CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
416 W. Congress St., Suite 100
Tucson, Arizona 85701
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

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0156

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Fife Symington, Governor Russell F. Rhoades, Director

AU95:0266
November 22, 1995

File No. 102806

Mr. James A. Briscoe
Tombstone Development Company/Jaba, Inc.
2100 North Wilmont
Tucson, Arizona 85712

RE: **Tombstone Development Co-Contention Mine**
Inventory No. 102806

Dear Mr. James A. Briscoe:

Recent legislation requires that all existing discharging facilities obtain Aquifer Protection Permits (APPs) by the year 2000. In order to meet this goal, the Department of Environmental Quality (ADEQ) has published a list of all facilities operating pursuant to R18-9-103 (i.e. have submitted a Notice of Disposal or obtained a Groundwater Quality Protection Permit). The facilities were listed in order of the dates by which the facility is required to submit an application for an APP. This letter is to inform you that your facility is included on this list.

Your facility, **Tombstone Development Co-Contention Mine**, with **Inventory No. 102806**, is scheduled to submit a permit application to the ADEQ by November 10, 1996. Your facility is classified as a(n) mining facility. If you would like a complete copy of the list, it is available from the ADEQ Librarian, 3033 North Central Avenue, Phoenix, Arizona 85012, for a fee of $12.00.

If you have any questions about your facility's status, please call the Aquifer Protection Program Section at (602) 207-4682.

Sincerely,

Lynne Dekarske/CGG

Charles G. Graf, Manager
Aquifer Protection Permit Section

CGG:ld

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Fife Symington, Governor Edward Z. Fox, Director

MU95:0121 **Inv. #102806**
April 13, 1995

James A. Briscoe
Jaba, Inc.
2100 North Wilmot Road, #218
Tucson, Arizona 85712

Dear Mr. Briscoe:

This is in regards to our conversation on April 5, 1995, in regards to the Tombstone Development Co.'s Contention Mine area. I contacted you in regards to an Aquifer Protection Program (APP) permit for your facility. According to our file you have already submitted a determination of applicability for this facility and that you need an APP permit for closure. However, I found that this facility did not have a submittal date for an APP application. This has been remedied. Your APP submittal date will now be November 10, 1996.

It is in your best interest to come into our office for a pre-application meeting. Because of the amount of data that can be required for an APP permit application it is best to schedule pre-application meetings far in advance of the due date. I suggest that we plan this meeting for the last week in June, 1995.

I am sending you a list of materials to bring to a pre-application meeting. You will need to summarize the past operations at this site, any ongoing remediation based on ADEQ compliance actions as well as water quality and waste characterization data already collected at the site.

Please call me and let me know when you are available in the last week of June. I am suggesting a morning meeting on June 28, however, this may change based on staff availability. If you have any questions please call me at (602) 207-4385.

Sincerely,

Shirin Tolle

Shirin Tolle
Mining Unit
Aquifer Protection Program Section

SLT:amq

cc: Mike Greenslade, APP Mining Unit
Gary Burchard, APP Mining Unit
Dennis Turner, Supervisor APP Mining Unit*

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

3033 North Central Avenue, Phoenix, AZ 85012

EDWARD Z. FOX, Director
(602) 207-2203
FAX (602)207-2218

Office of the Administrative Counsel 207-2212
Rule Development 207-2222
Office of Public Affairs & Information 207-2210
Public Information 207-2210
Legislative Liaison 207-2216

WILLIAM D. WILEY, Deputy Director
207-2204

Office of Customer Service 207-2214
Ombudsman; Border Coordinator; & Small Business Technical Assistance
Office of Management, Budget and Audit 207-4433
Office of Program Support & Assistance 207-4629

JOSEPH C. SMITH
ADMINISTRATION DIVISION
207-2307 FAX: 207-4888

Business & Finance 207-4755
Fee Payment 207-4742

Contracts & Procurement 207-4775
Contract Oversight
Purchasing

General Services 207-4720

Human Resources 207-4792
Personnel; Training; Safety

Information Resources Management 207-4809

State Revolving Fund 207-4728

Northern Regional Office 779-0313
2501 N. 4th Street, Flagstaff, AZ 86004
FAX: 779-4396

Southern Regional Office 628-6733
400 W. Congress, Ste. 433
Tucson, AZ 85701

NANCY C. WRONA
AIR QUALITY DIVISION
207-2308 FAX: 207-2366

Air Quality Assessment 207-2347
Air Data Analysis; Air Quality Modeling; Air Monitoring & Data Collection
Compliance 207-2301
Permits 207-2338
Program Planning & Development 207-2373
State Implementation Plans (SIP) Coordination 207-2373
Vehicle Emissions, Phoenix 207-7000
Fleet Inspections Monitoring
Vehicle Emissions Waivers
Vehicle Emissions, Tucson 628-5651
4949 E. 29th Street, Tucson AZ 85711
FAX: 628-6139

Northern Regional Office 779-0313
2501 N. 4th Street, Flagstaff, AZ 86004
FAX: 779-4396

Southern Regional Office 628-6733
400 W. Congress, Ste. 433
Tucson, AZ 85701

ETHEL R. DeMARR
WASTE PROGRAMS DIVISION
207-2381 FAX: 207-4236

Division Support & Pollution Prevention 207-4207
Hazardous Waste 207-4153
Emergency Response 207-4150
Hazardous Waste Inspections 207-4152
Remedial Projects 207-4189
Superfund
Solid Waste 207-4123
Recycling 207-4463
Special Waste 207-4463
Used Oil 207-4140
Waste Tires 207-4198
Underground Storage Tanks 207-4345

Northern Regional Office 779-0313
2501 N. 4th Street, Flagstaff, AZ 86004
FAX: 779-4396

Southern Regional Office 628-6733
400 W. Congress, Ste. 433
Tucson, AZ 85701

BRIAN E. MUNSON
WATER QUALITY DIVISION
207-2305 FAX: 207-4528

Aquifer Protection & Reuse Permits 207-4682
Drinking Water 207-4619
Operator Certification 207-4628
Water System Plan Review 207-4625
Wellhead Protection 207-4425
Hydrologic Support & Assessment 207-4419
Pesticides; Clean Lakes; Water Quality Standards; Surface & Groundwater Monitoring
Surface Water 207-4466
Wastewater Plan Review
NPDES Permits; Non-Point Source; Stormwater
Water Quality Planning 207-4627

Northern Regional Office 779-0313
2501 N. 4th Street, Flagstaff, AZ 86004
FAX: 779-4396

Southern Regional Office 628-6733
400 W. Congress, Ste. 433
Tucson, AZ 85701

TOLL FREE NUMBER ..... 1-800-234-5677 EMERGENCY RESPONSE ..... 257-2330 PUBLIC INFORMATION LINE 207-4300

Date 1/14/94

Pre-Application Meeting Requested Information

An applicant for an Aquifer Protection Permit should bring the following information to the pre-application meeting.

- Location Map - such as a state road map, showing general location of the facility.
- Topographic Map - showing location of the facility. (7.5 min. USGS quadrangle map if available. Map must show Township, Range, and Section.)
- Site Map - showing all existing and planned features of the site, if known.
- Hydrogeologic Information
  - Depth to groundwater, if known.
  - Groundwater flow direction, if known.
  - Rock and soil types in site vicinity, if known.
  - Subsurface lithology, if known (driller's logs may be available from ADWR)
  - Wells within one-half mile radius of site (available from ADWR). Nearest well to the site if no wells are within ½ mile.
  - Location of surface water bodies in the site vicinity.
  - Groundwater Quality data, if available.
- Discharge Characterization
  - Discharge rate
  - Chemical composition of discharge
- Proposed (conceptual) or as-built design features of discharge control measures.
- Planned Life of Facility
- Information on Past Land Use
  - Previous facility discharges (quantity and quality)
  - Other activities in the area that might have affected groundwater quality

SH:DD:hm
a:preappgu.mem/dd2

Arizona Department of Environmental Quality
Water Quality Division

Fact Sheet

3033 N. Central Ave., Phoenix, AZ 85012 January 4, 1995

AQUIFER PROTECTION PERMITS (APPs)

General Permits & Other Facilities Not Requiring an APP
(R18-9-126 thru 129, and A.R.S. 49-250.01)

General permit types *with specific conditions listed in rule and statute* include the following:

* Septic systems with flows less than 2000 gallons per day.
* Septic systems with flows between 2000 and 20,000 gallons per day. This includes restrictions on discharge density, depth to groundwater and percolation rate for new facilities built after September of 1989.
* Agricultural application of wastewater sludge.
* Sand, gravel, and placer mining using only physical processes(no chemicals).
* Discharges from hydrostatic testing of drinking water distribution systems and other pipelines.
* Lined evapotranspiration (ET) beds receiving sewage.
* Disposal of uncontaminated soil, cement, bricks, or similar inert material.
* Certain water transportation facilities that receive effluent from any wastewater treatment facility.
* Injection wells, surface impoundments, and leach lines receiving filter backwash from potable water treatment systems, evaporative coolers, heat exchange systems, condensate from refrigeration systems, and swimming pools with flows less than 1000 gallons/day.
* Lined surface impoundments receiving backwash from potable water treatment systems with no flow limitation.
* Agricultural activities that follow best management practices to reduce or prevent the discharge of pollutants (A.R.S. 49-247.B).
* Facilities for the management of stormwater regulated by the clean water act.

AQUIFER PROT.
PERMIT APP.

Arizona Department of Environmental Quality

AQUIFER PROTECTION PERMIT APPLICATION

(see guidance document for details)

A. FACILITY DATA

1. NAME OF FACILITY (List previous names, if any)

_____

_____

2. a) DATE FACILITY BEGAN (or is expected to begin) OPERATIONS

_____

b) EXPECTED LIFE OF THE FACILITY

_____

3. MAILING ADDRESS OF FACILITY

_____

_____

_____

4. FACILITY ADDRESS

_____

_____

_____

5. COUNTY _____

6. FACILITY LOCATION

a)

Township	Range	Section(s)	Quarters
_____	_____	_____	___1/4,___1/4,___1/4
_____	_____	_____	___1/4,___1/4,___1/4

b) Latitude _____

Longitude _____

7. FACILITY CONTACT PERSON _____

8. TELEPHONE NUMBER _____

9. NATURE OF BUSINESS (FACILITY)

_____

_____

_____

_____

_____

B. APPLICANT INFORMATION

1. NAME OF APPLICANT

_____

_____

2. APPLICANT MAILING ADDRESS

_____

_____

_____

CONSULTANT MAILING ADDRESS (OPTIONAL)

_____

_____

_____

3. TELEPHONE NUMBER OF APPLICANT

_____

C. OWNER INFORMATION

1. NAME OF OWNER

_____

2. OWNER MAILING ADDRESS

_____

_____

_____

3. TELEPHONE NUMBER OF OWNER

_____

4. LAND OWNER

_____

5. LAND OWNER ADDRESS

_____

_____

_____

D. OPERATOR INFORMATION

1. OPERATOR NAME

_____

2. OPERATOR ADDRESS

_____

_____

_____

3. OPERATOR TELEPHONE NUMBER

_____

E. EXISTING ENVIRONMENTAL PERMITS

1. NPDES PERMITS & NUMBERS

_____

_____

2. REUSE PERMITS & NUMBERS

_____

_____

3. RCRA PERMITS & NUMBERS

_____

_____

4. AIR QUALITY PERMITS & NUMBERS

_____

_____

5. SOLID WASTE PERMITS & NUMBERS

_____

_____

G. REQUIRED ATTACHMENTS

Please indicate in the spaces provided that the appropriate attachments or information have been included.

1. LOCATION MAP

_____Have you attached 2 copies of the appropriate map?

Is all the following information indicated on the map?

_____The facility site boundary?

_____An area of at least 3 miles around the boundary?

_____Location of all wells within 1/2 mile of the boundary?

_____Land ownership or use of properties adjacent to the site?

_____Have you included well construction details and well uses?

2. SITE PLAN - TWO COPIES

_____Have you included the site plan?

Is all the following indicated on the plan?

_____Property lines?

_____Buildings and structures?

_____Locations of water wells, borings or samling points?

_____Locations of discharge sites?

_____Topography?

_____Proposed Point of Compliance?

3. FACILITY DESIGN PLANS - TWO COPIES: PROPOSED AND/OR "AS BUILT"

_____Have you included the design drawings?

4. CHARACTERIZATION OF DISCHARGE

Summarize past (or anticipated) discharge practices:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

a) _____Have you attached analytical reports or projected data describing the chemical, biological and physical properties of the discharge described above?

b) List the rates at which a discharge has or will occur.

_____

_____

_____

What is the duration and frequency of the discharge?

_____

_____

_____

c) List the location of each discharging facility.

Descriptive Name	Latitude	Longitude

5. DEMONSTRATION OF BADCT

____Indicate that you have attached a description of pollutant control methodologies for the facility and a discussion of why they meet the BADCT requirement. You may use this page if convenient.

6. DEMONSTRATION OF COMPLIANCE WITH STANDARDS.

_____Have you indicated a proposed Point of Compliance on the appropriate site plan or map?

Is the proposed Point of Compliance for:

_____Hazardous substances?

_____Non-hazardous substances?

Provide justification for selecting the proposed Point of Compliance.

_____

_____

_____

_____

_____

_____

_____

_____

7. DEMONSTRATION OF TECHNICAL CAPABILITY

a. Who is responsible for the design of the facility?

_____

_____

Provide the basis for the party's capability:

_____

_____

_____

_____

b. Who is responsible for the construction of the facility or its components?

_____

_____

_____

_____

Provide the basis for the party's capability:

_____

_____

_____

_____

c. Who is responsible for the operation of the facility?

_____

_____

_____

Provide the basis for the party's capability:

_____

_____

_____

8. DEMONSTRATION OF FINANCIAL CAPABILITY

Please indicate in the spaces provided that the appropriate attachments or information have been included. Please submit financial information in a form that will easily allow ADEQ to keep such information confidential.

a) Have you included estimates for the total costs of each of the following aspects of the facility?

_____Construction;

_____Operation;

_____Closure;

_____Post-closure care;

b) _____Have you attached the required statement from the applicant's chief financial officer that the applicant is financially capable of meeting the costs estimated in sub-section a) above?

c) If the applicant is not a governmental entity, have you included one of the following?

_____The most recent 10K form of the applicant;

_____A report containing <u>all</u> of the following:

___Applicant's organizational structure

___Description of applicant's business

___Applicant's net worth, describing major assets and liabilities

___Description of judgments exceeding $100,000.00 against applicant during five years prior to making this application

___Description of bankruptcy or insolvency proceedings by applicant during five years prior to making this application

___Names & dates of birth of executive officers (If applicant is a corporation);

_____Evidence of a bond, insurance, or trust fund.

9. ENFORCEMENT ACTIONS

Provide a brief description of any action for the enforcement of any federal or State law, rule or regulation, or any county, city or local government ordinace relating to the protection of the environment, instituted against the applicant during the five years prior to making this application.

_____

_____

_____

_____

_____

_____

_____

10. ZONING

___Indicate that you have included evidence that the facility complies with applicable municipal or county zoning ordinances and regulations.

H. CERTIFICATION

I certify under penalty of law that I have personally examined and an familiar with the information submitted in this application and all attachments and that based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

_____

NAME AND OFFICIAL TITLE

_____

SIGNATURE

_____

DATE SIGNED

We recommend that two copies of the application be submitted to expedite review within Plan Review & Permits Section .

AQ. PROTECTION
PROGRAM RULES

AQUIFER PROTECTION PROGRAM RULES

JUNE 1994

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Aquifer Protection Program Section
3033 North Central Avenue, 4th Floor
Phoenix, Arizona 85012

DISCLAIMER

The Department has printed this information for the benefit of the regulated public affected by the rules. It is not the official version of the rules, and may contain errors. The official version of the rules, as published in the Arizona Administrative Code, may be obtained from the Secretary of State.

CHAPTER 9. ARTICLE 1.
AQUIFER PROTECTION PERMITS

R18-9-101. Definitions

In addition to the definitions prescribed in A.R.S. §§ 49-101 and 49-201, the terms of this Article shall have the following meanings:

1. "Alert level" means a numeric value, expressing either a concentration of a pollutant or a physical or chemical property of a pollutant, which is established in an individual Aquifer Protection Permit and which serves as an early warning indicating a potential violation of either an Aquifer Water Quality Standard at the applicable point of compliance, or any permit condition.
2. "Aquifer Protection Permit" means an individual or general permit issued pursuant to A.R.S. §§ 49-203 and 49-241 through 251, and this Article.
3. "Aquifer Water Quality Standard" means a standard established pursuant to A.R.S. §§ 49-221 and 49-223.
4. "BADCT" means the best available demonstrated control technology, processes, operating methods, or other alternatives to achieve the greatest degree of discharge reduction determined for a facility by the Director pursuant to A.R.S. § 49-243(B) and (D).
5. "Discharge density" means the volume of effluent discharged per unit of time, per unit area of land available to assimilate the discharge. This shall be expressed in gallons per day per acre or in pounds of nitrogen per day per acre.
6. "Drywell" has the meaning ascribed to it in A.R.S. § 49-331(3).
7. "Groundwater Quality Protection Permit" means a permit issued by the Arizona Department of Health Services or the Department pursuant to R9-20-208 prior to the effective date of this Article.
8. "Inert material" means that which is insoluble in water and will not decompose or leach substances to water, such as broken concrete, brick, rock, gravel, sand, and uncontaminated soils.
9. "Injection well" means a well which receives a discharge through pressure injection or gravity flow.
10. "Notice of Disposal (NOD)" means a document submitted pursuant to R9-20-205(A) prior to the effective date of this Article.
11. "Recharge project" has the meaning ascribed to it in A.R.S. § 45-651(5).
12. "Sewage" means wastes from toilets, baths, sinks, lavatories, laundries, and other plumbing fixtures in residences, institutions, public and business buildings, mobile homes, watercraft, and other places of human habitation, employment, or recreation.
13. "Sewage disposal system" means a system for sewage collection, treatment, and discharge by surface or underground methods.
14. "Surface impoundment" means a pit, pond or lagoon, having a surface dimension that is equal to or greater than its depth, which is used for the storage, holding, settling, treatment or discharge of liquid pollutants or pollutants containing free liquids.
15. "Temporary cessation" means any cessation of operation of a facility for a period of greater than 60 days but which is not intended to be permanent.
16. "Underground storage and recovery project" has the meaning ascribed to it in A.R.S. § 45-802.6.

R18-9-102. Facilities to which the Article does not apply

This Article shall not apply to any of the following:

A. Drywells which are used solely to receive storm runoff, except those that drain areas in which hazardous substances, are used, stored, loaded, or treated.
B. The application of nitrogen fertilizers.
C. Animal feeding operations.
D. Activities conducted pursuant to a remedial action order issued or a plan approved pursuant to A.R.S. §§ 49-281 through 49-287, and R18-7-101 through R18-7-110.
E. Any use of pesticides directly in the commercial production of plants and animals which is subject to the Federal Insecticide, Fungicide and Rodenticide Act, (P.L. 92-516; 86 Stat. 975; 7 United States Code sections 135 et. seq., as amended), or A.R.S. §§ 49-301 through 49-309 and the rules adopted thereunder, or Title 3, Chapter 2, Article 6 of the Arizona Revised Statutes and the rules adopted thereunder.

R18-9-103. Transition of groundwater quality protection permit program to aquifer protection permit program

A. Subject to the other provisions of this section, a Groundwater Quality Protection Permit issued pursuant to R9-20-201 through 226 before the effective date of this Article is continued according to the terms of the permit.

B. An owner or operator of a facility for which a Groundwater Quality Protection Permit has been issued shall be deemed to be in compliance with this Article and Title 49, Chapter 2, Article 3, of the Arizona Revised Statutes if both of the following conditions are met:
   1. The owner or operator is in compliance with the conditions of the Groundwater Quality Protection Permit.
   2. The owner or operator is not causing or contributing to the violation of any Aquifer Water Quality Standard.

C. An owner or operator of a facility for which a notice of disposal as required by R9-20-205 has been filed shall be deemed to be in compliance with this Article and Title 49, Chapter 2, Article 3 of the Arizona Revised Statutes if the owner or operator is not causing or contributing to the violation of any Aquifer Water Quality Standard.

D. An owner or operator of a facility which is in existence on the effective date of this Article, which was exempted by R9-20-202(B) before the effective date of this Article, and which is neither exempted under A.R.S. § 49-250(B) or R18-9-105, nor is issued a general permit under this Article, shall be deemed to be in compliance with this Article and Title 49, Chapter 2, Article 3 of the Arizona Revised Statutes if the person submits the information described in R18-9-108(A) and (B)(1) through (4) within 90 days after the effective date of this Article.

E. Subsections (B), (C) and (D) shall apply to a person until either of the following occurs:
   1. The owner or operator are issued an Aquifer Protection Permit.
   2. The owner or operator are denied an Aquifer Protection Permit.

F. The Department shall be notified by the transferor and the transferee of any change in the owner or operator of a facility subject to subsections (B), (C) or (D) within 10 days after the change occurs. The notice shall include the name of the transferor owner or operator, the name of the transferee owner or operator, and the name and location of the facility.

G. The Department shall maintain a priority list indicating the order in which the facilities subject to subsections (A), (B), (C), and (D) shall be requested to submit permit applications pursuant to R18-9-107. The list shall be available to the public upon request. The list shall be based upon the potential environmental risks to the aquifers of the state and upon the risks to public health posed by the facilities, as determined upon consideration of the following:
   1. The general vulnerability of the aquifer in terms of depth to groundwater and productivity of the aquifer.
   2. Existing aquifer water quality.
   3. The drinking water population potentially affected.
   4. The waste hazard potential of the facility.
   5. The existence of documented pollution problems attributable to the facility.
   6. The status of the facility under R9-20-201 through R9-20-226.

H. A person who has an application for a Groundwater Quality Protection Permit pending on the effective date of this Section shall become subject to this Article and shall be issued an individual Aquifer Protection Permit if a permit is issued.

R18-9-104. Transition: Temporary cessation, closure, post-closure

A. A person who has filed a notice of disposal as required by R9-20-205 shall notify the Director before any temporary cessation. The Director shall specify any measures to be taken by the person in order to prevent violations of Aquifer Water Quality Standards at the applicable point of compliance.

B. A person who has filed a notice of disposal as required by R9-20-205 and who owns or operates a facility that is required to obtain an individual Aquifer Protection Permit under Title 49, Chapter 2, Article 3 of the Arizona Revised Statutes and this Article shall submit an application for an individual Aquifer Protection Permit if there is a cessation, for a period of at least three years, of the activity for which a facility or portion of a facility was designed and operated.

C. A person who has filed a notice of disposal as required by R9-20-205 and who owns or operates a facility that is required to obtain an individual Aquifer Protection Permit under Title 49, Chapter 2, Article 3 of the Arizona Revised Statutes and this Article shall notify the Director of the intent to cease operations prior to ceasing, without intent to resume, an activity for which the facility or a portion of the facility was designed or operated.

D. A person who has filed a notice of disposal as required by R9-20-205 who ceases, without intending to resume, an activity for which a facility or portion of a facility was designed and operated, or who is deemed subject to the closure requirements of this Section pursuant to subsection (B), and who owns or operates a facility that is required to obtain

an individual Aquifer Protection Permit under Title 49, Chapter 2, Article 3 of the Arizona Revised Statutes and this Article shall submit to the Director an application for an individual Aquifer Protection Permit within 90 days following the notification.

R18-9-105. Class exemptions

In addition to the classes or categories of facilities listed in A.R.S. § 49-250(B), the following classes or categories of facilities are exempt from the permit requirements of this Article:

1. Facilities which treat, store, or dispose of hazardous waste and which have been issued a permit or which have interim status, pursuant to the Resource Conservation and Recovery Act (P.L. 94-580; 90 Stat. 2796; 42 United States Code sections 6901 et. seq., as amended) or the rules adopted pursuant to A.R.S. § 49-922.
2. Underground storage tanks which contain regulated substances as defined in A.R.S. § 49-1001(8).
3. Facilities for the disposal of solid waste, as defined in A.R.S. § 49-701(12), which are located in unincorporated areas and which only receive solid waste from four or fewer households.

R18-9-106. Determination of applicability

A. Any person who engages or who intends to engage in an operation or an activity which may result in a discharge which is regulated under this Article may request on a form provided by the Department that the Department determine the applicability of A.R.S. §§ 49-241 through 251 and this Article to the operation or activity.

B. A person requesting a determination of applicability shall provide the following information:
   1. The name of the operation or activity.
   2. The location of the operation or activity.
   3. The names of the persons who are engaging or who propose to engage in the operation or activity.
   4. A description of the operation or activity.
   5. A description of the chemical composition and characteristics of materials stored, handled, used or disposed of in the operation or activity.
   6. Any other information required by the Director to make the determination of applicability.

C. Within 45 days after receipt of a request for a determination of applicability, the Department shall advise in writing the person making the request that the operation or activity is described by any one of the following:
   1. Is not subject to the requirements of A.R.S. §§ 49-241 through 251 and this Article because the operation or facility does not discharge as described by A.R.S. § 49-241.
   2. Is not subject to the requirements of A.R.S. § 49-241 through 251 and this Article because the operation or activity is exempted by A.R.S. § 49-250 or R18-9-105.
   3. Is subject to the general permit requirements of A.R.S. §§ 49-241 through 251 and this Article.
   4. Is subject to the individual permit requirements of A.R.S. 49-241 through 251 and this Article.

D. If, after issuing a determination under this Section, the Department concludes that its determination of applicability or the information relied upon for a determination of applicability is inaccurate, the Department may modify or withdraw its determination after written notice to the person who requested the determination of applicability.

R18-9-107. Individual permits: Application process

A. Any person who owns or operates a facility that discharges shall obtain an individual Aquifer Protection Permit, unless the facility is subject to a general permit issued by this Article, or is exempted by either A.R.S. § 49-250(B) or R18-9-105. A person who is required to obtain an individual Aquifer Protection Permit and who is not subject to R18-9-103(A) and (B), (C), or (D) shall not discharge after the effective date of this Article without an individual Aquifer Protection Permit.

B. A person who is required to obtain an individual Aquifer Protection Permit shall submit a permit application to the Department according to the following:
   1. For a new facility for which the owner or operator is not subject to R18-9-103(A) and (B), (C), or (D), not later than 180 days before the date on which the facility is expected to begin discharging.
   2. For a new facility for which the owner or operator is subject to R18-9-103(A) and (B), (C), or (D), within 90 days after receipt of a written request from the Director.

3. The name and mailing address of the operator of the facility.
4. The legal description of the location of the facility.
5. Expected operational life of the facility.
6. Any other federal or state environmental permits issued to the applicant.

B. For purposes of this subsection and subsection (C), "known" means that knowledge that the applicant actually has, or could reasonably be expected to have. Except as otherwise provided in R18-9-109(A), a person applying for an individual Aquifer Protection Permit shall provide the Director with all of the following information as attachments to the form described in subsection (A):

1. Two copies of a topographic map, or other appropriate map approved by the Department, of the facility location and contiguous land area, showing the known use of adjacent properties and all known water well locations found within one-half mile of the facility, and accompanied by a description of well construction details and well uses, if available.
2. Two copies of a facility site plan which shows all known property lines, structures, water wells, injection wells, and drywells and their uses, topography and the location points of discharge. The facility site plan shall also include all known borings unless the Director determines that borings are numerous and that the requirement can be satisfied by a narrative description of the number and location of the borings.
3. Two copies of the facility design plans indicating proposed or as-built design details and proposed or as-built configuration of basins, ponds, waste storage areas, drainage diversion features, or other engineered elements of the facility affecting discharge.
4. A summary of the known past facility discharge activities and the proposed facility discharge activities, indicating all of the following:
   a. The chemical, biological, and physical characteristics of the discharge.
   b. The rates, volumes, and frequency of the discharge for each facility.
   c. The location of the discharge.
5. A description of the BADCT to be employed in the facility. The applicant shall submit in support of the proposed BADCT a statement of the technology which will be employed to meet the requirements of A.R.S. § 49-243(B). This statement shall describe the alternative discharge control measures considered, the technical and economic advantages and disadvantages of each alternative, and the justification for selection or rejection of each alternative. The applicant shall evaluate each alternative discharge control technology, relative to the amount of discharge reduction achievable, site specific hydrologic and geologic characteristics, other environmental impacts, and water conservation or augmentation. The economic impact of implementation of each alternative control technology shall be evaluated on an industry-wide basis. In addition, a statement for a facility in existence on the effective date of this Article shall reflect consideration of the factors listed in A.R.S. § 49-243(B)(1)(a) through (h).
6. A demonstration that the facility will not cause or contribute to a violation of Aquifer Water Quality Standards at the applicable point of compliance. The demonstration shall propose the point or points of compliance for the facility based on A.R.S. § 49-244. If an Aquifer Water Quality Standard for a pollutant has been exceeded in an aquifer, the application shall also include a demonstration that no additional degradation of the aquifer, relative to that pollutant and determined at the applicable point of compliance, will occur as a result of the discharge from the proposed facility.
7. A demonstration that the person applying for the individual Aquifer Protection Permit is technically capable of fully carrying out the conditions of the permit. A person applying for an individual Aquifer Protection Permit may make the demonstration required by this subsection by submitting the following information for each person principally responsible for designing, constructing, or operating the facility:
   a. Any pertinent licenses or certifications held by the person.
   b. Any professional training relevant to the design, construction, or operation of the facility.
   c. Any work experience relevant to the design, construction, or operation of the facility.
8. A demonstration that the person applying for the individual Aquifer Protection Permit is financially capable of constructing, operating, closing, and assuring proper post-closure care of the facility in compliance with Title 49, Chapter 2, Article 3 of the Arizona Revised Statutes, this Article, and the conditions of the individual Aquifer Protection Permit. The person applying for an individual Aquifer Protection Permit shall submit all of the following in support of the demonstration of financial capability as described in this paragraph:
   a. An estimate of the total cost of constructing, operating, closing, and assuring proper post-closure care in compliance with Title 49, Chapter 2, Article 3 of the Arizona Revised Statutes, this Article, and the conditions of the individual Aquifer Protection Permit.

3. For an existing facility, within 90 days after receipt of a written request from the Director.

C. In the case of a permit application to be submitted at the request of the Director, the Director may establish a permit application schedule upon the request of the applicant if the applicant can show that more time is needed to gather and compile data as required by R18-9-108. A permit application schedule established by the Director shall require the submission of information as expeditiously as is practicable. If a permit application schedule provides that actions be taken during a period that exceeds 90 days after the date of receipt of a written request for the submission of an application, the schedule shall set forth interim requirements and the dates for their achievement. If the time necessary for completion of any interim requirements is more than six months and is not readily divisible into stages for completion, the schedule shall contain interim dates for submission of reports on progress toward completion of the interim requirements and shall indicate a projected completion date. Within 30 days after a date specified in a permit application schedule, an applicant shall submit to the Department a report indicating whether the action or actions to be taken as of that date were taken.

D. Upon request by the applicant, the Department shall schedule and hold a preapplication conference with an applicant to discuss any of the requirements of this Article. In addition, an applicant may submit to the Department for review and comment a proposal for meeting any of the informational requirements of this Article. The Department shall comment on the proposal within 30 days after receipt of the proposal.

E. Within 30 days after receipt of an application for an individual Aquifer Protection Permit, the Director shall notify the applicant in writing whether the application is complete. If the application is incomplete, the notification shall include a listing of additional information which is required to process the application and a time for the submission of the additional information. Within 20 days of receipt of the resubmitted application, the Director shall determine if the resubmitted application is complete.

F. Within 90 days after receipt of a complete application, the Director shall notify the applicant, in writing and by certified mail, of the preliminary decision either to deny the application or to issue an individual Aquifer Protection Permit. If, during this 90 day period, the Director determines there to be technical deficiencies in the application, the Director immediately shall give the applicant written notification of these deficiencies and give the applicant an opportunity to cure the deficiencies. The number of days between notification of the applicant and the submission of additional information or a response by the applicant shall not be included within the 90 days allowed the Director for notification of the applicant of the Director's decision to deny an application or to issue an individual Aquifer Protection Permit.

G. At its earliest opportunity, the Department shall make available to the applicant a copy of the draft of the individual Aquifer Protection Permit.

H. Within 30 days after the notification of the applicant required by subsection (F), the Director, in accordance with R18-1-401 and R18-9-124, shall cause to be published a notice of the preliminary decision to issue or deny an individual Aquifer Protection Permit.

I. Within 45 days after the publication of the public notice, a decision whether to conduct a public hearing shall be made by the Department. If a hearing is to be held, the Department shall schedule the hearing to begin on or before 75 days from the close of public comment established in the public notice required by subsection (H). The hearing record shall be closed within seven days after the close of the hearing.

J. Except as otherwise provided in this subsection, the Director shall issue or deny an individual Aquifer Protection Permit within 30 days after the close of the public comment period established in the public notice required by subsection (H), or, if a public hearing is held, within 45 days after the public hearing record is closed. The Director immediately shall give the applicant written notification of the final decision to issue or deny an individual Aquifer Protection Permit. The Director may extend the final decision deadline for not more than 90 days after the close of the public comment period, or, if a public hearing is held, after the public hearing record is closed, if the Director determines that additional information is required to make the decision whether to issue or deny a permit. The Director shall give the applicant written notification of a decision to extend the final decision deadline.

K. If an individual Aquifer Protection Permit is denied, the Director shall advise the applicant of the reasons for the decision in writing.

R18-9-108. Individual permits: Application requirements

A. A person applying for an individual Aquifer Protection Permit shall provide the Director with all of the following information on a form provided by the Department:
   1. The name and mailing address of the applicant.
   2. The name and mailing address of the owner of the facility.

b. A statement by the chief financial officer of the applicant that the applicant is financially capable of meeting the costs described in subparagraph (a). The statement shall specify in detail the financial arrangements for meeting the closure and post-closure plans submitted pursuant to paragraph (2) of subsection (C).

c. For a person other than a state or federal agency or a county, city, town or other local governmental entity, the demonstration of financial capability shall be further supported by any one of the following:

i. The most recent copy of the person's 10K form filed pursuant to section 13 or 15(d) of the Federal Securities and Exchange Act of 1934 (c. 404, Title I; 48. Stat. 894-95; 15 United States Code sections 78m and 78o, as amended).

ii. A report that contains all of the following information:

(a) A description of the person's status as a corporation, partnership, or other legal entity.

(b) A description of the person's business.

(c) An indication of the person's net worth, including a description of major assets and liabilities.

(d) A brief description of any judgment exceeding $100,000.00 rendered against the person during the five years preceding the date of the application.

(e) A brief description of any bankruptcy or insolvency proceedings instituted by the person during the five years preceding the date of the application.

(f) If the person is a corporation, the names of its executive officers and their dates of birth.

iii. Evidence of a bond, insurance, or a trust fund assuring that the applicant will be financially capable of meeting the closure and post-closure requirements of the individual Aquifer Protection Permit.

9. A brief description of any action for the enforcement of any federal or state law, rule or regulation, or any county, city or local government ordinance relating to the protection of the environment, instituted against the person during the five years preceding the date of application.

10. Evidence that the facility complies with applicable municipal or county zoning ordinances and regulations.

C. In addition to the information required by subsections (A) and (B), a person applying for an individual Aquifer Protection Permit shall provide any of the following information which the Director may request if necessary in order to determine whether to issue an individual Aquifer Protection Permit.

1. A hydrogeologic study which defines the discharge impact area for the operational life of the facility and which demonstrates that the facility will not cause or contribute to a violation of an Aquifer Water Quality Standard at the applicable point of compliance. If an Aquifer Water Quality Standard for a pollutant has been exceeded in an aquifer, the hydrogeologic study shall also include a demonstration that no additional degradation of the aquifer, relative to that pollutant and determined at the applicable point of compliance, will occur as a result of the discharge of the proposed facility. The hydrogeologic study, upon a request by the Director, shall include any of the following:

a. A description of the surface and subsurface geology, including a description of all borings.

b. The location of any perennial or ephemeral surface water bodies.

c. The characteristics of the aquifer and geologic units with limited permeability, including depth, hydraulic conductivity, and transmissivity.

d. Rates, volumes, and directions of surface water and groundwater flow, including hydrographs, if available, and equipotential maps.

e. The location of the 100-year flood plain and an assessment of the 100-year flood surface flow and potential impacts on the facility.

f. A documentation of the existing quality of the water in the aquifers underlying the site, including, where available, the method of analysis and quality assurance and quality control procedures associated with the documentation.

g. A documentation of the extent and degree of any known soil contamination in the vicinity of the facility.

h. An assessment of the potential of the discharge to cause the leaching of pollutants from surface soils or vadose materials. i. Any anticipated changes in the water quality expected as a result of the discharge.

i. A description of any expected changes in the elevation and flow directions of the groundwater that may be caused by the facility.

j. A map of the facility's discharge impact area.

k. The criteria and methodologies used to determine the discharge impact area.

l. The proposed location of each point of compliance.

2. A detailed proposal indicating the alert levels, discharge limitations, monitoring requirements, contingency plans, compliance schedules, and temporary closure, closure, and post-closure plans which the applicant proposes to satisfy the requirements of Title 49, Chapter 2, Article 3 of the Arizona Revised Statutes, and this Article.
3. Any other relevant information needed by the Director to determine whether to issue a permit.

D. A person applying for an individual Aquifer Protection Permit shall certify in writing that the information submitted in the application is true and accurate, to the best of the applicant's knowledge.

R18-9-109. Special provisions: Recharge and Underground Storage and Recovery

A. A person who is applying for an individual Aquifer Protection Permit for a facility that is a recharge or an underground storage and recovery project shall provide the Director with the information described in R18-9-108(A), (B) and (C), except for that information described in R18-9-108(B)(5).
B. When the Department receives an application for an individual Aquifer Protection Permit for a facility that is a recharge project or an underground storage and recovery project, the Department shall administer the application process described in this Article in coordination with the recharge and underground storage and recovery permit processes administered by the Department of Water Resources. The Department shall advise the Department of Water Resources of each permit application received for an individual Aquifer Protection Permit for a facility that is a recharge project or an underground storage and recovery project.

R18-9-110. Individual permit conditions: Alert levels

A. An individual Aquifer Protection Permit shall prescribe an alert level based on the site-specific conditions described by the applicant in the application submitted pursuant to R18-9-108, or otherwise known by the Director.
B. An alert level prescribed in an individual permit may be based on a pollutant which indicates the potential appearance of another pollutant.
C. An individual permit may prescribe the measurement of an alert level at the point of release, the point of compliance, or any intervening point.
D. An individual Aquifer Protection Permit shall require notification of the Department as described by R18-9-113 and the implementation of the appropriate parts of the contingency plan as described in R18-9-114 if an alert level is exceeded.

R18-9-111. Individual permit conditions: Discharge limitations

A. An individual Aquifer Protection Permit shall prescribe discharge limitations based on the considerations described in A.R.S. § 49-243(A), (B), (C) and (D).
B. An individual Aquifer Protection Permit shall require notification of the Department as described in R18-9-113 and the implementation of the appropriate parts of a contingency plan as described in R18-9-114 if a discharge limitation is exceeded.

R18-9-112. Individual permit conditions: monitoring requirements

A. An individual Aquifer Protection Permit shall require that the permittee conduct any monitoring activity necessary to assure compliance with any other Aquifer Protection Permit condition, with the applicable water quality standards established pursuant to A.R.S. §§ 49-221 and 49-223, and with A.R.S. §§ 49-241 through 49-251.
B. An individual Aquifer Protection Permit shall specify all of the following:
   1. The type and method of monitoring to be conducted.
   2. The frequency of monitoring.
   3. Any requirements for the installation, use, or maintenance of monitoring equipment.
   4. The intervals at which monitoring results shall be reported to the Department.
C. An individual Aquifer Protection Permit shall require that a permittee make, for each sample taken or measurement made as required by the individual Aquifer Protection Permit, a monitoring record consisting of all of the following:

1. The date, time, and exact place of a sampling or measurement and the name of each individual who performed the sampling or measuring.
2. The procedures used to collect the sample or make the measurement.
3. The date on which sample analysis was completed.
4. The name of each individual or laboratory who performed the analysis.
5. The analytical techniques or methods used to perform the sampling and analysis.
6. The chain of custody records.
7. Any field notes relating to the information described in paragraphs (1) through (6).

