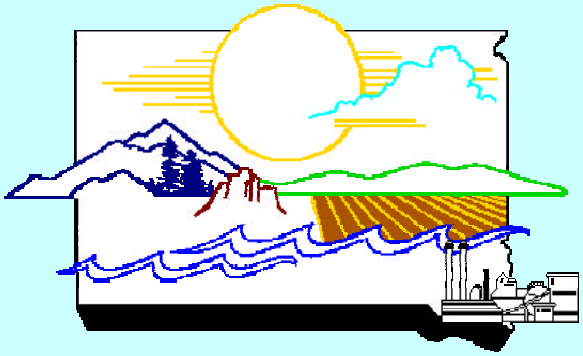
Wellhead Protection Success Stories

in

South Dakota



South Dakota Department of
Environment and Natural Resources
Groundwater Quality Program

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Executive Summary

South Dakota depends on ground water as its main source of drinking water, with many of the drinking water systems installed in shallow aquifers that are vulnerable to contamination. State wellhead protection activities were initiated in 1987 to protect public water supplies that draw on ground water as their source of drinking water. Since the inception of state wellhead protection, local governments, business and industry, and the public have been very active in wellhead protection activities. This document highlights six case studies where wellhead protection was successfully used by the public to protect their drinking water source. The cases involve protective measures for large and small industries (petroleum pipeline, service stations and industrial septic system drainfields) and activities protecting against agricultural chemicals and feedlot waste.

Wellhead Protection Success Stories

South Dakota is dependent on ground water as its primary source of drinking water. Approximately 95 percent of all public water supplies in South Dakota obtain their drinking water from ground water with the majority of ground water being produced from shallow surficial glacial aquifers in the eastern part of the state. Approximately 35 percent of all South Dakota public water supply wells are less than 100 feet deep. The South Dakota Public Water Supply Vulnerability Study[1] indicates that the majority of wells in the surficial glacial aquifers are classified as vulnerable to contamination.

State legislation in 1987 and 1989 enabled the development of a state wellhead protection program and provided for voluntary local wellhead protection programs. The South Dakota wellhead protection program is required by state law, but at the local level is a voluntary program where public water supplies are strongly encouraged to participate. The United States Environmental Protection Agency approved the South Dakota Wellhead Protection Program in September of 1992.

The state wellhead protection program consists of seven key components necessary for successful implementation. The most effective method of wellhead protection program development, although not the only one, is to proceed through the program on a step by step basis. The program's initial step is to identify the roles of all participants. The next steps involve delineating a wellhead protection area followed by identification of potential contaminant sources within the wellhead protection area. A management plan is then developed to minimize the impact of the contaminants. The remaining components of the wellhead protection program are contingency planning for water supply emergencies, siting new wells for expansion or replacement of the existing water supply and identifying avenues for the public to participate in the development of the wellhead protection program.

Local governments have been very active in wellhead protection in South Dakota. Currently, communities or water systems in ten counties in eastern South Dakota have delineated wellhead protection areas. To manage the adopted wellhead protection areas, zoning ordinances which limit or restrict high risk activities in and around the wellhead protection areas have been passed by nine counties and two cities that have delineated wellhead protection areas.

Until recently, wellhead protection was a term seldom heard in daily conversation. Today, through zoning ordinances and several successful examples of wellhead protection, the public has begun to understand the importance of wellhead protection. Examples of wellhead protection "in action" will be the focus of this document. It outlines processes, recommendations and lessons learned through the successful implementation of wellhead protection for each example.

One example will focus on a large petroleum spill which occurred near the City of Sioux Falls' main wellfield, and the cooperation between state, county, city and pipeline company officials in implementing new procedures and technologies in early leak detection and monitoring that will minimize the impact of spills that could potentially threaten the ground water source important to a population of more than 100,000.

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[1] DeMartino, Carolyn V. and Jarrett, Martin J., South Dakota Public Water Supply System Vulnerability Study. South Dakota Department of Environment and Natural Resources, Division of Geological Survey. Vermillion, South Dakota 57069.

Other success stories will demonstrate how local public water systems are taking a proactive stance in implementing wellhead protection and influencing the management decisions within these wellhead protection areas. Another example will focus on how South Dakota has set strict standards that must be met at petroleum contaminated sites located within a wellhead protection area. State ground water quality standards are adopted through a public hearing process, which indicates the citizens' concern and understanding of the potential hazards to their wellfields. Recently, large feedlots have been an environmental concern and through public involvement a county zoning committee placed restrictions on a proposed feedlot that would house 35,000 head of feeder cattle. Wellhead protection weighed heavily on the final committee decision. The final example focuses on the East Dakota Water Development District in Brookings, South Dakota and its efforts to educate the public about the impacts of operating Class V injection wells. The locations for the success stories highlighted in this report are shown in Figure 1.

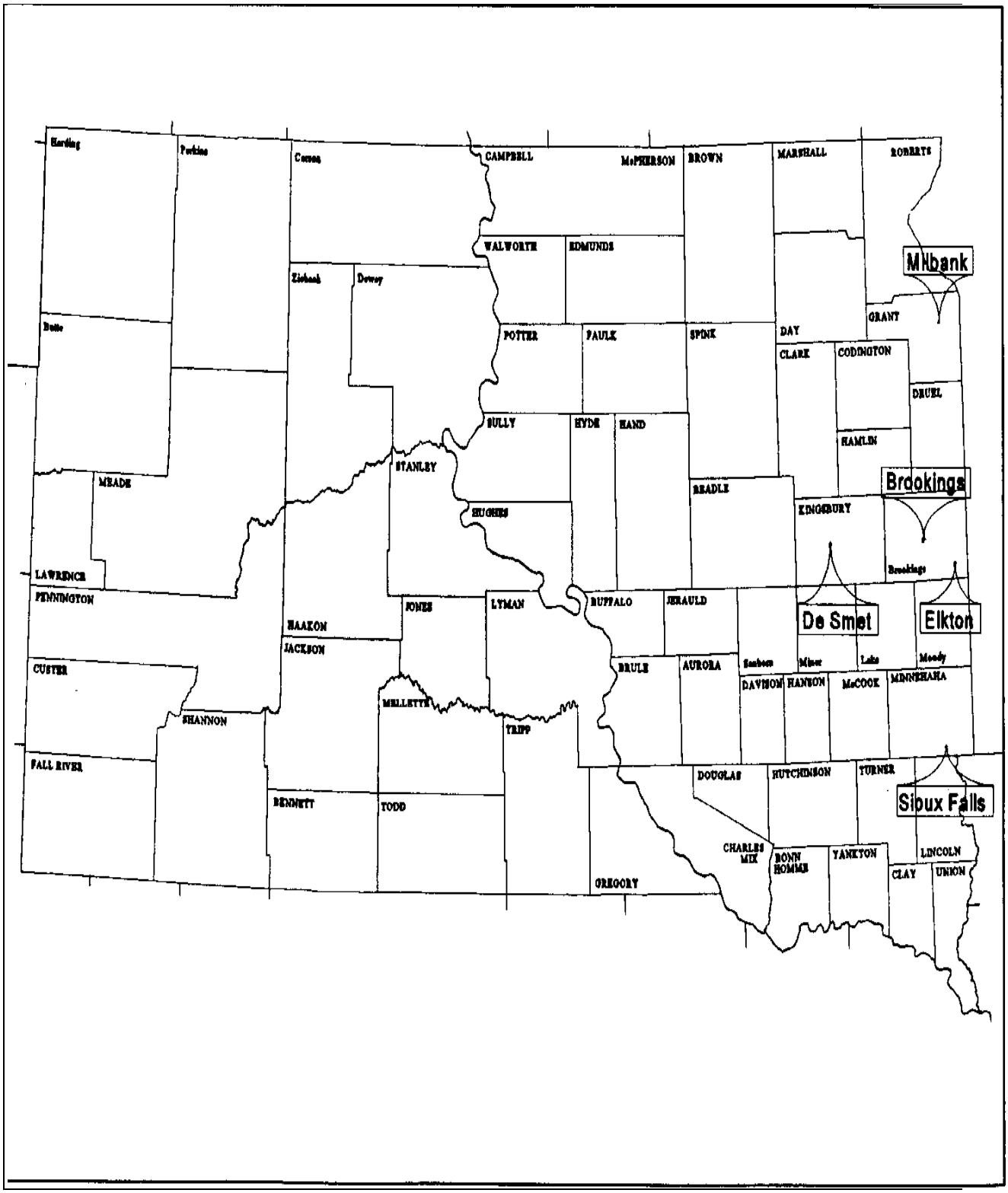

Figure 1 Map showing the location of the featured Wellhead Success Stories in South Dakota

Williams Pipeline Spill

The City of Sioux Falls' (Figure 1) wellfield begins on the northern edge of the city near the regional airport (Joe Foss Field) and extends along the Big Sioux River floodplain to north of Renner, South Dakota, as shown in Figure 2. Sioux Falls requires an average daily water use of over 16 million gallons per day with peak demand of approximately 30 million gallons per day. The majority of this water is obtained from the Big Sioux aquifer. The southern portion of the wellfield lies in the industrial district of Sioux Falls which harbors many potential sources of contamination from various industries. An underground petroleum pipeline owned and operated by Williams Pipeline Company (Williams) is routed through the Big Sioux aquifer in the Sioux Falls' wellfield for approximately three miles north of the Sioux Falls airport where it exits at the eastern boundary of the aquifer.

