

Appendix E

Federal Efforts to Detect Groundwater Contamination

E.1 MONITORING PROVISIONS FOR CATEGORY I SOURCES

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Subsurface Percolation	Safe Drinking Water Act - Underground Injection Control Program (40 CFR 144 and 146)	Cesspools or other waste receiving devices with open bottoms and sometimes perforated sides (Class V wells). Applies only to units serving 20 or more persons.	Regulations have not been promulgated for Class V wells.	Regulations have not been promulgated for Class V wells.	Regulations have not been promulgated for Class V wells.
Injection Wells Hazardous waste	Safe Drinking Water Act - Underground Injection Control Program (40 CFR 144 and 146) ^a	Wells that inject hazardous waste (as defined by RCRA) <u>beneath</u> the deepest formation containing, within one-quarter mile of the well bore, an underground source of drinking water (Class I wells).	Determine whether there is any migration of fluids into underground sources of drinking water.	Monitoring program must include (at a minimum): (1) analysis of injected fluid; (2) installation and use of continuing recording devices to monitor injection pressure, flow rate of fluid, volume of fluid and pressure on annulus; (3) demonstration of mechanical integrity every five years; and (4) <u>wells to monitor migration of fluids into and pressure in underground sources of drinking water</u> (location and number of wells are not specified).	<ul style="list-style-type: none"> Monitoring well parameters and frequency of sampling are not specified. Injected fluids are to be analyzed at sufficient intervals to yield representative data about their characteristics.
		Wells that inject hazardous waste (as defined by RCRA) <u>into or above</u> a formation containing, within one-quarter mile of the well bore, an underground source of drinking water (Class IV wells).	Regulations have not been promulgated for Class IV wells.	Regulations have not been promulgated for Class IV wells.	Regulations have not been promulgated for Class IV wells.
	Comprehensive Environmental Response, Compensation, and Liability Act (40 CFR 300)	Wells that release any hazardous substances, pollutants, or contaminant (as defined by CERCLA).	<ul style="list-style-type: none"> To provide preliminary assessment of the nature and extent of the release. To determine the source and dispersion of the hazardous substance. 	<ul style="list-style-type: none"> Collection of samples is minimized except in situations where there is an apparent risk to the public. Not specified. Monitoring is part of an immediate removal. 	<ul style="list-style-type: none"> Not specified. Not specified.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Injection Wells-Hazardous Waste (Continued)	Comprehensive Environmental Response, Compensation, and Liability Act (40 CFR 300) (Continued)		<ul style="list-style-type: none"> o To determine the nature and extent of the problem. o To monitor effect iveness of remedial action. 	<ul style="list-style-type: none"> o sufficient information is to be collected to determine the necessity for and proposed extent of remedial action. o Not specified. Assurance must be provided by the State to cover these activities. 	<ul style="list-style-type: none"> o Not Specified. o Not specified.
Injection Wells - Non-Hazardous Waste	Safe Drinking Water Act-Underground Injection Control Program (40 CFR 144 and 146)	Wells that inject waste beneath the deepest formation containing, within one-quarter mile of the well bore, an underground source of drinking water (Class I wells)	Same as objective for hazardous waste injection wells that inject beneath the deepest underground sources of drinking water.	Same as requirements for hazardous waste injection wells that inject beneath the deepest underground sources of drinking water.	Same as requirements for hazardous waste injection wells that inject beneath the deepest underground sources of drinking water.
Injection Wells - Non-waste	Safe Drinking Water Act-Underground Injection Control Program (40 CFR 144 and 146)	Wells used in connection with oil and gas production which inject fluids (Class II wells). Includes kens used for enhanced recovery, for storage of liquid hydrocarbon, and for @1a where injected fluids are brought to the surface and may be combined with waste waters from gas plants.	Same as objective for hazardous waste injection wells that inject beneath the deepest underground sources of drinking water.	<ul style="list-style-type: none"> o Monitoring program must include (at a minimum): (1) monitoring of injected fluids; (2) <u>observation of injection pressure, flow rate and cumulative volume</u>; and (3) demonstration of mechanical integrity every 5 years. o Hydrocarbon storage and enhanced recovery wells may be monitored on a field or project basis (rather than individually). 	<ul style="list-style-type: none"> o Nature of injected fluids is to be monitored at sufficient intervals to yield representative data about their characteristics. o Observation frequencies are specified for different types of wells (fluid disposal wells-weekly; enhanced recovery operations-monthly; injection of liquid hydrocarbons-daily). Observations are to be recorded at reasonable intervals of no greater than 30 days.
		Wells used for extraction of minerals (Class III wells). Includes mining of sulfur by Frasch process, in-situ production of uranium and other metals, and solution mining of salts or potash.	Same as objective for hazardous waste injection wells that inject beneath the deepest underground sources of drinking water.	<ul style="list-style-type: none"> o Monitoring program must include (at a minimum): (1) monitoring of injected fluids; (2) monitoring of injection pressure and either flow rate or volume; and (3) demonstration of mechanical integrity every 5 years. 	<ul style="list-style-type: none"> o Nature of injected fluids is to be monitored at sufficient intervals to yield representative data about their characteristics.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Injection Wells - Non-waste (Continued)	Safe Drinking Water Act Underground Injection Control Program (40 CFR 144 and 146) (Continued)			<ul style="list-style-type: none"> o Class III wells may be monitored on a field or project basis. o <u>Groundwater monitoring</u> is required where injection is into a formation containing water with less than 10,000 mg/l TDS. Monitoring wells must be completed into injection zone and any underground sources of drinking water above injection zone that may be effected. Wells must be located to detect any excursion of injection fluids, process byproducts, or formation fluids outside the mining area. o In areas subject to subsidence or collapse where injection wells penetrate an underground source of drinking water, an adequate number of wells must be completed to detect any movement of injection fluids. 	<ul style="list-style-type: none"> o Provisions specify monitoring of injection pressure, flow, or volume on a semi-monthly basis (or metering and daily recording of injected and produced volumes as appropriate). o Groundwater monitoring and monitoring of fluid level in injection zone are required semi-monthly (water quality parameters are not specified). o If wells are required in areas subject to subsidence or collapse, monitoring is required on a quarterly basis (water quality parameters are not specified).
		Wells not included in Categories 1, II, III, and IV (Class V wells). Examples of Class V wells include artificial recharge wells, and cooling water or air conditioning return flow wells.	Regulations have not been promulgated for Class V wells.	Regulations have not been promulgated for Class V wells.	Regulations have not been promulgated for Class V wells.
Land Application- Wastewater	Clean Water Act - Section 201 (40 CFR 35; 41 FR 6190, 1/11/76)	Wastewater land treatment processes (includes slow rate, rapid infiltration, and overland flow methods).	Protect groundwater used as drinking water supply and/or other designated uses as appropriate and prevent irrevocable damage to groundwater.	Regulations specify that groundwater monitoring requirements will be established on a site-specific basis. Requirements must include provisions for monitoring the effect on native groundwater.	Requirements are established on a site-specific basis.
Land Application - Wastewater Byproducts	Clean Water Act - Section 405 (40 CFR 257)	Sewage sludge application (includes agricultural, forest and land reclamation utilization, and dedicated land disposal).	No monitoring requirements are established by the regulations.	No monitoring requirements are established by the regulations. Groundwater monitoring may be required on a site-specific basis by the regulatory authority to ensure compliance with groundwater criteria.	No monitoring requirements are established.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Land Application - Hazardous Waste	Resource Conservation and Recovery Act - Subtitle C (40 CFR 264) ^b	Land treatment of hazardous wastes (as defined by RCRA).	<p>A three part monitoring program is established:</p> <ul style="list-style-type: none"> o Detect any contamination of groundwater due to leakage from a facility. o Determine whether the groundwater protection standard specified in the permit is being met. (continued on next page) 	<p>o <u>Detection Monitoring Program</u> - implemented when permit is issued and there is no indication of leakage. Program is continued through post-closure period. Exemption may be granted if there is no potential for migration of liquid from the facility to the uppermost aquifer through post-closure period. Background water quality levels for monitoring parameters must be based on data from quarterly sampling of wells upgradient from the site for one year.</p> <ul style="list-style-type: none"> - Number, location, and depth of wells are specified in the facility permit. Wells must yield groundwater samples from the uppermost aquifer that represent the quality of background water not affected by the facility and the quality of water at a specified compliance point. - If monitoring indicates a statistically significant increase of any parameter over the background level, a compliance monitoring program must be implemented (e.g., all wells must be sampled for 375 hazardous constituents (Appendix VIII, 40 CFR 261) to determine the concentrations of these constituents present in groundwater; see below) or it must be demonstrated that the statistically significant increase is the result of an error or is due to another source. <p>o <u>Compliance Monitoring Program</u> - implemented when hazardous constituents are detected at a specified compliance point and for a specified compliance period. A groundwater protection standard must be specified in the facility permit. Standard includes:</p> <ul style="list-style-type: none"> (i) list of hazardous constituents to be monitored; 	<ul style="list-style-type: none"> o Parameters are specified in the facility permit (include indicator parameters, waste constituents, or byproducts). Each monitoring well is to be analyzed for specified parameters at least semiannually. o Groundwater flow rate and direction in the uppermost aquifer are to be determined at least annually. <ul style="list-style-type: none"> o Parameters are specified in the groundwater protection standard (in the facility permit). Each monitoring well is to be analyzed for specified parameters at least quarterly.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Land Application - Hazardous Waste (Contd.)				<p>(ii) concentration limits for each constituent based on: background level; Maximum Contaminant Levels for 14 constituents established by the National Interim Drinking Water Regulations (if higher than background); or an alternative concentration limit established on a site-specific basis); and</p> <p>(iii) a specified point of compliance and compliance period (includes the active life of the facility and the closure period).</p> <p>- If monitoring indicates that the groundwater protection standard is not being met, a corrective action program must be undertaken or it must be demonstrated that the protection standard is being exceeded due to an error or another source.</p>	<p>o Groundwater flow rate and direction in the uppermost aquifer are to be demonstrated at least annually.</p> <p>o Samples from each monitoring well are to be analyzed for 375 hazardous constituents (Appendix VIII, 40 CFR 261) at least annually.</p>
			<p>o Demonstrate the effectiveness of corrective action measures taken at a facility (see app. G.I for corrective action requirements under Subtitle C of RCRA).</p>	<p>o <u>Corrective Action Monitoring Program</u> - implemented when compliance monitoring indicates that the groundwater protection standard is exceeded. Program is to be continued until levels of hazardous constituents in groundwater are reduced below the concentration limit specified in the protection standard. Monitoring program may be based on the requirements for a compliance Monitoring program and must be as effective as that program.</p>	<p>o Parameters and frequency may be based on the requirements for a compliance monitoring program and must be as effective as that program.</p>
	Comprehensive Environmental Response, Compensation, and Liability Act (40 CFR 300)	Land application facilities that release any hazardous substance, pollutant, or contaminant (as defined by CERCLA).	Same as requirements for hazardous waste injection wells under CERCLA.	Same as requirements for hazardous waste injection wells under CERCLA.	Same as requirements for hazardous waste injection wells under CERCLA.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Land Application - Non-Hazardous Material	CleanWater Act- Section 404 (40 CFR 30)	Disposal site for dredged or fill material.	No monitoring requirements are established.	No monitoring requirements are established for groundwater.	No monitoring requirements are established for groundwater.

