A GROUND-WATER PROTECTION STRATEGY

FOR THE

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GROUND-WATER PROTECTION STRATEGY

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CHAPTER I: EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

In the last decade the public has grown increasingly aware of the potential problem of ground-water contamination. Reports of chemicals threatening drinking water supplies have mobilized State, local and Federal governments to respond. But these responses suffer from a lack of coordination among responsible agencies, limited information about the health effects of exposure to some contaminants, and a limited scientific foundation on which to base policy decisions.

Officials at all levels of government have begun to look for a definable strategy to protect ground water. The strategy presented here will provide a common reference for responsible institutions as they work toward the shared goal of preserving, for current and future generations, clean ground water for drinking and other uses, while protecting the public health of citizens who may be exposed to the effects of past contamination.

EPA Administrator William D. Ruckelshaus recognized the need to protect ground-water quality as a national concern. In response, Deputy Administrator Alvin L. Alm formed a Ground-Water Task Force to: (1) identify areas of serious inconsistencies among programs and institutions at the State, local and Federal levels; (2) assess the need for greater program coordination within EPA; and (3) help strengthen States' capabilities to protect ground-water resources as they themselves define the need. In line with EPA's mission to preserve and enhance environmental quality, this strategy document focuses on issues of ground-water quality.

(Issues of water quantity and allocation are also important, but they are outside the province of EPA. Many ground-water quality issues (for example, salt-water intrusion) are closely related to issues of ground-water quantity and allocation. States will have to approach such issues through integrated policies; topics relating primarily to quantity and allocation are not addressed in this document. With respect to EPA activities the scope and intent of this document includes only EPA's statutory and regulatory authority.)

The Task Force was composed of staff from each affected EPA Program Office and two EPA regions. The Office of Water chaired the group. Beginning work in June 1983, the Task Force delivered a draft report to the Deputy Administrator on September 1, 1983. He sought the views of senior Agency policy-makers by meeting with the involved Assistant Administrators and their key staff on many occasions to discuss the report and its implications.

As options began to narrow, this senior policy group requested additional analyses from the Task Force, consulting with Regional Administrators as it proceeded. At length, after concerted debate and broad-scale Agency involvement, the main policy elements for an EPA Ground-Water Protection Strategy emerged. Draft conclusions were discussed with Congressional staff, State organizations, and environmental and industry organizations.

A draft strategy resulting from that decision process was then distributed to State officials and to select State, business and industry, and environmental organizations for comment. Approximately 150 organizations submitted comments. After receiving comments from these interested parties, EPA revised the draft strategy for final consideration by the Deputy Administrator and Assistant Administrators. This final Ground-Water Protection Strategy is the product of that deliberation process.

A Perspective on Ground Water

In the 1970's, national environmental concern focused mainly on natural resources and pollutants we could see or smell. Surface water and air quality, specific types of contaminants such as pesticides, or obvious sources of contamination such as uncontrolled hazardous waste sites, were of primary concern. People concerned themselves only rarely with ground water since, hidden from view as it is, few knew or really understood how seriously the resource was being compromised.

Today, ground-water contamination looms as a major environmental issue of the 1980's. The attention of agencies at all levels of government, as well as that of industry and environmentalists, is now focused on this vital resource. As contamination has appeared in well water and wells have been closed, the public has expressed growing concern about the health implications of inappropriate use and disposal of chemicals. As concern has increased, so have demands for expanded protection of the resource.

Our understanding of the sources and dimension of the threat is limited, but increasing. Scientists can now measure specific

organic chemicals at the parts-per-billion or -trillion levels. As new health studies are completed and as we learn more about various sources of ground-water contamination, our capacity to deal with this problem increases. Scientists and engineers have also learned more about how contaminants move in the subsurface -- which ones bind to soils and which ones pass through to the water table beneath. They are now identifying technologies to prevent, control, and clean up ground-water contamination.

Major Authorities and Responsibilities

The Task Force reviewed EPA's statutory authority as it relates to ground water and examined the current scope and extent of State programs as well. While the nature and variability of ground water makes its management the primary responsibility of States, the Task Force found that a number of Federal authorities exist to support States in the effort.

Since these Federal statutes were enacted at various times for separate purposes, inconsistency developed in EPA's regulations and in the decisions made under them. While these differences are often necessary and reasonable, there are a number that appear to hinder a cohesive approach to ground-water protection. Improving harmony among EPA's program rules affecting ground-water protection is an important need, since inconsistency in such matters leads to confusion and less effective protection than if roles, requirements, and responsibilities are clear and consistent.

In addition to its own authorities, EPA found a variety of powerful State and local statutes available for use. A number of States have begun their own programs for ground-water protection, some built on permits supported by a system of aquifer classification. Continuing the development of State programs in this area is vital, as they have the basic responsibility for the protection of the ground-water resource.

Strategic Concerns

Given public concerns, EPA, as well as State and local governmental agencies, must decide how best to protect public health and critical environmental systems. It seems clear to many that we must direct our energies to minimize future contamination, even as we detect and manage contamination associated with past activities.

Protecting ground water will be difficult. Starting with limited knowledge of the resource and limited means to address existing or potential problems, we must expend our efforts where

groundwater contamination would cause the greatest harm. Consequently, we assign highest priority to those ground waters that are currently used as sources of drinking water or that feed and replenish unique ecosystems.

Ground-water protection is a very complex and difficult issue. It will require sustained effort at all levels of government over a long period of time before this resource will be adequately protected. Within this context, EPA developed its Ground-Water Protection Strategy.

EPA's Ground-Water Protection Strategy

The EPA Strategy includes four major components that address critical needs. They are:

- Short-term build-up of institutions at the State level;
- Assessing the problems that may exist from unaddressed sources of contamination--in particular, leaking storage tanks, surface impoundments, and landfills;
- Issuing guidelines for EPA decisions affecting ground-water protection and cleanup; and
- Strengthening EPA's organization for ground-water management at the Headquarters and Regional levels, and strengthening EPA's cooperation with Federal and State agencies.

These components, described in detail in Chapter IV, are summarized below.

EPA will provide support to States for program development and institution building. EPA will encourage States to make use of certain existing grant programs to develop ground-water protection programs and strategies. These funds will support necessary program development and planning, the creation of needed data systems, assessment of legal and institutional impediments to comprehensive State management, and the development of State regulatory programs such as permitting and classification. Regional Administrators will work with Governors so that funds are directed to the State agency or programs with the most complete authority and capability to undertake or continue statewide program or strategy development. EPA will also provide State agencies with technical assistance in solving ground-water problems and will continue to support a strong research program in ground water.

EPA will address contamination from underground storage tanks. Because the evidence suggests that leaking storage tanks--particulary from gasoline--may represent a major, unaddressed source of ground-water contamination, the Deputy Administrator has directed the Office of Toxic Substances to design a study to identify the nature, extent, and severity of the problem. EPA is investigating the application of the Toxic Substances Control Act (TSCA), as well as other authorities, as a potential legal basis for applying appropriate requirements on design and operation of these tanks. In the meantime, the Agency will issue chemical advisories to alert owners and operators about the problem and work with States and industry to develop voluntary steps to reduce contamination. EPA is also planning direct regulation of underground storage of hazardous waste under the Resource Conservation and Recovery Act (RCRA).

EPA will study the need for further regulation of land disposal facilities, including surface impoundments and landfills. EPA, in cooperation with the States, will conduct studies of impoundments and landfills as to the degree of danger they present, set priorities for control, review the regulatory options available, and determine if additional Federal controls are needed.

EPA will adopt guidelines for consistency in its ground-water protection programs. The guidelines will be based on the policy that ground-water protection should consider the highest beneficial use to which ground water having significant water resources value can presently or potentially be put. Under this policy, the guidelines define protection policies for three classes of ground water, based on their respective value and their vulnerability to contamination. These guidelines are intended to provide a framework for the decisions that EPA and States will have to make in implementing EPA programs. The guidelines will be used by EPA and the States to make decisions on levels of protection and cleanup under existing regulations, to guide future regulations, and to establish enforcement priorities for the future. (These regulations will then provide the legal basis for the implementation of the guidelines. It is not intended that any substantive or procedural rights are provided by this Strategy.)

The classes of ground water are as follows:

Class I: Special Ground Waters are those that are highly vulnerable to contamination because of the hydrological characteristics of the areas under which they occur and that are also characterized by either of the following two factors:

a) Irreplaceable, in that no reasonable alternative source of drinking water is available to substantial populations; or

b) Ecologically vital, in that the aquifer provides the base flow for a particularly sensitive ecological system that, if polluted, would destroy a unique habitat.

Class II: Current and Potential Sources of Drinking Water and Waters Having Other Beneficial Uses are all other ground waters that are currently used or are potentially available for drinking water or other beneficial use.

Class III: Ground Waters Not Considered Potential Sources of Drinking Water and of Limited Beneficial Use are ground waters that are heavily saline, with Total Dissolved Solids (TDS) levels over 10,000 mg/L), or are otherwise contaminated beyond levels that allow cleanup using methods reasonably employed in public water system treatment. These ground waters also must not migrate to Class I or II ground waters or have a discharge to surface water that could cause degradation.

EPA will accord different levels of protection to each class as described in the examples below. Chapter IV describes in more detail the regulatory approaches EPA will take to protect these ground-water classes under each statute.

To prevent contamination of Class I ground waters EPA will initially discourage by guidance, and eventually ban by regulation, the siting of new hazardous waste land disposal facilities over Special Ground Waters. Some restrictions may also be applied to existing land disposal facilities. Further, Agency policy will be directed toward restricting or banning the use in these areas of those pesticides which are known to leach through soils and are a particular problem in ground water. EPA's general policy for cleanup of contamination will be the most stringent in these areas, involving cleanup to background or drinking water levels.

Ground waters that are current and potential sources of drinking water (Class II) will receive levels of protection consistent with those now provided for ground water under EPA's existing regulations. In addition, where ground waters are vulnerable to contamination and used as a current source of drinking water, EPA may ban the siting of new hazardous waste land disposal facilities, initially through guidance, and later through regulation. While EPA's cleanup policy will assure drinking water quality or levels that protect human health, exemptions will be available to allow a less stringent level under certain circumstances when protection of human health and the environment can be demonstrated. EPA may establish some

differences in cleanup depending on whether the ground water is used as a current or potential source of drinking water or for other beneficial purposes.

Ground waters that are not considered potential sources of drinking water and have limited beneficial use (Class III) will receive less protection than Class I or II. Technology standards for hazardous waste facilities generally would be the same as for Class I and Class II. With respect to cleanup, should the hazardous waste facility leak, waivers establishing less stringent concentration limits would be considered on a case-by-case basis. Waivers would not be available, however, when a facility caused the contamination that precluded future use. EPA's Superfund program will not focus its activities on protecting or improving ground water that has no potential impact on human health and the environment.

To improve the consistency and effectiveness of EPA's current ground-water programs, the guidelines will be incorporated into each of the Agency's relevant program areas. Many of these programs are delegated to the States, and for most programs, States must demonstrate that their programs are "no less stringent" than the Federal program in order to qualify for authorization to implement the programs. However, in implementing these guidelines EPA will provide as much flexibility to the States as is possible under state delegation agreements.

Consequently, EPA will to the extent possible keep regulatory requirements based on EPA's ground-water protection guidelines general and performance-oriented. EPA will, in addition, develop guidance to accompany such regulations for use by EPA when EPA directly administers a program in a State (e.g., implementation in a non-delegated State or implementation of a program which cannot be delegated). Such accompanying guidance would not be binding on the States, but it could also be used by the States to assist them in developing their own regulatory requirements or guidelines. This guidance will, for example, define more precisely the meaning of the terms used in the Strategy, such as "vulnerable and unique habitat".

The task of actually determining whether the ground water in a particular location fits the criteria for Class I, II, or III will be a site-specific determination. In programs involving permits, such as RCRA and Underground Injection Control (UIC), for example, this determination will be made during the permitting process based on data supplied by the permit applicant. In cleanup actions under Comprehensive Environmental Response Compensation and Liability Act (CERCLA), the ground-water class will

be determined in conjunction with the assessment of the extent of contamination. Where States have already mapped or designated ground water for that location, the State classification of the ground water will provide useful guidance.

EPA will improve its own institutional capability to protect ground water. EPA has assigned ground-water coordination and development responsibilities to the Assistant Administrator for Water and he has established an Office of Ground-Water Protection to oversee the implementation of this Strategy. The Director of that Office has already started to work with other EPA offices and Regions to institutionalize EPA and State ground-water roles, plan for correction of uncontrolled sources of contamination, identify and resolve inconsistencies among EPA programs, and learn more about the nature and extent of ground-water contamination.

EPA Regional offices are also in the process of establishing Regional ground-water units. They will coordinate Regional ground-water policy and program development and assist the States through grants and technical assistance designed to increase their institutional capabilities to manage ground water.

