US EPA ARCHIVE DOCUMENT

PART III

APPENDICES

APPENDIX A

GLOSSARY

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AQUIFER - A geologic formation, group of geologic formations, or part of a geologic formation that yields significant quantities of water to wells and springs.

AQUIFER SYSTEM - A heterogeneous body of intercalated permeable and less permeable material that acts as a water-yielding hydraulic unit of regional extent.

AQUITARD - A confining bed that retards, but does not prevent the flow of water to or from an adjacent aquifer; it does not readily yield water to wells or springs.

CONE OF DEPRESSION - A depression in the POTENTIOMETRIC SURFACE of a body of ground water that has the shape of an inverted cone and develops around a pumped well.

CONFINED CONDITIONS - Exists when an aquifer is confined between two layers of much less pervious material. The pressure condition of such a system is such that the water level in a well penetrating the confined aquifer usually rises above the top of the aquifer.

CONTAMINANT PLUME - Irregular volume occupied by a body of dissolved or suspended pollutants in ground water.

CRA - Abbreviation of Classification Review Area.

DISCHARGE AREA - A discharge area is an area of land beneath which there is a net annual transfer of water from the saturated zone to a surface-water body, the land surface or the root zone. The net discharge is physically manifested by an increase of hydraulic heads with depth (i.e., upward ground-water flow to the water table). These zones may be associated with natural areas of discharge such as seeps, springs, caves, wetlands, streams, bays, or playas.

ECOLOGICAL SYSTEM (ECOSYSTEM) - An ecological community together with its physical environment.

ECOLOGY - The science of the relationships between organisms and their environment.

*For general information only -- not to be viewed as suggested or mandatory language for regulatory purposes.

ECOSYSTEM - See ECOLOGICAL SYSTEM.

FLOW NET - A graphical presentation of ground-water flow lines and lines of equal pressure head.

GEOLOGIC FORMATION - A body of rock that can be distinquished on the basis of characteristic lithologic features such as chemical composition, structures, textures, or fossil content.

GROUND-WATER - Subsurface water within the zone of saturation.

GROUND-WATER BASIN - (a) A subsurface structure having the character of a basin with respect to the collection, retention, and outflow of water, (b) An aquifer, or system of aquifers, whether or not basin-shaped, that has reasonably well defined hydrologic boundaries and, more or less, definite areas of recharge and discharge.

GROUND-WATER FLOW DIVIDE - An imaginary plane (or curved surface) distinguished by the limiting flow lines of adjacent flow systems. Conceptually there is no flow across this plane between the flow systems.

GROUND-WATER FLOW REGIME - The sum total of all ground water (water within the saturated zone) and surrounding geologic media (e.g., sediment and rocks). The top of the ground-water regime is the water table while the bottom would be the base of significant ground-water circulation. Temporarily perched waters within the vadose zone would generally not qualify as part of the ground-water regime.

GROUND-WATER FLOW SYSTEM (GROUND-WATER SYSTEM) - A body of circulating ground water having a water-table upper boundary and ground-water flow divide boundaries along all other sides. These boundaries encompass distinct recharge and discharge areas unique to the flow system.

GROUND-WATER SYSTEM - See GROUND-WATER FLOW SYSTEM.

HYDRAULIC CONDUCTIVITY - The capacity of earth materials to transmit water.

HYDRAULIC GRADIENT - The change in STATIC HEAD per-unit-of-distance in a given direction.

HYDRAULIC HEAD GRADIENT - See HYDRAULIC GRADIENT.

PIEZOMETRIC SURFACE - See POTENTIOMETRIC SURFACE.

POTABLE WATER - Water that is safe and palatable for human use; concentrations of pathogenic organisms and dissolved toxic constituents have been reduced to safe levels, and it has been treated so as to be tolerably low in objectionable taste, odor, color, or turbidity.

POTENTIOMETRIC SURFACE (PIEZOMETRIC SURFACE) - An imaginary surface representing the STATIC HEAD of ground water and defined by the level to which water will rise in a well. The WATER TABLE is a particular potentiometric surface.