^a RCRA and SDWA have overlapping jurisdiction for injection wells used to dispose of hazardous wastes. A permit-by-rule approach has been instituted to coordinate the requirements of both programs. Under this approach, an owner or operator of such a well must comply with all applicable SDWA technical requirements pursuant to the Underground Injection Control Program and certain RCRA administrative requirements. See 40 CFR 144.14.

^b The monitoring requirements presented in the table are for permitted facilities. EPA has also promulgated interim status requirements for these facilities which must be met until a final permit is issued. The interim status monitoring requirements specify the installation of at least one upgradient well and three downgradient wells to determine initial background concentrations of certain parameters and to determine whether waste constituents have entered the groundwater. Groundwater monitoring requirements can be waived by an owner or operator if there is low potential for waste migration (EPA approval of the waiver is not required). See 40 CFR 265.

Source: Office of Technology Assessment.

E.2 MONITORING PROVISIONS FOR CATEGORY II SOURCES

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Landfills - Hazardous Waste	Resource Conservation and Recovery of hazardous wastes (as defined Act - Subtitle C by RCRA). (40 CFR 264) ^a	Landfills used for the disposal of hazardous wastes (as defined)	Three part monitoring program is established: o Detect any contamination of groundwater due to leakage from a facility.	<p>o <u>Detection Monitoring Program</u> - implemented when permit is issued and there is no indication of leakage. Program is continued through post-closure period. Exemption may be granted if there is no potential for migration of liquid from the facility the uppermost aquifer through post-closure period or if facilities use double liners and leak detection system.</p> <p>- Background water quality levels for monitoring parameters must be based on data from quarterly sampling of wells upgradient from the site for one year.</p> <p>- Number, location, and depth of wells are specified in the facility permit. Wells must yield groundwater samples from the uppermost aquifer that represent the quality of background water not affected by the facility and the quality of water at a specified compliance point.</p> <p>- If monitoring indicates a statistically significant increase of any parameter over the background level, a compliance monitoring program must be implemented (e.g., all wells must be sampled for 375 hazardous constituents (Appendix VIII, 40 CFR 261) to determine the concentration of those constituents present in groundwater; see below) or it must be demonstrated that the statistically significant increase is the result of an error or is due to another source.</p> <p>o <u>Compliance Monitoring Program</u> - implemented when hazardous constituents are detected at a specified compliance point and for a specified compliance period.</p>	<p>o Parameters are specified in the facility permit (Include indicator parameters, waste constituents, or byproducts) . Each monitoring well to is to be analyzed for specified parameters at least semiannually.</p> <p>o Groundwater flow rate and direction in the uppermost aquifer are to be determined at least annually.</p>
			o Determine whether the groundwater protection standard specified in the permit is being met.		