D. An individual Aquifer Protection Permit shall require that a permittee retain or have access to a monitoring record made pursuant to subsection (C) for a period of 10 years after the date of the sample or measurement.

R18-9-113. Individual permit conditions: Reporting requirements

A. An individual Aquifer Protection Permit shall require that a permittee give written notice to the Director 180 calendar days before any major modification to the facility, as described in A.R.S. § 49-201(18).

B. Except as otherwise provided in R18-9-114(B), an individual Aquifer Protection Permit shall require that a permittee notify the Director within five days after becoming aware of a violation of a permit condition or that an alert level has been exceeded.

C. An individual Aquifer Protection Permit shall require that a permittee submit a written report within 30 days after the permittee becomes aware of the violation of a permit condition. The report shall document all of the following:
1. A description of the violation and its cause.
2. The period of violation, including exact date(s) and time(s), if known, and the anticipated time period during which the violation is expected to continue.
3. Any action taken or planned to mitigate the effects of the violation, or to eliminate or prevent recurrence of the violation.
4. Any monitoring activity or other information which indicates that any pollutants would be reasonably expected to cause a violation of an Aquifer Water Quality Standard.
5. Any malfunction or failure of pollution control devices or other equipment or process.

D. An individual Aquifer Protection Permit shall require that a permittee shall notify the Director within five days after the occurrence of any one of the following:
1. The filing of bankruptcy by the permittee.
2. The entry of any order or judgment against the permittee for the enforcement of any environmental protection statute and in which monetary damages or civil penalties are imposed.

R18-9-114. Individual permit conditions: Contingency plan requirements

A. An individual Aquifer Protection Permit shall require that a contingency plan specify, in a manner consistent with this section, the actions to be taken in the event of a discharge that results in any one of the following:
1. Violation of a permit condition.
2. Violation of an Aquifer Water Quality Standard.
3. An alert level having been exceeded.
4. An imminent and substantial endangerment to the public health or the environment.

B. An individual Aquifer Protection Permit shall require that a contingency plan contain all of the following:
1. A plan to provide emergency response on a 24-hour basis in the event that a condition arises which results in an imminent and substantial endangerment to the public health or the environment.
2. The designation of an emergency response coordinator to be responsible for activation of the contingency plan and emergency response measures.
3. A requirement that the emergency response coordinator notify the Department immediately in the event that emergency response measures are taken or those portions of a contingency plan that address an imminent and substantial endangerment are activated.
4. A list of names, addresses and telephone numbers of persons to be contacted in the event that an imminent and substantial endangerment to the public health or the environment arises.
5. A general description of the procedures, personnel and equipment to be used to assure appropriate mitigation of unauthorized discharges.

C. Contingency plans required by the Federal Water Pollution Control Act (P.L. 92-500; 86 Stat. 816; 33 United States Code sections 1251, et. seq., as amended) or the Resource Conservation Recovery Act (P.L. 94-580; 90 Stat. 2796; 42 United States Code sections 6901 et. seq., as amended) may be amended to meet the requirements of this section and submitted to the Department for approval in lieu of a separate aquifer protection contingency plan.

D. An individual permit may require that a contingency plan provide for any one or more of the following actions to be taken in the event of a discharge that results in any of the conditions described in subsection (A):
   1. Verification sampling.
   2. Further monitoring.
   3. The submission of reports describing the causes, impacts, or mitigation of the discharge.
   4. Submission of a proposed corrective action plan for approval by the Director as described by this paragraph. The Director shall approve the proposed corrective action plan if the corrective action plan returns the facility to compliance with the facility's permit conditions, this Article and Title 49, Chapter 2, Article 3 of the Arizona Revised Statutes.

E. A permittee shall maintain at least one copy of the contingency plan required by the individual Aquifer Protection Permit at the location where the day-to-day decisions regarding the operation of the facility are made. A permittee shall advise all employees responsible for the operation of the facility of the location of copies of the contingency plan.

F. A permittee shall revise promptly all copies of the contingency plan upon any change in the information contained in the contingency plan.

R18-9-115. Individual permit conditions: Compliance schedule

A. A compliance schedule established in an individual Aquifer Protection Permit shall require compliance as expeditiously as is practicable. If a compliance schedule provides that actions be taken during a period that exceeds one year from the date of permit issuance, the schedule shall set forth interim requirements and the dates for their achievement. If the time necessary for completion of any interim requirements is more than one year and is not readily divisible into stages for completion, the permit shall contain interim dates for submission of reports on progress toward completion of the interim requirements and shall indicate a projected completion date. Within 30 days after a date specified in a compliance schedule, a permittee shall submit to the Department a report indicating whether the action or actions to be taken as of that date were taken.

B. In determining the requirements of and length of a compliance schedule for a facility, the Director shall consider all of the following factors:
   1. The character and impact of the discharge.
   2. The nature of construction or activity required by the permit.
   3. The number of persons affected or potentially affected by the discharge.
   4. The current state of treatment technology.
   5. The age of the facility.

C. An individual Aquifer Protection Permit shall not establish a compliance schedule for a new facility for which the owner or operator is not subject to R18-9-103(A) and (B) unless the facility will employ BADCT and will not exceed Aquifer Water Quality Standards when the facility begins to discharge. The requirement of this subsection that a facility employ BADCT does not apply to a recharge project or an underground storage and recovery project.

R18-9-116. Individual permit conditions: Temporary cessation, closure, post-closure

A. An individual Aquifer Protection Permit shall require that the permittee notify the Director before any temporary cessation of operations at the facility. An individual Aquifer Protection Permit shall specify any measures to be taken by the permittee if there is any temporary cessation of operations at a facility.

B. An individual Aquifer Protection Permit shall require that a permittee notify the Director of the permittee's intent to cease operations prior to ceasing, without intent to resume, an activity for which the facility was designed or operated.

C. An individual Aquifer Protection Permit shall require that a permittee who ceases, without intending to resume, an activity for which a facility was designed and operated, submit to the Director for approval a closure plan within 90 days following the notification. A closure plan shall describe all of the following:
   1. The approximate quantities and the chemical, biological, and physical characteristics of the materials to be removed from the facility.

2. The destination of the materials to be removed from the facility and an indication that placement of the materials at that destination is approved.
3. The approximate quantities and the chemical, biological, and physical characteristics of the materials that will remain at the facility.
4. The methods to be used to treat any materials remaining at the facility.
5. The methods to be used to control the discharge of pollutants from the facility.
6. Any limitations on future land or water uses created as a result of the facility's operations or closure activities.
7. The methods to be used to secure the facility.
8. An estimate of the cost of closure.
9. A schedule for implementation of the closure plan and the submission of a post-closure plan.

D. Within 60 days after receipt of a complete closure plan, the Director shall approve or reject the closure plan. The Director shall approve a closure plan that eliminates, to the greatest extent practicable, any reasonable probability of further discharge from the facility and of exceeding Aquifer Water Quality Standards at the applicable point of compliance.

E. An individual Aquifer Protection Permit may prescribe any part of a closure plan submitted pursuant to subsection (C).

F. An individual Aquifer Protection Permit shall require that a permittee submit to the Director for approval, and shall adhere to, a post-closure monitoring and maintenance plan for a facility, unless the Director determines that the closure of the facility will eliminate to the greatest degree practicable, any reasonable probability of further discharge from the facility and of exceeding Aquifer Water Quality Standards at the applicable point of compliance. The post-closure plan shall describe all of the following:
1. The duration of post-closure care.
2. The monitoring procedures to be implemented by the permittee, including monitoring frequency, type, and location.
3. A description of the operating and maintenance procedures to be implemented for maintaining aquifer quality protection devices, such as liners, treatment systems, pump-back systems, and monitoring wells.
4. A schedule and description of physical inspections to be conducted at the facility following closure.
5. An estimate of the cost of post-closure maintenance and monitoring.
6. A description of limitations on future land or water uses, or both, at the facility site as a result of facility operations.

G. Within 60 days after receipt of complete post-closure plan, the Director shall approve or reject the post-closure plan. The Director shall approve a post-closure plan that eliminates, to the greatest extent practicable, any reasonable probability of further discharge from the facility and of exceeding Aquifer Water Quality Standards at the applicable point of compliance.

H. An individual Aquifer Protection Permit may prescribe any part of a post-closure plan submitted pursuant to subsection (F).

I. An individual Aquifer Protection Permit shall require that the permittee give the Department written notice that a closure plan or a post-closure plan has been implemented fully.

R18-9-117. Individual permit conditions: Technical and financial capability

A. An individual Aquifer Protection Permit shall require that a permittee have and maintain the technical and financial capability necessary to fully carry out the terms and conditions of the permit.

B. The Director may establish any of the permit conditions described in R18-9-109 through R18-9-116 on the basis of the Director's evaluation of the permittee's technical or financial capability necessary to carry out the terms and conditions of the individual Aquifer Protection Permit.

C. An individual Aquifer Protection Permit shall require that a permittee maintain any bond, insurance policy, or trust fund provided under R18-9-108(B)(8)(c)(iii) or R18-9-121(A). A bond, insurance policy, or trust fund required to be maintained under this subsection shall remain in effect for the duration of the permit.

R18-9-118. Individual permit duration

Subject to modification or revocation as provided in this Article, and except as otherwise provided in R18-9-119, an individual Aquifer Protection Permit issued under this Article shall be valid for a specified term not to exceed the

operational life of the facility and any period during which the facility is subject to a post-closure plan pursuant to R18-9-116(F) through (H).

R18-9-119. Temporary permits

A. The Director may waive any or all of the application requirements, the application process, or the individual permit conditions described in this Article in issuing a temporary individual Aquifer Protection Permit to a person for the operation of a facility to be used for the remediation of an accidental discharge of a pollutant.

B. Subject to the other provisions of this subsection, the Director may postpone any or all of the public notice or public hearing requirements of this Article and issue a temporary individual Aquifer Protection Permit in order to prevent a discharge or if circumstances which could not have been foreseen or controlled by the applicant do not allow the timely preparation and issuance of an individual Aquifer Protection Permit. Public notice shall not be postponed beyond 30 days after the issuance of the temporary individual Aquifer Protection Permit.

C. A temporary individual Aquifer Protection Permit issued under this Section shall be issued for a period not to exceed one year and shall not be renewed.

R18-9-120. Individual permits: Certification of permittee

The Director shall not issue an individual Aquifer Protection Permit unless the permittee certifies that the permittee understands the requirements and conditions of the permit and the penalties for violations of the permit conditions, this Article, and Title 49, Chapter 2, Article 3 of the Arizona Revised Statutes.

R18-9-121. Individual permits: Permit actions

A. The Director shall issue an individual Aquifer Protection Permit if the Director determines, based upon the information obtained by or made available to the Department, that the applicant will comply with A.R.S. § 49-241 through 251 and this Article. The Director may issue an individual Aquifer Protection Permit conditioned upon the applicant providing evidence of a bond, an insurance policy, or a trust fund covering the costs of meeting the closure and post-closure requirements of the individual Aquifer Protection Permit if the Director otherwise would have denied the permit under paragraph (2) of subsection (B) on the basis that the applicant was financially incapable of meeting the closure and post-closure requirements of the individual Aquifer Protection Permit.

B. The director may deny an individual Aquifer Protection Permit if the Director determines upon completion of the application process described in R18-9-107 and R18-9-108 any one of the following:
   1. That the applicant has failed or refused to correct deficiencies in the permit application.
   2. That the applicant has failed to demonstrate that the facility and the operation thereof will comply with the requirements of A.R.S. §§ 49-241 through 251 and this Article. This determination shall be based on the information submitted in the Aquifer Protection Permit application, in addition to any information submitted to the Department pursuant to a public hearing, or any relevant information which is otherwise developed or acquired by the Department.
   3. That the applicant has provided false or misleading information to the Department.

C. The Director may modify an individual Aquifer Protection Permit based upon a request or upon the Director's initiative. A request for permit modification shall be in writing and shall contain the facts and reasons which justify the request. The Director may modify an individual Aquifer Protection Permit if the Director determines any one or more of the following:
   1. That material and substantial alterations or additions to a permitted facility justify a change in permit conditions.
   2. That the discharge from the facility violates or could reasonably be expected to violate any Aquifer Water Quality Standard.
   3. That rule or statutory changes have occurred, such as to require a change in the permit.
   4. That there has been a change of an applicable point of compliance.

D. Notwithstanding subsection (G) and R18-9-124(F), and with the written concurrence of the permittee, the Director may make minor modifications to the individual Aquifer Protection Permit without giving public notice or conducting a public hearing, for any of the following reasons:
   1. To correct typographical errors.

2. To increase the frequency of monitoring or reporting.
3. To change an interim compliance date in a compliance schedule if the permittee can show just cause and that the new date does not interfere with the attainment of a final compliance date requirement.
4. To change construction requirements, if the alteration complies with the requirements of this Article and provides equal or better performance.
5. To replace monitoring equipment, including wells, if such replacement results in equal or greater monitoring effectiveness.

E. The Director may transfer an individual Aquifer Protection Permit if the Director determines that the proposed transferee will comply with A.R.S. §§ 49-241 through 251 and this Article. A permittee is responsible for complying with permit conditions, A.R.S. § 49-241 through 251, and this Article, regardless of whether the permittee has sold or otherwise disposed of the facility, until the Director transfers a permit pursuant to this subsection.

F. The Director may suspend or revoke an individual Aquifer Protection Permit or Groundwater Quality Protection Permit, for any of the following reasons:
1. Non-compliance by the permittee with any applicable provision of Title 49, Chapter 2, Article 3 of the Arizona Revised Statutes, this Article, or any permit condition.
2. The permittee's misrepresentation or omission of any fact, information, or data related to an Aquifer Protection Permit application or permit conditions.
3. If the Director determines that the permitted activity is causing or may cause a violation of any Aquifer Water Quality Standard.
4. If a permitted discharge has the potential to cause or will cause imminent and substantial endangerment to public health or the environment.

G. The Director shall issue a public notice of all proposed permit actions pursuant to R18-9-124.

R18-9-122. Consolidation of individual permits

The Director may consolidate into a single document, and may issue as a single permit, any number of individual Aquifer Protection Permits for which any one applicant applies if the facilities for which the permits are sought are part of the same project or operation, if the facilities are located in a contiguous geographic area, and if the applications for the facilities are submitted simultaneously. Under the circumstances described in this Section, the Director may also consolidate those permit conditions that have general applicability to the facilities for which permits are sought.

R18-9-123. Aquifer Protection Permit Application Fees

A. With each application for an individual Aquifer Protection Permit under R18-9-107, the applicant shall remit an initial fee according to the following schedule, except as otherwise provided in subsections (H), (I) and (J). The fee shall be payable to the state of Arizona, and shall be deposited in the state general fund, or if otherwise required by law, in the Water Quality Assurance Fund, or a fund established specifically for aquifer protection permit fees.

Categories (In U.S. dollars)	Initial Fee	Maximum Fee
Wastewater Treatment Plants		
On-Site Sewage Disposal Systems (less than 20,000 gpd)	$ 1550	$ 3450
Wastewater Treatment Plants Where Influent is Predominantly Sewage		
Lined Surface Impoundment (Evapotranspiration)	3300	6500
Discharge to Water of the U.S.	4800	7950
Subsurface Discharge	4150	7950
Landfills		
Municipal solid waste	4500	15750
Construction Debris	2850	6950
Other	5100	4600
Mines		
Tailings Piles or Ponds	7150	15400
Base Metal Leaching Operations with Chemical Process	4600	10550
Precious Metals Processing	4150	10200
In-Situ Leaching	8950	14600
Other	5900	14400
Drywells	1350	4250
Industrial Wastewater Discharges		
Surface Impoundment	3650	9900
Discharge to Water of U.S.	5050	9700
Subsurface Discharge	4600	10250
Other Discharging Facilities	4850	15900

B. If the actual cost of processing the application identified in subsection (A) or (J) is less than the initial fee paid, the difference between the actual cost and the amount listed and paid shall be returned to the applicant with a final itemized bill within 30 days of the issuance or denial of the permit. If the actual cost of processing the application is greater than the corresponding amount listed, the department shall send the applicant a final itemized bill for the difference between the initial fee paid and the actual cost of processing the application, except that the final bill shall not exceed the applicable maximum fee in subsection (A) or (J). Such difference shall be paid in full before issuance of the permit.

C. The Department shall keep a record of the costs associated with denied applications. If there is an amount not covered by the initial fee and that is not paid, the Department shall add the product of the unpaid hours multiplied by the hourly rate in subsection (G) at the time of denial to the initial fee of a permit applied for under R18-9-107 by the same entity at a later date.

D. When determining actual cost under subsection (B), the Department shall use a flat hourly rate for all direct labor hours spent working on the permit. The hourly rate shall be based on an annual sum of the following aquifer protection permit program related costs divided by the direct labor hours allocated for aquifer protection permit processing for the same year:

1. Salary and personnel benefit costs of aquifer protection permit program employees directly involved in processing permits.
2. Salary and personnel benefit costs of aquifer protection permit program employees indirectly involved in processing permits, such as supervisory and clerical personnel.
3. Department overhead and other operating expenses attributable to all aquifer protection permit program employees.
4. Per diem expenses.
5. Transportation costs.
6. Reproduction costs.
7. Laboratory analysis charges.
8. Public notice advertising and mailing costs.
9. Presiding officer expenses.
10. Court reporter expenses.

11. Facility rentals.
12. Other reasonable, direct, permit-related expenses documented in writing by the Department.

E. Direct labor hours spent working on the permit shall consist of time spent by aquifer protection permit program technical staff or consultants on tasks specifically related to the processing, issuance, or denial of a particular permit, including time at a facility inspecting the facility, time at a public hearing, or time at a preapplication conference held pursuant to R18-9-107(D).

F. Direct labor hours shall not include any of the following:
1. training.
2. travel to or from any facility or permit hearing.
3. time by clerical or supervisory staff, unless the supervisory staff is filling in for a particular technical staff member in that person's absence.

G. From the effective date of this subsection, the flat hourly rate shall be $31.84 per hour. The Director shall annually publish the fee schedules under subsections (A) and (J) and the flat hourly rate under this subsection which will be applicable for the following 12 months. The fee schedules and hourly rate shall be based on the Department's costs for the previous full fiscal year.

H. For individual Aquifer Protection Permits which are consolidated pursuant to R18-9-122, and unless the applicant qualifies for the fee provision described in subsection (I), the applicant shall remit an initial fee which equals the sum of the greatest initial fee among the facilities, and the initial fee applicable to each additional facility reduced by 40%. The maximum fee to the applicant for consolidated permits shall be equal to the greatest maximum fee among the facilities, plus the maximum fee applicable to each additional facility reduced by 40%.

I. For purposes of subsection (A), an applicant applying for individual permits for two or more facilities of the same category of facilities that, in addition, are engaged in similar operations, and have discharges of similar chemical characteristics, and are geographically contiguous, is required to remit only the initial fee, and shall be charged no more than the maximum fee, applicable to a single such facility.

J. With an application that is a request for modification to an individual Aquifer Protection Permit or for a transfer of an individual Aquifer Protection Permit, the applicant shall remit an initial fee in the same manner as described in subsection (A), and according to the following schedule:

Categories	Initial Fee	Maximum Fee (In U.S. dollars)
Permit modification as described in R18-9-121(C)(1) or (2) or that results from a major modification to a facility as described in A.R.S. § 49-201.18	1000	(Same as that allowed under subsection A)
Permit modification that is described as a minor modification under R18-9-121(D)	0	100
Any other permit modification including those described in R18-9-121(C)(3) or (4)	300	1000
Permit transfer	300	500

K. This rule is effective April 12, 1992. Persons who have submitted complete applications for permits, modifications or transfers before the effective date of this rule shall be required to remit only the permit application fee that was in effect when the application was submitted. Persons who have submitted applications before the effective date of this rule that are incomplete as of the effective date of this rule shall be subject to an initial fee equal to the permit fee for the appropriate category at the time of submission. The final itemized bill for an application that is incomplete on the effective date of this rule shall include only direct labor hours incurred after the effective date of this rule.

R18-9-124. Public participation

A. On a monthly basis, the Director shall cause to be posted in the offices of each county department of health and each council of governments lists of all applications for individual Aquifer Protection Permits, of the notifications

received pursuant to R18-9-116(C), and of the proposed permit actions, received or initiated by the Department during the previous month.

B. In addition to the information required to be published in a public notice, any public notice issued under this Article shall include a description of the procedure for requesting a public hearing regarding a proposed permit action specifying both of the following:
   1. That any request for a public hearing shall be submitted in writing to the Department prior to the close of the public comment period.
   2. That any request for a public hearing shall identify the proposed permit action and shall state specifically the reason for making the request.

C. Except as otherwise provided in subsection (G), any written public comment period established in a public notice issued under this Article shall extend for no more than 30 calendar days after the date of the first publication of the public notice.

D. Each public notice issued under this Article shall be mailed to the permit applicant, affected federal, state and local agencies, and to persons who have requested, in writing, copies of particular proposed permit action notices.

E. If two or more proposed permit actions have similar effective dates, and are located in the same vicinity, public notices of the proposed actions may be combined and issued as a single notice.

F. The Department shall conduct a public hearing on a proposed permit action if the Director determines either of the following:
   1. That significant public interest exists.
   2. That significant issues or information have been brought to the attention of the Department which have not been considered previously in the permitting process.

G. Public notice of any public hearing held pursuant to this Article shall be made according to R18-1-401 and the public hearing shall be conducted as a general public hearing pursuant to R18-1-402. When a public hearing is conducted, written public comment shall be accepted until the close of the hearing record as specified by the person presiding at the public hearing.

H. At the same time that the Department notifies an applicant of the final permit determination, the Department shall send notice of such determination, through regular mail, to affected state and local agencies, and to persons who submitted comments or attended a public hearing on the permit action, or who made written requests to receive the final permit determination.

I. The Director shall respond in writing to all written comments submitted during the written public comment period.

R18-9-125. General permits: General provisions

A. The Director may revoke a person's general permit and require the person to obtain an individual Aquifer Protection Permit pursuant to A.R.S. § 49-245(B) and this Article for any of the following reasons:
   1. The person has failed to comply with the terms and conditions of the General Permit as described in this Article.
   2. The discharge from a facility subject to a General Permit causes or contributes to the violation of an Aquifer Water Quality Standard.

B. The Director may revoke a General Permit for all facilities within a specific geographic area if the Director determines that the cumulative effects of the facilities subject to the general permit are such that any water quality standard established pursuant to A.R.S. §§ 49-221 and 49-223 may be violated due to geologic or hydrologic conditions.

C. The Director shall notify a permittee, by certified mail, of the Department's decision to revoke a person's General Permit, and of the requirement to apply for an individual Aquifer Protection Permit pursuant to this Article.

D. The issuance of a General Permit under this Article pursuant to A.R.S. § 49-245, does not affect or modify in any way the obligations or liability of any person for any damages, injury, or loss, resulting from a discharge.

R18-9-126. General permits: Sewage disposal systems

A. A General Permit is issued for sewage disposal systems which have flows of less than 2000 gallons per day, which are in compliance with R18-9-801 through R18-9-819, and which receive materials which conform to paragraph (1) of subsection (D).

B. A General Permit is issued for sewage disposal systems which have flows greater than or equal to 2000 gallons per day but less than 20,000 gallons per day, which are approved by the Department, the Arizona Department of Health

Services, or a county health department pursuant to R18-9-804 and R18-9-805 prior to the effective date of this article and which are in compliance with the provisions of R18-9-804 and R18-9-805.

C. A general permit is issued for sewage disposal systems which have flows greater than or equal to 2000 gallons per day but less than 20,000 gallons per day, which are approved pursuant to R18-9-804 and R18-9-805 after the effective date of this Article, and which meet all of the following conditions:
   1. The subsurface disposal system is located in a soil which has a percolation rate faster than 60 minutes per inch, but not faster than one minute per inch.
   2. The discharge density of effluent from the sewage disposal system, when based on the average daily sewage flow figures found in Appendix I, is not greater than:
      a. 1,200 gallons, or the equivalent of 0.4002 lbs. of total nitrogen, per day per acre, where the nitrate concentration (as nitrogen) of the ambient groundwater is 3.0 mg/l or less;
      b. 800 gallons, or the equivalent of 0.2668 lbs. of total nitrogen, per day per acre, where the nitrate concentration (as nitrogen) of the ambient groundwater is greater than 3.0 mg/l and less than or equal to 5.0 mg/l; or
      c. 400 gallons, or the equivalent of 0.1334 lbs. of total nitrogen, per day per acre, where the nitrate concentration (as nitrogen) of the ambient groundwater is greater than 5.0 mg/l and less than or equal to 7.0 mg/l.
   3. The bottom of subsurface disposal system is at least:
      a. 40 feet above the static groundwater level where the soil percolation rate is slower than or equal to one minute per inch but faster than two minutes per inch.
      b. 10 feet above the static groundwater level where the soil percolation rate is slower than or equal to two minutes per inch but faster than 10 minutes per inch.
      c. 5 feet above the static groundwater level where the soil percolation rate is slower than or equal to 10 minutes per inch.

D. The materials received by any sewage disposal system subject to a General Permit issued by this Section shall conform to both of the following:
   1. The materials are typical sewage and do not include motor oil, gasoline, paints, varnishes, solvents, pesticides, fertilizers, or other materials not generally associated with toilet flushing, food preparation, laundry and personal hygiene.
   2. Commercial operations utilizing hazardous substances or creating hazardous wastes, as defined in A.R.S. § 49-921(5), do not dispose of such materials into the system.

R18-9-127. General permits: Recharge pilot projects and underground storage and recovery pilot projects

A. A General Permit is issued for recharge pilot projects and underground storage and recovery pilot projects which meet all of the following conditions:
   1. Not more than 10,000 acre feet of water shall be applied or injected at the facility site over a two-year period.
   2. Site-specific hydrogeologic data for the development of an individual Aquifer Protection Permit for the project is obtained in the course of operating the facility. This condition is satisfied if the permittee does both of the following:
      a. Drills, and completes by the end of the first quarter after the first application or injection of water at the facility site, a sufficient number of monitoring wells to adequately assess the impact of the discharge on aquifer water quality.
      b. Samples quarterly by the monitoring wells described in subparagraph (a).
   3. The source water to be used for recharge or underground storage is either of the following:
      a. Water conveyed by way of the Central Arizona Project Aqueduct or through a natural river drainage system.
      b. Any water, other than that described in subparagraph (a), which does not violate Aquifer Water Quality Standards or any applicable surface water quality standards, except that water that is not delivered directly to the saturated zone may exceed any standards for bacteria and turbidity.
   4. The source water to be used for recharge or underground storage is not effluent dominated water, as defined by R18-11-201(7), at the point of diversion.
   5. The point of diversion to the recharge or underground storage and recovery facility is not within five miles downstream from the surface discharge from a wastewater treatment plant.

6. Prior to commencement of operation, the operator notifies the Department of the intent to conduct a pilot recharge project or underground storage and recovery project.
7. Prior to commencement of operation, the operator identifies the information to be collected in coordination with the Department of Water Resources and the Department.
8. The operator holds a permit issued according to Title 45, Chapter 2, Article 13, or Chapter 3, Article l of the Arizona Revised Statutes.
9. The project is not located within one-half mile from any hazardous waste landfill, sanitary landfill, any site on the National Priority List under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (P.L. 96-510; 94 Stat. 2767; 42 United States Code sections 9601 et. seq., as amended), or any known location of a hazardous substance disposal.

B. Pilot projects shall be limited to a duration of two years commencing with the first application or injection of water at the facility site. Upon written request, the Department may issue an extension of this time limit, not to exceed one year, if the water to be recharged or stored has not been available to conduct the project.

C. Unless an extension described in subsection (B) has been granted, the applicant shall submit to the Department, a closure plan or a notice of intent to apply for an individual permit at least 30 days prior to the end of the time limit prescribed in subsection (B). A notice of intent to apply for an individual Aquifer Protection Permit shall include a schedule for the timely submittal of the permit application.

R18-9-128. General permits: Agricultural application of wastewater sludge

A. A General Permit is issued for agricultural applications of wastewater sludge meeting all of the conditions described in this section.

B. Any sludge stored at the application site for more than 24 hours shall be stored in water-tight manner.

C. The site at which the sludge is applied is subject to the following conditions:
1. The sludge shall not be stored or applied closer than 250 feet from any water well, other than a public or semi-public drinking water well, or closer than 1,000 feet from any public or semi-public drinking water supply well.
2. The sludge shall not be applied to land with slopes greater than six percent.
3. Application sites within the 100-year floodplain shall be approved by the local floodplain administrator.
4. The sludge shall not be applied to land where the mean annual groundwater elevation is less than 40 feet below the land surface.

D. The sludge shall be applied as follows:
1. All sludge shall be uniformly distributed and incorporated.
2. A new crop shall be grown with each application of sludge.
3. The sludge shall not be applied to frozen or snow-covered ground or to saturated soils.

E. The rate at which the sludge is applied is subject to all of the following:
1. The sludge shall be applied at a rate not to exceed eight dry tons per acre.
2. The sludge shall not be applied to soil with pH of less than 6.5 at the time of the sludge application.
3. No more than 10% of the maximum allowable cumulative metal application shall be applied annually. The maximum allowable cumulative metal application varies with the cation exchange capacity (CEC) of the soil and shall be determined based on the following table:

CECMETAL	Less Than 5	5 to 15	Greater than 15
Lead	500	1000	2000
Zinc	250	500	1000
Copper	125	250	500
Nickel	50	100	200

4. The annual application of cadmium shall not exceed 0.5 Kg/ha or 0.45 pounds per acre.
5. The application of sludge shall not result in an application of nitrogen that exceeds the nitrogen requirement of the crop to be grown with that sludge application.
6. The application of the sludge shall not result in a hydraulic loading rate that exceeds 27,000 gallons per acre per application.
7. The sampling required to determine the application rates described in this Section shall be performed no more than one month prior to the application.

F. The analyses required to determine the application rates described in this Section shall be performed by laboratories certified by the state if such certification procedures exist.

G. Records relating to sludge application shall be kept and shall be available as follows:
   1. Copies of any soil, crop, sludge, or water monitoring record shall be made available to the owner of the wastewater treatment facility from which the sludge was obtained and to the Department.
   2. A record of the sludge application at each site shall be kept and submitted monthly to the owner of the wastewater treatment facility and made available to the Department. The record shall include the dates of sludge application and weather conditions on those dates; the amounts, quality, and source of the sludge; the location within the site where the sludge was applied; and the cumulative amounts of nutrients and heavy metals applied to each field.

H. The irrigation of the application site with fresh water shall not exceed the consumptive use of the crop and evapotranspiration needs.

R18-9-129. General permits: other facilities

A. A General Permit is issued for the discharge of wash water from sand and gravel operations, and placer mining operations, if only physical processes are employed and no hazardous substances, other than those naturally existing in the sand and gravel or the placer material, have been added or exposed during the processing or removal of the sand and gravel.

B. A General Permit is issued for discharges from hydrostatic tests of drinking water distribution systems, and of other pipelines not previously used for the transmission of fluids, if all of the following conditions are met:
   1. The quality of the source water does not violate any Aquifer Water Quality Standard.
   2. The discharge is not to a Water of the United States, as defined in 40 CFR Part 122.2.
   3. The test site is restored to its natural grade.

C. A General Permit is issued for discharges from hydrostatic tests of pipelines previously used for transmission of fluids, other than those previously used for drinking water distribution systems, if all of the following conditions are met:
   1. All liquid discharged is contained in an impoundment which is lined with flexible geomembrane material having a thickness of at least 10 mils.
   2. The liner material is placed over a layer, at least three inches in thickness, consisting of well-sorted sand or finer grained material, or over an underliner determined by the Director to provide equal or better protection.
   3. Within 60 days after the end of the hydrostatic test, all test waters are evaporated, or removed from the impoundment to a treatment works or landfill approved to accept such material. Other methods for removal of the test waters must have the prior written approval of the Director.
   4. The liner is removed and disposed of at an approved landfill unless the liner can be reused at another test location without a reduction in integrity.
   5. The test site is restored to its natural grade.

D. A General Permit is issued for facilities which, for purposes of water quality sampling, hydrologic parameter testing, well development or redevelopment, receive water, drilling fluids or drill cuttings from a well, if the discharge is to the same aquifer in approximately the same location from which the water supply was withdrawn originally.

E. A General Permit is issued for injection wells, surface impoundments, and leach lines receiving discharge from only filter backwash from potable water treatment systems, condensate from refrigeration units, overflows from evaporative coolers, heat exchange system return water, or swimming pool filter backwash, where the discharge is less than 1,000 gallons per day.

F. A General Permit is issued for lined evapotranspiration beds receiving sewage which are issued an Approval to Construct pursuant to R18-9-804 and 805, and which are inspected and leak tested by the Department or its designated representative during construction.

G. A General Permit is issued for disposal of material that contains only uncontaminated soil, cement, bricks, or other similar inert material.

H. A General Permit is issued to facilities used for transportation of water for beneficial use, or pumped from the groundwater, which contain effluent from any wastewater treatment facility if all of the conditions are met:
   1. The effluent is added for the purpose of delivery to a reuse, recharge, or underground storage and recovery facility that has a permit.
   2. The transportation facility is concrete-lined.

3. The effluent does not exceed any Aquifer Water Quality Standard, except those standards for turbidity and bacteria.
4. The volumes and rates of effluent added do not exceed that necessary to meet the requirements of the permitted reuse, recharge, or underground storage and recovery facility.

I. A general permit is issued for surface impoundments which meet all of the following conditions:
1. The surface impoundments receive only filter backwash from potable water treatment systems.
2. The surface impoundments are constructed and operated pursuant to R18-4-231 and R18-4-265.
3. The surface impoundments are lined with a material having a permeability not greater than 1 x 10[-6] cm/sec.

R18-9-130. Violations: Enforcement

Any person who owns or operates a facility contrary to the provisions of this Article, who violates the conditions specified in a permit issued pursuant to this Article, or who violates any Groundwater Protection Permit continued pursuant to R18-9-103(A), is subject to the enforcement actions prescribed in Title 49, Chapter 2, Article 4 of the Arizona Revised Statutes.

Appendix I
Average Daily Sewage Flow

Type of Establishment (unit basis)	Sewage Flow (gallons per unit per day)
Airport (passenger)	4
Apartments, multiple family (resident)	100
1 bedroom, assume 2 residents,	
2 bedrooms, assume 3 residents, etc.	
Camp: Campground, overnight with flush toilets (camper)	25
Campground, overnight with flush toilets and shower (camper)	50
Construction (bed)	50
Day with no meals served (camper)	15
Luxury (camper)	100-150
Resorts, day and night, with limited plumbing (camper)	50
Tourist with central bath and toilet facilities (person)	35
Clubs: Country (resident member)	100
Country (nonresident member)	25
Cottages with seasonal occupancy (resident)	100
Dwellings: Boarding of rooming houses (resident)	100
Additional kitchen requirements for nonresidents boarders	10
Dwellings: Residential (resident)	100
Factory (person)	25
Hospital (bed)	250-400
Hotel (room)	125
Institutions other than hospitals (person)	75-125
Laundries, self service (machine)	400
Mobile Home: Family (per resident)	100
Retirement (resident)	75
Motel (room)	125
Office (person)	25
Picnic: With bathhouses, showers & flush toilets (picnicker)	20
With toilet facilities only (picnicker)	10
Public Restrooms (toilet)	200
Restaurant (seat)	30
per meal served	100
Schools: Boarding (pupil)	100
Day with cafeteria, gymnasiums & showers (pupil)	25
Day with cafeteria, but no gymnasiums or showers (pupil)	20
Day without cafeteria, gymnasiums or showers (pupil)	15
Service Station (bay)	1000
Shopping Center (square foot)	1
Swimming pool (swimmer)	10
Theaters: Drive-in (car space)	5
Movie (seat)	5
Trailer Park: (also see mobile home)	
Travel with no sewer connection (space)	125
Travel with sewer connection (space)	175

Organic Loading. Base All Organic Loadings on 200 mg/l BOD% and 210 mg/l SS.

CHAPTER 9. ARTICLE 2.
AGRICULTURAL GENERAL PERMITS

R18-9-201. Definitions

In addition to the definitions in A.R.S.§§ 49-101 and 49-201, the terms of this Article shall have the following meanings:

1. "Application of nitrogen fertilizer" means any use of a substance containing nitrogen for the commercial production of crop plants. The commercial production of crop plants includes commercial sod farms and nurseries.
2. "Crop plant needs" means the amount of water and nitrogen required to meet the physiological demands of the crop plant to achieve a defined yield.
3. "Crop plant uptake" means the amount of water and nitrogen which can be physiologically absorbed by the roots and vegetative parts of a crop plant following the application of water.

R18-9-202. Agricultural general permits: nitrogen fertilizers

All persons who engage in the application of nitrogen fertilizers are issued an agricultural general permit and shall comply with the agricultural best management practices listed in this Section. A person who engages in the application of nitrogen fertilizer pursuant to an agricultural general permit shall comply with all of the following:

1. Application of nitrogen fertilizer shall be limited to that amount necessary to meet projected crop plant needs.
2. Application of nitrogen fertilizer shall be timed to coincide as closely as possible to the periods of maximum crop plant uptake.
3. Application of nitrogen fertilizer shall be by a method designed to deliver nitrogen to the area of maximum crop plant uptake.
4. Application of irrigation water to meet crop plant needs shall be managed to minimize nitrogen loss by leaching and runoff.
5. The application of irrigation water shall be timed to minimize nitrogen loss by leaching and runoff.
6. The operator shall use tillage practices that maximize water and nitrogen uptake by crop plants.

R18-9-203. Agricultural general permits: concentrated animal feeding operations

All persons who engage in concentrated animal feeding operations are issued an agricultural general permit and shall comply with the agricultural best management practices listed in this Section. A person who operates a concentrated animal feeding operation facility pursuant to an agricultural general permit shall comply with all of the following:

1. Harvest, stockpile and dispose of animal manure from concentrated animal feeding operations to minimize discharge of nitrogen pollutants by leaching and runoff.
2. Control and dispose of nitrogen contaminated water resulting from activities associated with a concentrated animal feeding operation, up to a 25 year, 24 hour storm event equivalent to minimize the discharge of nitrogen pollutants.
3. Close facilities in a manner to minimize the discharge of nitrogen pollutants.

APPLICATION
FEES

NOTICE

AQUIFER PROTECTION PERMIT APPLICATION FEES

To All Interested Parties:

Effective April 12, 1992, the Arizona Department of Environmental Quality has repealed A.A.C. R18-9-123, relating to aquifer protection permit (APP) application fees and enacted a new R18-9-123 and R18-9-123.1, attached, pursuant to the authority of A.R.S. § 49-203(A)(7) and 1991 Arizona Session Laws, chapter 280, section 5. A copy with the changes from the last proposed version marked approximately by underline and strikeout is available on request.

The rules reflect changes made in response to comments received through January, 1992, as well as lower initial and maximum fees, and a lower hourly rate for processing APP's. The lower hourly rate and fees result from DEQ deciding not to include any indirect administrative expenses as costs to be recovered.

A summary of written and oral comments and DEQ's response to them is in a rulemaking docket at the agency at 3033 N. Central Ave., Phoenix.

If you have any questions regarding these rules, please call Mark Lewandowski at DEQ at 207-2230 or 1-800-234-5677, x2230.

R18-9-123. Aquifer Protection Permit Application Fees

A. With each application for an individual Aquifer Protection Permit under R18-9-107, the applicant shall remit an initial fee according to the following schedule, except as otherwise provided in subsections H, I and J. The fee shall be payable to the State of Arizona, and shall be deposited in the state general fund, or if otherwise required by law, in the Water Quality Assurance Fund, or a fund established specifically for aquifer protection permit fees.

