SECTION 4
PROGRAM DESCRIPTION

PROGRAM DESCRIPTION

FOR THE

WEST VIRGINIA

UNDERGROUND INJECTION CONTROL PROGRAM

Division of Water Resources

Department of Natural Resources

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ABBREVIATIONS

CFR - Code of Federal Regulations

CWA - Clean Water Act

DNR - Department of Natural Resources

DWR - Division of Water Resources

EPA - Environmental Protection Agency

HW/GW Branch - Hazardous Waste/Ground Water Branch

IWIS - Injection Well Inventory System

MOA - Memorandum of Agreement (between the State and EPA)

MOU - Memorandum of Understanding (between the Division of Water Resources, the Department of Mines Office of Oil and Gas, and the Oil and Gas Conservation Commission)

NPDES - National Pollution Discharge Elimination System

PSD - Prevention of Significant Deterioration (Clean Air Act)

RCRA - Resource Conservation and Recovery Act

SDWA - Safe Drinking Water Act

State UIC Regulations - Administrative Regulations of the State Water Resources Board, Chapter 20, Article 5A (Series IX, 1982) of the Code of West Virginia, as amended.

UIC - Underground Injection Control

USDW - Underground Source of Drinking Water

USGS - United States Geological Survey

WVG&ES - West Virginia Geological and Economic Survey

LIST OF FIGURES AND TABLES

I. ADMINISTRATIVE OVERVIEW OF THE PROGRAM

A. Scope, Structure, Coverage and Processes

Ground water is a valuable resource in West Virginia. Approximately fifty percent of the population obtains drinking water from ground water sources. Community ground water systems serve 38.3% of the State's population (512 of the total 770 community water systems). Although the remaining community water systems depend primarily on surface water, most surface water originates from ground water (especially during low flow periods). The rural population uses individual water systems which rely almost exclusively on ground water. Ground water is rarely treated, except for chlorination, being presumed to be free from impurities (Miller, 1981). Communities which depend upon ground water and homeowners with private wells can suffer a severe economic hardship if their source of ground water is lost due to contamination. Also, cleanup of an aquifer which has been contaminated by synthetic organic chemicals, for example, is almost never physically or economically feasible (Miller, 1981).

Proper regulation of underground injection of wastes is crucial to assure the integrity of ground water resources in the State. The number of permit applications for injection of industrial and hazardous wastes is expected to increase with any expansion of the chemical industry. Also, economic incentives now exist for investment in enhanced recovery projects in the oil and gas industry. The State's Underground Injection Control (UIC) Program is designed to prevent these and other injection activities from contaminating Underground Sources of Drinking Water (USDW's).

The State UIC Program will regulate all five classes of wells as defined in Section III,A of this Program Description. This will be accomplished by the procedures described in Section I,B of this Program Description and in the Application for Program Authorization for Class II Wells submitted

pursuant to Section 1425 of the Safe Drinking Water Act (SDWA).

The Division of Water Resources (DWR), Department of Natural Resources was designated by the Governor as a lead agency in the development and implementation of the UIC Program (Appendix A). The Division is responsible for protection and maintenance of both surface and ground water quality. This regulatory power is derived from Chapter 20, Article 5A of the Code of West Virginia, as amended. The Hazardous Waste/Ground Water Branch was established within the Division to develop the various Federal programs concerning ground water related activities, including both the UIC Program and the Hazardous Waste Management Program. Prior to the establishment of this section, there was no structured approach to the protection of ground water within the Division. The development and implementation of these programs has resulted in a regulatory and enforcement program which assures the proper management of ground water resources in the State.

The State UIC Program fits into the Division's desire to protect ground water quality at a level commensurate with projected use. It provides for nondegradation of high quality portions of the resource for drinking water while allowing for other legitimate utilization. The Division will classify ground water as to its quality in order to facilitate management of the resource. This allows for a determination of the potential use of portions of the resource and therefore provides a comparison of quality and availability in relation to future needs.

This approach represents a long term endeavor, which is to be coordinated with efforts to define ground water resources within the State under the UIC Program. Because of the long term requirements for classifying <u>all</u> ground water, the Division seeks to increase efforts to delineate and classify those areas utilized to meet existing high quality needs. The highest priority would, of course, be the <u>preservation</u> of existing sources

of public drinking water. In this regard, the Division would identify recharge areas for existing public ground water supplies as well as the quality and availability of the resource throughout the State. Since ground water use has already been established, this can be done before classification and before standards are established. This information would be most important for use in the decision process for siting new disposal facilities and the establishment of priorities for remedial actions. The State UIC Program will coordinate with other State programs in this endeavor, such as the National Pollutant Discharge Elimination System (NPDES) and the Hazardous Waste Management Program under the Resource Conservation and Recovery Act (RCRA).

There are several areas where the scope of the State UIC Program differs from the Federal minimum requirements. First, the Federal regulations give the term of UIC permits as ten years. The Division's permits are for a duration of five years. This is consistent with permitting under the State Water Pollution Control Act. Second, the State UIC Regulations require new Class I wells which will inject hazardous waste (below the deepest underground source of drinking water) to comply with location standards similar to those of the Hazardous Waste Management Act. Third, the State UIC Regulations prohibit injection of hazardous wastes into all Class IV wells (into or above underground sources of drinking water). This prohibition of injection of hazardous wastes into Class IV wells and concern with the injection of certain other types of wastes underground are based upon the peculiarities of the geology of West Virginia.

As characterized by the definition of plateau, the surficial geology of West Virginia is a relatively elevated area of comparatively flat beds. However, detailed subsurface analyses in specific areas of the Appalachian Plateau have delineated the complex structural and stratigraphic nature of

the region. The intensity of folding and the prevalence of faulting may be much greater beneath the surface in portions of the Appalachian Plateau area than is apparent at the surface (ORSANCO, 1973).

The Appalachian Plateau of West Virginia (Appendix B) has been intermittantly active tectonically during the past one billion years. During this period there have been many significant events of deformation, the earliest being the Grenville orogeny during the Precambrian Era (approximately one billion years ago). The intense igneous activity associated with this event formed what is known as the basement structure. Several major fault zones are known to exist within this basement structure as a result of deformation related to the igneous activity. These major fault zones affected subsequent sedimentation in the sense that displaced basement structure would institute differential sedimentation and broad areas of relief. These basement faults have been reactivated throughout geologic time by tectonic processes and have propagated extensive and often undefinable fracture networks. Some of the surface faults in existence today were formed by the reactivation of the Cambrian age basement faults during the folding of the Appalachian Mountains (upper Paleozoic period). (Shumaker, 1982).

These complex fracture networks occur westward across the Appalachian Plateau into Ohio and Kentucky. There is a recent case in eastern Kentucky in which hydrocarbon recovery from the Devonian shales caused pressure declines in the reservoir rock over several counties. This example is evidence of an interconnecting network of fracture permeability.

Fractures often occur at depths in excess of 4,000 feet and although they may terminate in less competent rocks, they can propagate across these potential boundaries towards the surface. At extreme depths, compressional forces of overlying strata or mineralization may seal these fractures, but in some instances they may remain open or be reopened. The nature and extent

of these fractures has not been fully defined. This subject is under investigation by oil and gas companies, and earth scientists in the State.

Horizontal variability in the thickness of either the injection zone or the confining layer may jeopardize safe injection of industrial waste. The dynamic environment which existed during the deposition of sedimentary rock in the State resulted in unconformities and many lateral variations in the stratigraphic sequence. Confining layers may diminish in thickness, "pinch out", intertongue, or laterally grade into more permeable rock. This may increase the possibilities for upward migration of injection fluids. Likewise, the injection zone may do the same, leaving less storage space than anticipated for the injection fluids.

The geology of the Valley and Ridge Province in eastern West Virginia (Appendix B) presents several complexities which prohibit underground injection of waste. Depth to the Precambrian crystalline basement is 0-1400 feet in some locations, thus deep injection zones with sufficient permeability cannot be found. In areas with overlying sedimentary rocks, there are often no rock units which are sufficiently impermeable (confining layers) to impede upward migration of injected fluids from an injection zone. The sedimentary rocks overlying the basement in these areas consist predominantly of thick limestones with solution cavities. These sedimentary deposits are highly folded, faulted and fractured. There have been 97 earthquakes in the last 100 years which have affected eastern West Virginia, some with sufficient force (Modified Mercalli Scale rating of VI) to damage well casing and open fractures in the confining layers above an injection zone. Eastern West Virginia is located in Seismic Risk Zone Two (Algermission, 1969), in which moderate damage may be expected from seismic disturbances in the Blue Ridge area. Eastern West Virginia is "generally unfavorable" for underground injection (Smith, 1979).

Underground fluid movement in West Virginia is dominated by fracture flow systems. Fractures are a common yet largely unpredictable occurrence. Even considerable geologic research may not reveal fractures in what may be thought to be a confining layer. Because it is difficult to determine the extent of fracturing within a proposed confining layer, its integrity cannot be guaranteed. In other words, the upward migration of injection fluids is always a possibility. Thus, it is impossible to guarantee that fluids injected underground will permanently stay in the reservoir in which they are placed.

As an additional example of the uncertainty involved in injecting waste, a case history analysis was used to evaluate the effectiveness of underground injection of industrial waste. Several industrial waste injection wells were issued permits by the Division of Water Resources during the 1970's. The wells were located on the Appalachian Plateau in western West Virginia. There were no known geologic hazards associated with the well locations (i.e., seismic activity, shallow depth to basement, lack of confining layers, and major faults).

During the operation of the wells, the following situations arose:

1. The proposed disposal formation lacked sufficient permeability to accept the wastes, even after acid treatment and hydraulic fracturing.
2. Wastes from nearby injection wells entered the borehole of a well under construction, and moved up the borehole after displacing the drilling fluid.
3. Several casing leaks appeared in one well. More than three years passed before the leaks were finally located and plugged. The leaks appeared above the injection zone.
4. One well was operating at an injection pressure which was twice the maximum bottom hole injection pressure specified in the

permit. Excessive injection pressure can lead to fracturing of the overlying formation and vertical fluid migration.

5. Borehole collapses in one well resulted in moving up the borehole to select another injection zone.

6. During the permit process, an applicant stated that the injection zone would be located at a depth of 5,400 feet. Due to a variety of circumstances (lack of permeability, borehole collapse, etc.) the injection zone when operation began was only 3,500 feet.

Because geologic uncertainty exists, anytime waste is injected, it is important that the State stress a strong permit review process to assure, before underground injection begins, that waste will remain where it is placed. The State (as decribed in the following section) will consider first the overlying confining beds, areal tectonics, and sedimentary environment, and then the reservoir characteristics. This approach was recommended by the Interstate Oil Compact Commission (1969). The State will also require monitoring once underground injection begins in order to detect any upward migration of wastes as early as possible, if it should occur. This may require installation of monitoring wells in some cases.

Justification will be required prior to injection of industrial wastes. Disposal alternatives such as chemical, physical and biological treatment will be emphasized as preferred. Generally, a well will not be permitted if there are other methods of treating the waste (economics will not be considered in making this decision) (Smith, 1979). Underground injection has been considered a favorable disposal alternative due to its cost compared with other disposal methods (Mohr and O'Brien, 1973).

B. Description of the Organization and Responsibilities of the State Agencies Involved in Administering the UIC Program

The State intends to obtain authorization for the West Virginia UIC Program by means of existing statutes. These statutes are the Water Pollution Control Act (Chapter 20, Article 5A of the West Virginia Code, as amended), the Hazardous Waste Management Act (Chapter 20, Article 5E of the State Code, as amended), and the Oil and Gas Laws (Chapter 22, Articles 4 and 4A of the State Code, as amended).

There are five State agencies involved in the State UIC Program. The Division of Water Resources (DWR) issues permits to all classes of wells and is the lead agency in development and implementation of the UIC Program. The Department of Mines, Office of Oil and Gas and the Oil and Gas Conservation Commission have the primary responsibility for implementation of the Class II (oil and gas related) portion of the UIC Program under an Application for Program Authorization under Section 1425 of the Safe Drinking Water Act (Section 5 of this Application for Program Authorization). The West Virginia Geological and Economic Survey provides information on the geology of the State to the above agencies. The Department of Health will be consulted during the permit application review to assess the possible effects upon the health of the public which may occur if the injected fluids were to enter an underground source of drinking water. The Department of Health will also be notified of actual, possible and suspected violations of primary drinking water standards or the presence of priority pollutants or any other substances which may cause endangerment of the public health. Reports of actual violations of UIC permits will be forwarded to the Department of Health whenever such violations may allow the injected fluids to enter underground sources of drinking water. The Department of Health is the State agency which has the responsibility for making determinations as to the suitability of water for human consumption and of what constitutes