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Landfills - Hazardous Waste (Continued)				<p>- A groundwater protection standard must be specified in the facility permit. Standard includes:</p> <ul style="list-style-type: none"> (i) list of hazardous commitments to be monitored; (ii) concentration limit for each constituent based on: background level; Maximum Contaminant Levels for 14 constituents established by the National Interim Drinking Water Regulation (if higher than background); or an alternative concentration limit (established on a site-specific basis); and (iii) a specified point of compliance and compliance period (includes the active life of the facility and the closure period). - If monitoring indicates that the groundwater protection standard is not being met, a corrective action program must be undertaken (see app. G.2) or it must be demonstrated that the protection standard is being exceeded due to an error or another source. 	<ul style="list-style-type: none"> o Parameters are specified in the groundwater protection standard (in the facility permit). Each monitoring well is to be analyzed for specified parameters at least quarterly. o Groundwater flow rate and direction in the uppermost aquifer are to be determined at least annually. o Samples from each monitoring well are to be analyzed for 375 hazardous constituents (Appendix VIII, 40 CFR 261) at least annually.
			<ul style="list-style-type: none"> o Demonstrate the effectiveness of corrective action measure taken at a facility (see app. G.2 for corrective action requirements m&r Subtitle C of RCRA). 	<ul style="list-style-type: none"> o <u>Corrective Action Monitoring Program</u> - implemented when compliance monitoring indicates that the groundwater protection standard is exceeded. Program is to be continued until levels of hazardous constituents in groundwater are reduced below the concentration limit specified in the protection standard. Monitoring program may be based on the requirements for a compliance monitoring program and must be as effective as that program. 	<ul style="list-style-type: none"> o Parameters and frequency may be based on the requirements for a compliance monitoring program and must be as effective as that program.
	Toxic Substances Control Act - Section 6 (40 CFR 761)	Chemical waste landfills used for the disposal of PCBs at concentrations of 50 ppm and above.	To determine baseline groundwater quality data.	<ul style="list-style-type: none"> o Groundwater must be sampled prior to commencement of operations. If underlying earth materials are homogeneous, impermeable, and uniformly sloping in one direction, only three wells are required. o No groundwater monitoring is required during active life or after closure of facility (surface water monitoring is required). 	<ul style="list-style-type: none"> o Sampling frequency is net specified. o Parameters must include (at a minimum) PCBs, pH, specific conductance and chlorinated organics.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Landfills - Hazardous Waste (Continued)	Comprehensive Environmental Response Compensation, and Liability Act (40 CFR 300)	Landfills that release any hazardous substance, pollutant or contaminant (as defined by CERCLA).	<ul style="list-style-type: none"> o To provide preliminary assessment of the nature and extent of the release. o To determine the source and dispersion of the hazardous substance. o To determine the nature and extent of the problems. o To monitor effectiveness of the remedial action. 	<ul style="list-style-type: none"> o Collection of samples is to be minimized except in situations where there is an apparent risk to the public. o Not specified. Monitoring may be part of an immediate removal. o Sufficient information is to be collected to determine the necessity for and proposed extent of remedial action. o Not specified. Assurance must be provided by the State to cover these activities. 	<ul style="list-style-type: none"> o Not specified. o Not specified. o Not specified. o Not specified.
Landfills - Sanitary	Resource Conservation and Recovery Act - Subtitle D (40 CFR 257)	Sanitary landfills defined as facilities which pose no reasonable probability of adverse effects on health or the environment from disposal of solid waste (as defined by RCRA).	No requirements established.	<ul style="list-style-type: none"> o No monitoring requirements are established. o Groundwater monitoring may be required by State solid waste programs. Federal requirements for State programs recommend the establishment of monitoring requirements (see 40 CFR 256.22). 	No requirements established.
	Comprehensive Environmental Response, Compensation, and Liability Act (40 CFR 302)	Sanitary landfills that release any hazardous substance, pollutant or contaminant (as defined by CERCLA).	Same as requirements for hazardous waste landfills under CERCLA.	Same as requirements for hazardous waste landfills under CERCLA.	Same as requirements for hazardous waste landfills under CERCLA.
Open Dumps (including illegal dumping) -Waste	Resource Conservation and Recovery Act - Subtitle D (40 CFR 257)	Open dumps defined as facilities which do not meet the criteria for sanitary landfills under RCRA.	Same as requirements for sanitary landfills under Subtitle D of RCRA.	Same as requirements for sanitary landfills under Subtitle D of RCRA.	Same as requirements for sanitary landfills under Subtitle D of RCRA.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Open Dumps (including illegal dumping) - Waste (Continued)	Comprehensive Environmental Response, Compensation, and Liability Act (40 CFR CERCLA, 300)	Open dumps that release any hazardous substance, pollutant or contaminant (as defined by CERCLA).	Same as requirements for hazardous waste landfills under CERCLA.	Same as requirements for hazardous waste landfills under CERCLA.	Same as requirements for hazardous waste landfills under CERCLA.
Residential Disposal	Federal Insecticide, Fungicide, and Rodenticide Act - section 19 (40 CFR 165)	Burial of small quantities of pesticide containers in open fields (containers which held organic or metallo-organic pesticides except organic mercury, lead, cadmium, or arsenic compounds).	No requirements established.	No requirements established.	No requirements established.
Surface Impoundments - Hazardous Waste	Resource Conservation and Recovery Act - Subtitle C (40 CFR 264)	Surface impoundments used for the treatment, storage or disposal of hazardous waste (as defined by RCRA).	Same as requirements for hazardous waste landfills under subtitle C of RCRA.	Same as requirements for hazardous waste landfills under RCRA.	Same as requirements for hazardous waste landfills under RCRA.
	Comprehensive Environmental Response, Compensation, and Liability Act (40 CFR 300)	Surface impoundments that release any hazardous substance, pollutant or contaminant (as defined by CERCLA).	Same as requirements for hazardous waste landfills under CERCLA.	Same as requirements for hazardous waste landfills under CERCLA.	Same as requirements for hazardous waste landfills under CERCLA.
Surface Impoundments - Non-Hazardous Waste	Surface Mining Control and Reclamation Act (30 CFR 816 and 817)	Impoundments defined as all water, sediment, slurry, or other liquid or semi-liquid holding structures and depressions, either naturally formed or artificially built. Structures may be temporary or permanent. Applies to all surface and underground coal mining operations.	To determine the impacts of the mining operation on the hydrologic balance within the permit and adjacent areas.	o Groundwater monitoring plan must be included in a permit application which provides for the monitoring of parameters that relate to the suitability of the groundwater for current and approved post-mining land uses and to objectives for protection of the hydrologic balance. Monitoring site locations must be specified. o Monitoring of a particular water-bearing stratum may be waived by the regulatory authority if it can be demonstrated that it is not a stratum which serves as an aquifer which significantly ensures the hydrologic balance of the cumulative impact area (the area, including the permit area, within which impacts resulting from the proposed operation may interact with the impacts of all anticipated mining).	o Groundwater monitoring plan must specify parameters and sampling frequency. o At a minimum, total suspended solids, pH, total iron, total manganese, and water levels shall be monitored. o Samples must be taken and analyzed quarterly at each monitoring location. Additional monitoring may be required by the regulatory authority.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
