on proposed area.
Need ultimately to consider well construction methods.
How does delineation, contaminant inventory and susceptibility determination all interact to ensure best protection strategy? May vary from site to site, or from one area of state to another.
Need to inform public of method limitations and assumptions.
How will we achieve QA/QC?
How will we consider effects from proximate recharge areas?

Summary of Surface Water Work Group Session

A review of the Water Supply Watershed Protection classification standards was presented. The 1989 N.C. Water Supply Watershed Protection Act established delineated watersheds identified as water supply watersheds that would be subject to

state rules. Local governments are required by the state to adopt minimum protective ordinances in these critical and protected areas.

The Water Supply Watershed Protection rules state that for WS-I, WS-II, WS-III and WS-IV watersheds the **critical area** is defined as either **2** mile from the normal pool elevation of the reservoir and draining to the intake or to the ridge line of the watershed (whichever comes first); or **2** mile upstream from and draining to the intake located directly in the stream or river or to the ridgeline of the watershed (whichever comes first). For WS-I, WS-II, and WS-III waters the **protected area** is defined as the entire drainage area or watershed for the river or stream. For WS-IV watersheds a protected area is defined as the area adjoining and upstream of the critical area in which protection measures are required. The boundary of the protected area is defined as within five miles of the normal pool elevation of the reservoir and draining to water supply reservoirs (measured from the normal pool elevation) or to the ridge line of the watershed (whichever comes first); or 10 miles upstream and draining to the intake located directly in the stream or river, or to the ridgeline of the watershed (whichever comes first). In a WS-IV watershed, three zones have thus been defined and GIS layers exist: the critical area, the protected area, and the entire watershed.

There was concern expressed that the delineated protected area of 10 miles upstream and draining to the intake for WS-IV waters wouldn=t allow for consideration of potential contaminants outside the protected area. The discussion led to the conclusion that if this is determined to be a serious issue, the susceptibility determinations described in the SWAP plan can include searches for contaminants of interest within any of the three zones of the WS-IV watershed. Specific contaminants may be evaluated differently depending on the zone where they occur.

There was some interest expressed in expanding the contaminant inventory and also the susceptibility determination beyond the protected area in WS-IV waters based on the characteristics of the contaminant and the receiving surface water.

CONSENSUS FOR SURFACE WATER DELINEATION METHODOLOGY:

Use existing delineation method as defined in the Water Supply Watershed Protection rules. For the Source Water Assessment Program plan the protected area or the entire drainage area for WS-I, WS-II, and WS-III, delineates the assessment area. For the Source Water Assessment Program plan the protected area of a WS-IV delineates the minimum area for the assessment area. If warranted, based on expert knowledge, a larger assessment area may be established for WS-IV watersheds as determined by characteristics of specific contaminants and the receiving surface water.

In addition during the surface water work group session, the following questions and comments were recorded by Norma Murphy, DENR facilitator.

Use current delineation methods.

Current delineation meets EPA requirements.

The state=s WSWP sets minimum requirements for protection ordinances but local governments can adopt more stringent ordinances.

Interstate cooperation - each state responsible for its own intake.

Focus resources on new data and analysis.

Keep WS I - III as they are but change WS-IV to be more specific to the environmental conditions of the river itself.

Use current methodology but along entire watershed.

Use current methodology but consider the total upstream drainage and watershed when evaluating contaminant inventory and vulnerability.

Use existing methodology but modify it to include contaminant sources upstream of the 10 mile protected area; this will vary by both contaminant type and stream type.

Use current methodology but use entire watershed for WS-IV's. Include additional watershed attribute data to assist in susceptibility analysis like watershed slope physiographic province etc.

Should inventory/assessment area be different for WS-IV and WS-V's than the current state delineation method ?

Support following existing methods of state's methodology for delineation unless there are watersheds in which contaminant inventories suggest otherwise.

Should there be a one-size fits all method or a case-by-case method of delineation for assessment/inventory purposes ?

Brief Summary of Surface Water and Ground Water Work Groups Contaminant Inventory Discussion

A summary of the state=s proposed approach to contaminant inventory was distributed for review and comment at both the Ground Water and Surface Water Work Group afternoon sessions. The state proposes to use existing databases on contaminant inventory. All known potential sources of contamination that can be located through an existing electronic database will be identified within the delineated source water assessment area. The contaminant inventory will support the computer based, GIS approach to be used for the SWAP process. The contaminant source list in Appendix F of the SWAP Guidance will be used in conjunction with applicable databases in DENR for possible contaminants. The database search will go outside of the Department to other state agencies, local health departments, local governments, and others identified as maintaining key contaminant databases. The data will be incorporated in a GIS format and plotted on maps showing the delineated area and potential contaminant sources.

The generated maps will be sent to the public water systems in draft form to allow the system, if it so chooses, to correct data on the map or provide additional information. The water system will not be required to do anything with the draft map. If the water system makes corrections or can provide compatible data to add to the assessment, it will be incorporated and provided in the final assessment results.

The issue of contaminant inventory will be on the agenda for the October 2, 1998 Advisory Committee Meeting. In order to meet SWAP plan development deadlines consensus on the state=s approach for contaminant inventory in source water assessment delineated areas will need to be reached during that meeting or in a scheduled additional meeting thereafter.

The following comments on Contaminant Inventory Strategy from Surface Water and Ground Water Work Groups were recorded by the facilitators:

How well do different state agencies that have contaminant inventory data share that with other agencies ? And how compatible are the databases ?
Identify known problems from the raw water monitoring data that is available.
Need to address non-regulated contaminants even though it may be a problem not recognized now but rather a future problem to be assessed.
Consider using EPA sediment sampling database. (Corps of Engineers, USGS may also have data)
Other sources of data, local governments, county/municipal planning departments.
Advertise for assistance from citizens through the use of public service announcements.
Use an Internet site to post the locations of contaminant sources for the education of public water suppliers.
Seasonal variability of parameters should be considered.
Use this program to guide gathering of more data. Compile metadata of data including analytical methods and procedures.

Parking Lot Issues from SWAP Plan Development Morning Session

These comments were recorded by the facilitators during the discussion. However, because they were not directly related to the ongoing discussion they were Aparked@ for later consideration at future Advisory Committee meetings.

Definition of "contaminant inventory"
-former land uses
-land practices

Definition of "susceptibility" / "vulnerability"

Distinguish between:

1. *Ground water*
2. *Drinking water*
3. *Potable water*

Protection of wells: poorly constructed wells, irrigation sources contamination

Mechanism to "grandfather" /address sources that maybe affected by more stringent regulations

Substandard septic systems & wells.

Parking Lot Issues from Ground Water Work Group Session

These comments were recorded by the facilitators during the discussion. However, because they were not directly related to the ongoing discussion they were Aparked@ for later consideration at future Advisory Committee meetings.

Geologic factors

Land use/cover

Land surface/slope

Subsurface transmissivity

Parking Lot Issues from SWAP Surface Water Work Group Meeting

These comments were recorded by the facilitators during the discussion. However, because they were not directly related to the ongoing discussion they were Aparked@ for later consideration at future Advisory Committee meetings.

What program will there be to assure public distribution of information and oversee whether assessments used?

Can local governments adopt ordinances that alter the delineation of the critical area or the protection area?

For WS-IV, what criteria will be used to delineate area in which a contamination source inventory will be conducted?

What is done upstream, potentially effects downstream water quality and quantity. Therefore, look at cumulative effects rather than solely focus on discrete and linear effects.

Should there be a public advisory committee set up now to advise during implementation?

Is contamination inventory a state or local responsibility? If local, what is the oversight?

What system will be put in place to monitor changes and update advisories?

If entire watershed is delineated (WS-1- 4) then is the state obligated to complete SWAP for

watershed?

What will be the efforts for interstate cooperation in conducting SWAP and delineation in shared areas?

Are there any cases where there are overlapping protection and critical areas? If so, which ordinances are applicable? (Only WS-IVS may overlap)

Will current delineation strategy meet EPA criteria to delineate entire watershed area upstream of any intakes including WS-IV?

Summary of Suggested Benefits and Uses of Source Water Assessments

1. Integrate SWAP plans into basinwide management plans.
2. Increase public awareness of the relationship between human activities and protection of public water supplies and that they have a role in protecting water supplies.
3. Target incentive and technical assistance programs.
4. Facilitate the process for determining alternatives for disposing of waste and contaminants.
5. Local governments can use susceptibility determinations to plan for future needs.
6. SWAP plans might encourage local governments to adopt more stringent ordinances than the state minimum requirements.
7. Improve land use planning for future water uses.
8. Avoid redundancy in multiple local programs
9. Phase out landfills and increase recycling.
    1. Assist local governments in completing local water supply plans since the information is the same as required for SWAP plans.
11. Assist in identifying risk/cost of clean-ups.
    2. Compiling data into one place can assist DENR and other agencies in improving regulations and programs.
13. Help local governments in siting new wells.
        3. The data developed and compiled should be treated as a strategic resource.
15. Incentives in rules for implementing SWAP plans.
16. Focus attention on areas for additional research and monitoring.
17. Ensure quality data.
18. Incorporation of Internet access valuable for public education.
19. Integrate into land use planning guidelines that incorporate water quality.

20. Help inform developers about options for development of land.
21. Tool for discussion of relative risk.
22. Enable better decisions on economic development.
23. SWAP plans can serve as basis for source water protection by the water system owner/operator.
24. Enhance understanding of consumer confidence reports.
25. Increase consumer confidence in drinking water quality and safety.
4. Enhance understanding by consumers of why protection and treatment strategies are implemented and how they affect water supply pricing/rates.
27. Help utilities identify contaminants and contaminant sources.
28. Help utilities prepare consumer confidence reports.
29. Emphasize importance of good well construction for drinking water supplies.
30. Increase awareness of quantity/availability of water as well as quality.
31. Foster cooperation between all users of water within a basin or watershed.
32. Allow local governments to make good decisions to improve public health.
33. Ensure equity among all who benefit with regard to costs of implementation.
34. Provide consultants with basis for designing treatment processes.
35. Tailor frequency and type of monitoring for water supply systems.

Technical and Citizens Advisory Committee Meeting
North Carolina SWAP Plan Development
October 2, 1998
Combined Morning Session

9:00 - 9:10 North Carolina=s Proposal for Public Participation in SWAP Plan Development and Implementation, Jessica Miles, Chief, Public Water Supply Section

9:10 - 9:45 Facilitated Discussion on Public Participation Proposal, Norma Murphy

9:45 - 10:00 North Carolina=s Proposal for Completing the Required Contaminant Inventory for Source Water Assessments, Raj Butalia, Computing Consultant, Public Water Supply Section

10:00 - 10:30 Facilitated Discussion on Contaminant Inventory Proposal, Norma Murphy

10:30 - 10:45 Break

10:45 - 11:00 Overall Approach to Determining Susceptibility of Public Water Supplies to Contamination, Bob Midgette, Supervisor, Protection and Enforcement Branch

11:15 - 11:30 Surface Water Vulnerability Rating System, Elizabeth Morey, Hydrogeologist, Public Water Supply Section

11:30 - 11:45 Ground Water Vulnerability Rating System, Gale Johnson, Hydrogeologist, Public Water Supply Section

11:45 - 12:00 Susceptibility Determinations for Source Water Assessments, Bob Midgette

12:00 - 12:15 Questions, Objectives for Afternoon Work Group Sessions, Bob Midgette

12:15 - 1:45 Lunch (on your own)
Afternoon Ground Water and Surface Water Work Group Sessions

1:45 - 4:30 Session 1 Ground Water Susceptibility Determination Approach
FACILITATOR

Break Included

1:45 - 4:30 Session 2 Surface Water Susceptibility Determination Approach
FACILITATOR

Summary of the Second Technical and Citizens Advisory committee Meeting for North Carolina=s Source Water Assessment Program Plan Development

Introduction

The second of three planned North Carolina Source Water Assessment Program (SWAP) Technical and Citizens Advisory Committee meetings was held in Raleigh, NC in the Parker Lincoln Building on October 2, 1998. An agenda of the meeting is attached. The morning session consisted of a series of short presentations by Public Water Supply (PWS) Section staff on components of the SWAP plan including Public Participation, Contaminant Inventory, and Susceptibility Determination. Since the Public Participation and Contaminant Inventory issues had been discussed in the previous Advisory Committee meeting they were presented briefly again and then facilitated discussions were held in the morning combined session to allow for all participants to provide comments on the state=s proposed strategies. Therefore, the proposed strategies as presented to the Advisory Committee for these two components will now be considered appropriate for incorporation into the state=s draft SWAP plan.

