CHAPTER XV - INTERAGENCY COORDINATION: BRINE DISPOSAL, UNDERGROUND INJECTION AND OIL SPILL RESPONSE

A. INTRODUCTION

This Generic Environmental Impact Statement addresses regulation of the oil, gas and solution mining industries by the Division of Mineral Resources under Article 23 of the Environmental Conservation Law and supporting regulations. However, the Division of Mineral Resources (DMN) is not the sole regulator and decision maker for oil and gas operations in New York State. A number of aspects of oil and gas development are subject to regulation by other state, local and federal government agencies. Additional agencies may have an indirect role in the regulation of these operations. In addition, some issues in which DMN does not have a primary role in regulation are discussed in this chapter because of the close relationship with the DMN's own regulatory functions.

This chapter focuses generally on interagency coordination with local governments, and specifically on coordination with other agencies regarding brine disposal, underground injection and oil spill prevention and clean-up. Many detailed aspects of these direct and indirect relationships with other programs are described in previous chapters. Table 15.1 summarizes the roles of various agencies in the regulation of oil, gas, solution mining, and brine disposal operations in New York State.

B. LOCAL GOVERNMENT

New York's Oil, Gas and Solution Mining Law specifically supersedes all local laws or ordinances relating to the regulation of the oil, gas, solution mining, and brine disposal industries, but reserves to local governments jurisdiction over local roads and the rights of local governments under the Real Property Tax Law. This provision of the law was enacted because of legislative concern that a patchwork of conflicting local ordinances

TABLE 15.1

OIL, GAS, SOLUTION MINING, AND BRINE DISPOSAL INTERAGENCY COORDINATION

	AGENCY										
	DEC					Local Health	Local	Federal Agencies			Coast
	DMN	DRA	DW	DSHW	PSC	Agency	Govt.	EPA	FERC	Corps	Guard
New Wells											
Drilling	●	-	-	-	-	-	-	-	-	-	-
Stream Protection	-	●	-	-	-	-	-	-	-	-	-
Wetlands	-	●	-	-	-	-	*	-	-	●	-
Flood Plain	-	●	-	-	-	-	*	-	-	-	-
Site Restoration	●	-	-	-	-	-	-	-	-	-	-
Production Wells											
Taxation	-	-	-	-	-	-	●	-	-	-	-
Well Plugging	●	-	-	-	-	-	-	-	-	-	-
Production Operations	●	-	-	-	-	-	-	-	-	-	-
NGPA Price Determinations	O	-	-	-	-	-	-	-	●	-	-
Injection Wells											
Enhanced Oil Recovery	●	-	-	-	-	-	-	●	-	-	-
Brine Disposal	O	-	●	O	-	-	-	●	-	-	-
Underground Gas Storage	●	-	-	-	-	-	-	-	●	-	-
Solution Mining	●	-	-	-	-	-	-	●	-	-	-
Well Plugging Class II & III	●	-	-	-	-	-	-	●	-	-	-
Pipelines											
Gathering Lines	O	-	-	-	●	-	-	-	-	-	-
Stream Protection	-	●	-	-	-	-	-	-	-	-	-
Wetlands	-	●	-	-	-	-	*	-	-	●	-
Flood Plain	-	●	-	-	-	-	*	-	-	-	-
Intrastate Pipelines	-	-	-	-	●	-	-	-	-	-	-
Interstate Pipelines	-	-	-	-	-	-	-	-	●	-	-
Fluid Disposal											
Road Spreading	-	-	-	O	-	-	●	-	-	-	-
Stream Discharge	-	-	●	-	-	-	-	-	-	-	-
STP Disposal	-	-	●	-	-	-	●	-	-	-	-
Complaint Response											
Initial Response	O	-	-	-	-	●	-	-	-	-	-
Follow-up on Oil & Gas Complaints	●	-	-	-	-	O	-	-	-	-	-
Oil Spill Response (oil wells)	O	-	●	-	-	-	-	●	-	-	●

● Primary Role
O Secondary Role
- No Role
* Role pertains in certain circumstances

TABLE 15.1
15-1a

regulating oil, gas and solution mining might otherwise result, and because of legislative recognition of the need for technically sound regulation which would be difficult for individual local governments to achieve. At the same time, the Legislature recognized the need for coordination between State and local levels of government. For example, the law requires each person granted a drilling permit to give notice by certified mail to any affected local government prior to the commencement of drilling operations. This prior notice is also required to be given by certified mail to any landowner whose surface rights will be affected by drilling operations.

Certain aspects of the permit review process can directly involve local governments as described in Chapter 8. These include the issuance of wetlands permits and floodplain permits where local governments have asserted legal jurisdiction under State law. The use of local roads by oil and gas equipment is also regulated by local governments, as exemplified by weight limits placed on local roads during the spring thaw.

Chapter 869 of the Laws of 1985 amended the Real Property Tax Law in regard to taxation of oil and gas properties in New York State. Under this legislation, effective in 1986, the Department is required annually to submit information to real property tax directors on oil and gas production and on oil and gas well drilling permits for the preceding calendar year. Information provided to local governments is similar to that contained in the Department's annual Oil and Gas Production Report.

C. COMPLAINT RESPONSE

Due to the extent of the Department's regulatory responsibilities, the DEC receives a broad range of complaint reports on environmental problems. Among the types of complaints received are those that may be related to oil and gas activity. The appropriate agency for responding to complaints,

however, depends on the nature of the problem. Table 15.2 details New York Laws and Regulations related to oil, gas, solution mining, and brine disposal activity.

1. Water Supply Problems

The DOH enforces guidelines and standards for community and non-community water supply systems in New York State. A community water supply system is defined as a system that serves at least five service connections used by year-round residents, or regularly serves at least 25 year-round residents. There are approximately 3,400 community water supply systems, of which approximately 1,800 serve municipalities, with the remainder serving mobile home parks, apartments/condominiums and residential institutions. The federal Safe Drinking Water Act (SDWA) also establishes requirements for municipal water supplies, including establishment of drinking water standards and a program to protect aquifers that are sole sources of public water supplies. The SDWA Amendments of 1986 support state ground water quality management programs, including support for establishment of state wellhead protection programs. These measures will help to assure protection of public water supplies.