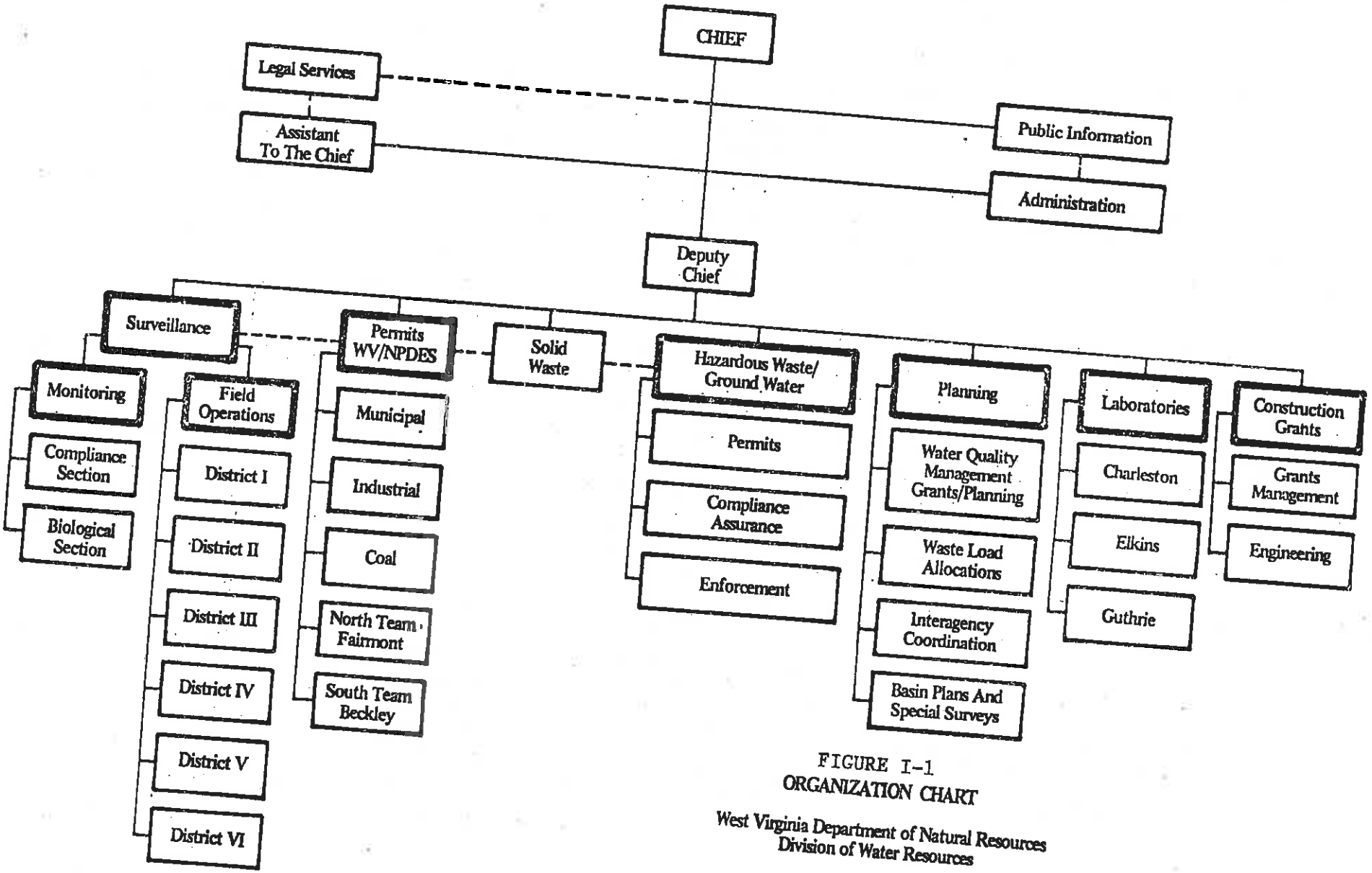


FIGURE I-1
ORGANIZATION CHART

West Virginia Department of Natural Resources
Division of Water Resources

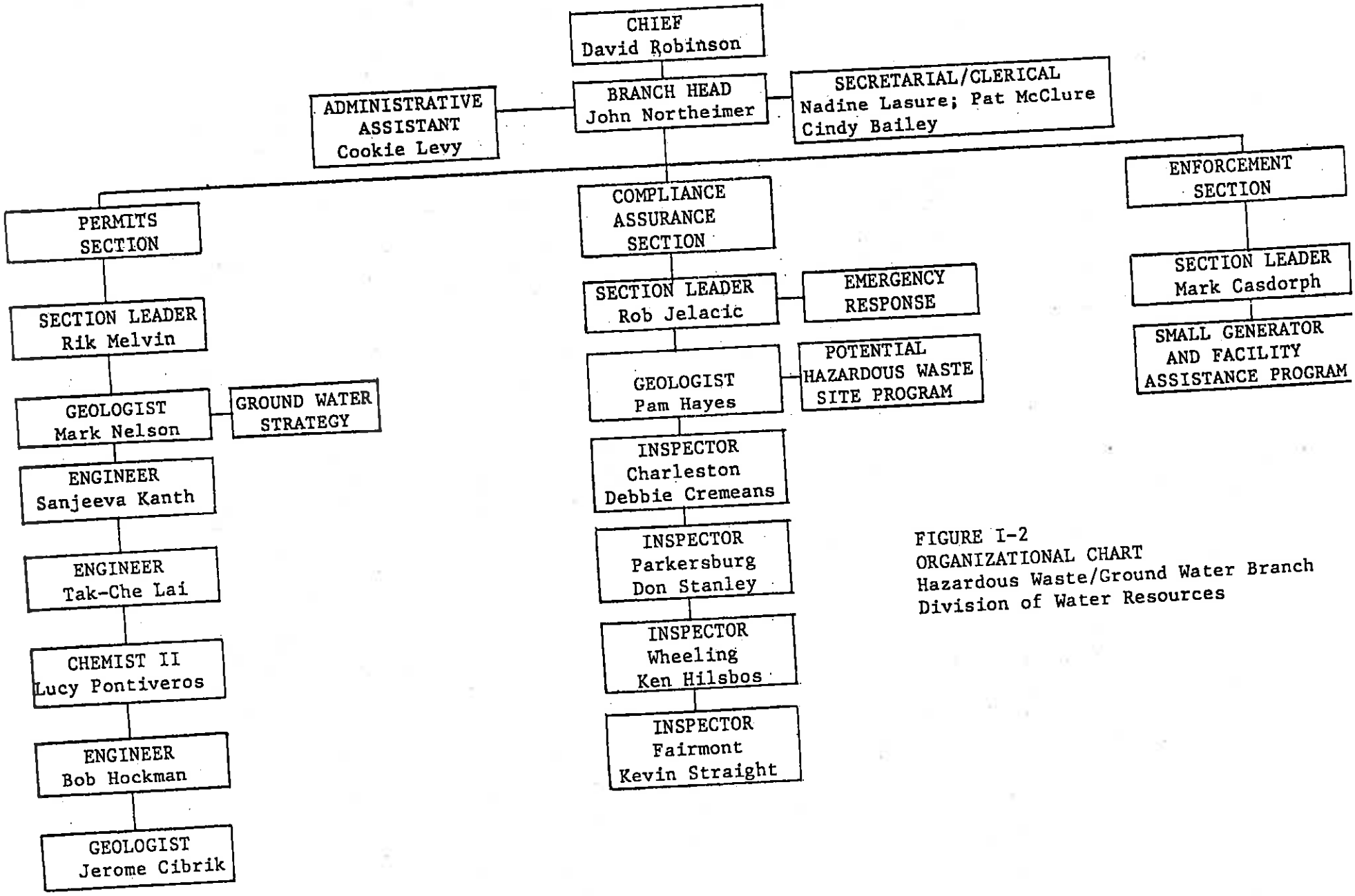


FIGURE I-2
ORGANIZATIONAL CHART
Hazardous Waste/Ground Water Branch
Division of Water Resources

endangerment of the health of the public. The Department of Health will evaluate the information relayed or transmitted to them and will notify the DWR of their conclusions (Appendix E).

The DWR is the lead agency as designated in the Memorandum of Agreement (MOA) between the State and the U.S. Environmental Protection Agency (EPA). An organizational chart of the Division is given in Figure I-1. The Hazardous Waste/Ground Water (HW/GW) Branch of the Division will function as the primary contact between the State and the EPA. Figure I-2 shows the internal organization of the HW/GW Branch. Personnel are assigned to UIC activities as described in Table I-3. The Branch Head will coordinate the functions of the participating agencies. Required reports and other pertinent information needed to assure interagency communication and cooperation will be forwarded via the Branch Head to the Groundwater Protection Section, Water Supply Branch, EPA Region III.

The Hazardous Waste/Ground Water Branch will be responsible for permitting, compliance evaluation and enforcement for Class I, III, IV and V wells (these Classes are defined in Section III,A of this Program Description). In addition, the HW/GW Branch will be responsible for assessment of Class V wells and for the ground water characterization studies which are contracted to the U.S. Geological Survey (Section II,B of this Program Description).

The required data and program progress reports for the Class II (oil and gas related) portion of the UIC Program will be submitted to the HW/GW Branch so that appropriate Federal grant funds may be passed through to the Department of Mines, Office of Oil and Gas. Appendix C gives the procedure involved in this funding transfer.

The Application for Program Authorization for Class II Wells under

TABLE I-3

HAZARDOUS WASTE/GROUND WATER BRANCH

STAFF DESCRIPTION AND RESOURCE COMMITMENTS

Position	Work Years
Natural Resources Administrator	.15
Administrative Assistant	.15
Public Information Representative	.50
Clerk	.20
Engineer	.20
Engineer	.70
Engineer Technician	.10
Chemist	.20
Geologist	.80
Inspector	.10
Inspector	.10
Inspector	.10
Inspector	.10
Inspector	.10
Total	3.50

Section 1425 of the Safe Drinking Water Act will give the primary responsibility for implementation of the portion of the UIC Program covering enhanced recovery wells and new brine disposal wells to the Department of Mines, Office of Oil and Gas and the Oil and Gas Conservation Commission. This appplication is being made under existing State statutes and regulations. Existing brine disposal wells (currently operating under DWR Water Pollution Control Permits) will be repermitted under the Department of Mines, Office of Oil and Gas during the first five years of the UIC Program's operation. Organizational charts for the oil and gas agencies are in Figures I-4 and I-5.

The responsibility for the Class II portion of the State UIC Program includes permitting, compliance monitoring and enforcement. This permitting process includes obtaining a UIC Permit from the Division of Water Resources as described in Section 13.00 of the State UIC Regulations. The Division, as lead agency, retains overview responsibility for this portion of the program and is able to employ its enforcement capabilities on its permit when necessary to aid the oil and gas agencies in their compliance assurance program. The Division's permit also enables the Class II portion of the program to fulfill the EPA requirements for public notice of all UIC permits. Neither the Department of Mines, Office of Oil and Gas nor the Oil and Gas Conservation Commission have regulations which fulfill the EPA public notice requirements.

In order to reduce the paperwork and the complexity of this procedure for the permit applicant, the DWR and the Department of Mines, Office of Oil and Gas have devised a single permit application form which satisfies the information requirements of both agencies. A single document has also been devised which incorporates both permits. The details of this permitting

FIGURE I-4
ORGANIZATIONAL CHART
Department of Mines

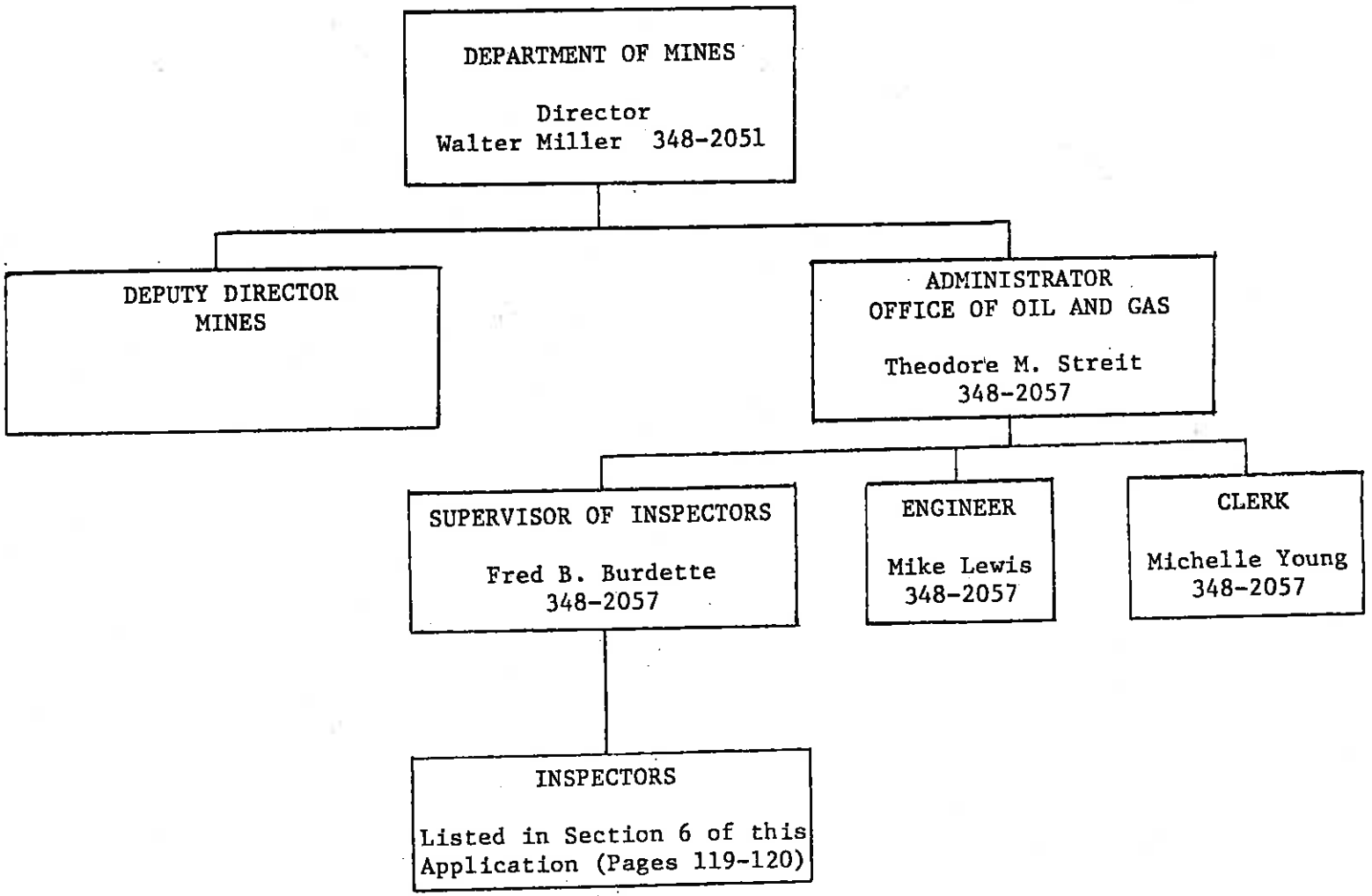
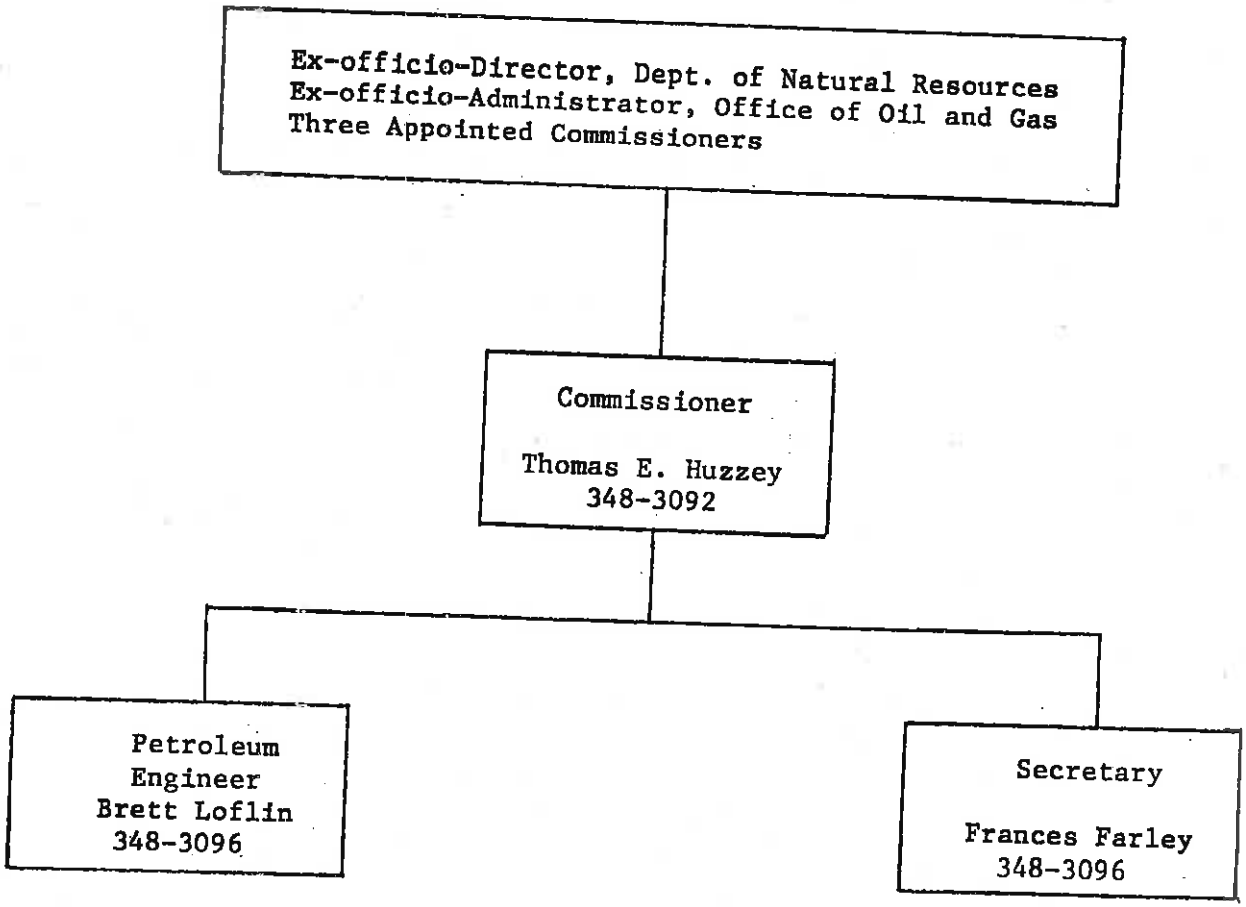