The vulnerability of the wellfield to contamination by this petroleum pipeline was clearly identified when a manufacturing defect in the pipeline went unnoticed until mid-January, 1992, releasing between 200,000-400,000 gallons of petroleum 1500 feet from the edge of the aquifer (T102N R49W Section 15) near the wellfield (Figure 2). The spill focused the public's attention on the vulnerability of the wellfield, and a task force was organized to research methods of prevention, early leak detection and monitoring, with the main focus to provide recommendations to minimize the risk of aquifer contamination from the pipeline.

The task force members represented officials from the city, county and state governments as well as Williams. The main goal of the task force was to review/consider different corrective measures for the pipeline which could be implemented to improve the protection of the Big Sioux aquifer and the city's wellfield. The task force met over the next year to research and discuss what measures could be taken to protect the aquifer. The various methods were evaluated based on technical merits and benefits of protection versus the cost of implementing the improvement. Press releases were issued to keep the public informed of the progress made at the meetings.

Wellhead protection requirements were a major concern during the task force meetings because Minnehaha County has defined the entire Big Sioux aquifer as the wellhead protection area, and refers to it as the "Water Source Protection Overlay District". The shallow surficial aquifer maps, which were the basis for determining the aquifer boundaries at the pipeline crossing, were prepared by the South Dakota Geological Survey and adopted by the county. These maps define the area where strict wellhead protection zoning ordinances are enforced.

Current zoning ordinances relative to wellhead protection do not directly impact the pipeline because it was "grandfathered" into the ordinances when they were passed. The process of grandfathering allows an existing business to operate under the original ordinances without having to upgrade their system to meet new, possibly more stringent ordinances, although, when the operation is upgraded, the business must meet the most current ordinances in place. Grandfathering is a common practice used in many counties when new, more stringent ordinances are enacted. In the case of Williams, the ordinances were not applicable to the existing pipeline but did heighten public awareness of the potential threat the pipeline posed to the wellfield. Public awareness of the threat to their drinking water supply was a significant driving force behind the changes made to make the pipeline safer.

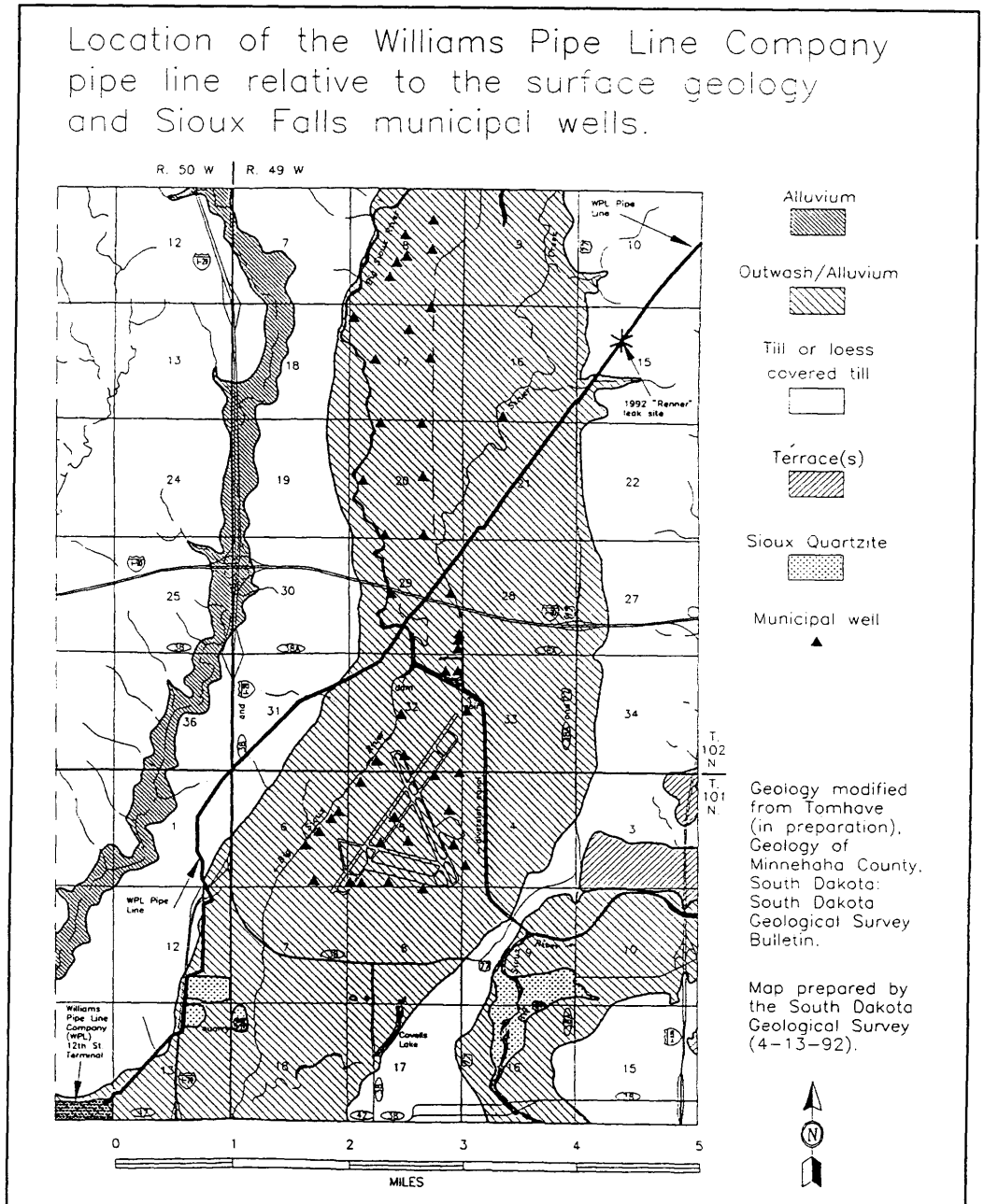

Figure 2 Map showing the proximity of the pipeline to the Sioux Falls' wellfield. (Note the wellfield continues off the map to the north.)

The initial task force recommendation was to temporarily reduce the operating pressure in the pipeline from 1,150 pounds per square inch to 900 pounds per square inch between Sioux Falls and Marshall, Minnesota. This reduced the stress placed on the pipeline and provided a larger safety factor because the temporary operating pressure was significantly under the maximum allowable working pressure of 1,210 pounds per square inch.

The next task force recommendation, with which Williams concurred, was to conduct a 13 mile "close-interval" survey on the pipeline. The survey consisted of probing the pipeline every 2.5 feet to verify the structural integrity of the pipeline and document any corrosion problems. Also recommended and performed was a soil vapor survey, with probes placed every 100 feet, to determine if there were other leaks in the pipeline.

In addition, the task force recommended that Williams upgrade their computer monitoring of the pipeline from Sioux Falls to Marshall. Software improvements were implemented at the pipeline monitoring facility in Tulsa, Oklahoma, to track pressure and temperature on a "real time" basis. Real time is identified as measurements taken every 7 seconds, 24 hours a day while the pipeline is operating. To complement the software upgrade, a motor operator valve was installed which allowed remote control of the valve from Tulsa should a problem arise. An additional feature of the valve allowed more accurate pressure and temperature data to be obtained. Subsequent "simulated" leaks were identified within 3-4 minutes, which would allow only an estimated 350 gallons of product to leak.

The task force believed the improvements made by Williams would help monitor the pipeline, but they were still concerned about the integrity of the pipeline, and several measures were discussed to address this issue. Discussion focused on the manufacturing process used on the original pipe and the potential defects associated with the process. A defect could go undetected in the longitudinal welded seam produced during the manufacturing process. In addition to leak prevention, the task force felt that early leak detection was also an important priority for further investigation.

The task force identified and investigated four options to protect the aquifer from potential pipeline leaks. The first option was to replace the original pipe with new seamless pipe. All joints would be field x-rayed to identify defective welds that could produce leaks when the line was re-pressurized. Next the committee looked at re-routing the pipeline across the aquifer. As seen in Figure 2, the pipeline crossed the aquifer diagonally. The committee evaluated rerouting the pipeline so it would cross the aquifer perpendicularly at a narrow point in the aquifer.

The final two aquifer protection plans were leak detection options of which the first was a leak detection line called the Leak Alarm System for Pollutants (LASP) located along side the pipeline. The LASP is a vapor sensor tube that prevents water from entering the sensing tube but allows petroleum vapors to pass and accumulate. A vacuum pump periodically removes the air from the tube and passes the air stream through a sensor which detects if petroleum vapors are present. The final option was to encase the entire pipeline in a synthetic liner at the point it crossed the aquifer,

which would in effect contain a leak and prevent it from entering the aquifer. The synthetic liner option was not enacted although it was an economically viable option. The committee had concerns that the liner could be damaged due to rodents or field equipment and may interfere with the corrosion protection of the pipeline.