The state=s proposal for determining the susceptibility of public water supplies to potential contaminant sources was presented for the first time. The afternoon break-out group sessions discussed the state=s proposed methodology for determining the susceptibility of surface water and ground water public water supply intakes to potential sources of contamination.

After the meeting summary below is an important notice on some changes that have resulted since the meeting as a result of brand new guidance information from EPA. Be sure to review this section.

Brief Summary of Presentations from the Morning Session

Public Participation

Jessica Miles presented a brief overview of the state=s plan for the Public Participation component of the SWAP plan. This was a review of the presentation provided in the first meeting. Following the presentation, a facilitated discussion was led by Department of Environment and Natural Resources (DENR) facilitators, Norma Murphy and Christy Osterhout, to provide opportunity for Advisory Committee participants to provide comment or make suggested additions or revisions of the state=s proposed plan for the Public Participation component of the SWAP plan. The comments below were recorded by the facilitators during the discussion:

- *Concern about short-time between now and public meetings for plan development.*
- *Emphasize non-regulatory aspect of plan especially for public meetings.*

- Use a specific plan for disseminating assessment information to specific groups - water suppliers, etc., local planning organizations (Council of Governments), NC American. Planning Association., League of Municipalities, NC Medical Society, AARP, AIDS services groups, Health Directors, River Basin Organizations.
- Incorporation of SWAP information into DWQ Basinwide plans for program priority setting and plan development.
-Uncertainty of information (limitations & assumptions need to be clearly presented in the plan).
- Another meeting to oversee "worst cases," or "false sense of security" may be necessary. Make sure plan doesn't scare public.
- Minimum set of data to report to ensure uniformity/credibility.
- Specific ways to disseminate information: Internet, send post cards with URL.
- Great way to teach the public (public health).
- University extension services should be utilized.
- Public service announcements on radio & TV (NC Now, PBS).
- Mass mailing (system or general public or town elders); format an email announcement of the SWAP plan for different environmental list-servers.
- Annual meetings (League of Municipalities and other groups) get on their agenda for SWAP presentations.
- AIDS services groups, Local Health Directors, Medical Doctors need to be informed.
- Farming communities - worst case scenario (oversee development of plan - another meeting).
- Need for addressing data voids & data concerns.

These comments and suggestions will be incorporated into the state's proposed Public Participation component for the draft SWAP plan as deemed appropriate by PWS staff.

Contaminant Inventory

Raj Butalia, Computer Consultant, PWS Section, presented the state's proposed strategy for the Contaminant Inventory component of the SWAP plan. North Carolina's SWAP plan needs to specify the contaminants of concern and the significant sources of the identified contaminants. The majority of the contaminants of concern are specified in the Safe Drinking Water Act, i.e. the Primary Drinking Water Standards. There are a few additional contaminants regulated by the PWS Section in North Carolina. The state will focus its efforts on acquiring data for potential sources, and thus for the contaminants. All potential sources in the delineated assessment area will be identified from electronic databases.

The sources of the electronic databases include the Environmental Protection Agency's regulatory programs (RCRA, TRI, CERCLA, NPL, non-NPL), DENR's regulatory programs (Divisions of Land Resources, Waste Management, and Water

Quality, as well as other state agencies (Department of Health and Human Services, Employment Securities Commission, NC Department of Agriculture). A draft written summary of the state=s strategy, AProposed Contaminant Inventory for North Carolina SWAP@ was provided to Advisory Committee participants and is included as an attachment for anyone unable to attend the October 2nd meeting. Also included as Attachment 1, is a table of ADatabases identified that will be used for assessment purposes@, that lists possible contaminant source databases as well as other GIS data that will be used in the assessment process.

Following the presentation, a facilitated discussion was led by Department of Environment and Natural Resources (DENR) facilitators, Norma Murphy and Christy Osterhout, to provide opportunity for Advisory Committee participants to provide comment or make suggested additions or revisions of the state=s proposed plan for the Contaminant Inventory component of the SWAP plan. The comments below were recorded by the facilitators during the discussion:

- Need for agriculture data (land use, animals, crop patterns, chemical use); problem - crops by county reported at year=s end;
- How to present data uncertainty, limitations and assumptions;
- UST incident list;
- Pesticide dealerships list - restricted use (see Henry Wade);
- Potential contaminant source list - remove military installations from list but include potential contaminating activities (Gary Davis will provide list from Camp Lejeune) - contact other military bases;
- Waste spills database;
- Generic category for other military sources;
- Microbiological contamination needs addressing;
- Pesticide releases (Henry Wade);
- Database of animal operations available.

These comments and suggestions will be incorporated into the state=s proposed Public Participation component for the draft SWAP plan as deemed appropriate by PWS staff.

Susceptibility Determination

Bob Midgette presented the overall approach to ADetermining Susceptibility of Public Water Supplies to Contamination.@ The state proposes to delineate ground water source PWS systems in accordance with North Carolina=s approved Wellhead Protection Program. The state proposes to delineate surface water source PWS systems as defined in the Water Supply Watershed Protection Rules with some consideration for

increasing the assessment area for WS-IV watersheds if warranted based on expert knowledge.

Because of the need to prioritize PWS systems due to limited time and resources available for SWAP plan assessments to be completed the state proposes to use a phased approach to the assessments. Transient non-community systems will be assessed according to the Phase I susceptibility determination procedure. Community systems and Non-transient Non-community systems will be assessed according to a combined Phase I and Phase II susceptibility determination. The procedure for susceptibility determination for ground water and surface water PWS intakes is described in detail in two draft documents (ASurface Water System Susceptibility Determination Procedure@ and AGround Water System Susceptibility Determination Procedure@) that were distributed to participants at the October 2nd meeting and are included as attachments for anyone unable to attend.

Briefly, for a Phase I assessment, after delineation is completed, the inherent vulnerability of the intake shall be determined based on a set of specific factors for both ground water and surface water sources. Elizabeth Morey and Gale Johnson, gave presentations providing detail on how the inherent vulnerability of surface and ground water intakes will be determined. After the inherent vulnerability rating is determined then a potential contaminant source rating will be determined for each intake. The two ratings will then be mathematically combined to equally consider both the inherent vulnerability of the intake and the potential contaminant sources identified within the delineated area. The results of all these Phase I assessments will be converted to a percentile ranking. The percentile ranking will be divided into five equal parts or quintiles. The highest ranked 40 percent, including any systems with monitoring results indicating raw water contamination, will be assessed further according to the Phase II procedure. The Phase II susceptibility determination procedure will utilize an evaluation of the number of potential contaminant sources within a refined risk category of lower, moderate, and higher, and the location of these sources within the delineated assessment areas. The result is a determination for each Phase II assessed public water system of an overall susceptibility category of higher, moderate, or lower. This approach provides a relative comparison of susceptibility for a public water system to other assessed public water systems.

Summary of Surface Water Work Group Session

The afternoon breakout session for surface water walked through the 10/1/98 draft document "Surface Water System Susceptibility Determination Procedure" that was handed out at the start of the meeting.

Step 1: No elaboration of delineation occurred.

Step 2: Inherent Vulnerability

Table 1. Intake Characteristic Factors

Watershed Classification.

The group liked the use of the watershed classification structure in the table. It was noted that there was a typo in Column 2 - one of the WS-IV's should have been a WS-V. The result of the discussion was the conclusion that the WS-III classification should be with the moderate Vulnerability as the WS-III has more similarities with the land use restrictions of the WS-II than the WS-IV.

Intake Location

Several group members were not familiar with the distinctions between Class 1,2, and 3 reservoirs. Class 1 are single purpose drinking water reservoirs with specific restrictions controlling the shoreline, while Class 3 are large multipurpose reservoirs like Falls Lake, Jordan Lake and Lake Norman. Land use controls around Class 1 and 2 are much tighter, affording greater public hearth protection. Direct stream intakes have fewer protections. Some discussion about the fact that run-of-river intakes can pass pollution more quickly downstream past the intake, while reservoirs need more time to flush contaminants. Their vulnerability to variations in water quality was an issue. Since their vulnerability to acute contaminants was at least as great as for impoundments, the consensus was to leave it as it was, but to consider reducing the score for moderate and lower vulnerability to maybe 4 and 2 as determined by PWS Section staff.

Raw Water Quality

There was substantial discussion about how best to incorporate concerns about the actual water quality at the intake into the susceptibility analysis. Surface water plants

routinely monitor for several water quality parameters, including coliform, turbidity, and color. Discussion around the Department=s system of classifying the use support was questioned as a possible surrogate: fully supporting, partially supporting, use threatened, and not supporting. That stream water quality rating system was explained to be based on biologic or chemical data if data were available and on the agency=s best professional judgement if data was not readily available. Since the plant data is actual data at the intake, it was chosen as a better measure of water quality, even though no plant data is gathered for contaminants like organic chemicals. It was decided to add a row to the table to add the use support category, but NOT to assign points to it and not factor it in to the calculation, but rather as additional information for the water system and general public.

One issue that was not resolved at the meeting was the need to put some sort of definition on the raw water quality standard vulnerability determination. Having AExceeds Standards@ or A> 50% of Standards@ does not provide the associated time frame for the measurement. Is it worst case? Worst day each year? The 90th percentile? The Public Water Supply Section was instructed to refine the definition to clarify the intent.

Watershed Characteristics Evaluation

The watershed characteristic evaluation is expected to include an analysis of land use/land cover, population density, soil type, precipitation patterns, geology, and land slope. This analysis, expected to be contracted with USGS, would be one method of getting at nonpoint water quality impacts where detailed data sets are not available. The group was very supportive of this type of analysis factoring into the overall susceptibility determination approach. One source of data to look at is the Agricultural Statistics Division.

Step 3 Contaminant Inventory/ Rating

Table 2 from ASurface Water System Susceptibility Determination Procedure@ was not discussed in any depth, as it had been covered in the combined morning session. There was some elaboration from the text in how the ranking of H,M,L would be assigned. For databases of known regulated contaminants, such as exists in DENR, higher would be assigned based on professional judgement. For databases of facilities likely to use regulated contaminants, the table grouping facilities as higher, moderate and lower would be used, as developed from EPA and Oregon=s WHP program and modified by PWS staff.

Table 3 from "Surface Water System Susceptibility Determination Procedure" discussions did lead to the desire to change the table. The committee determined that there was a need to normalize the watersheds, or for example, to calculate the surface water contaminant rating ***per unit of watershed area***. The final weighting factors in Table 3 may be adjusted to facilitate an easier combining of the Inherent Vulnerability calculated in Step 2 with the Contaminant Rating generated in Step 3. The relative weights should stay the same. In order to get a Contaminant Rating with a meaningful number, once the weighting is done, the final unit may be something like number of contaminant units per 10 square miles, or per 100 acres, or something similar. PWS should adjust the multiplier to get something understandable. It was also recommended that when the watershed area calculations are done, to be sure not to include the surface area of the water body.

Step 4. Susceptibility Rating/Priority Screening

There were no comments or questions on Step 4.

Step 5. Susceptibility Determination - Phase I

There was not a broad support for the A-E ranking concept. The surface water work group felt that once the decision was made for a particular system to proceed with a Phase II or not was all the relative ranking that was necessary. PWS expressed some concern that there might be an assumption that systems that did not get a Phase II susceptibility determination were not vulnerable, while the number of systems that will go through the Phase II procedure is driven by resource constraints, not the need for further assessment. Information on higher/moderate/lower risk for the various categories should be provided to the water systems as the assessment. Providing the relative rankings was seen as potentially detrimental and misleading. Remember that being lower on the relative ranking list would not necessarily equate directly to real risk of contamination.