FIGURE I-5
ORGANIZATIONAL CHART
OIL AND GAS CONSERVATION COMMISSION



process are discussed in Section V,A of this Program Description.

There are several other areas in which the participating agencies have responsibilities in the permitting process. First, is the area of drilling permits and permits to plug and abandon wells. The Department of Mines, Office of Oil and Gas issues the drilling permits for all wells and the permit needed before plugging wells. An Affidavit of Plugging and Filling must be submitted to the Department of Mines, Office of Oil and Gas. The Commissioner of the Oil and Gas Conservation Commission must also be notified by the permittee within ten days after the discontinuance of injection into enhanced recovery wells in unitized fields.

Second, the Department of Mines, Office of Oil and Gas will evaluate the results of mechanical integrity tests for all wells and will forward this information to the Chief of the DWR. A description of the types of mechanical integrity tests which will be accepted may be found in Section 6.02 of the State UIC Regulations.

Third, bonding and financial responsibility for all wells will fall under the authority of the Department of Mines, Office of Oil and Gas pursuant to Chapter 22-4-1 et seq. of the Code of West Virginia, as amended, and the regulations thereunder, and under the DWR's authority pursuant to Chapter 20-5A and regulation 13.07(g) of the State UIC Regulations.

Due to these close interactions, inter-agency cooperation will be a key factor in the success of the program. The details of this interaction are delineated in the Memorandum of Understanding (MOU) between the participating agencies (Appendix D). This MOU provides for the necessary transfer of data and reports between agencies, coordination of response to citizen complaints and mutual notification and coordination of public hearing activities.

Activities affecting ground water in the State are regulated by the

agencies which will implement the UIC Program and the State Department of Health. Ground water strategy is coordinated through the Planning Branch of the DWR. Response to ground water contamination problems is coordinated with the Health Department through the Hazardous Waste/Ground Water Branch of the DWR (Appendix E). Technical support for hazardous waste contamination of ground water is provided by the EPA through the DWR.

C. Staffing and Funding Requirements

The DWR staffing requirements are listed in Table I-3. The program administrator will be in charge of overseeing field investigations, reports, compliance monitoring and enforcement. The geologist will assess subsurface strata for adequacy as confining layers or injection zones, interpret geophysical logging data, assess groundwater contamination potential and make reports regarding geological hazards relating to underground injection. The engineers will assess the adequacy of well construction, borehole injection pressures and other factors relating to reservoir engineering. The chemist will assess compatabilities associated with the injection process. Inspectors will conduct field reconnaissance of injection sites and assure compliance with applicable regulations of the UIC Program. Permits will be reviewed by the engineers, the chemist and the geologist. The Class II (oil and gas related) program staff requirements are shown in Figures I-4 and I-5.

Regarding possible funding cuts, before core program elements would be cut, the activity most likely to have its funding reduced would be the contractual work with the United States Geological Survey (USGS) to characterize ground water in the State. This would be done to avoid cuts in the basic program implementation activities such as permit review, compliance assurance and enforcement.

All UIC Program positions at the Hazardous Waste/Ground Water Branch, the Office of Oil and Gas, and the Oil and Gas Conservation Commission are currently filled. Itemized costs for development and implementation of the program may be found in Appendix F. The sources and amounts of these funds are also to be found there.

II. THE PROTECTED RESOURCE

A. Definition of Underground Source of Drinking Water

The definition of an underground source of drinking water in the UIC Program was adopted verbatim from the federal definition in 40 CFR Part 146, as amended. This definition is located in Section 2.00 of the State UIC Regulations:

> "Underground source of drinking water" (USDW) means an "aquifer" or its portion:
>
> (a)(1) which supplies any public water system; or
>
> (2) which contains a sufficient quantity of ground water to supply a public water system; and
>
> (i) currently supplies drinking water for human consumption; or
>
> (ii) contains fewer than 10,000 mg/l total dissolved solids; and
>
> (b) which is not an exempted aquifer.

The Chief of the Division of Water Resources may identify and must protect as an underground source of drinking water (except where exempted), all aquifers or parts of aquifers which meet the definition above. Even if an aquifer has not been specifically identified by the Chief, it is an underground source of drinking water if it meets the above definition.

Another definition which should be mentioned here is that of "water resources" under the State Water Pollution Control Act. It clearly includes the ground water in USDW's:

> "Water resources," "water" or "waters" shall mean any and all water on or beneath the surface of the ground, whether percolating, standing, diffused or flowing, wholly or partially within this State, or bordering this State and within its jurisdiction, and shall include, without limiting the generality of the foregoing, natural or artificial lakes, rivers, streams, creeks, branches, brooks, ponds (except farm

ponds, industrial settling basins and ponds and water treatment facilities), impounding reservoirs. springs, wells, water courses and wetlands.

B. Identification and Description of USDW's

Groundwater systems in the Appalachian Plateau of West Virginia (Appendix B) exist in complex sequences of confined aquifers, confining beds and free-flowing unconfined aquifers. These different systems are caused by alternating permeable and impermeable layers made up of shales, sandstones, siltstones, and coals. The groundwater flow regime for these systems is further complicated by varying degrees of permeability. Permeability exists both as primary, intergranular pore space within the rock, and secondary openings created after deposition, fractures and faults. Of these, secondary permeability is the most significant. Water wells which penetrate fractures will yield higher amounts of drinking water per foot of drawdown than those which do not penetrate fractures. In the Valley and Ridge Province (Appendix B) of eastern West Virginia the flow and occurrence of groundwater is primarily controlled by solution enlarged openings (karst) which exist in the limestone deposits. All of these ground water systems are recharged in the upland areas between streams and by leakage through confining beds. Discharge occurs from springs and surface seepage (Heath, 1982).

The State has been working within the UIC Program to identify and characterize ground water resources in West Virginia. This project is no simple task due to the presence of alluvial aquifers, perched water tables, a predominance of fracture-flow systems, large karst areas and the complex folding and faulting present in the eastern portions of the State. This hydrogeologic complexity has necessitated several different projects to describe the State's ground water resources.

The first task undertaken was to compile and evaluate existing groundwater data from oil and gas well driller's logs. This study was performed

by the U.S. Geological Survey (USGS) in cooperation with the West Virginia Geological and Economic Survey (WVGES). The results of this study were used to compile a set of two computer generated maps delineating the fresh and saline water elevations throughout the State. The map scales are 1:250,000. The project was completed in 1980. One map depicts the elevation of the base of the fresh water while the other shows the elevation of the top of the saline water. Also included on each map is an inset map showing the thickness of the zone between the base of the fresh water and the top of the saline water. These inset maps were generated by a computer program which subtracted the data array representing the top of the saline water from the array representing the bottom of the fresh water and then contoured the difference.

These maps will facilitate a quick estimation of the elevation of the base of fresh water at a given location and will be of use in the permitting process. The actual elevation will be influenced by local topography and geology and should be determined from data taken on site.

A second project is being conducted to identify and characterize the State's ground water resources. This project is being undertaken by the USGS for the Division of Water Resources. It involves the compilation of data and the generation of a Ground-Water Atlas for each major river basin in the State.

The Ground-Water Hydrology of the Potomac River Basin (1973) map was prepared by USGS in cooperation with the WVGES and the DNR. This map is the precursor of the current River Basin Atlas project which is based on its format. Each Basin Atlas will contain a geologic map and information on potential ground water yield, water quality, well locations sampled, and chemical suitability of ground water for domestic or public use.

A total of eleven Basin Atlases will be completed by 1984. They are (along with their current status): Potomac and Little Kanawha (complete);

Monongahela and Guyandotte (being prepared for print); Elk (in colleague review at USGS); Tug Fork (ready for colleague review by September 1, 1982); Gauley (data collection is complete, data is now in initial interpretation); Ohio and Kanawha and their minor tributaries (95% data collection complete, ready for review in March). These Basin Atlases will be extremely useful in delineating the availability and quality of the ground water of the State.

The third project being conducted by the USGS for the DWR to identify and characterize ground water in the state is an Aquifer Recharge Area Study. The alluvial deposits in the larger river valleys are generally thick enough to supply a significant amount of potable groundwater to wells. These hydrologically sensitive areas are heavily populated and industrialized. This necessitates a detailed evaluation of the geologic setting (stratigraphy, lithology, and structure) in order to understand the occurrence, movement, and quality of groundwater in these alluvial aquifers.

The objectives of this Aquifer Recharge Area Study are to define ground-water recharge and discharge characteristics in areas of existing or potential waste management sites (including subsurface disposal wells) and to delineate the general areas of ground-water recharge for aquifers serving as public water supplies. Aquifer and field dispersivity tests will be conducted to determine the hydraulic properties of the alluvial and (or) fracture-system aquifers underlying the study areas. Parameters include hydraulic conductivity, transmissivity and storage coefficients, directional permeability, rate of movement, and vertical and lateral dispersivity characteristics. This data will be gathered from existing water wells in the study area and will be used in conjunction with background information already available.

The Aquifer Recharge Area Project is scheduled for completion by October 1, 1984. This study will facilitate the evaluation of the

potential effects of existing and proposed injection well facilities by providing information regarding the suitability of certain hydrologic environments for facility siting.

C. Definition of Exempted Aquifers

Exempted aquifers may be defined by the criteria in Section 3.00 of the State UIC Regulations, the standards of which were also adopted verbatim from 40 CFR Part 146:

> An aquifer or a portion thereof which meets the criteria for an "underground source of drinking water" in Section 2.00 may be determined to be an exempted aquifer if it meets the following criteria:
>
> (a) It does not currently serve as a source of drinking water; and
>
> (b) It cannot now and will not in the future serve as a source of drinking water because:
>
> (1) It is mineral, hydrocarbon or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II or III operation to contain minerals or hydrocarbons that, considering their quantity and location, are expected to be commercially producible; or
>
> (2) It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical; or
>
> (3) It is so contaminated that it would be economically or technologically impractical to render the water fit for human consumption; or
>
> (4) It is located over a Class III well mining area subject to subsidence or catastrophic collapse; or
>
> (c) The total dissolved solids (TDS) content of the groundwater is more than 3,000 and less than 10,000 mg/l and it is not reasonably expected to supply a public water system.

The Chief may identify and describe in geographic and/or geometric terms (such as vertical and lateral limits and gradient) which are clear and definite, all aquifers or parts thereof which he proposes to designate as exempted aquifers using the criteria listed above. Initially, no aquifers or portions of aquifers will be designated as exempted. It is the policy of the Division of Water Resources to control and reduce pollution in order to rehabilitate contaminated groundwater rather than to abandon an aquifer to further pollution.

An applicant for a Class III well permit which requires an aquifer exemption under Section 3.01(b)(1) of the State UIC Regulations must furnish the data necessary to demonstrate that the aquifer is expected to be mineral or hydrocarbon producing. Information contained in the mining plan for the proposed project, such as a map and general description of the mining zone, analysis of the amenability of the mining zone to the proposed mining method, and a time-table of planned development of the mining zone must be considered by the Chief in addition to the information required in the permit application.

For Class II wells, a demonstration of commercial producibility shall be made as follows:

(a) For a Class II well to be used for enhanced oil recovery processes in a field or project containing aquifers from which hydrocarbons were previously produced, commercial producibility shall be presumed by the Chief upon a demonstration by the applicant of historical production having occurred in the project area or field.

(b) For Class II wells not located in a field or project containing aquifers from which hydrocarbons were previously

produced, information such as logs, core data, formation description, formation depth, formation thickness and formation parameters such as permeability and porosity shall be considered by the Chief, to the extent such information is available.