In addition to the upgrades already performed by Williams, the committee agreed on the following options to protect the aquifer and the city wellfield from possible pipeline spills. The original pipeline had to be replaced with a new seamless pipe where it crossed the aquifer but did not have to be located perpendicular across the aquifer. It remained in its original location, although the new pipe was installed under the river instead of remaining at the original surface crossing. Routing the pipeline under the river minimized potential damage to the pipeline and prevented rapid contamination of the down gradient wellfield which could have happened if the pipeline ruptured over the river. Also installed at the river crossing were two manually operated valves, one on each side of the river, that allowed isolation of the pipeline section crossing under the river. In conjunction with the new pipeline and valves, the LASP was installed along side the new pipe.

The above upgrades allowed considerably more protection to the aquifer than before the spill. The upgrades cost Williams a significant amount of capitol investment to install and maintain the systems which cost approximately $825,000. These upgrades constitute the best and most economical protection to the aquifer.

In conjunction with the upgrades on the pipeline, three additional protection measures in the form of contingency planning were finalized that will mitigate the effects of future spills. The first plan, the Mutual Aid Spill Cooperative, was signed by Williams and other petroleum companies in the Sioux Falls area formalizing a relationship to share equipment and resources should a spill be discovered at one of the cooperatives' facilities. The second contingency plan adopted by Williams and approved by the city, specifically addressed the Big Sioux aquifer and Sioux Falls' wellfield by putting in place a set of operating procedures should a leak be discovered. Finally, Sioux Falls' Water Supply Contingency Plan, prepared by the city water department addressed all potential threats to the city wellfield, including Williams Pipeline. The contingency plan included a notification roster and a preplanned procedure for shutting down wells in a contaminated area.

During the course of the task force meetings, a study was implemented to simulate a petroleum spill in the aquifer to determine how much time the City of Sioux Falls had before the contamination front would reach a well. The study was conducted by researchers at the Northern Great Plains Water Resources Research Center and the United States Geological Survey by modeling the entire wellfield and simulating water table elevations from which groundwater gradients, velocities and flow directions were obtained for the study area. A large petroleum spill of 35,000 gallons was then simulated at several critical but generalized areas along the pipeline to determine the amount of time required for a petroleum contamination front to reach the nearest well. Results indicated that the city had only days before contamination would reach the nearest well. This time frame, however, along with Williams monitoring in "real time" would allow sufficient time for the city to shut down all wells that could potentially be contaminated by a spill. Contingency plans could then be implemented by

drawing water from alternate well locations, allowing the contaminated area to be cleaned up while not affecting the city's water supply.

A second study consisting of two parts, was performed by researchers at the South Dakota Geological Survey. The first part of the study delineated time related capture zones for all of the city wells near the pipeline. Time related capture zones identify an area that will contribute water to a well over a specified length of time. The second part of the study determined locations for monitoring points within the wellfield to detect line sources, point sources and nonpoint sources of contamination. Several of the groundwater sites identified in the study had monitoring wells installed and are now used for early detection of contaminant fronts.

The Williams Pipeline case is an example of how wellhead protection concerns focused the public's attention on a potentially large contamination source. Public awareness of the damage that a leak this pipeline could cause if it occurred in or near the wellfield resulted in government officials and industry working together to reduce the likelihood of a major contamination event. The task force process took time, but resulted in successful upgrades to the pipeline, upgrades which now better protect the city's water supply. Throughout the process two distinct lessons have been learned. Grandfathering existing land uses into new, more restrictive ordinances is a generally accepted procedure, but it may be necessary to closely evaluate the impacts that releases from these facilities may have before they are grandfathered into law. Secondly, it is easier to stress prevention and provide protection today, by making the changes needed for future protection of the natural resources, than paying for the costs of clean-up tomorrow.

Land Purchases

Several rural water systems in the Big Sioux drainage basin have been purchasing land surrounding their wellfield as it becomes available. Since most of the wellfields are surrounded by agricultural land, there is public concern over the potential contamination from fertilizers and pesticides. The biggest concern is nitrate from commercial fertilizers and land application of manure. This concern has prompted the rural water system managers and boards, to influence the type of farm management practices used in the wellhead protection areas. For most rural water systems there has not been a significant problem where nitrate levels have exceeded the maximum contaminant level for drinking water (10 milligrams/liter nitrate as nitrogen), but in many systems these levels have been rising.

When the rural water systems first began operating, they owned only the land where their wellfield was located, which usually included only 5-10 acres. Now, many of the systems own a substantial portion of the land adjacent to their wellfields. The King-Brook Rural Water System, located north of De Smet, South Dakota (Figure 1), owns approximately 400 acres and is the largest owner of land adjacent to its wellfield. The land is leased out to local cattlemen who must sign a contract which dictates acceptable management practices to use on the land. The rural water system board reviews management practices every year before the grazing season begins to determine how many cow-calf pairs will be allowed on the land. The renter is responsible for weed control and must receive board approval before any chemical spray is applied to the pasture land.

Other rural water systems permit other uses on their parcels of land which include planting a forage crop such as canary grass or brome grass. Several rural water systems no longer plant alfalfa, due to nitrate problems associated with the crop when it is plowed under as a nitrogen source.

In addition to controlling management practices within the wellhead protection area, the land is used for future expansion of the rural water system. As demand for affordable, safe drinking water increases and more small towns, farms and ranches hook up to these systems, the rural water systems will be increasingly responsible for providing the water to the rural areas.

Land Use Changes

Public knowledge of the need to protect groundwater has been increasing since wellhead protection activities began. Specifically, many municipal water superintendents are taking a very proactive stance in promoting wellhead protection and helping to protect the water supply. The superintendents have initiated grass roots efforts to implement wellhead protection now in lieu of the state or other government agency initiating wellhead protection activities. This local impetus also offers credibility to wellhead protection since the information is coming from a local individual who is concerned about groundwater protection and who works directly with the affected public.

The city of Milbank, South Dakota, (population 3900)(Figure 1) derives its source of drinking water from springs and deep wells located several miles from town. The city's average water use is approximately 500,000 gallons per day. In 1993 which, was a wet year in that part of the South Dakota, all of the city's drinking water was derived from the springs. The springs are not always a dependable water source since quantity fluctuates with precipitation patterns. During dry years, the deep wells, which produce poorer quality water, are used and blended with higher quality water from the springs.

The springs consist of three infiltration galleries located in a ravine surrounded by pasture, crop land and a flood control pond (Figure 3 and Figure 4). The infiltration galleries are constructed of a square concrete box built vertically into the ground to a depth of 18 feet. Two foot diameter pipes with 1/4" holes extend horizontally from the concrete structure approximately 30 feet on either side of the structure. The three infiltration galleries are networked together and are connected to the main line which gravity feeds to the city. Since the groundwater in the springs is very near the land surface the water superintendent is very concerned about potential contamination from the surrounding area. The superintendent also realizes that a treatment plant would be very expensive to construct and that the springs system would have to be abandoned if the contamination was severe. Therefore, he is interested in a wellhead protection program that will minimize the risk of contamination from the surrounding land. Consequently, the superintendent has begun working with the surrounding land owners to generate interest in wellhead protection and changes in land use practices.

Grant county implemented an Aquifer Protection Overlay District in July, 1993. The county commissioners realized that the local economy is fueled from agricultural activities. Therefore, wellhead protection ordinances were enacted that adequately protect the aquifer yet are not overly burdensome to small family agricultural operations. The ordinances specifically addressed agricultural activities that involve fertilizer applications including manure and large feedlot operations. Expressly prohibited are the fall application of commercial nitrogen fertilizers except spreading of manure and new feedlots greater than two hundred animal units.