It was recommended that the passing out of the draft assessments to the water systems be added as a separate step after Step 5. It was agreed that Phase 1 assessments would be distributed to all water systems upon completion, even those slated for a Phase 2 work.

Step 6. Susceptibility Determination - Phase II

Table 4 from "Surface Water System Susceptibility Determination Procedure" was not changed. There was some clarification provided about the rating values. Table 4 is representative of the type of more specific information believed to be available for regulated contaminant databases. It is the supposition of the PWS Section that most of the regulatory programs behind these databases will have some statutory or regulatory distinctions between operators or facilities that exist. In cases where that split between what can be classified as higher, moderate, and lower is included in the statutes or rules, that split will be made. In cases where guidance on relative risk has not been predetermined, the approach will be to rank all occurrences and group by thirds as higher, moderate, and lower. For example, if quantity of a certain contaminant is found in a database, such as metal finishers, and ranges between 500 and 4000 gallons, the facilities would be sorted by quantity and then given a relative rank. This was decided to be preferable to trying to go contaminant by contaminant and set specific quantity thresholds as a group without a lot of data to support one level versus another.

There was some discussion about the need to include consideration of the size or type of NPDES discharge. In Phase I, one small package plant of residential wastes would be counted as one potential contaminant source, as would one large municipal discharge receiving waste from an industrial pretreatment facility. The question was raised if this shouldn't be better differentiated in Phase I than Phase II. The PWS Section's response to this question was the concern of differentiating between different types of contaminants in Phase I. Similar breakdowns are possible for probably any database found. If we try to get more specific data for NPDES dischargers in Phase 1, then each group with interest in a particular contaminant group would probably request the same differentiation for their particular facility or contaminant. This would, in effect be a commitment to doing Phase II level analysis for all water supplies, for which the resources are insufficient. Others in the subcommittee echoed their interest in expanded detail in their area of interest if another facility type received the higher level of detail. PWS committed to consideration of this issue.

Table 5 from "Surface Water System Susceptibility Determination Procedure" was discussed in some detail. Some clarification of zones was provided. For WS-I and WS-II, the zones that exist are the critical area, and then the rest of the watershed which is protected. A titled zone of Protected officially exists only for a WS-IV watershed, which is the 10 mile radius drainage area. Therefore, the zones in the first column should be amended to read, Critical; Watershed (WS-II, III); Protected (WS-IV); Watershed (WS-IV, V); and Total. Note that switches the order of the second and third row headings. It was also noted that the asterisk should be associated with the word "Total" not the number 10. As discussions about the numbering system progressed, it was agreed that

consistent with Phase 1 Assessments, if relative rankings are not published, then the numbers in the table become irrelevant. It was agreed that the PWS Section and DENR may continue with the ranking system in order to help guide DENR priorities for work.

Summary of Ground Water Work Group Session

The afternoon breakout session for ground water centered on the 10/1/98 draft AGround Water System Susceptibility Determination Procedure@ that was handed out at the start of the meeting.

Step 1: Delineation

As the delineation methodology was the topic of discussion at the September 3rd meeting no further discussion was required.

Step 2: Inherent Vulnerability of the Aquifer

The meeting began with a discussion of Table 1. AAquifer Rating Based on Water Transmitting Characteristics.@ Concerns were raised with regard to the relative ratings assigned to the aquifers and ground water sources listed in the table. Many of the concerns centered on the observation that the aquifer ratings did not take into account water table depth below land surface or the material overlying the aquifer. It was pointed out that the aquifer rating was a relative measure of the transport characteristics of the different aquifer materials and did not consider any mitigating factors associated with the unsaturated zone. It was further noted that these factors were considered separately in the unsaturated zone rating. At this point the group decided that it would be more appropriate the discuss the unsaturated zone rating and, once completed, to return to the discussion of aquifer rating.

Unsaturated Zone Rating

The discussion of the unsaturated zone rating began by informing the group that the state is considering contracting with the USGS to develop an unsaturated zone rating system. The group was informed that, if developed, the GIS based system would use a combination of selected factors to assign an unsaturated zone rating to each PWS

ground water intake. The selected factors (land use/land cover, hydraulic conductance, and land-surface slope) are those that contribute to the likelihood that contaminants from surface and shallow sources will follow the path of aquifer recharge and reach the water table. Following a discussion of the procedure for rating and weighting the contributing factors the group recommended that land use/land cover should be weighted relatively very high. The group further recommended that, once developed, the unsaturated zone ratings along with the rating and weighting values assigned to the contributing factors should be confirmed with historical data, literature review, and expert opinion. The group inquired as to the possibility of obtaining hydraulic conductance values and depth of the water table information from county soil surveys. It was pointed out that information available from county soil surveys might suffice in areas with shallow water tables but would be insufficient in many areas. It was also noted that existing digital elevation models combined with statistical information on the depth below land surface of the water table in different regions would be used to calculate the thickness of the unsaturated zone.

Several work group members felt that information on well construction and improperly abandoned wells should be included in the unsaturated zone rating. After discussing this issue it was agreed that problems associated with improperly constructed and abandoned wells were typically addressed on a site-specific basis as identified and could not be considered up front. It was also pointed out that the inherent vulnerability analysis, of which the aquifer and unsaturated zone ratings are components, refers only to the geologic/hydrogeologic characteristics of the delineated area. Anthropogenic influences on the vulnerability of the ground water intake are not considered at this stage of the analysis. If information concerning improperly constructed and abandoned wells is to be factored into the SWAP plan, it would be in some other component of the analysis. The group was informed that PWS systems would be given the opportunity to review the information supporting the Phase I assessments for corrections and/or to add information for use in the assessments. It is possible that information received from PWS systems concerning improperly constructed and abandoned wells could be incorporated into Phase II assessments. However, absent this information, PWS wells would be considered to be properly constructed. The group recommended that assumptions such as this should be clearly stated in the SWAP.

Aquifer Rating

Table 1. Aquifer Rating Based on Water Transmitting Characteristics

Members of the work group stated that the term Ahighly confined aquifers@ is a misnomer and that such aquifers do not actually occur in North Carolina. Evidence was cited of wells screened in the water table aquifer responding to withdrawals from deeper, supposedly confined aquifers. The group agreed that aquifer designations such as AHighly Confined,@ ALeaky-Confined,@ and ASemi-Confined@ should be avoided. It was also agreed that references to specific hydrogeologic unit names (e.g., Castle Hayne Aquifer) should be removed. The group recommended that coastal plain aquifers should be designated as ADeep Confined,@ AShallow Confined,@ and AUnconfined@ with examples given of where they typically occur (e.g., Deep Confined (Kinston area), Shallow Confined (Pamlico County), Unconfined (Sand Hills area), etc.). Some members of the group felt that fractured rock aquifers should likewise be divided into shallow and deep categories. It was felt that ground water from deeper fracture zones was more protected from surface and shallow sources of contamination than ground water from shallower fracture zones. However, the categorization was rejected due to the fact that rock wells are typically open hole wells with the potential for fractures occurring at any depth to yield water to the well. Concern was expressed that an aquifer rating of 1 (lowest vulnerability) might lead some PWS systems to regard their intakes as not vulnerable to contamination and result in their disregarding possible contaminating activities and sources. It was explained however, that the aquifer rating was relative to other aquifers and not an absolute measure of aquifer vulnerability.

Table 2. Example matrix used to establish an inherent vulnerability rating for ground water sources of public water supply by addition of the source aquifer and unsaturated zone ratings.

No objections were raised to the equal weighting of the aquifer and unsaturated zone ratings.

Step 3: Contaminant Rating

Table 3. Example Databases Containing Information about Known Potential Contaminant Sources

Group members pointed out that Farmers for Fairness had a database of all reported sewer spills in North Carolina. It was suggested that this database could be used to locate areas with chronic sewer problems. In a similar fashion, sections of

highways with a high incidence of traffic accidents involving spills and releases should be identified.

Table 4. Ground Water Contaminant Rating

The question was raised as to whether or not a single, high risk potential contaminant source within the delineated area should result in the ground water intake be designated as highly susceptible to contamination. It was pointed out that the contaminant rating is only one component of the susceptibility determination. A single, higher risk potential contaminant source would be more or less significant to the susceptibility of the ground water intake depending on the inherent vulnerability of the aquifer. The group was in agreement that the number of potential contaminant sources, along with their risk category, should figure into the overall susceptibility determination.

Due to time constraint, the Ground Water Group session ended at this point with the group deciding to resolve any remaining issue via conference calls and email.

IMPORTANT NOTICE - CHANGES SINCE THE OCTOBER 2ND MEETING:

One day after the Advisory Committee meeting, an official correspondence arrived by e-mail from EPA stating that state SWAP plans were required to provide a final, bottom line, assessment result for each system or a relative ranking system, and that the presentation of the material in the tables or in a GIS system data layer as the assessment, as favored by the Advisory Committee, would be rejected by EPA. This new information, combined with the Advisory Committee meeting requires that we rethink our strategy.

It appears that EPA would approve a plan with the A-E in the 10/1/98 proposals, as relative assessments are approvable, but there was interest by the stakeholders in staying away from relative assessments. If we do not provide relative rankings, even by groups like A-E, then a definitive answer for each system is required. The DENR steering committee is working on a revised proposal that would result in a final assessment result for each system by combining an overall H, M, L (higher, moderate, lower) for Inherent Vulnerability with an overall H, M, L for Contaminant Characteristics, to give a final assessment result for each system of H, M, or L, or perhaps a Yes/No on vulnerability. The interim tables would still be provided in the assessment.

We are also evaluating the ease of moving to incorporate the concept of the Zones, or proximity to the source, from Phase II to Phase I and dropping the Phase concept (but not the priority for more detail concept). Once the assessments were distributed to all system, we would focus the subsequent work (what was Phase II) on the protection activities of trying to provide more contaminant specific detail to the most susceptible systems (as was proposed previously). From that effort, we could provide procedures and guidance for systems that were not susceptible enough to get state assistance with subsequent database review to initiate additional protection efforts on their own.

This approach should receive EPA approval, while providing more specific useful information to public water systems, staying away from a grouped ranking, and providing more definite answers to the water system.

Technical and Citizens Advisory Committee
North Carolina SWAP Plan Development
Meeting Agenda
November 5, 1998

9:00 - 9:15 Advisory Committee Comments on Proposed Susceptibility Determination Procedure; Jessica Miles, Chief, Public Water Supply Section

9:15 - 9:30 Overview of Revisions to Susceptibility Determination Procedure; Bob Midgette, Supervisor, Protection and Enforcement Branch, PWS Section

9:30 - 10:00 Revised Surface Water System Susceptibility Determination Procedure; Elizabeth Morey, Hydrogeologist, Protection and Enforcement Branch, PWS Section

10:00 - 10:30 Revised Ground Water System Susceptibility Determination Procedure; Gale Johnson, Hydrogeologist, Protection and Enforcement Branch, PWS Section

10:30 - 10:45 Break

10:45 - 12:00 Facilitated Discussion of Revised Susceptibility Determination Procedure; Norma Murphy, Facilitator

12:00 - 1:30 Lunch (on your own)

1:30 - 2:00 Overview of Draft SWAP Plan; Bob Midgette

2:00 - 3:00 Facilitated Discussion of Draft SWAP Plan; Norma Murphy, Facilitator

Summary of the Third Technical and Citizens Advisory Committee Meeting for North Carolina=s Source Water Assessment Program Plan Development

Introduction

The third of three planned North Carolina Source Water Assessment Program (SWAP) Technical and Citizens (TAC) Advisory Committee meetings was held in Raleigh, NC in the Parker Lincoln Building on November 5, 1998. An agenda of the meeting is attached. The combined Surface Water and Ground Water work group session consisted of a series of short presentations by Public Water Supply (PWS) Section staff on revisions to the Susceptibility Determination procedure and an overview of the Draft SWAP plan. The Susceptibility Determination procedure was revised to incorporate suggestions received during the October 2, 1998 TAC Advisory Committee meeting. Facilitated discussions on the revised Susceptibility Determination procedure and the Draft SWAP plan were conducted. Because the discussions were inclusive of PWS systems regardless of source there were no breakout work-group sessions for ground water and surface water.

