3 Step 3: Conducting a Potential Contaminant Source Inventory

Introduction: what this step is about

In this step, you will identify and evaluate the substances and activities in your WHPA that threaten your water supply.

The next step in developing your Wellhead Protection (WHP) plan is to conduct a potential contaminant source inventory. A ***Potential Contaminant Source*** (PCS) is any substance or activity that could adversely affect the quality of your drinking water supply. The PCS inventory is a complete listing, including mapped locations, of past and present land use activities within the wellhead protection area (WHPA) that threaten ground-water quality. Your goal is to protect your drinking water supply by protecting the land area surrounding the well because this is the area that can transmit water directly to your well. The purpose of this step is to inventory the existing and potential sources of ground-water contamination within the WHPA or areas you identified and delineated in Step 2. Each well will have its own WHPA which may or may not overlap with the other WHPAs associated with other wells. To protect this area, you must first learn what the specific actual and potential threats are. In this step, you will identify and evaluate all of the various substances and activities within the WHPA that are potential threats to ground-water quality.

Preventing drinking water contamination through wellhead protection is less costly than cleaning up a polluted water source.

Once drinking water is polluted, there are few easy fixes. Cleaning up contamination or providing alternative water sources to affected residents can be difficult and costly. If cleanup is even possible, it can cost hundreds of thousands or even millions of dollars. Many communities must abandon the use of a contaminated aquifer when faced with contamination of their ground-water supplies. The community must then either find other water supplies, drill new wells away from the contaminated area of the aquifer or, if feasible, drill new wells into a different aquifer. According to the United States Environmental Protection Agency, prevention of contamination through wellhead protection is 27 times less costly than cleaning up a contaminated water source.

Considering the importance of ground water as source of drinking water for so many communities, and the cost and difficulty of either cleaning it up after it has become polluted or providing new water sources, common sense tells us that the best action is to prevent contamination in the first place.

After documenting every PCS that could threaten your water supply, these actual or potential sources must be ranked according to the risk they present for each public water supply (PWS) well. This ranking will ensure that the most vulnerable wells and the greatest threats are addressed first when you make specific decisions about protecting your water supply.

The most common source of ground-water contamination in North Carolina is leaking underground storage tanks; accidental spills are the second most common problem. Some common PCSs that may threaten ground-water quality are listed in Table 1.

Procedure: what you need to do to complete Step 3 toward your WHP plan

Examples of Potential Contaminant Sources

- Underground storage tanks
- Accidental spills
- Failing septic systems and drainfields
- Improperly abandoned wells
- Use and spillage of fertilizers and pesticides
- Hazardous materials at businesses
- Animal feedlots
- Landfills
- Land disposal of wastes
- Underground pipelines and sewers

Completing a PCS inventory is a process that cannot be completed in a single step. General information will lead to a search for specific details, and new questions may come up that need further investigation and verification. You will have to use a combination of methods to locate and identify all PCSs located within the delineated WHPA. Many contaminants are associated with particular land uses, so you will need to collect agricultural, commercial, industrial, residential, and other types of data that can help locate and identify land use activities associated with potential contaminants. Because soil and ground-water contamination can be very long-lasting, it is critical to identify not just current conditions but also historical land uses, old waste disposal sites, and past uses of chemicals that might be hazardous to drinking water. Businesses that closed long-ago may have left underground storage tanks or other buried chemicals that are still a potential threat to your water supply.

Some background for the PCS inventory process is contained in North Carolina's 1999 "Source Water Assessment Program Plan" (SWAP), a program that calls for assessment of all PWS wells and surface water intakes. In addition, consultants such as those available from the NC Rural Water Association, have experience in searching electronic databases and completing the PCS data sheets.

Collect physical information for each WHPA

The Nine Most Common Contaminants of Ground Water in North Carolina

1. Benzene
2. Chloroform
3. Tri- and Tetrachloroethlylene
4. Polychlorinated Biphenyls (PCBs)
5. Methylene chloride
6. Toluene
7. Pesticides
8. Nitrates
9. Heavy metals

You should complete a *Potential Contamination Source Data Sheet* (Attachment 1) for each PCS you identify. Some of the information needed to complete the sheet will be available from the databases and records that you search. Contact with an owner may be required to complete other details, either by on-site visit, telephone interview, or mail survey. Include a description of the PCS, its location, the volume of material involved, and any permit references, as indicated on the form. Also, if any existing contamination incidents are identified within the WHPA, include a description of the current status for each in your WHP plan.

If you are uncertain about the potential pollutants being used, a list of contaminants typically associated with common source activities is provided in Table 1. This table contains PCS categories that will be later used with the "PCS Identity Code" form found in Attachment 2. Each PCS will be associated with a PCS Identity Code. A much more exhaustive list of PCSs and their possible contaminants can be found in (USEPA, 1993, Table 4-4) and (Wyoming DEQ, 1997). Refer to the References and Resources section at the end of this chapter for these references if more information is desired.

Search existing information

Electronic Databases: Federal government agencies and the State of North Carolina maintain records relevant to ground-water contamination in electronic form that can be searched using a computer. A list of such sources is given in the "Resources and References" section. Information on contamination incidents, such as a PIRF (Pollution Incident Reporting Form), must be included in the WHP plan.

Table 1. Potential Contaminant Sources and Associated Contaminants

SOURCE	HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT
Abandoned wells	Surface runoff; effluents from barnyards, feedlots, septic tanks, or cesspools; gasoline; used motor oil; road salt
Above ground storage tank	Heating oil; diesel fuel; gasoline; other petroleum products; other commercially used chemicals
Agricultural facilities	Pesticides; fertilizers; gasoline and motor oils from chemical applicators
Airport	Jet fuels; deicers; diesel fuel; chlorinated solvents; automotive wastes; heating oil; building wastes
Animal feedlot/ waste storage	Livestock sewage wastes; nitrates; phosphates; chloride; chemical sprays and dips for controlling insect, bacterial, viral, and fungal pests on livestock; coliform and noncoliform bacteria; viruses
Asphalt plants	Petroleum derivatives
Auto repair[1]	Waste oils; solvents; acids; paints; automotive wastes; miscellaneous cutting oils
Body shop/salvage[1]	Any wastes from businesses and households; oils
Cemetery	Leachate; lawn and garden maintenance chemicals
Chemical production	Hazardous chemical products in inventories
Chemical mixing storage	Acids/alkalis, solvents, organic chemicals
DOT stations	Road salt (sodium and calcium chloride); road salt anticaking additives (ferric ferrocyanide, sodium ferrocyanide); road salt anticorrosives (phosphate and chromate); oil and grease, fuel tanks; repair shop wastes;
Drainage canals	Pesticides; fertilizers; bacteria
Dumps	Leachate; organic and inorganic chemical contaminants; wastes from households and businesses; nitrates; oils; metals
Electroplaters/ metal finishers[1]	Boric, hydrochloric, hydrofluoric, and sulfuric acids; sodium and potassium hydroxide; chromic acid; sodium and hydrogen cyanide; metallic salts
Fertilizer/pesticide mixing and storage	Pesticide and fertilizer residues
Fertilizer/pesticide production	Acids, mine tailings, chemical by-products
Funeral homes	Formaldehyde; wetting agents; fumigants; solvents
Gas stations	Oils; solvents; miscellaneous wastes
Golf courses	Fertilizers; herbicides; pesticides for controlling mosquitoes, ticks, ants, gypsy moths, and other pests
Holding pond/lagoon	Sewage wastewater; nitrates; other liquid wastes; microbiological contaminants
Injection wells	Highly toxic wastes; hazardous and nonhazardous industrial wastes; oil-field brines
Laboratories	X-ray developers and fixers; infectious wastes; radiological wastes; biological wastes; disinfectants; asbestos; beryllium; solvents; infectious materials; drugs; disinfectants (quaternary ammonia, hexachlorophene, peroxides, chlornexade; bleach); miscellaneous chemicals
Laundromat/dry cleaners[1]	Solvents (perchloroethylene, petroleum solvents, Freon); spotting chemicals (trichloroethane, methylchloroform, ammonia, peroxides, hydrochloric acid, rust removers, amyl acetate)

