UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JAN 26 1989

OFFICE OF WATER

MEMORANDUM

SUBJECT: Ground-Water Protection Policy Pertaining to Underground Injection Control and Related Aspects of the High Plains States Aquifer Recharge Demonstration Program

FROM: Michael B. Cook, Director
Office of Drinking Water

Marian Mlay, Director
Office of Ground Water Protection

TO: Water Division Directors
Regions VI - X

I. PURPOSE

The purpose of this memorandum is to clarify EPA's ground-water protection responsibilities in two general areas as they pertain to the High Plains States Ground-Water Recharge Demonstration Program Act: establishment of ground-water quality goals and general monitoring guidance. Guidance provided in this memo is tailored to the High Plains Program, and is not directly applicable to other federal or non-federal projects that may affect groundwater.

II. BACKGROUND

The High Plains States Groundwater Recharge Demonstration Program Act of 1983 (Public Law 98-434 hereinafter "the Act") requires that the Bureau of Reclamation conduct a two-phase program to (1) study the application of recharge technologies and develop a detailed plan for projects and (2) design, construct and operate up to 21 demonstration projects.

The Act requires that the Secretary of the Interior, acting through the Bureau, and the Administrator of the Environmental Protection Agency enter in a memorandum of understanding "to provide for an evaluation of the impacts to surface and ground-water quality resulting from the ground-water recharge demonstration projects constructed pursuant to this Act. The Administrator shall consult with the United States Geological Survey and shall make maximum use of data, studies and other technical resources and assistance available from State and local entities in conducting the evaluation. The evaluation of water quality impacts shall be completed so as to be included in the Secretary's final report to Congress". DOI and EPA representatives formalized cooperation and documented agreements in a June 21, 1985 Memorandum of Understanding (MOU). Project-specific coordination is being formalized by execution of Interagency Agreements between EPA and Bureau of Reclamation regional offices.

Under the authority of the SDWA, EPA has promulgated minimum requirements for effective Underground Injection Control (UIC) programs. Approximately half of the demonstration sites are expected to use injection wells as part of the recharge technology employed. The programs are either carried out by the States, (Primacy programs), or directly implemented by EPA (DI programs). The UIC regulations are designed to prevent endangerment of underground sources of drinking water (USDWs) from underground injection. The regulations define USDWs as any aquifer or portion thereof which currently supplies a public water system or which contains a sufficient quantity of water to supply a public water system, and either currently supplies drinking water for human consumption, or contains fewer than 10,000 mg/l total dissolved solids (40 CFR 146.3). The regulations also provide for some narrow exemption criteria, whereby aquifers which are not currently used and have no potential as drinking water sources can be exempted from protection as USDWs. The regulations prevent endangerment of USDWs from underground injection by prohibiting movement of fluid containing any contaminant into a USDW, if the presence of that contaminant may cause a violation of any primary drinking water regulation or may otherwise adversely affect the health of persons [40 CFR 144.12(b)].

Agricultural recharge wells are considered Class V wells. This is a broad Class of wells encompassing a diverse group of wells for which the Agency has not promulgated specific technical requirements. Under the Federal regulations these wells are authorized by rule as long as they do not endanger USDWs (40 CFR 144.12(b)). However, the UIC program Director may require owners and operators of Class V wells to obtain a permit under certain conditions to prevent endangerment of USDWs. In addition, Primacy States may have promulgated more extensive regulations governing these wells.

Other statutory provisions are relevant to the High Plains Program including additional portions of the SDWA, the Clean Water Act (CWA), and the National Environmental Policy Act (NEPA). Although not the focus of this memorandum, sponsors should be alerted to such relevant statutes and regulations covering, for example:

- Federal agency adherence to State Wellhead Protection Programs (SDWA section 1428.)
- Emergency powers to prevent imminent and substantial endangerment to human health from any contaminant that is likely to enter a USDW or surface water. (SDWA section 1431; CWA section 504.)
- Discharges to surface waters (and to ground waters in some very limited circumstances) under the National Pollutant Discharge Elimination System (CWA section 402.)
- Dredge and fill operations within navigable waters (e.g., for project construction or maintenance; CWA section 404.)
- Review authority by EPA over certain Federal projects (NEPA section 309.)

In administering Federal statutes, States may often apply standards which are more stringent than the Federal "baseline". In addition, many States administer their own laws which cover activities not controlled by Federal laws. Project sponsors should contact EPA Regional and State environmental personnel for further guidance on these matters.

III. GROUND-WATER PROTECTION GOALS

The Agency believes that these projects should be designed, operated, and completed so as to be protective of human health and the environment and in compliance with the UIC regulations. EPA believes that either one of the following conditions will ensure that no endangerment of a USDW occurs in the High Plains project. First, no endangerment would occur if constituent concentrations in the ground water at the point of injection did not exceed the National Primary Drinking Water standards (i.e. maximum contaminant level (MCLs)) promulgated in 40 CFR Part 141, or Agency-recommended health-based limits which have been peer-reviewed by the Agency, such as health advisories (HAs). Second, where such standards are already exceeded due to activities not related to the High Plains Project no endangerment would occur if constituents in the injectate did not exceed ambient concentrations in the ground-water.