surface Impoundments - Non-Hazardous Waste (Continued)	Federal Land Policy and Management Act - Mineral Leasing Act of 1920 and Materials Au of 1947 (43 CFR 23). Covers minerals such as coal, phos- phate, asphalt, sodi- um, potassium, sand, stone, gravel and clay.	Impoundments used for the treatment or control of runoff and drainage during mining operations on Federal lands.	No requirements established.	No requirements established.	
	- U.S. Mining Laws (43 CFR 3800). Cover locatable minerals such as gold, silver, lead, iron and copper.	Not explicitly mentioned in the regulations. However, impoundments are part of mining operations. Applies only to Federal lands.	No requirements established.	No requirements established.	No requirements established.
	- Geothermal steam Act (30 CFR 270 and BLM Operational Order No. 4).	Pits and sumps used to retain all materials and fluids necessary to drilling, produc- tion, or other operations on Federal lands.	o To determine existing inter quality. o To ensure that operations are conducted in compliance with regulation and orders.	o No specific requirements are established for pits and sumps. Regulation state that monitoring of environmental impacts may be conducted by the use of aerial surveys, inspections, periodic samplings, continuous recordings, or other methods specified on a site-specific basis. o Data must be collected for a period of at least one year prior to production.	o Specified by the regulatory authority on a site-specific basis.
Waste Tailings	Federal Land Policy and Management Act - Mineral Leasing Act of 1920 and Materials Act of 1947 (43 CFR 23)	Not explicitly mentioned in the regulations. However, waste tailings are part of mining operations. Applies only to Federal lands.	Same as objective for non- hazardous waste surface impoundments under these laws.	Same as requirements for non-hazardous waste surface impoundments under these laws.	Same as requirements for non- hazardous waste surface impoundments under these laws.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Waste Tailings (Continued)	- U.S. Mining Laws (43 CFR 3800)	Not explicitly defined in the regulations, but disposal of waste tailings is mentioned as part of a mining operation.	Same as objective for non-hazardous waste surface impoundments under these laws.	Same as requirements for non-hazardous waste surface impoundments under these laws.	Same as requirements for non-hazardous waste surface impoundments under these laws.
	Uranium Mill Tailings Radiation Control Act - Active Sites (40 CFR 192)	Disposal areas covered by the regulations containing waste tailings from uranium processing activities. Such areas include the region within the perimeter of an impoundment or pile.	Same as requirements for hazardous waste surface impoundments under Subtitle C of RCRA.	Same as requirements for hazardous waste surface impoundments under RCRA except: - molybdenum and uranium are added to the list of hazardous constituents in Appendix VIII, 40 CFR 261; - additional concentration limits for radioactivity are specified as part of the groundwater protection standard; - detection monitoring program must be completed within one year; and - alternative concentration limits which are established (as part of the groundwater protection standard) are as low as reasonably achievable after considering practicable corrective actions, and that, in any case, the concentration levels for specified parameters are specified at all points at a greater distance than 500 meters from the edge of the disposal area and/or outside the site boundary.	Same as requirements for hazardous waste surface impoundments under RCRA.
	Uranium Mill Tailings Radiation Control Act - Inactive Sites (40 CFR 192)	Processing sites designated by DOE containing residual radioactive materials at which all or substantially all of the uranium was produced for sale to a Federal agency prior to Jan. 1, 1971.	o To establish background groundwater quality. o To identify the presence and movement of contamination associated with the tailings piles.	o Monitoring program may be conducted. It should be sufficient to meet the objective through one or more upgradient wells. o Monitoring should assess the location of contaminants in groundwater, the rate and direction of movement of contaminated groundwater, and its relative contamination. Also, an assessment should identify the attenuative capacity of the unsaturated and saturated zones to determine the extent of contaminant movement.	No requirements established.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Waste Piles – Hazardous Waste	Resource Conservation and Recovery Act – Subtitle C (40 CFR 264)	Waste piles used for the treatment or storage of hazardous wastes (as defined by RCRA).	Same as objective for hazardous waste landfills under Subtitle C of RCRA.	Same as requirements for hazardous waste landfills under Subtitle C of RCRA.	Same as requirements for hazardous waste landfills under Subtitle C of RCRA.
	Comprehensive Environmental Response, Compensation, and Liability Act (40 CFR 300)	Waste piles that release any hazardous substance, pollutant or contaminant (as defined by CERCLA).	Same as objective for hazardous waste landfills under CERCLA.	Same as requirements for hazardous waste landfills under CERCLA.	Same as requirements for hazardous waste landfills under CERCLA.
Waste Piles – Non-Hazardous Waste	Surface Mining Control and Reclamation Act (30 CFR 816 and 817)	Refuse piles containing coal mine waste (includes coal processing waste and underground development waste). Applies to all surface and underground coal mining operations.	Same as objective for non-hazardous waste surface impoundments under SROA.	Same as requirements for non-hazardous waste surface impoundments under SROA.	Same as requirements for non-hazardous waste surface impoundments under SROA.
Materials Stockpiles	Federal Land Policy and Management Act – Mineral Leasing Act of 1920 and Materials Act of 1947 (43 CFR 23)	Not explicitly mentioned in the regulations. However, waste piles are part of mining operations. Applies only to Federal lands.	Same as objective for non-hazardous waste surface impoundments under these laws.	Same as requirements for non-hazardous waste surface impoundments under these laws.	Same as requirements for non-hazardous waste surface impoundments under these laws.
	– U.S. Mining Laws (43 CFR 3600)	Not explicitly defined in the regulations, but waste piles are mentioned as part of a mining operation.	Same as objective for non-hazardous waste surface impoundments under these laws.	Same as requirements for non-hazardous waste surface impoundments under these laws.	Same as requirements for non-hazardous waste surface impoundments under these laws.
	Federal Insecticide, Fungicide, and Rodenticide Act (40 CFR 165)	Storage of packages and containers of pesticides.	To assure minimal environmental insult.	<ul style="list-style-type: none"> o No mandatory monitoring requirements are established. o An environmental monitoring system should be considered in the vicinity of storage facilities. o Samples from the surrounding groundwater should be collected as appropriate. 	Not specified.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Graveyards	—	—	—	—	—
Animal Burial	—	—	—	—	—
Aboveground Storage Tanks - Hazardous Waste	Resource Conservation and Recovery Act - Subtitle C (40 CFR 264)	Aboveground tanks used for the treatment or storage of hazardous wastes (as defined by RCRA).	To ensure the tank is being operated according to design.	<ul style="list-style-type: none"> o No requirements are established for groundwater monitoring. o Monitoring of tank operation is required to meet objective including data on pressure and temperature, and observations of construction material and area surrounding the tank. o Procedure for emptying and inspecting tank must be established. 	<ul style="list-style-type: none"> o No requirements are established for groundwater monitoring. o Monitoring pressure and temperature at least once each operating day is required (if tank is uncapped, the level of waste inside must be inspected). o Construction materials of tank must be inspected at least weekly. o Area surrounding the tank must be inspected at least weekly to detect obvious signs of leakage (e.g., dead vegetation). o Frequency of inspections involving emptying of tank is not specified (must be based on the route, construction materials of tank, corrosion or erosion protection used, and corrosion or erosion observed).