EPA will carry out this Strategy in partnership with other Federal agencies, especially the Department of Interior (DOI), to insure that the Strategy is implemented as effectively as possible.

The body of this report contains three chapters and an Appendix. Chapter II describes the nature and extent of ground-water contamination. Chapter III describes State and Federal programs for ground-water protection. Chapter IV describes EPA's strategy to protect ground water. The appendices include a matrix describing State, local, and Federal roles and a summary of the options considered by EPA in developing this Strategy.

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CHAPTER II: THE NATURE AND EXTENT OF GROUND-WATER CONTAMINATION IN THE UNITED STATES

THE NATURE AND EXTENT OF GROUND-WATER CONTAMINATION OF THE UNITED STATES

EPA's Task Force on Ground Water examined a number of published and internal technical reports to assess the nature, sources, and extent of ground-water contamination. This chapter presents the findings and conclusions of that review.

Findings

1. THE NATURE OF GROUND WATER

Ground water is a vast resource underlying all of our land. Ground water occurs in aquifers beneath the surface of the earth. Aquifers are geologic formations that contain enough water in a sufficiently permeable setting to yield usable amounts of water to wells and springs. Because of its dimension and because of geologic and geochemical factors that influence its movement and characteristics, it is a very complex resource to understand.

Usable aquifers are present nearly everywhere in the United States. The volume of known ground water is about 50 times greater than annual surface flow in the entire Nation. Another way to conceptualize the immense size of this resource is to consider that the volume of ground water to be found within one-half mile of the surface is estimated to be more than four times that of the Great Lakes.

In general, the degree to which people use ground water depends on a number of factors, one of which is whether good quality surface water is available. Another is the relative cost of delivering the ground water to individual users.

Ground water is the source of a substantial proportion (24 percent) of the Nation's domestic, agricultural, and industrial water. Between 1950 and 1980, total ground-water withdrawals increased from 34 to 89 billion gallons per day (BGD), an increase of 162 percent. The 1980 figure represents 24 percent of all the fresh water used (372 BGD) that year. Further, ground-water withdrawals are projected to reach 100 BGD by 1985. The principal uses of ground water in 1980 were for irrigation (60 BGD), public drinking water (12 BGD), with smaller amounts applied to industrial and rural household use.1/

Reliance on ground water has increased greatly over the past 35 years. In part, this increase is the result of a migration

of population during the decade of the 1970's to rural areas, where ground water is more easily accessible than surface water. In some parts of the country ground water is often the only available source of drinking water and can generally be used with little or no treatment.

Once contaminated, ground water presents particularly difficult problems for monitoring and clean-up. In many ways ground water is far more difficult to manage than air or surface water because it is not accessible directly. Ground water is slow-moving, with velocities generally in the range of 5 to 50 feet per year. Large amounts of a contaminant can enter an aquifer and remain undetected until a water well or surface water body is affected. Moreover, contaminants in ground water--unlike those in surface water--generally move in a plume with relatively little mixing or dispersion, so concentrations remain high. These plumes of relatively concentrated contaminants move slowly through the aquifer and are typically present for many years--sometimes for decades or longer--making the resource virtually unusable over periods of time. Although opportunity exists for chemical or biological transformation, changes in the concentrations of contaminants occur slowly so that they may not be readily discernible in the short-term. Because an individual plume may underlie only a very small part of the land surface, it is difficult to detect by aquifer-wide or regional monitoring.

Monitoring of ground water is very expensive, particularly where depths are substantial and multiple test wells must be drilled. Restoration after contamination is often complex and expensive, and success is unpredictable. For example, in the case of a gasoline spill, where the contaminant is valuable, recovery operations are typically 40-60 percent effective at best. In most circumstances it is prudent to protect the resource from contamination in the first place, rather than rely on clean-up after the fact.

Ground-water contamination is of particular concern because of its potential impact on sources of drinking water. Over 50 percent of the U.S. population draws upon ground water for its potable water supply. Approximately 117 million people in the U.S. get their drinking water from ground water supplied by 48,000 community public water systems and approximately 12 million individual wells. The remaining people get their drinking water from 11,000 public water systems drawing from surface water sources. About 95 percent of rural households depend on ground water, as does a still larger proportion (97 percent) of the 165,000 non-community public water supplies (such as camps or restaurants serving a transient population). Finally, 34 of the 100 largest U.S. cities rely completely or partially on ground water.2/

Until recently, the public viewed drinking water drawn from the ground as a pristine resource, unspoiled by human activities. Most believed that soils were capable of binding and holding chemicals applied to their surfaces. While this is true for some chemicals, we have learned over the past few years that it is definitely not true for several important and widely used classes of chemicals, such as low molecular-weight organic solvents. Among those of primary concern are such common chemical solvents as tri- and tetrachloroethylene, benzene, and chlorinated benzenes.

This new understanding of the vulnerability of ground water to contamination by man-made chemicals is significant. Where concentrations of these substances have been encountered in ground water, they have been orders of magnitude higher than those generally found in surface water. This is particularly disturbing because, while about half of water systems drawing from ground water provide chlorination treatment, this is ineffective for chemical contaminants. Only about 6 percent of such systems use treatment which remove chemical contaminants.3/ Many of the most troublesome chemicals are toxic, and some have been linked to cancer in test animals. For example, the suspected carcinogen trichloroethylene (TCE), has been found--if only rarely--at levels as high as 500,000 ppb (parts-per-billion) in heavily contaminated ground water. Typical concentrations in ground water are significantly less than 100 ppb, but surface water concentrations seldom exceed 1 ppb. EPA's health advisory on TCE recommends safe levels of TCE in drinking water at 2,000 ppb for an exposure duration of 1 day and at 80 ppb for a duration of one to two years, based on toxic effects. The companion guidance on cancer risks projects excess risk due to drinking water contaminated by TCE to be one in a million at a lifetime exposure level of 2.8 ppb.4/ The Agency is also proposing drinking water regulations which includes TCE as one substance to be controlled.

2. THE SOURCES OF GROUND-WATER CONTAMINATION

The diversity and number of existing and potential sources of ground-water contamination are large. There are three categories of sources of ground-water contamination: waste disposal, non-disposal use of chemicals on the surface of the land, and salt-water encroachment in response to ground-water development. As a result of differences in hydrogeological conditions and ground-water use, the threat posed by these sources varies greatly with each specific site.

States assess ground-water contamination problems on the basis of severity and/or frequency of degradation. The following is a brief listing based on anecdotal information of the problems States have identified: 5/

Major problems: industrial landfills/lagoons; municipal landfills/lagoons; underground storage tanks; and chemical oil and brine spills.

Intermediate problems: well injection; pesticides; fertilizers; and septic tanks.

Minor problems: salt water/brackish water intrusion; road salts; and feedlots.

Varies: wastewater treatment; land use; and mining background.

Some of the more troublesome contaminants from these sources include:

- gasoline (ethylene dibromide/ethylene dichloride, benzene, toluene, lead)
- organic solvents (TCE, TCA, benzene)
- heavy metals (cadmium, lead, chromium, mercury)
- inorganic chemicals (ammonia, cyanide)
- organic chemicals (PCB, PBB)
- soil fumigants (DBCP, EDB, aldicarb) and other pesticides
- pathogens and nitrates

One estimate indicates that there are now over 61,000 chemicals on the market and several hundred are added each year.6/

Improper waste disposal accounts for a substantial amount of ground-water contamination. Many types of waste disposal pose obvious risks to ground-water quality. Despite this, past decisions on locating hazardous waste disposal facilities give evidence of scant consideration of potential adverse impacts on ground water. Indiscriminate disposal of toxic and hazardous chemicals onto the land has given rise to Federal and State cleanup programs under the Superfund legislation. While the full number of such facilities remains unknown, EPA and the States have identified approximately 16,000 potential sites, including disposal sites. Some 5,600 of these sites have undergone preliminary screening, and 546 of them are now listed for priority attention under Superfund.7/

In addition to facilities receiving hazardous wastes, other facilities that may contaminate ground water are of concern. In the mid 1970's, EPA and the States' became increasingly concerned that all waste disposal landfills (not just those receiving hazardous wastes under RCRA) may be creating a substantial problem for ground water. There are an estimated 93,000 such landfills in the United States. Of these, 75,000 are classified as on-site/ industrial, and we know little about them. Another 18,500 are classified as municipal.8/ Fewer than 10 States require any form of regular monitoring for ground-water quality at these facilities. Landfills are invariably located on land that is considered to have little or no value for other use, -- such as marshlands, abandoned sand and gravel pits, old strip mines or limestone sinkholes -- all of which are susceptible to ground-water contamination problems. 9/

A similar situation obtains at pits, ponds, and lagoons--usually grouped and referred to as surface impoundments--that receive both hazardous and non-hazardous wastes. EPA's recently completed Surface Impoundment Assessment (SIA) surveyed the numbers and locations of surface impoundments, and estimated their potential effects on ground-water quality.10/ The SIA defined impoundments to be any significant man-made or natural depression used to treat, store or dispose of waste (agricultural, mining, oil and gas, municipal and industrial).

The study was not field-verified and so is subject to error. Still, it presents an initial working estimate of the number, location, and water quality impact of surface impoundments. The SIA identified a total of 181,000 surface impoundments. Most of them are unlined. About 40 percent of municipal and industrial impoundments are located in areas with thin or permeable soils, over aquifers currently used for drinking or that could be used for drinking. About seven percent of all sites appear to be located so as to pose little or no threat to ground water. Because of the lack of generally available knowledge, ground-water protection was rarely, if ever, considered when these facilities were sited.

Septic systems also discharge high volumes of waste to ground water. In some parts of the country, primarily in the eastern half of the country, they are among the most frequently reported sources of contamination.11/ Approximately 20 million American households, or 29 percent, use this type of on-site waste disposal system. Assuming a 50-gallon daily discharge per capita, household septic tanks handle about 3.5 billion gallons of waste per day.12/ The primary health hazard is the introduction of pathogens and nitrates to ground water, but the presence of organic cleaning solvents is of growing concern as well.

Other practices may account for up to two-thirds of the incidents of ground-water contamination.13/ Use of pesticides and fertilizers, chemigation (where chemicals are mixed with irrigation waters), coating of roads with waste oils, use of highway de-icing compounds, leaking underground storage tanks and pipelines, accidental spills and "midnight dumping," abandoned wells, drawdowns causing encroachment of salt water, and poorly managed artificial recharge have all caused ground-water contamination. Many of these practices go on with little recognition or concern for their potential impact on ground-water quality.

Leaking storage tanks may be causing the most serious risks to human health and the environment. Such tanks are used to store liquids of every description, including gasoline, hazardous and toxic chemicals, domestic fuels, process chemicals, and dilute wastes. Storage tanks are installed either above or below ground. Incidents of contamination from above-ground tanks, though less common, usually result in significant environmental damage, since they often involve large volumes of lost product. A number of factors account for leaking tanks, including age, soil conditions, and improper installation.

Nationally, there are an estimated 1.5-2.0 million underground storage tanks now being used to store gasoline, the vast majority of which are steel. A small fraction of these are made of specially protected steel,* and another small fraction of tanks are made of fiberglass.14/ Some experts estimate that between 75,000 and 100,000 underground storage tanks are leaking right now and the number is rising.15/ However, these estimates are based on statistical estimates of the likelihood of tank leakage rather than field testing of the rate or extent of leakage. We know much less about underground storage tanks used for pure (process) chemical storage, or hazardous and nonhazardous waste storage.

About one million of the steel tanks now in the ground are more than 16 years old and unprotected (e.g., by double liners or cathodic protection). About 40 percent of all steel gasoline storage tanks underground in the U.S. belong to gasoline stations, and approximately 40 percent of these belong to major oil companies. The other 60 percent belong to small oil companies, jobbers, industries, and individual station owners. Unlike the major oil companies, which have significant tank protection and replacement programs underway, this sector has not established a comprehensive protection program. 16/

*/ Cathodically (an electrical method for neutralizing electrical currents in steel tanks for corrosion protection).

The Maine Department of Environmental Protection (DEP) estimates that there are a minimum of 10,000 retail gasoline storage tanks in the State and that 25 percent of them may be leaking. The estimated annual loss from these leaking underground storage tanks is 11 million gallons for this one State, although it is not known how much of this seeped into ground water.19/ (It is important to note that Maine's estimate may not be representative and cannot be applied across the nation.)

3. THE EXTENT OF GROUND-WATER CONTAMINATION

Information on the current extent of contamination is far from adequate to quantify the severity of the problem. Despite numerous, well-documented incidents that continue to come to light, EPA and the Nation as a whole lack a reliable means to systematically measure the amount of damage already done and likely to occur. A great deal of information has been assembled over the years, but it has focused primarily on traditional parameters affecting potential use, like salinity. Only recently have advances in analytical chemistry enabled scientists to measure specific chemicals at low levels and begin to assemble information on chemicals of most concern as risks to public health.