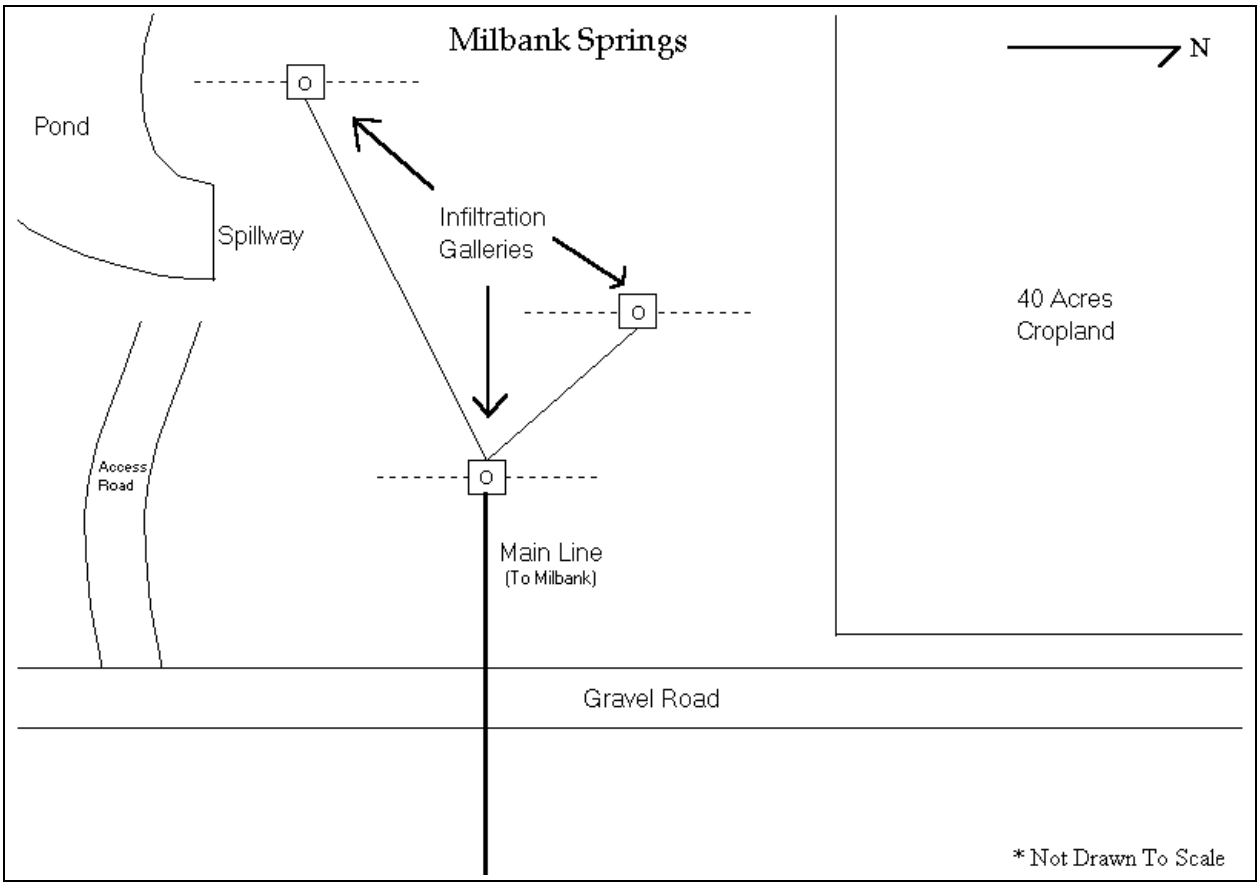

Figure 3 Location of the Milbank springs and wellfield relative to the cropland.

One local farmer was particularly interested in wellhead protection and was aware of the benefits from the program. His land is adjacent to Milbank's springs and is the only crop land that poses a potential threat to the water supply. When the superintendent began working with the farmer, the Conservation Reserve Program was nearing the end of its enrollment period, and the cropland could not be enrolled. However, the farmer has implemented best management practices on this land. These practices include crop rotation, no fall commercial fertilizer application, and chisel plowing, which leaves at least 30 percent of the crop residue on the soil surface. The spring fertilizer application incorporates dry fertilizer to minimize surface runoff to the springs. This land is in a delineated wellhead protection area, and other restrictions apply as described in the Grant County aquifer protection ordinances. The farmer would prefer to place this parcel of land in a program such as the Conservation Reserve Program but since this program is no longer accepting sign ups, other options such as the city purchasing easements, or other government sponsored conservation programs similar to the Conservation Reserve Program, are being explored for an alternative use of this land which will help protect the adjacent public water supply.

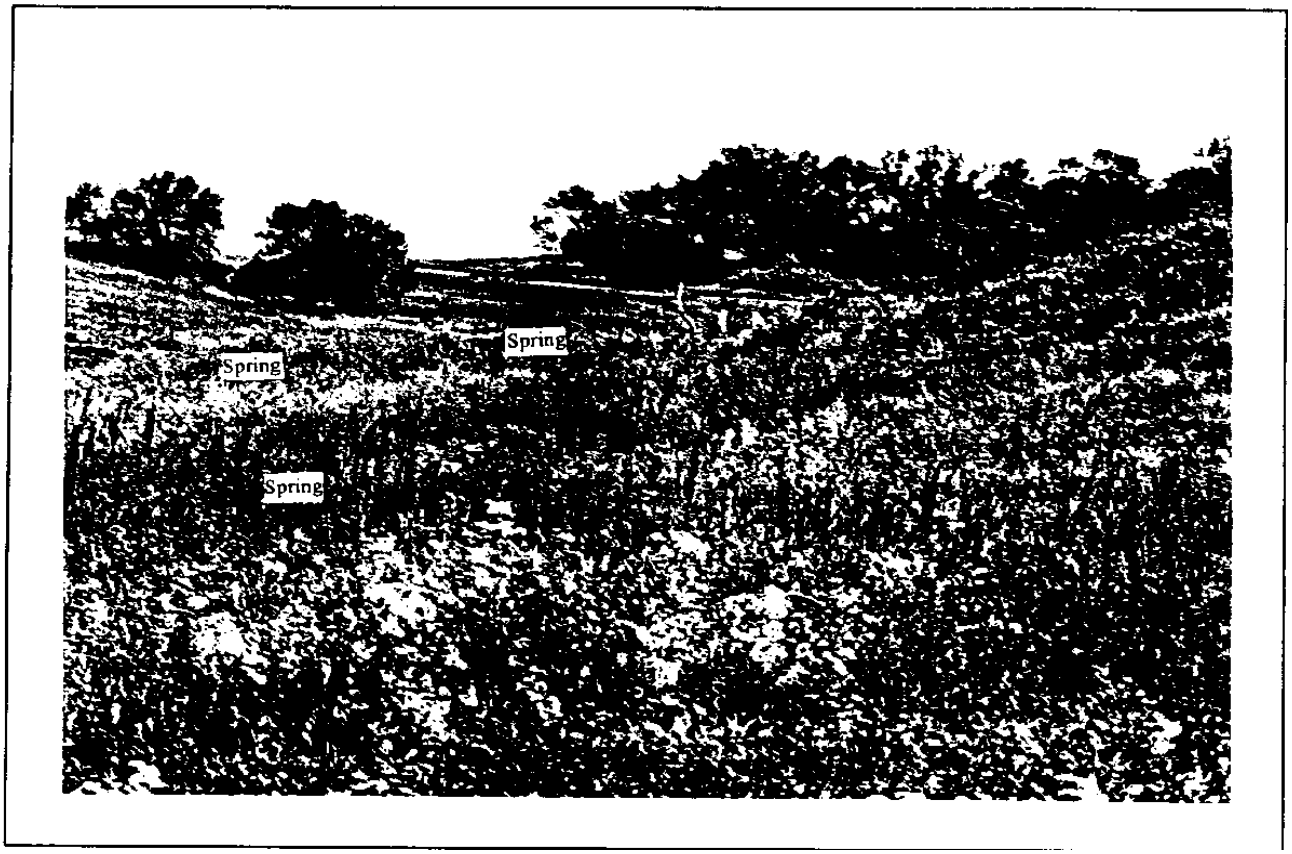

Figure 4 Picture identifying the terrain where the springs are located.

Petroleum Remediation in Wellhead Protection Areas

South Dakota has adopted strict remediation standards at petroleum contaminated sites. All spills greater than 25 gallons are reported to the South Dakota Department of Environment and Natural Resources. An assessment is performed to determine the degree of contamination in the groundwater and soils. If contamination is found and contaminant concentrations are higher than allowable state standards, remediation methods are implemented until submitted lab samples indicate contamination is below state standards.

Soil remediation standards at petroleum contaminated sites vary according to several factors. The two main factors to consider are the permeability of the contaminated soil and the vertical distance between the contamination and the aquifer. The least remediation is required on glacial till or bedrock soils that generally confine a deep (+100 feet) aquifer where soil contamination levels must not exceed 100 parts per million (ppm) total petroleum hydrocarbons. The soils in a shallow, unconfined aquifer must meet the most stringent remediation standards where soil concentrations must be under 10 ppm total petroleum hydrocarbons. Regardless of soil contamination, groundwater samples must meet the state groundwater quality standards for benzene, ethylbenzene, toluene and xylene which are 0.005 ppm, 0.7 ppm, 1 ppm and 10 ppm respectively, in addition to a maximum 10 ppm standard for total petroleum hydrocarbons.

If the contaminated site is in a delineated wellhead protection area, allowable groundwater total petroleum hydrocarbon levels drop to 0.1 ppm. These petroleum clean-up standards for groundwater were adopted by the South Dakota Board of Water Management at a public hearing. The more stringent standards established for contamination in a wellhead protection area recognized the importance of protecting public water supplies, and the successful passage of regulation in a public hearing indicates the public support for such measures.

Feedlot Near Wellfield

A feedlot to handle up to 35,000 head of cattle was proposed for southeastern Brookings County (Figure 1). Although the feedlot site was not located directly over the aquifer or wellhead protection area, many groundwater concerns were raised at public meetings regarding the feedlot. The major concerns were that seepage from the waste pond, runoff from the lots, and runoff from land applied manure would leach into the nearest aquifer and wellhead protection area (Figure 5). If this leaching occurred, it could possibly impact the public water supply well system located there. Based partly on these contamination concerns raised through the increased awareness of the need for wellhead protection, the Brookings County Planning and Zoning board proposed several restrictions on the operation of the feedlot including the prohibition of manure application over the aquifer and surface areas that drain to the wellhead protection area.