	Comprehensive Environmental Response, Compensation, and Liability Act (40 CFR 300)	Storage tanks that release any hazardous substance, pollutant or contaminant (as defined by CERCLA).	Same as objective for hazardous waste landfills under CERCLA.	Same as requirements for hazardous waste landfills under CERCLA.	Same as requirements for hazardous waste landfills under CERCLA.
	Toxic Substances Control Act (40 CFR 761)	See TSCA requirements, below, for hazardous waste containers.	Same as objective for hazardous waste containers under TSCA.	Same as requirements for hazardous waste containers under TSCA.	Same as requirements for hazardous waste containers under TSCA.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Aboveground Storage Tanks - Non-Hazardous Waste					
Aboveground Storage Tanks - Non-Waste	Clean Water Act - section 311 (40 CFR 112)	Onshore and off shore facilities with aboveground capacities of greater than 1,320 gallons of oil (or single tanks with capacities greater than 60 gallons). ^d	To ensure the integrity of the tank.	<ul style="list-style-type: none"> No requirements are established for groundwater monitoring. The Spill Prevention Control and Countermeasure (SPCC) Plan must discuss provisions for integrity testing of the tank and for observations of the facility operation for upsets in plant effluent discharges which could cause an oil spill. 	Not Specified.
	Hazardous Liquid Pipeline Safety Act (49 CFR 195)	Storage of hazardous liquids (as defined by HLPFA) incidental to their movement by pipeline or affecting interstate or foreign commerce. Regulations explicitly define aboveground "breakout tanks" which are used to relieve surges in a hazardous liquid pipeline system or to receive and store hazardous liquid transported by a pipeline. Requirements do not apply to Federal facilities. ^e	To ensure the integrity of the tank.	No requirements are established for groundwater monitoring.	Each tank must be inspected at least once a year.
Underground Storage Tanks - Hazardous Waste	Resource Conservation and Recovery Act - Subtitle C (40 CFR 264)	Covered underground tanks used for the treatment or storage of hazardous waste as defined by RCRA.	Regulations have not been promulgated.	Regulations have not been promulgated.	Regulations have not been promulgated.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
	Comprehensive Environmental Response, Compensation, and Liability Act (40 CFR 3a))	Storage tanks that release any hazardous substance, pollutant or contaminant (as defined by CERCLA).	Same as objective for hazardous waste landfills under CERCLA.	Same as requirements for hazardous waste landfills under CERCLA.	Same as requirements for hazardous waste landfills under CERCLA.
Underground Storage Tanks - Non-Hazardous waste	—	—	—	—	—
Underground Storage Tanks - Non-Waste	Clean Water Act - section 311 (40 CFR 112)	Onshore facilities with underground storage capacities equal to or greater than 42,000 gallons.	To ensure the integrity of the tank.	<ul style="list-style-type: none"> o No requirements are established for groundwater monitoring. o The Spill Prevention Control and Countermeasure (SPCC) Plan must discuss provisions for regular pressure testing and for observations of the facility operation for upsets in plant effluent discharges which could cause an oil spill. 	Not specified.
Containers - Hazardous Waste	Resource Conservation and Recovery Act - Subtitle C (40 CFR 264)	Containers used for the storage of hazardous wastes (as defined by RCRA).	To ensure containers are not leaking and spill containment system has not deteriorated.	<ul style="list-style-type: none"> o No requirements are established for groundwater monitoring. o Containers and storage areas must be inspected. 	<ul style="list-style-type: none"> o No requirements are established for groundwater monitoring. o Inspections must be conducted at least weekly.
	Toxic Substances Control Act - Section 6 (40 CFR 761)	Containers used to store PCBs at concentrations of 50 ppm and above. Container means any package, can, bottle, bag, barrel, drum, tank or other device.	No requirements established.	<ul style="list-style-type: none"> o No requirements are established for groundwater monitoring. o Containers must be inspected for leaks. 	<ul style="list-style-type: none"> o No requirements are established. o Inspections must be conducted at least once every 30 days.
	Comprehensive Environmental Response, Compensation, and Liability Act (40 CFR 300)	Containers that release any hazardous substance, pollutant or contaminant (as defined by CERCLA).	Same as objective for hazardous waste landfills under CERCLA.	Same as requirements for hazardous waste landfills under CERCLA.	Same as requirements for hazardous waste landfills under CERCLA.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Containers - Non-Hazardous Waste	--	--	--	--	--
Containers - Non-Waste	Federal Insecticide, Fungicide, and Rodenticide Act (40 CFR 165)	Pesticide containers.	See objective for materials stockpiles under FIFRA.	See requirements for materials stockpiles under FIFRA.	See requirements for materials stockpiles under FIFRA.
Open Burning and Detonation Sites	Resource Conservation and Recovery Act - Subtitle C (40 CFR 264)	Open burning and detonation of waste explosives. ^f	Regulations have not been promulgated.	Regulations have not been promulgated.	Regulations have not been promulgated.
	Federal Insecticide, Fungicide, and Rodenticide Act (40 CFR 165)	Open burning of small quantities of combustible pesticide containers which held organic or metal-organic pesticides (except organic mercury, lead, cadmium or arsenic compounds).	Same as objective for residential disposal (burial) under FIFRA.	Same as requirements for residential disposal (burial) under FIFRA.	Same as requirements for residential disposal (burial) under FIFRA.
	Comprehensive Environmental Response, Compensation, and Liability Act (40 CFR 300)	Sites which release any hazardous substance, pollutant or contaminant (as defined by CERCLA).	Same as objective for hazardous waste landfills under CERCLA.	Same as requirements for hazardous waste landfills under CERCLA.	Same as requirements for hazardous waste landfills under CERCLA.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Radioactive Disposal Sites	Atomic Energy Act (10CFR60)	Geologic repositories for high-level radioactive wastes.	To ensure that geotechnical design parameters are confirmed and to ensure that appropriate action is taken to inform NRC of changes needed in design to accommodate actual field conditions encountered.	At a minimum, measurements shall be made of rock & formations and displacement, changes in rock stress and strain, rate and location of water inflow into subsurface areas, changes in groundwater conditions, rock pore pressures including those along fractures and joints, and the thermal and thermochemical response of the rock mass as a result of development and operations of the geologic repository.	Not specified.
	Atomic Energy Act (10 CFR 61) ^h	Disposal sites for low-level radioactive wastes.	To provide basic (preoperational) environmental data on the site, to evaluate the potential health and environmental impacts during construction and operation, and to evaluate the long-term effects and need for mitigative measures.	<ul style="list-style-type: none"> o Preoperational monitoring must provide information about the ecology, meteorology, climate, hydrology, geology, geochemistry, and seismology of the disposal site over a twelve month period. o Monitoring during construction and operation must be capable of providing early warning of releases of radionuclides from the sites before they leave the site boundary. o Post-operational monitoring system must be based on the operating history and the closure and stabilization of the site and must be capable of providing early warning releases of radionuclides from the site before they leave the site boundary. 	<ul style="list-style-type: none"> o Not specified. o Not specified. o Not specified.