Categories	Initial Fee (In U.S. dollars)	Maximum Fee
Wastewater Treatment Plants		
On-Site Sewage Disposal Systems (less than 20,000 gpd)	$1550	3450
Wastewater Treatment Plants Where Influent is Predominantly Sewage		
Lined Surface Impoundment (Evapotranspiration)	3300	6500
Discharge to Water of the U.S.	4800	7950
Subsurface Discharge	4150	7950
Landfills		
Municipal solid waste	4500	15750
Construction Debris	2850	6950
Other	5100	14600
Mines		
Tailings Piles or Ponds	7150	15400
Base Metal Leaching Operations with Chemical Process	4600	10550
Precious Metals Processing	4150	10200
In-Situ Leaching	8950	14600
Other	5900	14400
Drywells	1350	4250
Industrial Wastewater Discharges		
Surface Impoundment	3650	9900
Discharge to Water of U.S.	5050	9700
Subsurface Discharge	4600	10250
Other Discharging Facilities	4850	15900

B. If the actual cost of processing the application identified in subsection A or J is less than the initial fee paid, the difference between the actual cost and the amount listed and paid shall be returned to the applicant with a final itemized bill within 30 days of the issuance or denial of the permit. If the actual cost of processing the application is greater than the corresponding amount listed, the department shall send the applicant a final itemized bill for the difference between the initial fee paid and the actual cost of processing the application, except that the final bill shall not exceed the applicable maximum fee in subsection A or J. Such difference shall be paid in full before issuance of the permit.

C. The Department shall keep a record of the costs associated with denied applications. If there is an amount not covered by the initial fee and that is not paid, the Department shall add the product of the unpaid hours multiplied by the hourly rate in subsection G at the time of denial to the initial fee of a permit applied for under R18-9-107 by the same entity at a later date.

D. When determining actual cost under subsection B, the Department shall use a flat hourly rate for all direct labor hours spent working on the permit. The hourly rate shall be based on an annual sum of the following aquifer protection permit program related costs divided by the direct labor hours allocated for aquifer protection permit processing for the same year:

1. Salary and personnel benefit costs of aquifer protection permit program employees directly involved in processing permits.

2. Salary and personnel benefit costs of aquifer protection permit program employees indirectly involved in processing permits, such as supervisory and clerical personnel.
3. Department overhead and other operating expenses attributable to all aquifer protection permit program employees.
4. Per diem expenses.
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8. Public notice advertising and mailing costs.
9. Presiding officer expenses.
10. Court reporter expenses.
11. Facility rentals.
12. Other reasonable, direct, permit-related expenses documented in writing by the Department.

E. Direct labor hours spent working on the permit shall consist of time spent by aquifer protection permit program technical staff or consultants on tasks specifically related to the processing, issuance, or denial of a particular permit, including time at a facility inspecting the facility, time at a public hearing, or time at a preapplication conference held pursuant to R18-9-107.D.

F. Direct labor hours shall not include any of the following:
1. training.
2. travel to or from any facility or permit hearing.
3. time by clerical or supervisory staff, unless the supervisory staff is filling in for a particular technical staff member in that person's absence.

G. From the effective date of this subsection, the flat hourly rate shall be $31.84 per hour. The Director shall annually publish the fee schedules under subsections A and J and the flat hourly rate under this subsection which will be applicable for the following 12 months. The fee schedules and hourly rate shall be based on the Department's costs for the previous full fiscal year.

H. For individual Aquifer Protection Permits which are consolidated pursuant to R18-9-122, and unless the applicant qualifies for the fee provision described in subsection I, the applicant shall remit an initial fee which equals the sum of the greatest initial fee among the facilities, and the initial fee applicable to each additional facility reduced by 40%. The maximum fee to the applicant for consolidated permits shall be equal to the greatest maximum fee among the facilities, plus the maximum fee applicable to each additional facility reduced by 40%.

I. For purposes of subsection A, an applicant applying for individual permits for two or more facilities of the same category of facilities that, in addition, are engaged in similar operations, and have discharges of similar chemical characteristics, and are geographically contiguous, is required to remit only the initial fee, and shall be charged no more than the maximum fee, applicable to a single such facility.

J. With an application that is a request for modification to an individual Aquifer Protection Permit or for a transfer of an individual Aquifer Protection Permit, the applicant shall remit an initial fee in the same manner as described in subsection A, and according to the following schedule:

Categories	Initial Fee (In U.S. dollars)	Maximum Fee
Permit modification as described in R18-9-121.C(1) or (2) or that results from a major modification to a facility as described in A.R.S. § 49-201.18	1000	(Same as that allowed under subsection A)
Permit modification that is described as a minor modification under R18-9-121.D.	0	100
Any other permit modification including those described in R18-9-121.C(3) or (4)	300	1000
Permit transfer	300	500

K. This rule is effective April 12, 1992. Persons who have submitted complete applications for permits, modifications or transfers before the effective date of this rule shall be required to remit only the permit application fee that was in effect when the application was submitted. Persons who have submitted applications before the effective date of this rule that are incomplete as of the effective date of this rule shall be subject to an initial fee equal to the permit fee for the appropriate category at the time of submission. The final itemized bill for an application that is incomplete on the effective date of this rule shall include only direct labor hours incurred after the effective date of this rule.

R18-9-123.1 Review of Bill

A. Any person who receives a final bill from the department for the processing, and issuance or denial of a permit under this article may request an informal review of the hours billed and may pay the bill under protest. If the bill is paid under protest, the department shall issue the permit if it would be otherwise issuable after normal payment. The request shall specify the areas of dispute and be made in writing to the assistant director of the department for the office of water quality within 10 working days of the date of receipt of the final bill. Unless the department and applicant agree otherwise, the informal review shall take place within 30 days of the department's receipt of the request. Notice of the time and place of informal review shall be mailed to the requester at least ten working days prior to the informal review. The assistant director shall review whether the time billed is correct and reasonable for the tasks involved. Disposition of the informal review shall be mailed to the requester within ten working days after the informal review.

B. The assistant director's decision after the informal review shall become final unless within thirty days after receipt of the decision the applicant requests a hearing before an administrative law judge appointed by the department of administration. The hearing, and any appeal of the decision, shall be governed by A.R.S. § 49-321. Any final agency decision issued pursuant to this section is subject to judicial review pursuant to title 12, chapter 7, article 6.

APPLICATION
GUIDANCE
MANUAL

AQUIFER PROTECTION PERMITS
APPLICATION GUIDANCE MANUAL

PREPARED BY:
ARIZONA DEPARTMENT OF
ENVIRONMENTAL QUALITY
Modified September 11, 1991

APPLICATION GUIDANCE MANUAL

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Date: September 11, 1991

I. INTRODUCTION

A. PURPOSE AND USE OF THE MANUAL

The purpose of this manual is to provide the regulated community with information to help complete a permit application and guide them through the Aquifer Protection Permit (APP) process. It describes the permitting process, outlines specific information requirements for the individual permit application and provides technical information to guide the applicant in designing acceptable monitoring, contingency, and closure plans.

By the fact that you are using this guidance manual, it must be assumed that you are required to obtain an Individual Aquifer Protection Permit (APP). If you are uncertain, the DEQ has a simple form ("Determination of Applicability") which may be submitted to determine if the APP rules apply to your operation, or if you qualify for a general permit. A general permit is written into the regulations, and does not require the submission of an application, but there are criteria listed in the regulations to which a facility must adhere to maintain compliance with a particular general permit.

Each discharge facility or practice will present a unique situation and the specific requirements will depend on that

situation. Content presented here is not intended to be all inclusive. Furthermore, not every applicant will have to address everything in this document. This manual is to be used as a general guide by the permit applicant to facilitate the permitting process. It can not substitute for direct communications with the Arizona Department of Environmental Quality, Office of Water Quality, Water Permits Unit (257-2270).

B. APPLICABLE STATUTES AND RULES

The Environmental Quality Act of 1986 (Arizona Revised Statutes, or A.R.S. Title 49) established the requirement to develop the Aquifer Protection Permit program. Throughout this manual, statutory references will be in the form: A.R.S. 49-xxx, where xxx stands for the specific section of the statute; and regulatory references will be in the form: A.A.C. R18-9-xxx, which stands for Arizona Administrative Code, Title 18, Chapter 9, and xxx represents the specific section or rule.

The legal basis for this program are the following statutes and regulations:

- A.R.S. Title 49, specific sections including:
  - 201 (Definitions)

- 203 (Powers and Duties of Director)
- 221 & 223 (Water Quality Standards)
- 224 (Aquifer Identification, Classification)
- 241-251 (Aquifer Protection Permits)

- Arizona Administrative Code:
  - Title 18, Chapter 9, Article 1 (Aquifer Protection Permits)
  - Title 18, Chapter 11, Article 4 (Aquifer Water Quality Standards)
  - Title 18, Chapter 11, Article 5 (Aquifer Boundaries and Protected Use Classification)

For more specific information concerning this program, not contained in this manual, you are directed to consult any of the above. These documents may be obtained from the Secretary of State, State Capital, 7th Floor, West Wing, 1700 W. Washington, Phoenix, AZ 85007 or (602) 542-4086.

C. MAJOR REQUIREMENTS FOR AN AQUIFER PROTECTION PERMIT

In order to obtain an Aquifer Protection Permit for a discharging facility, the applicant must make two demonstrations:

1. The first demonstration is that "the facility will be so designed, constructed and operated as to ensure the

greatest degree of discharge reduction achievable through the application of the best available demonstrated control technology, processes, operating methods or other alternatives. This requirement, commonly referred to as "BADCT", is described in A.R.S. 49-243.B.1.

2. The second demonstration is that the discharge will not cause or contribute to a violation of an aquifer water quality standard (see Appendix A) at the applicable point of compliance, (A.R.S. 49-243.B.2.), or if an aquifer water quality standard is already exceeded at the point of compliance, that the discharge will not cause further degradation of the aquifer with respect to the parameter which exceeds the standard (A.R.S. 49-243.B.3.).

One exception to these requirements is applicants for recharge or underground storage and recovery projects. Applicants for permits for these projects are not required to demonstrate compliance with BADCT. The requirements for permitting recharge or underground storage and recovery projects are given in A.R.S. 49-243.C. Applicants for these projects must show that it will be so designed, constructed and operated as to

ensure that the project will not cause or contribute to the violation of an aquifer water quality standard.

More detailed information concerning these demonstrations can be found in Chapter III.

II. AQUIFER PROTECTION PERMIT PROCESS

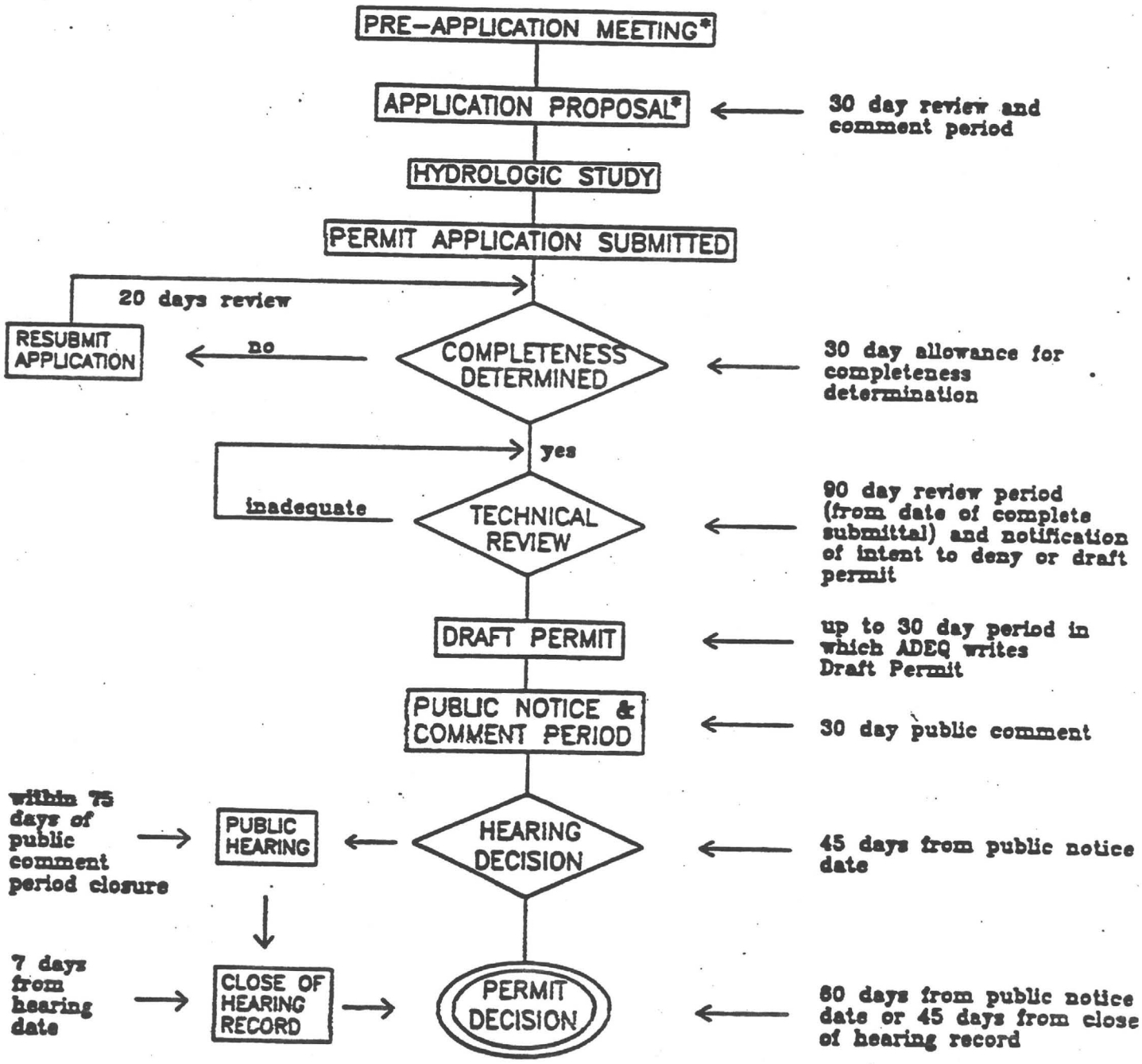
A. STEPS IN THE PERMIT PROCESS

Figure 1 is a flow chart indicating the major steps for obtaining an individual Aquifer Protection Permit. The associated time frames are the maximum times allowed for ADEQ review or processing. Many permits will not require this much time.

1. In order to clarify ADEQ's information needs and requirements for a permit application a facility owner/operator can request a pre-application meeting be held. This meeting will also help the Department understand the facility design and operation.

   In order to make the pre-application meeting be more effective, the applicant should be prepared to discuss specific facility designs and locations. Bring a location map and site plan to the meeting, if possible. Available information on waste characterization will also be helpful. Reviewing this manual prior to the pre-application meeting may give an applicant some more ideas of information to present to the Department.

ADEQ AQUIFER PROTECTION PERMIT PROCESS



*optional

figure 1

It should be noted that ADEQ will be glad to meet with a prospective applicant in more preliminary stages of project development, but these meetings should not be considered as a formal pre-application conference.

The degree of guidance the Department will be able to provide is dependent upon the extent the applicant has finalized his/her plans and the amount of information that can be supplied at the meeting. Please be aware the Department can not commit to absolute decisions at a pre-application meeting, but will provide guidance in terms of the BADCT proposal, level of detail for any necessary hydrologic studies, and the scope of any water quality sampling.

2. Following the pre-application meeting, an applicant has the option of submitting a proposal for a permit application. The proposal should outline how the applicant will meet the informational requirements for a permit based on issues identified in the pre-application meeting. For example, a proposal might explain that an applicant will generate a water table elevation map in the area of the facility by measuring water levels in five known existing wells, and propose to drill three other wells at specific locations on site. These last

three will also be used to collect water quality data, and the proposal would include well construction designs for this purpose. The Department will respond by approving the usefulness of the existing well locations and the proposed locations along with the designs, or make comments or suggestions to modify the proposed task. Other aspects of developing the permit application may be addressed in the proposal.

3. After approval of the proposal or other direction given to the applicant by the Department, the applicant will conduct a hydrologic study if it is required. Determining the scope of the study is a good reason for having a pre-application meeting. The format for collecting and reporting data for the hydrologic study is discussed later in this manual. (See Chapter IV).

4. Once all the information for the permit application has been gathered, it must be compiled in a format easily reviewed by ADEQ so that the processing of the permit is as efficient as possible. The Department has prepared a form which accompanies this manual to assist an applicant in presenting the information in a uniform manner. Chapters III & IV discuss how to organize application information as well. At this time, the application should be submitted to the Water Permits Unit of ADEQ

along with the appropriate fee. The fees list can be found in Table 1.

5. When the Department receives an application, it is assigned to a project officer in the Department's Water Permits Unit. This person will be your contact for all questions concerning your project. The first thing a project officer does is check the application for completeness. In other words, are all the required parts included? If not, the applicant is notified of the deficiencies and requested to correct them. There is no specific response time for new facilities, but an existing facility will be requested to submit this information according to a schedule agreed on by the applicant and DEQ.

TABLE 1

FEE SCHEDULE

Each application for an individual Aquifer Protection Permit must be accompanied by a non-refundable fee. Make checks payable to the State of Arizona.

Categories	Fee (In U.S. Dollars)
On-Site Sewage Disposal Systems (less than 20,000 gpd)	$1,200
Wastewater Treatment Plants Where Influent is Predominantly Sewage	
Surface Impoundment	$1,400
Discharge to Water of the U.S.	$1,600
Subsurface Discharge	$1,400
Recharge and Underground Storage and Recovery Without Effluent	$2,200

Recharge and Underground Storage and Recovery Using Effluent..... $2,800

Solid Waste Disposal Facility (Landfills)..... $2,200

Construction Debris Landfills..... $1,200

Mines

Surface Impoundments..... $1,800

Tailings Piles or Ponds..... $2,200

Base Metal Leaching Operations Including Collection and Process Ponds..... $2,300

Cyanide Leaching Including Collection and Process Ponds..... $1,500

In-Situ Leaching..... $3,400

Discharge to Water of U.S..... $1,900

Dry Wells..... $ 900

Industrial Wastewater Discharges

Surface Impoundment..... $2,200

Discharge to Water of U.S..... $1,700

Subsurface Discharge..... $1,900

Other Discharging Facilities.....	$1,800
Permit Transfer.....	$ 200
Permit Modification that constitutes a major modification as described in A.R.S. 49-201.18.....	Same as for original permit in application according to type of facility
Permit Modification that is described as a minor modification under R18-9-121.D.....	0
Permit modification that is neither a major modification nor a minor modification.....	$ 200

6. Once it has been determined that the application is complete, the Department begins its technical review of the submittal. The project officer may refer various portions of the application to appropriate units within the department for this technical review. Staff evaluates the technical merits of the data to see if they support the conclusions. Staff reviews the adequacy of the demonstrations of BADCT and compliance with Aquifer Water Quality Standards at the applicable point(s) of compliance (see Chapter III.E.6.). If there are problems with the presentation or substance of the information, the applicant will be informed and have an opportunity to rectify the situation. Whenever additional information is requested the 90-day ADEQ review timeframe is halted and resumes upon receipt of the information. If the requirements of the statutes and regulations have been met, the applicant will be notified of our preliminary decision to issue a permit.

7. At this stage the project officer will begin drafting the permit, setting the appropriate conditions such as discharge limitations, groundwater monitoring limits, alert levels, reporting requirements or compliance schedules. The public notice and other supporting documents are also prepared at this time.

8. The public notice of ADEQ's intent to issue (or deny) a permit is published in a newspaper with distribution in the area where the facility is located. The Department accepts written comment from the public concerning the draft permit for a period of 30 days following publication. During this period any person may request a public hearing be held.

9. The Department will conduct a public hearing in a city near the location of the facility to solicit further public comment on the draft permit if the Director determines that significant public interest exists, or that significant issues or information have been brought to our attention which were not previously considered in the permitting process.

10. Weighing information contained in the permit application and obtained from either the general public comment period or the public hearing, the Director will make his final decision to issue or deny an Aquifer Protection Permit. An applicant will have had previous opportunity (in steps 5 & 6) to correct any situation which would lead to denial of the application. However, the Director has authority for denial of permit applications for good cause.

11. Any person may appeal a permit action if that person is or may be adversely affected by the action. Appeals are made to the Water Quality Appeals Board in accordance with A.R.S. 49-323.

B. PERMIT ACTIONS

The flow chart of Figure 1, just discussed, describes the basic process of permit issuance. As was mentioned, the process may culminate in permit denial. The regulations provide for denial in the cases where the applicant has failed or refused to correct deficiencies in the application, provided false or misleading information or has failed to demonstrate that the operation of the facility will comply with the requirements of the statutes and regulations. In the last case, the applicant will have an opportunity to correct an application before the decision to deny is necessary. The statute also provides that the Director may deny a permit if he determines the applicant incapable of fully carrying out the terms and conditions of the permit based on the applicant's past performance or technical and financial competence to comply with the terms and conditions.

Other permit actions the Director may take include modifying, transferring, suspending and revoking. There are two types of modifications that can be performed on permits, major and

minor. A major modification constitutes substantial changes in an issued permit for reasons outlined in the regulations. (A.A.C. R18-9-121.C.) and requires submission of a fee (A.A.C. R18-9-123.D.). Minor modifications are changes which do not affect the scope or intent of the permit, and do not require the publishing of a public notice (A.A.C. R18-9-121.D.). All other permit actions must go through the public participation process described in steps 8 through 11 of the permit process (Sec. II.A.).

When a facility is sold to a new owner, a permit is transferrable if the Director determines the new owner is able to comply with the statutes and regulations (A.A.C. R18-9-121.E.).

C. OTHER PERMITS AND REGULATIONS

Other approvals and permits may be required by Federal, State or Local governments. A list of possible permits that may be required for various facility types is included in Table 2. This is not an exhaustive list; additional permits may be necessary. It is the permittee's responsibility to obtain and comply with all applicable laws and regulations.

TABLE 2

Other Permits and Approvals Which May Be Required in Addition to The Aquifer Protection Permit

Permit or Regulation	Agency
Solid Waste Disposal	DEQ (Solid Waste Unit)
Zoning Approval	Local City or County
WQARF (closed facilities before January 1, 1986)	DEQ (Remedial Action Unit)
Permit for Reuse of Reclaimed Wastewater	ADEQ
NPDES (Discharge to navigable waters)	Application is made at ADEQ EPA is issuing authority
Sludge Handling and Disposal	ADEQ and/or EPA

Air Pollution Control (e.g. incinerators, air strippers or dust control)	ADEQ/County Health Department
Flood Control	Local Flood Control District
Construction Permits	ADEQ/County Health Dept. and local building authority
Well Construction	Department of Water Resources
404 Permit	U.S. Army Corps of Engineers
Reclamation Plan	BLM
Operation & Reclamation Plan	Forest Service
Hazardous Waste Permit	EPA-RCRA
Air Quality Permit	EPA-Air

Dredge & Fill 404 Permit	Corps of Engineers
UIC Regulations (In-situ leach)	EPA
UMTRA & Other Programs	EPA
UMTRA & Other Programs	N.R.C.
Air Emmission Permit	DEQ - Air Quality
Solid Waste Disposal/ Operational Plan Approval	DEQ-Solid Waste
Well Construction Program Permit	Department of Water Resources
Poor Water Quality Withdrawal Permit	Department of Water Resourses
If on or near State lands	State Lands
Approval to Proceed	State Historic Preservation Office
Registration/Safety	State Mine Inspector

Land use - zoning approval	County/City
Engineering/Construction Approval	County
Dam Safety & Stability	Department of Water Resources

III. INFORMATION REQUIREMENTS FOR A PERMIT APPLICATION

This chapter is intended to aid the applicant in providing the mandatory information required in a permit application (A.A.C. R18-108.A & B). By following these instructions, the information should be presented in a format most useful to the Department. This should facilitate a more speedy review of your application. The instructions are numbered and organized to refer to the specific item on the application form.

A. FACILITY DATA

1. Name of Facility

This should be the name of the business, project or operation. It should be a unique name; that is, if the company owns or operates multiple facilities in other locations, you may want to incorporate a reference to location in the name. It should be the name by which the operation is commonly known. If the facility was known by any previous names, please include also.

2. Duration of Facility Operation

a) Date facility began (or is expected to begin) operations.

Beginning operations for the Department's purposes means when do you expect to begin discharging from the facility?

b) Expected life of the facility.

Describe in specific terms if possible, you may use more general terms if the facility has a finite lifetime, an ore deposit, as opposed to a municipality's wastewater treatment plant which is hoped to serve the community in perpetuity.

3. Mailing Address of Facility

To what address would the Department write if sending correspondence about the facility? Give the street or Post Office Box, City, State and Zip Code on lines provided.

4. Facility Address

If different from the mailing address, include a street address, route number or other specific identifier, and the City, State and Zip Code for the actual location of the facility.

5. <u>County</u>

In which county or counties is the facility located?

6. <u>Facility Location</u>

a) Township, range, section, and quarters.

Locate the facility by the township and range coordinate system. If possible, break the section location down to three (3) quarter section divisions (1/4, 1/4, 1/4). This will be a 10 acre parcel. This location can be determined from U.S.G.S. topographic maps. Refer to Figure 2 for an explanation of this system. This information may also be obtained from County Recorder or Assessor's Offices.

b) Latitude and Longitude. Give the latitude and longitude of the approximate center of the property on which the facility is located. (See Appendix B for description of how to determine latitude and longitude.)

7. Facility Contact Person

Provide the name of a person at the facility who can be contacted about facility operations. This would be the person the Department would call if we were arranging a site visit.

8. Telephone Number

Give the phone number where the contact person may be reached during normal business hours.

9. Nature of Business

Provide a brief description of the activity conducted at the facility.

B. APPLICANT INFORMATION

1. Name of Applicant

Who is applying for this permit? If a company or corporation, state that name.

2. Applicant Mailing Address

Give address where correspondence concerning the application may be directed to the applicant. Include Street name, city, State and Zip Code. If you wish this correspondence to be sent directly to your consultant or engineer include that address as well.

3. Telephone Number of Applicant

Please be sure to include Area Code. Telephone number of the engineer or consultant firm may also be included in this section.

C. OWNER INFORMATION

1. Name of Owner

If different from the applicant, provide the name of the owner of the facility. There is no need to complete this part if the persons are the same.

2. Owner Mailing Address

Give the Street, City, State, Zip Code where the owner may be contacted.

3. Telephone Number of Owner

Give the telephone number of the facility owner.

4. Land Owner

Give the name of the person, agency or company which owns the land on which the facility is located if different than the facility owner.

5. Land Owner Address

Give the Steet, city, State and Zip Code of the land owner if different from that of the facility owner.

D. OPERATOR INFORMATION

This section pertains to the entity responsible for managing the facility operation, not necessarily individual persons. If the operator is a different person than the owner of the facility, provide the information requested in items 1 through 3. Examples of separate owner and operator are a lessee of the land or buildings on which the facility is

located, or a person under contract specifically to conduct the day to day business of the facility. A direct employee of the owner probably would not be considered a separate operator.

1. Operator Name

2. Operator Address

3. Telephone Number

E. EXISTING ENVIRONMENTAL PERMITS

List the numbers and the entity of issue of any other existing environmental permits that have been issued to the applicant. Some of the standard permits we commonly deal with are listed. Space is provided for other permits not mentioned. Please describe them.

F. REQUIRED ATTACHMENTS

1. Location Map

All permit applications must include two copies of a location map, preferably on a 7.5 minute U.S.G.S. topographic map or 15 minute map where the 7.5 minute map in unavailable. Other maps may be used, but require

approval by the Department. The map should clearly indicate all of the following:

- the facility site boundary
- an area of at least 3 miles around the boundary
- location of all wells within 1/2 mile of the facility boundary
- land ownership or use of properties adjacent to the site

2. <u>Site Plan</u>

In addition to the location map, two copies of a site plan must be submitted. The site plan should be drawn to an appropriate scale to show necessary details and should include:

- property lines
- buildings and structures
- locations of water wells, boring or sampling points

- locations of discharge sites (ponds, leachlines, dry wells, other injection wells, landfills, etc.). Each discharge location should be assigned a numeric identifier starting with 001 and proceeding consecutively. If the facility is known by a descriptive name include it as well. These identifiers will be used again in characterizing of discharge (see item 4, this section) and can be in the permit for monitoring requirements.

- topography

- Any other pertinent information

3. <u>Facility Design Plans</u>

Attach two copies of design drawings showing proposed or as-built construction details of pollution control systems. Engineered drawings are preferable, but all design plans should be either drawn to scale or indicate dimensions and should be accurate and legible. The design drawings should give both plan and cross-sectional views of elements of the system. For instance, a surface impoundment should have liner, subgrade, side slopes, anchor devices for liner, leachate collection system and dimensions detailed.

Similar details are required for drainage diversion features. Calculations used to determine the appropriate sizing should accompany the designs.

4. <u>Characterization of Discharge</u>

If yours is a property with a history of discharge or waste disposal, attach or include in the space provided a summary of the past discharge practices that you are aware of either personally or through employee interviews. Contact with the previous owner/operator of the facility may be necessary to fulfill this requirement. Your description should be specific for each discharging facility on site, i.e. what sort of materials were deposited in each pond, septic tank, landfill cell? If applying for a new facility permit, supply a similar discussion of anticipated discharges.

In addition to the discussion of discharge practices, the application must include a characterization of the discharges.

a.) Now list the chemical, biological and physical properties of the described discharges. This should include chemical analyses or projected chemical composition based on manufacturer's

data, bench or pilot scale testing or data from similar operations.

Every discharge should be evaluated for the following constituents at a minimum. Metals should be as total metals, although some applicants may also want to include analyses for dissolved metals. this would be important for discharges containing large amount of solids.

Arsenic	Fluoride
Barium	Calcium
Cadmium	Magnesium
Chromium	Sodium
Lead	Chloride
Mercury	Sulfate
Nitrogen (Total)	Alkalinity
Selenium	TDS
Silver	pH

In addition to the above, the following should be included in the discharge characterization if they

are used in processing, or would otherwise likely be present:

Endrin

Lindane

Methoxychlor

Toxaphene

Gross alpha particle activity (including radium-226 but excluding radon and uranium)

Combined Radium-226 and Radium-228

Tritium

Strontium-90

Those compounds detected by EPA Methods 601 & 602

Any hazardous substance as defined in A.R.S. 49-201.16 (See Appendix C)

Which of the specific constituents or groups of constituents from this last list to be characterized can be determined as a result of consultation with DEQ or the pre-application meeting.

Facilities which will be discharging wastes of animal or human origin must characterize the

biological components of the discharge. This could include:

Total coliform

Fecal coliform

Viruses

Parasites

Physical properties of the discharge which should be characterized may include:

Percent solids by volume

Moisture content

Temperature

Odor

b.) List the rates at which a discharge has or will occur. This may be given in appropriate units such as gpm, gpd, or tons per day.

Also provide the duration and frequency of the discharge. This can be expressed as continuous, intermittent, eg. once per day for 10 minutes, seasonal, (November thru April).

c.) Finally, list the location of each discharging facility, and be sure to reference these on the site plan. Locations must be given in latitude and longitude coordinates (see Appendix B for methods of determining latitude and longitude). For large facilities such as tailings ponds or evaporation ponds give the coordinates for the center of the facility.

5. Demonstration of BADCT

Attach a description of pollutant control methodologies for the facility and a discussion of why they meet the BADCT requirement.

The Department has developed guidance documents for determining BADCT for the following classes of facilities:

1. landfills
2. mines
3. municipal WWTP
4. on-site wastewater disposal systems
5. industrial WWTP

If your application is for one of these classes of facilities you should follow the guidelines in these documents for developing your BADCT demonstration. Format your demonstration consistent with the Table of Contents of the applicable document. These documents may be obtained from the ADEQ library (257-6959).

If you have a facility not covered by these documents you will need to discuss each control mechanism and the degree of discharge reduction it can provide. General discussions of the concept of BADCT given in the guidance documents may still be useful in making a determination.

Try to present your demonstration along the lines of the following discussion.

Include a description of the BADCT to be employed in the facility. Describe technology processes or operating methods employed to meet requirements of A.R.S. 49-243.B. Attaching a process flow diagram if appropriate. Include in your documentation a discussion of alternative discharge control measures, the technical and economic advantages and disadvantages of each alternative and the justification for selection or rejection of each alternative. Include an evaluation of each alternative discharge control technology in relation to discharge

reduction achievable, site specific hydrologic and geologic characteristics, environmental impacts and water conservation or water augmentation. Address economic impacts relative to industry-wide alternatives. Address factors that are relevant such as A.R.S. 49-243.B.1. a through h for existing facilities.

6. Demonstration of Compliance with Standards

Each application must include a demonstration that the facility's discharge will not cause Aquifer Water Quality Standards to be violated at the point of compliance. The amount of information needed to support this demonstration will vary depending on the design of the facility, characteristics of discharge from the facility, and ambient groundwater quality at the facility. For example, if a facility is designed with double liners and a leak detection system, such that no discharge will occur, the design itself could satisfy the demonstration. In such a situation, the point of compliance will be designated, but it will not be necessary to monitor at that point. However, the direction of groundwater flow and groundwater quality data would still be needed. The following sections discuss what standards are applicable to the demonstration and the statutory requirements for locating the point of compliance.

Applicable Standards

The Aquifer Water Quality Standards given in A.R.S. 49-223 and A.A.C. R18-11-402 and 403 are applicable to the permit process. These standards include the 29 parameters with Maximum Contaminant Levels (MCL's) set by the Administrator of the Environmental Protection Agency (EPA) and narrative standards related to human health and uses (Appendix A). As future MCL's are adopted by EPA, they will be incorporated into the Aquifer Water Quality Standards.

Point of Compliance

Propose the locations of the point of compliance for your facility. The point of compliance is defined by A.R.S. 49-244 as a vertical plane downgradient of the facility that extends through the uppermost aquifers underlying the facility. The location of the point of compliance will be determined on a case by case basis for each facility. The method of determination will differ depending on whether the discharge is a Hazardous Substance (see Appendix C) or a Non-hazardous Substance. Monitoring at the point of compliance will be in the aquifer. It may be necessary to have several monitoring locations (wells) within the plane defined as the point of compliance to adequately assure the standards are being met. See the "Monitoring Plan Considerations" section

for information on proposing monitoring at the point of compliance.

Point of Compliance for Hazardous Substances

For facilities which discharge a pollutant which is a hazardous substance as defined by A.R.S. 49-201.16., A.R.S. 244.1. requires that the point of compliance for that pollutant be the limit of the pollutant management area (the area on which pollutants are or will be placed). However, if the applicant can demonstrate it would be technically impractical to monitor at the boundary of the pollutant management area or that an alternative point of compliance would be substantially less costly, an alternate point of compliance may be approved. (A.R.S. 49-244.1.) An alternate point of compliance shall never be located further downgradient than:

1. The property boundary.

2. Any point of existing or reasonably foreseeable future drinking water source.

3. 750 feet from the pollutant management area.

Point of Compliance for Non-Hazardous Substances

For facilities which discharge non-hazardous substances the only requirement for the location of the point of compliance is that it ensure protection of all current and reasonable future uses of the aquifer. Therefore, the point of compliance can never be further from the facility than the location of the nearest present or future use. In most cases this requirement results in a compliance point at the property boundary because wells might be developed on adjacent properties for future uses.

Determination of Uses

Since the final determination of the compliance point is dependent on location of uses of the aquifer, in proposing a point of compliance, the applicant should consider all present uses in the area and any information useful in predicting where and if future uses might develop. Such information might include:

1. Land ownership and use.

2. Sources and availability of water in the area. Including well location map and table indicating uses of wells and construction details.

3. Zoning or other existing or proposed land use plans.

7. <u>Demonstration of Technical Capability</u>

By law the Department needs to be assured the applicant is technically capable of operating the facility according to the conditions of the permit. The areas concerning the facility where technical ability or capability are most important are design, construction and operation, including installation or maintenance of discharge control measures or complying with monitoring requirements. If a different person (person may be a company) is responsible for each of these areas, you should state the name of the persons relative to their responsibilities, and supply any of the following in support of their technical capabilities to perform the stated function:

- Any pertinent licenses or certifications held by the person
- Any professional training relevant to the design, construction, or operation of the facility.

- Any work experience relevant to the design, construction, or operation of the facility.

Although the last item is fairly open ended, the Department will review other information submitted to meet this requirement.

8. <u>Demonstration of Financial Capability</u>

An applicant is also required to demonstrate its financial capability to comply with the permit terms and conditions. Any financial information submitted under this requirement will be held confidential.

You should direct your financial demonstration toward the ability to construct, operate, close, and assure proper post-closure care of the facility.

a.) First, estimate the total cost of each of the following aspects of the facility.

- Construction; Present a realistic estimate of these costs based on the proposed BADCT.

- Operation;

- Closure; The requirements for closure are listed in A.A.C. R18-9-116.C.

- Post-closure care; If the nature of your facility will dictate conducting post-closure monitoring, maintenance or inspections, the cost of performing these must be estimated.

b.) The chief financial officer of the applicant must supply a statement that the applicant is financially capable of meeting the costs outlined in a.) above. The statement must be particular of the financial arrangements for meeting the closure and post-closure measures. If the applicant is a state or federal agency, county, city, town or other local governmental entity, this statement is adequate for this demonstration. If not, please continue.

c.) In support of the statement of the financial officer, the applicant must submit one of the following:

- A copy of the most recent of the applicant's 10K form as required by the Federal Securities and Exchange Act of 1984 as amended.

- A report that contains all of the following information:

  + A description of the applicant's status as a corporation, partnership, or other legal entity.
  + A description of the person's business.
  + An indication of the person's net worth, including a description of major assets and liabilities.
  + A brief description of any judgement exceeding $100,000 rendered against the person during the five years preceding the date of the application.
  + A brief description of any bankruptcy or insolvency proceedings instituted by the person during the five years preceding the date of the application.
  + If the applicant is a corporation, the names of its executive officers and their dates of birth.

- Evidence of a bond, insurance, or a trust fund assuring that the applicant will be financially capable of meeting the closure and post-closure requirements of the permit.

8. Past Performance

Another part of Director's determination that the applicant is capable of fully carrying out the terms and conditions of the permit, he must consider the applicant's past performance in the arena of environmental protection.

Provide a brief description of any action for the enforcement of federal or state law, rule or regulation, or any county, city or local government ordinance relating to the protection of the environment, instituted against the applicant during the five years preceding the date of application.

9. Evidence of Zoning

Include evidence that the discharging facility complies with applicable municipal or county zoning ordinances and regulations.

IV. SUPPLEMENTAL INFORMATION REQUESTED BY THE DIRECTOR

This chapter describes how to gather and present additional information which the Director may request to determine if a permit can be issued for a given facility. A.A.C. R18-9-108.C. provides the scope of the information the Director may need to consider. Much of this information can be described as hydrologic or geologic in nature. However, because of familiarity with your facility, you may be asked to propose items such as alert levels, discharge limitations and temporary closure measure which will be established as permit conditions.

We have attempted to describe under which conditions or for what types of facilities some of this information will likely be required. Remember, this is guidance. There are no absolute answers. If you are unsure of your specific situation, discussion with Department personnel is encouraged.

A. SITE HYDROGEOLOGY

The information presented in this section will be critical to the permit decision making process, therefore, special attention should be paid to presenting and discussing this element. Information to be supplied in this section may include, but is not limited to, the items discussed below:

1. Surficial Geology

This section should discuss:

- geomorphology (topography and drainage) if the site will be altered to change the topography or redirect drainage, plans showing these changes should be presented

  This information will be required for all lined facilities (surface impoundments and landfills) since protecting the facility from run on will be important for proper sizing of impoundments and prevention of leachate formation in landfills. Also for these types of facility sites estimations of volumes of surface water flow will be needed (see section on Surface Water hydrology)
- site soil descriptions (type, horizontal and vertical distribution, characteristics such as infiltration rates,

organic content, and mineral content). This type of information will be required where compacted soil liners are proposed or where the soil or vadose zone is being relied on for pollutant removal.