RECHARGE AREA - A recharge area is an area of land beneath which there is a net annual transfer of water through the vadose zone into the ground-water regime. The net recharge is manifested by an decrease in hydraulic heads with depth (i.e., downward ground-water flow from the water table).

SATURATED ZONE - A subsurface zone in which all the voids are filled with water under pressure greater than that of the atmosphere. This zone is separated from the overlying zone of aeration (unsaturated zone) by the WATER TABLE.

STATIC HEAD (HYDRAULIC HEAD) - The height above a datum plane of the surface of a column of water (or liquid) that can be supported by the static pressure at a given point.

STRESS (PUMPING STRESS) - Drawdown of water level and change in HYDRAULIC GRADIENT induced by pumping ground water.

SURFACE-WATER DIVIDE - The line of separation, or ridge, summit, or narrow tract of high ground, marking the boundary between two adjacent drainage basins, or dividing the surface waters that flow naturally in one direction from those that flow in the opposite direction.

TOTAL DISSOLVED SOLIDS (TDS) - The quantity of dissolved material in a sample of water determined either from the residue on evaporation by drying at 180°C, or, for waters containing more than 1,000 parts per million, from the sum of determined constituents.

UNCONFINED CONDITIONS - Exists when the upper limit of the aquifer is defined by the water table itself. At the water table, water in the aquifer pores is at atomospheric pressure.

UNSATURATED ZONE - See VADOSE ZONE.

VADOSE ZONE (ZONE OF AERATION) - A subsurface zone containing water under pressure less than that of the atmosphere, including water held by capillarity, and containing air or gases generally under atmospheric pressure.

WATER TABLE - The surface of a body of unconfined ground water at which the pressure is equal to that of the atmosphere.

WATER-TABLE GRADIENT - The change in elevation of the water table per unit of horizontal distance.

APPENDIX B

ALTERNATIVE OPTIONS CONSIDERED FOR DEFINING CLASSIFICATION KEY-TERMS AND CONCEPTS

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1.0 INTRODUCTION

One phase of the process for preparing the Guidelines for Ground-Water Classification involved defining key terms and concepts related to the classification scheme. The Office of Ground-Water Protection and guidelines work group developed these definitions through an intensive analysis of alternative options. As described previously, each approach was examined with respect to its:

- stringency
- consistency with other programs, and the overall intent of the strategy
- flexibility for accommodating state and region-specific characteristics or concerns
- arbitrariness
- potential implementational difficulties or complexities

This Appendix documents those options which were considered during the development process, but not specifically highlighted for public consideration in these Draft Guidelines. The alternatives discussed are not necessarily poor approaches to the key issues and concepts. In fact, many are currently used very effectively by other Federal, State, and local programs. These options, however, were deemed less suitable for a classification system with nationwide, broad-spectrum application. Comments on these alternatives, especially in the case of the "vulnerability," "substantial population," and "economically irreplaceable" terms will, of course, be considered by the Agency in preparing the Final Classification Guidelines.

2.0 CLASSIFICATION REVIEW AREA

Prior to the development of the Classification Review Area concept, the Agency reviewed the methods used by states in designating classified segments for ground-water systems. These include the classification of aquifers, or portions of aquifers as defined by geology, water quality, and surface-water relationships. In addition, cones of influence of individual wells are mapped and classified by some states.

It was decided that these techniques are not appropriate for the EPA process, as they would involve in-advance classification of large areas, in some cases, hundreds of square miles in extent. The Strategy clearly establishes that classification at this scale is within the role of the states. A more limited scope of review which centers on the proposed activity or facility was found to be most consistent with EPA policy.

One option which was also considered included a range in variable radii for the Classification Review Area, using combinations of hydrogeologic characteristics such as ground-water velocity, or types of geology (e.g., karst or glacial till) specific to different regions of the country. The disadvantage of using a geology-based variable radius is the inconsistency of its use. Given that this is a method of approximation only, designation of too small a Classification Review Area could provide inadequate protection to interconnected ground-water resources.