The most reliable way to assure compliance is to monitor the injectate and only inject fluids which meet the above-mentioned standards. In order to meet the standards, fluids may have to be treated or surface retention basins could be used to avoid injection of concentrated "slugs".

In certain limited instances, the Agency may be able to consider projects where the injectate did not meet all health-based standards if the sponsor could assure that no drinking water well would be affected for the duration of the project and for as long as it continued to have an impact on the receiving aquifer. For such projects EPA would require a permit which specifies an allowable mixing zone within the receiving aquifer, and expects that delegated States would do the same. Compliance with the protection standard would have to be demonstrated at the limit of the mixing zone. The sponsors would also have to demonstrate that they can and will impose institutional controls not only over the mixing zone, but also over a buffer area which would allow for remedial action before any water well was affected by unexpected release of contaminants. The permit would also require a very carefully designed monitoring program, which would:

- o measure the impact of the project on the receiving aquifer.
- o demonstrate compliance with the standard at the chosen point or points.
- o give advance warning of the possibility that an MCL or other health-based standard may be exceeded outside of the allowed mixing zone.
- o be active both during and after completion of the project, and until the applicant could demonstrate that the project no longer posed an adverse impact on the receiving aquifer.

While directly applicable to underground injection wells under the SDWA, the above guidance should be considered at sites employing other technologies. Finally, many States have regulations, both procedural and substantive that apply to the demonstration projects.

IV. MONITORING ISSUES

Monitoring of project sites is the responsibility of the sponsors, who will utilize their own staff, consultants, or the services of the U.S. or State Geological Surveys. As noted in the previous section, except for some possible limited exceptions,

periodic monitoring of the injectate will be the primary mechanism for ensuring compliance with SDWA-UIC requirements. Monitoring of ground and surface water is needed, however, to allow assessment of the relative impact of the demonstration project sites regardless of the relationship to standards per se. In addition, if any projects are allowed where the injectate exceeds health-based standards, an extensive monitoring system will be designed on a site-specific basis. EPA will be responsible for reviewing and approving in conjunction with the Bureau of Reclamation, all project-specific monitoring and quality assurance plans before recharge begins. Four aspects of monitoring are discussed in the following sections: determining the hydrogeologic framework, selecting contaminants to be monitored, and determining monitoring frequency and location.

IV A. DETERMINING THE HYDROGEOLOGIC FRAMEWORK

Hydrogeologic data must be gathered in order to: 1) adequately describe the hydrogeologic setting of each recharge demonstration project; 2) determine the rate and direction of ground-water flow so that monitoring-well screens are correctly positioned to allow collection of appropriate water-quality samples; 3) assess changes in water quality due to recharge project construction and operation; and 4) allow a determination of the applicability of the project results to other sites. The hydrogeologic site-characterization information to be obtained should include, but not necessarily be limited to:

1) A lithologic description of the unsaturated and saturated zones underlying the recharge site, the focus being on aquifers directly affected by recharge as well as those hydrogeologically connected;

2) Estimation of storativity, transmissivity and thickness of each significant aquifer and non-aquifer unit; and

3) Water level evaluation at the time of site characterization as well as projected fluctuations due to normal cyclical events.

Additional data may be required by EPA or Bureau Regional Staff, based on site-specific conditions.

IV B. SELECTING CONSTITUTENTS TO BE MONITORED

IV B1. BASELINE MONITORING

Project sponsors must establish ground-water quality conditions before recharge actually commences, by "baseline screening." Specific parameters which must be included in the program are:

1) MCLs (Attachment A);

2) Classic inorganic geochemical measures which at a minimum would include total dissolved solids, chloride, nitrate, carbonate and iron;

3) Other parameters as indicated, on a case-by-case basis by site and watershed reconnaissance (for example, in agricultural areas, selection of all or part of the National Pesticide Survey list (Attachment B) might be appropriate;) and

4) Other constituents identified in the injectate on a case-by-case basis.

IV B2. MONITORING DURING PROJECT

The monitoring program established during the pre-project phase, should be continued during the first year of recharge activities. Thereafter, if water quality conditions are relatively stable and/or predictable, the list of parameters for monitoring could be reduced or modified to focus on:

1) constituents identified by baseline screening as being present at higher levels in the injectate than in the ground-water; or which are of concern in the background ground-water and

2) general water-quality parameters, consisting of at least, e.g., total dissolved solids, nitrates, chlorides, carbonate, and iron.

3) "new" constituents which are identified in the injectate during recharge activities.

