GROUNDWATER RESOURCE SUMMARY

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The second priority of the USDA's National Program for Soil and Water Conservation is: " Protect the quality of surface and groundwater against harmful contamination from nonpoint sources." An understanding of the connections between the groundwater and the surface will be necessary to meet the USDA's second priority.

This is an introduction to materials you presently have in the field office and other reference materials which will be placed in the Field Office Technical Guide. It will also introduce you to information that is available now or which will be in the future. General nonpoint source considerations in rural areas will be discussed and additional sources of reference material will be covered. Within the last year each field office received a Field Level Training Manual entitled Principles of Ground Water for Resource Management Systems. This manual presents basic principles of ground water in a clear manner. It will be valuable in the next few years as we deal with groundwater quality and quantity issues.

STATUS OF CURRENT GROUNDWATER INFORMATION

Early legislation dealt with improving the quality of our surface water and at the present time most of the water pollution data for the state is surface water data. In part this relates to the idea that "out of sight is out of mind" and groundwater is out of sight. Recently legislation has come along requiring states to assess and deal with issues of groundwater quality and quantity. Use of groundwater is extensive in the rural areas of our state as shown in 1985 figures that single household systems provide about 56 mgpd to 1.1 million users. In addition most of the public water systems in West Tennessee use groundwater. Tennessee is starting to develop state-wide information on our aquifer systems. Up to now the concern has been directed at point sources of pollution such as hazardous waste sites (CERCLA or Superfund sites) or major municipal water supply systems such as at Memphis or Jackson, and the possible contamination of their aquifers. Because of these concerns much of the available state and U.S. Geological Survey(USGS) - Water Resources Division data deals only with small isolated portions of the aquifer systems. The Tennessee Geologic Map shows the regional geology which in general corresponds to the MLRA's and regional aquifers. As part of the state's Groundwater Management Strategy preliminary descriptions of the major regional aquifers of Tennessee have been published. The reports have more extensive maps showing where the aquifers are used for water supplies and

will be useful as references. An example of this is the map showing the Knox aquifer use. The aquifer is used over much of Middle Tennessee although it does not outcrop there.

PLANNED AND ON-GOING GROUNDWATER STUDIES

The Tennessee Dept. of Health and Environment(TDHE) and the Tennessee State Planning Office have contracted with the USGS to do three studies of groundwater quality monitoring.
1. Long-term groundwater quality monitoring of 90 wells and springs used mainly for public water supplies will provide baseline data.
2. Collect data from 150 rural wells throughout the state to make a preliminary assessment as to possible contamination of local aquifers from domestic, agricultural or industrial activities.
3. A study of shallow, localized aquifers in West Tennessee to determine nonpoint contamination in these shallow, alluvial aquifers used by rural landowners. Twenty wells in Shelby, Lake, Haywood and Obion Counties are being sampled.

ANALYSIS OF DATA

Preliminary data from this third study shows nitrite and nitrate reported as N ranging from <0.1 to 8.9mg/l. The national safe drinking water limit is 10mg/l. The wells were sampled in the winter and summer. Research nationwide has generally shown that amounts of N <0.2mg/l are natural, 0.2-3.0 natural or human influence, >3.0mg/l is human influence (TDHE recommends a maximum of 3.0mg/l) and as stated before >10 mg/l exceeds the safe drinking water limit. No pesticides were detected in these wells. Note! When reading reports realize nitrate might be expressed as N or NO3. The safe drinking limit if reported as N is 10mg/l. If nitrate is expressed as NO3 the limit is 45mg/l.

PLANNING FOR GROUNDWATER PROTECTION

Many aspects of groundwater quality and concerns about it can be addressed by us as SCS employees prior to the completion of studies now being carried out.

1. Karst topography is highly susceptible to pollution due to its characteristics. The Geologic Hazards Map of Tennessee shows the major karst regions of Tennessee though fractured rock anywhere is susceptible to this type of pollution. It also has a good description of water contamination concerns and construction concerns associated with karst terrain. A point that needs to be emphasized here is that surface and groundwater are very intimately connected in this type of terrain. Contaminated water can go

directly down a sinkhole to a well and then on to a spring beside a stream and provide base-flow to the stream. On the other hand water may go from the stream into the groundwater system depending on relative water levels and other factors. Many public and private water systems in Middle and East Tennessee are supplied by springs or by streams, the base-flow of which are supported by springs. RMS's designed to protect surface waters should be adapted for depression and sinkhole protection.

2. As discussed above increased nitrate is a major nonpoint pollutant whether it comes from septic systems, agricultural waste systems or from fertilizer applications. Other contaminants can also be a problem. The reason for concern in West Tennessee is the shallowness to alluvial aquifers and their high permeability. Many of the self-supplied users get their water from these aquifers. RMS's including nitrate and pesticide management are recommended here.

3. Another area of concern is recharge areas such as the outcrop areas of the Coastal Plain aquifers. Two major areas are the Tertiary sand aquifer, used extensively by Memphis and other cities in the area, and the Cretaceous sand aquifer of West Tennessee. Both of these aquifers are used locally as well as for public water supplies and are susceptible to contamination over the long term. Recharge areas in limestone and fractured rock aquifers which includes much of Middle and East Tennessee are more difficult to identify or define. Recharge areas, when defined, will require RMS's with nitrate and pesticide management.

4. Many instances of contamination by pesticides, fertilizers and biological organisms, nationwide and in Tennessee, are the result of faulty well construction, lack of disinfection after development or lack of well head protection. We can inform the public of this and encourage practices so that pesticides, nutrients and bacteria can not gain access to the aquifers at the well sites. Practices such as well head protection, and proper handling, mixing and storage of chemicals are recommended.

ADDITIONAL INFORMATION AND TRAINING

Each area and county has more information available to them concerning the aquifers than has been discussed here. Sources of information are federal, state and local agencies such as the USGS-Water Resources Division, TVA, TDHE or the Tennessee Department of Conservation- Division of Geology. Local planning agencies at the county or city level may have detailed studies and reports on their area. As discussed before data has been collected by various agencies on known sites of point source contamination such as certain landfill

sites. The Tennessee Division of Geology - List of Publications is a good reference for specific studies. D.C.'s and A.C.'s should check with county and regional planning agencies for further information.

Future training will be tailored specifically to each area. At some point we will look at each aquifer and its separate concerns. As data from the ongoing USGS and state projects becomes available it will be sent to each SCS office.