Also considered was the use of activity-specific radii--for example, a different radius for landfills than for pesticide application or underground tank installation. This alternative was critiqued for several reasons. Most importantly, the Agency believed that use of activity-related criteria to define the Classification Review Area could result in a different classification being applied to the same ground water for different types of activities. The classification process is designed to avoid such variability whenever possible.

3.0 CLASS I KEY TERMS AND CONCEPTS

3.1 Irreplaceable Source of Drinking Water

3.1.1 Substantial Population (Option A)

Option A for "substantial population" takes into account a quantitative or semi-quantitative assessment of both public water systems and concentrations of private wells. This approach also takes into account the added burden of providing alternative drinking water to users not served by a centralized water supply.

This definition for substantial population provides two important advantages:

- It considers both central city and suburban/ rural settings (public water systems as well as private well users) and, therefore, makes ground water in both settings potential Class I waters.

- It is based on terms and thresholds defined by the Census Bureau, is compatible with publicly available census data, and incorporates terms that have been used to describe population settings by other Federal programs.

Another option for a "quantifiable" Option A which involved defining "substantial population" in relative terms, considering all populations served by public water systems within a state. This option would define a substantial population as one that is served by a public water system that is larger than, for example, at least 95 percent of the systems that are served by ground water in the state. Such a definition would ensure that, at a minimum, the largest system or systems in each state would qualify as serving a substantial population. One concern was that this might produce inconsistencies between states. Some possible conflict with the policy of giving "special" protection to areas with greatest communal risk (inherent in the Strategy) was also noted. It should be remembered that Option B for defining "substantial population" is more qualitative in nature.

3.1.2 Comparable Quality

The Agency considered a definition of "comparable quality" consistent with the Class III definition of "treatable," or having Total Dissolved Solids equal to or less than 10,000 mg/l, but was concerned over the possibility that alternatives might be considered acceptable replacements although they deviate considerably from the quality of the current source or from the quality of water typically used for drinking in this Region.

3.1.3 Economic Infeasibility

Several alternative options considered for defining economic infeasibility under the "quantitative test" of Option A were assessed. One involved using the criteria developed by EPA'S Office of Drinking Water for evaluating excessive economic burden. This set of approaches would designate an alternative source as economically infeasible if:

- water bills to a typical user (a user who consumes about 100,000 gallons-per-year) will increase by more than $100 per year

- water bills to a typical user will increase to more than $300 per year

- the system investment (measured as undepreciated replacement costs) will increase by more than 100 percent.

Such options do not account for the community's ability to pay, a consideration of significant importance. Moreover, the dollar values set by the criteria are dated and have not been adjusted to account for inflation.

Another option considered for defining economic infeasibility would designate a source as infeasible if the cost to a typical user exceeds the amount paid by the upper five percent of all public water-system users in the state. This option accounts for ability and willingness to pay to some extent. Judgments are based, however, on data describing water costs (rather than household income) statewide. The measure of ability or willingness to pay is, therefore, indirect. This measure is also less accurate than the selected approach because statewide water rates do not always reflect the true cost of the water. Subsidies from state or local governments and economies of scale may cause rates paid by users to be lower than actual costs.

A third approach considered was an evaluation of economic feasibility on the basis of a comprehensive cost and benefit analysis. This option would require a much more data-intensive and complex analysis than any of the other options considered. More important, the Agency noted that a cost/ benefit analysis would necessarily give explicit consideration to the type of activity motivating the classification decision, contrary to the intent of the Ground-Water Protection Strategy. It should be remembered that Option B for determining "economic irreplaceability" is more qualitative in nature, but could utilize some of these specific measures as appropriate.