The great majority of the state's population is served by community water supplies, but some two million persons in upstate New York rely on individual groundwater supplies for their water. New York State Health Department regulations (10NYCRR 75) establish standards for individual household water supply and sewage disposal systems. These regulations provide that individual sewage disposal systems be designed and constructed in accordance with the "New York State Health Department Waste Treatment Handbook - Individual Household Systems" and that individual water supply systems be designed and constructed in accord with the DOH bulletin "Rural Water Supply." The two are closely inter-related from a public health perspective. To the extent that these

TABLE 15.2 NEW YORK STATE LAWS AND REGULATIONS RELATED TO OIL, GAS, AND SOLUTION MINING

Activity Subject	Authorizing Legislation	Regulations
Regulation of Oil, Gas and Solution Mining Drilling and Production	Environmental Conservation Law (ECL) Article 23, Titles 1 to 13, Title 19	6 NYCRR Part 550-559
State Environmental Quality Review Act (SEQRA)	ECL Article 8	6 NYCRR Part 617-618
State Pollutant Discharge Elimination System (SPDES) Permits	ECL Article 17, Title 7-8	6 NYCRR Part 750-758
Oil Spill Response and Cleanup	Navigation Law Article 12	6 NYCRR Parts 610-611 17 NYCRR Part 30-31
Waste Hauler Permits	ECL Article 27, Title 6	6 NYCRR Part 364
Protection of Freshwater Wetlands	ECL Article 24	6 NYCRR Parts 662-665
Protection of Water	ECL Article 15, Title 5 and Article 70	6 NYCRR Part 608
Floodplain Protection	ECL Article 36	6 NYCRR Part 500
Archeological and Historic Site Protection	State Historic Preservation Article 14	9 NYCRR Parts 428
Regulation of Intrastate Pipelines	Public Service Law (PSL) Article 7 and PSL Section 66	16 NYCRR Part 255

documents are followed they provide a measure of security, particularly with regard to bacteriological contamination, for the homeowner.

There is no legal mandate at the State level which requires approval of individual household systems. Compliance with the standards is accomplished through County sanitary codes, local building codes, but in most areas it is voluntary. "Rural Water Supply" standards are enforced by DOH for private wells under limited conditions: 1) Residences where social services pays the rent; 2) A temporary residence of three or more units with ten or more people (summer camps, mobile home parks, etc.); 3) New construction as part of the Building Construction Uniform Code.

The intensity of programs to regulate on-site sewage disposal varies among areas. Some counties have very active programs and very stringent requirements, while programs in other areas are non-existent except for response to nuisance complaints resulting from faulty sewage disposal systems.

Public Health Law, Article 11, Title 2 and ECL, Article 17, Title 15 also provide a mechanism for review and approval of water supply and wastewater disposal systems within realty subdivisions. A subdivision is defined as any tract of land which divided into five or more parcels for sale or for rent as residential lots or residential building plots. This program, administered by the State District Health Offices or local health departments having jurisdiction, requires the submission of realty subdivision plans for review and approval. Compliance with this program is enforceable by law and is the responsibility of the local health office having jurisdiction.

The diversity of jurisdictions having authority over local water supplies complicates the response to complaints about water supplies, including those complaints that complainants believe are related to oil and gas activity. Water supply complaints occur statewide and take many forms, including taste

and turbidity problems, water quantity problems, contamination by salt, gasoline and other chemicals, and problems with natural gas in water wells. All of these problems, including natural gas in water supplies, occur statewide and are not restricted to areas with oil and gas development. The lack of mandated approval for individual water supply system construction also complicates complaint investigations. The DOH and most county health departments will not sample well supply systems with substandard construction because poor construction can facilitate the movement of contaminants into water supplies, and water quality in these systems dramatically change in response to conditions such as recent precipitation.

The initial response to water supply complaints is best handled by the appropriate local health office, which has expertise in dealing with water supply problems. Formal procedures have been developed by the Department of Health's Buffalo office, under which local health units will respond to and investigate initial complaints on oil and gas operations to determine if the complaint is oil and gas-related and to provide determinations of possible public health problems. If the complaint is determined to be oil and gas related, it is referred to the appropriate Regional DMN staff for further investigation and resolution. It is expected that these procedures will provide increased coordination between the Division of Mineral Resources and local health units, and facilitate solution of problems.

However, these procedures apply only in three counties. Elsewhere, no formal mechanism exists for coordination of complaint investigations with local health units.

To better protect the integrity of individual water supplies, the DEC Upstate Groundwater Management Program recommends the enactment of a State Water Well Construction Code and legislation for the licensing of water well drillers.

2. Oil and Gas Well Drilling and Production

This chapter describes the regulatory jurisdiction of the Department of Environmental Conservation for oil, gas, solution mining and brine disposal well drilling and production. Complaints regarding these activities are handled by the DEC Division of Mineral Resources, through the appropriate DEC regional office. Problems concerning stream protection, wetlands and flood plains are the responsibility of the DEC Division of Regulatory Affairs (DRA), again through the appropriate DEC regional office.

Problems related to leases and lease interpretation are generally not within DEC jurisdiction. The New York State Attorney Generals' Office has published a booklet, "Guide for Landowners Selling Oil and Gas Leases", for landowners who are considering leasing their land for oil and gas development; a key recommendation is that landowners consult an attorney before signing a lease. Cornell Cooperative Extension has also developed a slide show that is available through local Coopertive Extension agents that provides information for landowners on the lease process.

3. Pipelines

The Department of Public Service regulates natural gas gathering lines and intrastate gas pipelines, as described in Chapter III. Complaints regarding this aspect of development are handled by Department of Public Service inspectors.

D. BRINE DISPOSAL

Environmentally-sound disposition of brine from oil and gas wells is a significant and increasing environmental issue. As New York State's active oil and gas wells mature, increases in volumes of brine production will occur. The brine consists of highly saline water that was trapped in place in the oil and gas reservoir rocks. At present, the acceptable alternatives for brine

disposal are limited. Allowable alternatives include road spreading, discharge to surface waters through permitted facilities and underground injection. In the future, it is anticipated that greater use will be made of underground injection and advanced technology treatment options.

1. Road Spreading

For decades, salt has been utilized by state and local governments in road and highway maintenance operations for ice control, dust control and road stabilization. Large amounts of salts are used during the winter for ice control, particularly in western New York. For example, in the winter of 1981/82, the New York State Department of Transportation alone used over 55,000 tons of salt in the counties in DEC Region 9 (Chautauqua, Cattaraugus, Erie, Niagara, Wyoming and Allegany counties).