2. <u>Subsurface Geology</u>

- cross sections;

  Include well logs used to construct the cross sections. Cross sections may be required where there are multiple geologic units present near the facility, where multiple aquifer systems exist beneath the facility or where wells from which data are presented, are completed at largely different depths. An example of an instance that would require geologic cross sections would be an application for a mining operation.

- thickness and water bearing characteristics of each geologic unit. Identify and characterize aquifers and geologic units of limited permeability. Include information on composition, grain size, prosity, permeability, and specific capacity.

3. <u>Surface Water Hydrology</u>

This section should include:

- the location of any perennial or ephemeral surface water bodies (these can be included on the location or site plan maps if appropriate)

- the distance of discharge areas from surface water bodies

  if there are perennial surface water bodies in the area of the discharge, the application should address the discharge's effect on the surface water quality relative to the water quality standards for the water body(s)

- flow characteristics of streams (when giving flow rates, give location, method and date of measurement, the annual mean flow, and period of record.)

- the location of the 100 year flood plain (this may be shown on the location map or site plan where the scale is appropriate)

- include calculations showing that design of any diversion or containment structures are adequate to handle anticipated surface water flows.

4. <u>Groundwater Hydrology</u>

This section should provide a good regional and site-specific discussion of groundwater and its relationship to the geology of the site, and, at a minimum, provide the following:

- Depth to groundwater

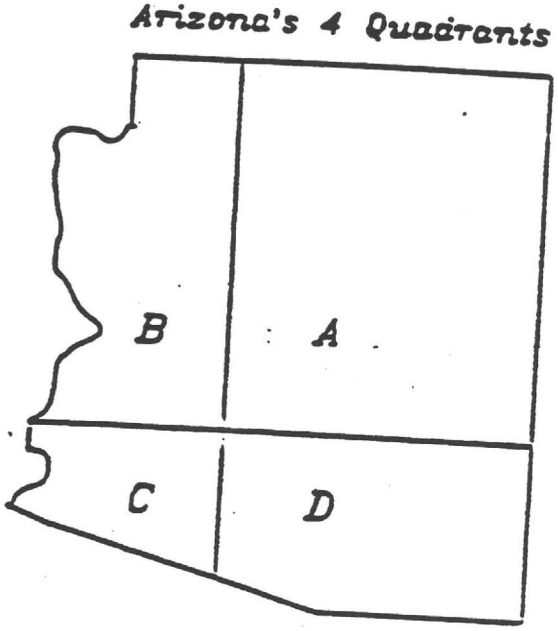
Give location of wells measured, date of measurement, location of measuring point and its height relative to land surface, time since well pumped prior to measurement, and any known construction data on the well, such as total depth and perforated intervals. Indicate if any wells are pumping in the vicinity at time of the measurement. This information should be given in tabular form. When giving well locations, use the Bureau of Land Management system of land subdivision (Figure 2). If drillers logs are available, copies should be included

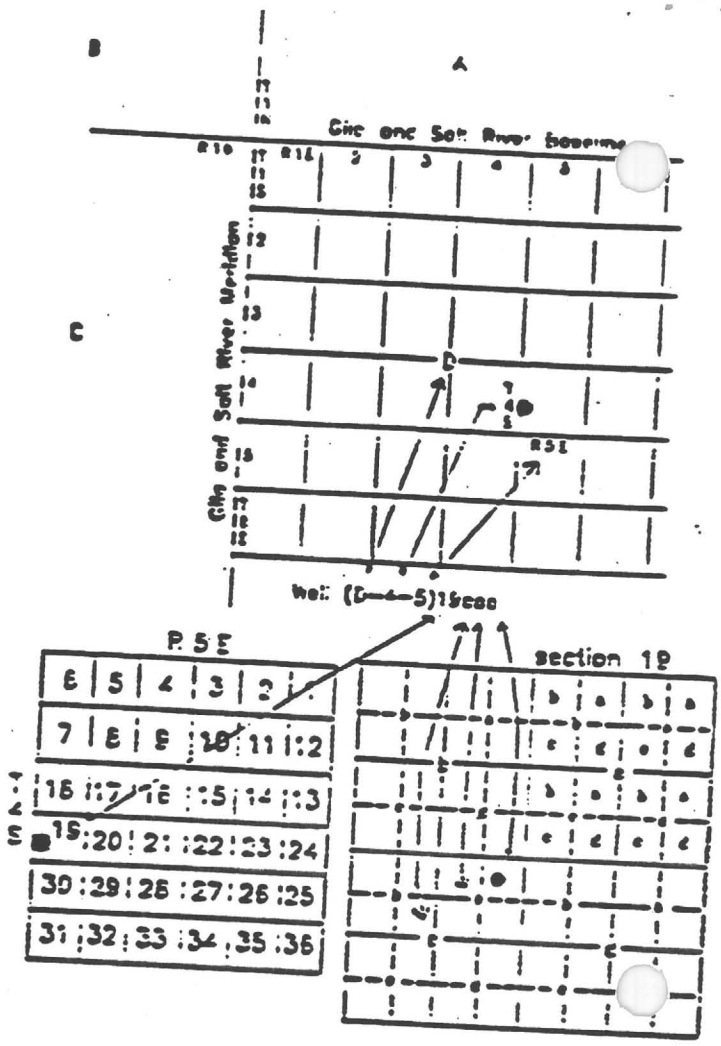
Water level elevation contour map (with data points plotted)

- A discussion of groundwater flow conditions - including flow rates, volumes and direction (seasonal changes in flow direction due to surface water recharge or groundwater pumpage should be described). Trends in water levels with time should be discussed and relevant hydrographs and equipotential maps should be included. All applications must identify the direction of groundwater flow in order to determine the point of compliance

- groundwater quality

Document ambient groundwater quality using sample data from wells. The specific parameters for which ambient groundwater quality must be characterized, will depend on the characteristics of the discharge.





The well numbers used by the Geological Survey in Arizona are in accordance with the Bureau of Land Management's system of land subdivision. The land survey in Arizona is based on the Gila and Salt River meridian and base line, which divide the State into four quadrants. These quadrants are designated counterclockwise by the capital letters A, B, C, and D. All land north and east of the point of origin is in A quadrant, that north and west in B quadrant, that south and west in C quadrant, and that south and east in D quadrant. The first digit of a well number indicates the township, the second the range, and the third the section in which the well is situated. The lowercase letters a, b, c, and d after the section number indicate the well location within the section. The first letter denotes a particular 160-acre tract, the second the 40-acre tract, and the third the 10-acre tract. These letters also are assigned in a counterclockwise direction, beginning in the northeast quarter. If the location is known within the 10-acre tract, three lowercase letters are shown in the well number. In the example shown, well number (D-4-5)19cad designates the well as being in the NE quarter of the NE quarter of the SW quarter, section 19, township 4 south, range 5 east. Where more than one well is within a 10-acre tract, consecutive numbers beginning with 1 are added as suffixes.

reference: Water Resources Data Arizona Water Year 1985
U.S. Geological Survey Water-Data Report AZ-85-1
White, N.D. and Garrett, W.B.

Figure 2 - WELL NUMBERING SYSTEM IN ARIZONA

5. Discharge Impact Area Assessment

The concept of Discharge Impact Area (DIA) is a key component of the Aquifer Protection Permit Program. The applicant may be directed by the department to supply information regarding hydrogeologic conditions, uses of groundwater, and existing water quality in the facility's DIA. The Department will evaluate the proposed project's effects with the DIA and may set permit conditions such as Alert Levels that are designed to regulate water quality impacts within that area. Facilities which may be required to perform discharge impact assessments include any facilities with large volumed discharges, such as WWTPs, recharge projects and injection wells.

Statutory Definitions

A.R.S. 49-201 contains two definitions that present the Discharge Impact Area in very broad terms:

1) Discharge Impact Area: "the potential areal extent of pollutant migration, as projected on the land surface, as a result of a discharge from a facility."

2) Pollutant: "fluids, contaminants, toxic wastes, toxic pollutants, dredged spoil, solid waste, substances and chemicals, pesticides, herbicides, fertilizers and other agricultural chemicals, incinerator residue, sewage, garbage, sewage sludge, munitions, petroleum products, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and mining, industrial, municipal and agricultural wastes or any other liquid, solid, gaseous or hazardous substances." Collectively, these definitions imply that establishing the DIA for a facility requires consideration of the most mobile constituents likely to be transported within the aquifer as a result of project operation.

The constituents to be considered are not limited to those regulated by numeric Aquifer Water Quality Standards, but include virtually any kind of fluid, solid, etc. DEQ expects the applicant to make the best effort to select and evaluate the most mobile and/or most concentrated pollutants that might be caused to migrate. In some cases, water may be the most mobile "pollutant" and may be used to define the DIA.

Using the "potential" "extent" of "migration" does not tie the discharge impact area to any standard concentrations, but implies that if pollutant could migrate into an area in any concentration, that area is part of the DIA. For practical purposes, the edge of the DIA should be that point at which the pollutant, because of dilution, dispersion, adsorption, or degradation, reaches a level indistinguishable from ambient concentrations by standard test methods.

Establishing the DIA

To establish the DIA for a facility, the applicant should use some form of quantitative model to predict pollutant migration. Many different types of models are available and they all have their applications. In most cases the appropriate models for discharging facilities will be analytical or semianalytical. It is the applicant's responsibility to select and apply a model that best represents their site conditions and operating scenario.

The following data should be incorporated into the transport model:

- Geometry of the system including aquifer depth, saturated thickness, confining layers, and mixing zones.

- Groundwater flow parameters such as direction gradient, recharge zones, and pumping wells.

- Ambient pollutant concentrations.

- Pollutant concentrations in discharge and discharge rates. Pollutant characteristics such as dissolved or phase separating.

- Estimated or test values of dispersivity.

- Retardation factor or distribution coefficient for solutes that can be adsorbed and decay factors if applicable.

If appropriate data are not available, the applicant may be directed to perform on-site or laboratory testing to gather the information or may be allowed to use justifiable assumptions based on published ranges of material properties.

The timeframe for migration is left open-ended in the statutory definitions. Modeling pollutant migration, however, requires that a time period be specified. For short-lived projects the timeframe may be the project life, including a reasonable post-closure period. For long-term projects the applicant should present a DIA that represents steady state conditions for the discharge.

Because DIA is defined by pollutant migration that results from a discharge, the DIA may incorporate existing contaminant plumes that may be caused to migrate. Facilities that discharge high volumes of fluid and that will influence groundwater flow rates and directions should consider known pollutant plumes in developing their DIA. Causing plume migration will not be grounds for permit denial. However, permit conditions may be set to control the impact of a facility on existing groundwater contamination problems.

6. <u>Monitoring Plan Considerations</u>

An applicant for an APP may propose a monitoring plan for the facility. The specifics of each monitoring program should be tailored to each facility, characteristics of the discharge and the type or purpose of monitoring.

Types of Monitoring

Monitoring may be required at a facility to confirm that the predicted characterization of the discharge is correct, to assure that discharge mitigation devices are functioning properly, or to confirm that the discharge is not causing a violation of an aquifer water quality standard at the point of compliance. The type and location of monitoring will be different depending on which of these goals it is to achieve. There are three main types of monitoring:

- Discharge Monitoring

This activity determines the quality or quantity of the potential discharge before it is released into the discharging facility. Discharge monitoring may be required when a permit specifies a level of quality or limit of quantity for the discharge. The permit will specify a maximum disposal level (MDL) or limit when the application indicates it is necessary to either treat the discharge or limit discharge to meet aquifer water quality standards or BADCT. Discharge monitoring may also be required if there is a potential for unpermitted chemicals being discharged.

- Control Technology Monitoring

  This activity tests the unsaturated zone to determine if liners or other control mechanisms are functioning as designed. Alert levels are typically used here. Detection usually triggers a contingency action to repair or maintain the facility to prevent discharge.

- Groundwater Monitoring

  Groundwater monitoring may be required at a point of compliance to assure compliance with Aquifer Water Quality Standards or it may be required between the discharge location and the point of compliance in order to refine predictions on the facilities impact.

- Determining When Monitoring is Necessary

Factors to be considered in determining if monitoring will be required include:

- discharge quantity

- concentration of constituents of concern in the discharge

- applicable aquifer water quality standards for constituents of concern

- the level of uncertainty regarding the effect of the discharge on groundwater quality

- proximity of water supply wells

Components of a Monitoring Plan

In proposing a monitoring plan the applicant should specify the following:

- number, location, and construction features of monitoring points and justification

- monitoring instrumentation (description of equipment to be used and method of installation)

- constituents to be monitored

- method of sampling, field measurements, sampling protocols, volumes to be purged from wells, sample

preservations, transportation, chain of custody, method of analysis and QA/QC procedures

- frequency of sampling

- post-closure monitoring

- record keeping and reporting

It is the responsibility of the facility to submit a plan that will produce factual, legally valid data. If DEQ finds the submitted monitoring plan adequate it will be incorporated as a condition of the permit. The following sections give some general information and references which may be useful in preparing the components of the monitoring plan.

Location of Monitoring Points

Monitoring points for groundwater monitoring should be located such that they coincide with the compliance point or are not farther away from the discharge than the compliance point. (See definition of compliance point in chapter 2). There should be a sufficient number of monitor points to assure that standards are not violated or that control are functioning properly. All monitoring point locations must be given in latitude and longitude.

Constituents to be Monitored

In developing a monitoring program, the constituents to be monitored should be determined early through consultation with DEQ. In many cases this early consultation is important because the applicant will begin monitoring prior to the permit application in order to collect ambient data. The type of well construction and sampling equipment may vary greatly for different parameters (Scalf, et al. 1981; Barcelona et al. 1983; and Schalla and Oberlander, 1982).

The identification of which constituents to be monitored will be based upon a consideration of:

- existing concentration levels of major ions in groundwater (i.e. background concentrations)

- constituents known to be in the effluent and/or any expected degradation products of those constituents

- the subsurface mobility of each of the constituents in the discharge

- constituents in the discharge which have a potential to adversely affect the use of the groundwater

Good monitoring parameters will:

- have high concentrations in the discharge relative to background concentrations

- have high mobility in the subsurface and therefore, potential for migrating to groundwater and

- be of public and environmental health concern

Generally, any effluent constituent which may affect the use of the water supply should be monitored. However, if the constituent has a low mobility in the subsurface and, therefore, is not expected to appear at the monitoring location, a more conservative constituent (one with greater surface mobility) may be chosen as an indicator parameter. Once an increase in this indicator parameter is detected, complete constituent monitoring will begin. Background water quality must be determined for all constituents which may affect use even if an indicator parameter will be used.

The Department will make the final determination of the constituents to be monitored upon review of the facility's recommendations and rationale. These constituents will be listed in the groundwater permit along with provisions for reevaluating the monitoring constituents as data are generated and interpreted.

Monitoring Instrumentation

Unsaturated (Vadose) Zone Monitoring

If a facility is permitted as a non-discharge facility, vadose zone monitoring may be required to document that there is no fluid movement. Wilson (1981 and 1982) and Everett, et. al. (1983) present the various vadose zone monitoring techniques to assess fluid movement.

Saturated Zone Monitoring

A monitoring well is necessary for obtaining samples of groundwater for analysis. In designing a monitoring well, the necessary considerations include:

- well size (diameter)
- number, location and length of perforated intervals
- sealing
- casing material
- type, materials, and construction of samplers or pumps

- location of pump within the perforated interval

It is important that wells be located, constructed and sampled in such a way as to ensure the collection of samples that are representative of the groundwater. Table 3 summarizes the advantages and disadvantages of different well sizes, casing materials and samplers along with references for further information. All wells must be constructed in accordance with Arizona Department of Water Resources Well Regulations (A.C.R.R. Title 12, Chapter 15, Article 8). A variance of these minimum onstruction standards may be necessary to achieve proper monitoring configurations. Prior to drilling, a permit to drill must be obtained from the Operations Division of the Department of Water Resources. Any necessary variances must be requested when applying for the drilling permit.

TABLE 3: Summary of Monitoring Well Construction Materials and Sampling Devices

Method	Description	Advantages	Disadvantages	References
Monitoring Well Construction				
1. Well Diameter				
a. Two-inch wells	Used where transmissivity is low or unknown	1. Inexpensive 2. Sampling techniques would not cause loss of volatiles.	1. May be difficult to develop 2. Samples small area 3. Use limited to monitoring	Schalla and Oberlander (1983)
b. Four-inch wells	Used where well yields are low.	1. Most development techniques possible 2. Suitable for most situations 3. May be used to perform dynamic sampling.	1. May not have capacity for use as withdrawals well for clean-up activities.	
c. Six-inch wells	Used where transmissivity is high.	1. All development techniques possible 2. Samples large area 3. Usually has capacity for use as withdrawal well for clean-up activities.	1. Expensive 2. Large volume of contaminated water to dispose of.	
2. Casing Materials				
a. PVC	This plastic is excellent for use in inorganic monitoring There may be depth limitations due to relative weakness of material. Schedule 80 may be necessary for depths over 100 feet.	1. Lightweight 2. Resistant to acids and alkalies 3. Inexpensive 4. Readily available	1. Weak, less rigid than steel 2. May absorb or leach organic organic chemicals 3. May not bond well with cement seal.	Curran and Tomson (1983 Fetter (1983 Miller (1982 Barcelona, Gibb, and Miller (1983

TABLE 3: (continued)

Method	Description	Advantages	Disadvantages	References
b. Teflon	The expense of this material may make it somewhat impractical for some applications.	1. Lightweight 2. Inert	1. Expensive 2. Not readily available	
c. Mild Steel	This material is excellent for use in organic monitoring Should not be used in corrosive situations or where monitoring for metals.	1. Strong and rigid 2. Resistant to corrosion and oxidation 3. Readily available	1. Heavy 2. May leach metals 3. Not chemically resistant	
d. Stainless Steel	This material is excellent for all but acidic waters.	1. Strong and rigid 2. Resistant to corrosion and oxidation 3. Readily available	1. Heavy 2. May corrode and leach chromium in very acidic waters. 3. Expensive (the primary limitation)	
Groundwater Sampling Apparatus				
1. Bailers	In its simplest form, a bailer consists of a pipe closed at one end and open at the other. A cable is attached to the open end. To collect a sample, the bailer is lowered into a well below the water level. The filled container is then raised to the surface.	1. Can be constructed with materials compatible with parameter(s) of interest (see II.B.2) 2. Inexpensive enough that separate bailer may be dedicated to each well 3. No power required 4. Outgassing of volatile organics minimized.	1. Impractical to evacuate stagnant water in well 2. Transfer of sample to sample bottle may result result in aeration	Gibb, Schuller, and Griffin 1981 Schalf, McNabb, Dunlap Cosby, and Fryberger (1981) Nacht (1983) Sisk (1981)

TABLE 3: (continued)

Method	Description	Advantages	Disadvantages	References
2. Suction Lift Pumps	These pumps create a vacuum inside a tube extending below the water level.	1. Portable and inexpensive.	1. Sampling limited to groundwater depths less than about 20 feet (the practical maximum suction lift) 2. Can strip volatile organics from sample	
3. Portable	Two types of portable submersible pumps are available. The newest type has a small diameter (as low as 1"), is good to a depth of 160 ft., and may be suitable for organics The older portable submersible pumps have been used to depths of 300 ft., but require a 3-inch I.D. casing.	1. Portable. 2. Depending upon pump size, large pumping rates and sampling from deep wells is possible. 3. Can be used to prepump prior to sampling. 4. Expensive	1. Larger pumps may require use of larger service type type vehicle 2. With conventional construction materials, many not be suitable for organics. 3. May be difficult to prevent cross-contamination if pump is used for sampling more than one well.	
4. Air-lift	Air is applied to force water out of a discharge tube.	1. Portable or permanent. 2. Can be used to prepump prior to sampling.	1. Oxidation a problem 2. No suitable for pH sensitive parameters, such as metals. 3. Stripping of volatile compounds may occur 4. The primary limitation is the potential alteration of water quality. 5. Possibility of introducing contaminants through air.	

TABLE 3: (continued)

Method	Description	Advantages	Disadvantages	References
5. Gas-drive Samplers	Similar to air-lift samplers, but gas (usually nitrogen) used instead of air to minimize alteration of water quality.	1. Portable 2. Can be used in small diameter wells 3. Inexpensive 4. Can be constructed with inert materials.	1. Requires compressed gas 2. Possible depth limitation 3. Alteration of water quality may occur if gas if gas contacts water	Robin, Dytynyhyn, & Sweeney 1982
6. Gas-operated Bladder pump	These pumps contain a collapsible membrane. Water enters membrane until full; gas is then applied to annulus around membrane, forcing water upwards.	1. Can be constructed of inert materials 2. Gas does not contact water sample 3. Small diameter	1. Requires compressed gas 2. Low pumping rates 3. Expensive	
7. Gas-driven Piston pump	Gas enters and exhausts from chambers between two pistons. Water enters on suction stroke, and is expelled in pressure stroke.	1. Gas does not contact water sample 2. Can be used for deep water levels 3. Small diameter	1. Expensive 2. Low pumping rates 3. Requires compressed gas 4. Particulate matter may damage pump unless suction line filtered.	

The depth and perforated interval of a well should be such that samples are obtained from the portion of the aquifer that would show the earliest effect from the discharge. For most discharges this will be the upper portion of the uppermost aquifer at the site. Therefore, most monitor wells should be completed only 20 or 30 feet into the aquifer. Exceptions to this general guideline would be: 1) discharges which are injected into or below the aquifer, 2) wells in very low yield aquifers, and 3) wells in areas with large seasonal water level variations. Where fluctuations in water table occur, these should be documented with hydrographs. Perforated intervals may be extended below or above the water table in such instances. However, in order to collect a representative sample, pmp intakes should be set no more than 10 feet below the projected pumping water level.

Sampling Protocols

Water standing in a well or the gravel pack annulus is in contact with the atmosphere and well casing. Therefore, its chemistry may differ from formation water that has not been exposed to the atmosphere. Just as samples from unpurged wells are not representative, samples from overpurged wells may also not be representative. Similarly once a sample is removed from the aquifer it's chemistry may change in response to its new environment. Because of these factors, sampling protocols must be

designed to ensure that samples representative of the aquifer are collected and to ensure that the chemical properties of that sample are preserved until analysis. The following references discuss sampling protocols in more detail: Scalf, et. al., 1981; Gibb, et. al., 1981, Nacht, 1983. Field measurements, which should accompany laboratory analytical data, should include temperature, specific conductance or electrical conductivity (adjusted to 25°C) and pH.

All monitoring plans must include a discussion of sampling protocols to be followed. This would include:

- methods of determining time or amount of pumping prior to sampling

- methods of cleaning sampling equipment (unless dedicated pumping equipment is used)

- types of sampling containers

- sample collection, preservation and transport

- quality control procedures such as duplicate sampling, equipment blanks and travel blanks

- chain of custody

- analytical methodologies to be used

All analytical work must be performed by a laboratory which is licensed by the State of Arizona, for the monitored parameter or approved by DEQ. Appendix gives some guidelines on sampling protocols. More detailed information can be found in the Departments Quality Assurance Project Plan Manual.

Frequency of Monitoring

The applicant should specify in the monitoring plan the frequency of sampling at each monitoring point. Discharge monitoring will generally be the most frequent since discharge quality may vary rapidly. In most cases groundwater monitoring should be quarterly or less.

Post Closure Monitoring

The monitor plan should specify the length of time that each monitoring point will be sampled after closure and the frequency of the sampling. The length of the post-closure monitoring period will depend on:

1. the amount of discharge

2. expected travel times to the monitoring point

3. probability of discharges occurring after closure.

CONTINGENCY PLAN REQUIREMENT

A permittee must be prepared to take action to correct any of the following circumstances:

1) Violation of a permit condition

2) Violation of an Aquifer Water Quality Standard

3) Exceeding an alert level

4) An imminent and substantial endangement to the public health or the environment

You must provide the name and phone number of an emergency response coordinator who will be responsible for notifying the Department and implementing your contingency plan addressing conditions that represent an imminent and substantial endangerment to the public health or the environment.

(You) should identify equipment failures which could cause a release of toxic substances to the environment, flooding, unsanitary conditions or other events with immediate impacts. Once identified, develop a plan of action and specify necessary

equipment, and personnel to remedy the impacts of such events. The plans should contain sufficient detail that ADEQ is assured that the most timely response will be provided.

If you were required to develop a contingency plan for another program such as RCRA, it may be amended as necessary to meet the requirements of the APP program, and submitted to the Department for approval under this section.

For circumstances which do not represent an immindent and substantial endangement to the public health and environment the applicant must propose a contingency plan consistent with A.A.C. R18-9-114.D.

C. REMEDIAL ACTION PLAN

When Required

While corrective actions conducted under a contingency plan for a permitted facility as discussed above, are a type of remedial activity, A.R.S. 49-243.G. allows for incorporation of remedial actions into a permit for existing facilities which were in operation prior to August 13, 1986.

In developing a permit application, the applicant could be directed to evaluate the vadose zone of the aquifer water quality beneath the facility site. If this evaluation indicates that past discharge practices have released hazardous substances such that the aquifer is or may be affected, the applicant may be directed to develop a remedial action plan. The implementation of the approved plan will become a permit condition.

Components of Plan

1. Identify source or sources of the release:

- Using knowledge of current disposal practices (operating practices)

- Investigating records of previous owners or interviewing former employee

- By examining the pattern of contamination (trace back to source)

2. Outline procedures for removing, treating, containing or eliminating the source of the release

3. Evaluate the extent of the contamination by the appropriate means which may include:

- Soil gas sampling

- Soil borings

- Groundwater sampling

- Geophysical surveys

- Other methods approved by Department

Any remedial action should attempt to restore the aquifer to levels of the AWQS or other health based guidance levels. The Department will provide the applicant with these values. It is recognized that the final cleanup

levels required by permit will be based on the feasibility of achieving those levels by the chosen treatment/remedial technology.

4. The applicant should review various alternatives for remediation, and propose a specific alternative. In reviewing alternatives, applicant should consider the following factors for each alternative.

   a. Population, environmental and welfare concerns at risk

   b. Routes of exposure

   c. Amount, concentration, hazardous properties, environmental fate, such as the ability to bio-accumulate, persistence and probability of reaching the waters of the state, and the form of the substance present.

   d. Physical factors affecting human exposure such as hydrogeology, climate and the extent of previous and expected migration.

e. The extent to which the amount of water available for beneficial uses will be preserved by a particular type of remedial action.

f. The technical practicability and cost effectiveness of remedial actions applicable to a site.

g. Propose a monitoring plan to determine the effectiveness of the selected remedial action alternative. Depending on the method of cleanup, monitoring could be conducted in the aquifer, vadose zone or soil or at the discharge from a treatment system. Frequency of monitoring could vary from daily to one-time at completion of the project.

D. CLOSURE PLAN

Attach a proposed closure plan. The plan should give details for closing the various discharge activities when you plan to cease the facility's operation. The Department recognizes that closure plans may change during operation. Therefore, a final closure plan will also be required 90 days prior to cessation of operation (R18-9-116.C).

The purpose for the closure plan submitted with the application is to ensure the facility can control further discharges and will not cause a violation of an Aquifer Water Quality Standard to evaluate whether you are capable of meeting the costs of closure.

The closure plan should include:

- The expected lifetime of the facility.

- The approximate quantities and the chemical, biological, and physical characteristics of the materials to be removed from the facility.

- The destination of the materials to be removed from the facility and an indication that placement of the materials at that destination is approved.

- The approximate quantities and the chemical, biological, and physical characteristics of the materials that will remain at the facility.

- The methods to be used to treat any materials remaining at the facility.

- The methods to be used to control the discharge of pollutants from the facility.

- Any limitations on future land or water uses created as a result of the facility's operations or closure activities.

- The methods to be used to secure the facility.

- An estimate of the cost of closure.

- A schedule for implementation of the closure plan and the submission of a post-closure plan.

In addition, specify to what degree any of the above items would be implemented during periods of temporary cessation. The same overlying philosophy for permanent closure applies here, but on a shorter term basis.

If the closure plan indicates the possibility of continuing discharges, a proposed post-closure plan is required.

The nature of some facilities will always necessitate post-closure plans. These included landfills, mine tailing ponds.

The proposal for post-closure should include:

- The duration of post-closure care.

- The monitoring procedures to be implemented by the permittee, including monitoring frequency, type, and location.

- A description of the operating and maintenance procedures to be implemented for maintaining aquifer quality protection devices, such as liners, treatment systems, pump-back systems, and monitoring wells.

- A schedule and description of physical inspections to be conducted at the facility following closure.

- An estimate of the cost of post-closure maintenance and monitoring.

- A description of limitations on future land or water uses, or both, at the facility site as a result of facility operations.

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APPENDIX A. AQUIFER WATER QUALITY STANDARDS

I. Narrative aquifer water quality standards (A.C.C. R18-11-405)

A. A discharge shall not cause a pollutant to be present in an aquifer classified for a drinking water protected use in a concentration which endangers human health.

B. A discharge shall not cause or contribute to a violation of a surface water quality standard established for a navigable water of the State.

C. A discharge shall not cause a pollutant to be present in an aquifer which impairs existing or reasonably foreseeable uses of water in an aquifer.

II. Numeric Aquifer Water Quality Standards (A.C.C. R18-11-406)

A. Aquifer Water Quality Standards for Inorganic Chemicals

Pollutant	(mg/l)
Arsenic	0.05
Barium	1

Cadmium	0.010
Chromium	0.05
Lead	0.05
Mercury	0.002
Nitrate (as N)	10
Selenium	0.01
Silver	0.05
Fluoride	4.0

B. Aquifer Water Quality Standards for Organic Chemicals

Pollutant	(mg/l)
Endrin	0.0002
Lindane	0.004

Methoxychlor	0.1
Toxaphene	0.005
2,4,-Dichlorophenoxyacetic Acid	0.1
2,4,5-Trichlorophenoxypropionic Acid	0.01
Total Trihalomethanes	0.10
Benzene	0.005

Pollutant	(mg/l)
Vinyl Chloride	0.002
Carbon Tetrachloride	0.005
1,2-Dichloroethane	0.005
Trichloroethylene	0.005
1,1-Dichloroethylene	0.007
1,1,1-Trichloroethane	0.20

Para-Dichlorobenzene	0.075

C. Aquifer Water Quality Standards for Radionuclides

1. The maximum concentration for gross alpha particle activity, including radium-226 but excluding radon and uranium, shall not exceed 15 pCi/1.

2. The maximum concentration for combined Radium-226 and Radium-228 shall not exceed 5 pCi/1.

3. The average annual concentration of beta particle and photon radioactivity from man-made radionuclides shall not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem/year.

4. Except for the radiouclides listed in this subsection, the concentration of man-made radionuclides causing 4 millirem total body or organ dose equivalents shall be calculated on the basis of a 2 liter per day drinking water intake using the 168 hour data listed in "Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure," National Bureau of Standards Handbook 69,

National Bureau of Commerce, as amended August, 1963 (and no future editions), incorporated herein by reference and on file with the Office of the Secretary of State and with the Department. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed 4 millirem/year. The following average annual concentrations are assumed to produce a total body or organ dose of 4 millirem/year:

Radionuclide	Critical Organ	pCi/l
Tritium	Total Body	20,000
Strontium-90	Bone Marrow	8

D. Aquifer Water Quality Standards for Microbiological Pollutants

1. When the membrane filter technique is used to test aquifer water quality, the number of coliform bacteria shall not exceed any one of the following:
   a. One per 100 milliliters as the arithmetic mean of all samples examined in a month.

b. Four per 100 milliliters in more than one sample when fewer than twenty samples are examined in a month.

c. Four per 100 milliliters in more than five percent of the samples when twenty or more samples are examined in a month.

2. When the multiple tube fermentation technique and 10 milliliter standard portions are used to test the aquifer water quality, coliform bacteria shall not be present in any one of the following:

a. More than ten percent of the tubes in all the samples examined in any one month.

b. Three or more tubes in more than one sample when less than twenty samples are examined in a month.

c. Three or more tubes in more than five percent of the samples when twenty or more samples are examined in a month.

3. When the multiple tube fermentation technique and 100 milliliter standard portions are used to test the aquifer water quality, coliform bacteria shall not be present in any one of the following:

a. More than sixty percent of the tubes in all samples examined in any one month.

b. Five tubes in more than one sample when fewer than five samples are examined in a month.

c. Five tubes in more than twenty percent of the samples when five or more samples are examined in a month.

E. Aquifer Water Quality Standards for Turbidity

1. One nephelometric turbidity unit as determined by a monthly average except that five or fewer nephelometric turbidity units may be allowed if it can be determined that the higher turbidity does not interfere with disinfection, prevent maintenance of effective disinfectant agents in water supply distribution systems, or interfere with microbiological determinations.

2. Five nephelometric turbidity units based on an average of two consecutive days.

APPENDIX B

Single Coordinate Latitude/Longitude Interpretation.

In order to locate a unique point on the earth's surface a system of locating is needed. The system must describe a position in both a north/south and east/west direction that is not duplicated anywhere else on earth. Latitude and longitude supplies the information needed to locate that unique point.

Latitude is used to determine the location north or south of the equator along lines called parallels. The equator is designated 0° latitude and the north and south poles are 90°N and 90°S respectively. The distance between degrees of latitude is constant anywhere on the earth. The measurements are written as degrees (°), minutes (') and seconds ("). There are 60 seconds per minute and 60 minutes per degree. A typical latitude would look like the following: 33°12'45" (read as thirty three degrees twelve minutes and forty five seconds). Arizona lies between 31 and 37° north latitude.

Longitude is used to determine the location east or west of the prime meridian, which runs through Greenwich, England and is considered zero longitude, and the International Dateline is the 180th meridian. All meridians converge at the poles, and so the distance between degrees varies depending on the latitude. Therefore, unlike degrees latitude, distance between degrees of longitude vary with location. The closer the point of interest is to the north or south pole the shorter the map distance will be between degrees. The nomenclature is written the same as latitude. A typical longitude would be written like the following: 111°30'25" (read as one hundred eleven degrees thirty minutes and twenty five seconds. Arizona lies between 109 and 115° west longitude.

Useful tools for locating the latitude and longitude (lat/long) of a single coordinate are a 7.5 minute USGS topographic map (also called a quadrangle map) and a specially created projection grid designed for use with these maps (included as Figures 3 and 4). The grid is designed to compensate for changes in the distance between degrees longitude with location. A typical USGS topographic map has a name located in the upper right and lower left corners. The name is generally from a prominent town or feature located within the map boundaries. Figure 1 shows a close up of the right upper corner of a topographic map and indicates the location of the name, latitude, and longitude. Longitude is found along the top and bottom edges of the map and latitude is on the right and left edges. Tic marks in the form of a "plus" (+) are located on the map at 2'30" (2 1/2 minute) intervals (Figure 1) for use in locating the lat/long with Figures 3 and 4.

To determine the lat/long of a single coordinate you will need to purchase or use the correct 7.5 min topographic map which includes your point of interest. These maps can be found at various map stores in Arizona.

The following description refers to Figures 3 and 4. Figure 3 will be used to determine longitude and Figure 4 will be used for latitude.

1. Locate the point of interest on the map (a dot or x at the site will do). Figure 2b indicates the relative distance of plus or minus one second therefore it is in your best interests to be as accurate as possible. The use of site plans, landmarks, street maps, etc. to locate your point of interest is recommended.

2. Note the latitude and longitude written in the lower right corner of the map. If your facility is located more than 2'30" from that corner you can find the latitude and longitude written at 2'30" intervals along the edges of the map. These intervals do not include the degrees, only minutes or minutes and seconds. The degrees (from the right lower corner) are added to the minutes and seconds. Make a note of the measurements closest to your point of interest. Also note the degrees of latitude for use in step #5.

3. If your point of interest is further than 2'30" from the edge use the small tic marks located at 2'30" intervals on the map (see Figure 1). Draw lines connecting the tic marks that surround your point of interest to make a square. Then proceed to the next step.

<u>To Determine Longitude:</u>

4. On the top edge of a separate sheet of paper make a mark. Lay the paper on the map so that the mark you made lies on, either the right edge of the map or on the right edge of the square you drew between tic marks, (whichever applies) and the top edge of the paper crosses your facility east to west. Mark the spot where your facility is located on the edge of the paper.

5. Lift the paper and lay it on Figure 3 so that your first mark is on the zero line of figure 3 and the number along the right side corresponds to the degrees latitude found at the lower right corner of the map.

6. Take the longitude you wrote down in step 2 and add the minutes and seconds from step 5 to get your longitude. Arizona's longitude ranges from about 109 to almost 115 degrees, west.

<u>To Determine Latitude:</u>

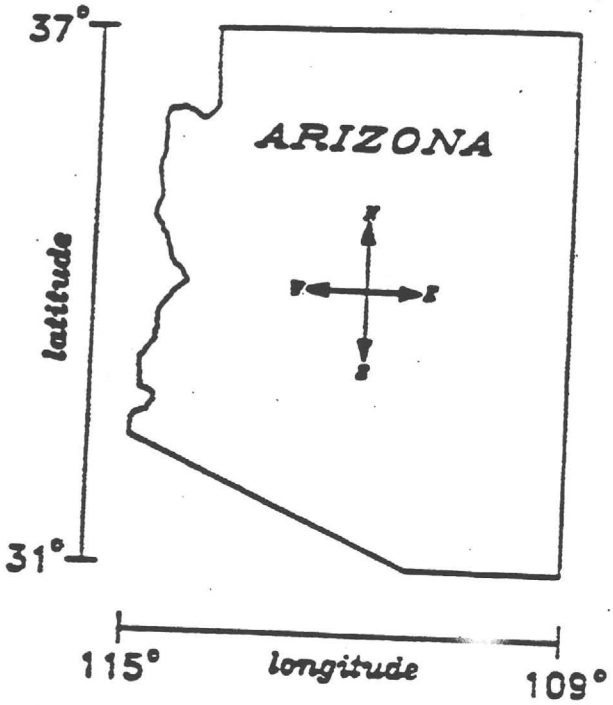
7. On the top edge of new clean sheet of paper make a mark. Lay the paper on the map so that the mark you made lies on, either the bottom edge of the map or on the bottom line of the square you drew between tic marks, (whichever applies) and the top edge of the paper crosses your facility north to south. Mark the spot where your facility is located on the top edge of the paper

8. Lift the paper and lay it on Figure 4 so that your first mark is on the zero point of the scale. Count the number of minutes and second between the two marks.

9. Take the latitude you wrote down in step 2 and add the minutes and seconds from step 8. Arizona's latitude ranges from 31 to 37 degrees north.

2a.

Figure 2



LONGITUDE (x)

1 degree = 305,572 ft = 57.873 miles
1 minute = 5093 ft = 0.965 miles
1 second = 85 ft = 0.016 mile

1 mile = 0.02 degree
1 mile = 1.04 minute
1 mile = 62.20 seconds

LATITUDE (y)

1 degree = 364,120 ft = 68.962 miles
1 minute = 6,069 ft = 1.149 miles
1 second = 101 ft = 0.019 mile

1 mile = 0.01 degree
1 mile = 0.87 minute
1 mile = 52.20 seconds

FORMAT:

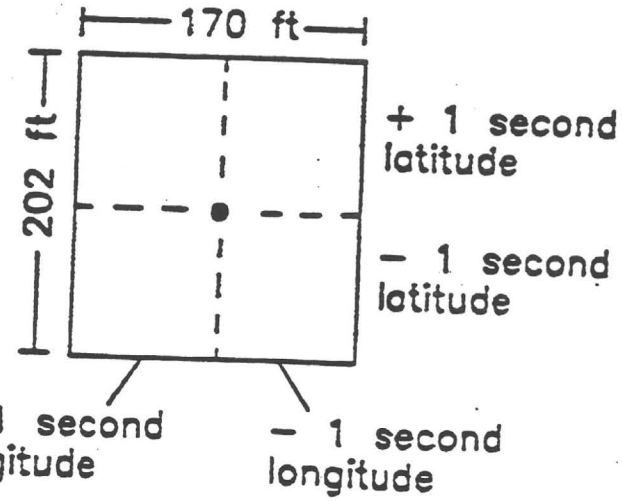
LONGITUDE: ddd mm ss.s LATITUDE: dd mm ss.s
(tenth of a second preferred when available)

2b.