3.2 Ecologically Vital Ground Water

Several alternative options were considered, but not highlighted for public comment, within the definition of an ecologically vital area. These included:

- Designating all discharge areas as ecologically vital ("all discharge areas" option)

- Designating ground-water discharge areas as ecologically vital if they contain an endangered or threatened species, or a management area designated for ecological protection by a Federal, State or local agency ("any protected ecosystem in a discharge area" option)

- Using critical habitats instead of all habitats of endangered species ("critical habitats" option).

The "all discharge areas" option was attractive, in that it would be relatively uncomplicated to implement and would serve to define both key terms, sensitive ecological system, and unique habitat. The Agency, however, perceived that it would result in a very large number of Class I designations, which is not in keeping with the intent of the Ground-Water Protection Strategy. More important, not all discharge areas are associated with truly unique habitats.

The "any protected ecosystem in a discharge area" option was judged to be an exceedingly comprehensive approach, accommodating currently existing ecological protection programs at all levels of government. However, extensive research would be required to identify the universe of such protected areas, and many inconsistencies exist from program to program and from state to state.

To clarify the "Critical Habitats" option, the reader should be aware that Critical Habitat areas are designated for some endangered or threatened species, and range from less than one square mile to thousands of square miles. Specific locational information is available in the Federal Register and Code of Federal Regulations for each of these areas. Use of Critical Habitats alone was considered unworkable for several reasons. Pursuant to the Endangered Species Act of 1973, equivalent protection must be afforded to all habitats, not just Critical Habitats. Many truly endangered species lack Critical Habitat designations. Although, at the present time, Critical Habitats are assigned on a routine basis when species become endangered, this was not the case at the inception of the program. Under extreme circumstances, Critical Habitats are intentionally not delineated to avoid publicizing an especially sensitive species. Limiting unique habitats to only the designated Critical Habitats would leave the habitats of many endangered and threatened species without Class I protection.

3.3 Highly Vulnerable Ground Water

With respect to ground-water vulnerability to contamination, options for both basic utilization and operational standpoints were examined. The Agency is requesting comment most specifically on the latter, although the choice of operational definition will have an impact on the overall concept use.

3.3.1 Alternative Approaches to Utilize the Ground-Water Vulnerability Concept

Two alternative approaches were considered for utilizing the ground-water vulnerability concept. Both were based on the concept that vulnerability is dependent upon the nature of the activity. This concept has validity in two respects. First, different kinds of activities will involve wastes of contrasting hazard. For example, hazardous wastes disposed of within a RCRA landfill present a significantly greater health risk upon direct contact than some mining wastes. Second, different kinds of activities have contrasting design and operating features. Consider the comparison of land treatment versus underground injection (via a deep well) of secondarily treated municipal waste waters. Some activities take place within the ground water medium and others take place well above the ground-water table. Thus, an approach employing this concept would provide a greater activity-specific picture of the potential for contamination to occur.

The first alternative considered would have incorporated an activity-dependent vulnerability concept, requiring the development of specialized operational methodologies for defining vulnerability for different activities. The Agency found two major disadvantages for this approach. First, under an activity-dependent vulnerability concept, the same ground water would likely be placed into different classes where different activities take place or are proposed in the same vicinity. Ground water could be vulnerable to one activity and not the other. It might lead to confusion in the regulated community, and the public at large, to find that the class of ground water changes with each activity. Secondly, the effort and time to develop specialized operational methodologies for each activity would be substantial.

The second alternative considered involved removing vulnerability as a class-determining factor. Each EPA program would, at its option, establish activity-specific operational definitions for vulnerability as might be needed for implementing management strategies. The principal advantage is that the class of ground water would consistently reflect the current and potential use of the resource. Specific operational definitions would then not need to be developed and tested as part of the OGWP classification program. One major disadvantage was raised, in addition. Ground-water vulnerability to contamination was established in the Ground-Water Protection Strategy as an essential component to the Class I concept. If EPA had decided to consider removing vulnerability as a class-determining factor, then this very important concept would be lost.

3.3.2 Selection of a Methodology to Operationally Define Ground-Water Vulnerability

Five operational methodologies were considered to determine ground-water vulnerability (see Table B-1).