- ^a The monitoring requirements presented in the table are for permitted facilities. EPA has also promulgated interim status requirements for these facilities which must be met until a final permit is issued. The interim status monitoring requirements specify the installation of at least one upgradient well and three downgradient wells to determine initial background concentrations of certain parameters and to determine whether waste constituents have entered the groundwater. Groundwater monitoring requirements can be waived by an owner or operator if there is low potential for waste migration (EPA approval of the waiver is not required). See 40 CFR 265.
- ^b The Federal Land Policy and Management Act (FLPMA) of 1976 (P.L. 94-579) requires that public lands be managed in a manner that will protect the quality of environmental values. In addition, there are a number of laws regulating certain activities on Federal lands. The mining regulations are authorized by both the FLPMA and the specific mining laws and are thus presented together in this table. Note that regulations for the Geothermal Steam Act were redesignated, with minor revisions, as 43 CFR 3260 on Sept. 30, 1983.
- ^c The requirements presented in this table are the Health and Environmental Protection Standards promulgated by EPA (40 CFR 192, 48 FR 45926, Oct. 7, 1983 and 48 FR 590, Jan. 5, 1983). The NRC has also promulgated licensing requirements for uranium mill tailings (10 CFR 30, 40, 70 and 150).
- ^d Facilities include those engaged in drilling, producing, gathering, storing, processing, refining, transferring, distributing or consuming oil and oil products. Oil is defined as oil of any kind or in any form, including but not limited to petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil.
- ^e Hazardous liquids include petroleum, petroleum products, and anhydrous ammonia.
- ^f Waste explosives include waste which has the potential to detonate and bulk military propellants which cannot safely be disposed of through other modes of treatment. Regulation for permitted facilities have not been promulgated. Interim status regulations for open burning and detonation do not establish groundwater monitoring requirements.
- ^g The requirements presented are those established by NRC for high-level radioactive wastes; these requirements are proposed regulations. See 46 FR 35280, July 8, 1981. EPA has also published proposed health and environmental standards. See 47 FR 58196, December 29, 1982.
- ^h The requirements presented are those established by NRC for low-level radioactive waste sites. EPA is also required to establish health and environmental standards for such sites; standards have not yet been promulgated by EPA.

