

Chapter 3. LAND USE AND CONTAMINATION SOURCE INVENTORY

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CHAPTER 3. LAND USE AND CONTAMINATION SOURCE INVENTORY

An important element to understanding existing and/or potential sources of ground water contamination is recognizing the interrelationship between land use and contamination sources.

3.1 Land Use

The TPNRD covers approximately 2,660,480 acres, in which the majority of the land is pastureland. The majority of the urban population resides in the North Platte and Ogallala areas. Irrigated cropland is found in the North Platte River valley, the South Platte River Valley, the Platte River valley and scattered throughout the uplands. The USDA Natural Resources Conservation Service has detailed census information for land use within the TPNRD.

The pattern for land use within the District is not expected to change significantly over the next decade and may show a slight conversion of agricultural lands to other utilities such as residential, industrial and commercial.

3.1.1 Major Land Resource Areas

The United States Department of Agriculture Natural Resources Conservation Service (NRCS) has determined that there are ten Major Land Resource Areas within Nebraska. Four of the Major Land Resource Areas are within the TPNRD. The four of the Major Land Resource Areas are within the TPNRD are shown in Figure 8.

3.1.2 Soils

The Nebraska Natural Resources Commission (NNRC) has on file in the Data Bank Generalized Soil Maps for Nebraska produced from data from the United States Department of Agriculture Natural Resources Conservation Service (NRCS). The Generalized Soil Map for the TPNRD prepared by the NNRC is shown in Figure 9. A color version of the Generalized Soil Map for the TPNRD is on file in the TPNRD offices and is available from NNRC.

3.2 Contamination Source Inventory

Nonpoint and point sources interact with the physical environment and have the ability to contaminate the ground water reservoir. Identifying these sources and developing controls can reduce the threat of ground water contamination.

3.2.1 Nonpoint Source Inventory

Nonpoint sources are defined as indiscernible, diffuse and indistinct conveyance from which pollutants are or may be discharged. Nonpoint sources, which are difficult to assess quantitatively and control, include inputs from agrichemicals, storm water runoff,

erosion, ground water, and biological sources such as animal feedlots. Nonpoint source pollution has the potential to significantly impact ground water quality. Nonpoint source problems in Nebraska include agrichemicals, sod erosion and sedimentation, livestock wastes and urban stormwater. No current data is available to quantify the pollutants from these sources.

Residential agrichemicals are applied in urbanized areas. The greatest potential for nonpoint sources lie in the cities of North Platte and Ogallala where the greatest concentration of the populous reside.

Erosion and sedimentation are natural geologic phenomena. Land development activities, however, can initiate severe, highly undesirable, and damaging alterations in the natural process by accelerating the erosion/sedimentation process.

Sedimentation is a rural and urban problem. Existing TPNRD programs assist landowners in the implementation of conservation plans for the construction of soil and water conservation practices. These include terraces, diversions, waterways and erosion control structures to help prevent sod erosion, reduce downstream sedimentation and control nonpoint pollution.

The Nebraska Erosion and Sediment Control Act of 1986 allows landowners to request the TPNRD assistance to control sediment and erosion. This act applies to agricultural lands and commercial, industrial and urban lands.

The Clean Water Act and its amendments have established water quality standards, discharge limitations, and permit goals for point discharge limitations, and permit goals for point discharges.

Nonpoint sources of pollution from agricultural lands are currently unregulated. The Clean Water Act statutorily exempted agricultural storm water and irrigation return flows.

3.2.2 Point Source Inventory

In addition to the authority delegated to the NRDs in the GWMPA, statutory authorities in the area of ground water quality have been assigned to the Nebraska Department of Environmental Quality (NDEQ) and the Nebraska Department of Health (NDOH).

In 1971, the Nebraska Environmental Protection Act established NDEQ and entrusted it with the responsibility of protecting and improving environmental quality in the state. NDEQ monitors the land, water, and air for changes in environmental quality. They also issue permits and periodically inspect industries engaged in activities that could affect environmental quality. Long range strategies are also developed, such as the Nebraska Groundwater Quality Protection Strategy (NGQPS).