3.3.2.1 Qualitative Methodology

A descriptive/qualitative method establishes the vulnerability of hydrogeologic settings, based on concepts of terrain lithology or hydrogeologic functions, as expressed in a few well chosen, technical words. Examples of highly vulnerable settings might include areas of karst terrain or ground-water recharge areas. Examples of low vulnerability may be discharge areas or confined aquifers. The general procedures to implement such a method would be to either match a candidate, real setting to a "standard setting," or to provide a map showing their location. While no quantitative criteria would necessarily be set, this type of method, when implemented, will result in the establishment of "precedent criteria" whenever a specific site is accepted or rejected.

3.3.2.2 Single Factor Methodology

The single factor method would employ a single quantitative criterion to all hydrogeologic settings. For example, areas with a depth to water of less than 150 feet could be considered highly vulnerable to contamination. The

TABLE B-1
SUMMARY OF OPERATIONAL METHODS FOR DEFINING THE KEY TERM
"HIGHLY VULNERABLE" GROUND WATER

METHODS	EXAMPLES OF "HIGHLY VULNERABLE"	COMMENTS
1. Qualitative description of highly vulnerable hydrogeologic settings	Highly vulnerable settings: a. unconfined aquifers overlain by sandy, highly permeable soils, or b. karst terrain, or c. ground-water recharge areas	Simple to use; requires judgement to match real settings to qualitative descriptions and a need for lengthy process to inventory descriptions of hydrogeologic settings judged to be highly vulnerable.
2. Single independent factor and criteria.	Vadose zone thickness less than 150 feet <u>or</u> hydraulic conductivity >1 x 10^{-4}	Simple to use; difficult to establish single criterion which is realistically applicable across the country.
3. Multiple independent	Vadose zone <150 feet, hydraulic conductivity >1.0 x 10^{-4} cm/sec, <u>and</u> recharge >5 inches per year	Improvement over single factor; in use by States; assumes each factor equal weight; assumes failure to meet any factor criterion will result in a determination of highly vulnerable; interrelationships between factors is ignored.
4. Numerical rating (weighted and non-weighted). For example, DRASTIC, a rating scheme developed by the National Water Well Association (Aller et al, 1985); other examples: . The hazard-ranking system for CERCLA (40 CFR 300, Appendix A); and . Legrand's standardized system for evaluating waste-disposal site (Legrand, 1980).	DRASTIC index greater than 150 over CRA	A more sophisticated method allowing for factor weighting and a single score or index. Weighted factors are added. States often moved in this direction after considering multiple factor approach; provides for professional judgment in selecting specific ratings; sometimes critized for being too "simplistic" for site-specific geotechnical assessment
5. Integrative criterion. Time-of-travel for a selected distance or time to reach an exposure point.	Average time-of-travel greater than 1/2 foot per day over CRA	Allows for factor weighting and a single score. Considers the interrelationships between factors. Very data intensive. Yields a single score. Not suited to mapping large areas.

fatal flaw to this method is the selection of a single quantitative factor to represent highly vulnerable conditions that can be applied across the country and its various hydrogeologic settings.

3.3.2.3 Multiple Factor Methology

The method of listing multiple independent-criteria is commonly applied in state programs for the location of hazardous-waste facilities and other facilities used for the disposal of noxious wastes. The principal drawback is the lack of consistency in these criteria among states. This method also has the disadvantage of not being able to weigh each factor according to their relative importance for contaminating ground-water. In addition, it sets a criterion that must be met for each factor. The approach is inflexible, in that a poor rating for one factor cannot be balanced against a superior rating of another factor to achieve an average acceptable rating. This balancing is important because ground-water transport and leaching potential are not additive processes, but are multiplicative.