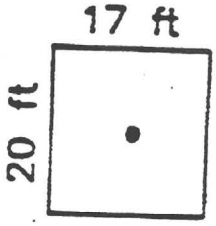
RANGE OF ACCURACY:

EXAMPLE:	WELL LOCATION	latitude (y)	longitude (x)
		34° 52' 30.0" /	109° 47' 30.0"

± 1 second



± 0.1 second



Close-up of NE corner of USGS Topographic Quadrangle

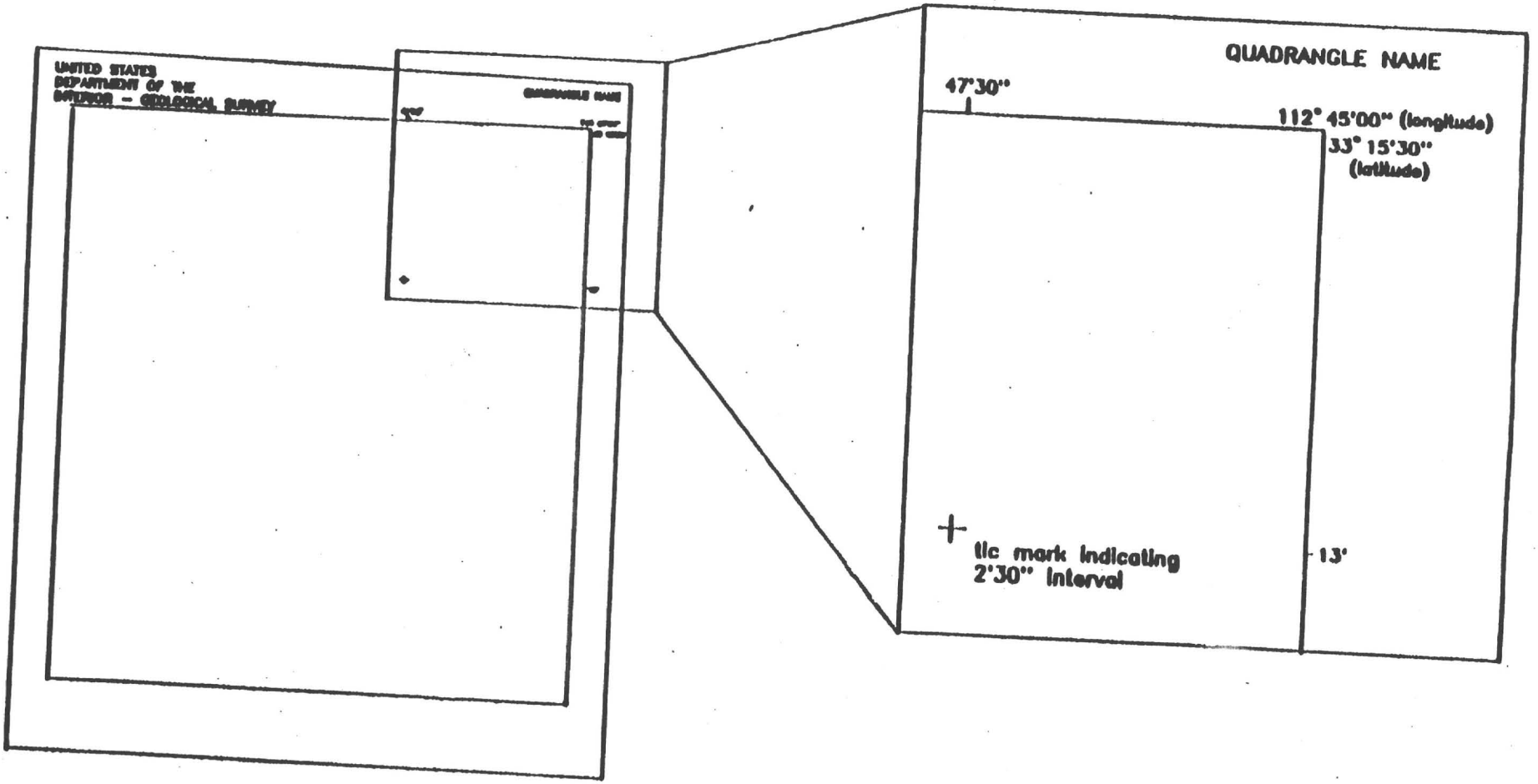


figure 1

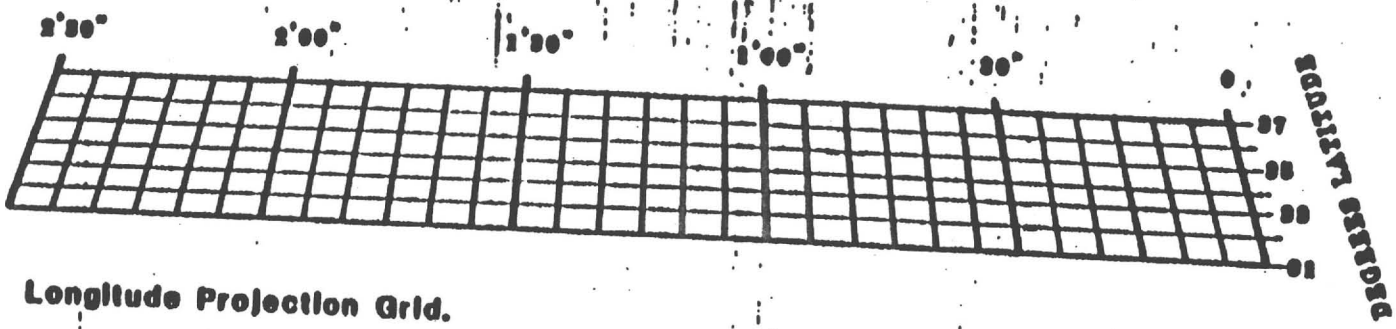


FIGURE 3: Longitude Projection Grid.

Use the degree line that corresponds to your latitude (see step 6)

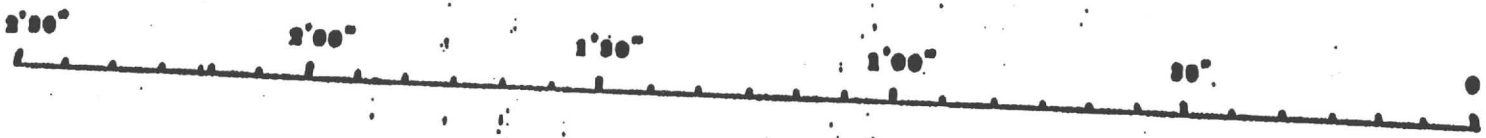


FIGURE 4: Latitude Projection Grid. See step 7.

APPENDIX C

The following chemical list has been designed to allow a person to determine which of the rules, statues or regulations a chemical belongs under.

The columns are set up so as to provide information on a chemical. The first column is an alphabetical list of the chemicals listed under the following;

1. Clean Water Act Sections 307(a) and 311(b)
2. CERCLA 102 as 302.4 of 40Code of Federal Regulations
3. RCRA 40 Code of Federal Regulations Section 261.33(e)
4. United States Code 42 241(b)(4).
5. A.R.S. 49-243D.

Since many chemicals have more than one name, the first column contains both the primary and the secondary names. Information on the chemicals is provided under the primary name, therefore when referencing the list by other than a primary name the second column will refer you to the primary name. The second column also provides a list of secondary names which a chemical may be referred to. The third column is the Chemical Abstracts Service Registry Number (CASRN) this number is unique to the chemical and therefore can be used as a final method of identifying the chemical. The next 3 columns are considered Hazardous Substances under ARS 49-201.16, and are the Clean Water Act Sections 311(b), 307(a) and CERCLA 102 as 302.4 of 40 Code of Federal Regulations. The seventh column corresponds to 40 Code of Federal Regulations 261.33(e) and is regulated under the Resource Conservation Recovery Act. The eighth column is United States Code 42 241(b)(4). The last column is organic substances referenced in ARS 49-243(D).

If a "y" (or yes) is given in any of the columns 4 through 9 it indicates the chemical is included on the list designated for that column similarly an "N" (or no) would mean that the chemical is not included on that list.

A "y" in any of the columns 4 through 8 would mean the chemical is a hazardous substance as defined by A.R.S. 49-201.16.

A "y" in the column marked A.R.S. 49-243D would mean the chemical is a chemical that requires the application of BADCT without regard to cost.

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS- 425 2430 99-241
ACENAPHTHENE	1,8-HYDROACENAPHTHYLENE; ETHYLENEAPHTHALENE	83329	N	Y	Y	N	N	N
ACENAPHTHYLENE	NONE	208968	N	Y	Y	N	N	N
ACETALDEHYDE	ETHANAL; ETHYLALDEHYDE	75070	Y	N	Y	N	N	N
ACETALDEHYDE, CHLORO-	CHLOROACETALDEHYDE	107200	N	N	Y	N	N	N
ACETALDEHYDE, TRICHLORO-	CHLORAL; TRICHLOROETHANAL	75876	N	N	Y	Y	N	Y
ACETAMIDE, N-(AMINOTHIOXOMETHYL)-	1-ACETYL-2-THIOUREA	591082	N	N	Y	N	N	N
ACETAMIDE, N-(4-ETHOXYPHENYL)-	PHENACETIN	62442	N	N	Y	Y	N	Y
ACETAMIDE, N-9H-FLUOREN-2-YL	2-ACETYLAMINOFLUORENE	53963	N	N	Y	N	Y	Y
ACETAMIDE, 2 FLUORO-	FLUOROACETAMIDE	640197	N	N	Y	N	Y	Y
ACETATE FAST ORANGE R	see 1-AMINO-2-METHYLANTHRAQUINONE	64197	Y	N	Y	N	N	N
ACETIC ACID	ETHANIC ACID; METHANE CARBOXYLIC ACID	141786	N	N	Y	N	N	N
ACETIC ACID, ETHYL ESTER	ETHYL ACETATE; ACETIC ETHER	62748	N	N	Y	Y	N	N
ACETIC ACID, FLUORO-, SODIUM SALT	FLUOROACETIC ACID, SODIUM SALT	301042	Y	N	Y	N	Y	N
ACETIC ACID, LEAD SALT	LEAD ACETATE; SUGAR OF LEAD	563688	N	N	Y	N	N	N
ACETIC ACID, THALLIUM(1) SALT	THALLIUM ACETATE	108247	Y	N	Y	N	N	N
ACETIC ANHYDRIDE	NONE	16752775	N	N	Y	Y	N	Y
ACETIC ETHER	see ACETIC ACID, ETHYL ESTER	67641	N	N	Y	N	N	N
ACETINIDIC ACID, N-[(METHYLCARBAMOYL)OXY] THIO-, METHYL ESTER	METHOMYL	75865	Y	N	Y	N	N	N
ACETONE	2-PROPANONE; DIMETHYLKETONE	75058	N	N	Y	N	N	N
ACETONE CYANOHYDRIN	2-METHYLLACTONITRILE, PROPANENITRILE,2-HYDROXY-2-METHYL	98862	N	N	Y	N	N	N
ACETONITRILE	ETHANENITRILE	53963	N	N	Y	N	N	N
3-(alpha-ACETAMYLBENZYL)-4-HYDROCOUMARIN AND SALTS	see WARFARIN	506967	Y	N	Y	N	Y	Y
ACETOPHENONE	ETHANONE, 1-PHENYL-; METHYL PHENYL KETONE	75365	Y	N	Y	N	N	N
2-ACETLYAMINOFLUORENE	ACETAMIDE, N-9H-FLUOREN-2-YL	591082	N	N	Y	N	N	N
ACETYL BROMIDE	NONE	107028	Y	Y	Y	Y	N	Y
ACETYL CHLORIDE	ETHANOYL CHLORIDE	79061	N	N	Y	Y	N	Y
1-ACETYL-2-THIOUREA	ACETAMIDE, N-(AMINOTHIOXOMETHYL)-	79107	N	N	Y	N	N	N
ACRALDEHYDE	see ACROLIEN	107131	Y	Y	Y	N	Y	Y
ACROLIEN	2-PROPENAL;ACRALDEHYDE; ACYLIC ALDEHYDE	124049	Y	N	Y	N	N	N
ACRYLAMIDE	2-PROPENAMIDE	23214928	N	N	N	N	Y	Y
ACRYLIC ACID	2-PROPENOIC ACID	1162659	N	N	N	N	Y	Y
ACRYLON	see ACRYLONITRILE	116063	N	N	Y	N	N	N
ACRYLONITRILE	2-PROPENENITRILE; ACRYLON; CARACRYL	148823	N	N	Y	N	Y	Y
ACYLIC ALDEHYDE	see ACROLIEN	309002	Y	Y	Y	Y	N	Y
ADIPIC ACID	PIRIMOPHOSMETHYL	107186	Y	N	Y	Y	N	Y
ADRIAMYCIN	DOXORUBICIN; 14-HYDROXYDAUNOMYCIN; ADRIABLASTINE	107051	Y	N	Y	N	N	N
ADRIABLASTINE	see ADRIAMYCIN	20859738	N	N	Y	N	N	N
AFLATOXINS	NONE	10043013	Y	N	Y	N	N	N
ALDICARB	PROPANAL, 2METHYL-2-(METHYLTHIO)-,O-[(METHYLAMINO) CARBONYL] OXIME							
ALANINE, 3-[P-BIS(2-CHLOROETHYL)AMINO] PHENYL- L-,	MELPHALAN; NITROGEN MUSTARD							
ALDRIN	1,2,3,4,10-10-HEXACHLORO-1,4,4a,5,8,8a-HEXAHYDRO-1,4:5,8-ENDO, EXO-DIMETHANONAPHTHALENE							
ALLYL ALCOHOL	2-PROPEN-1-OL; PROPENYLALCOHOL							
ALLYL CHLORIDE	3-CHLORO-1-PROPENE							
ALUMINUM PHOSPHIDE	NONE							
ALUMINUM SULFATE	NONE							
AMEROL	see AMITROLE							
2-AMINO-9	see 2-AMINO ANTHRAQUINONE							

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
2-AMINOANTHRAQUINONE	2-AMINO-9; 10-ANTHTRACENEDIONE	117793	N	N	N	N	Y	Y
AMINOBENZENE	see ANILINE							
4-AMINOBIPHENYL	BIPHENYLINE; P-PHENYLANILINE; XENYLAMINE	92671	N	N	N	N	Y	Y
1-AMINO-2-METHYLANTHRAQUINONE	ACETATE FAST ORANGE R	82800	N	N	N	N	Y	Y
2-AMINO-1-METHYL BENZENE	O-TOLUIDINE	95534	N	N	Y	N	Y	N
4-AMINO-1-METHYL BENZENE	P-TOLUIDINE	106490	N	N	Y	N	N	Y
5-(AMINOMETHYL)-3-ISOAZOLOL	3(2H)-ISOXAZOLONE,5-(AMINOMETHYL)-	2763964	N	N	Y	Y	N	N
2-AMINO-5-NITROANIOLE	see 5-NITRO-o-ANISIDINE							
4-AMINOPYRIDINE	4-PYRIDINAMINE	504245	N	N	Y	Y	N	Y
AMITROLE	1H-1,2,4-TRIAZOL-3-AMINE; AMEROL	61825	N	N	Y	N	Y	N
AMMONIA	NONE	7664417	Y	N	Y	N	N	N
AMMONIUM ACETATE	NONE	631618	Y	N	Y	N	N	N
AMMONIUM BENZOATE	NONE	1863634	Y	N	Y	N	N	N
AMMONIUM BICARBONATE	NONE	1066337	Y	N	Y	N	N	N
AMMONIUM BICHROMATE	NONE	7789095	Y	N	Y	N	N	N
AMMONIUM BIFLUORIDE	NONE	1341497	Y	N	Y	N	N	N
AMMONIUM BISULFITE	NONE	10192300	Y	N	Y	N	N	N
AMMONIUM CARBAMATE	NONE	1111780	Y	N	Y	N	N	N
AMMONIM CARBONATE	NONE	506876	Y	N	Y	N	N	N
AMMONIUM CHLORIDE	NONE	1215029	Y	N	Y	N	N	N
AMMONIUM CHROMATE	NONE	7788989	Y	N	Y	N	N	N
AMMONIUM CITRATE, DIBASIC	NONE	3012655	Y	N	Y	N	N	N
AMMONIUM FLUOBORATE	NONE	133826830	Y	N	Y	N	N	N
AMMONIUM FLUORIDE	NONE	1212518	Y	N	Y	N	N	N
AMMONIUM HYDROXIDE	NONE	1336216	Y	N	Y	N	N	N
AMMONIUM N-NITROSOPHENYLHYDROXYLAMINE	see CUPFERRON							
AMMONIUM OXALATE	NONE	6009707	Y	N	Y	N	N	N
		5972736						
AMMONIUM PICRATE	PHENOL, 2,4,6-TRINITRO- AMMONIUM SALT	14258492						
AMMONIUM SILICOFLUORIDE	NONE	131748	N	N	Y	Y	N	Y
AMMONIUM SULFAMATE	NONE	16919190	Y	N	Y	N	N	N
AMMONIUM SULFIDE	NONE	7773060	Y	N	Y	N	N	N
AMMONIUM SULFITE	NONE	12135761	Y	N	Y	N	N	N
AMMONIUM TARTRATE	NONE	10196040	Y	N	Y	N	N	N
AMMONIUM THIOCYANATE	NONE	14307438	Y	N	Y	N	N	N
AMMONIUM THIOSULFATE	NONE	3164292						
AMMONIUM VANADATE	NONE	1762954	Y	N	Y	N	N	N
AMYL ACETATE	VANADIC ACID, AMMONIUM SALT	7783188	Y	N	Y	N	N	N
ISO-	NONE	7803556	N	N	Y	N	N	N
SEC-		628637	Y	N	Y	N	N	N
TERT-		123922						
ANILINE		626380						
o-ANISIDINE AND o-ANISIDINE HYDROCHLORIDE	BENZENAMINE; AMINOBENZENE	625161						
ANTHRACENE	2-METHOANILINE	62533	Y	N	Y	N	N	N
10-ANTHRACENEDIONE	NONE	92519	N	N	N	N	Y	Y
ANTIMONY	see 2-AMINOANTRAQUINONE	120127	N	Y	Y	N	N	N
ANTIMONY AND COMPOUNDS	NONE							
ANTIMONY PENTACHLORIDE	NONE	7440360	N	Y	Y	N	N	N
ANTIMONY POTASSIUM TARTRATE	NONE		N	Y	Y	N	N	N
ANTIMONY TRI[illegible]IDE	NONE	7647189	Y	N	Y	N	N	N
ANTIMONY TRI[illegible]RIDE	NONE	28300745	Y	N	Y	N	N	N
	NONE	7789619	Y	N	Y	N	N	N
		10025919	Y	N	Y	N	N	N

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
ANTIMONY TRIFLOURIDE	NONE	7783564	Y	N	Y	N	N	N
ANTIMONY TRIOXIDE	NONE	1309644	Y	N	Y	N	N	N
ARAMITE	SULFUROUS ACID 2-(p-TERT-BUTYLPHENOXY)-1-METHYLETHYL- 2-CHLOROETHYL ESTER	140578	N	N	N	N	Y	Y
AROCLOR 1016	POLYCHLORINATED BIPHENYLS; PCBs	12674112	Y	Y	Y	N	Y	N
AROCLOR 1221	POLYCHLORINATED BIPHENYLS; PCBs	11104282	Y	Y	Y	N	Y	N
AROCLOR 1232	POLYCHLORINATED BIPHENYLS; PCBs	11141165	Y	Y	Y	N	Y	N
AROCLOR 1242	POLYCHLORINATED BIPHENYLS; PCBs	53469219	Y	Y	Y	N	Y	N
AROCLOR 1248	POLYCHLORINATED BIPHENYLS; PCBs	12672296	Y	Y	Y	N	Y	N
AROCLOR 1254	POLYCHLORINATED BIPHENYLS; PCBs	11097691	Y	Y	Y	N	Y	N
AROCLOR 1260	POLYCHLORINATED BIPHENYLS; PCBs	11096825	Y	Y	Y	N	Y	N
ARSENIC	NONE	7440382	N	Y	Y	N	Y	N
ARSENIC ACID	NONE	1327522	N	N	Y	Y	Y	N
ARSENIC AND COMPOUNDS	NONE	7778394	N	Y	Y	N	N	N
ARSENIC DISULFIDE	ARSENIC TRIOXIDE	1303328	Y	N	Y	N	N	N
ARSENIC(III) OXIDE	ARSENIC PENTOXIDE	1327533	Y	N	Y	Y	Y	N
ARSENIC(V) OXIDE	ARSENIC (V) OXIDE	1303282	Y	N	Y	Y	Y	N
ARSENIC PENTAOXIDE	NONE	1303282	Y	N	Y	Y	Y	N
ARSENIC TRICHLORIDE	ARSENIC (III) OXIDE	7784341	Y	N	Y	N	N	N
ARSENIC TRIOXIDE	NONE	1327533	Y	N	Y	Y	Y	N
ARSENIC TRISULFIDE	DIETHYLARSINE	1303339	Y	N	Y	N	N	N
ARSINE, DIETHYL-	NONE	692422	N	N	Y	N	Y	Y
ASBESTOS	BENZENAMINE, 4,4'-CARBONIMIDOYLBIS(N,N-DIMETHYL	1332214	N	Y	Y	Y	N	N
AURAMINE	L-SERINE, DIAZOACETATE (ESTER)	402808	N	N	Y	N	Y	N
AZASERINE	6-[(1-METHYL-4-NITRO-1H-IMIDAZOL-5-YL)THIO]-1H-PURINE	115026	N	N	Y	N	N	N
AZATHIOPRINE	ETHYLENIMINE		N	N	N	N	Y	Y
AZIRIDINE	NONE	151564	N	N	Y	Y	N	Y
AZIRIDINE, 2-METHYL-	MITOMYCIN C	50077	N	N	N	Y	N	N
AZIRINO (2',3':3,4)PYRROLO (1,2-a)INDOLE-4,7-DIONE, 6-AMINO-8-[((AMINOCARBONYL)OXY)METHYL]-1,1a,2,8a,8b-HEXAHYDRO-8a-METHOXY-5-METHYL	NONE		N	N	Y	N	N	N
BARIUM CYANIDE	3-METHYLCHOLANTHRENE	542621	Y	N	Y	N	N	N
BENZ(j)ACEANTHRYLENE,1,2-DIHYDRO-3-METHYL-	3,4-BENZACRIDINE	66495	N	N	Y	N	N	N
BENZ(c)ACRIDINE	BENZ[c]ACRIDINE	225514	N	N	Y	N	N	N
3,4-BENZACRIDINE	BENZENE, DICHLOROMETHYL-	225514	N	N	Y	N	N	N
BENZAL CHLORIDE	1,2-BENZANTHRACENE, BENZO[a]ANTHRACENE	98873	N	N	Y	N	N	N
BENZ[a]ANTHRACENE	see BENZ[a]ANTHRACENE	56553	Y	N	Y	N	N	N
1,2-BENZANTHRACENE	7,12-DIMETHYLBENZ[a]ANTHRACENE							
1,2-BENZANTHRACENE, 7,12-DIMETHYL-	see PYRIDINE	57976	N	N	Y	N	N	N
1-BENZAZINE	see ANILINE							
BENZENAMINE	see AURAMINE							
BENZENAMINE, 4,4'-CARBONIMIDOYLBIS(N,N-DIMETHYL	p-CHLOROANILINE							
BENZENAMINE, 4-CHLORO-	4-CHLORO-o-TOLUIDINE, HYDROCHLORIDE	106478	N	N	Y	Y	N	Y
BENZENAMINE, 4-CHLORO-2-METHYL-HYDROCHLORIDE	DIMETHYLAMINOAZOBENZENE	3165933	N	N	Y	N	N	N
BENZENAMINE,N,N-DIMETHYL-4-PHENYLAZO-	4,4'-METHYLENEBIS(2CHLOROANILINE)	60117	N	N	Y	N	N	N
BENZENAMINE, 4,4'-METHYLENEBIS(2-CHLORO-	o-TOLUIDINE HYDROCHLORIDE	101144	N	N	Y	N	N	N
BENZENAMINE-2-METHYL-, HYDROCHLORIDE	5-NITRO-o-TOLUIDINE	636215	N	N	Y	N	N	N
BENZENAMINE, 2-METHYL- 5-NITRO	p-NITROANILINE	99558	N	N	Y	N	N	N
BENZENAMINE, 4-NITRO-	NONE	100016	N	N	Y	N	N	N
BENZENE	4-BROMOPHENYL PHENYLETHER	71432	Y	Y	Y	Y	N	Y
BENZENE, 1-BROMO-4-PHENOXY-	see CHLOROBENZENE	101553	N	Y	Y	N	Y	Y
BENZENE, CHLORO-							N	N

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BENZENE, CHLOROMETHYL-	see BENZYL CHLORIDE							
BENZENE, 1,2-DICHLORO-	1,2-DICHLOROBENZENE, o-DICHLOROBENZENE							
BENZENE, 1,3-DICHLORO-	1,3-DICHLOROBENZENE, m-DICHLOROBENZENE	95501	Y	Y	Y	N		
BENZENE, 1,4-DICHLORO-	1,4-DICHLOROBENZENE, p-DICHLOROBENZENE	541731	N	Y	Y	N	N	N
BENZENE, DICHLOROMETHYL-	see BENZAL CHLORIDE	106467	Y	Y	Y	N	N	N
BENZENE, 2,4-DIISOCYANATOMETHYL	see TOLUENE DIISOCYANATE							
BENZENE, DIMETHYL m-, o- p-	see XYLENE (MIXED) m-, o-, p-							
BENZENE, HEXACHLORO-	see HEXACHLOROBENZENE							
BENZENE, HEXAHYDRO-	see CYCLOHEXANE							
BENZENE, HYDROXY-	see PHENOL							
BENZENE, METHYL-	see TOLUENE							
BENZENE, 1-METHYL-2,4-DINITRO-	2,4-DINITROTOLUENE							
BENZENE, 1-METHYL-2,6-DINITRO-	2,6-DINITROTOLUENE							
BENZENE, 1,2-METHYLENEDIOXY-4-ALLYL-	see SAFROLE	121142	Y	Y	Y	N	N	N
BENZENE, 1,2-METHYLENEDIOXY-4-PROPENYL	see ISOSAFROLE	606202	Y	Y	Y	N	N	N
BENZENE, 1,2-METHYLENEDIOXY-4-PROPYL	see DIHYDROSAFROLE							
BENZENE, 1-METHYL ETHYL-	see CUMENE							
BENZENE, NITRO-	see NITROBENZENE							
BENZENE, PENTACHLOR-	see PENTACHLOROBENZENE							
BENZENE, PENTACHLORONITRO-	see PENTACHLORONITROBENZENE							
BENZENE, 1,2,4,5-TETRACHLORO-	see 1,2,4,5,-TETRACHLOROBENZENE							
BENZENE, TRICHLOROMETHYL-	see BENZOTRICHLORIDE							
BENZENE,1,3,5-TRINITRO	sym-TRINITROBENZENE							
BENZENEACETIC ACID, 4-CHLORO-ALPHA-(4-CHLOROPHENYL)-ALPHA-HYDROXY-, ETHYL ESTER	see ETHYL 4,4'-DICHLOROBENZILATE	99354	N	N	Y	N	N	N
1,2-BENZENEDICARBOXYLIC ACID, ANHYDRIDE	see PHTHALIC ANHYDRIDE							
1,2-BENZENEDICARBOXYLIC ACID, [BIS(2-ETHYLHEXYL)] ESTER	see BIS (2-ETHYLHEXYL) PHTHALATE							
1,2-BENZENEDICARBOXYLIC ACID DIBUTYL ESTER	see n-BUTYL PHTHALTE							
1,2-BENZENEDOCARBOXYLIC ACID, DIETHYL ESTER	see DIETHYLPHTHALATE							
1,2-BENZENEDICARBOXYLIC ACID, DIMETHYL ESTER	see DIMETHYL PHTHALATE							
1,2-BENZENEDICARBOXYLIC ACID, DI-n-OCTYL ESTER	see DI-n-OCTYL PHTHALATE							
1,3-BENZENEDIOL	see RESORCINOL							
1,2 BENZENEDIOL, 4-[1-HYDROXY-2-(METHYLAMINO-ETHYL	see EPINEPHRINE							
BENZENESULFONIC ACID CHLORIDE	see BENZENESULFONYL CHLORIDE							
BENZENESULFONYL CHLORIDE	BENZENESULFONIC ACID CHLORIDE							
BENZENETHIOL	THIOPHENOL	98099	N	N	Y	N	N	N
BENZIDINE	(1,1'-BIPHENYL)-4,4'-DIAMINE	108985	N	N	Y	Y	N	Y
1,2-BENZISOTHIAZOLIN-3-ONE-1,1-DIOXIDE, AND SALTS	see SACCHARIN AND SALTS	92875	N	Y	Y	N	Y	Y
BENZO[a]ANTHRACENE	see BENZ[a]ANTHRCENE							
BENZO[b]FLUORANTHENE	NONE							
BENZO[k]FLUORANTHENE	NONE							
BENZO[j,k]FLUORENE	see FLUORANTHENE	205992	N	Y	Y	N	Y	Y
BENZOIC ACID	NONE	207089	N	Y	Y	N	N	N
BENZONITRILE	NONE							
BENZO[ghi]PERYLENE	NONE	65850	Y	N	Y	N	N	N
BENZO[def]PHENANTHRENE	see PYRENE	100470	Y	N	Y	N	N	N
BENZO[a]PYRENE	3,4-BENZOPYRENE	191242	N	Y	Y	N	N	N
BENZO[b]PYRIDINE	see PYRIDINE							
3,4-BENZOPYRENE	see BENZO[a]PYRENE	50328	N	Y	Y	N	Y	Y
p-BENZOQUINONE	1,4-CYCLOHEXADIENEDIONE							
BENZOTRICHLORIDE	BENZENE, TRICHLOROMETHYL-	106514	N	N	Y	N	N	N
BENZOYL CHLORI	NONE	98077	N	N	Y	N	Y	Y
		98884	Y	N	Y	N	N	N

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
1,2-BENZPHENANTHRENE	CHRYSENE	218019	N	Y	Y	N	N	N
BENZYL CHLORIDE	BENZENE, CHLOROMETHYL	100447	Y	N	Y	Y	N	N
BERYLLIUM	BERYLLIUM DUST	7440417	N	Y	Y	Y	N	Y
BERYLLIUM AND COMPOUNDS	NONE		N	Y	Y	N	Y	N
BERYLLIUM CHLORIDE	NONE		N	Y	Y	N	Y	N
BERYLLIUM DUST	see BERYLLIUM	7787475	Y	N	Y	N	N	N
BERYLLIUM FLUORIDE	NONE							
BERYLLIUM NITRATE	NONE	7787497	Y	N	Y	N	N	N
alpha- BHC	NONE	13597994	Y	N	Y	N	N	N
beta- BHC	NONE	319846	N	Y	Y	N	N	N
gamma- BHC	HEXACHLORCYCLOHEXANE (GAMMA ISOMER), LINDANE	319857	N	Y	Y	N	N	N
delta-BHC	NONE	58899	Y	Y	Y	N	N	N
2,2'-BIOXIRANE	1,2:3,4-DIEPOXYBUTANE	319868	N	Y	Y	N	Y	Y
(1,1'-BIPHENYL)-4,4'-DIAMINE	see BENZIDINE	1464535	N	N	Y	N	N	N
(1,1'-BIPHENYL)-4,4'-DIAMINE,3,3'-DIMETHOXY-	3,3'-DIMETHOXYBENZIDINE							
(1,1'-BIPHENYL)-4,4'-DIAMINE,3,3'-DICHLORO-	3,3'-DICHLOROBENZIDINE	92875	N	N	Y	N	N	N
(1,1'-BIPHENYL)-4,4'-DIAMINE,3,3'-DIMETHYL	3,3'-DIMETHYLBENZIDINE	91941	N	Y	Y	N	N	N
BIPHENYLINE	see 4-AMINOBIPHENYL	119904	N	N	Y	N	N	N
BIS(2-CHLOROETHOXY) METHANE	ETHANE, 1,1'-[METHYLENEBIS(OXY)] BIS(2-CHLORO-							
BIS(2-CHLOROETHYL) ETHER	DICHLOROETHYL ETHER, ETHANE, 1,1'-OXYBIS(2-CHLORO.	119937	N	Y	Y	N	N	N
BIS(2-CHLOROISOPROPYL) ETHER	PROPANE, 2,2'-OXYBIS(2-CHLORO-	111444	N	Y	Y	N	N	N
BISCHLOROETHYL NITROSOUREA	NONE	108601	N	Y	Y	N	N	N
BIS(CHLOROMETHYL) ETHER	METHANE, OXYBIS(CHLORO-		N	Y	Y	N	N	N
BIS(DIMETHYLTHIOCARBAMOYL) DISULFIDE	THIRAM	542881	N	N	Y	N	Y	Y
BIS (2-ETHYLHEXYL)PHTHALATE	1,2-BENZENEDICARBOXYLIC ACID, [BIS(2-ETHYLHEXYL)] ESTER	137268	N	N	Y	N	Y	Y
BROMINE CYANIDE	CYANOGEN BROMIDE	117817	N	Y	Y	N	N	N
BROMOACETONE	2-PROPANONE, 1-BROMO.	506683	N	N	Y	N	N	N
BROMOFORM	METHANE, TRIBROMO.	598312	N	N	Y	N	N	N
4-BROMOPHENYL PHENYL ETHER	BENZENE, 1-BROMO-4-PHENOXY-	75252	N	N	Y	Y	N	Y
BRUCINE	STRYCHNIDIN-10-ONE, 2,3- DIMETHOXY	101553	N	Y	Y	N	N	N
BUTADIENE DIOXIDE	see DIEPOXYBUTANE	357573	N	Y	Y	N	N	N
1,3-BUTADIENE, 1,1,2,3,4,4-HEXACHLORO-	HEXACHLOROBUTADIENE			N	Y	N	Y	Y
1-BUTANAMINE, N,BUTYL-N-NITROSO-	N-NITROSODI-n-BUTYLAMINE	87683	N	Y	Y	N	N	N
1-,4-BUTANEDIOL DIMETHYLSULFONATE (MYLERAN)	NONE	924163	N	N	Y	N	N	N
BUTANOIC ACID, 4-[BIS(2-CHLOROETHYL)AMINO] BENZENE	CHLORAMBUCIL		N	N	N	N	Y	N
1-BUTANOL	n-BUTYL ALCOHOL	305033	N	N	Y	N	Y	Y
2-BUTANONE	METHYL ETHYL KETONE	71363	N	N	Y	N	N	N
2-BUTANONE PERPXIDE	METHYL ETHYL KETONE PEROXIDE	78933	N	N	Y	N	N	N
2-BUTENAL	CROTONALDEHYDE	1338234	N	N	Y	N	N	N
2-BUTENE, 1,4-DICHLORO-	1,4-DICHLORO-2-BUTENE	123739	Y	N	Y	N	N	N
BUTTER YELLOW	see 4-DIMETHYLAMINOZOBENZENE	4170303						
BUTYL ACETATE	NONE	764410	N	N	Y	N	N	N
ISO-								
SEC-		123864	Y	N	Y	N	N	N
TERT-		110190						
n-BUTYL ALCOHOL	see 1-BUTANOL	105464						
BUTYLAMINE	NONE	540885						
ISO-								
SEC-		109739	Y	N	Y	N	N	N
TERT-		78819						
BUTYLBENZYLPHTHALATE	NONE	513495						
n-BUTYL PHTHALATE	1,2-BENZENEDICARBOXYLIC ACID, DIBUTYL ESTER; DIBUTYL	13952846						
		85687	N	Y	Y	N	N	N
		84742	Y	Y	Y	N	N	N

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 2430
BUTYRIC ACID, ISO-	PHTHALATE; DI-n-BUTYL PHTHALATE							
CACODYLIC ACID	NONE	107926	Y	N	Y	N	N	N
CADMIUM	HYDROXYDIMETHYLARSINE OXIDE	79312						
CADMIUM ACETATE	NONE	75605	N	N	Y	N	N	N
CADMIUM AND COMPOUNDS	NONE	7440439	N	Y	Y	N	Y	N
CADMIUM BROMIDE	NONE	543908	Y	N	Y	N	N	N
CADMIUM CHLORIDE	NONE		N	Y	Y	N	Y	N
CALCIUM ARSENATE	NONE	7789426	Y	N	Y	N	N	N
CALCIUM ARSENITE	NONE	10108642	Y	N	Y	N	N	N
CALCIUM CARBIDE	NONE	7778441	Y	N	Y	N	N	N
CALCIUM CHROMATE	NONE	52740166	Y	N	Y	N	N	N
CALCIUM CYANIDE	CHRONIC ACID, CALCIUM SALT	75207	Y	N	Y	N	N	N
CALCIUM DODECYLBENZENE SULFONATE	NONE	13765190	Y	N	Y	N	N	N
CALCIUM HYPOCHLORITE	NONE	592018	Y	N	Y	N	N	N
CAMPHENE, OCTACHLORO-	NONE	26264062	Y	N	Y	N	N	N
CAPTAN	TOXAPHENE	7778543	Y	N	Y	N	N	N
CARBAMIC ACID, ETHYL ESTER	NONE	8001352	Y	N	Y	N	N	N
CARBAMIC ACID, METHYLNITROSO-ETHYL ESTER	ETHYLCARBAMATE (URETHAN)	133062	Y	Y	Y	N	Y	Y
CARBAMIDE, N-ETHYL-N-NITROSO-	N-NITROSO-N-METHYLURETHANE	51796	N	N	Y	N	N	N
CARBAMIDE, N-METHYL-N-NITROSO-	N-NITROSO-N-ETHYLUREA	615532	N	N	Y	N	N	N
CARABAMIDE, THIO-	N-NITROSO-N-METHYLUREA	759739	N	N	Y	N	N	N
CARACRYL	THIOUREA	684935	N	N	Y	N	N	N
CARBAMIMIDOSELENOIC ACID	see ACRYLONITRILE	62566	N	N	Y	N	N	N
CARBAMOYL CHLORIDE, DIMETHYL-	SELENOUREA							
CARBARYL	DIMETHYLCARBAMOYLCHLORIDE	630104	N	N	Y	Y	N	Y
CARBOFURAN	NONE	79447	N	N	Y	N	N	N
CARBOLIC ACID	NONE	63252	Y	N	Y	N	N	Y
CARBON BISULFIDE	see PHENOL	156362	Y	N	Y	N	N	N
CARBON DISULFIDE	CARBON DISULFIDE							
CARBONIC ACID, DITHALLIUM(1) SALT	see CARBON BISULFIDE	75150	Y	N	Y	Y	N	Y
CARBONIC DICHLORIDE	THALLIUM(1) CARBONATE							
CARBONOCHLORIDIC ACID, METHYL ESTER	see CARBONYL CHLORIDE	6533739	N	N	Y	N	N	N
CARBONOXYFLUORIDE	METHYL CHLOROCARBONATE							
CARBON TETRACHLORIDE	CARBONYL FLUORIDE	79221	N	N	Y	N	N	N
CARBONYL CHLORIDE	METHANE, TETRACHLORO-	353504	N	N	Y	N	N	N
CARBONYL FLUORIDE	PHOSGENE; CARBONIC DICHLORIDE	56235	Y	Y	Y	N	N	N
CERTAIN COMBINED CHEMOTHERAPY FOR LYMPHOMAS	CARBON OXYFLUORIDE	75445	Y	N	Y	N	Y	Y
CHLORAL	ACETALDEHYDE, TRICHLORO-; TRICHLOROETHANAL	353504	N	N	Y	Y	N	Y
CHLORAMBUCIL	see BUTANOIC ACID, 4[BIS(2-CHLOROETHYL)AMINO] BENZENE		N	N	N	N	N	N
CHLORDANE (TECHNICAL MIXTURE AND METABOLITES	NONE	75876	N	N	N	N	Y	N
CHLORDANE	CHLORDANE, TECHNICAL; 4,7-METHANOINDAN,1,2,4,5, 6,7,8,8' OCTACHLORO-3a,4,7,7a-TETRAHYDRO-				Y	N	N	N
CHLORDANE, TECHNICAL	see CHLORDANE	57749	N	Y	Y	N	N	N
CHLORINATED BENZENES	NONE	57749	Y	Y	Y	N	N	N
CHLORINATED ETHANES								
CHLORINATED NAPHTHALENE			N	Y	Y	N	N	N
CHLORINATED PHENOLS			N	Y	Y	N	N	N
CHLORINE			N	Y	Y	N	N	N
CHLORINE CYANIDE	NONE		N	Y	Y	N	N	N
CHLORNAPHAZINE	CYANOGEN CHLORIDE	7782505	Y	N	Y	N	N	N
CHLOROACETALDEH	2-NAPHTHYLAMINE, N,N-BIS(2-CHLOROETHYL)-	506774	Y	N	Y	N	N	N
	ACETALDEHYDE, CHLORO-	494031	N	N	Y	N	N	N
		107200	N	N	Y	N	N	N