Local residents were opposed to the feedlot because they believed that the animal waste would produce enough nitrate to threaten the rural water system. This local water system, the Brookings-Deuel Rural Water System, is located approximately three miles southwest of the proposed feedlot (Figure 5). This water system is a major supplier of water, has over 2000 hookups and serves the counties of Brookings and Deuel. Nine smaller communities whose wells have been contaminated by nitrates or whose nitrate levels were approaching 10 milligrams/liter, are also supplied by this system. The water system has its wells in the Big Sioux aquifer which is a shallow, surficial aquifer and is vulnerable to contamination, particularly from non-point sources. The Brookings-Deuel Rural Water System, which already is experiencing high concentrations of nitrate, has expressed opposition to the feedlot primarily because of the proposed waste management plan. Public concerns were that the amount of waste generated by the feedlot would pose a threat of nitrate contamination due to surface runoff of the land applied waste.

Increased understanding of wellhead protection benefits has prompted the public to probe industry operations and identify potential impacts they pose to the environment, realizing the consequences to their drinking water supply should contamination occur. Industry is also recognizing its responsibility to the local community by protecting the natural resources where it has set up business. Programs such as wellhead protection signify to industry the public's commitment to ensure protection of their natural resources.

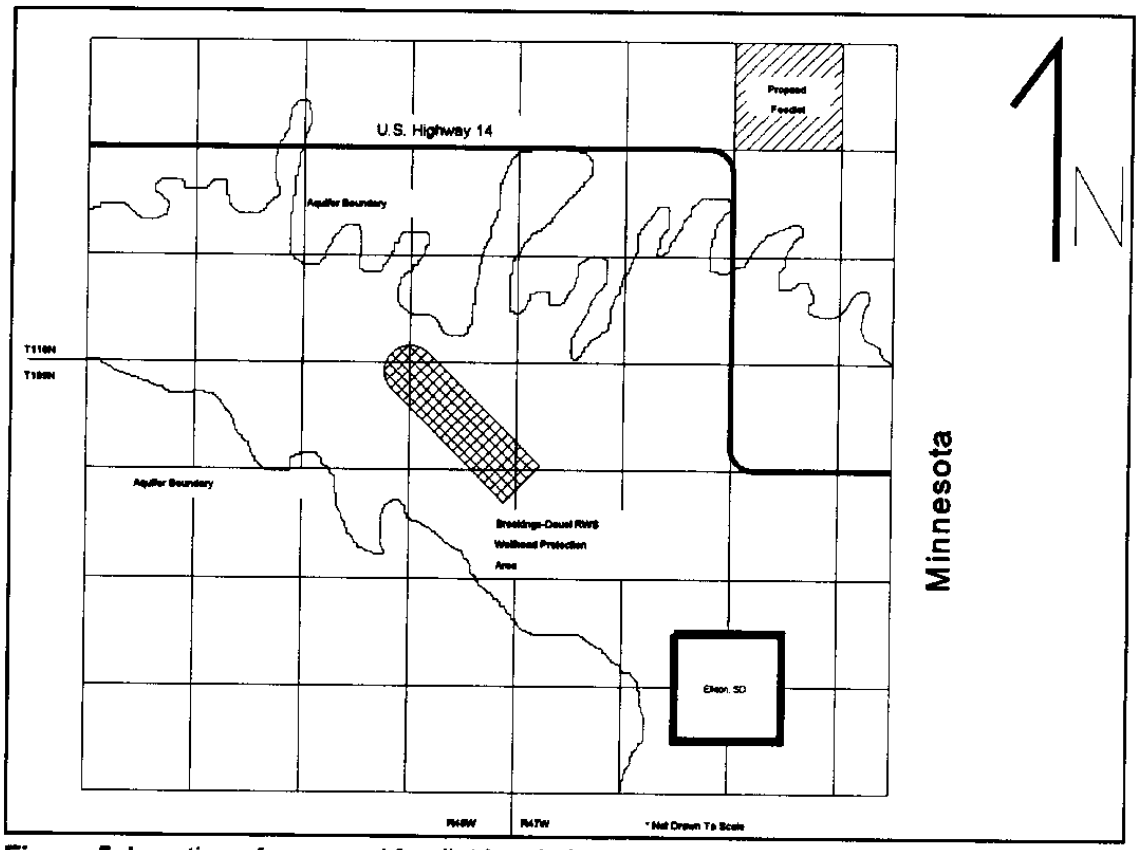

Figure 5 Location of proposed feedlot in relation to the adjacent wellhead protection area.

Class V Demonstration Project

The East Dakota Water Development District (East Dakota) located in Brookings, South Dakota, under contract with the U. S. Environmental Protection Agency, initiated a Class V injection well demonstration project in response to a nationwide underground injection well awareness effort by the Environmental Protection Agency. Class V injection wells are primarily those that dispose of wastewater into or above shallow groundwater, although some Class V injection wells are deep, and others are not used for disposal. The purpose of the project was to identify operating Class V injection wells, particularly those within the Big Sioux aquifer in the Brookings area due to the vulnerability of the aquifer from contamination and the large population obtaining water from the aquifer. A task force that included federal, state and local officials was organized by the East Dakota Water Development District to guide the efforts of the demonstration project.

The initial phase of the project identified operating Class V injection wells within a 30 mile radius of Brookings (Figure 6). Twenty six facilities with suspected Class V injection wells were targeted for field inspections. The majority of these Class V wells were 5X28 wells which are associated with automotive service stations, particularly the repair bay drains. Other Class V injection wells identified were the 5W32 (domestic waste septic systems) and 5W20 (industrial process water) types.

East Dakota began to advise operators in early 1992 of the potential for groundwater contamination from Class V injection wells located on their property. Several options for disposal of waste were presented to the operators which included: operating a dry shop, recycling, retaining the waste for treatment at another facility, treatment of
waste on site, applying to the EPA for an underground injection control permit without treatment, hooking up to a sanitary sewer line or any combination of the above options.

The demonstration project was successfully integrated with other groundwater protection programs. The Brookings County Commission used the information identified in the project and incorporated it into their wellhead protection ordinances targeted at 5X28 and 5W20 type Class V wells. Information obtained in the initial phases of the demonstration project was used in the South Dakota Public Water Supply Vulnerability Study. Superfund Amendments and Reauthorization Act (SARA) Title III data were also requested from the Brookings County Emergency Management Director and used to verify the existence of hazardous materials in use at any facilities that operate Class V wells. SARA Title III, also known as the community "right to know" act, requires all hazardous waste generators producing above threshold quantities to register their materials with the proper local officials.

The final product of the demonstration project was a video which identified the various Class V injection well types and the potential impacts these wells have on groundwater. This video has been distributed to federal, state and local agencies for use in educating the public on Class V wells, indicating how these wells, if not managed correctly, can adversely impact a drinking water supply if located near a public water supply well.