III. ACTIVITIES REGULATED UNDER THE UIC PROGRAM

A. Classification of Wells

The West Virginia Injection Well Inventory System (IWIS) as of April, 1982, indicates that there are 8 Class I, 399 Class II, 17 Class III and 105 Class V wells in the State. There are no Class IV wells known to exist in the State. The West Virginia UIC well classification system was adopted verbatim from the federal classification system in 40 CFR Part 146, and is described in Section 4.00 of the State UIC Regulations. These regulations cover all injection wells, including Class IV.

Injection wells are classified as follows:

1. Class I

(a) Wells used by generators of hazardous waste or owners or operators of hazardous waste management facilities to inject hazardous waste beneath the lowermost formation containing, within one quarter mile of the well bore, an underground source of drinking water.

(b) Other industrial and municipal disposal wells which inject fluids beneath the lowermost formation containing, within one quarter mile of the well bore, an underground source of drinking water.

2. Class II

Wells injecting fluids:

(a) Which are brought to the surface in connection with conventional oil or natural gas production and may be commingled with waste waters from gas plants which are an integral part of production operations, unless those wastes are classified as a hazardous waste at the time of injection,

(b) For enhanced recovery of oil or natural gas; and

(c) For storage of hydrocarbons which are liquid at standard temperature and pressure.

3. Class III

Wells which inject for extraction of minerals including:

(a) Mining of sulfur by the Frasch process;

(b) In situ production of uranium or other metals. This category includes only in-situ production from ore bodies which have not been conventionally mined. Solution mining of conventional mines such as stopes leaching is included in Class V;

(c) Solution mining of salts or potash;

(d) In situ combustion of fossil fuel; and

(e) Recovery of geothermal energy to produce electric power.

4. Class IV

(a) Wells used by generators of hazardous wastes or radioactive wastes, by owners or operators of hazardous waste management facilities, or by owners or operators of radioactive waste disposal sites to dispose of hazardous waste or radioactive wastes into a formation which within one quarter mile of the well bore, contains an underground source of drinking water.

(b) Wells used by generators of hazardous wastes or radioactive wastes, by owners or operators of hazardous waste management facilities, or by owners or operators of radioactive waste disposal sites to dispose of hazardous wastes or radioactive wastes above a formation which within one quarter mile of the well bore, contains an underground source of drinking water.

(c) Wells used by generators of hazardous wastes or by owners or operators of hazardous waste management facilities, to dispose of hazardous wastes which cannot be classified under Section 4.01(a) of the State UIC Regulations (e.g., wells used to dispose of hazardous wastes into or above a formation which contains an aquifer which has been exempted pursuant to Section 3.00 of the State UIC Regulations).

5. Class V Well

Injection wells not included in Classes I, II, III, or IV. Class V wells include, but are not limited to:

(a) Cesspools, including multiple dwelling, community or regional cesspools, or other devices that receive wastes, which have an open bottom and sometimes have perforated sides. The UIC requirements do not apply to single family residential cesspools which receive solely sanitary wastes and have the capacity to serve fewer than 20 persons a day.

(b) Sand backfill and other backfill wells used to inject a mixture of water and sand, mill tailings or other solids into mined out portions of subsurface mines whether what is injected is a radioactive waste or not.

(c) Septic system wells used to inject the waste or effluent from a multiple dwelling, business establishment, community or regional business establishment septic tank. The UIC requirements do not apply to single family residential septic system wells, nor to non-residential septic system wells which are used solely for the disposal of sanitary waste and have the capacity to serve fewer than 20 persons a day.

(d) Injection wells associated with the recovery of geothermal energy for heating, aquaculture and production of electric power.

(e) Radioactive waste disposal wells other than Class IV.

(f) Wells used for solution mining of conventional mines such as stopes leaching.

(g) Injection wells used for in situ recovery of lignite, coal, tar sands, and oil shale.

(h) Wells used to inject spent brine into the same formation from which it was withdrawn after extraction of halogens or their salts.

(i) Injection wells used in experimental technologies.

(j) Wells for waste disposal into solution cavities in carbonate formations

(k) Sinkholes used for the disposal of sewage or any other waste.

(l) Air conditioning return flow wells used to return (to the supply

aquifer) the water used for heating or cooling in a heat pump.

(m) Cooling water return flow wells used to inject water previously used for cooling.

(n) Drainage wells used to drain surface fluid, primarily storm runoff, into a subsurface formation.

(o) Dry wells used for the injection of wastes into a subsurface formation.

(p) Recharge wells used to replenish the water in an aquifer.

(q) Salt water intrusion barrier wells used to inject water into a fresh water aquifer to prevent the intrusion of salt water into the fresh water.

(r) Subsidence control wells (not used for the purpose of oil or natural gas production) used to inject fluids into a non-oil or gas producing zone to reduce or eliminate subsidence associated with the overdraft of fresh water.

B. Injection Well Inventory System

The Injection Well Inventory System (IWIS) presently includes all injection wells known to exist in the state. Information from permit applications and field reconnaissance has been included to provide an accurate data base. Regular inspections presently being conducted under the West Virginia Water Pollution Control Act by DWR personnel minimize the possibility of injection wells being overlooked on industry and mining sites. All operators currently holding an Underground Injection Control Permit are required to notify DWR of any planned or existing injection well.

Oil and gas operators must obtain an Underground Injection Control Permit from DWR prior to injection (as described in Section V of this Program Description). This required interaction guarantees that all Class II wells will be entered on the inventory. Regular inspections by Oil and Gas personnel

further minimize the possibility of overlooking an injection well.

The IWIS data base is updated upon receipt of a permit application, and upon notice that a permitted well has been plugged and abandoned. Information required to be submitted to the Chief is listed in Sections 20-5A-9, 20-5A-3(a) and 20-5A-3(d) of the State Water Pollution Control Act. Operators who fail to report existing injection wells are subject to the penalties detailed under the Act.

Under Section 13.02 of the State UIC Regulations, the Chief of the DWR is required to notify owners or operators of injection wells of their duty to submit inventory information. The owners and operators must submit inventory information within one year of the effective date of the program, or face penalties under the State Act. To ensure compatibility with the IWIS data system and the requirements of 40 CFR Part 123, the following information shall be required for submittal:

(1) facility name and location;

(2) name and address of legal contact;

(3) owner of facility;

(4) composition of injected waste; and

(5) operating status of the wells.

A copy of EPA Form 7500-48 (11-79), Inventory of Injection Wells, along with a self-addressed, stamped envelope will be mailed to all operators who hold water pollution control permits, mine operation permits, and oil and gas drilling permits. Copies will also be made available to Water Resources and Department of Mines inspectors for new facilities which develop within their Districts.

IV. ESTABLISHING CONTROL OF THE REGULATED COMMUNITY (Section 13.01, State UIC Regulations)

Underground injection is prohibited unless authorized by UIC permit or by rule. The construction of any well required to have an UIC permit is prohibited until the permit has been issued. The details of the permitting process are discussed in Section V of this Program Description. All injection wells which are currently operating under State permits will be regulated by rule until repermitted under the UIC Program (Section IV,A).

No authorization by permit or rule shall allow the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 C.F.R. Part 142 or promulgated pursuant to West Virginia Code, Chapter 16-1-1 et seq., or may otherwise adversely affect the health of persons. The applicant for a permit shall have the burden of showing that the requirements of this paragraph are met.

If any water quality monitoring of an USDW indicates the movement of any contaminant into the USDW from a Class I, II or III well (except as authorized under these regulations), the Chief of the Division of Water Resources must prescribe such additional requirements for construction, corrective action, operation, monitoring, or reporting (including closure of the injection well) as are necessary to prevent such movement. In the case of wells authorized by permit, these additional requirements shall be imposed by modifying the permit or the permit may be revoked if cause exists, or appropriate enforcement action may be taken if the permit has been violated.

If at any time the Chief learns that a Class V well may cause a violation of primary drinking water standards under 40 C.F.R. Part 142, or the West Virginia Code, Chapter 16-1-1 et seq., he must:

(1) Require the injector to obtain an Underground Injection Control Permit; or

(2) Order the injector to take such actions (including closure of the injection well) as may be necessary to prevent the violation; or

(3) Take enforcement action.

Whenever the Chief learns that a Class V well may be otherwise adversely affecting the health of persons, he may prescribe such actions as may be necessary to prevent the adverse effect, including any action mentioned in the list above.

Notwithstanding any other action described above, the Chief may take emergency action under Section 12a of the State Act. The Chief may take such emergency action upon receipt of information that a contaminant which is present in or is likely to enter a public water system may present an imminent and substantial endangerment to health of persons.

A. Authorization by Rule (Section 13.02, State UIC Regulations)

Injection into existing Class I, II, and III wells is authorized by rule for up to five years from the date the State receives program authorization from EPA. All such wells must be issued permits within the five year period or close down at its end, unless the rule is continued as described in the next paragraph.

If the permitting agency fails to issue a permit within the five year period, Class II and III wells in existing fields or projects may continue normal operations under authorization by rule until permitted. This includes construction, operation, and plugging and abandonment of wells provided the owner or operator maintains compliance with all applicable requirements of Section 13.02(b) of the State UIC Regulations.

Injection into existing Class IV wells as defined in Section III of this Program Description is authorized by rule for a period not to exceed six months after the State UIC Program is authorized by EPA. Such authorization by rule is contingent upon fulfilling the requirements of Section 7.03 and Section 11.04 of the State UIC Regulations.

Injections into Class V wells are authorized by rule for a period of five years, subject to fulfilling the requirements of Sections 12.00 and 13.02(b) and (d) of the State UIC Regulations. However, the Chief has authority to withdraw the authorization if required under Section 13.02.

Any facility authorized by rule must fulfill the requirements of Section 13.02(b) of the State UIC Regulations no later than one year after authorization. The same compliance evaluation program which is described in Section VI,B of this Program Description will be employed to verify compliance with these rules.

The Chief may require any Class I, II, III or V injection well authorized by rule to apply for and obtain an individual or area UIC permit. Cases where individual or area UIC permits may be required include, but are not limited to:

(1) The injection well is not in compliance with any requirement of the rule;

(NOTE: Any underground injection which violates any rule under Section 13.02 of the State UIC Regulations is subject to appropriate enforcement action).

(2) The injection well is not within the category of wells and types of well operations authorized in the rule;

(3) When the protection of USDW's requires that the injection operation be regulated by requirements, such as for corrective action, monitoring and reporting, or operation, which are not contained in the rule; or

(4) As a part of the orderly implementation of the UIC Program during the period of authorization by rule.

Any owner or operator authorized by a rule may request to be excluded from the coverage of the rule by applying for an individual or area UIC

permit. The owner or operator shall submit an application as described under Section 13.03 of the State UIC Regulations with reasons supporting the request to the Chief. The Chief may grant any such request.

Owners or operators of all injection wells authorized by rule must submit inventory information to the Chief. Authorization by rule is automatically terminated for any well where the owner or operator fails to comply within the one year maximum time allowed. The following describes this inventory information submittal:

(1) Contents. The Chief shall require:

(i) Information regarding pollutant loads and schedules for attaining compliance with water quality standards;

(ii) Facility name and location:

(iii) Name and address of legal contact;

(iv) Ownership of facility;

(v) Nature and type of injection wells; and

(vi) Operating status of injection wells.

(2) Notice. Upon approval of the State UIC Program, the Chief must notify owners or operators of injection wells of their duty to submit inventory information. The method of notification selected by the Chief will assure that the owners or operators will be made aware of the inventory requirement.

(3) Deadlines. Owners or operators of injection wells must submit inventory information no later than one year after the authorization by rule.

B. Notification of Owners and Operators to Apply for Permits

A mailing list is available in the DWR Public Information Office which contains the names, addresses and legal contacts for all owners and operators presently holding an Underground Injection Control Permit. This lists,

along with the Injection Well Information System list, will be used to notify owners and operators of the procedures for applying for a permit. Copies of the UIC Regulations will be available through the DWR Public Information Office. Legal notices (Class I advertisements) regarding the necessity to apply for permits will be placed in all major State newspapers. Citizen's action groups will be informed. District Water Resources inspectors and Oil and Gas inspectors will be notified of the procedures for applying for permits and asked about owners and operators within their districts which may have been overlooked on the mailing list.

The notification will include a schedule for applying for permits within the time limits listed in Section 13.03(b) of the State UIC Regulations. This requires existing injection wells to apply for a permit within four years of the effective date of the State UIC Program. The State will call for these applications on an individual basis according to the schedule in Section IV,D of this Program Description. Wells which inject hazardous waste must apply for a permit within six months of the effective date of the State UIC Program. New injection wells (except new wells in projects authorized by rule or new wells covered by an existing area permit) must submit an application for a permit a reasonable time before construction is expected to begin (as described in Section V of this Program Description).

C. Priorities for Issuance of Permits

Priorities for the repermitting of wells have been established based on reviews of present permits and suspected groundwater contamination situations. Information in the State files regarding casing leaks in Class I industrial waste injection wells indicate that these wells should receive first priority for permit reissuance review.

Since there are only eight Class I wells in the State, this entire class of wells will be reviewed for repermitting in the first year. The Class III wells are clustered at only two locations, so these wells will also be examined during the first year of the program.

This leaves the Class II well repermitting and the Class V well repermitting assessment. The Class V well assessment must be completed within three years. This work load will be distributed over this time as resources permit. The Class II well repermitting will be done in coordination with the Department of Mines, Office of Oil and Gas and the Oil and Gas Conservation Commission. This work will be distributed over the five years provided under the State UIC Regulations.

Additional criteria will be considered within the above general outline to set the priorities for repermitting. These include the likelihood of contamination of USDW's, potentially affected population, age and depth of injection well, and expiration date of existing State permits. Wells which will be given priority for permit reissuance review will be wells violating existing State requirements, wells known or suspected to be contaminating USDW's, and wells whose existing State permit is nearing expiration.

D. Permit Reissuance Schedule (Table IV-1)

The following table shows the anticipated schedule for the repermitting of existing wells. This schedule is based on the priorities discussed in Section IV,C of this Program Description.