Exceedances of water quality goals should be reported promptly to EPA regional staff, and recommendations of needed actions to prevent endangerment followed. Quarterly monitoring reports at all sites should be provided by the sponsor directly to EPA and Bureau Regional staff.

IV C. FREQUENCY OF MONITORING

The frequency of monitoring should be determined on a case-by-case basis, while considering such controlling factors as the hydrology of the area, climate, geography, flow characteristics of the source water, unsaturated-zone characteristics, etc. In

general, EPA believes that prior to initiation of injection or commencement of a demonstration project, two to four consecutive quarterly (i.e., every three months) sampling "sessions" will frequently be sufficient to characterize "baseline" conditions. After completion of baseline monitoring, sampling should continue on a quarterly basis unless monitoring on a less frequent or non-routine schedule can be justified.

IV D. LOCATION OF SAMPLING

Monitoring-wells should be screened in the receiving aquifer. At least one well must be located far enough upgradient from the injection well to be outside the boundary of the recharge plume. Other monitoring wells should be located downgradient of the injection well in the injectate's expected flow path. The precise position(s) of the downgradient well(s) must be specified in the sponsors monitoring plan, and will be reviewed by EPA and the Bureau of Reclamation, often with the technical input of USGS. Above-ground monitoring of the injectate to ensure compliance with standards is also required.

V. OTHER ISSUES

Water levels in monitoring wells should be measured before the wells are pumped for sampling purposes. Additional quarterly water-level measurements are suggested, even if monitoring wells are not sampled quarterly. Sponsors should also monitor injectate pressures and amounts and document any actions or events (e.g., such as accidental spills) that may affect ground or surface water quality.

Project sponsors should be reminded that additional site-specific monitoring requirements will be provided by each of the appropriate EPA Regional Offices. In addition, impacts to surface waters should be reviewed and appropriate monitoring included. Impacts from such activities as: facility construction, release of suspended sediment, accidental release of untreated recharge water, the treatment processes themselves, direct or indirect discharge to surface water or wetlands must be assessed. These impacts should be monitored and reported in a timely fashion to EPA.

cc: Regional OGWP and UIC Representatives
B. Glenn, Bureau of Reclamation (Denver)
E. Patten, USGS-Reston, Virginia
J. Mclean, USGS-Denver, Colorado

Attachment A: List of MCLs
B: List of National Pesticides Survey Parameters

ATTACHMENT A

DRINKING WATER REGULATIONS AND HEALTH ADVISORIES

U.S. ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF DRINKING WATER

Legend for draft version of Drinking Water Standards and Health Advisories table.

Abbreviations column descriptions are:

NIPDWR - National Interim Primary Drinking Water Regulation. Interim enforceable drinking water regulations first established under the Safe Drinking Water Act that are protective of public health to the extent feasible.

MCLG - Maximum Contaminant Level Goal. A non-enforceable concentration of a drinking water contaminant that is protective of adverse human health effects and allows an adequate margin of safety.

MCL - Maximum Contaminant Level. Maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

RfD - Reference Dose. An estimate of a daily exposure to the human population that is likely to be without appreciable risk of deleterious effects over a lifetime.

DWEL - Drinking Water Equivalent Level. A lifetime exposure concentration protective of adverse, non-cancer health effects, that assumes all of the exposure to a contaminant is from a drinking water source.

(*) The codes for the Status Reg and Status HA columns are as follows:

F - final

D - draft

L - listed for regulation

P - proposed (Phase II draft proposal, based on levels proposed in 1985)

Other codes found in the table include the following:

NA - not applicable

PS - performance standard 0.5 NTU - 1.0- NTU

TT - treatment technique

** - No more than 5% of the samples may be positive. For systems collecting fewer than 40 samples/month, no more than 1% may be positive.

*** - guidance

† - Large discrepancies between Lifetime and Longer term HA values may occur because of the Agency's conservative policies, especially with regard to carcinogenicity, relative source contribution, and less than lifetime exposures in chronic toxicity testing. These factors can result in a cumulative UF (uncertainty factor) of 10 to 1000 when calculating a Lifetime HA.