NDEQ's current monitoring programs involve predominantly point sources (e.g.

industrial and municipal discharge points and solid waste disposal sites) for compliance purposes. They do not systematically sample and/or monitor wells for ground water quality in other areas of the TPNRD which might relate to non-point sources (e.g. pesticides and nitrogen fertilizers). The NGQPS identifies the need to monitor potential contamination sources such as:

- 1) Spills and leaks of hazardous materials from commercial storage facilities,
- 2) Agricultural chemical usage, primarily nitrogen fertilizers and pesticides,
- 3) Waste treatment and disposal areas,
- 4) Abandoned or poorly constructed wells and test holes,
- 5) Hazardous material storage, usage, and disposal at industrial facilities, and
- 6) Spills or leaks of hazardous materials along transportation corridors.

A major focus of the Federal Clean Water Act (CWA) is controlling "point source" pollution. In this Act, a "point source" is defined as "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel . . . from which pollutants are or may be discharged". 33 U.S. C. Section 1362(14). This Act empowered the U.S. Environmental Protection Agency (EPA) or an authorized state agency to conduct programs relevant to the requirements of the CWA. Within the State of Nebraska, the NDEQ administers such programs; their requirements not only overlay the federal regulatory structure, but are often more stringent. Information on the number of regulatory point permits issued by NDEQ and EPA for various communities in the TPNRD may be obtained from NDEQ.

RCRA

The Resource Conservation and Recovery Act (RCRA) is a federal statute designed to protect ground water from contamination through releases of hazardous substances. It sets up a "cradle-to-grave" system for tracking wastes from their generation, through transportation, to treatment, storage or disposal. To comply with RCRA, businesses that generate, store or transport hazardous waste are required to register their activities with the EPA. A list of businesses in the TPNRD that have complied under RCRA can be obtained from the NDEQ.

Title III

The Emergency Planning and Community Right-to-Know Act, or Title III, lists businesses that use, store, or release hazardous substances as part of the normal business operations. Title III was established to provide necessary information to emergency response teams when preparing for incidents involving hazardous substances and to appraise the public of any hazardous materials being used in their community. A Toxic Chemical Release Inventory for the TPNRD may be obtained from NDEQ.

Underground Storage Tanks

NDEQ prepares Underground Storage Tanks (UST) lists and CERCLIS inventory reports that identify known contamination sites. UST identifies all sites with reported underground storage tanks releases. CERCLIS is an acronym for the Comprehensive Environmental Response and Liability Information System. UST lists and CERCLIS inventory reports may be obtained from NDEQ.

NPDES

The National Pollution Discharge Elimination System (NPDES) requires all persons discharging pollutants from a point source into any waters of the state to apply and obtain a permit for this activity. State requirements for NPDES permitting are specified under Title 119-NDEQ. Waste water treatment facilities, water treatment facilities, and sanitary improvement districts comprise the majority of the permittees. A list the NPDES permittees may be obtained from NDEQ.

Hazardous Waste Inventory

The EPA report for Hazardous Waste Administrative Inventory lists the facilities in the TPNRD. The list may be obtained from the EPA.

Solid Waste Facilities

Solid waste facilities are licensed by NDEQ.

The TPNRD is not aware of any active licensed landfills in the TPNRD. Solid waste from within the TPNRD are transported to an active land fill south of Ogallala in Perkins County.

The West Central Nebraska Development with offices in Ogallala, NE has taken an active role in coordinating solid waste management facilities in the TPNRD and may be contacted for information.

Chemigation

Chemigation through center pivot irrigation systems are regulated through the Nebraska Chemigation Act of 1986. This Act requires center pivot owners who chemigate to take measures to prevent chemicals from contaminating the groundwater supply. NRDs were assigned the responsibility to inspect these systems, verify safety precautions, and issue permits for chemigation. There are approximately 650 active permits in the TPNRD.