Table 1. Potential Contaminant Sources and Associated Contaminants (Continued)

SOURCE	HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT
Lift stations	Municipal wastewater; sludge; treatment chemicals
Machine shops	Solvents; metals; miscellaneous organics; sludges; oily metal shavings; lubricant and cutting oils; degreasers (TCE); metal marking fluids; mold-release agents
Major highways	Herbicides in highway rights-of-way; road salt (sodium and calcium chloride); road salt anticaking additives (ferric ferrocyanide, sodium ferrocyanide); road salt anticorrosives (phosphate and chromate); automotive wastes
Major railroads	Diesel fuel, oil, transported chemicals
Military bases	Fuel, Oil, Grease, Pesticides, hazardous chemicals
Mining	Acid drainage; metals; dissolved solids; radioactive ores other hazardous and nonhazardous wastes
Nurseries	Herbicides, insecticides, fungicides, and other pesticides
Oil wells	Metals; acids; minerals; sulfides; other sulfides; other hazardous and nonhazardous chemicals
Oil/gas pipeline	Corrosive fluids; hydrocarbons; other hazardous and nonhazardous materials and wastes
Other wells	Storm water runoff; spilled liquids; used oil; antifreeze; gasoline; other petroleum products; road salt; pesticides; and a wide variety of other substances
Photo processor	Cyanides; biosludges; silver sludges; miscellaneous sludges
Power lines	PCBs from transformers and capacitors; oils; solvents; sludges; acid solution; metal plating solutions (chromium, nickel, cadmium); herbicides from utility rights-of-way
Printer	Solvents; inks; dyes; oils; miscellaneous organics; photographic chemicals
Refineries	Hydrocarbons; oil-field brines (highly mineralized salt solutions)
Refinishing[1]	Paints; solvents; degreasing and solvent recovery sludges
Septic systems	Septage; coliform and noncoliform bacteria; viruses; nitrates; heavy metals; synthetic detergents; cooking and motor oils; bleach; pesticides; paints; paint thinner; photographic chemicals; swimming pool chemicals; septic tank/cesspool cleaner chemicals; elevated levels of chloride, sulfate, calcium, magnesium, potassium, and phosphate
Sewage plants	Sewage wastewater; nitrates; other liquid wastes; microbiological contaminants
Spray fields	Organic matter; nitrate; inorganic salts; heavy metals; coliform and noncoliform bacteria; viruses; nitrates; sludge; nonhazardous wastes
Substation	PCBs, oils
Underground storage tanks	Heating oil; diesel fuel; gasoline; other petroleum products; other commercially used chemicals
Waste piles	Organic and inorganic chemicals; metals; oils; wastes from households and businesses
Wood preserving[1]	Wood preservatives; creosote

[1] Listed by EPA as a light industry with high potential to contaminate ground water (USEPA, 1990)

Some Sources of Existing Information on PCSs

Superfund sites **(CERCLIS):** *USEPA; DENR Division of Waste Management (DWM), Superfund Section*

Point source discharges **(NPDES):** *DENR Division of Water Quality (DWQ), Water Quality Section*

Ground-water contamination sites **(PIRF)**: *DENR DWQ, Groundwater Section*

Abandoned dump sites: *DENR DWM, Solid Waste Section*

Hazardous waste management facilities: *DENR Division of Solid Waste Management, Hazardous Waste Section*

Underground storage tanks: *DENR, DWM, Underground Storage Tank Section*

Pesticide Applications: *NCDA, Food and Drug Division, Pesticide Division*

Land Application of Waste: *DENR DWQ, Water Quality Section*

Feedlots: *Local NRCS Office, NCDA*

Hard copy files: local, county, and state governments may have information on the location and type of PCS. Examples include:

- County septic tank permit records,
- The location of homes and businesses that are not on the PWS. These are likely locations for wells that can provide a direct route for contaminants to enter the ground water if not properly constructed.
- Cemeteries, landfills, and other land uses that may lead to ground-water contamination

Aerial photos: if aerial photos or other remote images exist, they can be used to learn about areas that are not accessible, or to measure the size of a large PCS such as a landfill or waste dump. Orthophotoquads, which are black and white images in map format, may be available for your area. Annual crop compliance slides from your county's Farm Service Agency office "USDA-FSA" may also be a useful source of information. The North Carolina Geological Survey has a collection of aerial photographs. The North Carolina Department of Transportation's Photogrammetry unit also has a collection of aerial photos, and if your WHPA is near a major road, photos may be available. Digital orthophotoquad quarter quadrangles are available from NCDOT and the United States Geological Survey at a scale of 1:12,000. Contact information including web addresses are given in the "Resources and References section" of this chapter.

Other published information: for compliance with emergency planning and Right-to-Know regulations, industries must notify emergency planning committees and fire departments of the use and storage of certain materials. Information from the North Carolina Department of Revenue, sales tax division, may provide information on retail sales of PCSs. The yellow pages of the local phone book and the directory of local businesses supplied by the Chamber of Commerce are also potential sources of information.

Locate PCSs on a preliminary map

Begin marking locations of known or suspected PCSs on a working map.

After gathering preliminary data from existing records, it is a good idea to plot the PCSs that have been identified so far on a map or aerial photo. This map does not have to be complex or highly technical; often paper copies of city street maps, plat maps, or USGS topographic maps will work well. Large scale aerial photos in the range of 1:3,000 to 1:12,000 are usually the most suitable for mapping. If no aerial photos or orthophotos are available, the information can be transferred to a USGS quadrangle or county road map. The USGS mapping center sells 1:24,000 scale topographic maps. A contact number and web address is given in the "Resources and References" section in this chapter.

Documenting the locations of known PCSs will help guide site visits to confirm these sources and may suggest land use patterns or situations that need additional investigation. Identification of several contamination sites close together, for example, may suggest that a common historical source might exist.

Identify additional PCSs and characterize each PCS

PCSs not identified from existing databases and information will need to be identified and documented. In addition, information on PCSs already identified in the initial search needs to be verified and possibly updated.

To collect up-to-date information about sources already identified, it may be necessary to conduct surveys of cooperating PCS owners or operators. The surveys should concentrate on gathering information for the PCS Data Sheet (Attachment 1), such as the amount and type of potential contaminants stored, produced, or disposed of at each site. Each sheet must also be labeled with the appropriate PCS Identity Code. This same code will be used on the final map of PCSs and on the Inventory of PCSs described below.

To find additional unrecorded sources, it will be necessary to do some detective work in the WHPA, where community sources of information may be as important as government records. A key step is to find out if private and community wells are serving as conduits for ground-water contaminants. Poorly constructed and improperly abandoned wells are numerous, and there are no records for many of them. Information from members of the community and visual surveys of the WHPA will be the primary ways to identify these.

Past PCSs are important to document and may not appear in current official records. Personal interviews with community residents can be extremely valuable sources of such information. Knowledge that a service station once stood on what is now a home site may lead to the discovery of an old underground storage tank. Retired facility operators, public officials such as firefighters, road commissioners, planning and zoning officials, building inspectors, health inspectors, and long-term residents can give an historical perspective, possibly revealing sources that cannot be identified any other way. The preliminary PCS map is a useful tool in collecting community information. Although interviews can be fruitful, they also require a substantial investment of time. Additional time is required to verify the information obtained as a result of these interviews.

There are several approaches to collecting local information:

Investigate undocumented PCSs by gathering community information through observations, surveys, and interviews.

"Windshield" Surveys are done by driving through the WHPA, and simply looking through the windshield for anything that might be a potential source of a contaminant. This can be done to find new leads or to confirm information from electronic databases, hard copy files, and the public. Land uses can indicate the types of PCSs to look for: private wells and septic tanks in rural residential areas, storage tanks in commercial areas, etc.

On-Site Surveys include visits to reported or possible PCSs to complete the detailed information that is required.

Contact with Individual Land Owners is time consuming but may be the only way to gather specific information. These surveys can be conducted by mail, telephone, or door-to-door. Be sure to collect all of the information required to complete your PCS Data Sheet and to ask about the history of the site.