Chemicals	Reg.*	(ug/l)	(ug/l)	(ug/l)	Status HA*	One-day ug/l	Ten-day ug/l	term ug/l	term ug/l	RfD ug/kg/day	DWEL ug/l	Lifetime ug/l	ug/l at 10-4 Cancer Risk	Cancer Group
Organics														
Acenaphthylene	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Acifluorfen	-	-	-	-	F	2000	200	100	400	13	400	-	100	B2
Acrylamide	P	-	zero	TT	F	-	300	20	70	0.2	7	-	1	B2
Acrylonitrile	L	-	-	-	-	-	-	-	-	-	-	-	-	-
Alachlor	P	-	zero	2	F	100	100	-	-	10	400	-	40	B2
Aldicarb	P	-	10	10	F	10	10	10	40	1.3	40	10	-	D
Aldicarb sulfone	P	-	40	40	F	60	60	60	200	6.0	200	40	-	D
Aldicarb sulfoxide	P	-	10	10	F	10	10	10	40	1.3	40	10	-	D
Ametryn	-	-	-	-	F	9000	9000	900	3000	9	300	60	-	D
Aminoma	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Ammonium Sulfamate	-	-	-	-	F	20000	20000	20000	80000	250	8000	2000	-	D
Anthracene	L	-	-	-	-	-	-	-	-	-	-	-	-	D
Atrazine	P	-	3	3	F	100	100	50	200	5	200	3	-	C
Baygon	-	-	-	-	F	40	40	40	100	4	100	3	-	C
Bentazon	-	-	-	-	F	300	300	300	900	2.5	90	20	-	D
Benz(a)anthracene (PAH)	L	-	-	-	-	-	-	-	-	-	-	-	-	B2
Benzene	F	-	zero	5	F	200	200	-	-	-	-	-	100	A
Benzo(a)pyrene (PAH)	L	-	-	-	-	-	-	-	-	-	-	-	-	B2
Benzo(b)fluoranthene (PAH)	L	-	-	-	-	-	-	-	-	-	-	-	-	B2
Benzo(g,h,i)perylene (PAH)	L	-	-	-	-	-	-	-	-	-	-	-	-	D
Benzo(k)fluoranthene (PAH)	L	-	-	-	-	-	-	-	-	-	-	-	-	B2
bis-2-Chloroisopropyl ether	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Bromacil	-	-	-	-	F	5000	5000	3000	9000	130	5000	90	-	C
Bromobenzene	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Bromochloroacetonitrile	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Bromochloromethane	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Bromodichloromethane (THM)	L	100	-	-	D	-	-	-	-	2	-	-	-	-
Bromoform (THM)	L	100	-	-	D	-	-	-	-	20	-	-	-	-
Bromomethane	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Butyl benzyl phthalate (BBP)	L	-	-	-	-	-	-	-	-	200	-	-	-	C
Butylate	-	-	-	-	F	2000	2000	1000	1000	100	4000	700	-	D
Butylbenzene n-	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Butylbenzene sec-	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Butylbenzene tert-	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Carbaryl	-	-	-	-	F	1000	1000	1000	1000	100	4000	700	-	D
Carbofuran	P	-	40	40	F	50	50	50	200	5	200	40	-	E
Carbon Tetrachloride	F	-	zero	5	F	4000	200	70	300	0.7	30	-	30	B2
Carboxin	-	-	-	-	F	1000	1000	1000	4000	100	4000	700	-	D

Chemicals	Standards				Health Advisories								
						10 kg Child			70-kg Adult				
	Status Reg.*	NPDWR (ug/l)	MCLG (ug/l)	MCL (ug/l)	Status HA*	One-day ug/l	Ten-day ug/l	Longer-term ug/l	Longer-term ug/l	RfD ug/kg/day	DWEL ug/l	Lifetime ug/l	ug/l at 10-4 Cancer Risk	Cancer Group
Chloramben	-	-	-	-	F	3000	3000	200	500	15	500	100	-	D
Chloramine	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Chlorate	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Chlordane	P	-	zero	2	F	60	60	0.5	0.5	0.045	2	-	3	B2
Chlorine	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Chlorine dioxide	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Chlorite	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Chloroacetaldehyde	L	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorodibromomethane (THM)	L	100	-	-	D	-	-	-	-	2	-	-	-	-
Chloroethane	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Chloroform (THM)	L	100	-	-	D	-	-	-	-	10	-	-	600	B2
Chloromethane	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Chlorophenol (2,4,6-)	L	-	-	-	D	-	-	-	-	-	-	-	300	B2
Chlorophenol (2,4-)	L	-	-	-	D	-	-	-	-	3	100	-	-	-
Chlorophenol (2-)	L	-	-	-	D	-	-	-	-	5	200	-	-	-
Chloropicrin	L	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorothalonil	-	-	-	-	F	200	200	200	500	15	500	-	200	B2
Chlorotoluene o-	L	-	-	-	D	-	-	-	-	20	-	-	-	D
Chlorotoluene p-	L	-	-	-	D	-	-	-	-	0.1	-	-	-	D
Chrysene (PAH)	L	-	-	-	-	-	-	-	-	-	-	-	-	B2
Cyanazine	L	-	-	-	F	100	100	20	70	2	70	10	-	D
Cyanogen Chloride	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Cymene p-	-	-	-	-	D	-	-	-	-	-	-	-	-	-
2,4-D	P	100	70	70	F	1000	300	100	400	10	400	70	-	D
Dacthal (DCPA)	-	-	-	-	F	80000	80000	5000	20000	500	20000	4000	-	D
Dalapon	L	-	-	-	F	4000	4000	300	900	26	900	200	-	D
DCE (cis-1,2-)	P	-	70	70	F	4000	1000	1000	1000	10	400	70	-	D
DCE (trans-1,2-)	P	-	100	100	F	20000	2000	2000	6000	20	600	100	-	D
Diazinon	-	-	-	-	F	20	20	5	20	0.09	3	0.6	-	E
Dibenz(a,h)anthracene (PAH)	L	-	-	-	-	-	-	-	-	-	-	-	-	B2
Dibromoacetonitrile	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Dibromochloropropane (DBCP)	P	-	zero	0.2	F	200	50	-	-	-	-	-	3	B2
Dibromomethane	L	-	-	-	D	-	-	-	-	-	-	-	-	D
Dibutylphthalate (DBP)	L	-	-	-	-	-	-	-	-	100	-	-	-	D
Dicamba	L	-	-	-	F	300	300	300	1000	30	1000	200	-	D
Dichloroacetaldehyde	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Dichloroacetic acid	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Dichloroacetonitrile	L	-	-	-	D	-	-	-	-	8	-	-	-	C
Dichlorobenzene p- [illegible]	F	-	75	75	F	10000	10000	10000	40000	100	4000	75	-	C