Two specific salts are widely used in highway maintenance operations, sodium chloride (NaCl) and calcium chloride ($CaCl_2$). Sodium chloride is used more extensively in snow and ice control operations because of its lower cost. However, calcium chloride has several specific advantages over sodium chloride, both in snow and ice control operations and as a dust control and road stabilization agent. The lower freezing point of a calcium chloride solution is a particular advantage during extremely cold weather in removing ice and snow from highways. Calcium chloride is also significantly more hygroscopic, that is, able to absorb water from the atmosphere when humidity is greater than 29 percent. When used on dirt roads, calcium chloride's moisture-absorbing properties help to suppress dust and maintain stable road surfaces. Sodium chloride will not absorb water from the atmosphere until the humidity is greater than 80 percent and thus it is significantly less effective for dust control. Because of cost considerations, however, mixtures of sodium and calcium chloride are typically used in highway operations.

Brines from oil and gas wells in New York State typically contain both

sodium and calcium chloride although the composition of the brines varies according to their source. Brines and other fluids are generated during the drilling, completion and production of oil and gas wells. As discussed in Chapter 9, fluids produced during drilling and completion operations may be stored temporarily at the well site but must subsequently be properly disposed of in accordance with State regulatory requirements. The characteristics of drilling and completion fluids are such that they are not well-suited for use on roads because of variable concentrations of salts due to dilution with freshwater, rainwater and fluids from other operations.

Most production brine in New York comes either from shallow oil wells or from deep gas wells. The characteristics of the brines from these wells differ significantly as shown in Tables 15.3 and 15.4. Because of the long history of waterflooding operations in New York State shallow oil wells, the concentration of brine in shallow oil production waters has been significantly diluted with time. Production fluids from deep gas and Bass Island wells, on the other hand, have extremely high brine concentrations. Table 15.5 from a Pennsylvania study compares the chemical characteristics of commercial road salt, undiluted shallow oil brine and deep gas brine.

The characteristics of gas well brines are sufficiently similar to those of commercial road salts to make them attractive to local highway departments for use in road maintenance operations. Additional factors stimulating their use are the relatively low cost of brines and the need by producers for a means to properly dispose of these fluids. Until recently, towns have used commercial salts for such maintenance operations, but oil and gas brines have been utilized increasingly as a substitute at a substantial monetary savings. An estimated 90 percent of all brine produced in gas and new oil fields in New York State is now hauled off site and spread over roads for dust and ice

TABLE 15.3

BRINE CHEMICAL CHARACTERISTICS FROM NEW YORK PRODUCING ZONES

(Using Chemical Analyses Graded Fair or Better Quality)

Fair or Better Grade: Mass Balance ±1000–10,000 milligrams/liter and Cation/Anion Balance ± 0–100 milliequivalents/liter

Parameter (Mg/L)	Potsdam Theresa	Queenston	Medina	Oriskany	Bass Island	Upper Devonian Oil Zones
Sodium (Na)	76,712	73,500	69,893	45,457	60,750	36,367
Calcium (Ca)	31,256	36,603	37,124	33,684	56,400	16,467
Magnesium (Mg)	3,499	2,887	2,766	5,168	3,160	2,733
Strontium (Sr)	--	0	--	--	--	107
Barium (Ba)	750	0	--	--	--	8
Potassium (K)	3,367	1,124	--	1,307	--	71
Iron (Fe)	17	195	676	215	18	189
Manganese (Mn)	0	--	84	--	0	7
Chloride (Cl)	183,701	187,418	181,298	145,442	203,000	92,167
Bromide (Br)	1,417	1,120	1,721	1,687	--	860
Sulfate (SO_4)	18	--	736	57	180	619
Bicarbonate (HCO_3)	89	--	25	203	50	0
Iodine (I)	8.50	11.00	18.00	10.00	--	200.0
Lithium (Li)	54.0	--	--	--	--	--
Trace Metals	--	--	--	--	--	.74
Hydrocarbons	--	--	--	--	--	107.50
Measured TDS	300,763	298,358	292,121	231,836	323,500	156,267
Calculated TDS	299,187	302,869	292,727	232,743	323,558	149,582
IONIC RATIOS						
Na/Ca	2.47	2.01	1.89	1.42	1.08	2.24
Ca/Mg	9.75	12.76	15.90	6.93	34.17	6.04
Mg/K	1.07	2.64	--	4.00	--	47.03
Cl/Br	142.84	255.07	102.49	104.86	--	104.60
No. of Analyses	9	2	8	4	2	3

TABLE 15.4

BRINE CHEMICAL CHARACTERISTICS FROM NEW YORK PRODUCING ZONES
(Using All Acceptable Chemical Analyses)

Minimally Acceptable Grade: Mass Balance ±10,000–40,000 milligrams/liter and/ or Cation/Anion Balance±0–100 milliequivalents/liter

Parameter (Mg/L)	Potsdam Theresa	Queenston	Medina	Oriskany	Bass Island	Upper Devonian Oil Zones
Sodium (Na)	78,364	73,500	63,511	60,250	53,671	36,642
Calcium (Ca)	30,965	36,603	29,885	37,351	38,615	15,199
Magnesium (Mg)	3,389	2,887	2,716	5,402	5,059	2,418
Strontium (Sr)	--	0	1,049	120	875	107
Barium (Ba)	750	0	17	200	1	8
Potassium (K)	3,398	1,124	1,450	1,329	3,146	71
Iron (Fe)	17	195	346	218	66	146
Manganese (Mn)	0	--	65	0	7	5
Chloride (Cl)	185,724	187,418	157,251	173,676	171,160	89,558
Bromide (Br)	1,503	1,120	1,874	2,682	1,422	836
Sulfate (SO_4)	16	--	346	264	165	716
Bicarbonate (HCO_3)	78	--	54	114	50	10
Iodine (I)	9.67	11.00	15.60	8.25	--	147.33
Lithium (Li)	109.50	--	--	129.00	--	--
Trace Metals	29.50	--	37.17	17.70	32.09	.74
Hydrocarbons	--	--	264.17	--	2,622.47	73.45
Measured TDS	304,406	298,358	264,381	280,269	276,781	145,067
Calculated TDS	302,625	302,869	257,384	280,326	270,961	145,455
IONIC RATIOS						
Na/Ca	2.55	2.01	2.16	1.93	1.45	2.48
Ca/Mg	9.96	12.76	11.66	7.55	14.39	6.33
Mg/K	1.02	2.64	2.00	10.13	1.81	47.03
Cl/Br	136.08	255.07	83.16	82.09	111.94	114.85
No. of Analyses	10	2	67	10	10	5

TABLE 15.5

CHEMICAL CHARACTERISTICS OF COMMERCIAL ROAD SALT, SHALLOW OIL BRINE, AND DEEP GAS BRINE (mg/l)