Before you begin any individual contacts, especially door-to-door surveys, it is essential to notify the public of the upcoming inventory. You can involve the media to promote the inventory through local publicity. Preparing the public for

Involving the public through publicity in local media can improve the quality of information you collect about PCSs.

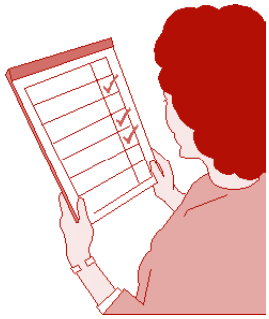
this survey and explaining its purpose will often increase the response rate and improve the quality of information you collect.

Once all additional information collection is complete, you should update all PCS Data Sheets with additional information gained during this process and complete a Data Sheet for each new PCS identified. You should also update the preliminary PCS map.

Summarize the information from all PCS Data Sheets

Now that all information on PCSs within the WHPA has been collected from official and community sources, it is time to summarize the information in the most useful form before moving to the next step. The goal is to organize the information so that PCSs and pollutants are consistently identified in the WHPA and to make the task of ranking sources easier.

Complete the PCS Code Form for each WHPA



The PCS Identity Code Form (Attachment 2) lists PCSs by category and is used to assign a unique identification number to each individual PCS. First, number the categories that you found in your WHPA. For example, if you found only three categories — cemeteries, dry cleaners, and gas stations, you would number these categories 1, 2, and 3, respectively on the inventory form. If there is more than one source in a category, label each source with a different letter. If there were two cemeteries, they would be designated 1A and 1B; three dry cleaners would be designated 2A, 2B, and 2C; and the single gas station would be identified as 3. These same codes should be copied onto each individual PCS data sheets and the final map described below. These codes will also be transferred to the Final Inventory Form after the PCSs have been ranked by risk.

Complete the inventory by organizing, summarizing, and mapping the final information.

Plot the locations of all PCSs on the final inventory map

Place a corresponding number on the final inventory map, indicating the location of the source using the PCS Identity Code assigned to each. This map is basically a revised, clean version of the preliminary working map developed earlier in the inventory process. If there are zoning ordinances in effect, it will be helpful to combine this with a zoning map. This will help to determine later whether new or existing ordinances are needed to protect the PWS. A sample map is shown in a partial plan example in Attachment 5.

Estimate risks and rank potential contaminant sources

Once the PCSs are identified, the next step is to estimate the risks posed to your water supply. You will rank each PCS according to the threat it poses to the water supply wells. Then you can determine which PWS wells are most vulnerable as a guide for management and protection. A systematic evaluation of the relative risk of contamination from each PCS identified in the inventory will allow you to determine (1) which water supply well is at the greatest risk of contamination, and (2) which PCSs should be considered first because they pose the greatest threat. Good risk assessment is the best basis for setting priorities to manage PCSs and protect your water supply.

Table 2. General risk ranking of PCSs (adapted from EPA, 1993; Oregon DEQ, 1996).

Commercial/Industrial	Agricultural/Rural	Residential/Municipal	Miscellaneous
HIGHER RISKS			
Automobile repair shops/gas stations	Auction lots	Airports – maintenance/ fueling areas	Historic gas stations
Boat services/ repair/refinishing	Confined animal feeding operations (CAFOs)	Landfills/dumps	Historic waste dumps/landfills
Chemical/petroleum processing/storage	Farm machinery repair	Railroad yards/ maintenance/fueling areas	Injection wells/drywells/sumps
Chemical/petroleum processing/storage	Machine shops	Septic systems – high density – >1/acre	Military installations
Dry cleaners	Lagoons/liquid wastes	Stormwater discharges	Road salt storage areas
Electrical/electronic manufacturing	Pesticide/fertilizer/petroleum storage, handling, mixing, and cleaning areas	Utility stations – maintenance areas	Underground storage tanks
Fleet/trucking/bus terminals	Unauthorized/illegal waste disposal		Utility right-of-ways – pesticide use areas
Furniture repair/manufacturing			
Home manufacturing			Wells
Junk/scrap/salvage yards			
Machine shops			
Metal plating/finishing/fabricating			
Mines/gravel pits			
Parking lots/malls – >50 spaces			
Photo processing/printing			
Plastics/synthetics producers			
Research laboratories			
Wood preserving/treating			
Wood/pulp/paper processing and mills			
MODERATE RISKS			
Car washes	Crops – irrigated**	Drinking water treatment plants	Above ground storage tanks
Cement/concrete plants	Greenhouses, vegetables	Golf courses	Construction/demolition areas
Food processing	Boarding stables	Housing – high density – >1 house/0.5 acres	Freeways/state highways
Funeral services/graveyards	Land application sites	Motor pools	Hospitals
Hardware/lumber/parts stores		Parks	Managed forests
Medical/vet office		Waste transfer/ recycling stations	Sludge disposal areas
		Wastewater treatment plants/collection stat's.	Railroads
			Random dumpsites
LOWER RISKS			
Office buildings/complexes	Crops – nonirrigated Christmas trees, grains, grass seeds, hay, pasture	Apartments and condominiums	Surface water – streams/lakes/rivers
RV/mini storage	Rangeland	Campgrounds/RV parks	
	Septic systems – low density – <1/acre	Fire stations	
		Schools	

* Facility-specific management practices are not taken into account in estimating risks and assigning these categories.
** Note: Drip-irrigated crops are considered lower risks.

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A very general approach to estimating risk can be based on a simple grouping of PCSs into categories of lower, moderate, or higher risk. Examples are shown in Table 2. While this kind of approach is fairly broad, it may give a reasonable basis for initial prioritization in situations where detailed background information and technical expertise is lacking.

Ranking PCSs by risk is the basis for setting priorities to protect your drinking water supply.

The next level of risk assessment considers both the ranking of the PCS itself and its distance from the well, an indication of the likelihood that the PCS can actually contribute contamination to the well. For example, a moderate risk PCS that is close to the water supply well may be of more concern than a higher risk PCS located far from the well where it is unlikely to affect the water supply.

There are more sophisticated systematic risk assessment methods available to evaluate the various risk factors and arrive at a numeric score for each pollution hazard. Some methods are better suited for assessing the risks posed by a variety of sources; others focus on evaluating risks from a single source. EPA's risk assessment tools include:

- DRASTIC (Aller et al., 1987), a modeling tool that evaluates the vulnerability of ground water to contamination
- The ground-water pathway of the Hazard Ranking System
- The abandoned well risk assessment methodology
- The Priority Setting Approach

EPA's Priority Setting Approach is the basis for the method recommended in this guidance. Details of the approach are contained in the EPA Technical Assistance Document, Managing Ground Water Contamination in Wellhead Protection Areas: A Priority Setting Approach (EPA/570/9-91-023).

Risk evaluation for PCS may be based on

- Simple ranking by relative risk categories from published sources
- Ranking of sources plus distance to well
- Systematic risk assessment based on consideration of the severity of the contaminant plus the likelihood of release plus the probability of delivery to the well

The risk associated with a particular PCS can be considered as the product of three factors: (1) the severity of the source (e.g., its size, the amount and toxicity of the contaminant); (2) the likelihood and magnitude of a release from the source; and (3) the likelihood of the released contaminant reaching the well. For each WHPA, the PCSs identified in the inventory could be assigned to a relative risk category based on a multiplication of numeric scores assigned to each factor. These scores could, for example, represent the magnitude of each factor: 1-lower, 2-moderate, and 3-higher. Multiplying these scores would result in an overall risk score ranging from 1 (least risk) to 27 (highest possible risk). An example risk calculation sheet is presented in Attachment 3.