Dichloropropane (1,1-)	-	-	-	-	D	-	-	-	-	-	60	2000	-	500	B2
Dichloropropane (1,2-)	P	-	zero	5	F	-	90	-	-	-	-	-	-	60	B2
Dichloropropane (1,3-)	L	-	-	-	D	-	-	-	-	-	-	-	-	-	-
Dichloropropane (2,2-)	L	-	-	-	D	-	-	-	-	-	-	-	-	-	-
Dichloropropene (1,1-)	L	-	-	-	D	-	-	-	-	-	-	-	-	-	-
Dichloropropene (1,3-)	L	-	-	-	F	30	30	30	100	0.3	10	-	20	B2
Dieldrin	L	-	-	-	F	0.5	0.5	0.5	2	0.05	2	-	0.2	B2
Diethyl phthalate (DEP)	-	-	-	-	D	-	-	-	-	800	-	-	-	D
Diethylhexyl phthalate (DEHP)	-	-	-	-	D	-	-	-	-	20	-	-	-	B2
Dimethoate	-	-	-	-	F	10000	10000	10000	40000	300	10000	2000	-	D
Dimethyl phthlate (DMP)	L	-	-	-	-	-	-	-	-	-	-	-	-	D
Dinitrotoluene (2,4-)	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Dinoseb	L	-	-	-	F	300	300	10	40	1	40	7	-	-
Dioxane p-	-	-	-	-	F	4000	400	-	-	-	-	-	700	B2
Diphenamid	-	-	-	-	F	300	300	300	1000	30	1000	200	-	D
Diquat	L	-	-	-	-	-	-	-	-	2.2	-	-	-	-
Disulfoton	-	-	-	-	F	10	10	3	9	0.04	1	0.3	-	E
Diuron	-	-	-	-	F	1000	1000	300	900	2	70	10	-	D
Endothall	L	-	-	-	F	800	800	200	200	20	700	100	-	D
Endrin	L	0.2	-	-	F	20	5	5	20	0.015	2	0.3	-	E
Epichlorohydrin	P	-	zero	TT	F	100	100	70	70	2	70	-	400	B2
Ethylbenzene	P	-	700	700	F	30000	3000	1000	3000	100	3000	700	-	D
Ethylene dibromide (EDB)	P	-	zero	0.05	F	8	8	-	-	-	-	-	0.04	B2
Ethylene glycol	-	-	-	-	F	20000	6000	6000	20000	2000	40000	7000	-	D
EBU	L	-	-	-	F	300	300	100	400	0.03	1	-	20	B2
Fenamiphos	-	-	-	-	F	9	9	5	20	0.25	9	2	-	D
Fluometuron	-	-	-	-	F	2000	2000	2000	5000	13	4000	90	-	D
Fluorene (PAH)	L	-	-	-	-	-	-	-	-	-	-	-	-	D
Fluorotrichloromethane	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Fonofos	-	-	-	-	F	20	20	20	70	2	70	10	-	D
Formaldehyde	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Gasoline	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Glyphosate	L	-	-	-	F	20000	20000	1000	1000	100	4000	700	-	D