3.3.2.4 Numerical Rating Methodology

The numerical rating methodology is an extension of the multiple independent factor criteria listing method. In addition to establishing multiple factors, the range for each factor is subdivided and assigned relative numerical ratings. An example concerns the depth-to-water factor in DRASTIC (Aller, et al, 1985) shown in Table B-2. The numerical factor ratings can be multiplied by weight in order to reflect the relative importance of factors. Finally, the factor ratings, or weighted factor ratings, are added to give a final score. The selection of factors follows the same reasoning as discussed for the multiple factor method. Under this type of method, only a criterion for the final score is established. As long as the final score criterion is met, there are no limits assigned to any factors.

Hybrids of a numerical rating method and multiple factor method, or more sophisticated types of standards, are also possible. For example, minimum criterion can be established for critical factors. In addition, factor ratings may be multiplied or divided by other factor ratings to better approximate interrelationships between those factors.

The principal advantages of a numerical rating method include those presented for the multiple factor method, plus factor weighting. These systems are relatively easy to implement, depending upon the difficulty of measuring the

TABLE B-2
RANGES AND RATINGS FOR DEPTH TO WATER
AS USED IN THE NUMERICAL RATING SYSTEM DRASTIC
(ALLER, ET AL, 1985)

Depth to Water
(feet)

Range	Rating
0 - 5	10
5 - 15	9
15 - 30	7
30 - 50	5
50 - 75	3
75 - 100	2
100+	1

Weight: 5

factors selected. Factor weighting allows for the more important factors to be distinguished. This method also allows for compensation between factors, a low score in one factor may be offset by a high score in another factor.

The disadvantages are essentially the same as those of a multiple factor method. The factor weights, when used, will be somewhat subjective. The typical approach to assigning weights is to poll the "experts" and establish a consensus value. Weights assigned in one region may not work very well in other regions. The selection of a cut-off value for highly vulnerable will also have a limited technical basis.

3.3.2.5 Integrative Methodology

Integrative methodologies are often considered the most sophisticated, since they can represent the interaction and relative importance of the various hydrogeologic factors. The Office of Solid Waste is investigating a time-of-travel criterion as part of hazardous-waste land disposal siting requirements. The high-level radioactive waste (HLW) program within the Department of Energy has established a time-to-exposure criterion. The disadvantage of the integrative methods (for localized vulnerability assessments) is the need for accurate, site-specific data, usually requiring a detailed hydrogeological investigation. This presents conflicts with lower-risk activities where high cost investigations are typically not performed. In addition, the integrative methods are less suited to mapping purposes should states be interested in building upon EPA's system.

As a final note, Option B for determining vulnerability opens up the use of any or all of these approaches, depending on site and decision specificity. It is considered a "qualitative" option since the Agency would not provide specific recommendations on preferred methods, cutoffs, etc.

4.0 CLASS II KEY TERMS AND CONCEPTS

4.1 Current Source of Drinking Water

Several alternative options were considered within the definition of current source of drinking water. These were based upon:

- Occurrence of multiple wells in the Classification Review Area ("multiple well" option)
- Exceedance of a specified ground-water production level in the Classification Review Area ("exceeding a production level" option)
- Application of intensive management practices, or evidence of regional stress in the Classification Review Area ("intensive management or stress" option).

The multiple well option is an expansion of the "one-well" option that is highlighted for public comment. The determination of a current source of drinking water would be based upon the presence of two or more wells and would result in a more restrictive current-source subclass and increase the size of the potential-source subclass. This option would have created a bias against the more sparsely populated rural areas. The philosophy of the Agency is that, if a source is being used as drinking water by even one family, it should be classified and protected as a current source of drinking water.

The "exceeding-a-production level" option looks at the volume of drinking water being pumped, rather than a set number of wells. The intent of the option was to screen out little-used aquifers from the current source of drinking-water designation. This option was not highlighted for public comment for the same reasons as the multiple-well option.

The "intensive management or stress" option would focus on areas which are controlled through ground-water management agencies, or are exhibiting pumping stress (e.g., persistently falling water levels). This approach by itself could overlook a large number of other sources of drinking water that are not managed for ground-water withdrawal, or are not under stress.