Well Class/Type	FY'83	FY'84	FY'85	FY'86	FY'87	FY'88	Total
I. Industrial							8
II. Oil & Gas related							
Brine Disposal							60
Enhanced Recovery							339
III. Solution Mining							17
IV. Hazardous Waste							0
V. Assessment							105

New permit issuance is difficult to predict, due to fluctuations in the chemical and coal industry, and the impact of the UIC program on underground injection as a disposal alternative. Comments from industry during the public participation period for the proposed State Hazardous Waste Management Act regulations indicate that injection of hazardous wastes may be under consideration as a disposal alternative. The following schedule is based on expected permit applications through 1988: (Table IV-2)

Well Class/Type	FY'83	FY'84	FY'85	FY'86	FY'87	FY'88	Total
I. Industrial	0-5	0-5	0-5	0-5	0-5	0-5	0-30
II. Oil & Gas related							
Brine Disposal	0-5	0-5	0-5	0-5	0-5	0-5	0-30
Enhanced Recovery	70	77	85	93	102	110	537
III. Solution Mining	0-3	0-3	0-3	0-3	0-3	0-3	0-18
IV. Hazardous Waste	0	0	0	0	0	0	0
V. Miscellaneous	*	*	*	**	**	**	**

*Assessment in progress.

**Unknown. Dependent upon assessment.

E. Class V Well Assessment

The State has inventoried 105 Class V wells in West Virginia. These wells will be assessed beginning in 1983. At the end of the three year assessment period, a report will be submitted to EPA Region III containing a listing of all Class V wells and an assessment of the need for a regulatory program covering these wells to eliminate groundwater contamination from these wells.

A survey of State agencies will be conducted to locate unreported Class V wells. The State Department of Health and the Municipal Permits Section of the DWR will be utilized in the municipal sewage disposal well survey. The West Virginia Department of Mines and the Coal Permits Section of DWR will provide data on coal slurry wells. The Army Corps of Engineers will

be surveyed for recharge wells, and the State Department of Agriculture, and the Soil Conservation Service may provide data on any runoff collection wells for agricultural use. Inspectors and other regulatory personnel will be interviewed to discover any unreported wells in their districts.

Municipal disposal wells located in karst topography will receive first priority in the assessment. Many of these wells, located in eastern West Virginia, dispose of sewage into solution cavities in carbonate rock. Large public groundwater supplies in these areas draw water from the same carbonate rocks. Coal slurry disposal wells shall receive next priority in the assessment. Incidents of public groundwater supply contamination have occurred from coal slurry injection into abandoned mines which are used as subsurface reservoirs.

The State anticipates the issuance of a Ground Water Program Guidance by the EPA which will aid in the Class V inventory and assessment. The State has produced a list of items to consider in the assessment of Class V wells (Appendix G). The feasibility of obtaining the information on this list will be determined during the early stages of the assessment.

F. Elimination of Class IV Wells

Section 11.00 of the State UIC Regulations sets criteria and standards for Class IV wells. These wells are those existing wells used by generators of hazardous wastes and owners and operators of hazardous waste management facilities to inject into or above strata that contain an underground source of drinking water. All new Class IV wells are prohibited. Owners and operators of existing Class IV wells must submit to the Chief notice of the existence of any such well under their control and information regarding the well.

The State UIC Regulations authorize injection into existing Class IV wells for a period of up to six months after the State receives program

authorization from EPA (Section 13.02(a)(3)), but operation is prohibited after that time (Section 11.03(a). The owners or operators of Class IV wells will be notified by certified mail of the time by which closure must be accomplished (as decided upon by the Chief) and, if appropriate, of a compliance schedule leading to closure. In determining the enforcement strategy and time allowed for closure, the Chief must consider the following criteria:

(1) Population relying on the underground source of drinking water affected or potentially affected by the injection;

(2) Local geology and hydrology;

(3) Toxicity and volume of injected fluids; and

(4) Injection well density.

Nothing in the above paragraph is intended to limit the Chief in taking immediate action necessary to protect the health of persons.

Section 11.04 indicates that the Chief shall prescribe monitoring and reporting requirements for existing Class IV wells while they are operating. The monitoring must include the following requirements at a minimum:

(1) Record keeping as required in Chapter 20-5E of the West Virginia Code and the regulations thereunder.

(2) Weekly monitoring of existing water supply wells in the vicinity for parameters based upon the characteristics of the injection fluids.

(3) Maintenance of the results of monitoring under Section 13.06(e) of the State UIC Regulations.

The reporting requirements shall prescribe the form, manner, content and frequency of reports to the Chief. The permittee shall be required to identify the types of tests and methods used to generate the monitoring data. At a minimum, the requirements must include:

(1) Quarterly reporting of the results of the monitoring required above;

(2) Immediate notification to the Chief of any change in the

concentration of any parameter measured at an existing water supply well; and

(3) Written notification to the Chief within 30 days after any compliance schedule date as to whether the owner or operator has or has not complied with the requirement in question.

V. THE PERMITTING PROCESS

The State UIC Regulations prohibit underground injection unless authorized by permit or by rule. Initially, all existing Class I, II, and III wells will be regulated by rule. These wells are operating currently under State permits. They will be repermitted during the orderly implementation of the UIC Program (as discussed in Section IV of this Program Description).

Any person who is required to have a permit (including new applicants and permittees with expiring permits) shall complete, sign, and submit an application to the Chief as described in this section. Persons authorized with UIC authorization by rule shall apply for permits when required by the Chief and in accordance with Section 13.03 of the State UIC Regulations. When a facility or activity is owned by one person but is operated by another person, it is the operator's duty to obtain a permit.

Class I and Class III wells will be permitted by the Division of Water Resources. Class II wells will be permitted by both the Division of Water Resources and the Office of Oil and Gas (Department of Mines). No permits will be issued to Class IV wells. Class V wells are currently not required to apply for a permit unless the Chief requires it (based on Section 13.01(d) and (e) of the State UIC Regulations).

A Class I or Class III permit application and instructions (Appendix H) may be obtained upon request from:

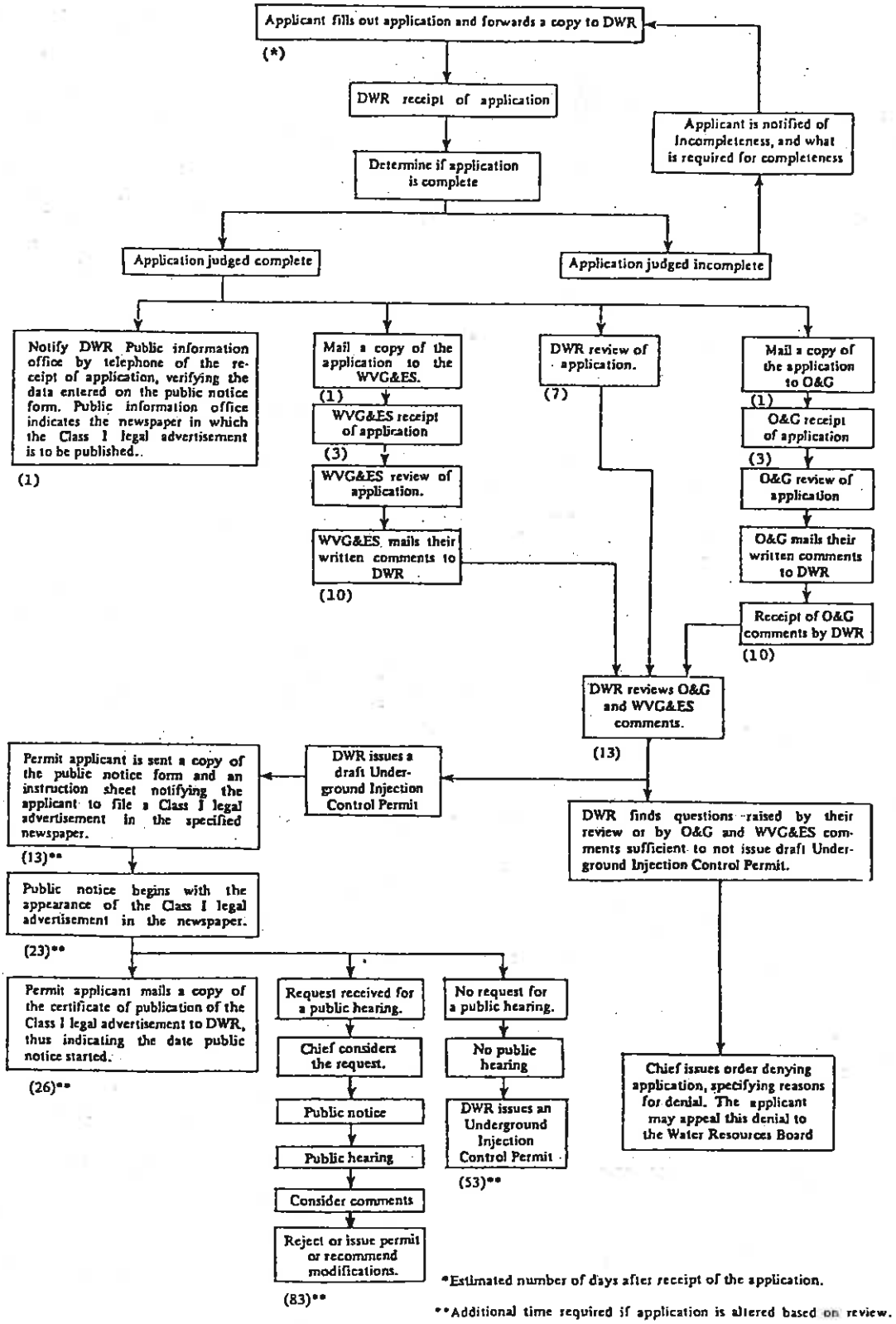
Chief, Division of Water Resources, DNR
1201 Greenbrier Street
Charleston, WV 25311
Attention: Hazardous Waste/Ground Water Branch

Upon receipt of a complete application, the Division of Water Resources processes the application in a manner outlined in the FLOW CHART FOR PROCESSING CLASS I & CLASS III PERMIT APPLICATIONS (Figure V-1). The permit process requires, at minimum, 53 days from submission of a complete application. At least 83 days are required if a public hearing is held.

FIGURE V-1

FLOW CHART FOR PROCESSING CLASS I & CLASS III PERMIT APPLICATIONS

Division of Water Resources (DWR); Office of Oil & Gas, Department of Mines (O&G); West Virginia Geological and Economic Survey (WVG&ES); Underground Injection Control (UIC)



*Estimated number of days after receipt of the application.

**Additional time required if application is altered based on review.

Additional time will be required if flaws in a proposed design are discovered during review which necessitate modification of the application.

A Class II application (Appendix I) may be obtained upon request from:

Office of Oil and Gas
Department of Mines
1613 Washington St., E.
Charleston, WV 25311

A Class II well must be permitted by both the Office of Oil and Gas, and the Division of Water Resources. In an effort to reduce paper work for the applicant, a single application form was developed containing the information required by both agencies. This single form is obtainable from the Office of Oil and Gas. A signed copy must be forwarded to each agency (except as noted on the Instruction Sheet, Form IV-3-AP).

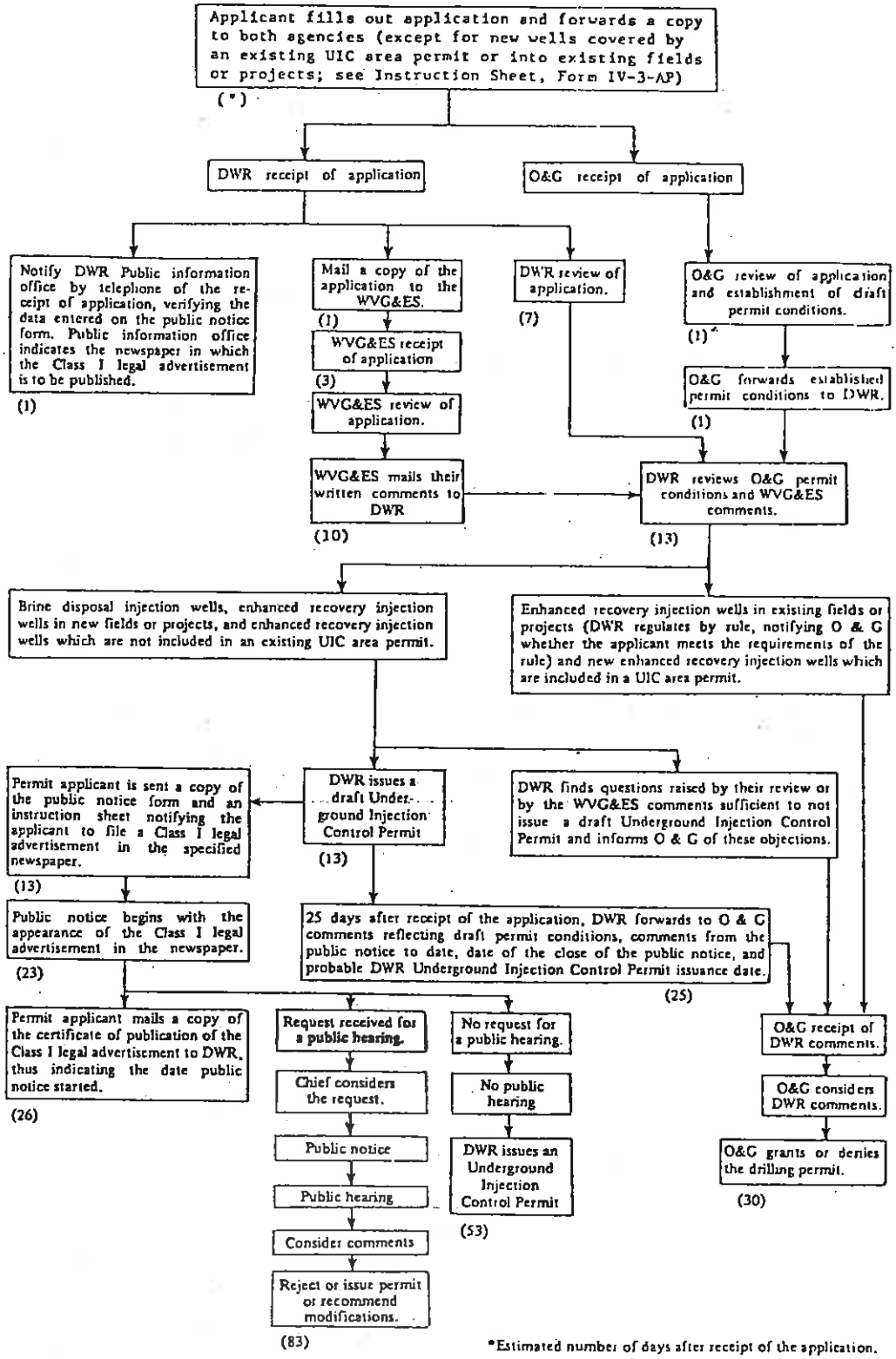
Upon receipt of a complete application by both the Division of Water Resources and the Office of Oil and Gas, the application is processed in a manner outlined in the FLOW CHART FOR PROCESSING CLASS II PERMIT APPLICATIONS (Figure V-2). The permit process requires 53 days from submission of a complete application. The permit process requires 83 days if a public hearing is required.