Brief Summary of Presentations

Jessica Miles presented a brief overview of the October 2, 1998 comments of the TAC Advisory Committee and how they were incorporated into the revisions of the Susceptibility Determination procedure. Additionally, it was explained that TAC Advisory comments were included appropriately by Staff in several sections of the draft SWAP plan.

Susceptibility Determination

Bob Midgette presented the revisions to the state=s overall approach to ADetermining Susceptibility of Public Water Supplies to Contamination.@ The revised procedure as detailed in Chapter 2 of the Draft SWAP plan, combines descriptive ratings for inherent vulnerability and contaminant rating that results in a qualitative rating for susceptibility of higher, moderate, or lower for each

PWS system. The state believes these revisions will satisfy EPA=s requirement for a susceptibility determination for all PWS systems. Also, this procedure will minimize the potential for inappropriate use of SWAP results to directly compare or rank PWS systems while maintaining the ability to prioritize PWS systems for the Phase II susceptibility determinations. Elizabeth Morey and Gale Johnson made short presentations on the revised surface and ground water susceptibility determination procedures. This led into a facilitated discussion with all attendees. The participants were asked to share their ideas on the revised susceptibility determination procedure and to reach consensus for the Draft SWAP plan. The following comments were recorded by Norma Murphy, DENR facilitator:

- can we make plan changes after Afinalization@ ?
- GW/Surface contamination i.e. fertilizer should also be listed in residential/municipal
- forest mgt. move off moderate list - Christmas tree/shrubbery mgt. should be separated out
- amount of source information released on Internet
- results format in reports and call meeting to discuss format
- salt water intrusion...a contamination source?
- conduct pilot before public meeting/finalization
- qualify databases
- funeral homes listed in contaminate inventory?

Following the facilitated discussion the TAC Advisory Committee was asked if there was consensus on the revised susceptibility procedure and all agreed that the new procedure was satisfactory.

Bob Midgette and Gale Johnson reviewed the Draft SWAP plan with emphasis on the sections that were added to the Draft that was available at the meeting. These sections included conjunctive delineation, delineation of recharge areas not adjacent to ground water intakes, consideration of well integrity, and proposed schedule of completion for SWAP activities. This led into a facilitated discussion with all attendees. The participants were asked to share their ideas on the Draft SWAP plan. The following comments were recorded by Norma Murphy, DENR facilitator:

- *database quality needs correction*
- *pilot study PWS systems need to agree to perform verification of assessment results*
- *disseminate pilot study data to appropriate parties*
- *include rural water groups & AWWA for final Arollout@ of plan*
- *program implementation section should refer to idea of continual improvement*

Following the facilitated discussion the TAC Advisory Committee was asked if they were satisfied with the Draft SWAP plan. It was agreed that the Draft SWAP plan was acceptable. The participants were thanked for their contributions to the SWAP plan development and were reminded that further input may be sought by the state as the implementation of the SWAP plan progresses.

APPENDIX D

TECHNICAL AND CITIZENS ADVISORY COMMITTEE

MEETING INFORMATION

D - 1

ADVISORY COMMITTEE INVITATION LETTER

AND MAILING LIST

August 4, 1998

Dear :

The 1996 amendments to the Safe Drinking Water Act created a new requirement for all states to conduct delineation and assessment of all public water system drinking water intakes in the state. This requirement applies both to surface water intakes and wells regulated by North Carolina=s Public Water Supply Section. This activity will include delineating and defining the area of concern or vulnerability for the intake, identifying potential contaminants in that delineated area, assessing the risk to the intake from the contamination, and making the information available to the public. The Department of Environment and Natural Resources has convened a working group of environmental divisions to draft the North Carolina Source Water Assessment Plan (SWAP). As a part of the law, Congress has placed a strong emphasis on public awareness and involvement, including the convening of citizens and technical advisory committees. The citizens and technical advisory committees are to advise the states as they draft their source water assessment plans for submittal to the Environmental Protection Agency. These advisory committees are expected to provide their advice and input as each state is considering the elements for inclusion in the plan.

The Department is in the process of naming the advisory committees and is searching for nominees who would be willing to assist. You have been identified as an individual or as representing an organization believed to have an interest in how this plan is developed in North Carolina, and as such are invited to participate in the planning process. We plan to hold three joint meetings of the citizens and technical advisory committees. These meetings are scheduled for 9:00 a.m. on September 3, October 2, and November 5 and are expected to last all day. Between these meetings, the citizens and technical advisory committees are expected to meet individually on specific issues for recommendation to the full group. Meetings will be held in Raleigh.

Source water assessments will allow North Carolina to systematically address issues of potential contamination of public water supplies in a comprehensive way, such as has not been done before. We are excited about the opportunity to use this advisory committee process in the development of such a worthwhile plan. Please use the attached form to indicate your level of interest and ability to assist with the SWAP development. The form should be faxed or mailed to Elizabeth Morey by August 17, 1998 as indicated on the form. If you have any questions, or know of another individual or organization that should participate in the planning process, please contact Elizabeth Morey at 919-715-0674 or at E-mail address Elizabeth_Morey@mail.enr.state.nc.us.

Sincerely,

Jessica G. Miles, P.E., Chief
Public Water Supply Section
Division of Environmental Health

JGM:spm

cc: Bill Holman
Linda Sewall
Bob Midgette
Elizabeth Morey

North Carolina
Source Water Assessment Program (SWAP)
Advisory Committee Meetings

Please indicate your level of interest in the SWAP process by checking the appropriate box(es) below:

‘ I am interested in serving on a citizen or technical advisory committee.

‘ If requested, I will attend the first advisory committee meeting on September 3, 1998.

‘ I am not interested in serving on an advisory committee, but would like to remain on the mailing list to receive information pertaining to the SWAP process.

‘ Please remove my name from the mailing list.

Please provide the following information:

Name: _____

Organization Affiliation/Representation: _____

Address: _____

_____

Phone Number: _____

Fax Number: _____

E-Mail Address: _____

Please submit this form by August 17, 1998.

MAILING LIST FOR SWAP PUBLIC PARTICIPATION

Director, Academy of Family Physicians

Director, Community Preservation Group of NC

Director, Conservation Fund

Director, Kidney Foundation

Director, Medical Society of NC

Director, Nature Conservancy-NC Chapter

Director, NC Petroleum Association Inc.

Director, NC Sierra Club

Director, NC Fair Share Program

Director, NC Poultry Federation

Director, NC League of Conservation Voters

Director, NC Cattlemans Association

Director, NC Association of Launderers and Cleaners

Stan Adams, NC Div. of Forestry Resources

Robert Aery, NC Association of Convenience Stores

Eric Aufderhaar, Groundwater Professionals of NC

Amy Axon, Division of Water Quality

Ronald Aycock, NC Assoc. of County Commissioners

Carl Bailey, DENR

Bouton Balbridge, Cape Fear River Watch, Inc.

Jerad Bales, US Geological Survey

Christie Barbee, Carolina Asphalt Pavement Association Inc.

Mike Baron, Water Conservation Office / UtilitiesDept.

Tom Bean, NC Wildlife Federation

Layton Bedsole Jr., NC State Ports Authority

Doug Bensinger, B&G Environmental

Harold Berry, NC Petroleum Marketers Association

Sandra Birkhead, Glaxo Welcome

Bill Black, US Army Corp of Engineers

James Blackburn, NC Assoc. of Co. Commissioners

Ann Borden, S&ME, Inc.

Dewey Botts, Division of Soil & Water Conservation

Kevin Boyer, GEI Consultants, Inc.

Sammy Boyette, NC Rural Water Association

John Bratton, NC Sedimentation Control Commission

Sherol Bremen, NC Petroleum Council

Greg Bright, Wake Co. Div. of Envir. Health

Jeffrey Brown, NC Center for Geo Information & Analysis (CGIA)

Margaret Brown, Protect Our Water
Robert Caldwell, NC State Grange

Reid Campbell, NC Utilities Commission-Public Staff

Chris Carter, Haw River Assembly

Charlie Carter, Womble Carlyle Sandridge & Rice

Charles Case, NC Citizens for Business & Industry

Jeff Cherry, Hunton & Williams

Walter Cherry, North Carolina Pork Council

Callie Childress, US Geological Survey

Anne Coan, NC Farm Bureau Federation

Ronald Coble, P.G.

Jerry Coker, Weyerhaeuser Co.

Mike Collins, CEM Corporation

Mimi Cooper, Health Director
Randolph County Health Department

Greg Cope (Dr.), Dept. of Toxicology

Andy Counts, American Furniture Mfg:s Association

Buzz Bryson, Environmental Services CP&L

Dollie Burwell c/o Eva Claytons Office

Jennifer Calcagni, Research Triangle Institute

Karen Cragnolin, RiverLink, Inc.

Patrick Davis,Triangle J Council of Government

Marion Deerhake

Paul Dew, NC Agribusiness Council, Inc.

Mollie Diggins, NC Sierra Club

Marion Dodd, League of Women Voters of NC

Rick Durham, Carolinas Chapter-
National Association of Water Co.
Bill Eaker, Land of Sky Regional Council

Jo-Leslie Eimers, US Geological Survey

Dave Evans, Dept. of Marine, Earth & Atmospheric Sciences

George Everett, MCIC

Lynne Faltraco, Concerned Citizens of Rutherford County (CCRC)

Linda Faulkner-Vaughn, McKim & Creed

Cindy Finan, NC American Waterworks Association

Mike Floyd, NC Groundwater Association

Robert Forbes, Jr., CH2M Hill

Marianne Frederick, Dept. Of Commerce Community Assistance

Nan Freeland, Clean Water Fund

Greg Garner, AIDS Service Organization of Wake Co.

Mark Garner, Jr., Rivers & Associates, Incorporated

Lewis Gaskin, NC Christmas Tree Growers

Lawrence Gayle, Triangle TRIO

Terry Green, NC Waterworks Operators Association

Angie Grooms, Duke Power

Robert Gruber, NC Utilities Commission-Public Staff

Leslie Hall, Jr., McKim & Creed

Billy-Ray Hall, NC Rural Economic Dev. Center

Roger Hansard, USDA NRCS

Jerry Hardesty, North Carolina Pork Council

Maryann Harrison, Neuse River Foundation

Jim Harrison, Pigeon River Action Group

Joe Harwood, NC Citizens for Business and Industry

Richard Hatch, NC Coalition on Aging

Mark Hawes, Shurtape Technologies Inc.

Commanding General Gary H. Davis, AC/S EMD
Camp Lejeune, North Carolina

Laurie Gengo, Poyner & Spruill

Thomas Glenn, City of Durham/Water Resources

Danny Gogal, Office of Environmental Justice

Paul Goodson, Professional Engineers of NC

Jeri Gray, Water Resources Research Institute of UNC

Ralph Heath

Milton Heath, Institute of Government

Jerry Henderson, DuPont

Ed Holland, Orange Water & Sewer Authority

Preston Howard, Director Div. of Water Quality

Michael Iagnocco, NC Assoc of Env Professionals

Greg Jennings, NCSU Bio/Agr Engineering

Ann Johnson, Governor=s Advisory Council on Aging

Peg Jones, NC Watershed Coalition, Inc.

Max Justice,Parker, Poe, Adams, & Bernstein

Bernard Kane, Jr., Pamlico-Tar River Foundation

Cindy Kirby, Community Water System Association

Stella Kirkendale, AIDS Service Organization of Wake Co.