Parameter mgl	Commercial Road Salt	Shallow Oil Brine	Deep Gas Brine
Chloride (Cl)	120,000	51,170	148,380
Sodium (Na)	59,500	26,208	61,003
Calcium (Ca)	1,090	10,115	29,880
Potassium (K)	532	442	2,608
Strontium (Sr)	0.16	139	1,400
Barium (Ba)	0.01	8.9	89
Lead (Pb)	1.48	1.5	2.68
Total Dissolved Solids	200,800	82,383	240,158
Magnesium (Mg)	210	1,282	4,240
Manganese (Mn)	0.28	5.7	76
Copper (Cu)	0.25	0.15	2.4
Zinc (Zn)	0.13	0.09	1.24
Aluminum (Al)	0.91	0.45	3.1
Iron (Fe)	2.08	42.3	171
Nickel (Ni)	1.9	1.92	2.66
Cadmium (Cd)	0.28	.007	0.65
Chromium (Cr)	0.11	0.11	0.29

Source: The Feasibility of Utilizing Production and Other Oil and Gas Well Fluids as Dust Palliatives and Deicers; Moody and Associates, December 1984

control. The majority of brine used in road spreading in New York is derived from deep gas well production; the diluted brines from the old shallow waterflooded oil fields are not used.

Hauling of brines for use on roads is regulated by the DEC Division of Solid and Hazardous Waste (DSHW) under 6 NYCRR Part 364, under which any person who desires to transport any type of industrial waste must first obtain a permit. Oil and gas drilling and production brines are considered industrial waste and, as such, are subject to the requirements of Part 364 for transportation and use.

Brine may be spread on paved and unpaved roads under Part 364 permits, but approval from the locality is required on the permit application. A standard condition for these permits is that the applicant must receive written approval from the highway superintendent or the town supervisor before road spreading salt brine. All oil must be separated from the brine solution and a spreader bar or similar spray must be used with the proper application rate to eliminate runoff. Spreading must also be confined to daylight hours.

Most permitted brine spreading is done by commercial haulers or by oil and gas company haulers. Spreading of brine for shoulder stabilization or ice control is generally performed by the town, and some towns utilize their own resources to spread brine for dust control on unpaved roads. DEC records for 1986 show that statewide approximately 13 million gallons of brine were transported by 18 permitted haulers, 4 of which were municipalities. This is equivalent to some 16,000 tons of dry highway salt, in comparison to the 55,000 tons of salt used in DEC Region 9 just by the New York State Department of Transportation in the winter of 1981/82; counties and towns also used substantial amounts of road salt. Towns which receive brine under Part 364 permits are shown in Figure 15.1. Since 1985, there has been a 40 percent increase in the municipalities which will accept production brine.

FIGURE 15.1 NEW YORK STATE TOWNS AND COUNTIES THAT ACCEPT BRINE FOR ROADSPREADING

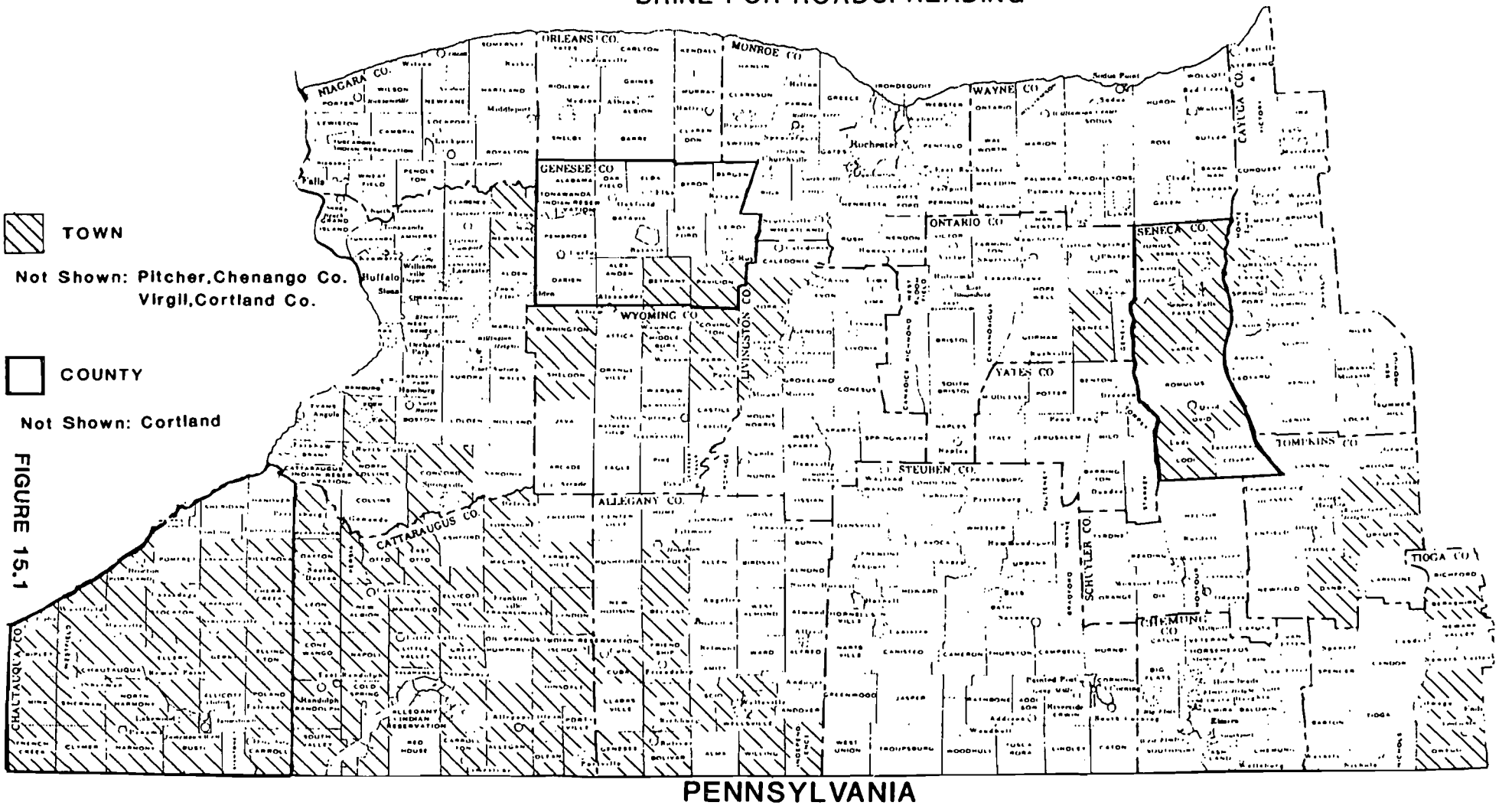

FIGURE 15.1

The use of brine in road spreading presents problems as well as benefits. As noted above, only some fluids produced from oil and gas wells are suitable for use on roads. Drilling and stimulation fluids are often not suitable for use on roads because of their variable concentrations of salts that result from dilution with freshwater, rainwater and fluids from other operations. The seasonal nature of road spreading also presents problems for oil and gas operators as an efficient means of disposing of oil and gas fluids. The imbalance between production and use on roads means that brines must either be stored between periods of use or alternative disposal means found.