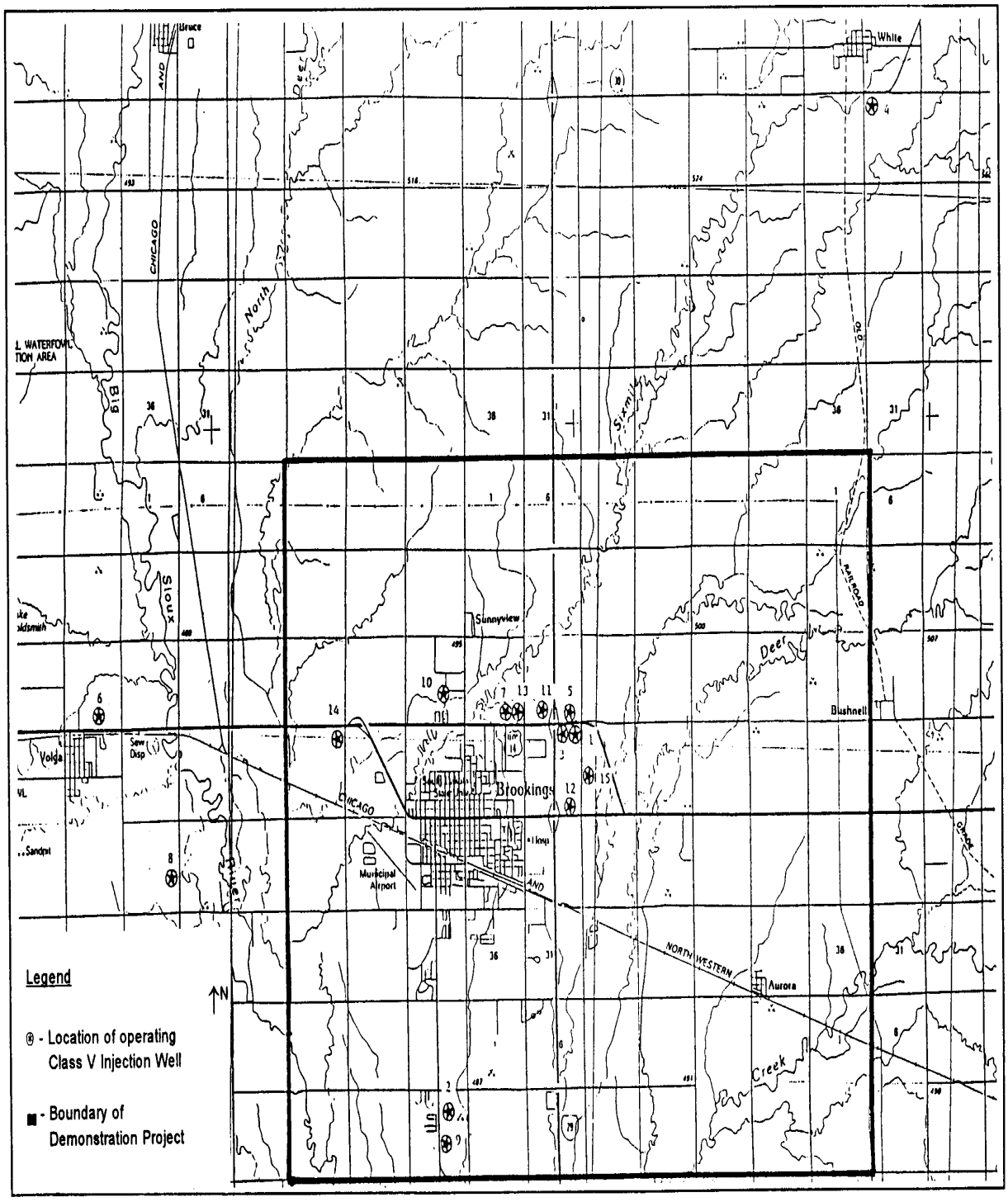

Figure 6 Map identifying the area where the Class V Injection Well Demonstration Project was implemented. Heavy line is the focal area for the Class V telephone survey.

Conclusion

Wellhead protection is very active in South Dakota as indicated by the success stories demonstrating how wellhead protection has involved and motivated the public to take a proactive stance in protecting their drinking water supply. The success stories have focused on how business and the public can successfully reach agreements on protecting drinking water sources and how many public water systems are encouraging wellhead protection at the local level. Public support for wellhead protection is indicated by their willingness to impose stricter remediation requirements at contaminated sites located within a delineated wellhead protection area. As demand grows for clean water, local wellhead protection programs will continue to be implemented to minimize the risk of contamination to these public water supplies, thus ensuring safe water for the people of South Dakota.

Appendix A

Model County Ordinance

4/16/91

MODEL COUNTY ORDINANCE
AQUIFER PROTECTION OVERLAY DISTRICT
OF
_____ COUNTY COMPREHENSIVE ZONING ORDINANCE

PURPOSE AND INTENT

The _____ County Planning Commission and Board of County Commissioners recognize (1) that residents of _____ County rely mainly on ground water for a safe drinking water supply and (2) that certain land uses in _____ County can contaminate ground water particularly in shallow/surficial aquifers.

The purpose of the Aquifer Protection Overlay District is to protect public health and safety by minimizing contamination of the shallow/surficial aquifers of _____ County.

It is the intent to accomplish aquifer protection, as much as possible, by public education and securing public cooperation. Appropriate land use regulations will be imposed, however, which are in addition to those imposed in the underlying zoning districts or in other county regulations. It is the intent to use existing programs to address existing land uses which pose a serious threat to public health through potential contamination of public water supply wellhead areas.

DEFINITIONS

1) ABANDONED WELL. A well no longer used or intended to be used as a water source.

2) ANIMAL FEEDLOT. A feeding operation involving more than two hundred (200) animal units in either a confined area where manure may concentrate or in a situation where the concentration of animals is such that vegetative cover cannot be maintained. One animal unit is equivalent to one beef cow, steer, feeder or fat beef animal; one horse; 0.7 dairy cow; 1.7 swine, 6.7 sheep, 33 hens, cockerels, capons, broilers or ducks; and 10 geese or turkeys.

3) AQUIFER. A geologic formation, group of formations or part of a formation capable of storing and yielding ground water to wells or springs.

4) BEST MANAGEMENT PRACTICES. Measures contained in Soil Conservation Service South Dakota Technical Guide, either managerial or structural, that are determined to be the most effective, practical means of preventing or reducing pollution inputs from nonpoint sources to water bodies.

5) CHEMIGATION. The process of applying agricultural chemicals (fertilizer or pesticides) through an irrigation system by injecting the chemicals into the water.

6) CLASS V INJECTION WELL. A conduit through which potentially contaminated but generally non-hazardous fluids can move from the land surface to the subsurface; the types of primary concern in _____ County are (1) commercial/industrial facility septic tanks used to dispose of more than domestic wastewater and (2) dry wells for repair/service bay drains at facilities servicing motorized vehicles/equipment.

7) CONTAMINATION. The process of making impure, unclean, inferior or unfit for use by introduction of undesirable elements.

8) CONTINGENCY PLANS. Detailed plans for control, containment, recovery and clean up of hazardous materials released during floods, fires, equipment failures, leaks and spills.

9) DEVELOPMENT. The carrying out of any surface or structure construction, reconstruction or alternation of land use or intensity of use.

10) FACILITY. Something built, installed or established for a particular purpose.

11) GREY WATER. All domestic wastewater except toilet discharge water.

12) HAZARDOUS MATERIALS. A material which is defined in one or more of the following categories:

(a) Ignitable: A gas, liquid or solid which may cause fires through friction, absorption of moisture, or which has low flash points. Examples: white phosphorous and gasoline.

(b) Carcinogenic: A gas, liquid or solid which is normally considered to be cancer causing or mutagenic. Examples: PCB's in some waste oils.

(c) Explosive: A reactive gas, liquid or solid which will vigorously and energetically react uncontrollably if exposed to heat, shock, pressure or combinations thereof. Examples: dynamite, organic peroxides and ammonium nitrate.

(d) Highly Toxic: A gas, liquid or solid so dangerous to man as to afford an unusual hazard to life. Examples: parathion and chlorine gas.

(e) Moderately Toxic: A gas, liquid or solid which through repeated exposure or in a single large dose can be hazardous to man. Example: atrazine.

(f) Corrosive: Any material, whether acid or alkaline, which will cause severe damage to human tissue, or in case of leakage might damage or destroy other containers of hazardous materials and cause the release of their contents. Examples: battery acid and phosphoric acid.

13) MANURE STORAGE AREA. An area for the containment of animal manure in excess of 8,000 pounds or 1,000 gallons.

14) LEAKS AND SPILLS. Any unplanned or improper discharge of a potential contaminant including any discharge of a hazardous material.

15) PASTURE. A field that provides continuous forage to animals and where the concentration of animals is such that a vegetative cover is maintained during the growing season.

16) PRIMARY CONTAINMENT FACILITY. A tank, pit, container, pipe or vessel of first containment of a liquid or chemical.

17) SECONDARY CONTAINMENT FACILITY. A second tank, catchment pit, pipe or vessel that limits and contains a liquid or chemical leaking or leaching from a primary containment area; monitoring and recovery are required.

18) SHALLOW/SURFICIAL AQUIFER. An aquifer 0 to 80 feet in depth in which the permeable media (sand and gravel) starts near the land surface immediately below the soil profile.

19) TEN YEAR TIME OF TRAVEL DISTANCE. The distance that ground water will travel in ten years. This distance is a function of aquifer permeability and water table slope.

20) ZONE OF CONTRIBUTION. The entire area around a well or wellfield that contributes water to the well or wellfield.

ESTABLISHMENT/DELINEATION/REGULATION OF AQUIFER PROTECTION OVERLAY ZONES

Boundaries for the aquifer protection zones for the Aquifer Protection Overlay District are shown on maps prepared by the East Dakota Water Development District, Brookings, South Dakota. Said maps are hereby adopted by reference as part of this ordinance as if the maps were fully described herein.

The Aquifer Protection Overlay District is divided into two zones. The zone of contribution for Zone A was mapped by the East Dadota Water Development District with South Dakota Geological Survey technical assistance using techniques outlined in the U.S. Environmental Protection Agency publication "Guidelines for Delineation of Wellhead Protection Areas", June, 1987. The shallow/surficial aquifer boundary for Zone B was mapped by the South Dakota Geologic Survey.

ZONE A -- AQUIFER CRITICAL IMPACT ZONES

Zone A, the wellhead protection area, is the mapped zone of contribution around all public water supply wells or wellfields in shallow/surficial aquifers and includes land upgradient from the well or wellfield to the ten year time of travel boundary plus any delineated adjacent lands not underlain by the aquifer with sufficient slope that contaminated surface water could flow directly onto Zone A.

Permitted Uses in Zone A:

The following uses are permitted provided they meet appropriate performance standards outlined for aquifer protection overlay zones:

1) Agriculture;
2) Horticulture;
3) Parks, greenways or publicly owned recreational areas;
4) Necessary public utilities/facilities designed so as to prevent contamination of groundwater.

Special Exceptions in Zone A:

The following uses are permitted only under the terms of a special exception and must conform to provisions of the underlying zoning district and meet Performance Standards outlined for Aquifer Protection Overlay Zones.

1) Expansion of existing uses to the extent they remain or become non-conforming and to the extent allowed by the underlying district. The Board of Adjustment shall not grant approval unless it finds the proposed expansion does not pose greater potential for groundwater contamination than the existing use.