Jean Crews-Kleine, NC Rural Economic Dev. Center

Mary Kollstedt, State Conservationist
USDA-NRCS

Ron Lambe, Western NC Alliance

Douglas Lassiter, NC Septic Tank Association

John Leonard, ENSR Cons. & Engineering

Gale Lewis, Alliance for Responsible Swine Industry

Ginney Linsey, Clean Water Fund of NC

Barbara Lisle, US Geological Survey

John Morris, NC Div of Water Resources

Arthur Mouberry, DENR

Calvin Murphy, Utilities Director
Eastern Band of Cherokee Indians

Rusty Norris, ENSR Cons. & Engineering

E.M.T. O=Nan, Protect All Children=s Env.

Jon Ort (Dr.), NC Cooperative Extension Service

Michael Allen, MacConnell & Associates, P.C.

Jane Sharp-MacRae, Conservation Council of NC

Joe McClees, Septic Tank Association

Rich McLaughlin (Dr.), Dept. of Soil Science

Jesse Meredith, M.D.,Commission for Health Services

David Meredith, North Carolina State Grange

Time Minton, NC Association of Realtors

Steve Mitchell, TRIO Eastern NC

Donna Moffit, NC Div. of Coastal Management

Kasey Monro, Kemp Construction, Inc.

David Moreau, Env. Management Commission
Dept. of City & Regional Planning

Ted Outwater, Clean Water Fund of North Carolina

Dean Chastain, RCRA Manager
Seymour Johnson AFB

Lynne Palmer, RCRA Manager
Seymour Johnson AFB

Linwood Peele, NC Div of Water Resources

George Pettus, Goldsboro Hog Farms

Stephen Phillips, PCS Phosphate Co. Inc.

Terry Pierce, Association of Local Health Directors

Transylvania County Health Department

Jacquelyn Pikul, Clean Water Fund of NC

Doug Piner, Environmental Management Department
PSC Camp Lejeune, North Carolina

Janet Preyer, NC Environmental Defense Fund

Renee Price, Conservation Council of NC

Karen Priest

Ellen Pulaski, CP&L

Stan Taylor, Triangle Env. Inc.
John Ray Bigmeat, Eastern Band of Cherokee Indians

Ken Reckhow,WRRI

Ed Regan, NC Association of County Commissioners

Jeanne Robbins, US Geological Survey
Water Resources Division

Dave Rock, American Academy of Pediatrics

Terry Rolan, NC American Waterworks Association
City of Durham Env. Resources Dept.

John Runkle, Conservation Council of NC
John Smith, Pesticides
Food & Drug / Agriculture

Gavin Smith (Dr.), NC Div. of Emergency Management

Mark Sobsby (Dr.), UNC-CH School of Public Health

Jerry Ryan, US Geological Survey

Gary Sanderson, Clairiant Corporation

Scott Sauer, County of Scotland

Allen Scarborough, Environmental Affairs
Rhone-Poulenc Ag. Company

Bob Schley, NC Rural Water Association

Edward Scott, III, Environmental Concerns Comm.
NCCBI

Ed Scott, NCCBI

Ann Seaton, Little Tennessse Watershed Association

James E Caldwell, Mid-CarolinaCouncil of Governments

Carl Shy, UNC-CH School of Public Health
Dept. Of Entomology

Howard Singletary, NC Crop Protection Association

Katherine Skinner Nature Conservancy-NC Field Office

Bob Slocum, NC Forestry Association

W.A. Soders, International Paper Riegelwood Mill

James Spangler, NC Association of Env. Professionals

Andrea Spangler, Piedmont Triad Regional Water Authority

Jean Spooner, NCSU Water Quality Group

Jim Stamm, Trip Van Noppen
Southern Env. Law Center

AARP

Jill Strickler, Heater Utilities

Eddie Stroup, NC Association of Soil & Water Conservation Districts

Roger Swann, NC Rural Water Association

Melinda Taylor, NC Environmental Defense Fund

Michael Teague (Dr.), Clairiant Corporation

Silvia Terziotti, US Geological Survey

Wayne Thomann, (Dr.) Occupational & Env. Safety

Paula Thomas, Manager of Env. Policy
NC League of Municipalities

Jerry Thompson, Lumber River Basin Committee

Kaye Thompson, NC Association of Convenience Stores

Eric Tolbert, Div. of Emergency Management

Lou Turner, Laboratory Services

Les Twidle, NC Rural Economic Dev. Center

Willem van Eck, Ph.D.,
NC Academic Associates, Inc.

James Vardy, US Coast Guard

Henry Wade Pesticides Section
NC Department of Agriculture

Chuck Walkild, CP&L

Jim Warren, NC Warn

Southeast Waste Exchange
Urban Institute

Bill Weatherspoon, NC Petroleum Council

Hugh Wells, NC Utilities Commission

Richard Wells, Trigon Engineering Consultants

Richard Whisnant, Institute of Government

William White, Moore & Van Allen, FLLC

Steve Whiteside, Joint PENC/CENC Env. Com.
GEI Consultants, Inc.

Polly Williams, Older Women=s League

Paul Wilms, NC Home Builders Association

Allen Wilson, Trout Unlimited-NC Council

Don Womble, Association of Local Health Directors
Hoke County Health Department

Janet Zeller, Blue Ridge Env. Defense League

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TECHNICAL AND CITIZENS ADVISORY COMMITTEE

WRITTEN COMMENTS

North Carolina Source Water Assessment TAC Advisory Committee

Public Participation Homework Assignment

Summary of the responses received from participants in the SWAP Ahomework assignment@ which consisted of three questions relating to public participation. The participants were asked to respond to the following questions based on the outline of the SWAP development process explained in the first TAC Advisory Committee meeting held on September 3, 1998 by the second committee meeting date.

1. Do you feel the state will provide adequate opportunity for participation by stakeholder groups representing a broad range of interests ?

- The state must do everything possible to include all citizens/stakeholders as safe clean water is vital to all. Inclusion is the key. I have not been impressed with certain agencies attempts in the past. Bureaucrats/technocrats approach matters completely differently. Clean water is just not science. It involves a human factor. There are many organizations who will willingly become involved (NC Watershed Coalition, et al.). Don=t hesitate to approach them. Public education of the subject must be included in the process (press, TV, radio) reaching all stakeholders.

- I do feel that a very broad range of interests are represented but participation may be limited to previously identified issues with little opportunity to address new concerns.

- Yes and no. Many (if not all) relevant groups are on the committee. However, I worry that our role is limited to endorsing decisions already made and methods already selected.

- Yes, between the committee and the public participation, it should. It would be good to involve local governments in the process as well.

- Yes, the state has given much notification with respect to the advisory committees and mailings.

- Yes, if stakeholders are assertive and involved enough. Environmental justice groups need special attention and assistance. Stakeholders who want better enforcement of present regulations also need to be heard and heeded.

- From what I saw in the meeting, there is a broad range of interests and quite a spectrum of society represented, and it appeared to me that you were not only providing an opportunity, but encouraging it. I was somewhat disappointed in some folks that were absent, but were on the original attendee list.

2. Do you feel that the public participation process will provide for both technical (i.e., technical feasibility and effectiveness of the SWAP approach) and citizens (i.e., desirability and appropriateness of the SWAP approach) considerations ?

- Solicitation for help by technical and citizen groups must be made to feel they are truly a part of the process. Their comments must not only be taken down but acknowledged as important. In the past, this has not been the case, leading to distrust and poor rapport. The state, in asking for advice and comments, should be willing to accept them.

- I think its very valuable to have citizens and technical groups combined and provides opportunity for us to educate each other on our concerns.

- Yes, if the role of the committee is not limited to endorsing decisions already made and methods already selected.

- Yes, as described, it seems to involve both the technical staff and citizens.

- Yes, however time is wasted when you spend an extended period of time explaining technical terms to those non-technical persons. This may turn people away.

- I agree (as a stakeholder) that study, research and planning must underlay effective action and results. But citizens need visible action and enforcement of fines and shut downs of recalcitrant developers and industries who refuse to cooperate. Our actions must support our words. DEM must be educated for our long-term benefits of enforcement and must stop undercutting our monitors and chemists reports (and fines).

- I feel like (from what I experienced in the afternoon session) that as a group we need to realize what we are charged to do. My opinion was that we wanted to create a database that would be of assistance to Public Water Supply Systems by delineating boundaries of assessment areas (group could not seem to agree on the methodology), identify potential contaminants and determine susceptibility. The group I attended continued to comment on what would be done to people that

had well heads or water supplies that we determined were at risk? (That regulatory mentality I spoke of). I guess a brief summary to your question is, it will take more meetings than are planned at the rate we moved yesterday.

3. Should the state develop an ongoing public participation process during the implementation of the SWAP after receiving program approval from EPA ? If so, describe the preferred format of the public involvement.

- Inclusion is the key. Efforts to promote watershed conservation should be made, bringing together all stakeholders, not simply industry and municipalities.

- Yes, the SWAP should be an ongoing project with same continuing public education element.

- Yes, this public participation should involve discussing problems with SWAP implementation and future directions of SWAP. I like the technical and citizen format as this broadens everyone=s perspectives.

- This would depend on the recommendations with the SWAP. If some of the elements require actions by the public, then they should be involved in the implementation. Perhaps some regional meetings involving local officials and some TV or radio coverage would be helpful.

- No, there are too many people who could cause delays in process. By allowing public participation after EPA approval, you=ll have more than enough to deal with and the same questions will continue to be asked.

- Yes, but how about before EPA approval and after/or during (state approval process?) Short-term profits must be balanced by long term health costs and profits well beyond 2003 or 2005 when balancing cost/benefit equations. Local maps of potential pollution sources and suspected present pollution (plus ground water sources at risk) need newspaper and newsletter publicity. Radio & TV call in shows (with graphics for TV). Examples of theoretical delineation methods with graphics are helpful to stakeholders. A Calculated fixed radius@ and A simplified variable shape@ protection areas need pictures!

- Yes, I think it is in the best interest of the program if you have at least one representative from the different interests involved in ongoing participation of implementation.

State=s Response to the public participation Ahomework assignment@ questions:

The state invited over 140 stakeholders to participate in the SWAP development process. There was representation from a broad group of perspectives. Input from

participants was considered and incorporated appropriately into the SWAP plan. If their suggestions were not included explanation and justification was provided.

There will be the opportunity for continued input from TAC committee members as the SWAP plan implementation moves forward. Specifically, certain TAC committee members will be asked to provide review and comments on the results of the pilot study source water assessments to ensure that the reporting of the results is both understandable and useful to PWS system owners and customers.

Effectiveness of TAC Advisory Committee Involvement in SWAP Plan Development-- Survey Summary

During the November 5, 1998 TAC Advisory Committee meeting a survey form was distributed. The following is a summary of the questions and responses and comments received from 19 committee members who completed and returned the form.

How many of the joint Technical and Citizens Advisory Committee meetings did you attend ?	**0-1**(3)	**2**(5)	**3**(11)
On a scale of 1-4, 4 being strongest agreement, please mark the following: *	Strongly Disagree	Disagree / Agree	Strongly Agree
High quality of basic education and information was provided.	0	0	10 9
The state was prepared for the committee meetings.	0	0	5 14
Sufficient opportunity was provided to give input.	0	0	8 11
The committee discussions were productive.	0	1	7 11
Input from committee affected the outcome of the plan.	0	1	6 12
There was adequate time allotted overall for the committee process.1	1	7	10
I support the draft plan as discussed today.	0	1	11 7
I am satisfied with the overall advisory committee process.	0	1	9 9

*(*shown is the number of responses to the question out of 19 surveys completed)*

*(**overall averages for each question)*

Q1. 3.47 *Q5. 3.57*
Q2. 3.73 *Q6. 3.42*
Q3. 3.57 *Q7. 3.31*
Q4. 3.52 *Q8. 3.42*

Please provide any specific feedback you have on any aspect of the SWAP plan development process.