Due to the nature of the resource, it is very unlikely that a comprehensive picture of ground-water contamination will ever be available from ambient monitoring data. The vastness of the ground-water resource makes the cost of significant ambient monitoring prohibitive. While anecdotal data does not tell much about the extent of the real problem, it does indicate that a problem may exist and highlights the need for further investigation.

For now, we must rely primarily on such data as that collected by other Federal and State agencies and at RCRA and Superfund sites to expand knowledge of the problem. For example, EPA expects that required monitoring of the approximately 1,500 existing hazardous waste disposal facilities will bring to light more contamination incidents. A recent EPA study identified and characterized 929 documented cases of contamination from abandoned hazardous waste facilities. Although the study is not based on a representative sample, about one-third of the 929 cases involve documented contamination of ground water. In an additional one-third, ground-water contamination is strongly suspected. 18/

In addition, we must make use of data on well closings, such as that reported in recent Congressional and EPA studies. These reports together show that nearly 8,000 private, public, and industrial wells have been reported closed or affected by toxic and other forms of contaminated ground water. It is very probable that many more wells were closed but the closings were never documented. 19/

The Ground-Water Supply Survey recently conducted by EPA illustrates the potential for ground-water contamination by organic chemicals. This survey covers the Nation's 48,000 public water systems drawn from ground water. The survey found that man-made chemicals are being detected in about one-third of the large public water systems (serving over 10,000 people) but are being detected in only about one-fifth of all ground-water systems. This indicates that some contamination exists and that the water supply, as well as potential sources of contamination, should be carefully examined.20/

Only about three percent of these systems detected levels of contamination at the levels at which EPA is considering establishing drinking water standards (5-50 ppb). Although the vast majority of these systems are finding levels of contamination of little significance to public health, it is nevertheless disturbing that they are being found at all. Since these chemicals are not naturally occurring, they must come from human activities. Unless the sources can be found and managed, serious problems may lie ahead.

There are few data on ground-water contamination in the 160,000 non-community systems (those serving a transient population). There are also virtually no data related to man-made chemicals in the 12-14 million individual wells, even though many are old, shallow, and most vulnerable to contamination.

In addition to the man-made organics discussed above, other Federal and State studies have found other types of more conventional contaminants -- such as chlorides, sulphates, nitrates, and metals -- in ground-water supplies at levels that may cause a public health problem.

* * * * * * *

Conclusions

Based on review of the preceding information, the Agency drew a number of conclusions in support of the ground-water policy development effort. They are as follows:

1) Based primarily on anecdotal data, ground-water contamination may be a widespread problem that deserves increased attention. Virtually every State in the Nation has detected ground-water contamination affecting use, and the monitoring efforts currently underway are expected to identify many more problems. Whenever these situations have surfaced, public concern has been intense, especially where drinking water supplies have been affected. Sufficient information is available to raise concerns that a widespread problem may exist.

2) Ground water is vulnerable to contamination, expensive to monitor, difficult to clean up, and not usable once seriously contaminated. General misunderstanding of the nature of ground-water has subjected the resource to pollution by many past actions involving the use and disposal of chemicals on and in the land. Cleaning up contaminated ground water is difficult, expensive, and often unsuccessful. These facts clearly argue for future programs to focus on better protection of the resource while efforts to detect and deal with serious contamination resulting from past actions continue.

3) Surface impoundments, landfills, and storage tanks must be better designed and constructed. Reports of ground-water contamination from surface impoundments, landfills, and storage tanks have been growing over the past few years. The attention of EPA and the Congress has been drawn to these sources as areas where additional national controls may be needed. Although there are other important, uncontrolled sources, these categories appear most in need of effective regulation.

4) More factual information is needed to determine the actual extent and severity of the ground-water contamination problem in the country. The nature and extent of ground-water contamination should receive more attention from the Federal government, particularly EPA, and the DOI. In particular, agencies should make usable data from existing sources of information more accessible to managers responsible for ground-water protection at all levels of government.

The importance of the ground-water resource will continue to increase. The present ground-water contamination problem is expected to appear more severe as additional information is collected, because the probability that many sources are contributing to the problem is high. Further studies of the nature and extent of the problems should indicate the significance of contamination sources to the quality of ground water and provide information concerning the fate of the contaminants and their potential impact on human health and the environment.

CHAPTER III: WHO IS RESPONSIBLE FOR PROTECTING GROUND WATER?

WHO IS RESPONSIBLE FOR PROTECTING GROUND WATER?

The Ground-Water Protection Strategy was developed in full recognition of EPA's recently released policy statements on delegation and oversight. The clear intent of those policies is to make use of Federal, State, and local governments in a partnership to protect public health and the environment. State and local governments are expected to assume primary responsibility for the implementation of environmental programs because they are best placed to address specific problems as they arise on a day-to-day basis. The EPA role is to provide national environmental leadership, develop general program frameworks, establish standards required by Federal legislation, conduct research and national information collection, provide technical support to States, and provide assistance to States in strengthening their programs. The Federal, State, and local roles as expressed in this Strategy are completely consistent with EPA's delegation and oversight policies.

The EPA role identified above will involve cooperation from other Federal agencies, especially regarding research information collection and technical support to the States. The EPA will provide program leadership and technical assistance to the States in matters involving the protection of ground-water quality, and will rely on the Department of the Interior and the U.S. Geological Survey (USGS), for assistance in defining the hydraulics and geochemistry of ground-water flow. In addition, USGS will provide technical assistance (largely through its "Federal-State Cooperative Program"), will conduct basic and applied research in ground-water physics and chemistry, and will work with EPA to help develop and support effective monitoring strategies.

EPA's Ground-Water Task Force examined Federal legislation and State program authorities to determine whether sufficient statutory and regulatory flexibility exists to protect ground water. The range of authorities at both levels is quite broad, but we need to make better, more closely coordinated use of them. The Task Force findings and conclusions follow.

Findings

Three levels of government--State, local, and Federal--have substantial responsibility for ground-water protection. Until the mid-1970's, it was principally the States and localities that

were concerned with protecting the quality of ground water. Many did not recognize ground-water contamination as a significant problem. Federal environmental programs of the early and mid-1970's focused on other media or on chemicals of concern: the Clean Air Act (CAA) for air; the Clean Water Act (CWA) for surface water; the Safe Drinking Water Act (SDWA) for drinking water; and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) for pesticides.

In the late 1970's, significant threats to ground water by man-made contaminants became apparent, and ground water emerged as an area of major public concern. Regulatory and technical assistance efforts of EPA's drinking water program began to turn in that direction, as States signaled their need for information upon which to base their responses to contaminated ground water found in public and private drinking water wells. At the same time, new Federal statutes were passed to address additional environmental threats: TSCA for control of commercial toxics; RCRA for hazardous waste management; and CERCLA for abandoned waste sites.

Several of the older statutes--CWA, SDWA, and FIFRA--have authorities that can be applied to ground-water protection. The newer statutes have provisions that are, in some cases, even better suited to the task. So, in addition to the traditional activity of States and localities, we now have a broad arsenal of Federal statutory authorities to apply in the prevention and control of ground-water contamination. Attachment I contains a brief summary of the roles that the three levels of government--local, State, Federal--have assumed for ground-water protection.

States, with local governments, have the principal role in ground-water protection and management. Based on historical State authorities, as well as Federal program authority delegated by EPA, States are best suited to undertake direct implementation and enforcement of ground-water protection programs. A variety of institutions at the State and local levels address the problem of ground water. Approximately 40*/ States have general environmental statutes which include authority to protect ground water; 15 States have laws that apply specifically to ground water. Forty-seven States have more than one major agency dealing with ground-water issues, some have as many as eight.21/

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*/ References to States include territories, for a total of 57 jurisdictions.

States use different mechanisms to protect ground-water quality. For example, about 32 State governments use general water quality standards to supplement Federal standards for ensuring safe drinking water supplies. Over 40 State governments require some type of discharge permit, though most discharge permits are written to protect surface waters. Eleven States now have some form of ground-water classification in place. Several States have the authority to impose some type of State land-use controls, but only a few actively use them to protect ground water.

To deal with contamination incidents, at least 21 States have established cleanup funds. Use of these funds varies, from helping to cleanup sites included in the Superfund program to dealing with sites excluded from Federal programs.

Nearly 40 States maintain monitoring networks for determining the general quality and quantity of ground water within the State, while about the same number of States actively monitor the ground water surrounding the major contamination sites. Over 40 States have programs to notify and educate the public regarding ground-water issues.

The management of ground water takes place in many ways. Thirty-nine State governments organize their ground-water protection work under the auspices of a lead agency. Fifteen other State governments recognize a lead agency only informally. Most States have written procedures and agreements for coordinating ground-water activities, although 12 rely on informal methods to coordinate.

Finally, most States either conduct work in support of nationally managed programs or implement programs delegated by EPA, including RCRA, UIC, portions of CERCLA, and the CWA Construction Grants program. By October 1984, EPA expects that there will be a UIC program in every State and jurisdiction. At that time, 33 States will have primary enforcement responsibility for all classes of wells; three states will have authority for oil and gas related wells only; one state will have authority for all wells except oil and gas. EPA will be implementing the remaining programs. In terms of the regulated universe, 73 percent of disposal wells, 92 percent of oil and gas wells, and 97 percent of mining-related wells will be regulated by States. (Fourteen States have full primary enforcement authority delegated under the UIC program, and 11 others have partial enforcement authority. A Federally-administered UIC program has been proposed in 23 States.)

Under the RCRA program, 45 States have at least interim authorization to exert certain controls over hazardous wastes facilities. To date, 13 States have interim authorization to issue permits to land-based facilities. By statute, all States with interim authorization under RCRA must obtain full authorization by January 1985. Under CERCLA, EPA has signed cooperative agreements for 52 sites where the State is the lead agency for remedial actions; EPA retains control over the selection of the cleanup alternative at these sites. Under FIFRA, States have primacy in pesticide use enforcement. Pesticide use restrictions imposed by EPA can be enforced by individual States.

Local governments can also play a major role in ground-water protection. They derive their authorities from State environmental statutes or from related, powerful authorities, such as those to protect public health and to control land use. Through local zoning, lot sizes have been regulated into a few localities to prevent intensive residential or commercial development over recharge areas. In other cases, localities have enacted bans on the siting of waste disposal facilities where ground-water contamination could occur. Some communities also set restrictions on the density of septic systems. Some areas, like Long Island and Cape Cod, have enacted strict, local control programs to protect ground water.

While State and local governments have moved forward to address contamination of their ground water, they have been hampered by the lack of a ready answers and the absence of staff trained in a technological and scientific discipline still in its developmental stage. New Federal efforts to help States cope with these problems have proved useful, but they have also contributed at times to competition and overlap. State institutions have been sorely taxed to take on new responsibilities, deal with contamination sources not covered by Federal statutes, and fashion a comprehensive effort to protect both the quality and quantity of their ground water.

EPA's statutes, while designed for more general purposes, provide substantial protection for ground water. EPA must apply these authorities flexibly and imaginatively in programs that take into account widespread threats to the resource. Several such programs are just beginning to come into effect, while others have been in place for some time.

CERCLA establishes a trust fund (Superfund) to finance government responses to releases, or threats of release, of hazardous substances that may harm health or the environment. Superfund can address these problems not only in emergency situations, but also at sites where longer term remedies are required. The statute directs that a priority list of at least 400 sites be identified as candidates for remedial action.

A major factor in evaluating sites for response action is the threat of ground-water contamination. Of the 539 sites now listed for priority attention, 410 appear to have caused ground-water contamination.

Under RCRA, EPA has implemented regulations to provide "cradle to grave" management of hazardous waste. The program includes standards applicable to generators and transporters of hazardous waste and performance standards for permitting hazardous waste treatment, storage, and disposal facilities. The standards establish the principal ground-water protection policies of the RCRA hazardous waste program. EPA has also established criteria for non-hazardous solid waste disposal under Subtitle D of RCRA. States must adopt and enforce these criteria, if they are to have an EPA-approved State solid waste management plan. EPA has completed all major statutory requirements under Subtitle D of RCRA excepting the duty to review and approve State plans within six months of submission. Some States have not submitted plans but intend to do so. Citizens may seek enforcement of these criteria directly in Federal district courts.

In addition, EPA is progressing with implementation of the UIC program under the SDWA. It ensures that injection well practices do not threaten present and future sources of drinking water. The UIC program will regulate approximately 160,000 wells by permit or rule.

The sole-source aquifer program under the SDWA permits citizens to petition EPA for designation of an area as a sole-source aquifer if it is the principal water supply. If so designated, EPA reviews all Federally-assisted projects which may affect the quality of ground water in the sole-source aquifer.