Private Septic Systems

A common private septic system consists of a septic tank and soil absorption field. Liquid waste flows from the tank to the soil absorption field where it is purified as it filters through the soil. Soil type is crucial to this process since only certain types of soil can properly purify the effluent. A soil with large pores allows the effluent to move quickly

and does not hold it long enough for complete purification before it encounters the ground water. Where soils are too tight, septic systems will not drain adequately and may break down or cause nuisance conditions. Pollutants of concern from septic systems are nitrates, bacteria, viruses, and hazardous chemicals.

There are presently no statistics which summarize the number of septic systems in the TPNRD. However, areas of concern include residential development surrounding lakes. Soils in these areas are coarse, and depth to groundwater is relatively shallow, making the potential for contamination greater than in upland sites.

The location of septic systems relative to drinking water wells is important in determining contamination potential. Where local hydrogeology is suitable, and wells and septic systems are properly constructed, contamination from private septic systems should be minimal.

3.2.3 Concentration of Total Dissolved Solids

Concentration of total dissolved solids (TDS) is shown on Figure 11 and includes the major dissolved constituents: calcium, magnesium, sodium, potassium, bicarbonate, sulfate and chloride. Most ground water in the principal reservoir contains low levels of total dissolved solids. In a few areas of the major river valleys in Nebraska, concentrations of TDS exceed 500 milligrams per liter in the principal ground water reservoir. These areas have been affected by seepage from rivers that may have been enriched in total dissolved solids by evapotranspiration and by irrigation return flows. The U.S. Public Health Service in 1962 recommended a limit of 500 milligrams per liter of TDS in drinking water. Regulations implemented in 1977 by the U.S. Environmental Protection Agency (EPA) do not contain a specific limit for TDS, but secondary guidelines that are based generally on aesthetic considerations include a limit of 500 milligrams per liter.

Although the concentration of total dissolved solids serves to indicate the level of mineralization of water in the principal ground water reservoir, this is only one aspect of water quality. TDS is not an indicator of health-related contaminants, such as nitrates, radioactive and nonradioactive metals and organic compounds. In various locations across the state, water occurs in wells with concentrations of nitrates (as nitrogen) exceeding the EPA standard for drinking water of 10 milligrams per liter. Many organic chemicals become injurious to health at concentrations considerably less than one milligram per liter, and TDS levels usually offer no clues to the presence of these chemicals. Considerable variance from average quality can occur at different depths or times at any specific site. Analysis for specific potential contaminants in a well is warranted when there may be a health concern related to water.

3.2.4 Ground Water Vulnerability to Contamination

DRASTIC Method

Figure 10 is a Generalized Map of the TPNRD showing the potential ground water vulnerability to contamination using the DRASTIC method prepared by NNRC. A color version of the Generalized Map for the TPNRD is on file in the TPNRD offices and is available from NNRC.

The DRASTIC method was developed by the EPA and the National Water Well Association. The method incorporates weighted factors affecting contaminant transport to ground water. The hydrogeologic factors used in the evaluation are:

- D - Depth to water
- R - Recharge to the aquifer
- A - Aquifer media
- S - Soil media
- T - Topography (slope)
- I - Impact to vadose (unsaturated) zone
- C - Conductivity (hydraulic) of the aquifer

3.2.5 Wellhead Protection Area

NDEQ may delineate Wellhead Protection Areas. These protected areas may be assigned Remedial Action Classes (RAC) by NDEQ. Wellhead Protection Areas have been delineated by NDEQ for seven out of the ten municipalities in the TPNRD (Brady, Brule, Hershey, North Platte, Ogallala, Paxton, and Sutherland).

3.3 Needs and Data Deficiencies

The land use data provided by the NNRC data bank primarily focused on agricultural lands. All urban lands were grouped together. In urbanized areas, where sources of containments may need to be further defined, a more detailed map may be necessary.

Improperly abandoned wells provide a mechanism to introduce containments into the ground water. The Nebraska Department of Health, Title 178, Chapter 12 - Regulations Governing Water Well Construction, Pump Installation and Water Well Abandonment Standards - defines the proper procedure to abandon a well. A record of permanently discontinued wells or water wells in which the use has been accomplished is deficient. A method of identifying and locating improperly abandoned wells may be needed to eliminate this passage of containments. The TPNRD provides cost-share assistance for properly sealing abandoned wells.

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