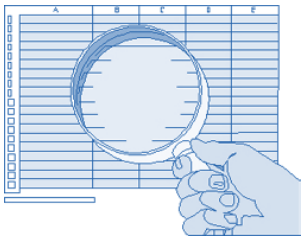
Factors to consider in developing the index include:

- **Severity of Contamination**
  - Toxicity of each contaminant (The OSHA designations of chemicals inventoried at some facilities can be used)
  - Persistence of the contaminant in the environment (how quickly the contaminant breaks down after release)
  - Mobility and attenuation (how easily the contaminant moves through the soil and how much may be held by the soil)
  - Quantity of the contaminant that could be released by this source

- **Likelihood of Contamination Release**
  - Nature of the source activity (Is the activity weather dependent? Carefully controlled?)
  - Compliance history of a permitted facility (Do current practices and history suggest that there is a good probability of release?)
- **Likelihood of delivery to well**
  - Distance to well
  - Time of ground-water travel to well (ground-water velocity under pumping conditions)
  - Characteristics of the WHPA (hydraulic conductivity, pathways for contaminant movement to ground water and ground-water movement through the aquifer, e.g. rock fractures)

Note that the likelihood of contaminant delivery to a well varies with WHPA characteristics. Due to overlapping WHPA, a PCS may occur in multiple WHPAs. In such a situation, the PCS must be ranked with respect to each of the WHPA's wells.

Complete the master scoresheet



Sort the PCSs in the risk assessment worksheet by risk category for each well. Transfer these PCSs to the WHPA PCS Inventory form. An inventory form is required for each well in the WHPA. An example form is provided in Attachment 4. Record each PCS on the form by PCS category, PCS Identity Code, name, location, and risk category. In a 1-3 scoring system, overall risk scores of 1-9 would be categorized as "lower risk sources", risk scores of 10-18 would be considered "moderate risk sources", and risk scores of 19-27 would be considered "higher risk sources". Categorizing PCSs will help you later in prioritizing management strategies to protect your WHPA.

Involving the public

Public information & education and public involvement in the inventory process can promote awareness of drinking water protection, provide better information on PCSs, and lead to improved management.

A public information and education program and public involvement in WHP can create greater awareness of pollution prevention and drinking water protection and lead to better management. If residents understand that the purpose is protecting their drinking water, their investment, and their health, they will likely support the effort. Broad public support can lead to better participation in surveys and more complete information. The effectiveness of your Wellhead Protection (WHP) Program can only be as good as the information gathered in this step; if a serious PCS is overlooked, your drinking water cannot be protected from it. Therefore, it is important to get public cooperation in making the inventory as thorough as possible.

The public can provide helpful input in many phases of the inventory and ranking process. Residents may know of unused wells or buried wastes that are not recorded elsewhere. Educating the public about the purpose of wellhead protection usually leads to improved cooperation and better information.

The data-gathering activity is an excellent opportunity to understand the needs and perceptions of the community. Residents may believe, for example,

that a PCS exists in a former industrial site. Investigation of this situation may lead to the discovery of a new PCS, or it may be shown that there is no cause for concern. In either case, the process will demonstrate that community concerns are taken seriously and that the resulting WHP plan will address local needs.

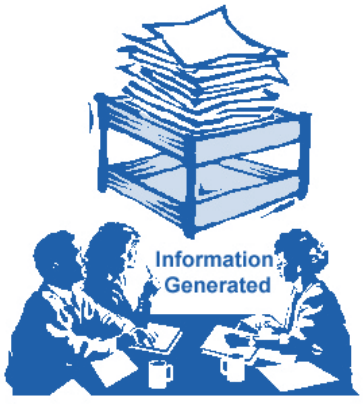
Local volunteers may be used for surveys to collect community information. Following the initial inventory, students, retirees, and other volunteers can help you complete a field search for existing and potential contaminants. In most cases, volunteers will need training in administering the survey and knowing what to look for in the field. Confidentiality issues must also be addressed.

The public can also be included in the ranking activities. It is critical that the Planning team listen to the concerns of the community. At the same time, it should be cautioned that risk is often seriously misunderstood by the public and public perceptions of risk may not always agree with actual risk assessment. A public process can be a good opportunity to educate the community with regard to actual risks associated with drinking water contamination.

Products that should result from Step 3, to be included with the final plan:

When you've completed this step, you should have the following information to include with the final plan you submit to PWS:

1. **List of sources used to identify PCSs**.
   List the electronic databases that were used, document files that were reviewed, surveys conducted, and any other sources used.
2. **Printouts showing search results of each electronic database searched.**
   Be sure the name of the database is included with its results. Indicate which items in the database search results were included as PCSs in the plan, and which lie outside the WHPA
3. **A sample of each survey questionnaire used to gather basic site information.**
   Include questions about the amount and type of potential contaminants stored, produced, or disposed of at each site.
4. **Summary of data from each type of survey** (keep individual responses on file locally)
5. **Data Sheet for each PCS included in the Plan** (Attachment 1)
6. **WHPA PCS Identity Code Form for each well or zone, showing categories of PCSs found** (Attachment 2)**.**
   You may adjust the categories for your specific situation. For instance, if you have many hog lagoons, you may wish to have that as a category, rather than "holding pond/lagoon" so that the exact nature of the PCS is known.
7. **Criteria used for deciding which PCSs to include and the ranking system used.**
   The ranking system presented earlier in this chapter is suggested for ease of adaptation, however no one particular system is required. You will need to indicate the ranking system that you selected.
8. **WHPA Inventory List of PCSs grouped by higher, moderate, and lower risk for each well** (Attachment 4)
9. **Map(s) of PCSs with Identity Codes**
10. **Documentation of public citizen involvement**



Resources and References

Aller, L., T. Bennett, J. H. Lehr, R. J. Petty, and G. Hackett, 1987. DRASTIC: A Standardized System For Evaluating Ground-water Pollution Potential Using Hydrogeologic Settings. U.S. Environmental Protection Agency, EPA/600/2-87/035, 622 pp.

ATSDR ToxFAQsTM, a series of summaries about hazardous substances in the environment; online at http://www.atsdr.cdc.gov/toxfaq.html#-A-

INTEGRATED RISK INFORMATION SYSTEM (IRIS), prepared and maintained by the U.S. Environmental Protection Agency (U.S. EPA), an electronic data base containing information on human health effects that may result from exposure to various chemicals in the environment; online at http://www.epa.gov/iris/intro.htm

Oregon DEQ 1996. Oregon Wellhead Protection Program Guidance Manual.

POTENTIAL DRINKING WATER CONTAMINANT INDEX, A list of potential drinking water contaminants and their potential sources associated by three categories of land use: Commercial/Industrial, Residential/Municipal and Agricultural/Rural; online at http://www.epa.gov/OGWDW/swp/vcontam3.html

POTENTIAL SOURCES OF DRINKING WATER CONTAMINATION INDEX, a list of some potential facilities and activities where one might find the contaminants referred to in the contaminant index above; online at http://www.epa.gov/OGWDW/swp/sources1.html

USEPA. 1990. A Review of Sources of Ground-Water Contamination from Light Industry. EPA/440/6-90-005.

USEPA. 1991. Guide for Conduction Contaminant Source Inventories for Public Drinking Water Supplies. U.S. EPA Technical Assistance Document. EPA 570/9-91-014. Washington D.C.

USEPA. 1991. Managing Ground-water Contamination Sources in Wellhead Protection Areas: A Priority Setting Approach. EPA 570/9-91-023, Washington, DC.

USEPA. 1993. Wellhead Protection: A Guide for Small Communities. EPA/625/R-93/002. Office of Research and Development, Cincinnati, OH.

Wyoming DEQ. 1997. Wyoming's Wellhead Protection Program Guidance Document. November; online at http://www.wrds.uwyo.edu/wrds/deq/whp/

Photos/Maps

GISDataDepot. (downloadable digital Orthophotos) http://www.gisdatadepot.com

NCDOT Photogrammetry Unit. (Aerial Photos) Contact: Keith Johnston, PE, PLS (919) 250-4167 http://apps01.dot.state.nc.us/apps/directory/680.html

NCSU Libraries GIS Data Archive (Digital Orthophotoquads)
http://www.lib.ncsu.edu/stacks/gis/themes/term0410.html

USGS National Mapping Information. USGS topographic maps and aerial photographs. http://mapping.usgs.gov/esic/to_order.html
1-888-ASK-USGS (1-888-275-8747)

Regulatory Databases Containing PCS Information

ASTDR: Agency for Toxic Substances and Disease Registry
http://www.atsdr.cdc.gov/hazdat.html
Responsible Agency: U.S. Department of Health and Human Services
The database contains records for 75 sites in North Carolina that contain information on chemicals associated with these sites.