Source: Office of Technology Assessment.

E.3 MONITORING PROVISIONS FOR CATEGORY III SOURCES

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Pipelines — Hazardous Materials	Hazardous Liquid Pipeline Safety Act (49 CFR 195)	Pipelines used to transport hazardous liquids (includes petroleum, petroleum products, and anhydrous ammonia).	To ensure the integrity of the pipeline.	<ul style="list-style-type: none"> o No requirements established for groundwater monitoring. o All new pipelines or relocated, replaced or otherwise changed pipelines must undergo hydrostatic testing prior to use. 	No requirements established for groundwater monitoring.
	Comprehensive Environmental Response, Compensation and Liability Act (49 CFR 300)	Pipelines that release any hazardous substance, pollutant or contaminant (as defined by CERCLA).	o To provide preliminary assessment of the nature and extent of the release.	o Collection of samples minimized except in situations where there is an apparent risk to the public.	o Not specified.
			o To determine the source and dispersion of the hazardous substance.	o Not specified. Monitoring may be part of an immediate removal.	o Not specified.
			o To determine the nature and extent of the problem.	o collection of sufficient information to determine the necessity for and proposed extent of remedial action.	o Not specified.
			o To monitor effectiveness of the remedial action.	o Not specified. Assurance must be provided by the State to cover these activities.	o Not specified.
Pipelines - Non-Hazardous Materials	—	—	—	—	—
Materials Transport and Transfer — Operations — Hazardous Materials and Waste	Hazardous Materials Transportation Act (49 CFR 171)	The transportation of hazardous materials and hazardous waste (as defined by HMTA) by rail car, aircraft, vessel and motor vehicles used in interstate and foreign commerce (and motor vehicles used to transport hazardous waste in intrastate commerce).	No requirements established for groundwater.	No requirements established for groundwater.	No requirements established for groundwater.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Materials Transport and Transfer Operations - Hazardous Materials and Waste (Continued)	Comprehensive Environmental, Response, Compensation, and Liability Act (40 CFR 300)	Transport-related accidents that release any hazardous substance, pollutant, or contaminant (as defined by CERCLA).	Same as objectives for pipelines under CERCLA.	Same as requirements for pipelines under CERCLA.	Same as requirements for pipelines under CERCLA.

source: Office of Technology Assessment.

E.4 MONITORING PROVISIONS FOR CATEGORY IV SOURCES

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Irrigation Practices	Clean Water Act - Section 208 (40 CFR 35, Subpart C) ^a	Return flows from irrigated agriculture.	Determine the impact of the source.	o No specific requirements established. o Groundwater monitoring can be undertaken by a State if it is established as a priority in the State's annual work program submitted to EPA.	No requirement established.
Pesticide Applications	Clean Water Act - Section 208 (40 CFR 35, Subpart C)	Agriculturally related nonpoint sources of pollution.	Same as objective for irrigation practices under CWA.	Same as requirements for irrigation practices under CWA.	Same as requirements for irrigation practices under CWA.
	Federal Insecticide, Fungicide, and Rodenticide Act	Application of certain pesticides which may cause unreasonable adverse effects on the environment.	No requirements established.	No requirements established.	No requirements established.
Fertilizer Applications	Clean Water Act - Section 208 (40 CFR 35, Subpart C)	Agriculturally related nonpoint sources of pollution.	Same as objective for irrigation practices under CWA.	Same as requirements for irrigation practices under CWA.	Same as requirements for irrigation practices under CWA.
Animal Feeding Operations	Clean Water Act - Section 208 (40 CFR 35, Subpart C)	Runoff from manure disposal areas and from land area used for livestock.	Same as objective for irrigation practices under CWA.	Same as requirements for irrigation practices under CWA.	Same as requirements for irrigation practices under CWA.
De-icing Salts Application	—	—	—	—	—
Urban Runoff	Clean Water Act - Section 208 (40 CFR 35, Subpart C)	Urban stormwater runoff systems.	No requirements established.	No requirements established.	No requirements established.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Percolation of Atmospheric Pollutants		—	—	—	—
Mining and Mine Drainage - Surface Mining	Clean Water Act - (Section 208(40 CFR 35, Subpart G)	Mine-related sources of pollution including mine runoff from new, active, and abandoned surface and underground mines.	No requirements established.	No requirements established.	No requirements established.
	Federal Land Policy and Management Act ^b				
	- Mineral Leasing Act of 1920 and Materials Act of 1947 (43 CFR 23)	Mining of minerals such as coal, phosphate, asphalt, sodium, potassium, sand, stone, gravel and clay (on Federal lands).	No requirements established.	No requirements established.	No requirements established.
	- U.S. Mining Laws (43 CFR 23)	Mining of minerals such as gold, silver, lead, iron and copper (on Federal lands).	No requirements established.	No requirements established.	No requirements established.
surface Mining Control and Reclamation Act (30 CFR 816)		surface mining of Coal.	Determine the impacts of the mining operation on the hydrologic balance within the permit and adjacent areas.	o Groundwater monitoring plan must be included in a permit application which provides for the monitoring of parameters that relate to the suitability of the groundwater for current and approved postmining land uses and to objectives for protection of the hydrologic balance. Monitoring site locations must be specified. Monitoring is conducted during operations and reclamation activities (until performance bond release). (Continued next page)	o Groundwater monitoring plan must specify parameters and sampling frequency. o At a minimum, total dissolved solids or specified conductance (corrected to 25°C), pH, total iron, total manganese, and water levels shall be monitored. (Continued next page)