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 2430
CHLOROALKYL ETHERS			N	Y	Y	N	N	N
2-CHLOROALLYL DIETHYLDITHIOCARBAMATE	see SULFALLATE							
p-CHLOROANILINE	see BENZENAMINE, 4-CHLORO							
CHLOROBENZENE	BENZENE, CHLORO-	108907	Y	Y	Y	N	N	N
4-CHLORO-m-CRESOL	p-CHLORO-m-CRESOL; PHENOL, 4-CHLORO-3-METHYL-	59507	N	Y	Y	N	N	N
p-CHLORO-m-CRESOL	see 4-CHLORO-m-CRESOL							
CHLORODIBROMOMETHANE	NONE							
1-CHLORO-2,3-EPOXYPROPANE	EPICHLOROHYDRIN; OXIRANE, 2-(CHLOROMETHYL)-	124481	N	Y	Y	N	N	N
CHLOROETHANE	NONE	106898	Y	N	Y	N	N	N
1-(2-CHLOROETHYL)-3-CYCLOHEXYL-1-NITROSOUREA	CCNU	75003	N	Y	Y	N	Y	Y
2-CHLOROETHYL VINYL ETHER	ETHANE, 2-CHLOROETHOXY		N	N	N	N	Y	Y
CHLOROFORM	METHANE TRICHLORO-	110758	N	Y	Y	N	N	N
CHLOROMETHYL METHYL	see BIS(CHLOROMETHYL) ETHER	67663	Y	Y	Y	N	Y	Y
CHLOROMETHYL METHYL ETHER	METHANE, CHLOROMETHOXY; BIS(CHLOROMETHYL) ETHER							
beta-CHLORONAPHTHALENE	2-CHLORONAPHTHALENE; NAPHTHALENE, 2-CHLORO-	107302	N	N	Y	N	N	N
2-CHLORNAPHTHALENE	see beta-CHLORONAPHTHALENE	91587	N	Y	Y	N	N	N
4-CHLORO-o-PHENYLENEDIAMINE	NONE							
2-CHLOROPHENOL	o-CHOLOROPHENOL; PHENOL, 2-CHLORO-		N	N	N	N	Y	N
o-CHLOROPHENOL	see 2-CHLOROPHENOL	95578	N	Y	Y	N	N	N
4-CHLOROPHENYL PHENYL ETHER	NONE							
1-(o-CHLOROPHENYL) THIOUREA	THIOUREA, (2-CHLOROPHENYL)-	7005723	N	Y	Y	N	N	N
3-CHLORO-1-PROPENE	see ALLYL CHLORIDE	6344821	N	N	Y	Y	N	Y
3-CHLOROPROPIONITRILE	PROPANENITRILE, 2-CHLORO							
CHLOROSULFONIC ACID	NONE	542767	N	N	Y	Y	N	Y
4-CHLORO-o-TOLUIDINE, HYDROCHLORIDE	see BENZENAMINE, 4-CHLORO-2-METHYL-HYDROCHLORIDE	7790945	Y	N	Y	N	N	N
CHLORPYRIFOS	NONE							
CHROMIC ACETATE	NONE	2921882	Y	N	Y	N	N	N
CHROMIC ACID	NONE	1066304	Y	N	Y	N	N	N
CHROMIC ACID, CALCIUM SALT	see CALCIUM CHROMATE	11115745	Y	N	Y	N	N	N
CHROMIC SULFATE	NONE	7738945						
CHROMIUM	NONE							
CHROMIUM AND COMPOUNDS	NONE	10101538	Y	N	Y	N	N	N
CHROMOUS CHLORIDE	NONE	7440473	N	Y	Y	N	Y	N
CHRYSENE	1,2-BENZPHENANTHRENE		N	Y	Y	N	Y	N
COBALTOUS BROMIDE	NONE	10049055	Y	N	Y	N	N	N
COBALTOUS FORMATE	NONE	218019	N	Y	Y	N	N	N
COBALTOUS SULFAMATE	NONE	7789437	Y	N	Y	N	N	N
COKE OVEN EMISSIONS	NONE	544183	Y	N	Y	N	N	N
CONJUGATED ESTROGENS	NONE	14017415	Y	N	Y	N	N	N
COPPER	NONE		N	N	Y	N	Y	Y
COPPER AND COMPOUNDS	NONE		N	Y	N	N	Y	Y
COPPER CYANIDE	NONE	7440508	N	Y	Y	N	N	N
COUMAPHOS	NONE		N	N	Y	N	N	N
CREOSOTE	NONE	544923	N	Y	Y	N	N	N
p-CRESIDINE	5-METHYL-o-ANISIDINE	56724	Y	N	Y	N	N	N
CRESOL(s)	see CRESYLIC ACID	8001589	N	N	Y	N	N	N
m-		120718	N	N	N	N	Y	Y
o-								
p-								
CRESYLIC ACID	CRESOL(s)							
m-		1319773	Y	N	Y	N	N	N
o-		108394						
		95487						

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
p-CROTONALDEHYDE	see 2-BUTENAL	106445						
CUMENE	BENZENE, 1-METHYLETHYL-; ISOPROPYLBENZENE	98828	N	N	Y	N	N	N
CUPFERRON	AMMONIUM N-NITROSOPHENYLHYDROXYLAMINE	135206	N	N	N	N	Y	Y
CUPRIC ACETATE	NONE	142712	Y	N	Y	N	N	N
CUPRIC ACETOARSENITE	NONE	12002038	Y	N	Y	N	N	N
CUPRIC CHLORIDE	NONE	7447394	Y	N	Y	N	N	N
CUPRIC NITRATE	NONE	3251238	Y	N	Y	N	N	N
CUPRIC OXALATE	NONE	5893663	Y	N	Y	N	N	N
CUPRIC SULFATE	NONE	7758987	Y	N	Y	N	N	N
CUPRIC SULFATE AMMONIATED	NONE	10380297	Y	N	Y	N	N	N
CUPRIC TARTRATE	NONE	815827	Y	N	Y	N	N	N
CYANIDES	NONE	151508	N	Y	Y	N	N	N
CYANIDES (SOLUBLE CYANIDE SALTS)	NOT ELSEWHERE SPECIFIED	143339						
CYANOGEN	NONE	57125	N	N	Y	N	N	N
CYANOGEN BROMIDE	see BROMINE CYANIDE	460195	N	N	Y	Y	N	Y
CYANOGEN CHLORIDE	see CHLORINE CYANIDE							
CYCASIN	METHYLAZOXYMETHANOL BETA-d-GLUCOIDE	14901087	N	N	N	N	Y	Y
1,4-CYCLOHEXADIENEDIONE	p-BENZOQUINONE	106514	N	N	Y	N	N	N
CYCLOHEXANE	BENZENE, HEXAHYDRO-	110827	Y	N	Y	N	N	N
CYCLOHEXANONE	NONE	108941	N	N	Y	N	N	N
1,3-CYCLOPENTADIENE,1,2,3,4,5,5-HEXACHLORO-	HEXACHLOROCYCLOPENTADIENE; PERCHLOROCYCLOPENTADIENE	77474	Y	Y	Y	N	N	N
CYCLOPHOSPHAMIDE	2H-1,3,2-OXAZAPHOSPHORINE,2-[BIS(2-CHLOROETHYL) AMINO] TETRAHYDRO-2-OXIDE	50180	N	N	Y	N	Y	Y
2,4-D ACID	2,4-DICHLOROPHENOXYACETIC ACID, SALTS AND ESTERS; 2,4-D SALTS AND ESTERS	94111						
2,4-D ESTERS	NONE	94757	Y	N	Y	N	N	N
		94791	Y	N	Y	N	N	N
		94804						
		1320189						
		1928387						
		1928616						
		1929733						
		2971382						
		53467111						
		25168267						
2,4-D-SALTS AND ESTERS	see 2,4-D ACID							
DACARBAZINE	NONE							
DAUNOMYCIN	5,12-NAPHTHACENEDIONE,(8S-CIS)-8-ACETYL-10-[3-AMINO-2,3,6-TRIDEOXY-ALPHA-L-LYOXY-HEXOPYRANOSYL)OXY]-7,8,9,10-TETRAHYDRO-6,8,11-TRIHYDROXY-1-METHOXY-	20830813	N	N	N	N	Y	Y
DDD	see DICHLORODIPHENYL DICHLOROETHANE		N	N	Y	N	N	N
4,4'-DDD	see DICHLORODIPHENYL DICHLOROETHANE							
DDE	4,4'DDE							
4,4'-DDE	see DDE	72559	N	Y	Y	N	N	N
DDT	see DICHLORODIPHENYL TRICHLOROETHANE							
4,4'-DDT	see DICHLORODIPHENYL TRICHLOROETHANE							
DDT AND METABOLITES								
DECACHLOROOCTAHYDRO-1,3,4-METHENO-2H-CYCLOBUTA [c,d]PENTALEN-2-ONE	see KEPONE		N	Y	Y	N	Y	N
DECHLORANE	see MIREX							
DIALLATE	S-(2,3-DICHLOROALLYL)DIISOPROPYLTHIOCARBAMATE	2303164	N	N	Y	N	N	N

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
Pink/red water from TNT operations								
K048			N	N	Y	N	N	N
Dissolved air flotation (DAF) float from the petroleum refining industry								
K049			N	N	Y	N	N	N
Slop oil emulsion solids from the petroleum refining industry								
K050			N	N	Y	N	N	N
Heat exchanger bundle cleaning sludge from the petroleum refining industry								
K051			N	N	Y	N	N	N
API separator sludge from the petroleum refining industry								
K052			N	N	Y	N	N	N
Tank bottoms (leaded) from the petroleum refining industry								
K060			N	N	Y	N	N	N
Ammonia still lime sludge from coking operations								
K061			N	N	Y	N	N	N
Emission control dust/sludge from the primary production ofsteel in electric furnaces								
K062			N	N	Y	N	N	N
Spent pickle liquor from steel finishing operations								
K069			N	N	Y	N	N	N
Emission control dust/sludge from secondary lead smelting								
K071			N	N	Y	N	N	N
Brine purification muds from the mercury cell process in chlorine production, where seperately prepurified brine is not used								
K073			N	N	Y	N	N	N
Chlorinated hydroarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production								
K083			N	N	Y	N	N	N
Distillation bottoms from aniline extraction								
K084			N	N	Y	N	N	N
Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds								
K085			N	N	Y	N	N	N
Distillation or fractionation column bottoms from the production of chlorobenzenes								
K086			N	N	Y	N	N	N
Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead								
K087			N	N	Y	N	N	N

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
By-product salts generated in the production of MSMA and cacodylic acid								
K032								
Wastewater treatment sludge from the production of chlordane			N	N	Y	N	N	N
K033								
Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane			N	N	Y	N	N	N
K034								
Filter solids from the filtration of Hexachlorocyclopentadiene in the produciton of chlordane			N	N	Y	N	N	N
K035								
Wsatewater treatment sludges generated in the production of creosote			N	N	Y	N	N	N
K036								
Still bottoms from toluene reclamation distillation in the production of disulfoton			N	N	Y	N	N	N
K037								
Wastewater treatment sludges from the production of disulfoton			N	N	Y	N	N	N
K038								
Wastewater from the washing adn stripping of phorate production			N	N	Y	N	N	N
K039								
Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate			N	N	Y	N	N	N
K040								
Wastewater treatment sludge from the production of phorate			N	N	Y	N	N	N
K041								
Wastewater treatment sludge from the production of toxaphene			N	N	Y	N	N	N
K042								
Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the produciton of 2,4,5-T			N	N	Y	N	N	N
K043								
2,6-Dichlorophenol waste from, the production of 2,4-D			N	N	Y	N	N	N
K044								
Wastewater treatment sludges from the manufacturing and processing of explosives			N	N	Y	N	N	N
K045								
Spent carbon from the treatment of wastewater containing explosives			N	N	Y	N	N	N
K046								
Wastewater treatment sludges from the manufacturing formulation and loading of lead-based initiating compounds			N	N	Y	N	[illegible]	N
K047								
			N	N	Y	N	[illegible]	[illegible]

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
K112								
Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene			N	N	Y	N	N	N
K113								
Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene			N	N	Y	N	N	N
K114								
Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene			N	N	Y	N	N	N
K115								
Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene			N	N	Y	N	N	N
K116								
Organic condensate form the solvent recovery column in the production of toluene diisocyanate via phosgenation of toluenediamine			N	N	Y	N	N	N
K117								
Wastewater from the reaction vent gas scrubber in the production of ethylene bromide via bromination of ethene			N	N	Y	N	N	N
K118								
Spent absorbent solids from the puification of ethylene bromide in the production of ethylene bromide			N	N	Y	N	N	N
K136								
Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene			N	N	Y	N	N	N

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	AHS 243D
Decanter tank tar sludge from coking operations K093			N	N	Y	N	N	N
Distillation light ends from the production of phthalic anhydride from ortho-xylene K094			N	N	Y	N	N	N
Distillation bottoms from the produciton of phthalic anhydride from ortho-xylene K095			N	N	Y	N	N	N
Distillation bottoms from the production of 1,1,1-trichloroethane K096			N	N	Y	N	N	N
Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane K097			N	N	Y	N	N	N
Vacuum stripper dicharge from the chlordane chlorinator in the production of chlordane K098			N	N	Y	N	N	N
Untreated process wastewater from the production of toxaphene K099			N	N	Y	N	N	N
Untreated wastewater from the production of 2,4-D K100			N	N	Y	N	N	N
Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting(Components of this waste are identical with those of K069) K101			N	N	Y	N	N	N
Distillation tar residues from the distillation of aniline-bsed compounds of veterinary pharmaceuticals from arsenic of organo-arsenic compounds K102			N	N	Y	N	N	N
Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic of organo-arsenic compounds K103			N	N	Y	N	N	N
Process residues from aniline extraction from the production of aniline K104			N	N	Y	N	N	N
Combined wastewater streams generated from nitrobenzene/anniline chlorobenzenes K105			N	N	Y	N	N	N
Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes K106			N	N	Y	N	N	N
Wastewater treatment sludge from the mercury cell process in chlorine production K111			N	N	Y	N	N	N
Product wastewaters from the production of dinitrotoluene via nitration of toluene			N	N	Y	N	N	N

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
conditions.								
F027								
Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-trichlorophenol as the sole component.)			N	N	Y	N	N	N
F028								
Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027.			N	N	Y	N	N	N
K001								
Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol			N	N	Y	N	N	N
K002								
Wastewater treatment sludge from the production of chrome yellow and orange pigments			N	N	Y	N	N	N
K003								
Wastewater treatment sludge from the production of molybdate orange pigments			N	N	Y	N	N	N
K004								
Wastewater treatment sludge from the production of zinc yellow pigments			N	N	Y	N	N	N
K005								
Wastewater treatment sludge from the production of chrome green pigments			N	N	Y	N	N	N
K006								
Wastewater treatment sludge from the production of chrome green pigments (anhydrous and hydrated)			N	N	Y	N	N	N
K007								
Wastewater treatment sludge from the production of iron blue pigments			N	N	Y	N	N	N
K008								
Oven residue from the production of chrome oxide green pigments			N	N	Y	N	N	N
K009								
Distillation bottoms from the production of acetaldehyde from ethylene			N	N	Y	N	N	N
K010								
Distillation side cuts from the production of acetaldehyde from ethylene			N	N	Y	N	N	N
K011								
Bottom stream from the wastewater stripper in production of acrylonitrile			N	N	Y	N	N	N
K013								
Bottom stream from the acetonitrile column in the production of acrylonitrile			N	N	Y	N	N	N

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243d
K014 Bottoms from the acetonitrile purification column in the production of acrylonitrile			N	N	Y	N	N	N
K015 Still bottoms from the distillation of benzyl chloride			N	N	Y	N	N	N
K016 Heavy ends or distillation residues from the production of carbon tetrachloride			N	N	Y	N	N	N
K017 Heavy ends(still bottoms) from the purification column in the production of epichlorohydrin			N	N	Y	N	N	N
K018 Heavy ends from the fractionation column in ethyl chloride production			N	N	Y	N	N	N
K019 Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production			N	N	Y	N	N	N
K020 Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production			N	N	Y	N	N	N
K021 Aqueous spent antimony catalyst waste from fluoromethanes production			N	N	Y	N	N	N
K022 Distillation bottom tars from the production of phenol/acetone from cumene			N	N	Y	N	N	N
K023 Distillation light ends from the production of phthalic anhydeide from naphthalene			N	N	Y	N	N	N
K024 Distillation bottoms from the production of phthalic anhydride from naphthalene			N	N	Y	N	N	N
K025 Distillationbottoms fromthe production of nitrobenzene by the nitration of benzene			N	N	Y	N	N	N
K026 Stripping still tails from the production of methyl ethyl pyridines			N	N	Y	N	N	N
K027 Centrifuge and distillation residues from toluene diisocyanate production			N	N	Y	N	N	N
K028 Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane			N	N	Y	N	N	N
K029 Waste from the product steam stripper in the production of 1,1,1-trichloroethane			N	N	Y	N	N	N
K030 Column bottoms or heavy ends from the combined production of trichloroethylene and perch[illegible]ethylene			N	N	Y	N	[illegible]	N
K031 [illegible]			N	N	Y	N	[illegible]	[illegible]

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives (This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5-trichlorophenol)								
F021								
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, of component in a formulating process) of pentachlorophenol or of intermediates used to produce its derivatives			N	N	Y	N	N	N
F022								
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in aformulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions			N	N	Y	N	N	N
F023								
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a process) of tri- and tetrachlorophenols (This listing does not include wastes from equipment used only for the production or use of hexachlorophene from highly purified 2,4,5-trichlorophenol)			N	N	Y	N	N	N
F024								
Wastes, including but not limited to distillation residues, heavy ends, tars, and reactor cleanout wastes, from the production of chlorinated aliphalic hydrocarbons, having carbon content from one to five, utilizing free radical catalyzed processes. (This listing does not include light ends, spent filters aand filter aids, spent dessicants(sic), wastwater,wastewater treatment sludges, spent catayists, and wastes listed in 261.32)			N	N	Y	N	N	N
F026								
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline			N	N	Y	N	N	N

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
e) Pyridine								
F006								
Wastewater treatment sludges from electroplating operations except from the following processes 1) Sulfuric acid anodizing of aluminum 2) tin plating on carbon steel; 3) zinc plating (segregated basis) on carbon steel; 4) aluminum or zinc-aluminum plating on carbon steel; 5)cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and 6) chemical etching and milling of aluminum			N	N	Y	N	N	N
F007								
Spent cyanide plating bath solutions from electroplating operations (except for precious metals electroplating spent cyanide plating bath solutions)			N	N	Y	N	N	N
F008								
Plating bath sludges from the bottom of plating baths from electroplating operations where cyanides are used in the process (except for precious metals electroplating plating bath sludges)			N	N	Y	N	N	N
F009								
Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process (except for precious metals electroplating spent stripping and cleaning bath solutions)			N	N	Y	N	N	N
F010								
Quenching bath sludge from oil baths frommetal heat treating operations where cyanides are used in the process (except for precious metal heat treating quenching bath sludges)			N	N	Y	N	N	N
F011								
Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations (except for precious metals heat treating spent cyanide solutions from salt bath pot cleaning)			N	N	Y	N	N	N
F012								
Quenching wastewater treatment sludges from metal heat treating operations where cyanides used in the process (except for precious metals heat treating quenching wastewater treatment sludges)			N	N	Y	N	N	N
F019								
Wastewater treatment sludges from the chemical conversion coating of aluminum			N	N	Y	N	N	N
F020								
Wastes (except wastewater and spent carbon from hydrochloride purification) from the			N	N	Y	N	[illegible]	N

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33a	USCODE 241b.4	ARS 2430
ZIRCONIUM NITRATE	NONE	13746899	Y	N	Y	N	N	N
ZIRCONIUM POTASSIUM FLUORIDE	NONE	16923958	Y	N	Y	N	N	N
ZIRCONIUM SULFATE	NONE	14644612	Y	N	Y	N	N	N
ZIRCONIUM TETRACHLORIDE	NONE	10026116	Y	N	Y	N	N	N
F001			N	N	Y	N	N	N
The following spent halogenated solvents used in degreasing and sludges from the recovery of these solvents in degreasing operations:								
a) Tetra chloroethylene								
b) Trichloroethylene								
c) Methylene chloride		127184						
d) 1,1,1-Trichloroethane		79016						
e) Carbon tetrachloride		75092						
f) Chlorinated fluorocarbons		71556						
F002		56235						
The following spent halogenated solvents and the still bottoms from the recovery of these solvents:		(N.A.)	N	N	Y	N	N	N
a) Tetrachloroethylene								
b) Methylene Chloride								
c) Trichloroethylene		127184						
d) 1,1,1-Trichloroethane		75092						
e) Chlorobenzene		79016						
f) 1,1,2-Trichloro-1,2,2-trifluoroethane		71556						
g) o-dichlorobenzene		108907						
h) trichlorofluoromethane		76131						
F003		106467						
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:		75694	N	N	Y	N	N	N
a) Xylene								
b) Acetone								
c) Ethyl acetate		1330207						
d) Ethylbenzene		67641						
e) Ethyl ether		141786						
f) Methyl isobutyl ketone		100414						
g) n-Butyl alcohol		60297						
h) Cyclohexanone		108101						
i) Methanol		71363						
F004		108941						
The following spent non-halogenated slovents and still bottoms from the recovery of these solvents: a) Cresols/Cresylic acid b) Nitrobenzene		67561	N	N	Y	N	N	N
F005								
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:			N	N	Y	N	N	N
a) Toluene								
b) Methyl ethyl ketone								
c) Carbon disulfide								
d) Isobutanol								

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 2430
Characteristic of EP Toxicity								
Arsenic			N	N	Y	N	N	N
Barium			N	N	Y	N	N	N
Cadmium			N	N	Y	N	N	N
Chromium			N	N	Y	N	N	N
Lead			N	N	Y	N	N	N
Mercury			N	N	Y	N	N	N
Selenium D010			N	N	Y	N	N	N
Silver			N	N	Y	N	N	N
Endrin			N	N	Y	N	N	N
Lindane			N	N	Y	N	N	N
Methoxychlor			N	N	Y	N	N	N
Toxaphene			Y	N	Y	N	N	N
2,4-D			Y	N	Y	N	N	N
2,4,5-TP			Y	N	Y	N	N	N
URACIL, 5-[BIS(2-CHLOROETHYL)AMINO-	see URACIL MUSTARD		Y	N	Y	N	N	N
URACIL MUSTARD	URACIL, 5-[BIS(2-CHLOROETHYL)AMINO]-		Y	N	Y	N	N	N
URANYL ACETATE	NONE	66751	N	N	Y	N	N	N
URANYL NITRATE	NONE	541093	Y	N	Y	N	N	N
URETHANE	ETHYL CARBAMATE	10102064	Y	N	Y	N	N	N
VANADIC ACID, AMMONIUM SALT	see AMMONIUM VANADATE	51796	N	N	N	N	Y	Y
VANADIUM(V)OXIDE	see VANADIUM PENTAOXIDE							
VANADIUM PENTAOXIDE	VANADIUM(V) OXIDE							
VANADYL SULFATE	NONE	1314621	Y	N	Y	N	N	N
VINYL ACETATE	ETHENYLETHANOTE	2774136	Y	N	Y	N	N	N
VINYL CHLORIDE	ETHANE, CHLORO-.; MVC	108054	Y	N	Y	N	N	N
VINYLIDENE CHLORIDE	see 1,1-DICHLOROETHYLENE	75014	N	Y	Y	N	Y	Y
WARFARIN	3-(ALPHA-ACETAMYLBENZYL)-4-HYDROXYCOUMARIN AND SALTS							
XYLENE (MIXED)	BENZENE, DIMETHYL	81812	N	N	Y	Y	N	Y
m-	m-	1330207	Y	N	Y	N	N	N
o-	o-	108383						
p-	p-	95476						
XYLENOL	NONE	106423						
XENYLAMINE	see 4-AMINOBIPHENYL	1300716	Y	N	Y	N	N	N
YOHIMBAN-16-CARBOXYLIC ACID, 11,17-DIMETHOXY-18-[(3,4,5-TRIMETHOXY-BENZOYL)OXY]-METHYL ESTER	see RESERPINE							
ZINC	NONE							
ZINC AND COMPOUNDS	NONE	7440666	N	Y	Y	N	N	N
ZINC ACETATE	NONE		N	Y	Y	N	N	N
ZINC AMMONIUM CHLORIDE	NONE	557346	Y	N	Y	N	N	N
ZINC BORATE	NONE	52625258	Y	N	Y	N	N	N
ZINC BROMIDE	NONE	1332076	Y	N	Y	N	N	N
ZINC CARBONATE	NONE	7699458	Y	N	Y	N	N	N
ZINC CHLORIDE	NONE	3486359	Y	N	Y	N	N	N
ZINC CYANIDE	NONE	7646857	Y	N	Y	N	N	N
ZINC FLUORIDE	NONE	557211	Y	N	Y	N	N	N
ZINC FORMATE	NONE	7783495	Y	N	Y	N	N	N
ZINC HYDROSULFITE	NONE	557415	Y	N	Y	N	N	N
ZINC NITRATE	NONE	7779864	Y	N	Y	N	N	N
ZINC PHENOSULFONATE	NONE	7779886	Y	N	Y	N	N	N
ZINC PHOSPHIDE	NONE	127822	Y	N	Y	N	N	N
ZINC SILCO[illegible]IDE	NONE	1314847	Y	N	Y	N	N	N
ZINC SULFAT[illegible]	NONE	16871719	Y	N	Y	N	N	N
		7733020	Y	N	Y	N	N	N

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 2430
THIOUREA, (2-CHLOROPHENYL)-	see 1-(o-CHLOROPHENYL) THIOUREA							
THIOUREA, 1-NAPHTHALENL	see alpha-NAPHTHYLTHIOUREA							
THIOUREA, PHENYL	see N-PHENYLTHIOUREA							
THIRAM	BIS(DIMETHYLTHIOCARBAMOYL) DISULFIDE							
THORIUM DIOXIDE		137268	N	N	Y	N	N	N
TOLUENE	BENZENE, METHYL-		N	N	N	N	Y	N
TOLUENEDIAMINE	DIAMINOTOLUENE	108883	Y	Y	Y	N	N	N
		95807	N	N	Y	N	N	N
		25376458						
		496720						
TOLUENE DIISOCYANATE	BENZENE, 2,4-DIISOCYANATOMETHYL	823405						
		584849	N	N	Y	N	Y	Y
		91087						
O-TOLUIDINE	see 2-AMINO-1-METHYL BENZENE	26471625						
o-TOLUIDINE HYDROCHLORIDE	see BENZENAMINE, 2-METHYL-, HYDROCHLORIDE							
p-TOLUIDINE	see 4-AMINO-1-METHYL BENZENE							
TOXAPHENE	see CAMPHENE, OCTACHLORO							
2,4,5-TP ACID ESTERS	NONE							
1H-1,2,4-TRIAZOL-3-AMINE	see AMITROLE	32534955	Y	N	Y	N	N	N
TRICHLORFON	NONE							
1,2,4-TRICHLOROBENZENE	NONE	52686	Y	N	Y	N	N	N
TRICHLOROETHANAL	ACETALDEHYDE, TRICHLORO-; CHLORAL	120821	N	Y	Y	N	N	N
1,1,1-TRICHLOROETHANE	see METHYL CHLOROFORM	75876	N	N	Y	N	N	N
1,1,2-TRICHLOROETHANE	see ETHANE 1,1,2-TRICHLORO-							
TRICHLOROETHENE	TRICHLORETHYLENE; ETHYLENETRICHLORIDE							
TRICHLOROETHYLENE	see TRICHLOROETHENE	79016	Y	Y	Y	N	N	N
TRICHLORMETHANESULFENYL CHLORIDE	METHANESULFENYL CHLORIDE, TRICHLORO-							
TRICHLOROMETHANETHIOL	NONE	594423	N	N	Y	N	N	N
TRICHLOROMONOFLUORO-METHANE	METHANE, TRICHLOROFLUORO-		N	N	N	Y	N	Y
TRICHLOROPHENOL	NONE	75694	N	N	Y	N	N	N
2,3,4-		25167822	Y	N	Y	N	Y	Y
2,3,5-		15950660						
2,3,6-		933788						
2,4,5-	PHENOL, 2,4,5-TRICHLORO-	933755						
2,4,6-	PHENOL, 2,4,6-TRICHLORO-	95954						
3,4,5-		88062						
2,4,5-TRICHLOROPHENOXY-ACETIC ACID	see 2,4,5-T ACID	609198						
TRIETHANOLAMINE DODECYLBENZENESULFONATE	NONE							
TRIETHYLAMINE	NONE	27323417	Y	N	Y	N	N	N
TRIGLYCINE	see NITRILOTRIACETIC ACID	121448	Y	N	Y	N	N	N
TRIMETHYLAMINE	NONE							
sym-TRINITROBENZENE	see BENZENE, 1,3,5-TRINITRO-	75503	Y	N	Y	N	N	N
1,3,4-TRIOXANE, 2,4,6-TRIMETHYL	see PARALDEHYDE							
TRIS(1-AZIRIDINYL) PHOSPHINE SULFIDE	THIOEPTA							
TRIS(2,3-DIBROMOPROPYL) PHOSPHATE	1-PROPANOL, 2,3-DIBROMO- PHOSPHATE (3:1)	52240	N	N	N	N	Y	Y
TRYPAN BLUE	2,7-NAPHTHALENEDISULFONIC ACID,3,3'-[3,3'-DIMETHYL-(1,1'-BIPHENYL)-4,4'-DIYL)-BIS(AZO)]BIS(5-AMINO-4-HYDROXY)-TETRASODIUM SALT	126727	N	N	Y	N	Y	Y
		72571	N	N	Y	N	N	N
UNLISTED HAZARDOUS WASTES CHARACTERISTIC OF EP TOXICITY.			N	N	Y	N	N	N
Characteristic of Ignitability			N	N	Y	N	N	N
Characteristic of Corrosivity			N	N	Y	N	N	N
Characteristic of Reactivity			N	N	Y	N	N	N

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
SULFURIC ACID	NONE	7664939	Y	N	Y	N	N	N
SULFURIC ACID, DIMETHYL ESTER	see DIMETHYL SULFATE							
SULFURIC ACID, THALLUM(I)SALT	THALLIUM(I)SULFATE							
SULFUROUS ACID 2-(p-TERT-BUTYLPHENOXY)-1-METHYLETHYL-2-CHLOROETHYL ESTER	see ARAMITE	7446186	Y	N	Y	N	N	N
2,4,5-T		10031591						
2,4,5-T ACID	see 2,4,5-T ACID							
2,4,5-T AMINES	2,4,5-T; 2,4,5-TRICHLOROPHENOXY-ACETIC ACID							
	NONE	93765	Y	N	Y	N	N	N
		2008460	Y	N	Y	N	N	N
		6369966						
		6369977						
2,4,5-T ESTERS	NONE	1319728						
		3813147						
		93798	Y	N	Y	N	N	N
		2545597						
		61792072						
2,4,5-TP ACID		1928478						
2,4,5-T SALTS	see SILVEX	25168154						
TDE	NONE							
1,2,4,5-TETRACHLOROBENZENE	see DICHLORODIPHENYL TRICHLOROETHANE	13560991	Y	N	Y	N	N	N
2,3,7,8-TETRACHLORODIBENZO-p-DIOXIN (TCDD)	BENZENE, 1,2,4,5-TETRACHLORO-							
1,1,1,2-TETRACHLOROETHANE	NONE	95943	N	N	Y	N	N	N
1,1,2,2-TETRACHLOROETHANE	see ETHANE 1,1,1,2-TETRACHLORO-	1746016	N	Y	Y	N	Y	Y
TETRACHLOROETHYLENE	see ETHANE, 1,1,2,2-TETRACHLORO-							
2,3,4,6-TETRACHLOROPHENOL	ETHENE,1,1,2,2-TETRACHLORO-							
TETRAETHYLDITHIOPYRPHOSPHATE	see PHENOL, 2,3,4,6-TETRACHLORO-	127184	N	Y	Y	N	N	N
TETRAETHYL LEAD	see DITHIOPYRPHOSPORIC ACID TETERA ESTER							
TETRAETHYL PYROPHOSPHATE	PLUMBANE, TETRAETHYL; TEL							
TETRAHYDROFURAN	PYROPHOSPHORIC ACID, TETRAETHYL ESTER	78002	Y	N	Y	Y	N	Y
TETRAMETHYLDIAMINOBENZOPHENONE	FURAN, TETRAHYDRO-	107493	Y	N	Y	Y	N	Y
TETRANITROMETHANE	see MICHLER'S KETONE	109999	N	N	Y	N	N	N
TETRAPHOSPHORIC ACID, HEXAETHYL ESTER	METHANE, TETRANITRO-							
THALLIC OXIDE	see HEXAETHYL TETRAPHOSPHATE	509148	N	N	Y	Y	N	Y
THALLIUM	THALLIUM OXIDE							
THALLIUM ACETATE	NONE	1314325	N	N	Y	N	N	N
THALLIUM AND COMPOUNDS	see ACETIC ACID THALLIUM (I) SALT	7440280	N	Y	Y	N	N	N
THALLIUM(I)CARBONATE			N	Y	Y	N	N	Y
THALLIUM(I) CHLORIDE	see CARBONIC ACID, DITHALLIUM(L) SALT							
THALLIUM(I) NITRATE	NONE	7791120	N	N	Y	N	N	N
THALLIUM OXIDE	NONE	10102451	N	N	Y	N	N	N
THALLIUM(I) SELENIDE	see THALLIC OXIDE							
THALLIUM(I)SULFATE	NONE	12039520	N	N	Y	N	N	N
THIOACETAMIDE	see SULFURIC ACID, THALLIUM(I)SALT							
THIOEPTA	see ETHANETHIOAMIDE							
THIOFANOX	see TRIS(1-AZIRIDINYL) PHOSPHINE SULFIDE							
THIOMETHANOL	3,3-DIMETHYL-1-(METHYLTHIO)-2-BUTANONE,O-[(METHYLAMINO) CARBONYL] OXIDE	39196184	N	N	Y	Y	N	Y
THIOMIDODICARBONIC DIAMIDE	see METHANETHIOL							
THIOPHENOL	see 2,4-DITHIOBIURET							
THIOSEMICARBAZIDE	see BENZENETHIOL							
THIOUREA	see HYDRAZINECARBOTHIOAMIDE							
	see CARBAMIDE, THIO-							

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
SELENIUM OXIDE	see SELENIUM DIOXIDE							
SELENOUREA	see CARBAMIMIDOSELENOIC ACID							
L-SERINE, DIAZOACETATE (ESTER)	see AZASERINE							
SILVER	NONE							
SILVER AND COMPOUNDS		7440224	N	Y	Y	N	N	N
SILVER CYANIDE	NONE		N	Y	Y	N	N	N
SILVER NITRATE	NONE	506649	Y	N	Y	N	N	N
SILVEX	PROPIONIC ACID, 2-(2,4,5-TRICHLOROPHENOXY); 2,4,5-TP ACID	7761888	Y	N	Y	N	N	N
SODIUM	NONE	93721	Y	N	Y	N	N	N
SODIUM ARSENATE	NONE	7440235	Y	N	Y	N	N	N
SODIUM ARSENITE	NONE	7631892	Y	N	Y	N	N	N
SODIUM AZIDE	NONE	7784465	Y	N	Y	N	N	N
SODIUM BICHROMATE	NONE	26628228	N	N	Y	N	N	N
SODIUM BIFLUORIDE	NONE	10588019	Y	N	Y	N	N	N
SODIUM BISULFITE	NONE	1333831	Y	N	Y	N	N	N
SODIUM CHROMATE	NONE	7631905	Y	N	Y	N	N	N
SODIUM CYANIDE	NONE	7775113	Y	N	Y	N	N	N
SODIUM DIPHENYL-4,4'-bis-azo-2°, 8°-AMINO-1°-NAPTHOL-3°, 6°DISULFONATE	see DIRECT BLUE 6	143339	Y	N	Y	N	N	N
SODIUM DODECYLBENZENE SULFONATE	NONE							
SODIUM FLUORIDE	NONE	25155300	Y	N	Y	N	N	N
SODIUM HYDROSULFIDE	NONE	7681494	Y	N	Y	N	N	N
SODIUM HYROXIDE	NONE	16721805	Y	N	Y	N	N	N
SODIUM HYPOCHLORITE	NONE	1310732	Y	N	Y	N	N	N
		7681529	Y	N	Y	N	N	N
SODIUM METHYLATE	NONE	10022705						
SODIUM NITRITE	NONE	124414	Y	N	Y	N	N	N
SODIUM PHOSPHATE,DIBASIC	NONE	7632000	Y	N	Y	N	N	N
		7558794	Y	N	Y	N	N	N
SODIUM PHOSPHATE, TRIBASIC	NONE	10039324						
		10140655						
		7601549	Y	N	Y	N	N	N
		7785844						
		10101890						
		10361894						
SODIUM SELENITE	NONE	7758294						
		10124568						
SOOTS, TARS AND MINERAL OILS		1012188	Y	N	Y	N	N	N
STILBENEDIOL, alpha, alpha'-DIETHYL-	see DIETHYLSTILBESTROL	7782823						
STREPTOZOTOCIN	D-GLUCOPYRANOSE, 2-DEOXY-2-(3-METHYL-3-NITROSOUREIDO)-		N	N	N	N	Y	Y
STRONTIUM CHROMATE	NONE	18883664	N	N	Y	N	Y	Y
STRONTIUM SULFIDE	NONE	7789062	Y	N	Y	N	N	N
STRYCHNIDIN-10-ONE, AND SALTS	see STRYCHNINE AND SALTS	1314961	N	N	Y	N	N	N
STRYCHNIDIN-10-ONE, 2,3-DIMETHOXY	see BRUCINE							
STRYCHNINE AND SALTS	STRYCHNIDIN-10-ONE, AND SALTS							
STYRENE	NONE	57249	Y	N	Y	Y	N	Y
SUGAR OF LEAD	see ACETIC ACID, LEAD SALT	100425	Y	N	Y	N	N	N
SULFALLATE	CDEC; 2-CHLOROALLYL DIETHYLDITHIOCARBAMATE							
SULFUR HYDRIDE	see HYDROGEN SULFIDE	95067	N	N	N	N	Y	Y
SULFUR MONOCHLORIDE	NONE							
SULFUR PHOSPHIDE	see PHOSPHORUS SULFIDE	12771083	Y	N	Y	N	N	N
SULFUR SELENIDE	see SELENIUM DISULFIDE							