Updated by Office of Drinking Water

Chemicals	Standards				Health Advisories									
						10 kg Child			70 kg Adult					
	Status Reg.*	NPDWR (ug/l)	MCLG (ug/l)	MCL (ug/l)	Status HA*	One-day ug/l	Ten-day ug/l	Longer-term ug/l	Longer-term ug/l	RfD ug/kg/day	DWEL ug/l	Lifetime ug/l	ug/l at 10-4 Cancer Risk	Cancer Group
Heptachlor	P	-	zero	0.4	F	10	10	5	5	0.5	20	-	0.8	B2
Heptachlor epoxide	P	-	zero	0.2	F	10	-	0.1	0.1	0.013	0.4	-	0.4	B2
Hexachlorobenzene	-	-	-	-	F	50	50	50	200	0.8	30	-	2	B2
Hexachlorobutadiene	-	-	-	-	D	-	-	-	-	2	-	-	5	C
Hexachlorocyclopentadiene	L	-	-	-	-	-	-	-	-	7	-	-	-	-
Hexane (n-)	-	-	-	-	F	10000	4000	4000	10000	-	-	-	-	D
Hexazinone	-	-	-	-	F	3000	3000	3000	9000	30	1000	200	-	D
Hypochlorite	L	-	-	-	-	-	-	-	-	-	-	-	-	-
Hypochlorous acid	L	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene (PAH)	L	-	-	-	-	-	-	-	-	-	-	-	-	B2
Isophorone	L	-	-	-	D	-	-	-	-	150	-	-	-	-
Isopropylbenzene	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Lindane	P	4	0.2	0.2	F	1000	1000	30	100	0.3	10	0.2	3	C
Maleic hydrazide	-	-	-	-	F	10000	10000	5000	20000	500	20000	4000	-	D
MCPA	-	-	-	-	F	100	100	100	400	0.5	20	4	-	D
Methomyl	-	-	-	-	F	300	300	300	300	25	900	200	-	D
Methoxychlor	P	100	400	400	F	6000	2000	500	2000	50	2000	400	-	D
Methyl ethyl ketone	-	-	-	-	F	60000	6000	3000	9000	50	900	200	-	D
Methyl parathion	-	-	-	-	F	300	300	30	100	0.25	9	2	-	D
Methyl tert butyl ether	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Metolachlor	L	-	-	-	F	2000	2000	2000	5000	150	5000	100	-	C
Metribuzin	L	-	-	-	F	5000	5000	300	900	25	900	200	-	D
Monochloroacetic acid	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Monochlorobenzene	P	-	100	100	F	2000	2000	2000	7000	20	700	100	-	D
Naphthalene	-	-	-	-	D	-	-	-	-	410	-	-	-	-
Oxamyl (Vydate)	L	-	-	-	F	200	200	200	900	25	900	200	-	E
Ozone by products	L	-	-	-	-	-	-	-	-	-	-	-	-	-
Paraquat	-	-	-	-	F	100	100	50	200	4.5	200	30	-	E
Pentachloroethane	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Pentachlorophenol	P	-	200	200	F	1000	300	300	1000	30	1000	200	-	D
Phenanthrene (PAH)	L	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	-	-	-	-	D	-	-	-	-	40	-	-	-	-
Picloram	-	-	-	-	F	20000	20000	700	2000	70	2000	500	-	D
Polychlorinated byphenols (PCBs)	P	-	zero	0.5	P	-	-	1	4	-	-	-	0.5	B2
Prometon	-	-	-	-	F	200	200	200	500	15	500	100	-	D
Pronamide	-	-	-	-	F	800	800	800	3000	75	3000	50	-	C
Propachlor	-	-	-	-	F	500	500	100	500	13	500	90	-	D
Propazine	-	-	-	-	F	1000	1000	500	2000	20	700	10	-	C
Propham	-	-	-	-	F	5000	5000	5000	20000	20	600	100	-	D