In an effort to increase agency coordination and to minimize the complexity of the system for the applicant, a single document was developed which contains both permits required for Class II wells (Appendix J). This single document will be put to public notice by the DWR through its normal permitting process.

FIGURE V-2

FLOW CHART FOR PROCESSING CLASS II PERMIT APPLICATIONS

Division of Water Resources (DWR); Office of Oil & Gas, Department of Mines (O&G); West Virginia Geological and Economic Survey (WVG&ES); Underground Injection Control (UIC)



*Estimated number of days after receipt of the application.

A. Application Information

The Chief will not issue a permit (except for an emergency permit) before receiving a complete application. An application for a permit is complete upon the receipt by the Chief of an application form and any supplemental information which are completed to the Chief's satisfaction. All applicants for UIC permits shall provide the following information using the application form provided by the Chief (Appendix H):

(1) The activities conducted by the applicant which require the obtaining of permits under the State UIC Program.

(2) Name, mailing address, and location of facility for which the application is submitted.

(3) Up to four SIC (Standard Industrial Code) codes which best reflect the principal products or services provided by the facility.

(4) The operator's name, address, telephone number, ownership status, and status as Federal, State, private, public or other entity.

(5) A listing of all permits or construction approvals received or applied for under any of the following programs:

(i) Hazardous Waste Management program under RCRA and West Virginia Code, Chapter 20-5E-1 et seq.

(ii) NPDES program under CWA and State Act.

(iii) Prevention of Significant Deterioration (PSD) program under the Clean Air Act.

(iv) Nonattainment program under the Clean Air Act.

(v) National Emission Standards for Hazardous Pollutants (NESHAPS) pre-construction approval under the Clean Air Act.

(vi) Dredge or fill permits under Section 404 of CWA.

(vii) Other relevant environmental permits, including State

permits.

(6) A topographic map extending one mile beyond the property boundaries of the source, depicting the facility and each well where fluids from the facility are injected underground and those wells, springs, other surface water bodies, and drinking water wells listed in public records or otherwise known to the applicant in the map area.

(7) A brief description of the nature of the business.

(8) The owner or operator of a proposed new injection well shall submit plans for testing, drilling, and construction as part of the permit application.

Applicants shall keep records of all data used to complete permit applications and any supplemental information submitted for a period of at least three years from the date the application is signed.

The permit application shall be signed as follows:

(1) For a corporation: by a principal executive officer of at least the level of vice-president;

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

Any person signing a permit application must make the following certification:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting

false information, including the possibility of fine and imprisonment."

The permit shall require the permittee to maintain financial responsibility and resources to close, plug, and abandon underground injection wells in a manner prescribed by the Chief. The permittee must show evidence of financial responsibility to the Chief by submission of a surety bond, or other adequate assurance, such as a financial statement or other material acceptable to the Chief.

All of the information listed above must be submitted for permit applications for new wells. The Chief may rely on the State permit file for those items of information which are current and accurate in the case of repermitting an existing well (State UIC Regulations, Sections 8.05(a) and 10.05(a)).

Any information submitted to the State pursuant to the UIC Regulations may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed on the application form or instructions or, in the case of other submission, by stamping the words "CONFIDENTIAL BUSINESS INFORMATION" on each page containing such information. If no claim is made at the time of submission, the State may make the information available to the public without further notice.

Claims of confidentiality for the following information will be denied:

(1) The name and address of any permit applicant or permittee.

(2) Information which deals with the existence, absence, or level of contaminants in drinking water.

Upon a satisfactory showing to the Chief that such records, reports, permit documentation, or information would, if made public, divulge methods

or processes entitled to protection as trade secrets, the Chief shall consider, treat and protect such records as confidential. It is the responsibility of the person claiming any information as confidential to clearly mark each page containing such information with the word "CONFIDENTIAL" and to submit an affidavit setting forth the reasons that said persons believes that such information is entitled to protection. Any document submitted to the Chief which contains information for which a claim of confidential information is made must be submitted in a sealed envelope marked "CONFIDENTIAL" and addressed to the Chief. The document must be submitted in two separate parts. The first part must contain all information which is not deemed as confidential by the person preparing the report and shall include appropriate cross-references to the second part. The second part contains data, words, phrases, paragraphs, or pages and appropriate affidavits containing or relating to the information which is claimed to be confidential. No information shall be protected as confidential information by the Chief unless it is submitted in accordance with the provisions above. No information which is submitted in accordance with the provisions above shall be afforded protection as confidential information unless the Chief finds that such protection is necessary to protect trade secrets and that such protection will not hide from public view the characteristics of waste materials and probable effects of the introduction of such wastes or by-products into the environment. The person who submits information claimed as confidential shall receive written notice from the Chief as to whether the information has been accepted as confidential or not.

B. Permit Conditions

The following conditions are intended to assure compliance with the requirements of the State Act, the State UIC Regulations and the Safe Drinking Water Act.

1. Conditions Applicable to All Permits (State UIC Regulations, Section 13.12)

The following must be incorporated into permits either expressly or by reference (by means of a specific citation of the regulations in the permit).

The permittee has a duty to comply with all permit conditions. Any permit noncompliance constitutes a violation of the SDWA and the State Act and is grounds for enforcement action, for permit actions (suspension or revocation, revocation and reissuance, or modification), or for denial of a permit renewal application. If a permittee wishes to continue an activity regulated by a permit after the expiration date of the permit, the permittee must apply for and obtain a new permit. A permittee has a duty to halt or reduce activity when operations are in noncompliance of permit conditions. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. The permittee has a duty to mitigate noncompliance activity. The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with his permit. This requires the proper operation and maintenance of the injection facility. The permittee shall at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of his permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and

training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

A permit may be modified, revoked and reissued, suspended, or revoked for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, suspension or revocation, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

Permits do not convey any property rights of any sort, or any exclusive privilege. The issuance of a permit does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations.

A permittee has a duty to provide information. The permittee shall furnish to the Chief (within a reasonable time) any information which the Chief may request to determine whether cause exists for modifying, revoking and reissuing, or revoking the permit, or to determine compliance with the permit. The permittee shall also furnish to the Chief, upon request, copies of records required to be kept by the permit.

The State has a right to inspection and entry. The permittee must allow the Chief, or an authorized representative (upon the presentation of credentials and other documents as may be required by law) to:

(a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the permit;

(b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit;

(c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under the permit; and

(d) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the SDWA and State Act, any substances or parameters at any location.

Samples and measurements taken for the purpose of monitoring must be representative of the monitored activity. A permittee must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These records must be retained for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of the Chief at any time. Records of monitoring information must include:

(a) The date, exact place, and time of sampling or measurements;

(b) The individual(s) who performed the sampling or measurements;

(c) The date(s) the analyses were performed;

(d) The individual(s) who performed the analyses;

(e) The analytical techniques or methods used; and

(f) The results of such analyses.

All permits must include the following reporting requirements. All applications, reports, or information submitted to the Chief shall be signed and certified as required under Section 13.11 of the State UIC Regulations. The permittee must give notice to the Chief as soon as possible of any planned significant physical alterations or additions to the permitted

facility, or any planned significant changes in the operation of the facility. Monitoring results must be reported at the intervals specified in the permit. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of the permit shall be submitted no later than 30 days following each compliance schedule date. The permittee must report any noncompliance which may endanger health or the environment immediately after the permittee becomes aware of the circumstances (by using the Division's designated spill alert telephone number). A written submission shall also be provided within five days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance (including exact dates and times) and, if the noncompliance has not been corrected, the anticipated time it is expected to continue. This written submission must also contain the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The permittee must also report all instances of non-compliance not previously listed (in this paragraph) as necessary to be reported. This other noncompliance must be reported at the time the next monitoring reports are submitted. The report must contain the information listed as required for the written submission described previously in this paragraph.

When a permittee becomes aware that he failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Chief, he shall promptly submit such facts or information.

A permittee must give advance notice to the Chief of any planned changes in the permitted facility or activity which may result in non-compliance with permit requirements.

A permit is not transferable to any person except after notice to the Chief. The Chief may require modification or revocation and reissuance of the permit to change the name of the permittee and may incorporate such other requirements as may be necessary under the SDWA and the State Act and regulations. In some cases, modification or revocation and reissuance is mandatory (see Section 13.17 of the State UIC Regulations).

Except for new wells authorized by an area permit (State UIC Regulations, Section 13.04(c)), a new well may not commence injection until construction is complete, the permittee has submitted notice of completion of construction to the Chief, and

(a) the Chief has inspected or otherwise reviewed the new injection well and finds it is in compliance with the conditions of the permit, or

(b) the permittee has not received (within thirteen days of the date of the permittee's notice of completion to the Chief) notice from the Chief of an intent to inspect or otherwise review the new injection well. In this case prior inspection or review is waived and the permittee may commence injection. The Chief must include (in this notice of intent to inspect) a reasonable time period in which the well must be inspected.

The permittee shall notify the Chief at such times as the permit requires before conversion or abandonment of the well or in the case of area permits before closure of the project. Chapter 22, Article 4, Section 1k of the West Virginia State Code states that no injection well may be plugged without a permit. An "Affidavit of Plugging and Filling" must be submitted to the Office of Oil and Gas (22-4-9, Regulation 16.02). The Commissioner of the Oil and Gas Conservation Commission must also be notified within ten days after the discontinuance of injection into an enhanced recovery well in a unitized field (22-4A, Regulation 4.04). The permittee has the

responsibility of contacting these agencies and obtaining the necessary permit and forms before conversion or abandonment of an injection well.

2. Duration of Permits (State UIC Regulations, Section 13.13)

UIC permits are effective for a fixed term not to exceed five years. The term of a permit may not be extended by modification beyond the maximum duration of five years, but the Chief may issue any permit for a duration that is less than the full five year allowable term.

3. Schedules of Compliance (State UIC Regulations, Section 13.14)

Any permit may, when appropriate, specify a schedule of compliance leading to compliance with the SDWA, the State Act and the State UIC regulations. Any schedules of compliance must require compliance as soon as possible. In addition, schedules of compliance must require compliance no later than three years after the effective date of the permit. If a permit establishes a schedule of compliance which exceeds one year from the date of permit issuance, the schedule must set forth interim requirements and the dates for their achievement (except for the case in which a permittee ceases regulated activities and the current permit contains a schedule for termination which ensures timely compliance with applicable (requirements). However, the time between interim dates must not exceed one year. If the time necessary for completion of any interim requirement (such as the construction of a control facility) is more than one year and is not readily divisible into stages for completion, the permit shall specify interim dates for the submission of reports of progress toward completion of the interim requirements and indicate a projected completion date. The permit must be written to require that no later than 30 days following each interim date and the final date of compliance, the permittee must notify the Chief in writing of compliance or noncompliance with the interim or final requirements.

A UIC permit applicant or permittee may cease conducting regulated activities (by plugging and abandonment) rather than continue to operate. The applicant may fulfill permit requirements as described in Section 13.14(b) of the State UIC Regulations.

4. Recording and Reporting Monitoring Results (State UIC Regulations, Section 13.15)

All permits must specify requirements concerning the proper use, maintenance and installation (when appropriate) of monitoring equipment or methods. The permit must also describe the required monitoring (type, intervals, frequency sufficient to yield data representation of the monitored activity, and if applicable, continuous monitoring). Finally, the permit must specify the applicable reporting requirements based upon the impact of the regulated activity and as specified in the State UIC Regulations.

C. Permit Changes

1. Transfer of Permits

Except in the case of automatic transfers, a permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued, or a minor modification made to identify the new permittee and incorporate such other requirements as may be necessary under the SDWA and the State Act and the State UIC Regulations. Any UIC permit for a well not injecting hazardous waste may be automatically transferred to a new permittee if:

(a) the current permittee notifies the Chief at least 30 days in advance of the proposed transfer date;

(b) the notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility coverage, and liability between them and the notice demonstrates that the financial responsibility requirements of Section

13.07(g) of the State UIC Regulations will be met by the new permittee; and

(c) the Chief does not notify the existing permittee and the proposed new permittee of an intent to modify or revoke and reissue the permit. A modification under this section may also be a minor modification under Section 13.20 of the State UIC Regulations. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned above.

2. Termination of Permits (State UIC Regulations, Section 13.19)

The Chief may revoke or suspend a permit during its term (or deny a permit renewal application) if the permittee is in noncompliance with any condition of the permit. The permittee's failure (in the application or during the permit issuance process) to disclose fully all relevant facts or the permittee's misrepresentation of any relevant facts (at any time) is also sufficient cause for the Chief to revoke, suspend or deny permit renewal. Finally, the Chief may take any of these mentioned termination actions if a determination is made that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or revocation.

3. Modification or Revocation and Reissuance of Permits (State UIC Regulations, Section 13.18)

When the Chief receives any information (for example, inspects the facility, receives information submitted by the permittee as required in the permit, receives a request for modification or revocation and reissuance, or conducts a review of the permit file) he or she may determine whether or not one or more of the causes (listed in 13.18(a) and 13.18(b) of the State UIC Regulations) for modification or revocation and reissuance or both exists. If cause exists, the Chief may modify or revoke and reissue the permit accordingly (subject to the limitations on the consideration of facility siting as stated in 13.18(c)) and may request an updated application

if necessary. When a permit is modified, only the conditions subject to modification are reopened. If a permit is revoked and reissued, the entire permit is reopened and subject to revision and the permit is reissued for a new term. If cause does not exist under this section or Section 13.20 of the State UIC Regulations, the Chief shall not modify or revoke and reissue the permit. If a permit modification satisfies the criteria in Section 13.20 for "minor modifications" the permit may be modified without a draft permit or public review. Otherwise, a draft permit must be prepared.