Road spreading also presents potential environmental problems from improper application. Although the chemical properties of oil and gas brines are similar to those of commercial salts, the fact that brine is in liquid form presents potential problems of runoff and spills if the brine is not properly applied. Ideally, 0.4 gallons per square yard of 34 percent calcium chloride solution should be spread for optimal dust control on unpaved roads, but the brine must be applied in two applications, once in the spring at .3 gallons per square yard and once in the summer at .1 gallons per square yard. A 34 percent calcium chloride solution is supersaturated. New York brines are much less concentrated and the number of applications needed for dust control is 2.5 times that for a 34 percent solution. The application frequency needed can also be increased by temperature, precipitation, and traffic levels.

Studies have shown that calcium chloride-laden brines used as road agents should be applied a minimum of two or three times per season at approximately equal intervals, with subsequent applications depending on traffic volume, ambient temperature, precipitation and road material characteristics.

Deep well gas brine is also sometimes used for ice control. The high concentrations of salt in the brine, combined with the significant proportion

of calcium chloride to sodium chloride, means that production brine has a freezing point of as low as -6°F. As a consequence, it may be suitable for use as an ice control agent, although its liquid form presents the potential problem of runoff during application and of refreezing to form a slippery surface. In addition, solid granules are thought to be more effective in penetrating through the ice to break the ice bond with the pavement.

Under the Part 364 permits, the local governments have primary responsibility for determining optimal application rates, although the permits include a standard condition requiring the use of spreader bars or similar sprays to eliminate problems of runoff. Likewise, determinations of frequency of use and specific roads for application are the responsibility of local government. The DMN, in cooperation with the regional Solid Waste staff and the Conservation Officers, inspects waste haulers for compliance. Other units, including DEC Forest Rangers and Foresters, as well as police agencies, town officials and the general public also play important roles in policing this activity. Excessive application, discharge of unpermitted materials, unpermitted discharges, illegal times of discharge and excessive rates of discharge should be reported to the Division of Solid and Hazardous Waste for enforcement action.

2. Discharges to Surface Waters

Water quality management in New York State began in the 1950's, long before most other states recognized that water pollution was a problem, and is now carried out within the national framework of the Water Pollution Control Act of 1972, as amended, which establishes national goals for water quality.

A major provision of the federal law was establishment of the National Pollutant Discharge Elimination System, under which federal permits are required of all parties who propose to discharge pollutants into the state's surface waters. The law provides for delegation of the program to the states,

and all permits in New York State are handled by the Department of Environmental Conservation's Division of Water (DW). The State Pollutant Discharge Elimination System (SPDES) covers all existing and future discharges both to surface waters and ground water in the State.

Point discharges of oil and gas-related fluids may be allowed under SPDES permits, provided that water quality standards are not violated. Permit conditions for such discharges include limitations on total dissolved solids (TDS) levels (for oil and gas-related fluids, these are primarily salts) and on oil and grease discharge limitations. SPDES permits for oil and gas-related operations are primarily confined to surface discharges from secondary oil recovery operations. Most of the brine produced in New York State is the dilute brine associated with waterflooding operations. Chapter 12 of this GEIS provides further discussion of secondary oil recovery operations. Since SPDES permits are issued through the Division of Water, inspections are normally conducted by Division of Water staff. However, DMN personnel routinely inspect oil leases and refer questionable discharge operations to the Division of Water or enforce applicable Division of Mineral Resources regulations.

Another method of disposal for oil and gas production fluids is processing at a sewage treatment facility. Discharges of such facilities are regulated under SPDES permits, and must meet permit conditions for TDS levels and other criteria. A Part 364 permit is required for the hauler transporting brines to a sewage treatment plant.

The discharge of oil and gas waste products into a sewage treatment plant is a relatively unexplored disposal method in New York State. One major concern is the potential disturbance of the biological balance required to properly operate such a facility. However, a small concentration of brine is

needed for effective plant operation and the substantial dilution of oil and gas fluids in the overall flow of materials through the plant makes treatment feasible without upsetting the plant's operation or discharge requirements.

One plant in western New York accepts gas brines on a limited basis. Use of this technique at sewage treatment plants is dependent on specific local circumstances, particularly on potential sensitivity of the treatment processes to salt concentrations and on TDS discharge limitations for the receiving surface waters.

3. Underground Injection

The use of underground injection as a disposal technique has been widely used in a number of states for disposition of oil and gas-related fluids. The technique involves the drilling of a well and injection of fluids into formations hundreds or thousands of feet below the surface. With proper technical safeguards, such fluids can be safely injected into receiving formations and prevented from migrating into other zones, particularly groundwater. In many cases these fluids are returned to their original formation.

However, the use of this technique for disposal of hazardous wastes has been discouraged in New York, although it has been widely used in other areas, particularly Louisiana and Texas. As noted above, New York was one of the first states in the nation to recognize the importance of protecting both surface and underground water quality, particularly sources of public water supplies, and to enact legislation to protect these supplies.

A SPDES permit from the DEC Division of Water is required for any commercial injection disposal well in New York State. The Division of Mineral Resources provides technical assistance in the review of permit applications and provides facility inspections as necessary. Drilling of the well or conversion of the well to an injection well requires a DMN permit. In

addition, a federal Underground Injection Control (UIC) permit is also required for an injection well in New York State (see discussion of UIC program in next section). Other permits that may be required include a Part 364 hauler permit from the Division of Solid and Hazardous Waste.

Detailed guidelines for New York State brine disposal well permitting and the requirements for the surface and subsurface technical review are given in Appendix 7.

The primary environmental consideration in approval of an injection well permit application is the protection of groundwater resources through the prevention of movement of injected fluids into or between underground sources of drinking water (USDW).