2) All uses not permitted or prohibited in Zone A may be approved by the Board of Adjustment provided they can meet Performance Standards outlined for the Aquifer Protection Overlay Zones.

Prohibited Uses in Zone A:

The following uses are expressly prohibited in Zone A:

1) New feedlots installed after adoption of this ordinance;
2) Manure storage areas except above ground tanks;
3) Disposal of solid waste except spreading of manure;
4) Outside unenclosed storage of road salt;
5) Disposal of snow containing de-icing chemicals;
6) Processing and storage of PCB contaminated oil;
7) Car washes;
8) Auto service, repair or painting facilities and junk or salvage yards;
9) Disposal of radioactive waste;

10) Graveyards or animal burial sites;
11) Detonation sites;
12) Open burning except ditches, fields and non-hazardous yard and household wastes such as paper, wood and leaves.
13) Public sewer systems and waste water lagoons.
14) Fall application of nitrogen fertilizer except spreading of manure;
15) Land spreading of petroleum contaminated soil;
16) Land spreading or dumping of waste oil;
17) Class V injection wells.
18) All other facilities involving the collection, handling, manufacture, use, storage, transfer or disposal of any solid or liquid material or waste having a potentially harmful impact on ground water quality;

ZONE B -- AQUIFER SECONDARY IMPACT ZONES

Zone B is the remainder of the mapped shallow/surficial aquifer in the county not included in Zone A. Zone B is being protected because (1) the aquifer is a valuable natural resource for future development, (2) the aquifer provides drinking water supply for individual domestic users, (3) contamination is not justified just because this area is not currently used for public water supply and (4) contaminants from this area could eventually enter Zone A.

Permitted Uses in Zone B:

1) All uses permitted in the underlying zoning districts provided they can meet the Performance Standards as outlined for the Aquifer Protection Overlay Zones.

Special Exceptions in Zone B:

1) All special exceptions allowed in underlying districts may be approved by the Board of Adjustment provided they can meet Performance Standards outlined for the Aquifer Protection Overlay Zones.

Prohibited Uses in Zone B:

The following uses are expressly prohibited in Zone B:

1) Fall application of nitrogen fertilizer except spreading of manure;
2) Land spreading of petroleum contaminated soil;
3) Land spreading or dumping of waste oil;
4) Class V injection wells.

PERFORMANCE STANDARDS FOR AQUIFER PROTECTION OVERLAY ZONES:

The following standards shall apply to land uses in Zones A and B of the Aquifer Protection Overlay Districts:

1) New or replacement septic tanks and associated drain fields for containment and disposal of human or animal wastes must conform with regulations established by the State Department of Water and Natural Resources.

2) Open liquid waste ponds containing any solid or liquid material or waste will not be permitted without a secondary containment system except for community wastewater lagoons. Manure storage areas are permitted in Zone B but must be constructed in conformance with Soil Conservation Service South Dakota Engineering Standard for Waste Storage Ponds (425). (Appendix 1)

3) Storage of petroleum products in quantities exceeding one hundred (100) gallons at one locality in one tank or series of tanks must be in elevated tanks; such tanks larger than eleven hundred (1100) gallons must have a secondary containment system where it is deemed necessary by the County Zoning Office.

4) Any commercial or industrial facility, not addressed by 2) or 3) above, involving the collection, handling, manufacture, use, storage, transfer or disposal of any solid or liquid material or waste, except for spreading of manure, in excess of 1000 pounds and/or 100 gallons which has the potential to contaminate groundwater must have a secondary containment system which is easily inspected and whose purpose is to intercept any leak or discharge from the primary containment vessel or structure. Underground tanks or buried pipes carrying such materials must have double walls and accessible sumps.

5) When pastured animals are concentrated for winter feeding and the number of animal units exceeds two hundred (200), measures shall be employed to prevent runoff of manure.

6) Owners/operators of active or abandoned feedlots shall handle and dispose of manure in accordance with Soil Conservation Service South Dakota Engineering Standard for Nutrient Management (680). (Appendix 2)

7) Discharge of industrial process water on site is prohibited without County Zoning Office approval.

8) Auto service, repair or painting facilities and junk or salvage yards shall meet all State and Federal standards for storage, handling and disposal of petroleum products and shall properly dispose of all other potentially hazardous waste materials.

10) Since it is known that improperly abandoned wells can become a direct conduit for contamination of groundwater by surface water, all abandoned wells should be plugged in conformance with South Dakota Well Construction Standards, Chapter 74:02:04:67-70.

GRANT OF PERMIT, ALTERATION OF USE:

Before a permit is granted, the County Zoning Officer must examine an application and determine that the proposed use, activity or development meets the provisions of this ordinance.

When securing a use permit, the owner/developer agrees to make future improvements which may become necessary to prevent contamination of shallow/surficial aquifers and the owner/developer must allow County personnel to inspect any improvements to verify they meet the performance standards.

Whenever any person has an existing use, activity or development and thereafter desires alteration or expansion of the authorized use, such persons shall apply for a permit. The owner may appeal a County Zoning Officer's decision to modify or deny a requested permit to the County Planning Commission/Board of Adjustment.

EXCEPTIONS:

1) Storage of liquids, chemicals and fertilizers used in agricultural operations during planting and crop cultivation are exempt from the requirements of this ordinance March 1 to October 1. However, Best Management Practices are encouraged, particularly in Zone A.

2) Tanks used for chemigation are exempt from secondary containment regulations but secondary containment is encouraged.

3) Storage of liquid or dry fertilizer in amounts equal to or less than 1,000 pounds or 100 gallons, stored indoors by each farm operator is exempt from the requirements of this ordinance.

9) Any facility involving collection, handling, manufacture, use, storage, transfer or disposal of hazardous materials must prepare and have on file in the County Zoning Office an acceptable contingency plan for preventing hazardous materials from contaminating the shallow/surficial aquifer should floods, fire, other natural catastrophes or equipment failure occur:

a) For flood control, all underground facilities shall include a monitoring system and a secondary standpipe above the 100 year frequency flood level. For above ground facilities, an impervious dike, above the 100 year flood level and capable of containing 120 percent of the largest storage volume, will be provided with an overflow recovery catchment area (sump).

b) For fire control, plans shall include but not be limited to a safe fire fighting procedure, a fire retardant system and provision for dealing safely with both health and technical hazards that may be encountered by disaster control personnel in combating fire. Hazards to be considered are overhead and buried electrical lines, pipes, other buried objects and other hazardous liquids, chemicals or open flames in the immediate vicinity.

c) For equipment failures, plans shall include but not be limited to:

Below ground level, provision for removal and replacement of leaking parts, a leak detection system with monitoring and an overfill protection system.

Above ground level, provision for monitoring, replacement, repair and cleanup of primary containment systems.

d) For other natural or man-caused disasters, the owner and/or operator shall report all incidents involving liquid or chemical material which may endanger health and/or safety of disaster personnel and/or the general public.

e) Agricultural operations are exempted from performance standard 9) unless chemicals are stored which are on the Superfund Amendments and Reauthorization Act of 1986 (SARA Title III) extremely hazardous substance list in quantities exceeding the threshold planning quantity at any one time.

f) The County Zoning Office and DWNR shall be informed within 24 hours of all leaks and spills of materials that might potentially contaminate groundwater.

10) Since it is known that improperly abandoned wells can become a direct conduit for contamination of groundwater by surface water, all abandoned wells should be plugged in conformance with South Dakota Well Construction Standards, Chapter 74:02:04:67-70.

GRANT OF PERMIT, ALTERATION OF USE:

Before a permit is granted, the County Zoning Officer must examine an application and determine that the proposed use, activity or development meets the provisions of this ordinance.

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Whenever any person has an existing use, activity or development and thereafter desires alteration or expansion of the authorized use, such persons shall apply for a permit. The owner may appeal a County Zoning Officer's decision to modify or deny a requested permit to the County Planning Commission/Board of Adjustment.

EXCEPTIONS:

1) Storage of liquids, chemicals and fertilizers used in agricultural operations during planting and crop cultivation are exempt from the requirements of this ordinance March 1 to October 1. However, Best Management Practices are encouraged, particularly in Zone A.

2) Tanks used for chemigation are exempt from secondary containment regulations but secondary containment is encouraged.

3) Storage of liquid or dry fertilizer in amounts equal to or less than 1,000 pounds or 100 gallons, stored indoors by each farm operator is exempt from the requirements of this ordinance.

LIMITATION OF COUNTY LIABILITY:

Nothing in this ordinance shall be construed to imply that _____ County, by issuing a permit, has accepted any of an owner/developer's liability if a permitted development contaminates water in shallow/surficial aquifers.

UNDERLYING ZONES:

Underlying zoning restrictions apply along with restrictions set forth in the Aquifer Protection Overlay District.

SAVING CLAUSE:

Should any section or provision of this ordinance be declared invalid, such decision shall not affect the validity of the ordinance as a whole or any other part thereof.

Appendix B

Model Community Ordinance

MODEL COMMUNITY AQUIFER PROTECTION ORDINANCE

AN ORDINANCE OF THE CITY OF _____, SOUTH DAKOTA, PROVIDING FOR AN ORDINANCE ESTABLISHING REQUIREMENTS FOR THE PROTECTION AND PRESERVATION OF GROUNDWATER.