(Comments received)

- *TAC advisory committee process has been remarkably effective and collaborative between committee members and DENR staff. Very efficient use of everyone=s time and energy- especially under the tight schedule of the SWAP development process. Committee comments have been of consistently high and thoughtful quality and have been appropriately incorporated by DENR staff into the SWAP document. Hard work and participation of staff from many different DENR units has been especially evident. I look forward to an exemplary SWAP product for NC.*

- *Would be willing to review some drafts and provide comments relative to clarity of language for general population. Agree with xxx=s comment about AWWA and Rural water - consider sending their Board chair copy of draft and notice that they will receive copy of pilot study. Might ask them to include public meeting notice in their newsletters. Thanks for your efforts to make this an open & productive process.*

- *I feel that this could help on other rules & regulations that are coming in the future.*

- *The SWAP plan will almost certainly undergo revisions as it=s implemented. This committee should be kept informed and given the opportunity to comment on these revisions.*

- *PWS section has done an outstanding job soliciting input from this committee.*

- *I understand the compressed time frame, but all day meetings are impossible. I want to compliment you all on a beautiful-looking apparently well-conceived plan and a nicely organized and facilitated process. Good luck on actually making it happen. If I or xxxx can be of assistance as you go forward, please let me know.*

- *Information needs to continue to flow to the advisory committee and I strongly recommend that you continue to use them as a resource as the plan evolves. Additional meetings may be necessary and I feel that the group is committed to and would be in support of continued contributions.*

- *I am very pleased with the opportunity that has been provided anyone interested in this process to offer input. I am also very pleased with the cooperation between agencies. The meetings have been very organized and well presented. Staff has been very receptive to comments from the committee. Well done! Pilot study (ies) are important components and need to be incorporated as soon as possible.*
- *Not enough notice for first meeting. It seemed PWS staff had preconceived notions about potential contaminants, and nothing said would change their minds. Get rid of facilitators. They may know how to facilitate, but not how to respond to concerns expressed by group, presenter has to do that, so he/she might as well run discussion. Did not feel written and verbal comments/concerns were seriously considered or put into plan. Overall, a big waste of time for agency personnel, industry representatives, and private citizens.*

- *Process thoughtfully developed, professionally facilitated. Meeting rooms have been a problem. NC DENR needs to address this systematically especially since DENR is openly committed to public participation. For example, meeting rooms so designated, should as a matter of policy, be made available for public participation first.*

- *Time for the whole process was limited, but that helped keep us focused on the SWAP. Stretching out the process would not have added value. The pace was appropriate. Facilitators were valuable. Documents were clear. NOTE: Creating & enhancing digital data for GIS may take a lot of effort based on my experience with other projects. The effort would help maintain the credibility of the results.*

- *This has been a very open well-organized, and productive process.*

- *Good cross section of parties from state.*

- *An excellent method of including Aoutsiders@ into the state=s plan development process. Wish all state functions were handled this way! Kudos!*

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LIST OF TECHNICAL AND CITIZENS ADVISORY

COMMITTEE MEMBERS

List of Technical and Citizens Advisory Committee Members

Sheila Askew	Division of Waste Management
Eric Aufderhaar	Groundwater Professionals of North Carolina
Amy Axon	Division of Water Quality / Groundwater Section
Carl Bailey	Division of Water Quality / Groundwater Section
Layton Bedsole Jr.	North Carolina State Ports Authority
John Ray Bigmeat	Eastern Band of Cherokee Indians
Rusty Harris Bishop	NC Division of Pollution & Envir. Assist.
James Blackburn	General Counsel, North Carolina Association of County Commissioners
Jim Blose	North Carolina Division of Water Quality
Ann Borden	S&ME Inc.
Jeffrey Brown	North Carolina Center for Geological Information and Analysis (CGIA)
Reid Campbell, P.E.	North Carolina Utilities Commission Public Staff

Anne Coan	North Carolina Farm Bureau Federation
Ronald Coble, P.G.	Private Citizen
Mimi Cooper	Health Director Randolph County Health Department
Greg Cope, Ph.D.	Department of Toxicology
Jeff Coutu	North Carolina Div. Of Water Quality
Vernon Cox	Division of Soil & Water Conservation
Patrick Davis	Triangle J Council of Government
Gary H. Davis	Commanding General AC/S EMD Camp Lejeune
Marion Dodd	President League of Women Voters of NC
Jody Eimers	U.S. Geological Survey
George Everett (Laura Hartsell)	Executive Director MCIC
Linda Faulkner-Vaughn	McKim & Creed
Mike Floyd	North Carolina Groundwater Association
Marianne Frederick	Chief Planner - Dept of Commerce Community Assistance

Lewis Gaskin	North Carolina Christmas Tree Growers
Tom Glenn	City of Durham, NC
Jeri Gray	Water Resources Research Institute of North Carolina State University
Angie Grooms	Manager, Environmental Water Protection Duke Power Company
Moreland Gueth	Division of Forest Resource

Leslie Hall, Jr., P.E.	McKim & Creed
Roger Hansard	USDA NRCS
Jerry Hardesty	North Carolina Pork Council
Sid Harrell	Division of Environmental Health / PWS
Ed Holland	Orange Water & Sewer Authority
Tom Irving	North Carolina DOC / DCA
Peg Jones	President North Carolina Watershed Coalition, Inc.
Bill Lyke	Skelly & Loy
Dr. Rich McLaughlin	Department of Soil Science
Caroline Medlin	Land Resources
Buddy Melton	Asheville, NC Regional Office / PWS
David Meredith	North Carolina State Grange
Marti Morgan	North Carolina Haz. Waste
Arthur Mouberry	Chief, Groundwater Section Division of Water Quality
Bill Noyes	North Carolina DENR / LQS
Lynne Palmer	RCRA Manager Seymour Johnson AFB

George Pettus	Goldsboro Hog Farms
Stephen Phillips	PCS Phosphate Company, Inc.
Jeanne Robbins	U.S. Geological Survey
Harold Saylor	Asheville, NC Regional Office / PWS
Allen Scarborough, Ph.D.	Environmental Affairs Rhone-Poulenc Ag. Company
Jane Sharp-MacRae	North Carolina Conservation Council
Al Slagle	Asheville, NC Regional Office / PWS
Ruth Swanek	North Carolina DWQ
Andrea Spangler	Piedmont Triad Regional Water Authority
Dr. Woodhall Stopford	Duke University Medical Center
Jill Strickler	Heater Utilities
Dr. Wayne Thomann	Director Occupational & Environmental Safety Duke University Medical Center
Paula Thomas	Manager of Environmental Policy North Carolina League of Municipalities
Willem van Eck, Ph.D., CPSS	North Carolina Academic Associates, Inc.

Henry Wade	Pesticide Section / Department of Agriculture & Conservation Services
Richard Whisnant	Assistant Director Institute of Government
David Williams	Division of Pollution Prevention and Environmental Assistance
Steve Zoufaly	Division of Water Quality

APPENDIX E

NOTICE OF PUBLIC MEETINGS

FOR

NORTH CAROLINA SOURCE WATER ASSESSMENT PROGRAM

NOTICE OF PUBLIC MEETING

AGENCY: N.C. Department of Environment and Natural Resources.

ACTION: Notice is hereby given that the document titled "North Carolina Source Water Assessment Plan" is available for public review and comment.

SUMMARY: In 1996, the amendments to the federal Safe Drinking Water Act (SDWA) required states to establish Source Water Assessment Programs (SWAP), and submit a plan to the Environmental Protection Agency (EPA) by February 6, 1999 detailing how they will:

- delineate source water protection areas
- inventory significant contaminants in these areas
- determine the susceptibility of each water supply to contamination for each public water system intake

North Carolina has convened a Citizens and Technical Advisory Committee and held three meetings in Raleigh to ensure broad representation and wide public involvement in the development of the SWAP plan. North Carolina has been progressive in its approach toward source water protection. The state's SWAP will use the work of existing programs and activities to the fullest extent possible to avoid any duplication of effort and ensure the SWAP will integrate into ongoing Department of Environment and Natural Resources (DENR) activities. **The SWAP is a non regulatory program with no new requirements for public water systems.**

AVAILABILITY OF REVIEW MATERIALS: Interested parties may obtain a copy of the draft Source Water Assessment Program (SWAP) by contacting Linnette Weaver [Phone (919)715-2633; Fax (919)715-4374]. Technical questions on this document should be addressed to Mr. R.W. (Bob) Midgette [Phone (919)715-3224; Fax (919)715-4374].

PUBLIC MEETINGS: Four public meetings are scheduled in 1998:

Dec. 8	2:00 p.m.	Asheville - Arboretum, Visitor Educational Center in auditorium
Dec. 9	2:00 p.m.	Winston-Salem - Hall of Justice, Rm 701, 200 N. Main Street
Dec. 10	1:30 p.m.	Washington - Regional Office Hearing Room, 943 Washington
Dec. 14	7:00 p.m.	Raleigh - Archdale Bldg., Hearing Room, 512 N. Salisbury St.

COMMENT PERIOD: Comments on the document should be provided at the public meeting or by mail to Mr. R.W. (Bob) Midgette, Protection & Enforcement Branch, North Carolina Public Water Supply Section, P.O. Box 29536, Raleigh, NC 27626-0536 or by e-mail to robert_midgette@mail.enr.state.nc.us. Comments will be received until December 31, 1998.

APPENDIX F

POTENTIAL CONTAMINANT SOURCE DATABASES

Regulatory Databases Containing Potential Contaminant Source Information

(see Appendix G for listed Acronyms)

Animal Operations Database

Responsible Agency: Division of Water Quality, Water Quality Section

This database contains permitted facilities for agricultural operations consisting of swine, cattle, poultry and horse farms that are required to have Certified Animal Waste Management Plans. The database includes information on land area used for waste application and numbers of waste lagoons for over 2800 facilities. The database contains lattitude and longitude for each facility.

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

Responsible Agency: Division of Waste Management, Superfund Section

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by the state, municipalities, private companies, and private individuals pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The database contains information on over 130 sites. The database contains lattitude and longitude for each facility.

Hazardous Waste Facilities

Responsible Agency: Division of Waste Management, Hazardous Waste Section

This database has records for all hazardous waste TSD's, generators, and transporters as defined by RCRA. The database contains lattitude and longitude for over 5200 facilities.

Inactive Hazardous Sites

Responsible Agency: Division of Waste Management, Superfund Section

The database contains information on over 1100 sites with confirmed or suspected hazardous substance contamination. The database contains the physical address for each of the sites.

Large On-Site Wastewater Facilities

Responsible Agency: Division of Environmental Health, On-Site Wastewater Section

This database contains on-site wastewater facilities approved by the state. These facilities are permitted for greater than 3,000 gallons of flow per day or are industrial process wastewater systems. The database contains information on over 1600 systems including the physical addresses for each facility.

Non Discharge Database

Responsible Agency: Division of Water Quality, Water Quality Section

The non discharge database identifies industrial and municipal facilities that are permitted to operate any sewer system, treatment works, disposal system, petroleum contaminates soil treatment system, animal waste management system, stormwater management system or residual disposal/utilization system which does not discharge to surface waters of the state, including systems which discharge waste onto or below land surface. The database contains the physical address for over 1,200 permitted facilities.

NPDES: National Pollutant Discharge Elimination System

Responsible Agency: Division of Water Quality, Water Quality Section

The NPDES database identifies facilities permitted for the operation of point source discharges to surface waters in accordance with the requirements of Section 402 of the Federal Water Pollution Control Act. The database includes information on the type of waste and the permitted flow of over 1,600 municipal and industrial facilities in the state. The database contains lattitude and longitude for each facility.

NPL: National Priority List (Superfund)

Responsible Agency: Division of Waste Management, Superfund Section

The NPL is a subset of CERCLIS and identifies sites for priority cleanup under the Superfund Program. The database contains information on approximately 20 sites in North Carolina and the lattitude and longitude for each site.