EPA is also preparing regulations to establish standards under the SDWA for certain volatile organic chemicals and pesticides, which are the most commonly found contaminants in ground water. When enacted, these regulations will require monitoring by public water systems to protect users at the point of human consumption. Monitoring requirements for private wells are a State responsibility. The new monitoring requirements are particularly important, since half the Nation's population drinks water from underground sources.

The CWA provides a management structure for State water quality programs, including ground water. At one time, a number of States used funds provided under Section 208 of the CWA to conduct ground-water management programs. EPA's CWA funding

policies require that such activities must result in an official update to the State's overall Water Quality Management (WQM) plan, and require consistency between the WQM plan and all related treatment works construction grant and National Pollutant Discharge Elimination System (NPDES) permit decisions. Eleven States now use funds under Section 205(j) to support selected ground-water protection efforts. Under other provisions of the CWA, construction grant projects employing land application techniques to reuse and recycle nutrients must be designed to ensure protection of ground water for continuation of present use or for future use projected on the basis of present quality. The CWA also provides authority under Section 404 to protect wetlands, which are commonly fed by ground water.

EPA also has an active program under FIFRA, which provides authority to control the use of pesticides that may adversely affect ground water. EPA has in place registration and testing guidelines for evaluating the potential for pesticide chemicals to leach into ground water. EPA can use a variety of methods to limit potential damage, such as restricting the use of certain pesticides with a high likelihood of leaching into ground water.

TSCA provides EPA broad authority to regulate new and existing chemicals and chemical mixtures by exercising control during their manufacture, processing, and use, as well as at their eventual point of contact with people or the environment. For example, if a chemical has the potential to contaminate ground water, EPA has authority to limit certain uses, require warning labels, impose pollution control measures, alter disposal plans (with certain limitations), and require additional notifications after manufacture has begun.

EPA also has a significant research effort devoted to ground-water protection, concentrating on major management and scientific problems associated with the resource (see discussion in Chapter IV). Among the major topics of this research are: developing methods to protect and monitor ground water, tracking and measuring the transport and transformation of pollutants to the point of human exposure, determining health effects associated with various pollutant concentrations in ground water used as drinking water, and assessing the cost-effectiveness of aquifer reclamation.

Two major sources of ground-water contamination remain largely uncontrolled by current EPA programs. A number of sources of contamination described in Chapter II are regulated

by EPA (hazardous waste facilities, underground injection wells) but many more are not. States retain authority to regulate in areas not regulated by EPA. In addition, EPA believes that two of these unregulated sources appear to be of sufficient concern to warrant national attention. They are storage tanks and land disposal facilities (surface impoundments and landfills) for non-hazardous wastes and chemicals and other products, by-products, and intermediates. Land disposal of non-hazardous wastes are addressed under Subtitle D of RCRA. Only States and citizens may seek enforcement of these standards.

As for storage tanks, it is becoming increasingly obvious that we must learn a great deal more about the problem before any regulatory action is proposed. Furthermore, a number of States have already made progress on this issue by undertaking an inventory of these potential sources of pollution. Some States, like Maryland and California, are establishing design standards and criteria for installing, testing, and maintaining underground storage tanks used for hazardous wastes. In addition, several major oil companies, long aware of their potential liability, have begun an aggressive program to replace old metal tanks and to institute periodic inspections, better inventory controls, and cathodic protection.

With regard to surface impoundments, State programs have changed substantially since EPA conducted the initial Surface Impoundment Assessment in the late 1970's. These changes are the result of increased awareness and concern by the States and new Federal programs such as Subtitle D of RCRA.

The majority of States have some type of regulatory program that involves a system of permitting waste impoundments under either State or Federal authority. Some States have added to their NPDES programs provisions which address ground-water contamination. The more traditional programs, however, focus on the treatment phase of an entire facility or on the direct discharge of wastes to surface water rather than on ground-water contamination. Even State programs based on specific legislation usually focus on point-source discharges to surface water rather than on seepage and non-point source pollution of underground water.

A few State programs (New Mexico, New Jersey, Pennsylvania, California, Wyoming) directly control the discharge of wastes to ground water. However, the level of effort is quite uneven among the States in providing effective and necessary planning, review, inspection, monitoring, and enforcement to ensure compliance.

EPA regulations are inconsistent with regard to a number of issues relating to ground water: defining the resource to be protected, allowing for differential protection, setting the duration of control, prescribing the regulatory mechanism to be used, providing for some kind of waiver or variance, and stipulating the approach to monitoring and remedial action. Table A (page 31) illustrates the range of these inconsistencies. Attachment II presents a more detailed analysis of EPA regulations.

It is important to note that some apparent inconsistencies may, in fact, be justified. Despite this, a number of discrepancies may have no technical basis, and merely reflect different policy or management decisions by different people at different times.

The practical implications of these differences to the management of EPA programs can be illustrated by reference to some of the short- and long-term regulatory and program issues EPA now faces:

- Litigation issues. Two RCRA law suits raise significant issues of ground-water protection policy. In particular, both suits raise issues about what ground water should be protected. In one litigation, petitioners have raised issues concerning the removal of certain ground waters from the protections afforded by Subtitle C based on the quantity of the aquifer and its current and potential future uses. The Agency has deferred settlement of these issues pending the development of its ground-water strategy. In the other litigation, petitioners challenged the ground-water protection criteria of RCRA Subtitle D applicable to facilities handling non-hazardous solid wastes. In settlement negotiations, the petitioners have proposed a variety of approaches to protecting ground water, most of which were aimed at providing flexibility to account for differing existing and future ground water uses. The court has deferred briefing this issue at the request of the parties until the Agency's ground-water Strategy is finalized.

- Alternate concentration limits (ACLs) in RCRA. EPA has started evaluating land disposal permits. This work will require decisions on applications for alternate concentration limits. The criteria that EPA has established to date relies on a showing by the applicant that an alternate concentration will not pose a substantial present or potential hazard to human health or the environment. One issue that has emerged is how to evaluate ACLs in ground water that is already contaminated. In establishing a

policy in this area, it is important that the definition of "already contaminated" under RCRA, and the RCRA policy on ACLs in those ground waters, be consistent with definitions and policies of other EPA programs. The class definition and protection guidelines in this Strategy will ensure that consistency.

- Aquifer exemption in UIC. Under UIC, EPA may grant an exemption allowing injection into an aquifer that meets the definition of an underground source of drinking water (i.e., less than 10 000 mg/l TDS) if the aquifer contains toxic contaminants at levels that render its use impractical. The decision on what levels and types of contaminants render the aquifer unsuitable for use as drinking water is one that has implications for other Agency programs such as RCRA and Superfund.

- FIFRA/SDWA interface. The Office of Pesticide Programs and the Office of Drinking Water have developed a procedure for establishing advisory levels for pesticides in drinking water. The purpose of these levels is to render advice to State health officials for use in dealing with episodes of contamination. These levels, unlike tolerance levels for pesticides residues in food, do not reflect a level to which it is acceptable to contaminate drinking water, but rather a level for which remedial action is recommended. These advisories have potential application to other Agency programs such as RCRA and Superfund. For example, it is important that these advisories, guidance on ACLs (under RCRA), and cleanup criteria under Superfund be well coordinated.

- "How Clean is Clean?" Superfund managers must decide and EPA's enforcement program under emergency authorities (principally those under RCRA and CERCLA) must compel private actions that answer the question: "how clean is clean" in ground-water cleanups. Currently, the Agency is attempting to develop more specific decision criteria for determining levels to which contaminated ground water should be restored. This issue has broad implications within the Agency and is related to other Agency activities such as the development of health advisories. The Ground-Water Strategy provides a framework for developing these criteria based on the ground-water protection guidelines defined in the Strategy.

- Protection for especially valuable aquifers. Some ground waters are clearly more valuable than others and more susceptible to contamination. Some are critical sources of drinking water or provide base flow for particularly sensitive ecosystems. States and EPA could design an added level of protection for these ground waters by prohibiting certain practices over them. The RCRA program has begun to develop rules for locating hazardous waste facilities and will be considering limiting hazardous waste management activities over ground water that is highly vulnerable to contamination. Decisions made in this program will have policy implications for other programs. It is important that the level of protection provided by EPA's various regulations for highly vulnerable or valuable ground water be consistent and that various Agency programs define such ground water in a consistent way.

Conclusions

1) Building institutions, especially at the State level, is critical to the comprehensive management and protection of ground water. Many States have made major strides in increasing their capabilities to protect ground water, despite the difficulties implicit in this complex problem. While many States have expended substantial efforts to build and coordinate their State programs and have comprehensive programs that are in development or under operation, these efforts are still insufficient to ensure protection for a resource that demands a comprehensive approach.

2) EPA must achieve greater consistency among its programs if they are to have maximum effect in protecting ground water. EPA rules which protect ground water are sometimes inconsistent with one another, leading to conflicts, duplication, and different degrees of protection from program to program. This heightens the difficulty of decision-making by regulators as well as by regulated industries.

Sufficient flexibility exists in the rules and policies adopted under each EPA program such that it has been possible to craft an acceptable, case-by-case solution to problems created by apparent program inconsistencies. However, over the next few years the effects of program inconsistency are likely to become increasingly disruptive as RCRA, CERCLA, and UIC move to full implementation unless steps are taken to provide needed policy direction.

3) EPA has had no lead point of accountability and coordination for ground-water efforts at either the Headquarters or Regional levels. Ground-water program efforts are located in four offices in EPA headquarters: Office of Solid Waste and Emergency Response (RCRA and CERCLA); Office of Water (SDWA and CWA); Office of Pesticides and Toxic Substances (TSCA and FIFRA); and Office of Air and Radiation (Uranium Mining and Mill Tailings, Reclamation and Control Act (UMTRCA) and Atomic Energy Act (AEA)). The Regions have a similar configuration. Each performs functions related to ground-water protection and has responsibilities that overlap to some extent with those of others. Prior to formation of EPA's new Office of Ground-Water Protection, no single official below the Administrator has had the authority to establish policy or to coordinate these programs.

The Agency has either relied on general-purpose policy coordination mechanisms--such as Steering Committees--to resolve conflicts among programs, or has established ad hoc committees--such as Task Forces--to resolve specific issues. These methods have proven helpful, but they do not give EPA the capacity to provide unified direction to its ground-water protection effort over time.

Table A - Summary Table - Existing Federal Ground-Water Protection Programs

	Scope - what Resource is Protected?	Differential Protection of Groundwater?	Duration of Control?	Regulatory Mechanism?	Waiver/variance Provision?	Monitoring and Remedial Action Approach
SDWA-UIC Parts 144-146	Aquifers which could supply PWS with <10,000 mg/lTDS	Yes-Class V wells can degrade up to MCLs vs. no degradation for class I, II, III	During well operation, but presumably forever	Classes I to III-Design Standards Class V-non endangerment of USDWs	Yes-exempted aquifers can be designated	Specified in Permits
RCRA-264	Uppermost aquifers	No increase in hazardous waste constituents or no violation of MCLs	30 years post closure for disposal facilities	Design and performance standards	Yes-risk based alternate concentration limits on case-by-case basis	Monitoring and remedial action required
RCRA-257	Current USDWS and GW with <10,000 TDS	Maintain drinking water standards	Unspecified - regulatory scheme implies forever	Design and performance standards	NONE	NONE
UMTRCA	Uppermost aquifers	Yes-no increase in Mo or U. Radium 226/228 up to 5pCi, Gross Alpha up to 15pCi	Design objective of 200-1000 years	Design standards - liners required	NONE	Case-by-case decisions
TSCA-PCB Part 761	Groundwater (undefined)	No-no release of PCBs to any groundwater	20-years post closure	Design and location standards	NONE	Monitoring Required
CWA-Constr. Grants Part 35	Uppermost aquifers with 3 classes based on current and potential uses	Yes-protection to levels set by three classes	Unspecified	Best practicable waste treatment technology	NONE	Case-by-case monitoring to demonstrate compliance
FIFRA - Pesticide Policy	Groundwater	No-max. advisable level based on no effect on 10kg child drinking 1 liter/day	As long as the pesticide is registered	Controls on or prohibition of use of specific pesticides	NONE	Monitoring can be required of registrants if GW contamination is concern
High level Rad. Wastes	Groundwater (undefined)	Yes-Some aquifers become part of disposal site	10,000 years	Design and performance standards	NONE	NONE
CERCLA-NCP	Which could supply PWS or use by more than one person using scoring system	Yes-Decisions on a case-by-case basis	Unspecified	Case-by-case decisions	Case-by-case decisions	Case-by-case decisions

NOTE: This is an abbreviated summary of Attachment II.
It is not intended to describe programs fully or to provide detail on regulatory requirements.

CHAPTER IV: EPA'S STRATEGY TO PROTECT GROUND WATER

EPA'S STRATEGY TO PROTECT GROUND WATER

The principal challenge to EPA in developing a ground-water Strategy is to harmonize the implementation of its many ground-water programs and to enhance its partnership with the States to increase protection of this critical resource.