BE IT ORDAINED BY THE CITY OF _____, SOUTH DAKOTA:

SECTION I. STATEMENT OF PURPOSE:

The City of _____ recognizes that groundwater must be protected from contamination by establishing a comprehensive groundwater protection plan. Pursuant to the authority conferred by SDCL 9-29-1, 11-4, 11-6, and in the interest of serving the public health, safety, and welfare, the City of _____ desires to preserve groundwater resources, and to insure a safe and adequate water supply for present and future generations, by preserving and protecting groundwater resources.

SECTION II. SPECIAL DEFINITIONS:

1) Animal Feedlot: A feeding operation involving more than ten (10) animal units in either a confined area where manure may concentrate or in a situation where the concentration of animals is such that vegetative cover cannot be maintained. One animal unit is equivalent to one beef cow, steer, feeder or fat beef animal; one horse; 0.7 dairy cow; 1.7 swine; 6.7 sheep; 33 hens, cockerels, capons, broilers or ducks; and 10 geese or turkeys.

2) Class V Injection Well: A conduit through which potentially contaminated but generally non-hazardous fluids can move from the land surface to the subsurface; the types of primary concern are (1) commercial/industrial facility septic tanks when they are used to dispose of more than domestic wastewater and (2) dry wells for repair/service bay drains at facilities servicing motorized vehicles/equipment.

3) Contamination: The process of making impure, unclean, inferior or unfit for use by introduction of undesireable elements.

4) Contingency Plans: Detailed plans for control, containment, recovery and clean up of hazardous materials released during floods, fires, equipment failures, leaks and spills.

5) Development: The carrying out of any surface or structure construction, reconstruction or alteration of land use or intensity of use.

6) Facility: Something built, installed or established for a particular purpose.

7) Hazardous Materials: A material which is defined in one or more of the following categories:

   (a) Ignitable: A gas, liquid or solid which may cause fires through friction, absorption of moisture, or which has low flash points. Examples: white phosphorous and gasoline.

(b) Carcinogenic: A gas, liquid or solid which is normally considered to be cancer causing or mutagenic. Examples: PCBs in some waste oils.

(c) Explosive: A reactive gas, liquid or solid which will vigorously and energetically react uncontrollably if exposed to heat, shock, pressure or combinations thereof. Examples: dynamite, organic peroxides and ammonium nitrate.

(d) Highly Toxic: A gas, liquid or solid so dangerous to man as to afford an unusual hazard to life. Examples: parathion and chlorine gas.

(e) Moderately Toxic: A gas, liquid or solid which through repeated exposure or in a single large dose can be hazardous to man. Example: atrazine.

(f) Corrosive: Any material, whether acid or alkaline, which will cause severe damage to human tissue, or in case of leakage might damage or destroy other containers of hazardous materials and cause the release of their contents. Examples: battery acid and phosphoric acid.

8) Leaks and Spills: Any unplanned or improper discharge of a potential contaminant including any discharge of a hazardous material.

9) Primary Containment Facility: A tank, pit, container, pipe or vessel of first containment of a liquid or chemical.

10) Secondary Containment Facility: A second tank, catchment pit, pipe or vessel that limits and contains a liquid or chemical leaking or leaching from a primary containment area; monitoring and recovery systems are required.

11) Zone of Contribution: The entire area around a well or wellfield that contributes water to the well or wellfield.

SECTION III. SCOPE AND AUTHORITY

The Groundwater Protection Districts shall be considered as overlaying other zoning districts. Any uses permitted in portions of the districts so overlaid shall be subject to all the provisions of this district. In any cases where conflicts arise between the Groundwater Protection District regulations and other existing regulations, the more restrictive regulations shall apply.

SECTION IV. ESTABLISHMENT AND DELINEATION OF GROUNDWATER PROTECTION DISTRICTS

Boundaries for the Groundwater Protection Districts are hereby adopted by reference as part of these regulations as if the maps were fully described herein. The Groundwater Protection District is divided into two zones. Zone A, the Wellhead Protection Area, and Zone B, the Groundwater Protection Area.

Zone A, the Wellhead Protection Area, was mapped by the East Dakota Water Development District (EDWDD), Brookings, South Dakota. EDWDD utilized technical assistance from the South Dakota Geological Survey (SDGS) and "Guidelines for Delineation of Wellhead Protection Areas, June, 1987" in order to map Zone A, the Wellhead Protection Area.

Zone B, the Groundwater Protection Area, was mapped by SDGS and from input provided by local officials concerning stormwater drainage.

SECTION V. ZONE A -- WELLHEAD PROTECTION AREA

Zone A, the Wellhead Protection Area, is the mapped zone of contribution around all public water supply wells or wellfields and includes land within _____ feet plus any delineated adjacaent lands which contribute stormwater runoff directly into Zone A.

PERMITTED USES IN ZONE A:

The following uses are permitted provided they meet appropriate performance standards outlined for Groundwater Protection Overlay Zones:

1) Single and multi-family housing units which are connected to the central sanitary sewer system.

2) Retail sales and service establishments that store and handle regulated substances for resale in their original unopened containers of five (5) gallons or thirty-two (32) pounds, or less.

3) Other uses which are permitted in the underlying zoning districts which do not handle, use or store potential groundwater contaminants.

SPECIAL EXCEPTIONS IN ZONE A:

The following uses are permitted only under the terms of a special exception and must conform to the provisions of the underlying zoning district and meet Performance Standards outlined for the Groundwater Protection Overlay Zones.

1) Expansion of existing commercial and industrial establishments which handle, store or use potential groundwater contaminants.

2) Other uses permitted or permitted by special exception in the underlying district which pose a potential risk to groundwater resources and are not a prohibited use. (See Section VII)

SECTION VI. ZONE B -- GROUNDWATER PROTECTION AREA

Zone B, The Groundwater Protection Area, is the remainder of area within the incorporated limits, not included in Zone A, which is created to protect, preserve and maintain existing and potential groundwater supply and recharge areas.

PERMITTED USES IN ZONE B:

The following uses are permitted provided they meet appropriate Performance Standards outlined for Groundwater Protection Overlay Zones:

1) Retail sales and service establishments that store and handle regulated substances for resale in their original unopened containers of five (5) gallons or thirty-two (32) pounds, or less.

2) Residential development connected to central sewer system.

3) Outdoor recreation.

4) Farming and grazing provided that fertilizers, herbicides, pesticides, manure, and other leachables are handled and used appropriately.

5) Other uses which are permitted in the underlying zoning districts which do not handle, use or store potential groundwater contaminants.

SPECIAL EXCEPTIONS IN ZONE B:

The following uses are permitted only by special exception and must conform to the provisions of the underlying zoning district and meet Performance Standards outlined for the Groundwater Protection Overlay Zone.

1) Expansion of existing commercial and industrial establishments which handle, store or use potential groundwater contaminants.

2) Residential development not connected to a central sewer system.

3) New industrial or commercial uses permitted by special exception in the underlying district which pose a potential contamination risk to groundwater resources and are not a prohibited use. (See Section VII).

4) All fill sites.

SECTION VII. PROHIBITED USES

The following uses are expressly prohibited in Zone A and Zone B:

1) New feedlots.

2) Disposal of solid waste.

3) Storage of road salt or diposal of snow containing de-icing chemicals.

4) Graveyards and animal burial sites.

5) Land spreading or dumping of petroleum contaminated soil, waste oil, or industrial wastes.

6) Class V injection wells.

7) Junk or salvage yards.

SECTION VIII. GROUNDWATER PROTECTION PERFORMANCE STANDARDS

The following items, standards, and requirements shall apply to land ;uses in Zones A and B of the Groundwater Protection Overlay Zones:

1) The applicant shall supply the following information on a permit application:

a) The amount and type of potentially hazardous material to be ;utilized or stored at the site.

b) Proposed methods of handling and containment of potentially hazardous materials.

c) Location and proximity to public water supply wells, taking into consideration topography and drainage.

d) Quantities and methods of disposal of industrial waste or byproducts.

e) Additional information may be requested from the SD Department of Environment and Natural Resources on the potential contamination threat that the facility may pose to groundwater.

2) As a condition of permitting a special exception, the applicant for ;a special exception may be required to install a monitoring and leak detection system on proposed storage facilities.

3) As a condition of the permit under this section, the applicatn may be required to provide an enclosed area for loading, unloading, transfer, or mixing of potentially hazardous chemicals along with catch basins for any spill that may occur.

4) As a condition of the permit, the applicant shall provide the local Emergency and Disaster Services Coordinator with an inventory and location of hazardous chemicals.

5) Underground tanks less than 500 gallons are prohibited. Other tank installations require monitoring wells, overflow prevention, and corosion resistent construction.

6) Above ground tanks will require secondary containment capable of handling 120 percent of the largest storage volume.

7) The County Emergency and Disaster Services Coordinator and the SD Department of Environment and Natural Resources should be informed within 24 hours of any leak, spill, or release of potentially hazardous materials.

8) The City may also require additional safeguards to insure groundwater protection.