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System
http://www.epa.gov/superfund/sites/cursites/nccerlst.htm
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.

Large On-Site Wastewater Facilities
Responsible Agency: Division of Environmental Health, On-Site Wastewater Section
http://www.deh.enr.state.nc.us/oww/Inspecti/inspect.htm
This page lists onsite wastewater system operators by county.

NPDES (National Pollutant Discharge Elimination System)
Responsible Agency: Division of Water Quality, Water Quality Section
http://h2o.enr.state.nc.us/NPDES/permits.html#lists
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)
www.epa.gov/region4/wastepgs/sf/supfnd.htm
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)

www.epa.gov/ceppo/ds-epds.htm#title3

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)

http://gw.ehnr.state.nc.us

Responsible Agency: Division of Water Quality, Groundwater Section

The Groundwater Section maintains the State's incident management database which contains information on all ground-water 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, ground-water 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 4,400 sites where ground-water contamination occurred and the sites are not considered closed.

Petroleum Contained Soils

http://ust.enr.state.nc.us/docs/dedsoil.pdf

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. The database contains the physical address for each of the permitted facilities.

Pre-Sanitary Landfill Dumps

http://wastenot.enr.state.nc.us/SFHOME/Landfills_012002.pdf

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.

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.

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 3,400 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.

Contact Evan Kane (919) 715-6165 for database.

Above Ground Storage Tanks

DENR.

Contact DENRs customer service center Contact Information Center (Telephone 1-877-623-6748) for possible database information.

Animal Feedlots

Local NRCS office – http://www.nc.nrcs.usda.gov/Directory/directory.htm

Check with your local NRCS office for locations of animal feedlots in your area.

Chemical Substances

FEMA – www.fema.gov

Registry of Toxic Effects of Chemical Substances (RTECS)
http://www.usfa.fema.gov/fedguide/ch4-14.htm

USEPA – www.epa.gov
http://www.epa.gov/ceppo/pubs/camtrain/cameoim.pdf
http://www.epa.gov/ceppo/pubs/camtrain/cameosm.pdf
Chemical emergency response and planning software

De-Icing Salts

NC DOT – http://www.dot.state.nc.us/public

County Maintenance Offices – http://www.dot.state.nc.us/news/maintenance_offices.html

Phone listing of County NCDOT maintenance offices

Fertilizer Applications

Local NRCS office – http://www.nc.nrcs.usda.gov

Check for typical fertilizers used and fertilizer recommendations

North Carolina State Cooperative Extension Service – http://www.ces.ncsu.edu/counties/

Contact local office for information on typical fertilizers, application rates and potential transport and fate

North Carolina Department of Agriculture (NCDA) – http://www.ncagr.com/stats/otherept.htm#chem

This site lists typical chemical applications by crop

Hazardous Waste Management Facilities

DENR, Division of Solid Waste Management, Hazardous Waste Section
http://wastenot.enr.state.nc.us/hwhome/HWHOME.htm
The harzardous waster section holds a database for all hazardous waste TSD's, generators, and transporters as defined by RCRA. The database contains lattitude and longitude for over 5200 facilities. Contact DENRs customer service center Contact Information Center (Telephone 1-877-623-6748) for possible database information.

http://wastenot.enr.state.nc.us/HWHOME/guidance/guidance.htm
This page contains guidance documents for various hazardous waste compounds and issues.

USEPA
RCRIS and RCRA: Resource Conservation and Recovery Information System – www.epa.gov/epaoswer/hazwaste/data/notify.htm

Inactive Hazardous Sites

http://wastenot.enr.state.nc.us/SFHOME/ihs_inv_by_cty_012002.pdf
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.

Land Application of Waste

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.

ftp://h2o.enr.state.nc.us/pub/Non-Discharge/
The site has a spreadsheet ("sprayirrigation.xls) listing facilities that spray irrigate with wastewater

ftp://h2o.enr.state.nc.us/pub/Non-Discharge/Animal%20Operations%20Info/
This site has a spreadsheet ("location.csv") listing animal operations that spray irrigate with wastewater, and their locations

Non-Discharge permits, DENR, Water Quality Section, Permits and Engineering – http://h2o.enr.state.nc.us/ndceu/laws.html

Landfills

DENR, Division of Solid Waste Management, Solid Waste Section
http://wastenot.enr.state.nc.us/swhome/newhom.htm

http://wastenot.ehnr.state.nc.us/SWHOME/facil.htm
This page contains lists of all permitted solid waste facilities by type in North Carolina along with contact information

http://wastenot.ehnr.state.nc.us/SWHOME/mswlst.pdf
This page contains a list of all municipal waste facilities (landfills) in North Carolina with contacts.

Mine Tailing/Storage Piles

DENR, Division of Land Resources, Land Quality Section
http://www.dlr.enr.state.nc.us/DLR.htm

http://www.geology.enr.state.nc.us/Permitted%20Mines%201999-2000/permitte.htm
Contains a list of permitted active and inactive mines in North Carolina, and maps.

Pesticide Applications

NCDA, Food and Drug Division, Pesticide Division
http://www.agr.state.nc.us/fooddrug/pesticid/index.htm

NCDA
http://www.ncagr.com/stats/otherept.htm#chem
Lists herbicide, insecticide and fungicide usage in North Carolina by crop.

http://www.ncagr.com/stats/otherept.htm#rest
Restricted Pesticide Usage
Lists Herbicides and Pesticides which use is restricted in North Carolina.

North Carolina Pesticide Applicator Training Program
http://ipmwww.ncsu.edu/ncpat/
Information of Licensing and Certification, and training.

Septic Tanks

County Health Department; DENR, Division of Solid Waste Management, Solid Waste Section
http://wastenot.enr.state.nc.us/swhome/newhom.htm

Shallow Injection Wells

DENR, Groundwater Section
http://www.dwr.ehnr.state.nc.us/hms/gwbranch/GWB.htm
http://gw.ehnr.state.nc.us/rules.htm##2C200
Lists criteria and standards applicable to injection wells as part of NC ground-water protection rules.

http://www.epa.gov/safewater/uic/c5stimp.pdf
"Revisions to the Underground Injection Control Regulations for Class V Injection Wells". This guide has been developed to assist States and EPA Regions in implementing the "Class V Rule" *(Revisions to the Underground Injection Control Regulations for Class V Injection Well*s, 64FR 68546).

Surface Impoundments

DENR, Division of Environmental Health, Public Health Pest Management Section
http://www.deh.enr.state.nc.us/phpm/pages/index.htm

Applicator License
http://www.deh.enr.state.nc.us/phpm/pages/Applicator%20license.htm
These pages apply to pesticide application for mosquito control

Underground Storage Tanks

DENR, Division of Waste Management, Underground Storage Tank Section
http://wastenot.enr.state.nc.us

Petroleum Underground Storage Tank Database
http://wastenot.enr.state.nc.us/dbases.htm#UST Facilities
http://204.211.90.139/database.html
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.

USEPA
http://www.epa.gov/swerust1/regions/index.htm
Regional EPA offices for underground storage tanks.

Attachments:

Beginning with the next page, you will find attachments that are provided to make it easier for you to prepare your plan document.

Remember, the attachments that are labeled “Example” are only to give you ideas.

- **Attachment 1: Example of a Potential Contaminant Source Data Sheet**
- **Attachment 2: Example of a Potential Contamination Source Identity Code Form**
- **Attachment 3: Example of a Risk Assessment Worksheet.** This worksheet may be copied and used directly, or may be adapted as required. You may also want to develop a spreadsheet or database to list the PCSs and perform the ranking calculations and perform final sorting.
- **Attachment 4: Example of a WHPA PCS Inventory Form**
- **Attachment 5: Example of a partial plan, showing the portions of the plan that result from this step.** The example plan shows you the kind of information that you are expected to include in the plan that you submit for approval. Your final plan will be different than the fictional Town of Clearwater plan that is provided as an example. Your list and types of PCSs may be different and the number of wells in your WHPA may be different.