STRATEGIC CHOICES

In designing its Strategy, EPA faced a number of difficult choices. One strategic choice was to decide what role EPA should play in ground-water protection, recognizing that the States have fundamental responsibility for protection and management of the resource itself. EPA's statutes concentrate on specific contaminants and on specific sources of contamination, yet due to its vulnerability, ground water frequently demands more comprehensive protection. EPA sees the need to strengthen the ability of States to carry out this critical function. Only through strong, caretully designed State programs can the objective of comprehensive management be achieved.

A second strategic choice involves by what means and to what extent ground-water resources should be protected. EPA programs have begun to show inconsistency in specific decisions such as site cleanup, enforcement conditions, and application of waivers. The question is whether all ground water should be protected to the same level, or whether decisions relative to the appropriate type and level of protection should reflect the value of the resource. While an unspoiled environment is an attractive goal, the potential cost of protecting, monitoring, and restoring a resource so vast as ground water is enormous. This fact necessarily affects the decisions of managers at all levels, especially regarding the use of scarce public funds.

The Agency also considered whether it is proper from a public policy perspective to clean up all or portions of a resource that almost certainly will never be used. The Agency also asked whether it is doing enough to protect geologically vulnerable ground water that is essential to human uses, or that feeds highly sensitive or unique ecological systems. In certain of these cases, when the cost of *in situ* cleanup has been prohibitive, States have chosen to mitigate the damage by modifying the flow pattern of plumes, changing use patterns for wells, or treating the water at the point of use. EPA concluded that, while flexibility is essential, we should strive for greater consistency in ground-water decisions. This implies the need for guidelines to shape EPA program actions and in turn to provide leadership to the States.

In carrying out the Strategy, EPA will, to the extent possible, use the existing experience of other Federal agencies, such as the USGS. Cooperation is essential in order to minimize duplication of effort in the Federal sector and to ensure the development of a technically sound effort.

A final strategic choice is how to enhance consistency and coordination among EPA programs over time. Unlike the other media in which environmental pollutants are found--air and surface water--ground water previously has had no organization devoted to its protection. It is, rather, an integral part of many programs. A key strategic choice is how to emphasize and coordinate these programs without disrupting ongoing activities.

As EPA reviewed these strategic choices, it became clear that not everything can be done at once. An attempt to resolve every issue among EPA's diverse programs with the stroke of a pen will inevitably disrupt other important ongoing efforts. We cannot change in a moment institutional patterns that have developed gradually in response to other problems. We can accelerate the development of new knowledge only as fast as the scientific community can respond. Still, we can make steady progress, and we can accelerate the pace of work now underway, particularly at the State level.

EPA'S GROUND-WATER PROTECTION STRATEGY

EPA's Ground-Water Protection Strategy seeks to build up institutional capability in the States and within EPA to cope with ground-water problems on a comprehensive basis. The Strategy will provide greater consistency and coherence among EPA programs aimed at protecting ground water and will initiate new steps to deal with major forms of ground-water contamination not now fully controlled. The core elements of the strategy are to:

-- Strengthen State ground-water programs;

-- Cope with currently unaddressed ground-water problems;

-- Create a policy framework for guiding EPA programs; and

-- Strengthen internal ground-water organization.

1. STRENGTHEN STATE GROUND-WATER PROGRAMS

EPA will provide increased support to States for program development and institution building. EPA believes that the most effective and broadly acceptable way to increase national institutional capability to protect ground water is to strengthen State programs. Some States have already achieved excellent results, while others are progressing more slowly. Enhancing and accelerating these efforts should provide meaningful and lasting results.

EPA will encourage States to make use of existing grant programs to develop ground-water protection programs and strategies. EPA will work with States to develop institutional capability to protect ground water. States will be encouraged to prepare or enhance their ground-water program development plans, including an analysis of ground-water problems and needed ground-water protection activities. States should also identify technical assistance needed from EPA.

The work EPA will support is comparable to that undertaken over the past several years by States that have already developed ground-water protection programs, and will include program development activities such as:

1) Development of an overall State action plan or strategy to set ground-water protection goals and to coordinate ground-water programs in various institutions;

2) Identification of legal and institutional barriers to comprehensive ground-water protection programs;

3) Development of general ground-water programs (e.g., a permit system) and design of a source- or contaminant-specific ground-water protection program; and

4) Creation of data management systems to increase the accessibility and quality of needed information.

Since some States have already completed some or all of these tasks, the Agency will support activities to assess the ground-water resource (e.g., mapping, selected monitoring) as long as they are presented in a broad context indicating how they fit into an overall State ground-water strategy. EPA will not support routine operational or implementation activities as a part of ground-water program development activities.

Seven million dollars are available in Fiscal Year (FY) 85 for this purpose from CWA Section 106 water quality management grants. Funds from a range of existing grant programs are also eligible to support ground-water program development activities, including grants under sections 205(j) and 205(g) of CWA, the UIC program grant under section 1443(b) of the SDWA, and the program grant under section 3011 of RCRA.

EPA Regional Administrators will work with Governors in ground-water program and strategy development. Regional Administrators will work with Governors to identify the most appropriate mix of eligible grants and level of funding to support ground-water program development. EPA will make every effort to avoid serious impacts on a particular, existing program in a given State. RCRA funds will not be available until a State has met its RCRA program implementation commitments.

EPA will provide State agencies with technical assistance in solving specific ground-water problems and will enlist the aid of other Federal agencies whose particular expertise or programs provide valuable capabilities EPA staff in Headquarters, Regions, and laboratories, as well as other Federal agencies, will provide assistance to States in several areas: 1) technical and scientific issues; 2) State program design and implementation; 3) identification of research needs, 4) data management; and 5) training.

EPA will continue to support a strong research program in ground water and will work closely with other Federal agencies, especially the DOI. EPA conducts a research program to provide a broad range of data and information for use by decision-makers concerned with ground-water protection. The ground water research program is directed toward improving monitoring technology, prediction and assessment tools, and aquifer cleanup methods. Other research programs also contribute to the scientific bases upon which decisions about ground-water protection are made. For instance, a significant portion of the research on the health effects and removal of drinking water contaminants is directed toward chemicals found in ground water. Research to develop and evaluate technology for control of sources (such as surface impoundments) and improvements in methodology for analyzing water samples for trace constituents also contribute to our scientific capability. Quality assurance is always an important facet of any investigation, including those involving ground water, and remains a high priority in our research program.

2. COPE WITH CURRENTLY INADEQUATELY ADDRESSED GROUND-WATER PROBLEMS

EPA will survey inadequately addressed threats to ground water. In the Agency's review of ground-water contamination it became evident that contamination from many sources not regulated under RCRA Subtitle C or the UIC program can render ground water as unfit for use as waters contaminated with hazardous wastes. Often, too, such damage is more difficult and expensive to clean up.

Recognized sources of contamination include surface impoundments, landfills, underground storage tanks, pesticide and fertilizer uses, septic tanks, mining, unregulated drilling, natural gas pipelines, and sinkholes. Due to a lack of information, the extent and seriousness of the problems associated with each of these sources is not well understood.

EPA has found preliminary evidence that landfills, surface impoundments, and leaking storage tanks could constitute widespread problems and is initiating actions to further evaluate the threats from these sources and develop controls as may be appropriate. These actions are discussed below. For currently unaddressed sources, EPA will include in its ground-water monitoring strategy steps to help define the nature, extent, and severity of contamination from these sources.

EPA will study the effects of contamination from underground storage tanks. To protect ground water from the threats posed by leaking storage tanks, the Deputy Administrator has directed the Office of Toxic Substances (OTS) to design a study to identify the nature, extent, and severity of ground-water contamination resulting from leaking product tanks, including the human health and environmental effects that leaking underground tanks pose. This study will include motor fuel tanks. It will gather data about tank types, ownership, and the type of facility using the tanks (e.g., gasoline station, industrial, or commercial facility). OTS will test a sample of these tanks to determine the proportion now leaking. The Office will also assess testing and protection methodologies to evaluate their usefulness in a regulatory program. In future years the Office may study other underground tanks and pipelines.

In addition to identifying and characterizing the universe of storage tanks, EPA will review options for a regulatory program to control leaking storage tanks. The Agency will review the need for and nature of regulatory options for the manufacture and installation of tanks, periodic testing, improved records of product inventory, and cleanup requirements. In the meantime, EPA will issue a Chemical Advisory to alert all owners and

operators of underground storage tanks to the nationwide problem of ground-water contamination caused, in part, by gasoline. The Advisory will explain that tank owners and operators may be contributing to this problem, and that EPA has begun investigating the problem and is assessing the need for future regulation of underground gasoline storage tanks. EPA will also work with the States and with trade associations, such as the American Petroleum Institute (API) and the Society of Independent Gasoline Marketers of America (SIGMA), to develop voluntary steps to reduce contamination.

The Agency is also planning direct regulation of underground storage of hazardous waste under RCRA. Regulation of hazardous waste storage is required in the RCRA statute. Although regulations are already in place for above-ground tanks and some underground tanks, standards are needed for all underground tanks. Based on data developed over the past two years, EPA will complete its regulation of underground tanks containing hazardous waste, and may amend the regulations that are already in place.

EPA will study the potential environmental problems that could arise from land disposal facilities (surface impoundments and landfills). RCRA Subtitle C rules already apply to surface impoundments and landfills accepting designated hazardous wastes. Other facilities handling non-hazardous wastes and hazardous wastes produced by small generators are covered by RCRA Subtitle D criteria (enforceable under citizen suits), but they are not regulated under the Federally enforceable provisions of RCRA. These facilities may be significant sources of ground-water contamination. EPA will undertake a study of surface impoundments and landfills, in cooperation with the States, to determine if more extensive Federal and/or State requirements are necessary and appropriate.

The study will address several questions. It will: (1) identify, describe and categorize the various types of impoundments and landfills; (2) survey the regulatory methods either now used by States or considered feasible for controlling contamination from these facilities; and (3) determine what additional Federal controls may be needed. Field monitoring of selected impoundments and landfills may be undertaken to better define the impacts on ground water of such facilities. The study will categorize surface impoundments and landfills for two reasons: first, to distinguish between those that threaten ground water and those that do not; and second, to analyze regulatory approaches appropriate to each group, thereby minimizing the regulatory burden.

EPA will increase efforts to protect ground water from pesticide and nitrate contamination. Preliminary monitoring information indicates that use of certain pesticides may be an important source of ground-water contamination. The Agency is taking several steps to assess the leaching potential and health impacts of individual pesticides and to develop and implement a program designed to mitigate the threat they pose to ground water. EPA will:

- Require pesticide manufacturers to provide data on leaching potential as part of the registration process. (This data is already required for registration of new pesticides. A data call-in program has been initiated to accelerate the retrospective review of the ground-water contamination potential from use of existing pesticides.)

- Use modeling techniques and field monitoring to evaluate the extent and likelihood of ground-water contamination from use of the pesticides.

- Continue to evaluate the potential health effects of pesticides and issue health advisories regarding drinking water contamination.

- For pesticides found to pose a threat to ground water, use labeling restrictions or other means to restrict their use in certain geographic areas based on soil type, hydrogeology, and ground-water use.

- Encourage implementation of the restrictions through incorporation of ground-water provisions in FIFRA State enforcement grant agreements and by providing technical assistance to State officials, agricultural extension personnel, and others who aid in informing pesticide users.

- Provide guidance, including health advisories and technical assistance to State officials, agricultural extensive personnel, and others to aid in informing users.

EPA will prepare a monitoring strategy involving guidelines for network design. In reviewing the question of other contaminants, EPA considered several approaches to monitoring to determine their impact on ground-water quality. These approaches are: (1) ambient monitoring; (2) monitoring at the point of contamination, (3) monitoring at point of use; and (4) a combination of these.

- "Ambient" ground-water monitoring: EPA rejected this approach because plumes are relatively small, too slow moving, and easy to miss. Further, such a costly, broad-brush approach would involve monitoring ground water with no known use or potential for human exposure. However, ambient monitoring does help define background information on quality, status of the resource, and the ground-water flow system.

- Point of contamination: Such monitoring has not been done in a systematic way although considerable data exist from testing done where contamination was strongly suspected. The RCRA monitoring program provides the first systematic data on certain contamination sources--hazardous waste land disposal facilities. The cost of a special network just to monitor the more significant categories of contamination sources would be extremely high and a questionable investment considering the potential value of the information to be obtained.

  With enforced RCRA monitoring requirements supplemented by additional wells at selected sites, important information on contamination--both existing and potential--should be available. However, this type of monitoring is restrictive as to the information it provides on the hydrology and movement of the contaminants.