4.2 Potential Source of Drinking Water

Several other options were considered for the definition of "potential source of drinking water." These included:

- Stricter water-quality criteria
- Non-quantitative yield criterion
- Specific water-quality data needs
- Socioeconomic considerations.

The "Stricter Water-Quality Criteria" option would have adopted the Federal primary drinking-water-quality standards, in addition to the selected TDS cutoff. This was viewed as an attractive approach because it addresses levels of specific toxic contaminants. However, it was deemed to be overly restrictive since many ground waters that do not meet primary drinking water standards are treatable. Also, it is hard to "prove" they meet the MCLs.

The "Non-Quantitative Yield Requirements" option would have set no minimum yield to qualify as a potential source. The Agency decided, however, that areas do exist where yields are insignificant, however rare, and, therefore, must be considered in order that the classification system be complete.

Since ground-water quality data are not consistently available for all areas or regions, the issue of data needs for classification was carefully examined. One option studied was to require a ground-water quality test for classification. This approach would result in the most accurate quality assessment of the potential for the ground water to serve as drinking water, but was considered to be unnecessarily burdensome for most activities.

The "Socioeconomic Considerations" option would base the determination of potential drinking water on socioeconomic criteria. Some water is potentially drinkable, but may never be used because it is too costly to retrieve, not available because of institutional constraints, or is in an area in which development is unlikely. This approach was rejected because it was judged difficult to implement and not highly workable, since economic and institutional trends are often difficult to predict. Also, the test is too complex for the baseline of protection in Class II.

TABLE B-3
BENEFICIAL USES OF GROUND WATER
OTHER THAN FOR DRINKING WATER

A. MUNICIPAL	. fire protection . district heating . landscaping . blending
B. AGRICULTURE	. irrigation . livestock . frost protection . blending
C. INDUSTRY	. heating/cooling . process water . blending
D. MINING AND ENERGY DEVELOPMENT	. mineral . geothermal . hydrocarbon
E. ENERGY PRODUCTION	. power plants . heat pumps
F. ECOLOGICAL (NON-CLASS I)	. baseflow . heat pumps
G. STORAGE/WASTE DISPOSAL	. disposal of waste and treated waste water effluent . surplus fresh water management
H. RECREATION	. swimming pools (indirect) . golf courses . ice skating (indirect)
I. PASSIVE USES	. physical support for earth structures . impedance of subsidence and salt-water intrusion

4.3 <u>Ground Water with Beneficial Uses Other Than Drinking</u>

Within the context of "other beneficial use" (OBU), several options were considered but not adopted. These included:

- Providing a separate subclass within Class II for OBU
- Consideration of specific OBUs v. all OBUs as a group
- Giving more protection to ground water with dual uses.

The idea of creating a third subclass under Class II for ground waters with other beneficial uses (Table B-3) was not adopted for several reasons. First, the existing current and potential source of drinking-water subclasses appears to provide sufficient protection for the majority of OBUs. Second, most OBU ground waters would have a dual role as a current or potential source of drinking water, and would be afforded the protection given to drinking water as the highest and best use. Third, it would be difficult to assess the protection that should be afforded for OBU ground waters as a general subclass, because quality, yield, and other requirements are so varied among the many different uses and between regions.

Because EPA does not intend to use different management practices according to the various other beneficial uses of ground water, the Agency judged the consideration of specific OBUs to be unnecessary. In addition, the selection, definition, and determination of resource value of OBUs would be difficult [illegible] national scale, since resource values and uses vary cons[illegible]ly within a region. Some states are reviewing specific OBU subclasses for agricultural or other purposes. This is an ideal approach for tailoring ground-water protection at the state level, though it was deemed impractical to adopt some number of subclasses for OBUs on a nationwide basis.

The Agency considered providing a higher level of protection to drinking water, which is also being used for selected OBUs. This approach was considered to be less feasible on a national scale since resource values and uses vary widely.