A USDW is defined by federal regulations as an aquifer or its portion:

1) (i) which supplies any public water system; or

   (ii) which contains a sufficient quantity of groundwater to supply public water system; and

      (A) currently supplies drinking water for human consumption; or

      (B) contains fewer than 10,000 mg/l total dissolved solids; and

2) which is not an exempted aquifer.

Protection is achieved through stringent controls on the casing and cementing of the injection well. Permit conditions also involve pressure limitations on injection as well as monitoring and reporting requirements. A technical consideration for the applicant is the ability of the injection formation to accept fluids. Most formations in New York State are relatively "tight" and do not readily accept injected fluids. The operator must take this into consideration in designing an injection well. Further, a variety of treatment techniques may be required to ensure that the injected fluid will not plug the receiving formation and prevent further injection.

At present, one injection well in Chautauqua County has been given both a SPDES and federal UIC permit. There are additional federally permitted brine disposal wells in Steuben and Livingston Counties, and state and federal action is pending on several additional brine disposal wells.

E. FEDERAL UNDERGROUND INJECTION CONTROL PROGRAM

The federal Safe Drinking Water Act was enacted in 1974 in response to growing concerns over the need to protect the nation's sources of drinking water. Unlike New York, many states did not regulate activities which could contaminate or otherwise endanger underground sources of drinking water. A major element of the Safe Drinking Water Act is the Underground Injection Control (UIC) program.

The federal UIC program is administered by the Environmental Protection Agency (EPA) under Section 1422 of the Safe Drinking Water Act. However, the Act was designed to encourage each state to act as the primary implementing and administering agent for the federal requirements.

The UIC program was developed to control underground injection by specifying construction and monitoring requirements for injection wells. Therefore, this program includes injection for the purposes of both disposal and recovery operations. Of prime concern is the protection of the nation's underground sources of drinking water (USDW) from fluid injection below the ground surface. Under this program, no injection into a USDW can be authorized if it results in the movement of a fluid contaminant that adversely affects the health of persons. The definition of injection wells extends even to a pit or hole used for waste discharge when it is deeper than it is wide.

The UIC program divides injection wells into five classes:

1. Class I - injection of industrial, hazardous, and municipal wastes beneath the deepest stratum containing a USDW.
2. Class II - disposal of fluids which are brought to the surface in

connection with oil and gas production, enhanced recovery of oil or gas, or storage of liquid hydrocarbons.

3. Class III - injection of fluids used for the extraction of minerals, including solution mining of salts.
4. Class IV - injection of hazardous wastes into or above USDWs. Class IV wells are prohibited at 40 CFR Section 144.13.
5. Class V - all wells not incorporated in Class I-V. Typical examples of such wells are air conditioning/cooling water return wells, storm water drainages, recharge wells, abandoned water wells, and service station dry wells.

There are no wells the State would consider Class I wells in New York State, as State policy has not encouraged the use of underground injection as a disposal method for hazardous waste. Class IV wells are banned nationwide under the UIC program. There are thousands of Class V wells which are currently being inventoried.

In 1986, there were some 1,651 injection wells reported in use for secondary oil recovery (Class IIR) in New York State and some 80 active and over 200 inactive solution salt mining wells (Class III) in New York State. These Class IIR and Class III wells are regulated in New York State by the Division of Mineral Resources under the Oil, Gas and Solution Mining Law. Class IID brine disposal wells require permits from both the Division of Mineral Resources and the Division of Water through the SPDES program, in addition to the federal UIC permit required for any new or converted injection well.

1. Primacy under UIC

As mentioned above, the Safe Water Drinking Act was intended to encourage states to accept responsibility for the UIC program. States endeavoring to

implement and administer this program must demonstrate to EPA that their regulatory program is consistent with and as stringent as the UIC program defined in federal regulations (40 CFR 124, 144, 146, and 147). States accepting responsibility for the UIC program must periodically furnish documentation to EPA that summarizes program activities, identifies any violations and violators and makes recommendations for program redirection. Adopting responsibility for this program is known as accepting "primacy."

New York State has not accepted primacy for the UIC program. New York State already regulates underground discharges through the SPDES program. After considerable study, both in-house and through an independent consultant, State officials in 1982 concluded that assumption of primacy would not provide significant benefits to the State of New York. This decision was based on the fact that implementation of the UIC program would have only a minor impact on enhancing the protection of New York's groundwater resources, as New York's approach to groundwater protection is more restrictive than the UIC program. Furthermore, the costs of implementing and operating the program were seen to be inordinantly high considering the fact that no additional environmental benefits would accrue to New York State. Federal funds, if available at all, would cover only a small fraction of the cost of the program.

New York State's decision not to accept primacy for the UIC program places the responsibility for administration of the program on the EPA. As a consequence, the Environmental Protection Agency Region II office directly implements the UIC program in New York State, and they are involved in overseeing activities which are also regulated by the Division of Mineral Resources and the Division of Water. The DEC is now in the early stages of developing a Memorandum of Agreement on plugging and abandonment requirements with EPA for coordination with the UIC program in New York. This Agreement will be designed to improve coordination and communication, and where

possible, prevent overlapping or duplication of effort and conflicting requirements.

2. UIC Program Requirements

Because of its broad scope, the federal Underground Injection Control program is large and complex. The following discussion summarizes key aspects of the federal UIC program for New York State that relate to the regulation of oil, gas and solution mining activities by the Division of Mineral Resources and other State agencies. As mentioned previously, the DEC did not petition and has no intention in the future to petition for primacy. Details of the UIC program are specified in federal regulations, 40 CFR Parts 124, 144, 146 and 147.

The UIC program contains a general prohibition on any activity that allows 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 or may otherwise adversely affect the health of persons.

Injection activities may be authorized either by rule or by permit; authorization by rule allows certain existing injection activities to continue without having a permit, if the activities are in compliance with UIC program requirements. Existing Class II enhanced recovery wells are authorized by rule for the life of the project, contingent on compliance with casing and cementing requirements within three years and all other requirements within one year. Existing Class III wells are also authorized by rule, but all Class III wells were required to be permitted by June 25, 1985 for continued legal operation. However, the EPA administrator may require any well authorized by rule to obtain a permit.

a. Procedural Requirements

The federal UIC program establishes a number of procedural and technical requirements. The procedural requirements are largely intended to provide EPA with information needed to determine whether injection activities are in compliance with program requirements. Operators are required to submit to EPA an inventory of their injection wells subject to the federal program. Operators are required to monitor the nature of the injected fluid with sufficient frequency to provide information that is representative of its characteristics. This monitoring must be accomplished at least once within the first year. In addition, observation of the injection pressure, flow rate and cumulative volume must be recorded monthly for enhanced recovery operations and weekly for produced fluid disposal. Operators of Class I, II, and III wells are also required to demonstrate the mechanical integrity of the wells at least once every five years. Operators are required to submit periodic reports on the results of all monitoring.