Attachment 1: Example of a Potential Contaminant Source Data Sheet

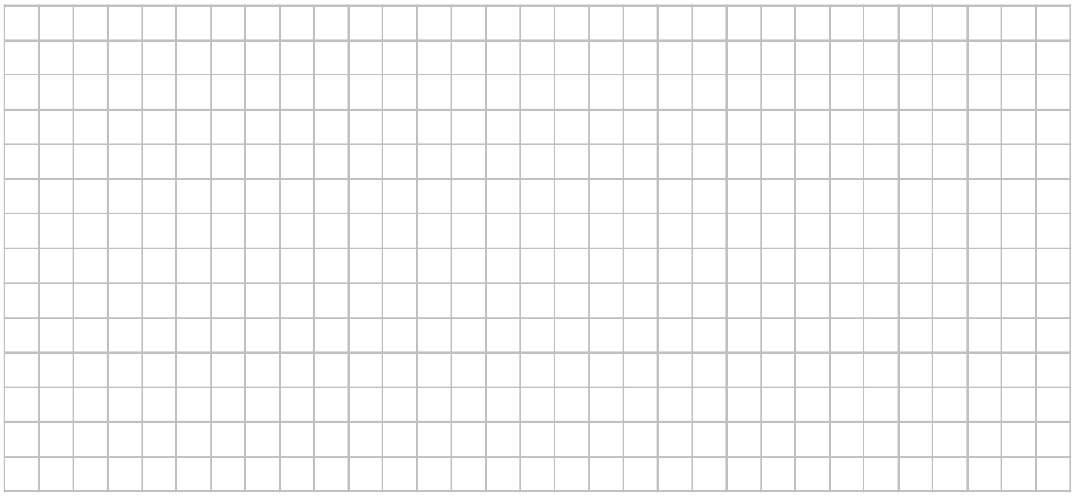
POTENTIAL CONTAMINANT SOURCE DATA SHEET

Wellhead protection area for PWS: [insert name]_____

Facility Name
Operating Status (open/closed/abandoned)
Address
Phone #:
Owner's Name
Owner's Address
Owner's Phone #
Well number, if applicable_____
Permit, if applicable_____
Zone, if applicable_____

Possible contaminant substances (use additional space below if necessary)	Maximum quantity anticipated on premises	Type of storage and containment:
Example: methylene chloride	Example: 110 gal.	Example: 55-gallon drums stored on loading dock and in shop.

Draw sketch outlining property, locating major buildings and potential contaminants



PCS Identity Code, assigned after completing PCS Inventory_____

Attachment 2: Example of a Potential Contamination Source Identity Code Form

WHPA
Potential Contaminant Source Identity Code Form
For WHPA (or zone) _____

Place a number next to each category that you identify in your WHPA. Place a corresponding number on the delineation map at the location of the source. If there is more than one source for a category, label each site with a letter (1A, 1B, 1C, 2A, 2B). Record the name of the business, owner's name, address, and specific PCS information for each site on a separate WHPA PCS Data Sheet.

___ABANDONED WELLS
___ABOVEGROUND STORAGE TANK
___AGRICULTURAL FACILITIES
___AIRPORT
___ANIMAL FEEDLOT/WASTE STORAGE
___ASPHALT PLANT
___AUTO REPAIR
___BODY SHOP/SALVAGE
___CEMETERY
___CHEMICAL PRODUCTION
___CHEMICAL MIXING/STORAGE
___DOT STATIONS
___DRAINAGE CANAL
___DUMPS
___ELECTROPLATERS/METAL FINISHERS
___FERTILIZER/PESTICIDE MIXING/STORAGE
___FERTILIZER/PESTICIDE PRODUCTION
___FUNERAL HOMES
___GAS STATIONS
___GOLF COURSES
___HOLDING POND/LAGOON
___INACTIVE/ABANDONED HAZARDOUS WASTE SITES
___INJECTION WELLS
___LABORATORIES
___LAUNDROMAT/DRY CLEANERS
___LIFT STATIONS
___MACHINE SHOPS
___MAJOR HIGHWAYS
___MAJOR RAILROADS
___MILITARY BASES
___MINING
___NURSERIES
___OIL/GAS PIPELINE
___OIL WELLS
___OTHER WELLS
___PHOTO PROCESSOR
___PRINTER
___POWER LINES
___REFINERIES
___REFINISHING
___SEPTIC SYSTEMS
___SPRAY FIELD
___SUBSTATIONS
___SEWAGE PLANT
___UNDERGROUND STORGE TANKS
___WASTE PILES
___WOOD PRESERVING

OTHER (SPECIFY)
___ _____
___ _____
___ _____

PLEASE CONTACT YOUR EMERGENCY MANAGEMENT COORDINATOR AND ASK FOR A COPY OF ALL RECORDS ON HAZARDOUS MATERIAL/SITES IN YOUR AREA. CONTACT YOUR LOCAL FIRE DEPARTMENT AS MSDS FORMS SHOULD BE FILED WITH THEIR DEPARTMENT FOR HAZARDOUS CHEMICALS STORED OR USED BY BUSINESSES IN YOUR AREA.

Attachment 3: Risk Assessment Worksheet: Well # _____

Risk Assessment Worksheet

PCS Identity Code	Severity (1)	Likelihood of Occurrence (2)	Likelihood of Delivery (3)	Overall Score (1) * (2) * (3)	Risk Category (b)

(a) In a 1-3 scoring system, Lowest Possible Risk will be 1, Highest Possible Risk will be 27. Add wells as necessary.
(b) Higher 19-27; Moderate 10-18; Lower 1-9

Attachment 4: Example of a WHPA PCS Inventory Form

WHPA PCS Inventory Form

Well[1] _____

HIGHER RISK SOURCES			
PCS Category	PCS Identity/ Map Code	Name	Address/Location
MODERATE RISK SOURCES			
LOWER RISK SOURCES			

[1] Repeat form for each well in WHPA

Attachment 5: Example of a partial plan, showing the portions of the plan that result from this step

Introduction

Two WHPAs representing the three wells in the Clearwater water system as delineated in Step 2 were used as the basis for the potential contaminant source (PCS) inventory. Methods used to conduct a PCS inventory included performing a database search of existing state and federal databases, conducting a windshield survey, and making on-site visits to each of the PCSs identified.

Database search

(Name) conducted a database search on Clearwater. The databases searched, and results of the search are summarized below:

FTP://h2o.enr.state.nc.us/pub/ — this address links to the first four databases:

1. Animal Operations Database DWQ
2. Class A Biosolids DWQ
3. Class B Biosolids DWQ
4. Spray Irrigation of Wastewater DWQ
5. Solid Waste Facilities DWM/SWS
   http://wastenot.ehnr.state.nc.us/swhome/permfr.htm
6. Pollution Incident Reporting Form (PIRF) Department of Environment and Natural Resources, Division of Water Quality, Groundwater Section
   http://gw.ehnr.state.nc.us/WebClass1.ASP
7. Underground Injection Control Permit Database (UIC): Division of Water Quality, Groundwater Section
8. Division of Emergency Management Database: Department of Transportation
9. Pollution Control System (PCS) Database (Water Discharge Permits): Environmental Protection Agency
10. Toxic Release Inventory System Database (TRIS): Environmental Protection Agency
11. Resource Conservation and Recovery Information System (RCRIS) Database: Environmental Protection Agency/Division of Waste Management, Hazardous Waste Section
12. Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) Database: Environmental Protection Agency/Division of Waste Management, Superfund Section
13. Agency For Toxic Substances and Disease Registry (ATSDR): U.S. Department of Health and Human Services

The database search found no Superfund sites, no ATSDR sites and no spills were found on the Emergency Management database. There were five RCRIS sites but only two, Bob's Chevrolet and Piedmont Furtniture, were in the WHPA. The three TRIS sites were out of the WHPA. There were four PCS sites, but only one was located in a WHPA, the N.C. National Guard Armory. Eleven ground-water contamination incidents were found with a Clearwater address, but only Clearwater Tribune, Jones and Company, the N.C. National Guard Armory and Clearwater College Maintenance were inside the WHPA.

Numerous animal operations are located in Clearwater County, but none were found in the WHPAs. There was one Underground Injection Site in Clearwater County, but it too was outside the WHPAs. There were no Spray Irrigation sites and no Class A or Class B Biosolids sites found. The solid waste landfill for Clearwater County is not located in the WHPAs. Data sheets were filled out for all sites found to be in the WHPAs during this database search and these were added to the list of PCSs found otherwise.