- Point of use: A third approach is to sample water from drinking water wells now in use. Several such surveys have been conducted which provide a general picture of the quality of ground water used for this particularly vital purpose. EPA is now developing additional drinking water standards which will extend monitoring by public water supplies and provide more information on contaminants, like volatile organic chemicals, that are associated with ground-water contamination. A similar survey focusing on pesticides is now being planned. In addition, EPA will provide health advisories for unregulated contaminants for States to use in conjunction with their monitoring efforts. Although the importance of this type of monitoring is self evident, detection at a supply well is "after the fact" of contamination. Moreover, this type of monitoring alone does not answer all questions relative to source of contamination, status of resource, or direction and movement of ground water.

- Combination of approaches: Such monitoring would be costly if EPA were to develop a network "from scratch". However, the Agency recognizes that considerable effort has been expended by other Federal agencies (particularly USGS), State and local agencies, and even private organizations to monitor ground water. The coordination role of EPA may be put to best use by marshalling these "forces" and encouraging the use of existing monitoring facilities and data to the greatest possible extent. A combined approach, therefore, may require some additional investment to fill in data gaps but provides the greatest potential for meeting monitoring needs by bringing together a broad, multiple interest base of information. Of particular interest is data: 1) documenting existing hydrologic and water quality conditions; 2) defining ground-water flow systems; 3) describing hydrologic characteristics of aquifer material in order to predict fate of contaminants; and (4) providing support for decisions on sitings, facility design, and remedial measures.

In reviewing these approaches EPA considered the most practical way to gather information most useful for future decisions. Besides continuing to require monitoring under RCRA, Superfund, and the UIC program and conducting targeted surveys of ground-water contamination from surface impoundments and underground storage tanks, EPA will utilize existing monitoring facilities and data from all available sources (other Federal agencies, State and local governments, and other organizations) to achieve the most effective and efficient acquisition of monitoring data. This approach will be described further in a ground-water monitoring strategy the Agency is now developing.

3. CREATE A POLICY FRAMEWORK FOR GUIDING EPA PROGRAMS

EPA will adopt guidelines for consistency in its ground-water protection programs. The guidelines are designed to protect ground water for its highest beneficial use.

The Task Force recommended that EPA develop some agreed-upon guidelines for ground-water protection in order to have a basis for consistent decision-making among EPA programs. In considering what they should be, the Agency reviewed several approaches (Attachment IV) to answer two critical questions:

- What is the definition of the resource to be protected? Existing programs use different terminologies to define the resource they protect. It became clear that ground-water definitions are crucial to achieving consistency in protection.

- To what level should EPA protect the resource? The Agency considered whether all ground water, regardless of its use and value, should be protected equally. It reviewed whether EPA should give a higher degree of protection to ground water that is more valuable to society, and less protection to ground water that does not now (and is unlikely in the future) to serve as a source of water for drinking or for another valued purpose (e.g., irrigation, livestock watering, or industrial use).

The Agency considered a number of factors in this review. First, it studied the statutory base within which all EPA programs must continue to operate. Above all else, the requirements of existing law must be fully implemented. Second, the Agency reviewed the characteristics of the resource itself. Ground water is much more expensive to monitor, clean up, and protect than is surface water or air. This resource is vast, hidden, and a proportion is already unusable due to natural contaminants (usually aquifers with high salt concentration). In some circumstances, full cleanup of existing contamination is beyond the capability of existing technology. Its slow movement, however, means that most pollution remains highly localized, which facilitates management of known contamination. Some ground waters are much more valuable than others because they are the exclusive source of drinking water for a population.

Finally, the Agency considered the fundamental purpose of any environmental program: to protect public health and the environment. EPA concluded that the policy that must guide its efforts must be based on the recognition of the highest beneficial use to which the ground-water resource can presently or potentially be put. In this context, EPA has concluded that the protection of particularly sensitive and valuable ground waters is of critical importance. For this reason, EPA will use its authorities to the extent possible to provide the added protection that these unique, highly important resources deserve. The guidelines for ground-water protection reflect these considerations.

Guidelines for Ground-Water Protection

EPA's guidelines for ground-water protection are based on the beneficial use criterion described above. Protection policies are defined for three classes of ground water. The class definitions reflect the value of the ground water and its vulnerability to contamination, and they apply to ground water having significant water resources value. The three classes are: I) Special Ground Water, II) Current and Potential Sources of Drinking Water and Water Having Other Beneficial Uses; and III) Ground Water Not a Potential Source of Drinking Water and Having Limited Beneficial Use. These guidelines establish the basic framework for the Ground-Water Protection Strategy.

In describing the various classes of ground water, emphasis is on broad definitions and basic criteria to be used in class assignment. Guidance will be developed establishing more specific criteria and definitions for classifying ground water. This guidance may prescribe additional criteria to be used in identifying the various classes. It may also describe specific information necessary to make a determination of hydrogeologic vulnerability, such as geologic setting, hydrogeologic characteristics, climate, and physiography. EPA will work closely with States, local governments, business and industry, environmental groups, and other Federal agencies, particularly the DOI, in the development of this guidance.

Class I - Special Ground Waters

Certain ground-water resources are in need of special protective measures. These resources are defined to include those that are highly vulnerable to contamination because of the hydrogeological characteristics of the areas under which they occur. Examples of hydrogeologic characteristics that cause ground water to be vulnerable to contamination are high hydraulic conductivity (Karst formations, sand and gravel aquifers) or recharge conditions (high water table overlain by thin and highly permeable soils). In addition, special ground waters are characterized by one of the following two factors:

(1) Irreplaceable source of drinking water. These include ground water located in areas where there is no practical alternative source of drinking water (islands, peninsulas, isolated aquifers over bed rock) or an insufficient alternative source for a substantial population; or

(2) Ecologically vital, in that the ground water contributes to maintaining either the base flow or water level for a particularly sensitive ecological system that, if polluted, would destroy a unique habitat (e.g., those associated with wetlands that are habitats for unique species of flora and fauna or endangered species).

In order to prevent contamination of special ground waters, EPA will use RCRA authorities to initially discourage by guidance, and will eventually propose regulations to ban the siting of new hazardous waste land disposal facilities above these ground waters. EPA will in addition request information about the need to establish similar restrictions for some existing land disposal facilities. Further, for any existing hazardous waste land disposal facilities regulated under RCRA that continue to operate in these locations, EPA will at a minimum continue to require design practices to prevent contamination, and may consider adding special design or operating requirements. No discharge from such facilities will be allowed to contaminate the ground water so that background conditions or drinking water standards are exceeded. Where contamination has occurred within the facility boundary, EPA regulations require cleanup of ground water either to drinking water or background levels. EPA may also use its Superfund or imminent hazard authority to seek cleanup beyond the facility boundary if necessary.

The Superfund Hazard Ranking System will continue to operate under the current formula in selecting sites for designation on the National Priority List (NPL). The immediacy of the threat to Special Ground Water will be one of the factors for taking action among sites listed on the NPL. Cleanup objectives for such Superfund sites will also be to drinking water or levels that protect human health. Consideration of statutory factors (cost-effectiveness and fund balancing) and the need to achieve rapid privately-financed response may require occasional acceptance of lower levels of cleanup.

Under TSCA, EPA will evaluate the merits of developing additional restrictions on the use, disposal, or storage of potentially threatening chemicals over these areas. EPA will also apply the information-gathering authority under TSCA to learn more about the use, disposal, and storage of chemicals in these areas.

Under the UIC provisions of the SDWA, EPA will consider developing special permit conditions (e.g., special cementing requirements for casings going through special ground water, as

well as monitoring of the ground water). EPA will also use the combined authorities of the Sole Source Aquifer (SSA) program and the National Environmental Policy Act (NEPA) to review Federally-financed projects to ensure protection of these special ground waters.

Class II - Current and Potential Sources of Drinking Water and Water Having Other Beneficial Uses

All other ground water currently used or potentially available for drinking water and other beneficial use is included in this category, whether or not it is particularly vulnerable to contamination. This comprises the majority of usable ground water in the United States.

As a general rule, Class II aquifers will receive levels of protection consistent with those now provided for ground water under EPA's existing statutes. This means that prevention of contamination will generally be provided through application of design and operating requirements based on technology, rather than through restrictions on siting, though exceptions may apply. Cleanup of contamination will usually be to background levels or drinking water standards, but alternative procedures may be applied for potential sources of drinking water or water used for agricultural or industrial purposes. EPA recognizes that in some cases alternatives to ground water cleanup and restoration may be appropriate. In these cases the contamination may be managed in order to avoid migration into a current source of drinking water or to avoid widespread damage. More specifics for each program area are defined below.

Under RCRA, prevention of contamination may include siting restrictions for new land disposal facilities over current sources of drinking water in areas highly vulnerable to contamination. These restrictions would initially be instituted through guidance and later through regulations.

Where ground water is used now for drinking water, cleanup of contamination from new and existing facilities will be subject to current requirements under RCRA, with cleanup to drinking water standards or background, as appropriate. For sites which can impact potential sources of drinking water or ground water used for other beneficial purposes, the same policy will generally apply. Alternate concentration limits (ACLs) now provided in the RCRA land disposal regulations will continue to be available for both current and potential sources of drinking water if the criteria for the ACLs can be met by an applicant. In addition, for ground waters not used as current sources of drinking water, EPA will also consider regulatory changes to allow variances in

cleanup that take into account such factors as the probability of eventual use as drinking water and the availability of cost-effective methods to ensure acceptable water quality at the point of use. Other factors such as yield, accessibility, and alternative sources will also be considered.

The superfund hazard ranking system is more likely to place a site on the National Priorities List when the ground water which is contaminated or threatened with contamination is a current source of drinking water than when it is an unused potential source. Additionally, when remedial action is considered at a site on the NPL, such considerations as technical infeasibility, statutory fund-balancing provisions, and potential for adverse public health impacts may make cleanup of the resource less likely for potential sources of drinking water than for current sources. In certain situations involving current sources of drinking water, such as when technical feasibility is an issue, the cost-effective remedy may be to provide an alternate drinking water supply rather than restoring the contaminated aquifer. In these situations monitoring of the plume of contamination would be used to evaluate the need for further action to prevent or mitigate migration of the contamination.

EPA has identified no specific changes in policies under TSCA at this time. At a minimum, TSCA information gathering authority may be used to gather additional data on ground-water contamination potential of particular chemicals.

The UIC Program will apply its current provisions to Class II waters. Where the potential is low for ground water to be used as drinking water (for example, when TDS levels are between 3,000 and 10,000 mg/L, mineral production is a competing use, or the aquifer is inaccessibly deep), EPA will apply existing UIC requirements to a Class II aquifer.

Class III - Ground Water Not a Potential Source of Drinking Water and of Limited Beneficial Use

Ground waters that are saline or otherwise contaminated beyond levels which would allow use for drinking or other beneficial purposes are in this class. They include ground waters (1) with a TDS level over 10,000 mg/L, or (2) that are so contaminated by naturally occurring contaminants or by human activity (unrelated to a specific hazardous waste land disposal site) that they cannot be cleaned up using methods reasonably employed in public water system treatment. In addition, the ground water must not be connected to Class I or Class II ground water or to surface water in a way that would allow contaminants to migrate to these waters and potentially cause adverse effects on human health or the environment.

Prevention of contamination may be less than that provided for Class I or II in some instances, but high levels of protection

will still be required in other cases. New and existing hazardous waste land disposal facilities regulated under RCRA will be required to meet the same technical standards -- such as liners, leachate collection systems, and monitoring -- as facilities located over Class I or II ground water. Hence, in terms of protection, the Ground-Water Protection Strategy currently envisions the same technical standard of protection for hazardous waste facilities in all classes. With respect to cleanup, should the hazardous waste facility leak, the Agency would normally grant variances that establish elevated concentration limits. Generally, cleanup decisions for Class III ground water that has been contaminated by human activities would be evaluated on a case-by-case basis. If contamination poses no risk to human health and the environment, as will frequently be the case (because the ground water is not usable and there are controls to ensure it is not used), then, under RCRA, cleanup requirements could be reduced or eliminated. Under other statutes, such as CERCLA, cleanup decisions may consider also the cost of the cleanup.

The Superfund program will not focus its response activities on cleanup of ground water in this class, although priority for taking Superfund actions may be given to sites over Class III ground water to control hazards unrelated to ground water (e.g., air emissions, fires, etc.).

Current UIC exemptions will remain in place, given the exemption provisions noted in Class II. Nutrient reuse and recycling requirements under the CWA will also follow these guidelines.

Implementation of the Guidelines for Ground-Water Protection

The purpose of these guidelines is to improve the consistency and effectiveness of EPA's current ground-water programs. Implementation of the guidelines requires translating the guidelines into specific requirements in each of the Agency's major program areas. This involves: (1) criteria and procedures for making decisions related to ground water according to quality, use, and vulnerability; and (2) changing existing regulations if necessary or possibly developing new regulations or guidelines that will result in "consistent" levels of protection in each program. These regulations will then provide the legal basis for the implementation of the guidelines. It is not intended that any substantive or procedural rights are provided by this strategy.