The UIC program establishes financial security requirements to ensure the proper plugging and abandonment of injection wells. EPA has some flexibility under the federal law and regulations as to the types of financial security it will accept. There is some overlap between federal financial security requirements and those of New York State under the Oil, Gas and Solution Mining Law. This overlap affects only those wells among the approximately 1,651 active injection wells in New York that were not "grandfathered" by the New York State law, and it is estimated to be 150 to 200 wells. Many of the injection wells in New York are exempt from State financial security requirements, but DEC and EPA are initiating discussions which may further minimize the problem of overlap and double bonding.

Additional requirements relating to proper plugging and abandonment are that operators prepare a plugging and abandonment plan for their injection wells, that operators notify EPA of the conversion or abandonment of a well at

least 45 days before plugging and abandonment and that the operator submit a plugging and abandonment report after plugging a well. To ensure proper tracking of well ownership, operators are required to notify EPA of transfers of ownership of wells.

b. Technical Requirements

The federal UIC program establishes a large number of detailed technical requirements for new injection wells. These requirements cover the construction, operation and plugging and abandonment of wells in order to prevent fluid migration into underground sources of drinking water.

The construction requirements for injection wells take into account the depths to the injection zone, depth to the bottom of underground sources of drinking water, estimated injection pressures, casing specifications and hole size. Existing Class II wells do not have to comply with these construction requirements if some form of regulatory control was in place at the time the well was drilled and if it can be proven by mechanical integrity testing that the well injection will not result in fluid migration to an underground source of drinking water.

Mechanical integrity testing of injection wells is a major emphasis of the UIC operational requirements. An injection well has mechanical integrity if 1) there is no significant leak in the casing, tubing or packer, and 2) there is no fluid movement into an underground source of drinking water through vertical channels adjacent to the injection wellbore. The federal regulations specify a number of accepted methods to determine mechanical integrity. However, completion techniques historically used in secondary oil recovery operations in New York State and elsewhere in the Appalachian Basin do not lend themselves to easy determination of mechanical integrity. Operators in New York have asked EPA to consider alternative methods of

testing for mechanical integrity on a regional basis.

Currently, accepted methods to evaluate leaks and mechanical integrity are:

1) monitoring of annulus pressure;

2) pressure test with a liquid or gas;

3) records of monitoring showing absence of significant changes in the relationship between injection pressure and injection flow rate for the following Class II enhanced recovery wells:

   a) existing wells completed without a packer but with available data from a pressure test provided that one pressure test is performed when the well is shut down if shutting-in the well does not cause a significant loss of oil or gas.

   b) existing wells constructed without a long string casing but with surface casing which terminates at the base of the fresh water zone as allowed by local geological and hydrological features, provided the annular space is visually inspected. The Director of EPA will prescribe a monitoring program to verify the absence of significant fluid movement from the injection zone into USDW.

4) radioactive tracer surveys (received approval 9/18/87).

One of the following methods must be used to determine the absence of significant fluid movement: 1) results of a temperature or noise log; 2) cementing records demonstrating the presence of adequate cement to prevent such migration (Class II, or III where the nature of the casing precludes the use of logging techniques); or 3) the Director of EPA may allow alternate tests to demonstrate mechanical integrity only in response to individual formal application.

Operators in New York have the option of using an inexpensive mechanical

integrity test, identified as the water-in-annulus test. This test was developed especially for wells without long string casing but with surface casing set through the water table aquifer, a common construction method in New York. The water-in-annulus test was approved temporarily by EPA in July 1984. Modifications to the test have been accepted and were published in the Federal Register. Because of completion practices, this method of testing is the only one many operators in New York's old oil fields have to verify mechanical integrity, but this testing is not acceptable to some EPA Washington, D.C. administrators. On July 14, 1987, EPA notified operators that water-in-annulus mechanical integrity test had only a one-year extension. In addition, it is approved only for existing wells in Allegany, Cattaraugus and Steuben counties of New York and selected counties in Pennsylvania.

Pressure limitations on injection are another major part of the UIC program. The purpose of these limitations is to prevent the initiation of new fractures or propagation of existing fractures in the confining zone adjacent to underground sources of drinking water. These requirements apply to both Class II and Class III wells, but Class III wells are subject to a further limitation on pressure designed to prevent fracturing in the injection zone, except during well stimulation.

The injection pressures originally specified in federal regulations for New York State caused considerable concern for existing Class II waterflood oil recovery operators, as they were significantly lower than the pressures needed for economically successful secondary recovery, due to the low permeability of the waterflooded oil sands. In response to these concerns, EPA has established alternative procedures for determining maximum injection pressures for enhanced recovery operations. Numerical standards have been established by EPA based on data provided by operators of injection wells, and will be published in the Federal Register. An operator wishing to use an

alternative maximum pressure higher than these standards must demonstrate to EPA that the confining layer will not be fractured and that migration of fluids into underground sources of drinking water will not occur.

The UIC program provides for certain exemptions to the general prohibition on injection into aquifers (definitions for exemptions are found in 40 CFR 146.4). An aquifer may be exempted if: 1) it does not currently serve as a source of drinking water and will not serve in the future, 2) it is hydrocarbon or geothermal energy producing, 3) it is situated at a depth or location which is economically or technologically impractical for usage, 4) it is contaminated to the point that it is economically or technologically impractical for usage, 5) it is located over a Class III well area subject to subsidence or collapse and/or 6) the total dissolved solid content is more than 3,000 but less than 10,000 mg/l and is not reasonably expected to serve as a public water supply system.

The only exempt aquifers in New York State are oil-bearing formations with a long history of waterflooding operations (Bradford 1st, 2nd, and 3rd sands and the Chipmunk and Kane formations). Ironically, the only reason that these aquifers must be specifically exempt from the UIC program is that waterflooding with freshwater for many years has brought their total dissolved solid levels below the 10,000 mg/l limit which is the upper threshold of the definition of a USDW in the UIC program. Injection into these aquifers is properly allowed as they have never and will not in the future serve as underground sources of drinking water in New York State.