PADS: PCB Activity Database System

Responsible Agency: Office of Pollution Prevention and Toxics, EPA

PADS identifies generators, transporters, commercial storers and/or brokers and disposers of PCBs. The database contains the physical address for over 110 sites.

PIRF: Pollution Incident Reporting Form

Responsible Agency: Division of Water Quality, Groundwater Section

The Groundwater Section maintains the State=s incident management database which contains information on all groundwater contamination sites including sites that are handled by other agencies. The database contains an inventory of reported leaking underground storage tank incidents and other ground water and soil contamination incidents. Additionally, groundwater incidents which are not regulated by other agencies and involve pollutants such as those from above ground storage tanks, chemicals, nitrates, pesticides, and other organic and inorganic contaminants are included. The database includes lattitude and longitude for over 4400 sites where ground water contamination occurred and the sites are not considered closed.

Petroleum Contaminated Soils

Responsible Agency: Division of Waste Management, UST Section
Database contains information on 27 permitted, dedicated sites where soil contaminated by leaking petroleum or chemical storage tanks can be taken to remove threats to health and the environment. This is done by allowing air to interact with the contaminates and feed the natural bacteria which assist in breaking down contaminates. The database contains the physical address for each of the permitted facilities.

Pre-Sanitary Landfill Dumps

Responsible Agency: Division of Waste Management, Solid Waste Section
Database contains an inventory of over 600 sites that are old municipal dumps which were not permitted since they pre-existed the effective date of the permitting rules. These sites are not currently in operation. The database contains lattitude and longitude for each facility.

SARA Title III Section 312 Database

Responsible Agency: Division of Pollution Prevention
Database contains inventory of facilities that store types and amounts of hazardous materials and are subject to the reporting requirements of SARA Title III Section 312, Emergency Planning and Community Right to Know Act. The database contains the physical address for over 6800 sites.

Septage Database

Responsible Agency: Division of Waste Management, Solid Waste Section
This database contains information on over 160 permitted, dedicated sites where septage is land applied. The septage management program assures that septage (a fluid mixture of untreated and partially treated sewage solids, liquids and sludge of human or domestic origin that is removed from a septic tank system) is managed in a responsible, safe and consistent manner across the state. The database contains lattitude and longitude for each facility.

Solid Waste Facilities

Responsible Agency: Division of Waste Management, Solid Waste Section
The database contains an inventory of permitted and unpermitted solid waste management or disposal facilities. Sites include local government landfills, recycling facilities, transfer stations, scrap tire facilities, construction and land clearing debris facilities. There are over 700 facilities in the database of which over 400 are currently operating. The database contains the physical address for each of the permitted facilities.

Stormwater Database

Responsible Agency: Division of Water Quality, Water Quality Section
This database contains municipal and industrial facilities that have been issued a stormwater permit. Examples of permitted facilities are vehicle maintenance areas, wood chip mills and mining sites. The database contains lattitude and longitude for each of over 3400 facilities.

UIC: Underground Injection Control Permit Database

Responsible Agency: Division of Water Quality, Groundwater Section, UIC Program
The UIC program permits Class V injection wells which do not inject waste into the subsurface. Examples of permitted Class V facilities include heat pump / air conditioning water wells, remediation wells, tracer wells, and experimental technology wells. There are over 200 permitted wells and lattitude and longitude are included for over 150. Physical addresses are known for the remaining permitted wells.

UST: Petroleum Underground Storage Tank Database

Responsible Agency: Division of Waste Management, UST Section

These facilities are regulated under Subtitle I of the RCRA and must be registered with the state and receive a operating permit annually. The database contains information on over 10,400 facilities with over 98,800 registered active tanks. Over 90 percent of these facilities met the December 22, 1998 deadline for having tanks upgraded with spill and overflow prevention devices. The database contains the physical address for each of the permitted facilities.

APPENDIX G

LIST OF ACRONYMS

List of Acronyms

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CGIA	Center for Geographic Information and Analysis
CWA	Clean Water Act
DENR	Department of Environment and Natural Resources
DWSRF	Drinking Water State Revolving Fund
EMC	Environmental Management Commission
EPA	Environmental Protection Agency
GPS	Global Positioning System
GIS	Geographic Information System
GWUDI	Ground Water Under Direct Influence of Surface Water
IUP	Intended Use Plan
MCL	Maximum Contaminant Level
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NTNC	Non Transient Non Community Water System
PCS	Potential Contaminant Source
PWS	Public Water Supply
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendment and Reauthorization Act
SDWA	Safe Drinking Water Act
SIC	Standard Industrial Classifications
SWAP	Source Water Assessment Program
TAC	Technical and Citizens Advisory Committee
TNC	Transient Non Community Water System
TRI	Toxic Release Inventory
TSCA	Toxic Substance Control Act
URL	Universal Resource Locator
WHP	Wellhead Protection Program
WSWP	Water Supply Watershed Protection

APPENDIX H

GLOSSARY OF TERMS

Glossary of Terms

Community Water System
A public water system that serves at least 15 service connections used by year-round residents of the area served by the system or regularly serves at least 25 year-round residents.

Contaminant Source Inventory
The process of identifying and inventorying contaminant sources within delineated source water assessment areas through existing data.

Contaminants of Concern
Contaminants of concern will include regulated contaminants for drinking water and some other contaminants that may present a threat to public health.

Critical Area
Critical Area means the area adjacent to a water supply intake or reservoir where risk associated with pollution is greater than from the remaining portions of the watershed. The critical area is defined as extending either **2** mile from the normal pool elevation of the reservoir in which the intake is located or to the ridge line of the watershed (whichever comes first); or **2** mile upstream from and draining to the to the intake (or other appropriate downstream location associated with the water supply) located directly in the stream or river (run-of-river), or to the ridge line of the watershed (whichever comes first). Since WS-I watersheds are essentially undeveloped, establishment of a critical area is not required. Local governments may extend the critical area as needed. Major landmarks such as highways or property lines may be used to delineate the outer boundary of the critical area if these landmarks are immediately adjacent to the appropriate outer boundary of **2** mile. The Commission may adopt a different critical area size during the reclassification process.

Drinking Water State Revolving Fund
Under section 1452 of the SDWA, EPA awards capitalization grants to states to develop drinking water revolving loan funds to help finance drinking water system infrastructure improvements, to enhance operations and management of

drinking water systems, and other activities to encourage PWS compliance and protection of public health.

Non-Community Water System

A public water system that is not a community water system. There are two types of Non-Community Water Systems: **transient** and **non-transient**.

Transient Non Community Water Systems

Transient Non Community Water Systems serve 25 non-resident persons per day for 6 months or less per year. These water systems typically serve restaurants, hotels, large stores, etc.

Non-Transient Non Community Water Systems

Non-transient non-community systems regularly serve at least 25 of the same non-resident persons per day for more than 6 months per year. These water systems typically serve schools, offices, churches, factories, etc.

Maximum Contaminant Level (MCL)

In the SDWA, an MCL is defined as Athe maximum permissible level of a contaminant in water which is delivered to any user of a public water system.@

Protected Area

Protected area means the area adjoining and upstream of the critical area in a WS-IV water supply in which protection measures are required. The boundaries of the protected areas are defined as within five miles of the normal pool elevation of the reservoir and draining to water supply reservoirs (measured from the normal pool elevation) or to the ridge line of the watershed (whichever comes first); or 10 miles upstream and draining to the intake located directly in the stream or river (run-of-river), or to the ridge line of the watershed (whichever comes first). Local governments may extend the protected area. Major landmarks such as highways or property lines may be used to delineate the outer boundary of the protected area if these land marks are immediately adjacent to the appropriate outer boundary of five or 10 miles. In some cases the protected area shall encompass the entire watershed. The Commission may adopt a different protected area size during the reclassification process.

Significant Potential Contaminant Source

All identified potential contaminant sources within delineated areas will be considered significant.

Susceptibility Determination
The determination that some potential sources of contamination must be present and the geology/hydrogeology or natural conditions of the location of the intake is such that a water supply could become contaminated.

State Source Water Petition Program
A state program implemented in accordance with the statutory language at section 1454 of the SDWA to establish local voluntary incentive-based partnerships for source water protection and remediation.

Vulnerability
This refers only to the geologic/hydrogeologic characteristics of the location of the water supply intake.

Watershed
A topographic boundary area that is the perimeter of the catchment area of a stream.

Watershed Area
A topographic area that is within a line drawn connecting the highest points uphill of a drinking water intake, from which overland flow drains to the intake.

Figure 1. Example of Surface Water Assessment Area (WS-II Watershed)

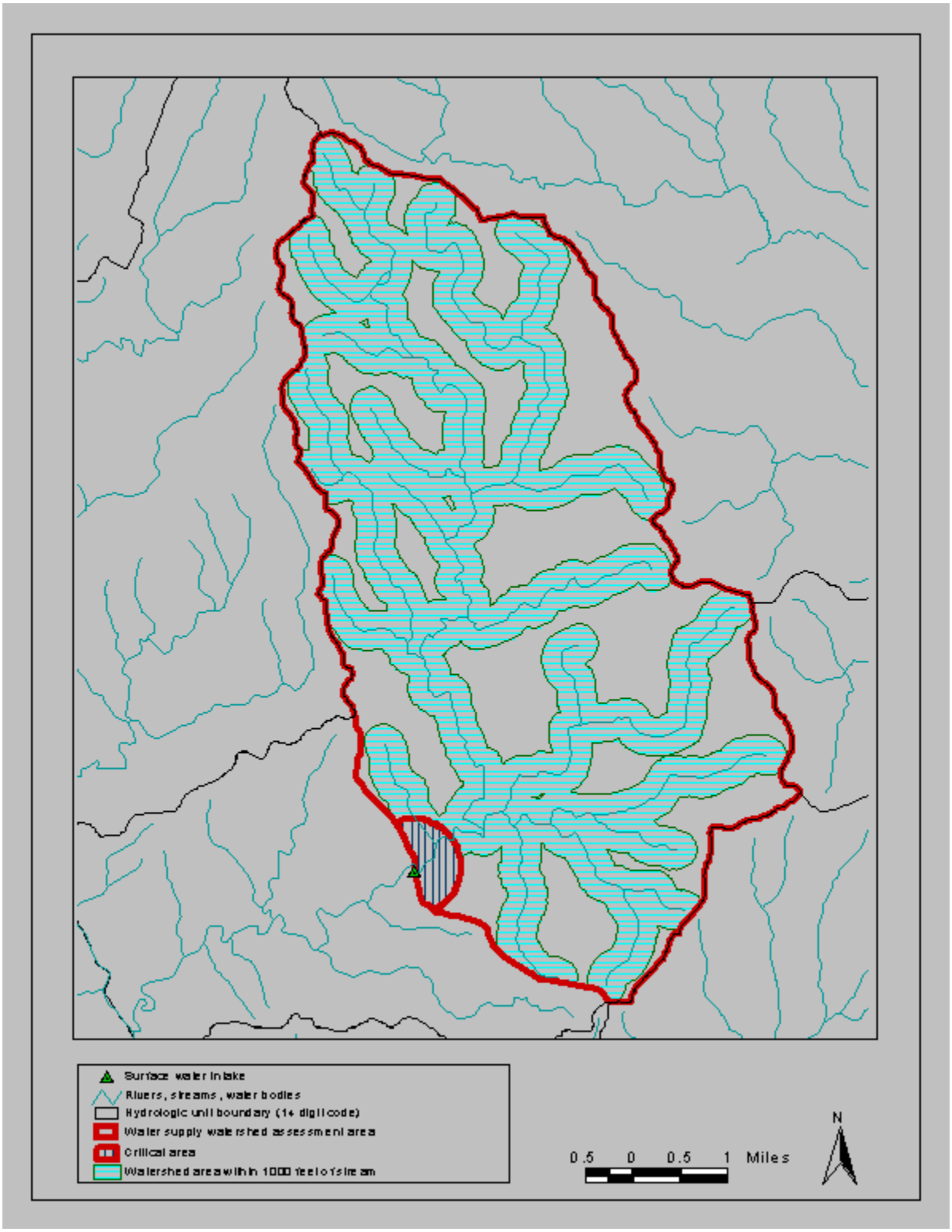


Figure 2. Example of Surface Water Assessment Area (WS-IV Watershed)