Even with the guidelines in place, certain inconsistencies among EPA programs will remain to be resolved and others will emerge. One major responsibility of the new EPA Ground-Water Protection Office (described below) is to identify and work with all EPA programs involved to resolve remaining issues of program inconsistency.

Many of EPA's programs are delegated to the States. For most programs, States must demonstrate that their programs are "no less stringent" than the Federal program in order to qualify for authorization to implement the programs. While EPA will foster State efforts to classify ground water in a manner consistent with the framework presented in this strategy, EPA will not require States to adopt the Federal classification scheme for their overall ground-water protection programs and will provide as much flexibility as possible under existing statutes to the States in implementing delegated EPA programs. Consequently, EPA will to the extent possible keep regulatory requirements based on EPA's ground-water protection guidelines general and performance-oriented. EPA will develop guidance to accompany such regulations for use by EPA when EPA directly administers a program in a State (e.g., implementation in a non-delegated State or implementation of a program which cannot be delegated). The guidance could also be used by the States to assist them in developing their own regulatory requirements or guidelines.

For EPA-administered programs, the task of actually determining whether the ground water in a particular location fits the criteria for Class I, II, or III will be a site-specific determination. In programs involving permits, such as RCRA and UIC, for example, this determination will be made during the permitting process based on data supplied by the permit applicant. In cleanup actions under CERCLA, the ground-water class will be determined in conjunction with the assessment of the extent of contamination. In many cases, the geologic and hydrologic information necessary to make these classifications will have to be gathered as a part of the site investigation. In other cases, ground-water studies already completed by other Federal or State agencies may sufficiently describe hydrogeology such that the ground-water classification decision will be greatly expedited. Where States have already mapped or designated ground-water classes for that location, the State classification of the ground water may be sufficient where it is comparable to these guidelines.

4. STRENGTHEN INTERNAL GROUND-WATER ORGANIZATION

During EPA's review of its ground-water programs, it became evident that the Agency could not go forward with an enhanced ground-water protection effort, or provide leadership to the States in achieving coordinated protection of the resource, without clearly designated responsibility and adequate staff support.

There is a continuing need to coordinate EPA programs within this common policy framework, and there must be effective support

to States seeking to manage their ground-water resources. A strong and supportive research effort is a crucial element. These tasks require an internal management structure, within which the several EPA programs with ground-water protection responsibilities can function in an orderly, mutually supportive way.

The Agency considered several options for increasing its own institutional capability at the Headquarters and Regional levels (see Attachments V, VI and VII). The major concern was to establish this capability without the substantial disruption that reorganization would involve. For that reason, the Agency will retain ongoing program efforts in their current organizational locations, assigning lead responsibility for ground-water coordination to the Assistant Administrator for Water, and locating lead responsibility in the counterpart divisions of the Regional offices.

In order to carry out this mandate, the Assistant Administrator for Water has been directed to:

- Establish an Office of Ground-Water Protection;
- Convene and chair an oversight committee of Assistant Administrators and two Regional Administrators; and
- Establish an ongoing dialogue with State program directors.

The Office of Ground-Water Protection (OGWP) was established on April 2, 1984. It will have responsibility to provide staff support to the AA/RA Oversight Committee. This committee will provide policy oversight and direction to the Office in the implementation of the Ground-Water Protection Strategy. It will ensure coordination of all EPA ground-water activities, identify and direct the development of ground-water policies and guidelines, and coordinate activities of program offices to carry out the Agency ground-water Strategy. The Office will also convene a "Ground-Water Steering Committee" to review all ground-water policies and regulations and make recommendations on all budget requests for ground-water protection activities. This committee will be composed of office directors with operating responsibilities for ground-water protection and several water division directors. Special attention will be given to coordinating research priorities to support State and EPA ground-water protection programs, and to planning future actions as experience is gained.

OGWP will also work with Regional ground-water offices, providing policy contact and program coordination, including developing guidance for use of grant funds to support State program development. It will provide guidance to Regions, and develop information for Regional use in providing technical assistance to the States, such as on data management techniques and State program development.

Data management and EPA research coordination will also be addressed. Over time OGWP will develop information on how to access available ground-water data for use by Regions, States, and site managers. It will identify new data needs, identify data needed to determine long-term trends and status, and conduct or initiate special studies of ground-water contamination.

Further, the Office will be responsible for assessing and evaluating how effective EPA has been in implementing the ground-water strategy -- such as in Regional coordination, steering committee effectiveness, State program development and implementation -- either directly or by arranging for an outside reviewer. The Office will also work with other program offices to assess the effectiveness of ground-water quality management and clean up activities, such as remedial action and site cleanup, and to support demonstrations of successful State ground-water program operations.

OGWP will work with other Federal agencies, such as U.S. Geological Survey (USGS), Department of Defense (DOD), Department of Energy (DOE), Department of the Interior (DOI), Nuclear Regulatory Commission (NRC), and U.S. Department of Agriculture (USDA), as well as with relevant outside interests, such as State organizations, trade and industry groups, environmental groups, the press, Congressional staffs, and others. It will convene an Interagency Committee on Ground Water consisting of individuals from Federal departments and agencies having ground water concerns. This committee will meet several times during the year to exchange information of mutual interest. Other committees will be established as needed. The Office will serve as an Agency spokesperson on legislative matters affecting ground water.

Regional responsibility for ground-water coordination and management will generally reside in the water divisions. In order to permit Regional flexibility, yet achieve adequate consistency among Regional programs, EPA has developed general criteria for Regional ground-water programs.

Functions for a Regional ground-water program include the development and oversight of ground-water policy development and coordination. Regions will establish an enhanced effort to provide States with technical and institutional support in developing ground-water programs and strategies. Regional ground-water protection offices will coordinate Regional ground-water programs such as State work programs, Regional program plans, site assessments, and enforcement. They will coordinate the ground-water data collected by Regional programs, and they will develop, with the States, systems for making data from various sources accessible to groundwater managers. They will also be responsible for coordinating related Regional training, technical assistance, and public response.

While each Regional organization will be somewhat different depending on the particular needs of the Region, each Regional organization should provide for a mechanism for full participation of all Regional ground-water programs at a level where decisions can be made and a mechanism for issue resolution by the Regional Administrator or the Deputy Regional Administrator. Each should include a full-time director and full-time support staff with technical, managerial and intergovernmental skills.

The organizational structure to be established at the EPA Headquarters and Regional levels should make a major contribution to the coordination of EPA programs and the support of State ground-water protection efforts.

* * * * *

In summary, this EPA Ground-Water Protection Strategy represents a major step forward in EPA and State efforts to protect ground water. The strategy has four goals:

- To foster stronger State government programs for Ground-Water Protection:

  -- EPA will provide grant support for State program development;

  -- EPA will offer technical assistance to States; and

  -- EPA will target research efforts to State requirements.

- To cope with inadequately addressed problems of ground-water contamination:

  -- EPA will assess the extent of contamination by leaking underground storage tanks, issue a Chemical Advisory warning gasoline station owners and operators of the problem, and consider the need to further regulate these contamination sources;

  -- EPA will assess the problems associated with surface impoundments and landfills; and

  -- EPA will strengthen its efforts to protect ground water from pesticide contamination and over time assess the effects of other practices on ground-water quality.

- To establish a framework for decision-making by EPA programs:

  -- EPA will adopt guidelines for ground-water protection. These guidelines will assure a high level of protection for ground water used for drinking and other beneficial purposes, and bring about greater cohesion in EPA ground-water protection efforts.

- To strengthen the internal ground-water organization

  -- EPA has established an Office of Ground-Water Protection in the Office of Water and counterpart offices will be established in each Region.

EPA believes that this strategy represents a pragmatic, evolutionary approach to improving the protection of the Nation's ground-water resource. It will provide the institutional muscle needed to bring about the needed change. It provides at the Federal and State levels a framework for decision-making and a roadmap to address new problems. This Strategy can only be successful through EPA leadership, the development of strong State programs, and general support from Congress, environmentalists, and the regulated community.

FOOTNOTES

1. "Ground Water: Issues and Answers", American Institute of Professional Geologists (AIPG), 1983.

2. "Ground Water: Issues and Answers", American Institute of Professional Geologists (AIPG), 1983.

3. "Survey of Operating and Financial Characteristics of Community Water Systems", U.S. EPA, Office of Drinking Water, October 1982.

4. EPA Health Advisory on Trichloroethylene (TCE).

5. Informal Survey, EPA Regional Offices, December 4, 1983.

6. Toxic Substances Control Act, 1983, The Chemical Inventory, OPTS, U.S. EPA.

7. CERCLA, Emergency and Remedial Response Information System (ERRIS), 1983, U.S. EPA.

8. "The Report to Congress: Waste Disposal Practices and Their Effects on Ground Water", EPA, Office of Water Supply, January 1977.

9. Ibid.

10. "Surface Impoundment Assessment (SIA): National Report" EPA, Office of Drinking Water (ODW), Draft, December 1982.

11. "The Report to Congress: Waste Disposal Practices and Their Effects on Ground Water", EPA, Office of Water Supply, January 1977.

12. Keeley, J. W., 1977. Magnitude of the Ground Water Contamination Problem. In Public Policy on Ground Water Protection, ed. W. R. Kerns, pp. 2-10. Proceedings of a national conference at Virginia Polytechnic Institute and State University, Blacksburg, Va., 13-16 April.

13. Miller, David, Geraghty and Miller, based on a series of regional surveys on ground-water contamination problems and development of the 1977 Report to Congress, phone conversation, December 23, 1983.

14. Dr. Rudy White, API; Phone Conversation: December 9, 1983.

15. "Leaking Gasoline Storage Tanks Risk Explosions and Contaminated Water Near Service Stations" (cites Warren Rogers, Newport, RI), The Wall Street Journal, November 16, 1982, p. 56.

16. Shaner, Richard, "The Tank Leak Mess", National Petroleum News, July 1982.

17. Marcel Moreau, Geologist, Maine Department of Environmental Protection (DEP), Phone Conversation, December 6, 1983.

18. "Assessment of Hazardous Waste Mismanagement: Damage Case Histories", EPA, Office of Solid Waste (OSW), December 1982.

19. "Groundwater Contamination by Toxic Substances: A Digest of Reports", Environment and Natural Resources Policy Division, Congressional Research Service (CRS), Library of Congress.

"Resource Losses from Surface Water, Groundwater, and Atmospheric Contamination: A Catalog", March 1980, Environment and Natural Resources Policy Division, Congressional Research Service (CRS), Library of Congress.

20. Westrick, James J., J. Wayne Mello, Robert F. Thomas, "National Ground Water Supply Survey" (GWSS), EPA, Office of Drinking Water, June 1982.

21. Informal Survey by EPA Regional Offices, 1982.

INTRODUCTION

This section contains three types of materials as background information.

1. Attachment I is a chart which describes the various functions agencies perform at the State, Federal and local levels to protect ground water.

2. Attachment II is a more detailed comparative analysis of EPA ground-water regulations than is provided in the text of the Strategy.

3. The last three appendices are summaries of the principal options EPA considered in the development of this Strategy.

APPENDICES

ATTACHMENT I

STATE/LOCAL/FEDERAL GROUND WATER ROLES

Role	State	Local	Federal
Direct Implementation Includes: All activities which directly affect individual sources of pollution, e.g., regulatory and enforcement action; product registration, emergency response and policy development	° The principal role of Ground Water Resource Management ° Implement Federally delegated programs ° Establish State source controls ° Manage contamination sites ° Emergency response	° Local strategies ° Local ordinances ° Land use and development controls ° Site management ° Emergency control	° Implement Federal Programs where States have not assumed delegated responsibility ° Product controls, bans, etc. under TSCA, FIFRA ° Superfund Trust Fund: Clean up and manage contamination ° Emergency response under various statutes ° Oversight of Federal program management and enforcement
Technical Support Includes: Development and provision of assistance or support to outside groups; purpose is to ensure success of State programs	° Technical assistance on site control and management, ground water protection ° Techniques, program management, etc.	° Public education and technical assistance	° Specialized: Health Advisories, biochemistry, hydrogeology, special problems in such areas as: laboratory testing ° General; institution building, program development, program guidance ° Scientific: Transfer of new science/technologies

STATE/LOCAL/FEDERAL GROUND WATER ROLES - continued

Role	State	Local	Federal
State Program Approval and Oversight			
Includes: Grant approval process, audits and evaluation of State programs	° Participation in criteria development	°	° EPA Lead
Standard Setting			
Regulations, rules, and standards for EPA statutes	° State standards for Federally unregulated contaminants and, where the State prefers more stringent State standards	°	° EPA has primary lead, e.g., - Drinking water standards - Technology based standards - Other ground water program standards
Research			
Includes: All activities that produce information improving the scientific or technical bases for making decisions at all levels of government	° Conduct some research, usually associated with specific sites ° State GS define aquifers - State mapping and inventorying	°	° EPA lead, e.g. fate, effects, monitoring technology, health effects ° USGS primarily provides data on hydrogeology, hydrology and geochemistry

STATE/LOCAL/FEDERAL GROUND WATER ROLES - continued

Role	State	Local	Federal
National Information Collection Includes: Data on quality of ground water and related data	° States collect data for state and local purposes and participate in Federal data collection via delegated programs and special studies	° Participate in data collection	° EPA provides: - monitoring data - source inventories - special studies ° USGS provides information on hydrogeology, hydrology and geochemistry
Funding of State Programs Includes: Operating expenses for State environmental programs	° States provide extensive support directly	° Some local areas provide funds dedicated to ground water protection	° EPA provides support to States through RCRA, UIC, and CWA grant programs and support for site clean up via Superfund ° USGS povides support through its Federal/State Cooperative Program and through other basic and applied research programs.