3. UIC Coordination

As noted earlier in this chapter, DEC and EPA Region II are in the process of developing a Memorandum of Agreement to facilitate interagency coordination. However, permits and regulatory programs will remain in place. Permits to drill, convert and/or operate injection wells are required by the

Division of Mineral Resources, Division of Water (for disposal wells), and EPA. Injection wells presently in existence must conform to the Division of Mineral Resources' and EPA's regulations. Inspections and enforcement can be carried out separately by any one of the three agencies. Financial security for operational liability, plugging and abandonment will be required by both the Division of Mineral Resources and EPA. Furthermore, permits to plug and abandon are also required by both the Division of Mineral Resources and EPA.

It must be noted that New York State's new requirements which became effective April 1, 1986 for well construction techniques are at least as stringent and often times more restrictive than UIC regulations. Such operations have been defined throughout the text of the GEIS. This overview of the UIC program should be used as a summary only and specifics should be derived from Title 40 of the Code of Federal Regulation.

F. OIL SPILL RESPONSE

1. New York State Responsibilities

On April 1, 1978, the New York State Legislature adopted the Oil Spill Prevention, Control and Compensation Program, Article 12 of the Navigation Law (Chapter 845 of the Laws of 1977). This law provides for the prohibition of oil spills, the clean-up of spills that occur, the compensation of victims of oil spills and the licensing of petroleum facilities and vessels. Amendments effective October 13, 1985, transferred oil spill powers, duties and obligations from the Department of Transportation to DEC.

Under this law and provisions of the Environmental Conservation Law, DEC has the lead role in spill prevention and response, which may be shared with other agencies under their own legislative mandates, such as police and fire officials who have pre-emptive emergency authority over people and property. Department of Health officials become involved in incidents requiring

evacuations or in any incident likely to affect public health. This would include water quality incidents, particularly those likely to affect drinking water quality. The type of response to a given spill depends on the amount and type of spilled material, its accessibility, the severity of the spill, the type and sensitivity of the resources affected and the urgency of protecting life and property.

Under the law, leaks and spills must be reported within two hours of their discovery. DEC has a 24-hour hotline that can be used for such reporting. The number of the hotline is 1-800-457-7362. Information about the spill is then relayed to the appropriate DEC regional office representative in the Division of Water. Because of the regulatory control exercised by the DEC Division of Mineral Resources over the oil and gas industry, this Division is usually notified initially by operators when oil or brine spills occur on oil, gas or solution mining well sites. Depending on the severity of the problem, additional notifications might be made to federal contact points such as the U.S. Environmental Protection Agency, the National Response Center, the U.S. Coast Guard, or the State Emergency Management Office might be notified to implement the State Disaster Plan.

If the party responsible for the spill is unwilling to take responsibility for containment and clean-up of a spill, the State can take the initiative through the use of standby contractors. Contractors for accidents involving oil spills are obtained through use of the NYS Oil Spill Fund. Fund amounts are recovered later through appropriate legal action against the violator.

Disposal of spilled materials must be conducted in an environmentally sound manner and all disposal areas for spilled materials must be permitted by DEC. Waste haulers must be licensed and use approved disposal areas.

At the completion of the clean-up efforts, a form describing the time,

location and extent of the spill and remedial measures taken must be completed and submitted to the Division of Water.

2. Federal Responsibilities

Federal law splits responsibilities for oil spill prevention and clean-up between the Coast Guard and the Environmental Protection Agency, under two separate pieces of legislation. A Memorandum of Understanding between EPA and the Coast Guard defines each agency's responsibility.

In general, the EPA regulates all non-transportation facilities. This includes onshore and offshore fixed and mobile oil drilling and production facilities, storage facilities and other associated facilities. The Coast Guard regulates those structures regarded as transportation-related facilities, including any onshore or offshore terminal facility used for the purpose of handling or transferring oil in bulk to or from a vessel, as well as storage tanks and the appurtenances for the reception of oily ballast water or tank washings from vessels. As defined in the MOU between EPA and the Coast Guard, practically all of New York State oil and gas producing facilities would be regulated by EPA, rather than by the Coast Guard.

Under CFR 40 Part 112, EPA regulates all facilities related to drilling, production, storage, gathering, processing, refining, transferring, distributing, or consuming oil and oil products which could damage any navigable water with a discharge of oil. Certain facilities are excluded from these regulations, including facilities which have: 1) aggregate capacities less than 1,320 gallons of oil, provided no single container holds more than 660 gallons and 2) a total storage capacity of 1,000 barrels (42,000 gallons or less of oil and such capacity is buried underground).

The definition of "navigable waters" under the federal program is very broad. It includes those waters defined by the Federal Water Pollution

Control Act and tributaries of such waters; any interstate waters; any intrastate lakes, rivers and streams which are utilized by interstate travelers for recreational or other purposes; and any intrastate lakes, rivers or streams from which fish or shellfish are taken and sold in interstate commerce. This broad definition, in conjunction with the fact that most New York oil fields are located near a tributary stream or a river, places these facilities under federal jurisdiction. One important element under Section 112 is the authority for EPA to mandate the preparation and implementation of a Spill Prevention Control and Countermeasure Plan (SPCCP). Operators of facilities under EPA jurisdiction are required to prepare a SPCCP on standard forms and maintain it on file at the operator's premises, although the SPCCP must be available to EPA upon reasonable request.

The requirements for a complete SPCCP for oil and gas operators in New York include the following:

1. Any aboveground facility which has encountered one or more spills within a 12-month period prior to the effective date of this part must submit a written description of each spill, corrective actions and plans to prevent reoccurrence.
2. The plan should include predicted directions, rates of flow and total quantities of oil discharged during a major failure.
3. Containment and diversion structures shall be provided and include dikes, berms, curb, culverts, booms, sorbent material and sumps.
4. If such structures listed in item 3 are impractical, the owner or operator must clearly demonstrate so and provide: 1) a strong contingency plan and 2) a written commitment of manpower, equipment and materials required to cope with an oil discharge.
5. Other items of discussion include, but are not limited to: 1) facility drainage; 2) bulk storage tanks; 3) facility transfer

operations; 4) oil production facilities such as bulk storage tanks, separators and tank batteries; 5) facility tank car and tank truck loading and unloading; 6) oil drilling and workovers; 7) inspections and records; 8) security and 9) personnel training and spill prevention procedures.

The Division of Mineral Resources presently requires all permit applications for oil wells to have the federal SPCCP attached. This requirement ensures that the operators have taken adequate steps to prevent and contain any oil spills which may occur on their facilities.

The federal regulations specify reporting requirements for operators in the event of an oil spill. These reporting requirements are in addition to those imposed by New York State law. Although the federal reporting requirements include spill volume criteria, the Department recommends that operators contact all affected agencies regardless of the spill size.