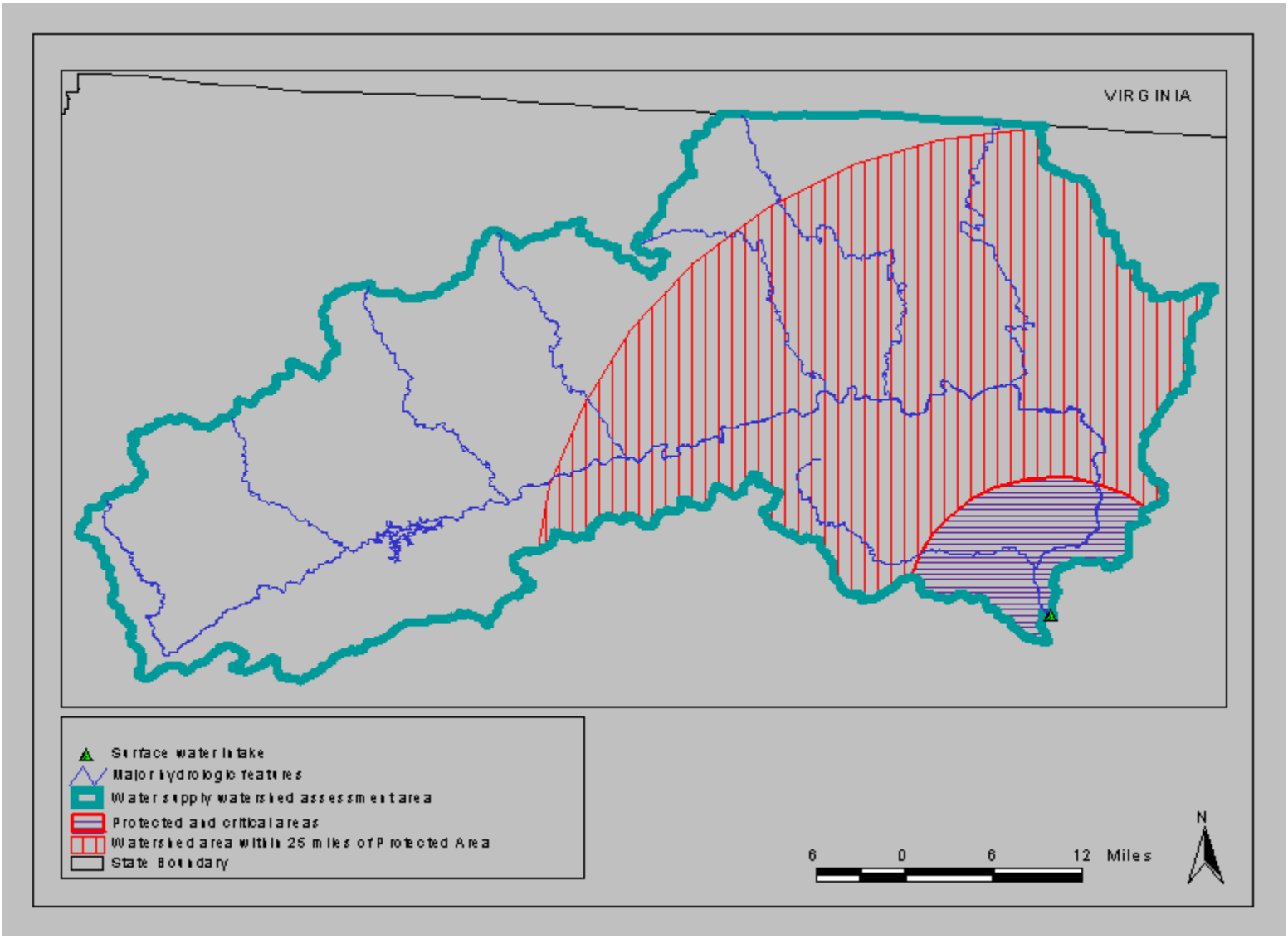


Figure 3. Detail of Surface Water Assessment Area shown in Figure 2. (Partial WS-IV Watershed)

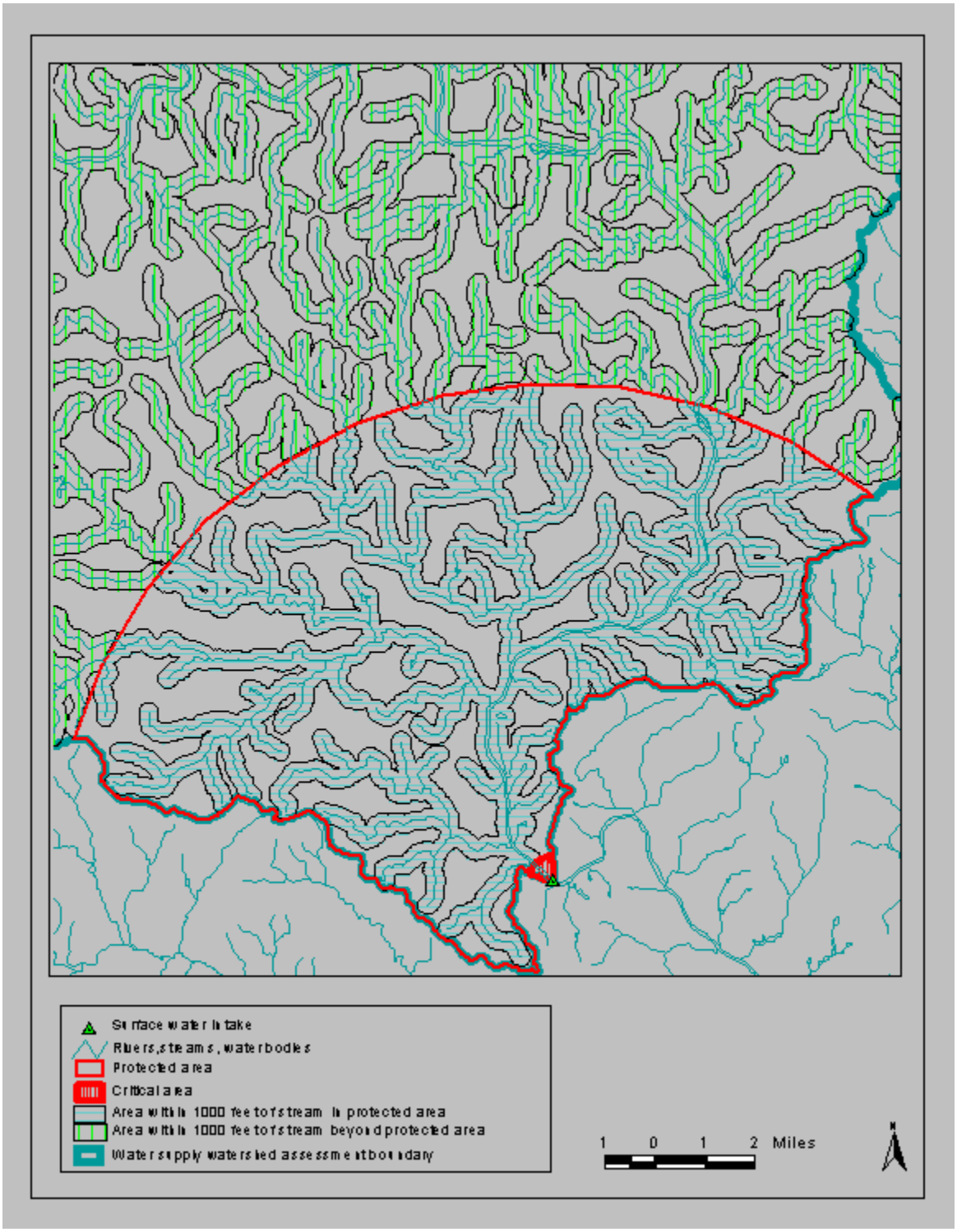
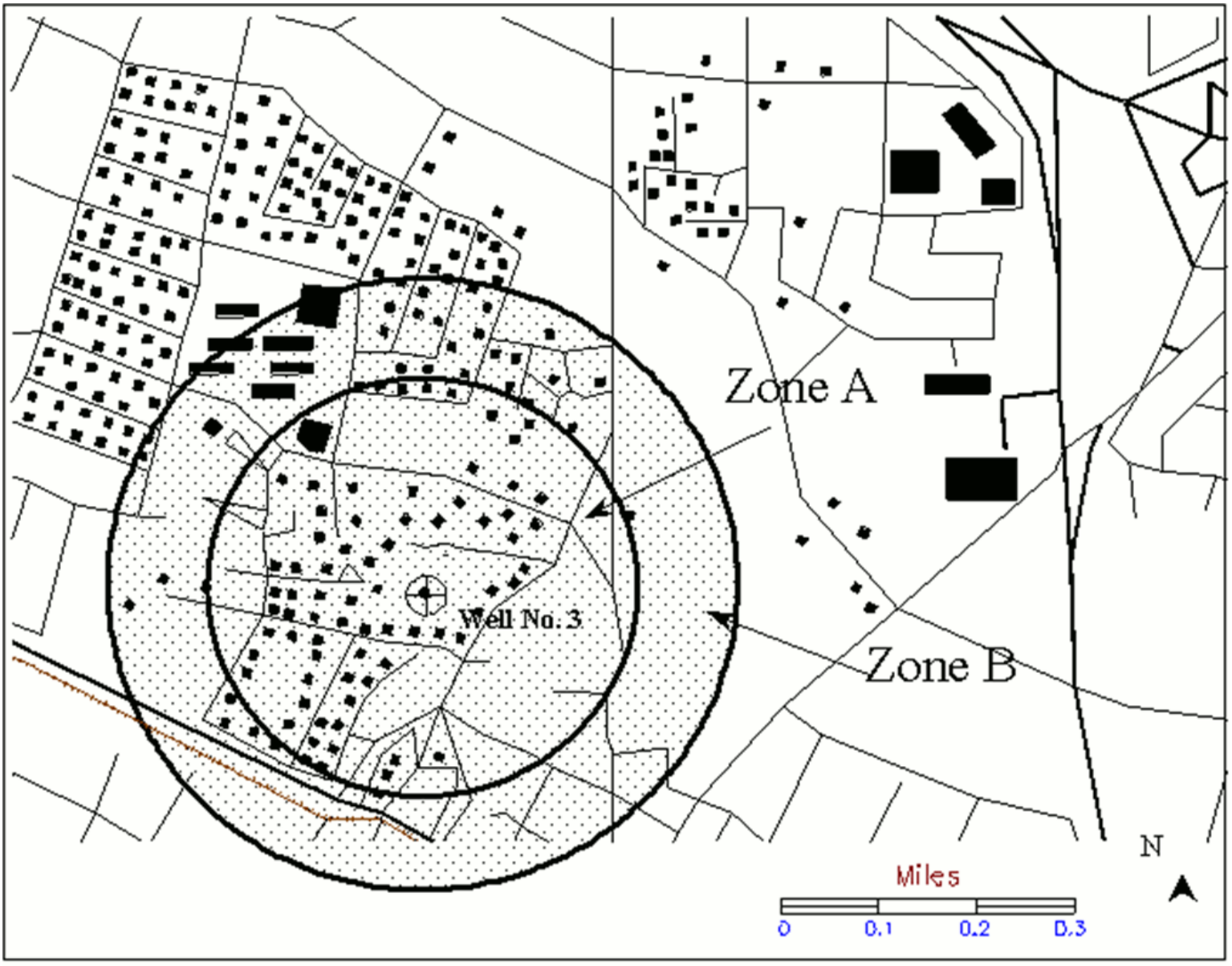


Figure 4. Example of Ground Water Assessment Area (ASWAP)



A_{SWAP} = Zone A + Zone B

Zone A area = Zone B area = 0.5 A_{SWAP} area