SUMMARY OF EPA GROUND WATER REGULATIONS

DEFINITION OF RESOURCE - LIMITING FACTORS

	General Scope	Quantity	Quality	Use	Other
RCRA 264	Aquifers, i.e., yield significant amounts of water				Monitoring only occurs in uppermost and interconnected aquifers
RCRA 257	Aquifers, i.e, yield useable quantity of water		10,000 mg/l TDS unless currently used		Point of application of std. may be moved if aquifer not used or needed
SDWA UIC	Aquifers, i.e., yield significant quantity of water	Sufficient to supply public water system (PWS)	10,000 mg/l TDS unless currently used	Potential to supply a PWS unless currently used	Exempted aquifer variance:* not curently used and not a potential source of drinking water because it is: o Mineral, hydrocarbon or geothermal energy producing; o Too deep to make recovery for drinking water practical; o So contaminated that it is impractical to make ground water fit for drinking; or o Located over a mining area subject to collapse
CERCLA NCP/NPL	Ground water(i.e., water in saturated zone beneath surface of land or water)	Extremely low yield NPL score = 0	Extremely saline NPL score = 0	Differing NPL score based on uses of ground water (drinking water, commercial, industrial irrigation) and number of people using aquifer	NPL score = 0 if: o Nearest well 3 mi. o No CW contamination and water table 150 ft. or soil permeability 10^{-7} cm/sec

* An aquifer does not become an exempted aquifer until EPA has approved such a designation.

T A B L E 1

DEFINITION OF RESOURCE - LIMITING FACTORS (continued)

	General Scope	Quantity	Quality	Use	Other
UMTRCA	Same as Part 264				Same as Part 264
TSCA-PCB	Ground water (undefined)				
CWA Construction Grants	Ground water (undefined)			3 classes based on current and potential use	
High Level Rad. Waste	Ground water(i.e., saturated zone)				Only GW beyond 10 km from waste. Fate of GW within 10 km considered in EIS
FIFRA Pesticide Policy	Ground water(i.e., saturated zone)				

T A B L E 1
Page 2

BASIS FOR DEFINING ACCEPTABLE DEGRADATION

	Constituent of Concern	No Degradation	Numerical Standard	Other
RCRA 264*	Hazardous constituents = list of 387 chemicals (including organic and inorganic constituents in NIPDWR)	HW constitutents: no increase over background NIPDWR: no increase if ambient exceeds MCLs	No violation of MCLs	Risk-based alternate concentration limit on a case-by-case basis
RCRA 257	Organic and inorganic constituents in NIPDWR	No increase if ambient exceeds MCLs	No violation of MCLs	
SDWA UIC	Fluids	Class I, II, III: No movement into USDW's (design standards)		
	Constituents in NIPDWR		No violation of MCLs	
	Contaminants not in NIPDWR			No adverse effect on health of persons
CERCLA NCP/NPL	The HRS scores the "most hazardous" constituents			HRS scores rely on Sax, NFPA Toxicity. Final level of cleanup is based on cost-effectiveness (defined to include adequate protection of public health, welfare, environment) and on preservation of Fund.

* The RCRA interim status rules (Part 265) establish no acceptable level of contamination. No action is required unless monitoring detects contamination.

T A B L E 2

BASIS FOR DEFINING ACCEPTABLE DEGRADATION

	Constituent of Concern	No Degradation	Numerical Standard	Other
UMTRCA	Same as part 264+ Radiological constituents in NIPDWR and Molybdenum and Uranium	No violations of MCLs which include: Radium 226/.228 5pCi Gross alpha 15pCi		
TSCA PCB	PCBs, pH, specific conductivity, chlorinated organics		Monitoring only No specified limits	
CWA Construction Grants	Current Drinking Water: all construction in NIPDWR	No increase if ambient above MCLs	No violation of MCLs	Microbiological limits for water used without disinfectants
	Potential Drinking Water: organic and inorganic in NIPDWR	No increase if ambient above MCLs	No violation of MCLs	
	Other uses	Case-by-case decision based on present or potential use.		
High Level Rad.Waste	Reasonably foreseeable releases from: 1. 14 specific radionuclides 2. other alpha-emitting radionuclides 3. any other radionuclide		1. limits for each constituent 2. 10 curies/ 1000 metric tons of heavy metal (MTHM) 3. 500 curies/ 1000 MTHM	
	Very unlikely releases from above		10 times above standards	
FIFRA Pesticide Policy	Pesticide under review		Maximum advisable level no effect on 10kg child drinking 1 liter/day	FIFRA must also consider risks and benefits of pesticide use in deciding upon appropriate controls

T A B L E 2
Page 2

	Technical Requirements	Environmental Performance Stds.	G-W Monitoring	Location	Remedial Action	Other
RCRA 264*	Standards for design, construction operation, closure, post	Ground water protection std. specified once facility leaks	For land disposal facilities: number/location; frequency; waivers possible	No waste management in a few areas e.g. flood plains/seismic zones; Variance possible	When needed to return to compliance with GW protection standard/treat or remove	
RCRA 257		GW performance				
SDWA UIC	Class I,II,III: - construction, operation, closure standards - plugging adjacent wells that may allow movement of fluid	Class I,II,III,V: non-endangerment USDWs	At discretion of permit writer			Ban on HW injection into USDWs
NCP NPL	Case-by-case decision under NCP could include any of these approaches					
UMTRCA	Liners closure requirements	Similiar to Part 264	Case-by-case decided by NRC		Similiar to Part 264	

*/ Interim status regulations (Part 265) include many of the same standards. They do not include a ground-water protection standard or a corrective action requirement.

TABLE 3

	Technical Requirements	Environmental Performance Stds.	G-W Monitoring	Location	Remedial Action	Other
TSCA PCB	Construction, operating, monitoring standards		At all facilities: number/location parameters	-50 ft above water table -not in recharge zone		
CWA Const. grants	Best practicable waste treatment technology	Case-by-case usually NIPDWR constituents	Required if needed to show			
High Level Rad. Waste	Design performance std.					
FIFRA Pesticide Policy	Uses labels to impose applicate rates through individual lisencing decisions		Can impose monitoring requirements on registrants if leaking is a potential concern	Uses lables to impose geographical restrictions, logoffs, etc.		Decision to cancel register pesticide

TABLE 3

ATTACHMENT III

State Assistance

Options	Implications
- Create a new grant program to provide broad State support for ground water	- Would increase support to States for program development, control of non-federally regulated sources of contamination - Would require a new grant authority and major new funds
- Provide support to States for program development	- Would increase capacity for problem assessment, strategies, system design; institutional coordination - Possible through existing authorities, e.g., CWA, 205(j), RCRA, UIC
- Provide increased funding and scope of authority to existing federally delegated State programs	- Increased grant support underway through regular budget channels - Expanded use of existing authorities

Options for Ground Water Protection Guidelines

1. What is the extent of the resource to be protected?

Options	Implications
- As measured by quantity	- "Significant" yields have never been defined, e.g., intrinsic value (< 1 gpm are not aquifers) or relative value (difference from wet to dry area).
- As measured by quality	- Varies by natural condition and human-made contamination - Generally defined based on total dissolved solids (TDS) - Some aquifers are pristine quality - Some aquifers are so contaminated they are unusable.
- As measured by location	- Some ground water, even relatively fresh is located at great depths making its economic use doubtful, particularly if plentiful surface water is available

2. To what level should EPA protect the resource?

Uniform Protection: - Nondegradation	- Perceived as goal for several States/EPA programs; tempered by waivers - Nondegradation is a practical impossibility - If fully implemented RCRA variances and UIC variances would have to be dropped; - Superfund theoretically would have to clean up every site regardless of NPL score
- Protect to a given level	- Allow degradation to protect a given use, e.g., drinking water or other standard - Difficult to establish a comprehensive set of standards - Would require extensive changes to UIC and RCRA rules - Superfund would have to clean up to reach these levels
Differential Protection: - Classification	- Various classes based on current and future use of water - Either by mapping areas or case-by-case - Effluent standards, ban or restrict activities, engineering or management practices - Massive change for RCRA - different design and operating rules; also UIC/SF - States/localities would classify; expensive to implement
- Waivers and exemptions	- Approach now used by UIC/RCRA - Resource broadly defined; regulations allow for case-by-case determination - Could mesh with existing State classification - Least disruptive for UIC and RCRA
Broader Environmental Policy: - Site-by-site assessment	- Agency defines acceptable risk level, e.g., 10-6 risk level and use it to determine whether action should be taken or allowed; case-by-case - Would require scrapping much of current RCRA/UIC - Risk analysis time consuming, probably exceeds current science
- Best alternative option	- Evaluate range of alternatives and choose one that is least environmentally disruptive - Mirrors NEPA approach - Would require modification of all existing regulations

ATTACHMENT V

Headquarters Coordination Options

Options	Implications
– Create an Office of Ground Water at the AA level (alternatively shift selected programs to one AA)	- Incorporate all ground water regulatory programs - Would provide consistent management, policy resolution, and need little guidance from which to operate - Would be highly disruptive and untimely - Would fragment existing programs where ground water is an integral part
- Give the lead to an Assistant Administrator	- Capability to undertake such an assignment - Coverage of ground water programs would be maximized by relying on a strong interagency coordinating office - Policy consistency and coordination is highly possible given a clear charge and sufficient resources - Could be started quickly with little disruption - Coordination across AAships sometimes difficult to achieve
- Establish a Standing Committee	- Similar to steering committee function of regulatory review and issue resolution could be initiated - Could be initiated quickly with little disruption - Committees usually have limited success in shaping operating programs
- Maintain current structure with no formal organization	- Rely on general Agency policy coordination structure, e.g., steering committee, budget reviews - Assign specific issues to program offices - Unlikely to obtain policy coordination

ATTACHMENT VI

Regional Management Options

1. What functions should be carried out in each regional office?

Options (Cumulative)	Implications
- Minimal effort: coordinate regional training, technical assistance and public response	- Possible within existing resources - This is the current minimal general effort - Little impact on program management and coordination
- Add capability to manage the nature, quality and accessibility of ground water data collected by regional programs; increased output to EPA research agenda	- Badly needed - Staff required - Little impact on direct program operations
- Add responsibility for oversight of State plans, program plans, and coordination of site assessment and enforcement	- Would assure operating regional programs are coordinated - Depending on level of authority of decision-making, could have substantial impact on program operations - Resources required
- Add responsibility for developing and overseeing regional ground water policy development and coordination	- Would greatly increase Regions' ability to assure policy consistency among its programs
- Add responsibility for a greatly enhanced regional effort to provide States technical and institutional support in developing ground-water plans and strategies	- Would be a substantial component in effort to assist States increase their ground water protection efforts - Require staff knowledgeable in program development and institutional arrangements, and ground water science and technology

Regional Management Options - continued

2. What mechanisms should be established to implement the functions determined necessary for the Regions?

Options	Implications
- Organize all ground water component programs (RCRA, Superfund, UIC) into a single Division	- Maximize coordination and policy consistency - Time consuming and disruptive
- Designate a lead Division	- Retains current responsibilities where they are - Depends on the effectiveness of the related decision-making to resolve issues and compel action among several divisions
- Designate a lead person reporting to Regional Administrator or Deputy Regional Administrator	- Could not carry out most functions directly but could provide leadership and direction - Minimizes disruption - Level of authority and staff support will be major determinants of success
- Create a technical group of experts (e.g., hydrogeologists) to assist all regional programs and review technical aspects of program actions	- Priority setting would be a problem - It would be counterproductive to remove experts from operating programs - Could not address management functions
- Establish a task force either at the staff level or at the Division Director level	- Staff level group could handle TA and data functions but not approve actions or resolve issues - Division Directors group could identify and resolve issues - No organizational change required - Without oversight by RA or DRA turf battles or issue avoidance could develop
- Create a management system such as MOUs, work plans or guidances	- Without persons responsible for implementation this approach is unlikely to succeed