D. Types of Permits

This section describes the various types of permits which exist in addition to the standard Underground Injection Control Program permit.

1. Area Permits (State UIC Regulations, Section 13.04)

The Chief may issue a permit on an area basis, rather than for each well individually, provided that the permit is for injection wells which meet the following criteria. If the wells are existing wells, they must be described and identified by location in permit applications. The Chief may accept a single description of such existing wells if they have substantially the same characteristics. Wells to be included in an area permit must be within the same well field, facility site, reservoir project, or similar unit in the State. They must be operated by a single owner and they must inject fluids which are not hazardous waste.

Area permits must specify the area within which the underground injections are authorized and the requirements for construction, monitoring, reporting, operation, and abandonment (for all wells which are authorized by the permit). The area permit may authorize the permittee to construct and operate, convert, or plug and abandon wells within the permit area provided:

(1) The permittee notifies the Chief at such time as the permit

requires;

(2) The additional well satisfies the criteria in the preceeding paragraph and meets the requirements specified in this paragraph above; and

(3) The cumulative effects of drilling and operation of additional injection wells are considered by the Chief during evaluation of the area permit application and are acceptable to him.

If the Chief determines that any well constructed within the area of an area permit does not satisfy any of the requirements mentioned in (1) and (2) of the above list, the Chief may modify the permit, revoke the permit, or take enforcement action. If the Chief determines that cumulative effects are unacceptable, the permit may be modified.

2. Temporary Emergency Permits (State UIC Regulations, Section 13.05)

The Chief may temporarily permit a specific underground injection which has not otherwise been authorized by rule or permit if:

(1) An imminent and substantial endangerment to the health of persons will result unless a temporary emergency permit is granted; or

(2) A substantial and irretrievable loss of oil or gas resources will occur unless a temporary emergency permit is granted to a Class II well; and

(i) Timely application for a permit could not practicably have been made; and

(ii) The injection will not result in the movement of fluids into underground sources of drinking water; or

(3) A substantial delay in production of oil or gas resources will occur unless a temporary emergency permit is granted to a new Class II well and the temporary authorization will not result in the movement of fluids into an underground source of drinking

water.

Permits granted under (1) of the above list must have their term no longer than required to prevent the hazard. Any permit granted under (2) of the above list shall be for no longer than ninety days (except when a permit application has been submitted prior to the expiration of the ninety day period, at which time the Chief may extend the temporary permit until final action on the application). Permits granted under (3) of the above list may be issued only after a complete permit application has been submitted and shall be effective until final action on the application.

Notice of any temporary emergency permit must be published within ten days of the issuance of the permit. The temporary permits may be either oral or written. If oral, they must be followed (within five calendar days) by a written temporary emergency permit. The Chief must condition temporary permits in any manner determined as necessary to ensure that the injection will not result in the movement of fluids into an underground source of drinking water.

3. Draft Permits (State UIC Regulations, Section 13.32)

Once an application is complete, the Chief must decide whether to prepare a draft permit or to deny the application. If the Chief decides to prepare a draft permit, it must contain all conditions under Section 13.06, 13.07, and 13.12 of the State UIC Regulations, all compliance schedules, and all monitoring requirements.

E. Special Conditions of Permitting (State UIC Regulations, Sections 13.07(i) and 13.08)

The Chief shall impose on a case-by-case basis such additional conditions as are necessary to prevent the migration of fluids into underground sources of drinking water. There are also two cases where the Chief may waive certain permit requirements to the extent that the reduction in requirements will not result in an increased risk of movement of fluids into an under-

ground source of drinking water.

The first case occurs when injection does not occur into, through, or above an underground source of drinking water (the Chief may then authorize a well or project with less stringent requirements for area of review, construction, mechanical integrity, operation, monitoring, and reporting). The second case is when injection occurs through or above an underground source of drinking water, but the computed radius of endangering influence is smaller or equal to the radius of the well (the Chief may authorize a well or project with less stringent requirements for operation, monitoring, and reporting). When reducing requirements, the Chief shall explain the reasons for the action by preparing a fact sheet as described in Section 13.31 of the State UIC Regulations.

VI. Compliance Tracking

A. Monitoring and Reporting Requirements (Sections 8.04, 10.04 and 11.04 of the State UIC Regulations)

Certain monitoring and reporting requirements must be specified in all permits. Among these specified requirements is a description of the required monitoring, including the type, intervals and frequency sufficient to yield data which are representative of the monitored activity (including continuous monitoring requirements when appropriate). The proper use, maintenance and installation of monitoring equipment or methods must also be specified when appropriate. Additionally, the applicable reporting requirements based upon the impact of the regulated activity and as specified in the State UIC Regulations must be stated in the permit.

1. Class I Wells

The Chief shall prescribe requirements for the monitoring of the injection well, the injection fluids, and the underground sources of drinking water that could potentially be affected by the injection. The Chief shall also prescribe the form, manner, content and frequency of reporting by the operators of Class I wells. The operator shall be required to identify the types of tests and methods used to generate the monitoring data.

The monitoring requirements prescribed in the permit for a Class I well must include certain items at a minimum. Testing of the injected fluids with sufficient frequency to yield representative data of its characteristics is required. Continuous recording devices must be installed to monitor injection pressure, flow rate and volume, and the pressure on the annulus between the tubing and the long strings of casing. A demonstration of mechanical integrity is required at least every five years during the life of the well. It is also necessary to list the type, number and location of wells within the area of review which are to be used to monitor

any migration of fluids into and the pressure in the underground sources of drinking water. The parameters to be measured and the frequency of monitoring must also be specified. The permittee is required to maintain the results of required monitoring for at least three years.

The reporting requirements incorporated into a Class I permit also have certain required minimums. Quarterly reports must be made to the Chief on:

(i) The physical, chemical and other relevant characteristics of injected fluids;

(ii) Monthly average, maximum, and minimum values for injection pressure, flow rate and volume, and annular pressure; and

(iii) Monitoring of pressure and quality in underground sources of drinking water.

Reporting of the periodic demonstration of mechanical integrity and of any other test of the injection well conducted by the permittee as required by the Chief must be included in the first quarterly report following the completion of these tests. Written notice to the Chief is required within 30 days after any compliance schedule date whether the permittee has or has not complied with the requirements in question. Immediate reports to the Chief are required of any violation of a permit condition or malfunction of the injection system which may cause fluid migration into or between underground sources of drinking water.

2. Class II Wells

The monitoring and reporting requirements for Class II wells are found in Section B,3 of the Application for Program Authorization for Class II Wells.

3. Class III Wells

The Chief shall prescribe the form, manner, content and frequency of reporting by operators of Class III wells. The operators shall be required to identify the types of tests and methods used to generate the monitoring data.

The monitoring requirements include the monitoring of the nature of the injected fluids with sufficient frequency to yield representative data on its characteristics. Whenever the injection fluid is modified to the extent that the analysis supplied with the permit application is incorrect or incomplete, a new analysis must be provided to the Chief. Also necessary is monitoring of injection pressure and either flow or volume (semi-monthly), or metering and daily recording of injected and produced fluid volumes as appropriate. Mechanical integrity must be demonstrated at least every five years during the life of the well for salt solution mining. Monitoring of the fluid level in the injection zone is required semi-monthly where appropriate, as is the semi-monthly monitoring of the parameters chosen to measure water quality in the monitoring wells as indicated by Section 10.02(f) of the State UIC Regulations. Quarterly monitoring of wells is required by Section 10.02(h) of the State UIC Regulations. All Class III wells may be monitored on a field or project basis (rather than individual well basis) by manifold monitoring. Manifold monitoring may be used in cases of facilities consisting of more than one injection well which are operating with a common manifold. Separate monitoring systems for each well are not required provided the owner/operator demonstrates that manifold monitoring is comparable to individual well monitoring.

The reporting requirements include the quarterly monitoring reports on wells, the results of mechanical integrity and any other periodic

test required by the Chief (reported in the first regular quarterly report after the completion of the test), written notice to the Chief within 30 days of any compliance schedule date (whether the permittee has or has not complied with the requirement in question), and immediate reporting to the Chief on any violation of a permit condition or malfunction of the injection systems which may cause fluid migration into underground sources of drinking water.

4. Class IV Wells

Although no Class IV wells are known to exist in West Virginia and none will be permitted by the State in the future, provisions have been made for the possibility that such wells may be discovered during the six month period after the State receives full program authorization from EPA (the operation of any existing Class IV well is prohibited after this six month period). To cover this possibility, the State UIC Regulations state that the Chief shall prescribe monitoring and reporting requirements for existing Class IV wells while they are operating. Also, the Chief shall prescribe the form, manner, content and frequency of reports. The permittee shall be required to identify the types of tests and methods used to generate the monitoring data.

Monitoring requirements include certain minimum procedures, such as record keeping as required in Chapter 20, Article 5E of the West Virginia Code, as amended, and the regulations thereunder. Weekly monitoring of existing water supply wells in the vicinity for parameters based upon the characteristics of the injection fluid is also necessary. The results of monitoring must be retained by the permittee as required under Section 13.12(j)(2) of the State UIC Regulations.

At a minimum, the reporting requirements include quarterly reporting of the results of monitoring, immediate notification to the Chief of any change in the concentration of any parameter measured at an existing

water supply well, and written notification to the Chief within 30 days after any compliance schedule date (whether the owner or operator has or has not complied with the requirement in question).

5. Class V Wells

Class V wells have no monitoring or reporting requirements because their impacts on underground sources of drinking water have not been assessed.

B. Compliance Evaluation Program

All monitoring forms and reports required to be submitted (except for Class II wells) will be forwarded to the Permits Section of the Hazardous Waste/Ground Water Branch. All monitoring forms and reports for Class II wells will be forwarded to the appropriate oil and gas agency. The monitoring forms and reports will then be compared with the scope of permitted activity to verify compliance. After compliance status has been determined, information will be entered in a computerized data retrieval system and the monitoring forms and reports themselves will be filed.

If reporting schedules are not followed and required materials are not submitted within a reasonable time following due dates, a reminder letter will be forwarded to the facility specifying a time by which it must be submitted. If the required materials have not been submitted by the established time, or if a history of non-reporting or late reporting requiring reminders develops, appropriate action will be taken.

When the monitoring forms or reports show permit violations, the facility monitoring records will be examined for trends and future submissions by the violator will be scrutinized for further violations and trends. If violations persist or increasing trends develop, either the Compliance Assurance Section or the Field Operations Branch will be

requested to carry out the necessary investigation of the situation. The Oil and Gas agencies have the primary responsibility to investigate Class II well violations. Investigations which confirm violations may result in issuance of an Order by the Chief or in other available enforcement actions.

This process will be augmented by unannounced inspections whose purpose will be to develop information on compliance independent of the information supplied by the permittee. There will also be a regular program of comprehensive inspections by the Compliance Assurance Section. Both of these types of inspections will seek to determine compliance with permit conditions, to verify the accuracy of submitted information, and to examine the adequacy of monitoring and other information generating methods. Facts gathered in these investigations will be recorded and incorporated in inspection reports. These inspection reports will be examined by Permits Section personnel to determine compliance.

The Compliance Assurance Section has four inspectors. These inspectors will work in cooperation with inspectors from the Field Operations Branch of the DWR. Field Operations inspectors are located in six districts covering the entire state. They each reside in and are well acquainted with their assigned areas. These two sets of inspectors, combined with the DWR Monitoring Branch personnel give sufficient staff to conduct compliance inspection work.

The inspectors are the DWR's principal investigatory group. They respond to citizen complaints, spill reports, etc. Monitoring report violations noted by the Permits Section will result in requests to either the Compliance Assurance Section or the Field Operations Branch to

investigate further. Citizen complaints may be received by phone, in writing or in person at the office in Charleston or at one of the district offices. Complaints will be recorded (if not submitted in written form) and then evaluated to determine their priority. High priority complaints will take precedence over ongoing field work and will be investigated promptly. The complainant is contacted regarding the results of the investigation. Written complaints will be answered in writing. Others will be answered in person or by phone.

DWR inspectors have the authority to enter any site or premises subject to regulation. This authority is found in several sections of Chapter 20, Article 5A of the Code of West Virginia, as amended. The most important section (20-5A-3(d)) states:

> Whenever required to carry out the objectives of this article: (A) The Chief shall require the owner or operator of any point source or establishment to (i) establish and maintain such records, (ii) make such reports, (iii) install, use and maintain such monitoring equipment or methods, (iv) sample such effluents in accordance with such methods at such locations, at such intervals and in such manner as the Chief shall prescribe, and (v) provide such other information as he may reasonably require; and (B) the Chief or his authorized representative upon presentation of credentials (i) shall have a right of entry to, upon or through any premises in which an effluent source is located or in which any records required to be maintained under (A) of this subsection are located, and (ii) may at reasonable times have access to and copy any records, inspect any monitoring equipment or method required under (A) of this subsection and sample any streams in

the area as well as sample any effluents which the owner or operator of such source is required to sample under (A) of this subsection.

In addition to the citation above, Section 8 of the Act gives the Chief and his authorized representatives the authority to inspect activities for permit compliance, from the construction phase through the operation and maintenance phase. The Chief's general powers and duties under Sections 3(a)(1) and 3(a)(12) of the Act provide additional authority regarding compliance. The State UIC Regulations Section 13.12(i) states:

> The permittee shall allow the Chief, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:
>
> (1) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
>
> (2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
>
> (3) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
>
> (4) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the SDWA and State Act, any substances or parameters at any location.

All inspections will be performed in such a manner that the information collected is relevant to the permit violation and that it is collected in a

competent manner. Such information will be admissible as evidence in enforcement proceedings or in court. Collected information is recorded on site in the inspection log. This log includes a photo log and site map. Samples collected are taken, preserved, and handled in an EPA-approved manner as outlined in the current applicable Federal Register. Compliance Assurance Section, Field Operations Branch and Monitoring Branch personnel have field manuals outlining these procedures. "Chain of custody" procedures are currently in use. The inspection report is written based on the above factual information.

VII. Enforcement

The enforcement of the State UIC Program for Class II wells will primarily be the responsibility of the Office of Oil and Gas of the Department of Mines and the Oil and Gas Conservation Commission. A description of this enforcement program may be found in Section E of the Application for Program Authorization for Class II Wells under Section 1425 SDWA. The coordination of this enforcement program with that of the DWR is delineated in the MOU between these agencies (Appendix D).