Chemicals	Standards				Health Advisories									
						10 kg Child			70-kg Adult					
	Status Reg.*	NPDWR (ug/l)	MCLG (ug/l)	MCL (ug/l)	Status HA*	One-day ug/l	Ten-day ug/l	Longer-term ug/l	Longer-term ug/l	RfD ug/kg/day	DWEL ug/l	Lifetime ug/l	ug/l at 10-4 Cancer Risk	Cancer Group
Propylbenzene n-	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Pyrene (PAH)	L	-	-	-	-	-	-	-	-	-	-	-	-	D
Simazine	L	-	-	-	F	50	50	50	200	5	200	4	-	C
Styrene	P	-	zero	5	F	20000	2000	2000	7000	200	7000	-	1	B2
2,4,5-T	L	-	-	-	F	800	800	800	1000	10	350	70	-	D
2,3,7,8 TCDD (Dioxin)	L	-	-	-	F	0.001	1E-04	1E-05	4E-05	1E-06	4E-05	-	2E-05	B2
Tebuthiuron	-	-	-	-	F	3000	3000	700	2000	70	2000	500	-	D
Terbacil	-	-	-	-	F	300	300	300	900	13	400	90	-	E
Terbufos	-	-	-	-	F	5	5	1	5	0.13	5	0.9	-	D
Tetrachloroethane (1,1,1,2-)	L	-	-	-	D	-	-	-	-	30	-	-	-	-
Tetrachloroethane (1,1,2,2-)	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Tetrachloroethylene	P	-	zero	5	F	2000	2000	1000	5000	10	500	-	70	B2
Toluene	P	-	2000	2000	F	20000	3000	3000	10000	300	10000	2000	-	-
Toxaphene	P	5	zero	5	F	500	40	-	-	100	-	-	3	B2
2,4,5 TP	P	10	50	50	F	200	200	70	300	7.5	300	50	-	-
Trichloroacetaldehyde	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Trichloroacetic acid	L	-	-	-	D	-	-	-	-	600	-	-	-	-
Trichloroacetonitrile	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Trichlorobenzene (1,2,4-)	-	-	-	-	D	-	-	-	-	20	-	-	-	-
Trichlorobenzene (1,3,5-)	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Trichloroethane (1,1,1-) †	F	-	200	200	F	100000	40000	40000	100000	90	1000	200	-	D
Trichloroethane (1,1,2-)	-	-	-	-	D	-	-	-	-	30	-	-	-	-
Trichloroethanol (2,2,2-)	L	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethylene	F	-	zero	5	F	-	-	-	-	7	300	-	300	B2
Trichloropropane (1,1,1-)	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Trichloropropane (1,2,3-)	-	-	-	-	D	-	-	-	-	6	-	-	-	-
Trifluralin	L	-	-	-	F	30	30	30	30	3	100	2	-	C
Trimethylbenzene (1,2,4-)	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Trimethylbenzene (1,3,5-)	-	-	-	-	D	-	-	-	-	-	-	-	-	-
Vinyl chloride	F	-	zero	2	F	3000	3000	10	50	-	-	-	1.5	A
Xylenes	P	-	10000	10000	F	40000	40000	40000	10000	2000	60000	10000	-	D

Updated by Office of Drinking Water

Cyanide	L	-	-	-	F	200	200	200	800	22	800	200	-	D
Fluoride	F	-	4000	4000	-	-	-	-	-	60	-	-	-	-
Lead (at source)	P	-	zero	5	-	-	-	-	-	-	-	-	-	-
Lead (at tap)	P	50	zero	TT	-	-	-	-	-	-	-	-	-	-
Manganese	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	P	2	2	2	F	-	-	-	-	0.3	10	2	-	D
Molybdenum	L	-	-	-	D	20000	200	6	20	0.6	20	4	-	D
Nickel	L	-	-	-	F	1000	1000	200	7000	20	7000	200	-	D
Nitrate (as N)	P	10000	10000	10000	F	-	1000	-	-	-	-	-	-	D
Nitrite (as N)	P	-	1000	1000	F	-	1000	-	-	-	-	-	-	D
Nitrate + Nitrite	P	-	10000	10000	-	-	-	-	-	-	-	-	-	-
Selenium	P	10	50	50	-	-	-	-	-	-	-	-	-	-
Silver	L	50	-	-	D	-	-	-	-	3	-	-	-	-
Sodium	L	-	-	-	D	-	-	-	-	-	20000 ***	-	-	-
Strontium	L	-	-	-	D	-	-	-	-	-	-	-	-	-
Sulfate	L	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	L	-	-	-	D	-	-	-	-	0.07	-	-	-	-
Vanadium	L	-	-	-	D	-	-	-	-	20	-	-	-	-
Zinc	L	-	-	-	D	-	-	-	-	-	-	-	-	-

Updated by Office of Drinking Water

Chemicals	Standards				Health Advisories									Cancer Group
						10 kg Child			70-kg Adult					
	Status Reg.*	NIPDWR (ug/l)	MCLG (ug/l)	MCL (ug/l)	Status HA*	One-day ug/l	Ten-day ug/l	Longer-term ug/l	Longer-term ug/l	RfD ug/kg/day	DWEL ug/l	Lifetime ug/l	ug/l at 10-4 Cancer Risk	
Microbiology and Turbidity														
Cryptosporidium	L	-	-	-	-	-	-	-	-	-	-	-	-	-
Giardia lamblia	P	-	zero	TT	-	-	-	-	-	-	-	-	-	-
Legionella	P	-	zero	TT	F	-	-	-	-	-	-	-	-	-
Standard plate count	P	-	NA	TT	-	-	-	-	-	-	-	-	-	-
Total coliform (current MCL based on density)	P	<1/100 ml	zero	**	-	-	-	-	-	-	-	-	-	-
Turbidity	P	1 NTU	0.1 NTU	PS	-	-	-	-	-	-	-	-	-	-
Viruses	P	-	zero	TT	-	-	-	-	-	-	-	-	-	-
MOU Chemicals														
Diisopropyl methylphosphonate	-	-	-	-	D	-	-	-	-	80	-	-	-	-
Fog Oil	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HMX	-	-	-	-	D	-	-	-	-	50	-	-	-	-
Nitrocellulose (non-toxic)	-	-	-	-	F	-	-	-	-	-	-	-	-	-
Nitroguanidine	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RDX	-	-	-	-	D	-	-	-	-	3	-	-	-	-
Trinitroglycerol	-	-	-	-	F	5	5	5	5	-	-	5	-	-
Trinitrotoluene	-	-	-	-	D	20	20	-	-	0.5	-	-	-	-
White Phosphorus	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc chloride	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Radionuclides														
Beta particle and photon activity (formerly man-made radionuclides)	D	4 mrem/yr	zero	-	-	-	-	-	-	-	-	-	4 mrem/yr	A
Gross alpha particle activity	D	15 pCi/l	zero	-	-	-	-	-	-	-	-	-	-	A
Radium 226/228	D	5 pCi/l	zero	-	-	-	-	-	-	-	-	-	29 pCi/l	A
Radon	D	-	zero	-	-	-	-	-	-	-	-	-	160 pCi/l	A
Uranium	D	-	zero	-	-	-	-	-	-	-	-	-	160 pCi/l	A