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
2-PROPANONE	see ACETONE							
2-PROPANONE, 1-BROMO-	see BROMOACETONE							
PROPARGITE	NONE							
PROPARGYL ACHOHOL	2-PROPYN-1-ol	2312358	Y	N	Y	N	N	N
2-PROPENAMIDE	see ACRYLAMIDE	107197	N	N	Y	Y	N	Y
PROPENE, 1,3-DICHLORO-	see 1,3-DICHLOROPROPENE							
1-PROPENE, 1,1,2,3,3,3-HEXACHLORO-	see HEXACHLOROPROPENE							
2-PROPENENITRILE	see ACRYLONITRILE							
2-PROPENENITRILE, 2-METHYL-	see METHACRYLONITRILE							
PROPENEOXIDE	see PROPYLENE OXIDE							
2-PROPENOIC ACID	see ACRYLIC ACID							
2-PROPENOIC ACID, ETHYL ESTER	see ETHYL ACRYLATE							
2-PROPENOIC ACID, 2-METHYL-, ETHYL ESTER	see ETHYL METHACRYLATE							
2-PROPENOIC ACID, 2-METHYL-, METHYL ESTER	see METHYL METHACRYLATE							
2-PROPEN-1-OL	see ALLYL ALCOHOL							
PROPIOLACTONE	see beta PROIOLACTONE							
PROPIONIC ACID	PROPANOIC ACID							
PROPIONIC ACID, 2-(2,4,5-TRICHLOROPHENOXY)	see SILVEX	79094	Y	N	Y	N	N	N
PROPIONIC ANHYDRIDE	NONE							
PROPENYLALCOHOL	see ALLYL ALCOHOL	123626	Y	N	Y	N	N	N
n-PROPYLAMINE	see 1-PROPANAMINE							
PROPYLENE DICHLORIDE	see 1,2-DICHLOROPROPANE							
PROPYLENE OXIDE	PROPENEOXIDE							
1,2-PROPYLENIMINE	see 2-METHYLAZIRIDINE							
PROPYLTHIOURACIL	NONE	75569	Y	N	Y	N	N	N
2-PROPYN-1-OL	see PROPARGYL ALCOHOL							
PYRENE	BENZO(def)PHENANTHRENE		N	N	N	N	Y	Y
PYRETHRINS	NONE	129000	N	Y	Y	N	N	N
		121299	Y	N	Y	N	N	N
4-PYRIDINAMINE	see 4-AMINOPYRIDINE	121211						
PYRIDINE	BENZO(b)PYRIDINE; 1-BENZAZINE	8003347						
PYRIDINE, 2-[(2-(DIMETHYLAMINO)ETHYL)-2-THENYLAMINO]-	see METHAPYRILENE	110861	N	N	Y	N	N	N
PYRIDINE, HEXAHYDOR-N-NITROSO	see N-NITROSOPIPERIDINE							
PYRIDINE, 2-METHYL	see 2-PICOLINE							
PYRIDINE, (S)-3-(1-METHYL-2-PYRROLIDINYL)-, &SALTS	see NICOTINE AND SALTS							
4(1H)-PYRIMIDINONE,2,3-DIHYDRO-6-METHYL-2-THIOXO-	see METHYLTHIOURACIL							
PYROPHOSPHORIC ACID, TETRAETHYL ESTER	see TETRA ETHYL PYROPHOSPHATE							
PYRROLE, TETRAHYDRO-N-NITROSO	see N-NITROSOPYRROLIDINE							
QUINOLINE	NONE							
RADIONUCLIDES	NONE							
RESERPINE	YOHIMBAN-16-CARBOXYLIC ACID, 11,17-DIMETHYOXY-18-[(3,4,5-TRIMETHYOXY-BENZOYL)OXY]-METHYL ESTER	91225	Y	N	Y	N	N	N
RESORCINOL	1,3-BENZENEDIOL; m-HYDROXYPHENOL	50555	N	N	Y	N	N	N
RUBBER INDUSTRY (CERTAIN COMPOUNDS)			N	N	Y	N	Y	Y
SACCHARIN AND SALTS	1,2-BENZISOTHIAZOLIN-3-ONE,1,1-DIOXIDE, AND SALTS	108463	Y	N	Y	N	N	N
SAFROLE	BENZENE, 1,2-METHYLENEDIOXY-4-ALLYL-		N	N	N	N	Y	N
SELENIOUS ACID	NONE	81072	N	N	Y	N	Y	Y
SELENIUM	NONE	94597	N	N	Y	N	Y	Y
SELENIUM AND COMPOUNDS		7783008	N	N	Y	N		N
SELENIUM DIO[illegible]	SELENIUM OXIDE	7782492	N	Y	Y	N		N
SELENIUM DIS[illegible]IDE	SULFUR SELENIDE	7446084	Y	N	Y	N	N	N
		7488564	N	N	Y	N	N	N

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
ESTER								
PHOSPHOROTHIOIC ACID, 0,0'DIETHYL o-PYRAZINYLESTER	see 0,0'DIETHYL o-PYRAZINYL PHOSPHOROTHIOATE							
PHOSPHOROTHIOIC ACID, 0,0-DIMETHYL-0-[p-[(DIMETHYLAMINO)-SULFONYL]PHENYL] ESTER	see FAMPHUR							
PHOPHORUS								
PHOSPHORUS OXYCHLORIDE	NONE							
PHOSPHORUS PENTASULFIDE	NONE	7723140	Y	N	Y	N	N	N
PHOSPHORUS SULFIDE	see PHOPHORUS SULFIDE	10025873	Y	N	Y	N	N	N
PHOSPHORUS TRICHLORIDE	PHOSPHORUS PENTASULFIDE; SULFUR PHOSPHIDE							
PHTHALATE ESTERS	NONE	1314803	Y	N	Y	N	N	N
PHTHALIC ANHYDRIDE		7719122	Y	N	Y	N	N	N
2-PICOLINE	1,2-BENZENEDICARBOXYLIC ACID ANHYDRIDE		N	N	Y	N	N	N
PIRIMOPHOSMETHYL	PYRIDINE, 2-METHYL-; ALPHA PICOLINE	85449	N	Y	Y	N	N	N
PLUMBANE, TETRAETHYL	see ADIPIC ACID	109068	N	N	Y	N	N	N
POLYBROMINATED BIPHENYLS	see TETRAETHYL LEAD		N	N	Y	N	N	N
POLYCHLORINATED BIPHENYLS								
	AROCLORS							
	AROCLOR 1016	1336363	N	N	N	N	Y	Y
	AROCLOR 1221	12674112	N	N	N	N	Y	Y
	AROCLOR 1232	11104282						
	AROCLOR 1242	11141165						
	AROCLOR 1248	53469219						
	AROCLOR 1254	12672296						
	AROCLOR 1260	11097691						
POLYNUCLEAR AROMATIC HYDROCARBONS		11096825						
POTASSIUM ARSENATE	NONE		N	Y	Y	N	N	N
POTASSIUM ARSENITE	NONE	7784410	Y	N	Y	N	N	N
POTASSIUM BICHROMATE	NONE	10124502	Y	N	Y	N	N	N
POTASSUUUIUM CHROMATE	NONE	7778509	Y	N	Y	N	N	N
POTASSIUM CYANIDE	NONE	7789006	Y	N	Y	N	N	N
POTASSIUM HYDROXIDE	NONE	151508	Y	N	Y	N	N	N
POTASSIUM PERMANGANATE	NONE	1310583	Y	N	Y	N	N	N
POTASSIUM SILVER CYANIDE	NONE	7722647	Y	N	Y	N	N	N
PROCARBAZINE	N-ISOPROPYL-ALPHA-(METHYLHYDRAZINE)-p-TOLUAMIDE	506616	Y	N	Y	N	N	N
PROCARBAZINE, HYDROCHLORIDE	NONE	671167	N	N	N	N	N	N
PROGESTERONE	NONE	366701	N	N	N	N	Y	Y
beta-PROIOLACTONE	2-OXETANONE; PROPIOLACTONE; BPL		N	N	N	N	Y	Y
PROKAMIDE	3,5-DICHLORO-N-(1,1-DIMETHYL -2-PROPYNYL)BENZAMIDE		N	N	N	N	Y	Y
1-PROPANAL, 2,3 EPOXY-	see GLYCIDYLALDEHYDE	239505585	N	N	N	N	Y	Y
PROPANAL, 2-METHYL-2-(METHYLTHIO)-,0-[(METHYLAMINO)CARBONYL]OXIME	see ALDICARB		N	N	Y	N	N	N
1-PROPANAMINE								
1-PROPANAMINE, N-PROPYL-	n-PROPYLAMINE							
1-PROPANOL, 2,3-DIBROMO-PHOSPHATE (3:1)	see DIPROPYLAMINE	107108	N	N	Y	N	N	N
1-PROPANOL, 2-METHYL-	see TRIS(2,3-DIBROMOPROPYL) PHOSPHATE							
PROPANE, 1,2-DIBROMO-3-CHLORO-								
PROPANE, 2-NITRO-	see 1,2-DIBROMO-3-CHLOROPROPANE							
PROPANE, 2,2'-OXYBIS(2-CHLORO-	2-NITROPROPANE							
1,3-PROPANE,SULTONE	BIS(2-CHLOROISOPROPYL) ETHER	79469	N	N	Y	N	Y	Y
PROPANEDINITRILE	1,2-OXATHIOLANE, 2,2-DIOXIDE	108601	N	Y	Y	N	N	N
PROPANENITRILE	see MALONONNITRILE	1120714	N	N	Y	N	Y	Y
PROPANENITRILE, 3-CHLORO-	see ACETONE CYANOHYDRIN							
1,3-PROPANETRIOL, TRINITRATE-	see 3-CHLOROPROPIONITRILE							
PROPANOIC ACID	see NITROGLYCERINE							
	see PROPIONIC ACID							

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
OXIRANE, 2-(CHLOROMETHYL)-	see EPICHLOROHYDRIN							
OXYMETHOLONE	17BETA-HYDROXY-2-(HYDROXY METHYLENE)-17GAMMA-METHYL DIHYROTESTOSTERONE	434071	N	N	N	N	Y	Y
PARAFORMALDEHYDE	NONE							
PARALDEHYDE	1,3,5-TRIOXANE, 2,4,6-TRIMETHYL	30525894	Y	N	Y	N	N	N
PARATHION	PHOSPHOROTHIOIC ACID,0,0-DIETHYL O-(P-NITROPHENYL) ESTER	123637	N	N	Y	N	N	N
PENTACHLOROBENZENE	BENZENE, PENTACHLORO	56382	Y	N	Y	Y	N	Y
PENTACHLOROETHANE	ETHANE, PENTACHLORO,; PENTALIN	608935	N	N	Y	N	N	N
PENTACHLORONITROBENZENE	BENZENE, PENTACHLORONITRO; PCNB;	76017	N	N	Y	N	N	N
PENTACHLOROPHENOL	PHENOL, PENTACHOLORO-; PCP; PENTA	82688	N	N	Y	N	N	N
1,3-PENTADIENE	see 1-METHYLBUTADIENE	87865	Y	Y	Y	N	N	N
PENTALIN	see PENTACHLOROETHANE							
PERCHLOROCYCLOPENTADIENE	see 1,3-CYCLOPENTADIENE,1,2,3,4,5,5-HEXACHLORO-							
PHENACETIN	ACETAMIDE, N-(4-ETHOXYPHENYL)-							
PHENANTHRENE	NONE	62442	N	N	Y	N	Y	Y
PHENAZOPYRIDINE HYDROCHLORIDE	NONE	85018	N	Y	Y	N	N	N
PHENOL	BENZENE, HYDROXY-; CARBOLIC ACID; HYDROXYBENZENE	136403	N	N	N	N	Y	Y
PHENOL, 2-CHLORO-	see 2-CHLOROPHENOL	108952	Y	Y	Y	N	N	N
PHENOL, 4-CHLORO-3METHYL-	see 4-CHLORO-m-CRESOL							
PHENOL, 2-CYCLOHEXYL-4,6-DINITRO-	see 4,6-DINITRO-o-CYCLOHEXYLPHENOL							
PHENOL, 2,4-DICHLORO-	see 2,4-DICHLOROPHENOL							
PHENOL, 2,6-DICHLORO-	see 2,6-DICHLOROPHENOL							
PHENOL, 2,4-DIMETHYL-2,4-XYLENOL	see 2,4-DIMETHYLPHENOL							
PHENOL, 2,4-DINITRO-	see 2,4-DINITROPHENOL							
PHENOL, 2,4-DINITRO-6-(1-METHYLPROPYL)-	see DINOSEB							
PHENOL, 2,4-DINITRO-6-METHYL- AND SALTS	see 4,6-DINITRO-o-CRESOL AND SALTS							
PHENOL,4-NITRO-	see p-NITROPHENOL							
PHENOL, PENTACHLORO	see PENTACHLOROPHENOL							
PHENOL, 2,3,4,6-TETRACHLORO-	2,3,4,6-TETRACHLOROPHENOL							
PHENOL, 2,4,5-TRICHLORO-	2,4,5-TRICHLOROPHENOL	58902	N	N	Y	N	N	N
PHENOL, 2,4,6-TRICHLORO-	2,4,6-TRICHLOROPHENOL	95954	Y	N	Y	N	N	N
PHENOL, 2,4,6-TRINITRO-AMMONIUM SALT	see AMMONIUM PICRATE	88062	Y	Y	Y	N	N	N
PHENYL DICHLOROARSINE	see DICHLOROPHENYLARSINE							
1,10-(1,2-PHENYLENE)PYRENE	see INDENO(1,2,3-cd)PYRENE							
PHENYLMERCURIC ACETATE	MERCURY, (ACETATO-O)PHENYL-							
N-PHENYLTHIOUREA	THIOUREA,PHENYL	62384	N	N	Y	Y	N	Y
P-PHENYLANILINE	see 4-AMINOBIPHENYL	103855	N	N	Y	Y	N	Y
PHENYTOIN	5,5-DIPHENYL HYDRANTOIN							
PHENYLTOIN, SODIUM SALT	NONE	57410	N	N	N	N	Y	Y
PHORATE	PHOSPHORODITHIOIC ACID, 0,0-DIETHYL S-(EHTYLTHIO) METHYL ESTER	298022	N	N	Y	Y	N	Y
PHOSGENE	see CARBONYL CHLORIDE							
PHOSPHINE	HYDROGEN PHOSPHIDE							
PHOSPHORIC ACID	NONE	7803512	N	N	Y	N	N	N
PHOSPHORIC ACID, DIETHYL p-NITROPHENYL ESTER	see DIETHYL-p-NITROPHENYL PHOSPHATE	7664382	Y	N	Y	N	N	N
PHOSPHORIC ACID, LEAD SALT	see LEAD PHOSPHATE							
PHOSPHORODITHIOIC ACID, 0,0' DIETHYL s-METHYLESTER	see 0,0'-DIETHYL s-METHYL DITHIOPHOSPHATE							
PHOSPHORODITHIOIC ACID, 0,0-DIETHYL S-(ETHYLTHIO) METHYL ESTER	see PHORATE							
PHOSPHOROTHIOIC ACID, 0,0-DIMETHYL s-[2(METHYL AMINO)-2-OXOETHYL] ESTER	see DIMETHOATE							
PHOSPHOROF[illegible]IDIC ACID, bis(1-METHYLETHYL) ESTER	see DIISOPROPYL FLUOROPHOSPHAT[illegible]							
PHOSPHOROI[illegible]IC ACID, 0,0-DIETHYL O-(P-NITROPHENYL	see PARATHION							

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
5-NITRO-o-ANISIDINE	2-AMINO-5-NITROANIOLE	99592	N	N	N	N	Y	Y
NITROBENZENE	BENZENE, NITRO-	98953	Y	Y	Y	N	N	N
NITROFEN	2,4-DICHLORO-1(4-NITROPHENOXY) BENZENE	1836755	N	N	N	N	Y	Y
NITROGEN DIOXIDE	NITROGEN(IV)OXIDE	10102440	Y	N	Y	N	N	N
NITROGEN MUSTARD	see MELPHALAN	10544726						
NITROGEN(II)OXIDE	see NITRIC OXIDE							
NITROGEN(IV)OXIDE	see NITROGEN DIOXIDE							
NITROGLYCERINE	1,2,3-PROPANETRIOL, TRINITRATE-							
NITROPHENOL (MIXED)								
m-		55630	N	N	Y	N	N	N
o-		25154556	Y	N	Y	N	N	N
p-	2-NITROPHENOL	554847						
p-NITROPHENOL	4-NITROPHENOL; PHENOL, 4-NITRO-	88755	Y	Y	Y	N	N	N
2-NITROPHENOL	o-NITROPHENOL	100027						
4-NITROPHENOL	see p-NITROPHENOL	100027	Y	Y	Y	N	N	N
NITROPHENOLS		88755	Y	Y	Y	N	N	N
2-NITROPROPANE	see PROPANE, 2-NITRO-		N	Y	Y	N	N	N
NITROSAMINES								
N,N-BIS(2-CHLOROETHYL)-2-NAPHTYLAMINE	CHLORNAPHAZINE		N	Y	Y	N	N	Y
N-NITROSOARCOSINE	NONE	494031	N	N	N	N	Y	Y
N-NITROSODI-n-BUTYLAMINE	1-BUTANAMINE, N-BUTYL-N-NITROSO-		N	N	N	N	Y	Y
N-NITROSODIETHANOLAMINE	ETHANOL, 2,2'-(NITROSOIMINO)BIS-	924163	N	N	Y	N	Y	Y
N-NITROSODIETHYLAMINE	EHTANAMINE, N--ETHYL-N-NITROSO-	1116547	N	N	Y	N	Y	Y
N-NITROSODIMETHYLAMINE	see DIMETHYLNITROSAMINE	55185	N	N	Y	N	Y	Y
N-NITROSODIPHENYLAMINE	NONE							
N-NITROSO-n-PROPYLAMINE	see DI-n-PROPYLNITROSAMINE	86306	N	Y	Y	N	N	N
N-NITROSO-n-ETHYLUREA	see CARBAMIDE, N-ETHYL-N-NITROSO-							
N-NITROSO-n-METHYLUREA	see CARBAMIDE, N-METHYL-N-NITROSO-							
N-NITROSO-n-METHYLURETHANE	see CARBAMIC ACID, METHYLNITROSO-ETHYL ESTER							
N-NITROSOMETHYLVINYLAMINE	ETHENAMINE, N-METHYL-N-NITROSO-							
N-NITROSOMORPHOLINE	NONE	4549400	N	N	Y	Y	Y	Y
N-NITROSONORNICOTINE	NONE		N	N	N	N	Y	Y
N-NITROSOPIPERIDINE	PYRIDINE, HEXAHYDRO-N-NITROSO		N	N	N	N	Y	Y
N-NITROSOPYRROLIDINE	PYRROLE, TETRAHYDRO-N-NITROSO-	100754	N	N	Y	N	Y	Y
p-NITROSODIPHENYLAMINE	NONE	930552	N	N	Y	N	N	Y
NITROTOLUENE m-, o-,p-	NONE		N	N	N	N	Y	N
m-		1321126	Y	N	Y	N	N	N
o-		99081						
p-		88722						
5-NITRO-o-TOLUIDINE	see BENZENAMINE, 2-METHYL- 5-NITRO-	99990						
5-NORBORNENE-2,3-DIMETHANOL,1,4,5,6,7,7-HEXACHLORO CYCLIC SULFITE	see ENDOSUFAN							
NORETHISTERONE	NONE							
OCTAMETHLYLPYRPPHOS-PHORAMIDE	see DIPHOSPHORAMIDE,OCTAMETHYL							
OSMIUM OXIDE	OSMIUM TETROXIDE		N	N	N	N	Y	Y
OSMIUM TETROXIDE	see OSMIUM OXIDE	20816120	N	N	Y	N	N	N
7-OXABICYCLO[2,2,1]HEPTANE-2,3-DICARBOXYLIC ACID	ENDOTHALL							
1,2-OXATHIOLANE, 2,2-DIOXIDE	see 1,3-PROPANE, SULTONE	145733	N	N	N	Y	N	Y
2H-1,3,2-OXAZAPHOSPHORINE,2-[BIS(2-CHLOROETHYL) AMINO]TETRAHYDRO-2-OXIDE	see CYCLOPHOSPHAMIDE							
2-OXETANONE	see beta-PROIOACTONE							
OXIRANE	ETHYLENEOXIDE	75218	N	N	Y	N	Y	Y

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243.3
METHYL PARATHION	O,O-DIMETHYL O-P-NITROPHENYL PHOSPHOROTHIOATE; DIMETHYL PARATHION	298000	Y	N	Y	Y	N	Y
4-METHYL-2-PENTANONE	see METHYL ISOBUTAL KETONE							
METHYL PHENYL KETONE	see ACETOPHENONE							
METHYLTHIOURACIL	4(1H)-PYRIMIDINONE,2,3-DIHYDRO-6-METHYL-2-THIOXO-							
METHYL YELLOW	see 4-DIMETHYLAMINOZOBENZENE	56042	N	N	Y	N	N	N
METRONIDAZOLE	NONE							
MEVINPHOS	NONE		N	N	N	N	Y	Y
MEXACARBATE	NONE	7786347	Y	N	Y	N	N	N
MICHLER'S KETONE	TETRAMETHYLDIAMINOBENZOPHENONE	315184	Y	N	Y	N	N	N
MIREX	DECHLORANE	90948	N	N	N	N	Y	Y
MITOMYCIN C	AZIRINO(2',3':3,4)PYRROLO(1,2-A)INDOLE-4,7-DIONE, 6-AMINO-8-[[((AMINOCARBONYL)OXY)METHYL]-1,1a,2,8,8a,8b-HEXAHYDRO-8a-METHOXY-5-METHYL-	2385855	N	N	N	N	Y	Y
MONOETHYLAMINE	NONE	50077	N	N	Y	N	N	N
MONOMETHYLAMINE	METHYAMINE							
MUSTARD GAS	1,2-DIBROMO-2,2-DICHLORO-ETHYLDIMETHYLPHOSPHATE	75047	Y	N	Y	N	N	N
NALED	NONE	74895	Y	N	Y	N	N	N
5,12-NAPTHACENEDIONE, (8S cis)-8-ACETYL-10-[AMINO]-7,8,9,10-TETRAHYDRO-6,8,11-TRIHYDROXY-1-METHOXY-	see DAUNOMYCIN	505602	N	N	N	N	Y	Y
NAPHTHALENE	NONE	300765	Y	N	Y	N	N	N
NAPHTHALENE, 2-CHLORO-	see beta-CHLORONAPHTHALENE							
1,4-NAPHTHALENEDIONE	see 1,4-NAPHTHOQUINONE	91203	Y	Y	Y	N	N	N
2,7-NAPHTHALENEDISULFONIC ACID,3,3'-[3,3'-DIMETHYL-(1,1'-BIPHENYL)-4,4'-DIYL)-BIS(AZO)]BIS(5-AMINO-4-HYDROXY)-TETRASODIUM SALT	see TRYPAN BLUE							
NAPHTHENIC ACID	NONE							
1,4-NAPHTHOQUINONE	1,4-NAPHTHALENEDIONE	1338245	Y	N	Y	N	N	N
1-NAPHTHYLAMINE	alpha-NAPHTHYLAMINE	130154	N	N	Y	N	N	N
2-NAPHTHYLAMINE	beta-NAPHTHYLAMINE	134327	N	N	Y	N	N	N
alpha-NAPHTHYLAMINE	see 1-NAPHTHYLAMINE	91598	N	N	Y	N	Y	Y
beta-NAPHTHYLAMINE	see 2-NAPHTHYLAMINE							
2-NAPHTHYLAMINE, N,N-BIS(2-CHLOROETHYL)-	see CHLORNAPHAZINE							
alpha-NAPHTHYLTHIOUREA	THIOUREA, 1-NAPHTHALENYL							
NICKEL	NONE	86884	N	N	Y	Y	N	Y
NICKEL AND COMPOUNDS		7440020	N	Y	Y	N	Y	N
NICKEL AMMONIUM SULFATE	NONE		N	Y	Y	N	Y	N
NICKEL CARBONYL	NICKEL TETRACARBONYL	15699180	Y	N	Y	N	N	N
NICKEL CHLORIDE	NONE	13463393	N	N	Y	Y	N	Y
NICKEL CYANIDE	NICKEL(II)CYANIDE	7718549	Y	N	Y	N	N	N
NICKEL(II)CYANIDE	see NICKEL CYANIDE	37211055						
NICKEL HYROXIDE	NONE	557197	N	N	Y	Y	N	N
NICKEL NITRATE	NONE	12054487	Y	N	Y	N	N	N
NICKEL SULFATE	NONE	14216752	Y	N	Y	N	N	N
NICKEL TETRACARBONYL	see NICKEL CARBONYL	7786814	Y	N	Y	N	N	N
NICOTINE AND SALTS	PYRIDINE, (S)-3-(1-METHYL-2-PYRROLIDINYL)-, AND SALTS							
NITIRC ACID	NONE	54115	N	N	Y	N		N
NITIRC OXIDE	NITROGEN(II)OXIDE	7697372	Y	N	Y	N		N
NITRILOTRIA[illegible]IC ACID	NTA; TRIGLYCINE; TGA	10102439	N	N	Y	N		N
p-NITROANIL[illegible]	see BENZENAMINE, 4-NITRO-	139139	N	N	N	N	N	N
							Y	Y

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
METHANE, DICHLORODIFLUORO-	see DICHLORODIFLUOROMETHANE							
METHANE, IODO-	see METHYL IODIDE							
METHANE, OXYBIS(CHLORO-	see BIS(CHLOROMETHYL) ETHER							
METHANE, TETRACHLORO-	see CARBON TETRACHLORIDE							
METHANE, TETRANITRO-	see TETRANITROMETHANE							
METHANE, TRIBROMO-	see BROMOFORM							
METHANE, TRICHLORO-	see CHLOROFORM							
METHANE, TRICHLOROFLUORO-	see TRICHLOROMONOFLUORO-METHANE							
METHANESULFONIC ACID,ETHYL ESTER	see ETHYLLMETHANESULFONATE							
METHANETHIOL	METHYLMECAPTAN; THIOMETHANOL							
METHANESULFENYL CHLORIDE, TRICHLORO-	see TRICHLORMETHANESULFENYL CHLORIDE	74931	Y	N	Y	Y	N	N
4,7-METHANO-1H-INDENE,1,4,5,6,7,8,8-HEPTACHLORO-3a,4,7,7a-TETRAHYDRO-	see HEPTACHLOR							
METHANOIC ACID	see FORMIC ACID							
4,7-METHANOINDAN, 1,2,4,5,6,7,8,8'-OCTACHLORO-3A,4,7,7a-TETRAHYDRO-,	see CHLORDANE							
METHANOL	METHYL ALCOHOL							
METHAPYRILENE	PYRIDINE, 2-[(2-(DIMETHYLAMINO)ETHYL)-2-THENYLAMINO]-	6756661	N	N	Y	N	N	N
2-METHOANILINE	see o-ANISIDINE	91805	N	N	Y	N	N	N
METHOMYL	see ACETIMIDIC ACID, N-[(METHYLCARBAMOYL)OXY] THIO-							
METHOXSALEN WITH ULTRA VIOLET A THEARPY (PUVA)								
METHOXYCHLOR	ETHANE, 1,1,1-TRICHLORO-2,2-BIS(P-METHOXYPHENYL		N	N	N	N	Y	N
METHYLAMINE	see MONOMETHYLAMINE	72435	Y	N	Y	N	N	N
METHYL ALCOHOL	see METHANOL							
METHYL-o-ANISIDINE	see p-CRESIDINE							
beta-METHYLARCOLIEN	see CROTONALDHYDE							
2-METHYLAZIRIDINE	1,2-PROPYLENIMINE							
METHYLAZOXYMETHANOL BETA-d-GLUCOIDE	see CYCASIN	75558	N	N	Y	Y	N	Y
METHYL BROMIDE	METHANE, BROMO							
1-METHYLBUTADIENE	1,3-PENTADIENE	74839	N	Y	Y	N	N	N
METHYL CHLORIDE	METHANE, CHLORO-	504609	N	N	Y	N	N	N
METHYL CHLOROCARBONATE	see CARBONOCHLORIDIC ACID, METHYL ESTER	74873	N	Y	Y	N	N	N
METHYL CHLOROFORM	1,1,1-TRICHLOROETHANE							
4,4'-METHYLENEBIS(2-CHLOROANILINE)	BENZENAMINE, 4,4'-METHYLENEBIS (2-CHLORO-	71556	N	Y	Y	N	N	N
4,4'-METHYLENEBIS(N,N-DIMETHYL) BENZENAMINE	NONE	101144	N	N	Y	N	N	N
2,2'-METHYLENEBIS(3,4,6-TRICHLOROPHENOL)	see HEXACHLOROPHENE		N	N	N	N	Y	Y
3-METHYLCHOLANTHRENE	see BENZ(J)ACEANTHRYLENE,1,2-DIHYDRO-3-METHYL							
METHYLENE BROMIDE	METHANE, DIBROMO							
METHYLENE CHLORIDE	METHANE, DICHLORO-	74953	N	N	Y	N	N	N
4,4'-METHYLENEDIANILINE AND ITS DIHYDROCHLORIDE	see 4,4' DIAMINODIPHENYLMETHANE	75092	N	Y	Y	N	N	N
METHYLENE OXIDE	see FORMALDEHYDE							
METHYL ETHYL KETONE	see 2-BUTANONE							
METHYL ETHYL KETONE PEROXIDE	see 2-BUTANONE PEROXIDE							
METHYL HYDRAZINE	see HYDRAZINE, METHYL							
METHYL IODIDE	METHANE, IODO-							
METHYL ISOBUTYL KETONE	4-METHYL-2-PENTANONE	74884	N	N	Y	N	Y	Y
METHYL ISOCYANATE	see ISOCYANIC ACID, METHYL ESTER	108101	N	N	Y	N	N	N
2-METHYLLACTONITRILE	see ACETONE CYANOHYDRIN							
METHYLMECAPTAN	see METHANETHIOL							
METHYL METHACRYLATE	2-PROPENONIC ACID, 2-METHYL-,METHYL ESTER							
6-[(1-METHYL-4-NITRO-1H-IMIDAZOL-5-YL)THIO]-1H-PURINE	see AZATHIOPRINE	80626	Y	N	Y	N	N	N
N-METHYL-N'-NITRO-N-NITROGUANIDINE	see GUANIDINE, N-NITROSO-N-METHYL-N'-NITRO							

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
3(2H)- ISOXAZOLONE, 5-(AMINOMETHYL)-	see 5-(AMINOMETHYL)-3-ISOXAZOLOL							
KELTHANE	NONE							
KEPONE	DECACHLOROOCTAHYDRO-1,3,4-METHANO-2H-CYCLOBUTA[c,d]-PENTALEN-2-ONE	115322	Y	N	Y	N	N	N
LASIOCARPINE	NONE	143500	Y	N	Y	N	Y	Y
LEAD	NONE	303344	N	N	Y	N	N	N
LEAD ACETATE	see ACETIC ACID, LEAD SALT	7439921	N	Y	Y	N	N	N
LEAD AND COMPOUNDS								
LEAD ARSENATE	NONE		N	Y	Y	N	N	N
LEAD CHLORIDE		7784409	Y	N	Y	N	N	N
		7645525						
LEAD FLUOBORATE	NONE	10102484						
LEAD FLUORIDE	NONE	7758954	Y	N	Y	N	N	N
LEAD IODIDE	NONE	13814965	Y	N	Y	N	N	N
LEAD NITRATE	NONE	7783462	Y	N	Y	N	N	N
LEAD PHOSPHATE	PHOSPHORIC ACID, LEAD SALT	10101630	Y	N	Y	N	N	N
LEAD STEARATE	NONE	10099748	Y	N	Y	N	N	N
		7446277	N	N	Y	N	Y	N
		7428480	Y	N	Y	N	N	N
		1072351						
LEAD SUBACETATE	NONE	52652592						
LEAD SULFATE	NONE	56189094						
		1335326	N	N	Y	N	N	N
LEAD SULFIDE	NONE	15739807	Y	N	Y	N	N	N
LEAD THIOCYANATE	NONE	7446142						
LINDANE	see gamma-BHC	1314870	Y	N	Y	N	N	N
LITHIUM CHROMATE	NONE	592870	Y	N	Y	N	N	N
MALATHION	NONE							
MALEIC ACID	NONE	14307358	Y	N	Y	N	N	N
MALEIC ANHYDRIDE	2,5-FURANDINE	121755	Y	N	Y	N	N	N
MALEIC HYDRAZIDE	1,2-DIHYDRO-3,6-PYRIDAZINEDIONE	110167	Y	N	Y	N	N	N
MALONONITRILE	PROPANEDINITRILE	108316	Y	N	Y	N	N	N
MELPHALAN	ALANINE,3,-[P[BIS(2-CHLOROETHYL)AMINO] PHENYL-,L-	123331	N	N	Y	N	N	N
MERCAPTODIMETHUR	NONE	109773	N	N	Y	N	N	N
MERCURIC CYANIDE	NONE	148023	N	N	Y	N	N	N
MERCURIC NITRATE	NONE	2032657	Y	N	Y	N	Y	Y
MERCURIC SULFATE	NONE	592041	Y	N	Y	N	N	N
MERCURIC THIOCYANATE	NONE	10045940	Y	N	Y	N	N	N
MERCUROUS NITRATE	NONE	8873359	Y	N	Y	N	N	N
MERCURY	NONE	592858	Y	N	Y	N	N	N
MERCURY AND COMPOUNDS	NONE	10415755	Y	N	Y	N	N	N
MERCURY, (ACETATO-O)PHENYL	NONE	7439976	N	Y	Y	N	N	N
MERCURY FULMINATE	see PHENYLMERCURIC ACETATE		N	Y	Y	N	N	N
MESTRANOL	see FULMINIC ACID, MERCURY (II)SALT							
METHACRYLONITRILE	NOT CONJUGATED ESTROGEN							
METHANAMINE, N-METHYL-	2-PROPENENITRILE, 2-METHYL-		N	N	N	N	Y	Y
METHANE, BROMO-	see DIMETHYLAMINE	126987	N	N	Y	N	N	N
METHANE CARBOXYLIC ACID	see METHYL BROMIDE							
METHANE, CHLORO-	see ACETIC ACID							
METHANE, CHLOROMETHOXY	see METHYL CHLORIDE							
METHANE, D[illegible]MO-	see CHLOROMETHYL METHYL ETHER							
METHANE, D[illegible]ORO-	see METHYLENE BROMIDE							
	see METHYLENE CHLORIDE							

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 2430
DIMETHANONAPHTHALENE								
1,2,3,4,10,10-HEXACHLORO-6,7-EPOXY-1,4,4a,5,6,7,8,8a-OCTAHYDRO-ENDO EXO-1,4:5,8-DIMETHANONAPHTHALENE	see DIELDRIN							
HEXACHLOROETHANE	ETHANE, 1,1,1,2,2,2-HEXACHLORO-	67721	N	Y	Y	N	N	N
HEXACHLOROHEXAHYDRO-ENDO,ENDO DIMETHANONAPHTHALENE	1,2,3,4,10-10-HEXACHLORO-1,4,4a,5,8,8a-HEXAHYDRO-1,4:5,8-ENDO, ENDO DIMETHYANOPHTHALENE	465736	N	N	Y	Y	N	Y
1,2,3,4,10-10-HEXACHLORO-1,4,4a,5,8,8a-HEXAHYDRO-1,4:5,8-ENDO, ENDO DIMETHYANOPHTHALENE	see HEXACHLOROHEXAHYDRO-ENDO,ENDO DIMETHANONAPHTHALENE							
1,2,3,4,10-10-HEXACHLORO-1,4,4a,5,8,8a-HEXAHYDRO-1,4:5,8-ENDO, EXO DIMETHYANOPHTHALENE	see ALDRIN							
HEXACHLOROPHENE	2,2'-METHYLENEBIS(3,4,6-TRICHLOROPHENOL)							
HEXACHLOROPROPENE	1,-PROPENE, 1,1,2,3,3,3-HEXACHLORO-	70304	N	N	Y	N	N	N
HEXAETHYL TETRAPHOSPHATE	TETRAPHOSPHORIC ACID, HEXAETHYL ESTER	1888717	N	N	Y	N	N	N
HEXAMETHYLPHOSPHORAMIDE	see HEXAMETHYLPHOSPHORIC TRIAMIDE	757584	N	N	Y	Y	N	Y
HEXAMETHYLPHOSPHORIC TRIAMIDE	HEXAMETHYLPHOSPHORAMIDE							
HYDRAZINE	see DIAMINE	680319	N	N	N	N	Y	Y
HYDRAZINE, 1,2-DIETHYL-	see N-N'DIETHYLHYDRAZINE							
HYDRAZINE, 1,1-DIMETHYL-	see 1,1-DIMETHYLHYDRAZINE							
HYDRAZINE, 1,2-DIMETHYL-	see 1,2-DIMETHYLHYDRAZINE							
HYDRAZINE, 1,2-DIPHENYL-	see 1,2-DIPHENOLHYDRAZINE							
HYDRAZINE, METHYL	METHYL HYDRAZINE							
HYDRAZINECARBOTHIOAMIDE	THIOSEMICARBAZIDE	60344	N	N	Y	Y	N	Y
HYDRAZOBENZENE	see 1,2-DIPHENOLHYDRAZINE	79196	N	N	Y	Y	N	Y
1,8-HYDROACENAPHTHYLENE	ACENAPHTHENE; ETHYLENEAPHTHALENE							
HYDROCHLORIC ACID	NONE	83329	N	Y	Y	N	N	N
HYDROCYANIC ACID	HYDROGEN CYANIDE	7647010	Y	N	Y	N	N	N
HYDROFLUORIC ACID	HYDROGEN FLUORIDE	74908	Y	N	Y	Y	N	N
HYDROGEN CYANIDE	see HYDROCYANIC ACID	7664393	Y	N	Y	N	N	N
HYDROGEN FLUORIDE	see HYDROFLUORIC ACID							
HYDROGEN PHOSPHIDE	see PHOSPHINE							
HYDROGEN SULFIDE	HYDROSULFURIC ACID; SULFUR HYDRIDE							
HYDROPEROXIDE, 1-METHYL-1-PHENYLETHYL-	alpha,alpha-DIMETHYLBENZYLHYDRO-PEROXIDE	7783064	Y	N	Y	N	N	N
HYDROSULFURIC ACID	see HYDROGEN SULFIDE	80159	N	N	Y	N	N	N
HYDROXYBENZENE	see PHENOL							
14-HYDROXYDAUNOMYCIN	see ADRIAMYCIN							
HYDROXYDIMETHYLARSINE OXIDE	see CACODYLIC ACID							
17 beta-HYDROXY-2-(HYDROXYMETHYLENE)-17gamma-METHYLDIHYDROTESTOOSTERONE	see OXYMETHOLONE							
2-HYDROXY-2-METHYL	see ACETONE CYANOHYDRIN							
m-HYDROXYPHENOL	see RESORCINOL							
2-IMIDAZOLIDINETHIONE	see ETHYLENETHIOUREA							
INDENO(1,2,3-cd)PYRENE	1,10-(1,2-PHENYENE)PYRENE							
IRON DEXTRAN	FERRIC DEXTRAN							
ISOBUTYL ALCOHOL	1-PROPANOL, 2-METHYL-	193395	N	Y	Y	N	Y	Y
ISOCYANIC ACID, METHYL ESTER	METHYL ISOCYANATE	9004664	N	N	Y	N	Y	Y
ISOPHORONE	NONE	78831	N	N	Y	N	N	N
ISOPRENE	NONE	624839	N	N	Y	Y	N	N
ISOPROPANOLAMINE DODECYLBENZENESULFONATE	NONE	78591	N	Y	Y	N	N	N
ISOPROPYL ALCOHOL MANUFACTURE (STRONG ACID PROCESS		78795	Y	N	Y	N	N	N
ISOPROPYLBENZENE	see CUMENE	42504461	Y	N	Y	N	N	N
N- ISOPROPYL-alpha-(METHYHLHYDRAZINE)-p-TOLUAMIDE	see PROCARBAZINE		N	N	N	N	Y	N
ISOSAFROLE	BENZENE, 1,2-METHYLENEDIOXY-4-PROPENYL	120581	N	N	Y	N	N	N