Planning team members [Name], [Name] and [Name] used the delineated topography map to identify potential contamination sources within the WHPAs. A "windshield survey" was conducted in the WHPA to determine PCSs. [Name] and [Name] visited each possible contamination source found in the database search and the windshield survey. Education about wellhead protection and ways to reduce the potential of contamination were discussed with owners/managers at each location. Assistance was also offered to help educate personnel at these locations.

There are four facilities within the WHPAs that are confirmed soil or ground-water contamination incidents.

Information about each is provided below.

1. Clearwater Tribune — No facility ID # — A petroleum spill was reported at this site on February 1999. A Limited Site Assessment was received by the Washington Regional Office (WARO) Groundwater Section on April 2, 1999. A letter requiring No Further Action at the site was written by the WARO on May 12, 1999.
2. Jones and Company — Incident # 1234 — This incident was reported in January 1990, and was the result of a leak from a 500-gallon fuel oil tank. According to a Soil Remediation and Groundwater Assessment Report submitted to the WARO on January 24, 1991, 46 tons of contaminated soil has been removed from the site. Samples collected from the remaining soil show maximum Total Petroleum Hydrocarbons (TPH) of 22 ppm. The soil standard is 10 ppm. One ground-water monitoring well had been installed at the site and a sample collected showed no compounds detected above quantitation limits. There was no additional correspondence following the submittal of the report.
3. N.C. National Guard Armory — Incident #5678 — A Tank Closure Report was submitted for this site on October 26, 1995. Samples collected from monitoring well MW-1 show Benzene concentrations to be 17,000 ppb. The site was accepted for State Lead clean-up status, and in a letter written on June 22, 1995 by Arther Mouberry, Groundwater Section Chief. The site was ranked as being 50 out of 56 sites in the Coastal Plain Region. The site will be cleaned up after the first 49 sites are finished.
4. Clearwater College Maintenance Building — Incident # 9876 — On October 21, 1991, a Site Assessment submitted to the WARO, showed minor soil contamination at the site. There was a slightly elevated concentration of Naphthalene at 43 ppm. On February 9, 2000, the WARO sent a letter to the responsible party requesting that a Limited Site Assessment be submitted within 120 days of receipt of the letter.

A Multi-System Query at http://www.epa.gov/enviro/index_java.html gives you information about all of the following:

1. National Pollutant Discharge Elimination System (NPDES). Identifies permitted facilities that discharge to surface waters — There are six facilities that have permits to discharge to surface waters. They are the Clearwater Wastewater Treatment Plant which discharges to the NE Cape Fear River, the Clearwater Water Treatment Plant which discharges backwash that drains to the NE Cape Fear River, and the Clearwater Pickle Company which discharges to a drainage ditch that eventually reaches the NE Cape Fear River. It is believed that permits issued to The Boling Group, The National Guard, and Sonocco Products are issued for stormwater drainage.
2. Toxic Release Inventory (TRIS) — Three facilities on this list permitted for air releases are outside of the WHPAs.
3. Hazardous Waste Handler (RCRIS) — There are two facilities located within the WHPAs that appear on this list, Bob's Chevrolet and Piedmont Furniture.
4. Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS). EPA/DWM/Superfund Section — There were no facilities within the WHPAs.
5. Biennial Reporting System. EPA/DWM/Superfund Section. Information from Large Quantity Generators (LCG) and Treatment, Storage and Disposal facilities — None were located within the WHPAs.
6. North Carolina Superfund Section — None were located within the WHPAs.
7. Inactive Hazardous Sites Inventory — None were located within the WHPAs.

There was one spill found on the Emergency Management data, but it too was outside the WHPAs.

The solid waste landfill for Clearwater County was found to be outside the WHPAs.

Five RCRIS sites were found with two of them located inside the WHPA: Bob's Chevrolet and Piedmont Furniture. Bob's Chevrolet is listed on this database because of a 250-gallon storage tank used to store waste oils, fluids, etc. from automotive work performed on-site.

This tank is pumped out by a contracted firm once every six weeks. Freon that is captured from older automobile air conditioners is also stored on-site and disposed of by a contract firm on a regular basis. Piedmont Furniture is on this database list because of glues, lacquers, oils, and stains that are used in their manufacturing process. The over-spray from the processes using these potential contaminants is collected and stored in 55-gallon drums on-site. These drums are collected by a contract firm when a truckload (approximately 100 drums) is available to be hauled. These waste products are re-cycled by the contract firm. There is also a 2,000 gallon diesel tank, 550 gallon diesel tank, 550 gallon gasoline tank, 3-2,000 gallon bulk tanks, 280 gallon used oil tank, coal storage, PCB transformers, boiler chemicals, and other smaller containers containing potential contaminants stored on site. These factors were considered along with location and history of the facilities when ranking these sites in the PCS inventory.

There were no Class A or B biosolids sites, no Superfund sites, no ATSDR sites, no underground injection sites, and no spray irrigation sites found in the database search. The sites found in the database search to be in the WHPAs were the first sites included in the PCS Survey. Detailed sheets on each site found inside the WHPAs are included in the back of the Wellhead Protection Plan.

Windshield Survey

[Name] conducted an extensive windshield survey of the delineated Wellhead Protection Areas. Using an EPA list of potential contamination sources (PCSs), he identified locations where contamination sources might exist. He conducted onsite visits to all of the facilities located within the area where potential contamination sources might be located and collected information about types, quantities and locations of known contaminants. He recorded information about each of these facilities on individual PCS sheets that are included with this document.

Septic Tanks

The Town of Clearwater operates a municipal sewage system within the town limits. There are approximately 100 residents located within the town that are still on individual septic tank systems.

Abandoned Wells

Locations of known abandoned wells are noted in the list of PCSs.

Risk Assessment

A risk assessment was conducted for each PCS and a worksheet is shown below. PCS data sheets are attached. In assessing the risk, the nature of the PCSs, the number of PCSs, the location of each PCS in relation to the well's location, and the history of compliance of the facility with any state or federal rules that may apply were all taken into consideration. The ranking of the vulnerability of the water supply wells is as follows with the well at the highest risk designated as number one:

The Wellhead Protection Committee feels that well #1 is at the greatest risk of contamination because of the close proximity of manufacturing and chemical storage in the immediate areas. Well #2 is subject to the next highest risk primarily due to the petroleum storage facility in the area. These factors were considered when determining priorities in managing the potential contamination sources in an effective manner.

Risk Assessment Worksheet: Well # ___1____

PCS Identity Code	Severity (1)	Likelihood of Occurrence (2)	Likelihood of Delivery (3)	Overall Score (a) (1)*(2)*(3)	Risk Category(b)
13A	3	2	3	18	Higher
14A	1	1	3	3	Lower
22A	2	2	1	4	Lower
25A	2	2	1	4	Lower
.	.	.	.	.	.
For illustration purposes: only the PCSs shown on the map are presented here					

(a) Lowest Possible Risk will be 1, Highest Possible Risk will be 27

(b) Higher 19-27; Moderate 10-18; Lower 1-9

LIST OF POTENTIAL CONTAMINANT SOURCES

A PCS inventory is shown below. The potential contamination sources in each zone are organized in the order of their potential risk or threat of contamination to the system. In each risk category, the sources are listed in the order of their ranking from highest to lowest risk. This order was determined by the WHP planning team using materials included in the guidance documents, the history and proximity of each potential contamination source to the well sites and information gathered during the on-site visits to each site. A map of PCS locations for WHPA #1 is shown in Figure 1.