The MOU indicates the following responsibilities regarding enforcement of Class II permits for the Chief of the DWR, the Administrator of the Office of Oil and Gas, and the Commissioner of the Oil and Gas Conservation Commission. The Administrator and the Commissioner shall review all monitoring forms and reports and shall take such actions as are necessary and appropriate to enforce all the terms and conditions of Office of Oil and Gas Class II well permits, except for those existing brine disposal wells which are currently operating under a permit from the DWR. (These wells will be repermitted under the system described in the MOU. When a brine disposal well is repermitted, the responsibility for the review of monitoring forms and reports by the Administrator and the Commissioner begins.) The Administrator and the Commissioner shall inform the Chief of enforcement actions taken by sending him a copy of each abatement form, criminal warrant, or court action filed on any Class II well facility. The Administrator and the Commissioner shall promptly inform the Chief of any violations of the DWR permit which are not also violations of the Office of Oil and Gas permit. The Chief shall coordinate the inspection and enforcement of Class II well permits with the Administrator and the Commissioner, taking appropriate enforcement action after this coordination.

The DWR enforcement program for all well classes is described in the following portions of this section.

A. Description of DWR Enforcement Program

When an inspector discovers noncompliance with permit conditions, a detailed, factual description of the noncompliance is recorded in the inspection log book. This log book and any other documentation of the noncompliance (such as photos, laboratory analysis of samples, etc.) are then incorporated into the inspection report.

Examination of the facts documented by the inspection report will be followed by the selection of the appropriate procedures necessary to obtain compliance. This selection process includes consultation between the Hazardous Waste/Ground Water Permits section, Enforcement section and the Chief.

The following administrative procedures are available to obtain compliance. Administrative orders may be made and entered by the Chief under Chapter 20, Article 5A of the West Virginia Code, as amended. These orders include: permit modification, revocation and suspension orders (20-5A-8); remedial action orders and cease and desist orders (20-5A-10); emergency orders (20-5A-12a) described in VII,C; and denial orders (20-5A-7). Any person adversely affected by such orders of the Chief has the right to appeal to the Water Resources Board (20-5A-15). Any person or the Chief adversely affected by an order made and entered by the Water Resources Board is entitled to judicial review of such order (20-5A-16). The judgment of the circuit court is final unless reversed, vacated or modified on appeal to the supreme court.

B. Remedies for Violation

State authority for maximum civil and criminal penalties is cited in Section 7 of the Attorney General's Statement and is in accordance with 40 CFR Section 123.9(a)(3). The Chief may apply to the State circuit courts or their judges for injunctive relief to compel compliance in accordance with Chapter 20, Article 5A, Section 17 of the West Virginia Code, as amended. Civil penalties agreed upon in settlements shall be appropriate

to the violation.

C. Emergency Action

Chapter 20, Article 5A, Section 12a of the West Virginia Code, as amended, describes how the Chief may issue emergency orders. The Chief may issue such orders whenever the discharge, release, deposit or escape of a pollutant into the waters of the State constitutes a clear, present and immediate danger to the health of the public or to the fitness of a private or public drinking water supply. The Chief must obtain the written concurrance of the Director of the Department of Natural Resources and the Director of the Department of Health to issue such an order. Such emergency orders may require the immediate cessation or abatement of any such discharge, release, escape, deposit or disposition, and the cessation of any drilling, redrilling, deepening, casing, fracturing, pressuring, operating, plugging, abandoning, converting or combining of any well, or require such other actions deemed necessary to abate the danger. Any emergency order issued in the above mentioned manner shall be effective immediately.

D. Compliance with Authorization by Rule

The notification of owners or operators of existing injection wells (which will be made when the State receives full authorization for the UIC Program) will contain a description of the types of wells which will be regulated by rule, the requirements of the regulations which they must meet (within one year), and notification of their duty to submit specified inventory information. They will be instructed to notify the DWR as they come into compliance with these requirements of the regulations. Inspections of this compliance will be made as the DWR is notified.

Since Class II enhanced recovery wells are operating under existing State permits based on current statutes and regulations and will continue to do so upon EPA authorization of the Application for Class II Wells under

Section 1425 SDWA, the enforcement and compliance procedures described in the Section 1425 Application and the MOU will apply. Existing Class I, Class II brine disposal, and Class III wells will be operating under existing permits from the DWR until repermitting and will be subject to regular compliance assurance inspections and the enforcement action described previously as required by existing State statutes and regulations.

VIII. TECHNICAL REQUIREMENTS

This section describes the technical requirements of the State UIC Program. These requirements are designed to prevent the movement of fluid containing contaminants into USDW's. These criteria and standards are the foundation of the UIC permitting program.

Class II technical requirements are those which are required pursuant to Chapter 22, Article 4, Section 1 et. seq. and Chapter 22, Article 4A, Section 1 et. seq. and the regulations thereunder and any other requirements that the Chief considers reasonably necessary to ensure that no pollution of USDW's occurs (Section 9.00, State UIC Regulations). These requirements of Chapter 22-4 and Chapter 22-4A are described in Section D of the Application for Program Authorization for Class II Wells Under Section 1425 of the SDWA.

Class IV wells have no technical requirements because no new ones will be permitted and existing ones must cease operations within six months of the State achieving full program authorization. Class V technical requirements have not been determined as they have not yet had the effects of their injections assessed. Thus, this section describes Class I and Class III well requirements.

A. Construction Requirements (State UIC Regulations, Sections 8.02 and 10.02)

Class I and Class III well regulations are designed to ensure that each well is constructed in a manner which prevents movement of injection fluids and/or formation fluids into USDW's. The permit applicant should submit a design which achieves this goal. This design should be of sufficient detail and accompanied by the appropriate required information in order to clearly indicate to the DWR that this has been accomplished.

1. Siting

Each Class I well shall be sited in such a fashion that it injects into a formation which is below the lowermost formation containing an underground source of drinking water within 1/4 mile of the well bore. This injection formation must have an overlying confining bed that is free of known faults or fractures within the area of review. Class I wells which will inject hazardous wastes must also comply with the additional siting requirements mentioned in part H of this section.

Class III wells have no siting requirements. They are located where the minerals, which are solution mined, naturally occur.

2. Casing and Cementing

All new Class I and Class III wells shall be cased and cemented to prevent the migration of fluids into or between underground sources of drinking water. The Chief may waive the cementing requirement for new Class III wells in existing projects or portions of existing projects where he has substantial evidence that no contamination of underground sources of drinking water would result. The casing and cement used in the construction of each newly drilled well shall be designed for the life expectancy of the well. In determining the specifying casing and cementing requirements, the Chief shall consider the following factors:

a. Depth to the injection zone;

b. Injection pressure (external pressure, internal pressure, axial loading, etc.);

c. Hole size;

d. Size and grade of all casing strings (wall thickness, diameter, nominal weight, length, joint specifications, construction material, etc.);

e. Corrosiveness of injected and formation fluids;

f. Lithology of possible injection and confining zones;

g. Type and grade of cement; and

h. Temperatures of injected fluid and formation fluid, (Class I wells only).

3. Tubing and Packer

All Class I injection wells, except for those municipal wells injecting non-corrosive wastes, shall inject fluids through tubing and packer set immediately above the injection zone. The tubing and packer shall be designed for the expected service. Class III wells have no tubing and packer requirements.

The use of other alternatives to a packer may be allowed with the written approval of the Chief. To obtain approval, the operator shall submit a written request to the Chief. This written request shall set forth the proposed alternative and all technical data supporting its use. The Chief shall approve the request if the alternative method will reliably provide a comparable level of protection to USDW's. The Chief may approve an alternative method solely for an individual well or for general use.

In determining and specifying requirements for tubing and packer, the Chief shall consider the following factors:

a. Depth of setting;

b. Characteristics of injection fluid (chemical content, density, etc.);

c. Injection pressure;

d. Annular pressure;

e. Rate, temperature and volume of injected fluid; and

f. Size of casing.

4. Logs and Other Tests

a. Class I Wells

Logs and other tests shall be conducted during the drilling and construction of new Class I wells. A descriptive report interpreting the results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the Chief. At a minimum such logs and tests shall include:

(i) Directional surveys conducted on all holes, including pilot holes, at sufficiently frequent intervals to assure that vertical avenues for fluid migration in the form of diverging holes are not created during drilling;

(ii) For surface casing intended to protect underground sources of drinking water:

(a) Resistivity, spontaneous potential and caliper logs before the casing is installed; and

(b) A cement bond, temperature, or density log after the casing is set and cemented.

(iii) For intermediate and long strings of casing intended to facilitate injection:

(a) Resistivity, spontaneous potential, porosity, and gamma ray logs before the casing is installed;

(b) Fracture finder logs in appropriate situations as prescribed by the Chief; and

(c) A cement bond, temperature, or density log after the casing is set and cemented.

b. Class III Wells

Appropriate logs and other tests shall be conducted during the drilling and construction of new Class III wells. A descriptive report interpreting the results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the Chief.

The Chief shall specify the logs and tests appropriate to each type of Class III well based on the intended function, depth, construction and other characteristics of the well, availability of similar data in the area of the drilling site and the need for additional information that may arise from time to time as the construction of the well progresses. At a minimum, such logs and tests, shall, as appropriate, include:

(i) Deviation checks conducted on all holes where pilot holes and reaming are used, unless the hole will be cased and cemented by circulating cement to the surface. Where deviation checks are necessary they shall be conducted at sufficiently frequent intervals to assure that vertical avenues for fluid migration in the form of diverging holes are not created during drilling;

(ii) For surface casing intended to protect underground sources of drinking water:

(a) Resistivity, spontaneous potential, and caliper logs before the casing is installed; and

(b) A cement bond, temperature, or density log after the casing is set and cemented.

(iii) For intermediate and long strings of casing intended to facilitate injection:

(a) Resistivity, spontaneous potential, porosity, and gamma ray logs before the casing is installed;

(b) Fracture finder logs in appropriate situations as prescribed by the Chief; and

(c) A cement bond, temperature, or density log after the casing is set and cemented.

5. Injection Formation Information

a. Class I Wells

At a minimum, the following information concerning the injection formation shall be determined for new Class I wells, and submitted to the Chief:

(i) Fluid pressure;

(ii) Temperature;

(iii) Fracture pressure;

(iv) Other physical and chemical characteristics of the injection matrix;

(v) Physical and chemical characteristics of the formation fluids; and

(vi) Compatibility of injected fluids with formation fluids.

b. Class III wells

If the injection formation is not a water bearing formation, fracture pressure must be submitted. If the injection zone is a formation which is naturally water bearing, the following information concerning the injection zone shall be determined or calculated for new Class III wells or projects:

(i) Fluid pressure;

(ii) Fracture pressure;

(iii) Physical and chemical characteristics of the formation fluids; and

(iv) The nature and volume of the injected fluid, the formation water and the process by-products.

B. Operating Requirements (State UIC Regulations, Sections 8.04 and 10.04)

The Chief shall prescribe requirements governing the operation of injection wells in the permit. Requirements for Class I and III shall, at a minimum, specify that:

1. Except during stimulation, injection pressure at the wellhead shall not exceed a maximum which shall be calculated so as to assure that the pressure in the injection zone during injection does not initiate new fractures or propagate existing fractures in the injection zone. In no case shall injection pressure initiate fractures in the confining zone or cause the movement of injection or formation fluids into a USDW;

2. Injection between the outermost casing protecting underground sources of drinking water and the well bore is prohibited; and

3. For Class I wells only, unless an alternative to tubing and packer has been approved, the annulus between the tubing and the long strings of casings shall be filled with a fluid approved by the Chief and a pressure, also approved by the Chief, shall be maintained on the annulus.

C. Area of Review Requirements (State UIC Regulations, Section 5.00)

The area of review may be defined as either the zone of endangering influence or an area within a fixed radius around each injection well.

The zone of endangering influence is that area, the radius of which is the horizontal distance from the injection well in which the pressures in the injection zone may cause the migration of the injection and/or

formation fluid into an underground source of drinking water. In the case of an application for an area permit, the zone of endangering influence is the area of the project plus a circumscribing area, the width of which is the horizontal distance from the perimeter of the project in which the pressures in the injection zone may cause the migration of the injection and/or formation fluid into an underground source of drinking water. The zone of endangering influence should be computed using an appropriate equation. This computation should use an injection time period equal to the expected life of the facility. The equation selected should be based upon, but not limited to, the following parameters:

1. Hydraulic conductivity of the injection zone;
2. Thickness of the injection zone;
3. Time of injection;
4. Storage coefficient;
5. Injection rate;
6. Observed original hydrostatic head of the injection zone (measured from the base of the lowest USDW);
7. Hydrostatic head of the USDW; and
8. Specific gravity of fluid in the injection zone.

A fixed radius around the well may be used to define the area of review. This fixed radius may not be less than 1/4 mile measured horizontally from the well bore. When an application is for an area permit, a fixed width may be used to define a circumscribing area around the perimeter of the project. The fixed width may not be less than 1/4 mile measured horizontally from the well bore. The perimeter of this circumscribing area defines the area of review. In determining a fixed radius or a fixed width to define an area of review, the following factors must be taken into

consideration: the chemistry of the injected and formation fluids; geology; hydrogeology; population and groundwater use and dependance; and historical practices in the area.

The Chief shall select the methods by which the area of review shall be established for each injection well or each field, project, or area of the State. Until a method has been selected by the Chief for use in a particular field or area of the State, the applicant may select either a fixed radius or calculation of the zone of endangering influence using an appropriate equation. This proposed method of establishing the area of review should be presented with the permit application.

If an applicant proposes a fixed radius as the area of review, the UIC technical staff will calculate the zone of endangering influence during the process of permit review. If this zone of endangering influence is less than the fixed radius selected by the applicant, the Chief will select the fixed radius as the method of establishing the area of review. If this zone of endangering influence is greater than the fixed radius selected by the applicant, the Chief will select the zone of endangering influence calculation method.

If an applicant calculates a zone of endangering influence, the Chief will review the adequacy of the equation selected for the calculation.

When sufficient permits have been processed to determine a preferred method of establishing the area of review for a particular field, project, or area of the State, this method will be presented to applicants for permits to inject in this particular field, project, or area of the State as the Chief's selected method.

D. Corrective Action Requirements (State UIC Regulations, Sections 6.01 and 13.09)

Applicants for Class I or III injection well permits shall identify