SECONDARY MAXIMUM CONTAMINANT LEVELS

Chemicals	Status *	SMCLs (mg/l)
Aluminum	P	0.05
Chloride	F	250
Color	F	15 color units
Copper	F	1
Corrosivity	F	non- corrosive
Dichlorobenzene -o	P	0.01
Dichlorobenzene -p	P	0.005
~~Dichloropropane-1,2~~	~~P~~	~~0.005~~
Ethylbenzene	P	0.03
Fluoride	F	2
Foaming Agents	F	0.5
Iron	F	0.3
Manganese	F	0.05
Monochlorobenzene	P	0.1
Odor	F	3 threshold odor numbers
Pentachlorophenol	P	0.03
pH	F	6.5 - 8.5
Silver	P	~~0.05~~ 0.09
Styrene	P	0.01
Sulfate	F	250
Toluene	P	0.04
Total Dissolved Solids (TDS	F	500
Xylene	P	0.02
Zinc	F	5

* Status Codes: P - proposed, F - final

Updated by Office of Drinking Water

Pesticides Included in the EPA National Pesticide Survey

Acifluorfen*
Alachlor*
Aldicarb*
Aldicarb sulfone*
Aldicarb sulfoxide*
Aldrin
Ametryn*
Atraton
Atrazine*
Atrazine, dealkylated
Barban
Baygon*
Bentazon*
Bromacil*
Butachlor
Butylate*
Carbaryl*
Carbofuran*
Carbofuran phenol
Carbofuran phenol-3KET
Carbofuran-3OH
Carboxin*
Chloramben*
Chlordane-alpha*
Chlordane-gamma*
Chlormeb
Chlorobenzilate
Chlorothalonil*
Chlorpropham
Cyanazine*
Cycloate
[illegible]*
Dalapon*
2,4-DB
DBCP*
DCPA
DCPA diacid metabolite
4,4'-DDD
4,4'-DDE
4,4'-DDT
Demeton-S
Diazinon*
Dicamba*
3,5-Dichlorobenzoic acid
1,2-Dichloropropane*
cis-1,3-Dichloropropene*
trans-1,3-Dichloropropene*
Dichlorprop
Dichlorvos
Dieldrin*

Dinoseb*
Diphenamid*
Disulfoton*
Disulfoton sulfone
Disulfoton sulfoxide
Diuron*
EDB*
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin*
Endrin aldehyde
EPTC
Ethoprop
Etridiazole
ETU*
Fenamiphos*
Fenamiphos sulfone
Fenamiphos sulfoxide
Fenarimol
Fluometuron*
Fluridone
HCH-alpha
HCH-beta
HCH-delta
HCH-gamma
Heptachlor*
Heptachlor epoxide*
Hexachlorobenzene*
Hexazinone*
5-Hydroxy Dicamba
Linuron
Merphos
Methiocarb
Methomyl*
Methoxychlor*
Methyl paraoxon
Metolachlor*
Metribuzin*
Metribuzin DA
Metribuzin DADK
Metribuzin DK
Mevinphos
MGK 264
Molinate
Napropamide
Neburon
Nitrates/Nitrites*
4-Nitrophenol
Norflurazon

Oxamyl*
PCP
Pebulate
cis-Permethrin
trans-Permethrin
Picloram*
Prometon*
Prometryn
Pronamide*
Pronamide metabolite
Propachlor*
Propanil
Propazine*
Propham*
Simazine*
Simetryn
Stirofos
Swep
2,4,5-T*
Tebuthiuron*
Terbacil*
Terbufos*
Terbutryn
2,4,5-TP*
Trideamefon
Tricyclazole
Trifluralin*
Vernolate

April 14, 1988

* Priority pesticides which have a high potential for leaching into groundwater. For information on Health Advisories, contact the Safe Drinking Water Hotline, 1-800-426-4791, toll-free Mon-Fri 8:30-4:30 E.S.T. (In Washington, D.C. call 382-5533)