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Mining and Mine Drainage - Surface Mining (Continued)	surface Mining Control and Reclamation Act (30 CFR 816) (Continued)			<p>o Monitoring of a particular water-bearing stratum may be waived by the regulatory authority if it can be demonstrated that it is not a stratum which serves as an aquifer which significantly ensures the hydrologic balance of the cumulative impact area (the area, including the permit area, within which impacts resulting from the proposed operation may interact with the impact of all anticipated mining).</p>	<p>o Samples must be taken and analyzed quarterly at each monitoring location. Additional monitoring may be required by the regulatory authority.</p>
	Surface Mining Control and Reclamation Act (40 CFR 874 and 875)	Lands and water which were mined (covers coal mining and mining of minerals and materials other than coal) or which were affected by such mining, waste banks, processing or other methods prior to Aug. 3, 1977.	No requirements established.	No requirements established.	No requirements established.
Mining and Mine Drainage - Underground Mining	Clean Water Act - section 208 (CFR 35, Subpart G)	Mine-related sources of pollution including mine runoff from new, active, and abandoned surface and underground mines.	No requirements established.	No requirements established.	No requirements established.
	Federal Land, Policy and Management Act				
	- Mineral Leasing Act of 1920 and Materials Act (43 CFR 23)	Mining for minerals such as coal, phosphate, asphalt, sodium, potassium, sand, stone, gravel and clay (on Federal lands).	Same as objective for surface mining under these laws.	Same as requirements for surface mining under these laws.	Same as requirements for surface mining under these laws.
	- U.S. Mining Laws (43 CFR 3800)	Mining of minerals such as gold, silver, lead, iron, and copper (on Federal lands).	Same as objective for surface mining under these laws.	Same as requirements for surface mining under these laws.	Same as requirements for surface mining under these laws.

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Mining and Mine Drainage - Underground Mining (Continued)	Surface Mining Control and Reclamation Act (30 CFR 817)	Underground mining of coal. ^c	Same as objective for surface mining under SMORA.	Same as requirements for surface mining under SMORA.	Same as requirements for surface mining under SMORA.

^a 40 CFR 35, subpart G are the regulations for S- grants for Water Quality Planning, Management, and Implementation. Although the Clean Water Act is directed at the protection of surface waters, some states have chosen to include groundwater quality programs in their water quality management plans. Such plans are required by the regulations to indicate recognition that groundwater and surface water intermix.

^b The Federal Land Policy and Management Act (FLPMA) of 1976 (P.L. 94-579) requires that public lands be managed in a manner that will protect the quality of environmental values. In addition, there are a number of laws regulating certain mining activities on Federal lands. The mining regulations are authorized by both the FLPMA and the specific mining laws and are presented together in this table.

^c Applies to SURF ax effects of underground mining.

Source: Office of Technology Assessment.

E.5 MONITORING PROVISIONS FOR CATEGORY V SOURCES

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Production Wells - Geothermal and Heat Recovery	Federal Land Policy and Management Act-Geothermal Steam Act(30cFR270 and ELM Operational Order No.4) ^a	wells used for the development of geothermal steam (on Federal lands)	<ul style="list-style-type: none"> o Determine existing water quality. o Ensure that operations are conducted in compliance with regulation and orders. 	<ul style="list-style-type: none"> o Data must be collected for a period of at least one year prior to production. o No specific requirements for pits and sumps. Regulations state that monitoring of environmental impacts may be conducted by the use of aerial surveys, inspections, periodic samplings, continuous recordings or other methods specified on a site-specific basis. 	Specified by the regulatory authority on a site-specific basis.
Production Wells - Water supply	---	---			---
Other Wells - Monitoring Wells, Non-Waste	---	---			---
Other Wells - Exploration Wells, Non-Waste	Federal Land Policy and Management Act - Mineral Leasing Act of 1920 and Materials Act of 1947 (40 CFR 23)	Exploration wells used in mining operations for minerals such as coal, phosphate, asphalt, sodium, potassium, sand, stone, gravel, and clay.	No requirements established.	No requirements established.	No requirements established.
Construction Excavation	CleanWaterAct - Section 208 (40 CFR 35 Subpart G) ^b	Construction activity related to sources of pollution.	<ul style="list-style-type: none"> o Determine the impact of the source. 	<ul style="list-style-type: none"> o No specific requirements established. o Groundwater monitoring can be undertaken by a State if established as a priority in the State's annual work program submitted to EPA. 	o No requirements established.

^a Note that regulations for the Geothermal Steam Act were redesignated, with minor revisions, as 43 CFR 3260 on Sept. 30, 1983.

^b 40 CFR 35, Subpart G are the regulations for State grants for Water Quality Planning, Management, and Implementation. Although the Clean Water Act is directed at the protection of surface waters, some States have chosen to include groundwater quality programs in their water quality management plans. Such plans are required by the regulations to indicate recognition that groundwaters and surface water intermix.

Source: Office of Technology Assessment.

E.6 MONITORING PROVISIONS FOR CATEGORY VI SOURCES

Source	Statutory Authority	Definition of Source	Monitoring Objective	Design of Monitoring System	Parameters and Sampling Frequency
Groundwater — Surface Water Interactions	Clean Water Act — Section 208 (40 CFR 35, Subpart G) ^a	Intermixing of groundwater and surface water.	Determine the impact of the source.	o No specific requirements established. o Groundwater monitoring can be undertaken by a State if established as a priority in the State's annual work program submitted to EPA.	No requirements established.
Natural Leaching	Reclamation Act	Natural salt deposits affecting underground water supplies.	No requirements established.	No requirements established.	No requirements established.
Salt-water Intrusion	Clean Water Act — Section 208 (40 CFR 35, Subpart G) ^a	Salt-water intrusion into rivers, lakes, and estuaries resulting from reduction of freshwater flow from any cause including <u>groundwater extraction</u> .	Same as objective for groundwater-surface water interactions under CWA.	Same as requirements for groundwater-surface water interactions under CWA.	Same as requirements for groundwater-surface interaction under CWA.
	Coastal Zone Management Act	Salt-water intrusion	No requirements established.	No requirements established.	No requirements established.

^a 40 CFR 35, subpart G are the regulations for State grants for Water Quality Planning, Management, and Implementation. Although the Clean Water Act is directed at the protection of surface waters, some States have chosen to include groundwater quality programs in their inter quality management plans.

Source: Office of Technology Assessment.