Well #1 (Zone #1). ***Note: For purposes of example brevity, wells #2 and #3 omitted in this table***			
HIGHER RISK SOURCES			
Category	Map Code	Name	Location
Chemical mixing and storage	3A	Manufacturer	
Gas Station	13A	Sanders' Market	
Gas Station	13B	Quick-E-Mart	
GW PIRF	8B	Clearwater Tribune	
GW PIRF	8D	Jones and Co.	
Lift Station	14B	Lift Station #3	
Refinishing	10A	Furniture maker	
Sewage Plant	6B	Gordon St. WWTP	
UST	1A	Simpson's Fuels	
UST	1C	Abandoned gas station	
AST	26A	Town of Clearwater Maintenance Yard	
MODERATE RISK SOURCES			
Auto Repair	2B	Service Center	
Auto Repair	2C	Tire Service & Repair	
Auto Repair	2D	Garage	
Chem mix/storage	3A	Food Processing Plant	
Fert/pesticide mixing	16A	Fertilizer plant	
Fert/pesticide stg.	15A	Ag. Supply store	
Gas Station	13A	Convenience store	
Gas Station	13C	Convenience store	
GW PIRF	8C	National Guard Armory	
Lift Station	14C	Lift Station #3	

LOWER RISK SOURCES			
GW PIRF	8H	Clearwater College Maintenance Building	
Holding pond/ Lagoon	25A	Farm	
Laundromat/ Dry Cleaner	21A	Clearwater Cleaners	
Laundromat/ Dry Cleaner	21B	Laundromat	
Lift Station	14A	Lift Station #5	
Lift Station	14C	Lift Station #1	
Lift Station	14D	Lift Station #4	
Major Hwy	22A	US 117 Bypass	
Military Base	7A	NC Army National Guard	
Other Wells	4A	Town of Clearwater Plant 2	
Printer	18A	Clearwater Times	
Printer	23A	Clearwater Copy & Print	
Sewage Plant	5A	Town of Clearwater WWTP	
UST	1B	Used Cars #1	
UST	1D	Used Cars #2	

Potential Contamination Source Inventory Summary

It is considered that the major sources of potential contamination occur within the WHPA surrounding wells #1 and #2, and the sources for the greatest concern are in proximity to well #1. There are an above-ground diesel fuel tank and maintenance equipment near the well. Also, left-over public works materials are stored on the site and there is concern about deteriorating sewage lines and lift stations that are on streets near the well site. Also of concern are the confirmed soil and groundwater contamination incidents that have occurred within the WHPAs.

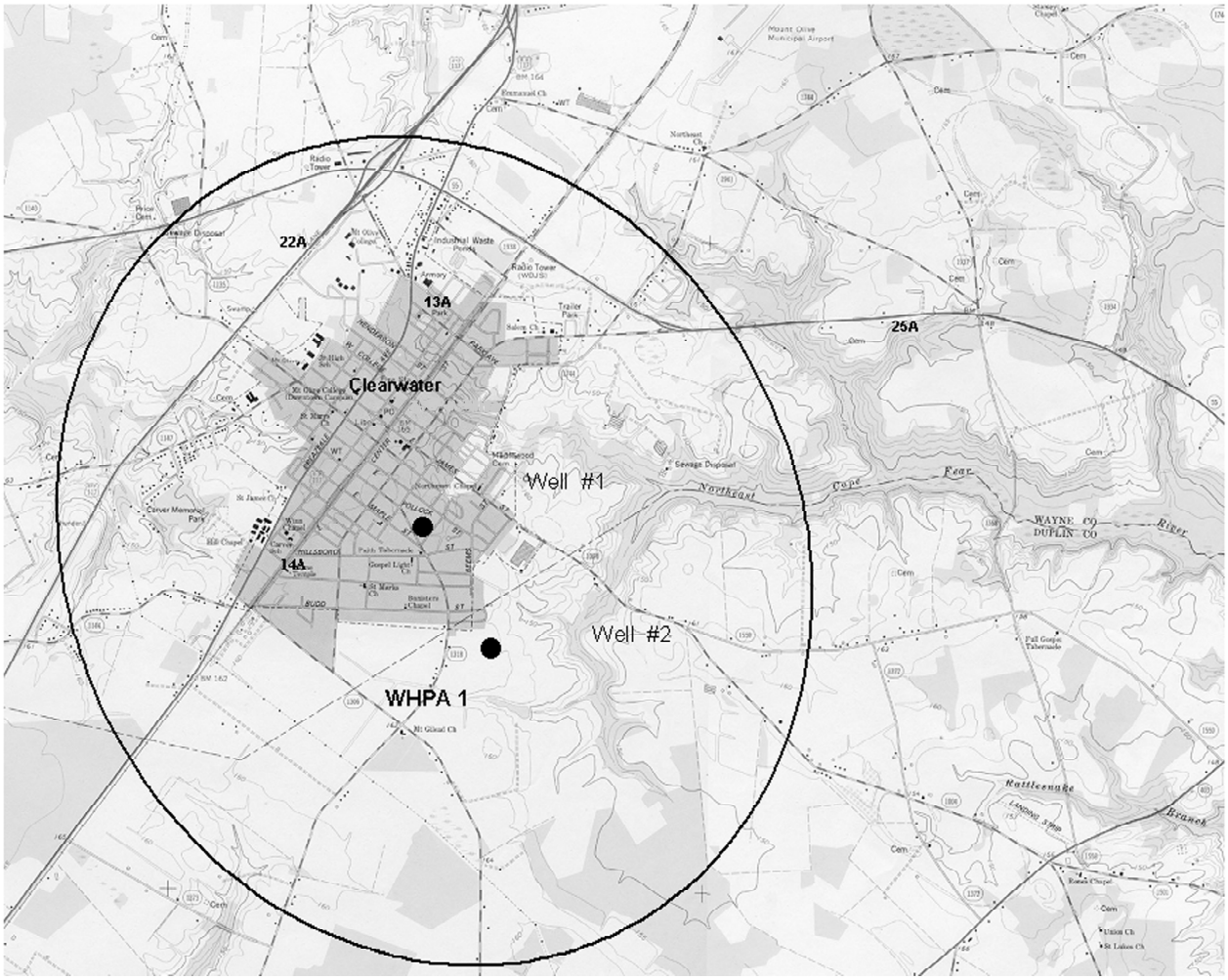


Figure 1. Final PCS Map with Identity Codes. (Note: For illustration purposes only; not all PCSs shown. Larger scale map copies may be necessary to show all PCSs for your WHPA.)

Potential Contaminant Source Data Sheet

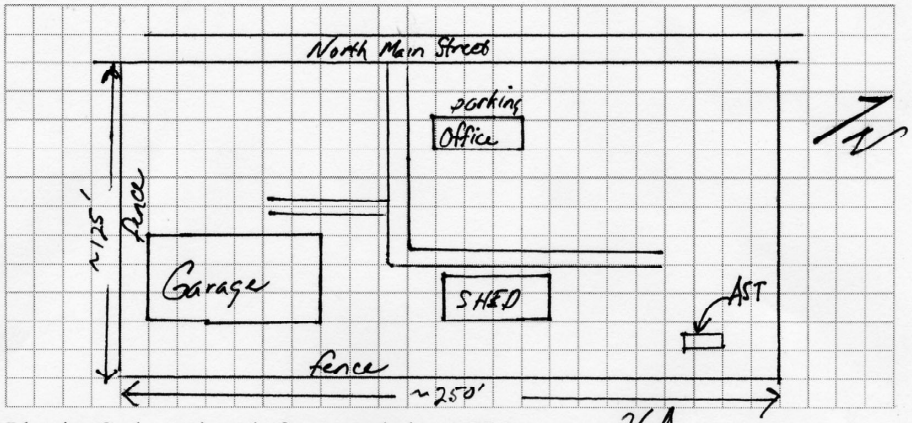
POTENTIAL CONTAMINANT SOURCE DATA SHEET

Wellhead protection area for PWS: WHPA 1

Facility Name Town of Clearwater Maintenance Yard
Operating Status (open/closed/abandoned)
Address 150 North Main St.
Phone #: 919-111-1111
Owner's Name Town of Clearwater
Owner's Address 100 North Main St.
Owner's Phone # 919-111-2222
Well number, if applicable 1
Permit, if applicable_____
Zone, if applicable_____

Possible contaminant substances (use additional space below if necessary)	Maximum quantity anticipated on premises	Type of storage and containment:
Diesel Fuel #2	500 gallons	Above Ground Storage Tank (AST)

Draw sketch outlining property, locating major buildings and potential contaminants



PCS Identity Code, assigned after completing PCS Inventory 26A