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 2430
ETHYLENETRICHLORIDE	see TRICHLOROETHENE							
ETHYLENIMINE	see AZIRIDINE							
ETHYL ETHER	ETHANE, 1,1'-OXYBIS							
ETHYLIDENE DICHLORIDE	see 1,1-DICHLOROETHANE	60297	N	N	Y	N	N	N
ETHYL METHACRYLATE	2-PROPENOIC ACID, 2-METHYL-,ETHYL ESTER							
ENTYLMETHANESULFONATE	METHANESULFONIC ACID, ETHYL ESTER	97632	N	N	Y	N	N	N
FAMPHUR	PHOSPHOROTHIOIC ACID, O,O-DIMETHYL-O-[p-[(DIMETHYLAMINO)-SULFONYL]PHENYL] ESTER	62500	N	N	Y	N	N	N
FERRIC AMMONIUM CITRATE	NONE	52857	N	N	Y	Y	N	Y
FERRIC AMMONIUM OXALATE	NONE	1185575	Y	N	Y	N	N	N
FERRIC CHLORIDE	NONE	2944674	Y	N	Y	N	N	N
FERRIC DEXTRAN	see IRON DEXTRAN	55488874						
FERRIC FLUORIDE	NONE	7705080	Y	N	Y	N	N	N
FERRIC NITRATE	NONE							
FERRIC SULFATE	NONE	7783508	Y	N	Y	N	N	N
FERROUS AMMONIUM SULFATE	NONE	10421484	Y	N	Y	N	N	N
FERROUS CHLORIDE	NONE	10028225	Y	N	Y	N	N	N
FERROUS SULFATE	NONE	10045893	Y	N	Y	N	N	N
FLUOROACETIC ACID, SODIUM SALT	see ACETIC ACID, FLUORO-, SODIUM SALT	7758943	Y	N	Y	N	N	N
FLUORANTHENE	BENZO[j,k]FLUORENE	7720787	Y	N	Y	N	N	N
FLUORENE	NONE	7782630						
FLUORINE	NONE	206440	N	Y	Y	N	N	N
FLUOROACETAMIDE	see ACETAMIDE, 2-FLUORO-	86737	N	Y	Y	N	N	N
FORMALDEHYDE	METHYLENE OXIDE	7782414	N	N	Y	N	N	N
FORMIC ACID	METHANOIC ACID							
FULMINIC ACID, MERCURY(II)SALT	MERCURY FULMINATE	50000	Y	N	Y	N	Y	Y
FULMARIC ACID	NONE	64186	Y	N	Y	N	N	N
FURAN	FURFURAN	628864	N	N	Y	Y	N	Y
FURAN, TETRAHYDRO-	see TETRAHYDROFURAN	110178	Y	N	Y	N	N	N
2,5-FURANDIONE	see MALEIC ANHYDRIDE	110009	N	N	Y	N	N	N
FURFURAL	2-FURANCARBOXALDHYDE							
FURFURAN	see FURAN							
D-GLUCOPYRANOSE, 2-DEOXY-2-(3-METHYL-3-NITROSOUREIDO)-,	see STREPTOZOCIN	98011	Y	N	Y	N	N	N
GLYCIDYLALDEHYDE	1-PROPANAL,2,3-EPOXY-							
GUANIDINE, N-NITROSO-N-METHYL-N'-NITRO-	N-METHYL-N'-NITRO-N-NITROGUANIDINE	765344	N	N	Y	N	N	N
GUTHION	NONE	70257	N	N	Y	N	N	N
HALOETHERS	NONE	86500	Y	N	Y	N	N	N
HALOMETHANES	NONE		N	Y	Y	N	N	N
HEMATITE UNDERGROUND MINING			N	Y	Y	N	N	N
HEPTACHLOR	4,7-METHANO-1H-INDENE,1,4,5,6,7,8,8-HEPTACHLORO-3a,4,7,7a-TETRAHYDRO-		N	N	N	N	Y	
HEPTACHLOR AND METABOLITES		76448	Y	Y	Y	Y	N	Y
HEXACHLORCYCLHEXANE (GAMMA ISOMER)	see gamma-BHC		N	Y	Y	N	N	N
HEPTACHLOR EPOXIDE	NONE							
HEXACHLOROBENZENE	BENZENE, HEXACHLORO-	1024573	N	Y	Y	N	N	N
HEXACHLOROBUTADIENE	see 1,3-BUTADIENE, 1,1,2,3,4,4-HEXACHLORO-	118741	N	Y	Y	N	Y	Y
HEXACHLOROCYCLOHEXANE (ALL ISOMERS)	see 1,3-CYCLOPENTADIENE,1,23,4,6,[illegible]XACHLORO-							
HEXACHLOROCYCLOPENTADIENE	see ENDRIN	608731	N	Y	Y	N		N
1,2,3,4,10,1[illegible]ACHLORO-6,7-EPOXY-1,4,4a,5,6,7,8,8a-OCTAH[illegible]-ENDO, ENDO-1,4:5,8-								

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
ESTRONE	NOT CONJUGATED ESTROGEN		N	N	N	N	Y	Y
ETHANAL	ACETALDEHYDE; ETHYLALDEHYDE	75070	Y	N	Y	N	N	N
ETHANAMINE, 1,1DIMETHYL-2PHENYL	see alpha,alpha-DIMETHYLPHENETHYLAMINE							
ETHANAMINE,N-ETHYL-N-NITROSO-	see N-NITROSODIETHYLAMINE							
1,2-ETHANEDIAMINE	see ETHYLENEDIAMINE							
ETHANE, 1,2-DIBROMO-	see ETHYLENE DIBROMIDE							
ETHANE, 1,1-DICHLORO-	see 1,1-DICHLOROETHANE							
ETHANE, 1,2-DICHLORO-	see 1,2-DICHLOROETHANE							
ETHANE, 1,1,1,2,2,2,-HEXACHLORO-	see HEXACHLOROETHANE							
ETHANE, 1,1'-[METHYLENEBIS(OXY)] BIS(2-CHLORO-	see BIS(2-CHLOROTHOXY) METHANE							
ETHANE, 1,1'-OXYBIS	see ETHYL ETHER							
ETHANE, 1,1'-OXYBIS(2-CHLORO-	see BIS(2-CHLOROETHYL) ETHER							
ETHANE, PENTACHLORO-	see PENTACHLORETHANE							
ETHANE, 1,1,1,2-TETRACHLORO-	1,1,1,2-TETRACHLOROETHANE	630206	N	N	Y	N	N	N
ETHANE, 1,1,2,2-TETRACHLORO-	1,1,2,2-TETRACHLOROETHANE	79345	N	Y	Y	N	N	N
ETHANE, 1,1,2-TRICHLORO-	1,1,2-TRICHLOROETHANE	79005	N	Y	Y	N	N	N
ETHANE, 1,1,1-TRICHLORO-2,2-BIS(P-METHOXYPHENYL	see METHOXYCHLOR							
1,2-ETHANEDIYLBISCARBAMODITHIOIC ACID	see ETHYLENEBIS DITHIOCARBAMIC ACID							
ETHANENITRILE	see ACETONITRILE							
ETHANETHIOAMIDE	THIOACETAMIDE							
ETHANIC ACID	see ACETIC ACID	62555	N	N	Y	N	Y	Y
ETHANOL,2,2'-(NITROSOIMINO) BIS	see N-NITROSODIETHANOLAMINE							
ETHANONE, 1-PHENYL	see ACETOPHENONE							
ETHANOYL CHLORIDE	see ACETYL CHLORIDE							
ETHENAMINE, N-METHYL-N-NITROSO-	see N-NITROSOMETHYLVINYLAMINE							
ETHENE, CHLORO-	see VINYL CHLORIDE							
ETHENE,2-CHLOROETHOXY	see 2-CHLOROETHYL VINYL ETHER							
ETHENE, 1,1-DICHLORO-	see 1,1-DICHLOROETHYLENE							
ETHENE,1,1,2,2-TETRACHLORO-	see TETRACHLOROETHYLENE							
ETHENE, trans-1,2-DICHLORO	see 1,2-TRANS-DICHLOROETHYLENE							
ETHENYLETHANOTE	see VINYL ACETATE							
ETHINYLESTRADIOL	NOT CONJUGATED ESTROGEN							
ETHION	NONE		N	N	N	N	Y	Y
2-ETHOXYETHANOL	see ETHYLENE GLYCOL MONOETHYL ETHER	563122	Y	N	Y	N	N	N
ETHYL ACETATE	see ACETIC ACID ETHYL ESTER							
ETHYL ACRYLATE	2-PROPENOIC ACID, ETHYL ESTER							
ETHYLALDEHYDE	ACETALDEHYDE; ETHANAL	140885	N	N	Y	N	N	N
ETHYLBENZENE	NONE	75070	Y	N	Y	N	N	N
ETHYLCARBAMATE (URETHAN)	see CARBAMIC ACID, ETHYL ESTER	100414	Y	Y	Y	N	N	N
ETHYL CYANIDE	PROPANENITRILE							
ETHYL 4,4'-DICHLOROBENZILATE	BENZENEACETIC ACID, 4-CHLORO-ALPHA-(4-CHLOROPHENYL)-ALPHA-HYDROXY-, ETHYL ESTER	107120	N	N	Y	Y	N	Y
ETHYLENEAPHTHALENE	ACENAPHTHENE; 1,8-HYDROACENAPHTHYLENE	510156	N	N	Y	N	N	N
ETHYLENE BROMIDE	see 1,2-DIBROMOMETHANE							
ETHYLENE DIBROMIDE	ETHANE, 1,2-DIBROMO-	83329	N	Y	Y	N	N	N
ETHYLENE DICHLORIDE	see 1,2-DICHLOROETHANE	106934	Y	N	Y	N	N	N
ETHYLENEOXIDE	see OXIRANE							
ETHYLENEBIS (DITHIOCARBAMIC ACID	1,2-ETHANEDIYLBISCARBAMODITHIOIC ACID							
ETHYLENEBISIMINODIACETIC ACID	see ETHYLENDIAMINE TETRAACETUC ACID	111546	N	N	Y	N	N	N
ETHYLENEDIAMINE	DIAMINOETHANE; 1,2-ETHANEDIAMINE							
ETHYLENEDIAMINE TETRAACETIC ACID (EDTA)	EDTA; ETHYLENEBISIMINODIACETIC ACID	107153	Y	N	Y	N	N	N
ETHYLENE GLYCOL MONOETHYL ETHER	2-ETHOXYETHANOL	60004	Y	N	Y	N	N	N
ETHYLENETHIOUREA	2-IMIDAZOLIDINETHIONE	110805	N	N	Y	N	N	N
		96457	N	N	Y	N	Y	Y

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 2430
ALPHA, ALPHA- DIMETHYLPHENETHYLAMINE	ETHANAMINE, 1,1-DIMETHYL-2PHENYL	122098	N	N	Y	Y	N	Y
2,4-DIMETHYLPHENOL	PHENOL, 2,4-DIMETHYL; 2,4-XYLENOL	105679	N	Y	Y	N	N	N
DIMETHYL PHTHALATE	1,2-BENZENEDICARBOXYLIC ACID, DIMETHYL ESTER	131113	N	Y	Y	N	N	N
DIMETHYL SULFATE	SULFURIC ACID, DIMETHYL ESTER	7781	N	N	Y	N	Y	Y
DINITROBENZENE (MIXED)	NONE	25154646	Y	N	Y	N	N	N
m-		99650						
o-		528290						
p-		100254						
4,6-DINITRO-o CRESOL AND SALTS	PHENOL, 2,4-DINITRO-6-METHYL- AND SALTS	534521	N	Y	Y	Y	N	Y
4,6-DINTRO-o-CYCLOHEXYLPHENOL	PHENOL, 2-CYCLOHEXYL-4,6-DINITRO-	131895	N	N	Y	Y	N	Y
DINITROPHENOL	NONE	25550587	Y	N	Y	N	N	N
2,5-		329715						
2,6-		573568						
2,4-DINITROPHENOL	PHENOL, 2,4-DINITRO-	51285	Y	Y	Y	Y	N	Y
DINITROTOLUENE	NONE	25321146	Y	Y	Y	N	N	N
3,4-		610399						
2,4-DINITROTOLUENE	see BENZENE, 1-METHYL-2,6-DINITRO-							
2,6-DINITROTOLUENE	see BENZENE, 1-METHYL-2,6-DINITRO-							
DINOSEB	PHENOL, 2,4-DINITRO-6-(1-METHYLPROPYL)-	88857	N	N	Y	Y	N	Y
DI-OCTYLPHTHATE	see DI(2-ETHYLHEXLY) PHTHATE							
DI-n-OCTYL PHTHALATE	1,2-BENZENEDICARBOXYLIC ACID, DI-N-OCTYL ESTER	117840	N	Y	Y	N	N	N
1,4-DIOXANE	see 1,4-DIETHYLENE DIOXIDE							
5,5-DIPHENYL HYDRANTOIN	see PHENYTOIN							
DIPHENYLHYDRAZINE	NONE							
1,2-DIPHENYLHYDRAZINE	HYDRAZINE, 1,2-DIPHENYL; HYDRAZOBENZENE							
DIPHOSPHORAMIDE,OCTAMETHYL-	OCTAMETHYLPYROPHOS-PHORAMIDE	122667	N	Y	Y	N	N	N
DIPROPYLAMINE	1-PROPANAMINE, N-PROPYL-	152169	N	Y	Y	N	N	N
DI-n-PROPYLNITROSAMINE	N-NITROSODI-n-PROPYLAMINE	142847	N	N	Y	Y	N	Y
DIQUAT		621647	N	N	Y	N	N	N
		85007	N	Y	Y	N	N	N
DIRECT BLACK 38	NONE	2764729	Y	N	Y	N	N	N
DIRECT BLUE 6	SODIUMDIPHENYL-4,4'-BIS-AZO-2",8"-AMINO-1"-NAPTHOL-3",6"DISULFONATE		N	N	N	N	Y	Y
DISULFOTON	0,0-DETHYL-S-[2-(ETHYLTHIO)ETHYL]PHOSPHORODITHIOATE		N	N	N	N	Y	Y
2,4-DITHIOBIURET	THIOMIDODICARBONIC DIAMIDE	298044	Y	N	Y	Y	N	Y
DITHIOPYROPHOSPHORIC ACID, TETRAETHYL ESTER	TETRAETHYLDITHIOPYROPHOSPHATE	541537	N	N	Y	Y	N	Y
DIURON	3-(3,4-DICHLOROPHENYL)-1,1-DIMETHYUREA	3689245	N	N	Y	Y	N	Y
DODECYLBENZENESULFONIC ACID	NONE	330541	Y	N	Y	N	N	N
DOXORUBICIN	see ADRIAMYCIN	27176870	Y	N	Y	N	N	N
ENDOSULFAN	5-NORBORNENE-2,3-DIMETHANOL,1,4,5,6,7,7-HEXACHLORO, CYCLIC SULFITE	115297	Y	Y	Y	Y	N	Y
alpha-ENDOSULFAN	NONE	959988	N	Y	Y	N	N	N
beta-ENDOSULFAN	NONE	33213659	N	Y	Y	N	N	N
ENDOSULFAN AND METABOLITES			N	Y	Y	N	N	N
ENDOSULFAN SULFATE	NONE	1031078	N	Y	Y	N	N	N
ENDOTHALL	7-OXABICYCLO[2,2,1] HEPTANE-2,3-DICARBOXYLIC ACID	145733	N	N	Y	N	N	N
ENDRIN	1,2,3,4,10,10-HEXACHLORO-6,7-EPOXY-1,4,4a,5,6,7,8,8a-OCTAHYDRO-ENDO, ENDO-1,4:5,8-DIMETHANONAPHTHALENE	72208	Y	Y	Y	Y	N	Y
ENDRIN ALDEHYDE	NONE	7421934	N	Y	Y	N	N	Y
ENDRIN AND METABOLITIES	NONE	106898	N	Y	Y	N	N	N
EPICHLOROHYDRIN	1-CHLORO-2,3-EPOXYPROPANE; OXIRA[illegible]2-(CHLOROMETHYL)-	51434	Y	N	Y	N	Y	Y
EPINEPHRINE	1,2-BENZENEDIOL, 4-[1-HYDOXY -2-(METHYLAMINO_ETHYL]-		N	N	Y	Y	N	Y
ESTRADIOL 17B	NOT CONJUGATED ESTROGEN							

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
DIAMINE	HYDRAZINE	302012	N	N	Y	N	Y	Y
DIAMINOTOLUENE	TOLUENEDIAMINE	95807	N	N	Y	N	N	N
		25376458						
		496720						
2,4-DIAMINOANISOLE SULFATE	NONE	823405						
4,4'-DIAMINODIPHENYLMETHANE	4,4'-METHYLENEDIANILINE AND ITS DICHLORIDE		N	N	N	N	Y	N
DIAMINOETHANE	see ETHYLENDIAMINE	101779	N	N	N	N	Y	N
2,4-DIAMINOTOLUENE	TOLUENE, 2,4-DIAMINO							N
DIAZINON	NONE	95807	N	N	N	N	Y	Y
DIBENZ (a,h) ACRIDINE	1,2-5,6-DIBENZACRIDINE	5333415	Y	N	Y	N	N	N
DIBENZ (a,j) ACRIDINE			N	N	N	N	Y	Y
DIBENZ[a,h] ANTHRACENE	1,2:5,6-DIBENZANTHRACENE; DIBENZO[a,h]ANTHRACENE;		N	N	N	N	Y	Y
DIBENZ [a,i] PYRENE	1,2:7,8-DIBENZOPYRENE	53703	N	Y	Y	N	Y	Y
1,2:5,6-DIBENZACRIDINE	see DIBENZ[a,h]ACRIDINE		N	N	Y	N	Y	Y
1,2:5,6-DIBENZANTHRACENE	see DIBENZ[a,h]ANTHRACENE							
1,2:7,8-DIBENZOPYRENE	see DIBENZ[a,i]PYRENE							
DIBENZO[a,h] ANTHRACENE	see DIBENZ[a,h]ANTHRACENE							
DIBENZO(a,i)PYRENE								
7H- DIBENZO (c,g) CARBAZOLE			N	N	N	N	Y	Y
DIBENZO(a,i) PYRENE			N	N	N	N	Y	Y
1,2-DIBROMOMETHANE	ETHYLENE BROMIDE; EDB		N	N	N	N	Y	Y
1,2-DIBROMO-3-CHLOROPROPANE	PROPANE, 1,2-DIBROMO-3-CHLORO-; DBCP; DBCP		N	N	N	N	Y	Y
1,2-DIBROMO-2,2-DICHLORO-ETHYLDIMETHYLPHOSPHATE	see MUSTARD GAS	96128	N	N	Y	N	Y	Y
DIBUTYL PHTHALATE	see n-BUTYL PHTHALATE							
DI-n-BUTYL PHTHALATE	see n-BUTYL PHTHALATE							
DICAMBA	NONE							
DICHLOBENIL	NONE	1918009	Y	N	Y	N	N	N
DICHLONE	NONE	1194656	Y	N	Y	N	N	N
S-(2,3-DICHLOROALLYL)DIISOPROPYLTHIOCARBAMATE	see DIALLATE	117806	Y	N	Y	N	N	N
3,5-DICHLORO-N-(1,1-DIMETHYL-2-PROPYNYL) BENZAMIDE	see PRONAMIDE							
DICHLOROBENZENE (MIXED)	NONE							
1,2-DICHLOROBENZENE	see BENZENE,1,2-DICHLORO-	25321226	Y	N	Y	N	N	N
1,3-DICHLOROBENZENE	see BENZENE, 1,3-DICHLORO-							
1,4-DICHLOROBENZENE	see BENZENE, 1,4-DICHLORO-							
m-DICHLOROBENZENE	see BENZENE, 1,3-DICHLORO-							
o-DICHLOROBENZENE	see BENZENE, 1,2-DICHLORO-							
p-DICHLOROBENZENE	see BENZENE, 1,4-DOCHLORO-							
DICHLOROBENZIDINE	NONE							
3,3'-DICHLOROBENZIDINE	(1,1'-BIPHENYL)-4,4'DIAMINE,3,3'DICHLORO-		N	Y	Y	N	N	N
DICHLOROBROMOMETHANE	NONE	91941	N	Y	Y	N	Y	Y
1,4-DICHLORO-2-BUTENE	see 2-BUTENE,1,4-DICHLORO	75274	N	Y	Y	N	N	N
DICHLORODIFLUOROMETHANE	METHANE, DICHLORODIFLUORO-							
DICHLORODIPHENYL DICHLOROETHANE	DDD; 4,4'-DDD; TDE	75718	N	N	Y	N	N	N
DICHLORODIPHENYL TRICHLOROETHANE	DDT; 4,4' DDT	72548	Y	Y	Y	N	N	N
1,1-DICHLOROETHANE	ETHANE, 1,1-DICHLORO; ETHYLIDENE DICHLORIDE	60293	Y	Y	Y	N	Y	Y
1,2-DICHLOROETHANE	ETHYLENE DICHLORIDE; ETHANE, 1,2-DICHLORO-	75343	N	Y	Y	N	N	N
1,1-DICHLOROETHYLENE	ETHENE, 1,1-DICHLORO; VINYLIDENE CHLORIDE	107062	N	N	N	N	Y	Y
1,2-TRANS-DICHLOROETHYLENE	ETHENE, TRANS-1,2-DICHLORO	75354	Y	Y	Y	N	N	N
DICHLOROETHYL ETHER	see BIS(2-CHLOROETHYL) ETHER	156605	N	Y	Y	N	N	N
2,4-DICHLORO-1(4-NITROPHENOXY) BENZENE	see NITROFEN							
2,4-DICHLOROPHENOL	PHENOL, 2,4-DICHLORO	120832	N	Y	Y	N	N	N

CHEMICAL NAME	OTHER PARAMETER NAMES	CASRN	CWA 311(b)(4)	CWA 307(a)	CERCLA 302.4	RCRA 261.33e	USCODE 241b.4	ARS 243D
2,6-DICHLOROPHENOL	PHENOL, 2,6-DICHLORO	87650	N	N	Y	N	N	N
2,4-DICHLOROPHENOXYACETIC ACID, SALTS AND ESTERS	see 2,4-D ACID							
DICHLOROPHENYLARSINE	PHENYL DICHLOROARSINE	696286	N	N	Y	Y	N	Y
'3-(3,4-DICHLOROPHENYL)1,1-DIMETHYUREA	see DIURON							
DICHLOROPROPANE	NONE	26638197	Y	N	Y	N	N	N
1,1-DICHLOROPROPANE		78999						
1,3-DICHLOROPROPANE		142289						
1,2- DICHLOROPROPANE	PROPYLENE DICHLORIDE	78875	Y	Y	Y	N	N	N
DICHLOROPROPENE-DICHLOROPROPENE MIXTURE	NONE	8003198	Y	N	Y	N	N	N
DICHLOROPROPENE(S)	PROPENE, 1,3-DICHLORO	26952238	Y	N	Y	N	N	N
2,3-DICHLOROPROPENE (ISOMERS)	DPA; BASFAPON	78886	Y	Y	Y	N	N	N
1,3-DICHLOROPROPENE	see DICHLORVOS	542756	Y	N	Y	N	N	N
2,2-DICHLOROPROPIONIC ACID SODIUM SALT	DICHLOROVINYLDIMETHYLPHOSPHATE	75990	Y	N	Y	N	N	N
DICHLOROVINYLDIMETHYLPHOSPHATE	1,2,3,4,10,10-HEXACHLORO-6,7-EPOXY-1,4,4a,5,6,7,8,8a-OCTAHYDRO-ENDO, EXO-1,4:5,8-DIMETHANONAPHTHALENE	62737	Y	N	Y	N	N	N
DICHLORVOS	BUTADIENE DIOXIDE; DEB	60571	Y	Y	Y	Y	N	Y
DIELDRIN	2,2'-BIOXIRANE	1464535	N	N	N	N	Y	Y
DIEPOXYBUTANE	NONE	1464535	N	N	Y	N	N	N
1,2:3,4-DIEPOXYBUTANE	see ARSINE DIETHYL	109897	Y	N	Y	N	N	N
DIETHYLAMINE	1,4-DIOXANE							
DIETHYLARSINE	HYDRAZINE, 1,2-DIETHYL-	123911	N	N	Y	N	N	N
1,4-DIETHYLENE DIOXIDE	see DISULFOTON	1615801	N	N	Y	N	N	N
N-N'DIETHYLHYDRAZINE	PHOSPHORODITHIOIC ACID, O,O-DIETHYL S-METHYLESTER	3288582	N	N	Y	N	N	N
O,O-DIETHYL-S-[2-(ETHYLTHIO)ETHYL] PHOPHORODITHIOATE	PHOSPHORIC ACID, DIETHYL p-NITROPHENYL ESTER	311455	N	N	Y	Y	N	Y
O,O'-DIETHYL S-METHYL DITHIOPHOSPHATE	1,2-BENZENEDICARBOXYLIC ACID,DIETHYL ESTER	84662	N	Y	Y	N	N	N
DIETHYL-p-NITROPHENYL PHOSPHATE	PHOSPHOROTHIOIC ACID, O,O-DIETHYL O-PYRAZINYL ESTER	297972	N	N	Y	Y	N	Y
DIETHYL PHTHALATE	4,4'STILBENEDIOL,ALPHA,ALPHA'-DIETHYL-	56531	N	N	Y	N	Y	Y
O,O-DIETHYL O-PYRAZINYL PHOSPHOROTHIOATE	DI-OCTYLPHTHATE; DOP; DEHP	117817	N	N	N	N	Y	N
DIETHYLSTILBESTROL	NONE		N	N	N	N	Y	N
DI(2-ETHYLHEXYL) PHTHALATE	see MALEIC HYDRAZIDE							
DIETHYL SULFATE	BENZENE, 1,2-METHYLENEDIOXY-4-PROPYL							
1,2-DIHYDRO-3,6-PYRIDAZINEDIONE	PHOSPHOROFLUORIDIC ACID, BIS(1-METHYLETHYL)ESTER	94586	N	N	Y	N	N	N
DIHYDROSAFROLE	PHOSPHORODITHIOIC ACID, O,O-DIMETHYL S-[2(METHYLAMINO)-2-OXOETHYL] ESTER	55914	N	N	Y	Y	N	Y
DIISOPROPYL FLUOROPHOSPHATE	(1,1'-BIPHENYL)-4,4'DIAMINE,3,3'DIMETHOXY	60515	N	N	Y	Y	N	Y
DIMETHOATE	METHANAMINE, N-METHYL-	119904	N	N	Y	N	Y	Y
3,3'-DIMETHOXYBENZIDINE	see BENZENAMINE, N,N-DIMETHYL-4-PHENYLAZO-	124403	Y	N	Y	N	N	N
DIMETHYLAMINE	METHYL YELLOW; BUTTER YELLOW							
DIMETHYLAMINOAZOBENZENE	see 1,2-BENZANTHRACENE, 7,12-DIMETHYL-	60117	N	N	N	N	Y	Y
4-DIMETHYLAMINOAZOBENZENE	(1,1'BIPHENYL)-4,4'-DIAMINE,3,3'-DIMETHYL	57976						
7,12-DIMETHYLBENZ[a]ANTHRACENE	HYDROPEROXIDE, 1-METHYL- 1-PHENYLETHYL-	119937	N	N	Y	N	Y	Y
3,3'-DIMETHYLBENZIDINE	see THIODANOX	80159	N	N	Y	N	N	N
alpha,alpha-DIMETHYLBENZLHYDROPEROXIDE								
3,3-DIMETHYLL-1-(METHYLTHIO)-2-[(METHYLAMINO) CARBONYL]OXIME	see CARBONOYL CHLORIDE, DIMETHYL							
DIMETHYLCARBAMOYLCHLORIDE	HYDRAZINE,1,1-DIMETHYL-							
1,1-DIMETHYLHYDRAZINE	HYDRAZINE,1,2-DIMETHYL-							
1,2-DIMETHYLHYDRAZINE	see ACETONE	57147	N	N	Y	N	Y	Y
DIMETHYLKETONE	METHYL PARATHION	540738	N	N	Y	N	N	
O,O-DIMETHYL O-p-NITROPHENYL PHOSPHOROTHIOATE	N-NITROSODIMETHYLAMINE	298000	Y	N	Y	Y	N	Y
DIMETHYLNITROSAMINE	see METHYL PARATHION	62759	N	Y	Y	Y	Y	Y
DIMETHYL PARATHION								

AQ. PROT. PERMIT
APP. PART II

Arizona Department of Environmental Quality

AQUIFER PROTECTION PERMIT APPLICATION

PART II - DISCRETIONARY INFORMATION

A. Specific portions of the following information is required upon request of the Department. Please see the application guidance document, or establish what is needed during the pre-application meeting. Requirements vary depending on facility design and specific site characteristics of the location.

1. HYDROLOGIC STUDY

Have you included:

_____a. A description of the surface and subsurface geology;

_____b. The location of any perennial or ephemeral surface water bodies;

_____c. The characteristics of the Aquifer and Geologic Units with limited permeability, including depth, hydraulic conductivity and transmissivity.

_____d. The rates, volumes and directions of surface water and ground water flow, including hydrographs, if available and Equi-potential maps.

_____e. The location of the 100-year flood plain and an assessment of the 100-year flood surface flow and potential impacts on the facility;

_____f. A documentation of the existing quality of the water in the aquifers underlying the site, including, where available, the method of analysis and quality assurance and quality control procedures associated with the documentation;

_____g. A documentation of the extent and degree of any known soil contamination in the vicinity of the facility;

_____h. An assessment of the potential of the discharge to cause the leaching of pollutants from surface soils or vadose materials;

_____i. Any anticipated changes in the water quality expected as a result of the discharge;

_____j. A description of any expected changes in the elevation and flow directions of the groundwater that may be caused by the facility;

_____k. Map of the facility's discharge impact area;

_____l. The criteria and methodologies used to determine the discharge impact area.

2. PROPOSALS FOR VARIOUS PERMIT CONDITIONS

If requested, have you included detailed proposals for the items indicating how the applicant proposes to satisfy the requirements of A.R.S. 49, Chapter 2, Article 3, and A.C.C. R18-9-101 thru 130.

_____a. Alert Levels

Alert levels may be based upon site-specific conditions described by the applicant or may be based upon a pollutant which indicates the potential appearance of another pollutant or may be prescribed to be measured at the point of release, the point of compliance or any intervening point;

_____b. Discharge Limitations

Discharge limitations should be based upon the considerations described in ARS 49-243 A, B, C, D;

_____c. Monitoring Plan

1) The type and method(s) of monitoring to be conducted;

2) The frequency of monitoring;

3) The analytical techniques or methods used to perform the sampling or analysis;

4) Any requirements for the installation, use or maintenance of monitoring equipments, and reporting intervals and monitoring records as prescribed by the department.

_____d. Contingency plans for alert level exceedances;

_____e. Contingency plans for discharge limit exceedances;

_____f. Contingency plans for Aquifer Water Quality Standard violations;

_____g. Compliance Schedule;

_____h. Temporary cessation plans;

_____i. Closure and Post-Closure plans.

BADCT
GUIDANCE
DOCUMENT

BADCT GUIDANCE DOCUMENT

FOR THE

MINING CATEGORY

DRAFT
FOR DISCUSSION
PURPOSE ONLY

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I. INTRODUCTION

A. Objective of BADCT Guidance Document

The purpose of this document is to guide selection of the Best Available Demonstrated Control Technology (BADCT) for mining facilities. For purposes of this document, mining facilities include mining, mineral processing, mineral extraction and associated disposal activities. This document will address the base metal, uranium, and precious metal segments of the mining industry. The Environmental Quality Act (A.R.S. 49-243 B.1.) requires that all permitted facilities utilize BADCT:

"...the facility will be designed, constructed and operated as to ensure the greatest degree of discharge reduction achievable through application of best available demonstrated control technology, processes, operating methods or other alternatives, including, where practicable, a technology permitting no discharge of pollutants...However, a discharge reduction to an aquifer achievable solely by means of site specific characteristics does not, in itself, constitute compliance with..." BADCT.

In other words, rather than using some minimum required control technology, mining operators should be using state-of-the-art design elements to limit discharge to aquifers. BADCT determination involves evaluating the "optimal" technologies as a first design. Site characteristics may be substituted for designed control technologies to arrive at a final design (BADCT for that facility and site). Two key concepts reflected in this document are that BADCT is site specific and that BADCT is determined through negotiation between the applicant and the Department of Environmental Quality (DEQ).

This document outlines the best demonstrated control technologies available for mining facilities and describes the stepwise process that a permit applicant should follow to select BADCT for a specific site. The BADCT Guidance Document is intended for use in conjunction with the Aquifer Protection Permit Guidance Document (currently under development). Meeting BADCT requirements is only one aspect of the Aquifer Protection Permit. The Department will use both Guidance Documents to evaluate permit applications. In the event that an inconsistency exists between this document and applicable rules and/or statutes, provisions of the latter will prevail. Statutory (state law) references are prefaced by A.R.S. (Arizona Revised Statutes) while regulation references are denoted by AAC (Arizona Administrative Code).

B. Facilities Requiring BADCT

Mining, processing, refining, and smelting facilities are considered to be discharging facilities (A.R.S. 49-241 B.) when they have any of the following: surface impoundments, solid waste disposal, injection wells, tailings piles and ponds, leaching operations, wastewater treatment facilities, addition of pollutants to underground caves or mines, or point source discharges to navigable waters. They are required to obtain an Aquifer Protection Permit with BADCT incorporated into their designs.

The Aquifer Protection Permit and BADCT requirements apply to both new and existing mining operations. The designations "new", "existing", and "closed" are specifically defined in A.R.S. 49-201. New facilities began construction or contracting after August 13, 1986. Facilities that have undergone major modifications after August 13, 1986 are deemed new facilities, as well. Existing facilities began construction or contracting on or before August 13, 1986. Closed facilities are those which ceased operation before January 1, 1986 with no intent to resume. Facilities which ceased operation after January 1, 1986 are regarded as existing facilities and are required to meet BADCT and other Aquifer Protection Permit requirements. Closed facilities are not required to obtain an Aquifer Protection Permit and are, therefore, not subject to BADCT requirements.

Some types of mining facilities are not required to obtain an Aquifer Protection Permit since they do not engage in "discharge" which means (according to A.R.S. 49-201.10) "the addition of a pollutant from a facility either directly to an aquifer or to the land surface or the vadose zone in such a manner that there is a reasonable probability that the pollutant will reach an aquifer." The following specific exemptions apply to some mining operations:

"Mining overburden returned to the excavation site, including any common material which has been excavated and removed from the excavation site and has not been subjected to any chemical or leaching agent or process of any kind". (A.R.S. 49-250.B.5)

"Wash water from sand and gravel operations, or placer mining operations, if only physical processes are employed and no hazardous substances are added during processing". (A.A.C. R18-9-103.2)

If an applicant is uncertain of the applicability of the rules or statutes to their facility, the applicant is encouraged to consult with the Department.

C. How To Use This Document

This guidance document is meant to be used by the permit applicant to develop BADCT for his facility. If you have additional questions, do not hesitate to contact the Water Permits Unit. It will also be used by the ADEQ reviewing permit writer to prepare the permit. Chapter II outlines the ADEQ process for reviewing the BADCT portion of a permit application.

Chapter III describes "How to Determine BADCT For Your Facility". This chapter discusses the process involved in selecting control technologies to assure that they represent BADCT for a specific facility.

Chapter IV identifies the control strategies which will be used in conjunction with Chapter III. The control strategies have been selected specifically for facilities common to Arizona's mining industry. The applicability and effectiveness of various pollutant control strategies are discussed for each mine facility type. Here, also, is included a description of individual discharge control components that are available for use at mine sites.

Chapter V addresses the "Site Characteristics and Other Considerations", including hydrogeologic characteristics, other environmental factors, water conservation and economics of other alternatives which may affect the BADCT selection for a facility.

Chapter VI is devoted to existing facilities and the special considerations for them.

A list of references and a list of "Frequently Asked Questions About BADCT" are incorporated into this document.

D. Other Permits and Regulations

Other approvals and permits may be required by Federal, State or Local governments. A list of possible permits that may be required is included in Table I. This is not an exhaustive list; additional permits may be necessary. It is the permittee's responsibility to obtain and comply with all applicable laws and regulations.

TABLE I: Other Permits/Approvals & Agencies

Federal	Various Federal Agencies	E.I.S.
	BLM	Reclamation Plan
	Forest Service	Operation & Reclamation Plan
	E.P.A. - Water	N.P.D.E.S. - Clean Water Act
	E.P.A. - RCRA	Hazardous Waste Permit
	E.P.A. - Air	Air Quality Permit
	Corps of Engineers	Dredge & Fill 404 Permit
	E.P.A.	UIC Regulations (In-situ leach)
	E.P.A.	UMTRA & other programs
	N.R.C.	UMTRA & other programs
State	DEQ - Water	Reuse Permit
	DEQ - NPDES	Discharge permit-surface water
	DEQ - Waste	Hazardous Waste Permit
	DEQ - Air Quality	Air Emissions Permit
	DEQ - Solid Waste	Solid waste disposal/ operational Plan Approval
	DEQ - WQARF	Remedial Action (closed facilities)

(Cont.)

DWR - Wells	Well construction/water withdrawal permit (potable and monitoring wells)
DWR - Wells	Poor Water Quality Withdrawal Permit
State Lands	If on or near State Lands
State Historic Preservation Office	Approval to Proceed
State Mine Inspector	Registration/Safety
County/City	Land use - zoning approval
County	Engineering/construction approval
Local District	Flood control approval
DWR	Dam Safety & Stability

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II. BADCT REVIEW PROCESS

The BADCT review process is a part of the Aquifer Protection Permitting process. This Chapter will deal only with the BADCT process. For a description of the permitting process, and how BADCT fits in, the reader is directed to the Aquifer Protection Permits Guidance Manual. Figure 1 is a flow chart of the BADCT review process described here.

When an applicant submits an application for an Aquifer Protection Permit, it must include a proposal of what BADCT is to be at that facility. The proposal should describe the optimal design for the facility as selected from Chapters IV & V of this manual. The applicant should then include a description of the site specific design proposal, and justification for any deviations from the optimal design. The justification should address any of the following which figure into the deviation: site specific hydrologic and geologic characteristics, other environmental factors, water conservation or augmentation, or economic impacts of the use of alternative technologies, processes or operating methods on an industry wide basis.

DEQ's review (initiated by the permit writer) begins with an accuracy c[illegible] [illegible]al desig[illegible] Is the one presented for this facility correctly [illegible]sen from the [illegible]idance document? If DEQ determines that it is not, the applicant will be notified of the need to make the appropriate corrections and resubmit. Depending on the degree of deficiency, this notification and resubmittal process may be more or less formal, but in all cases any final determination must be documented in the Department's files.

If the optimal design is represented, the permit writer checks the prop[illegible]d BADCT for the facility. If the proposed design provides a similar level of protection, or is more effective than the optimal desig[illegible] as presented in this document, the permit writer approves the design and can proceed with the remainder of the permit application review.

The permit writer will examine the information provided to determine if the greatest degree of discharge reduction will be achieved, i.e. that the proposed BADCT design will yield a performance similar to that achieved by the optimal design.

When evaluating a BADCT proposal, the permit writer must ask, "Is this the <u>best available demonstrated</u> control technology? Since at this point, the applicant has deviated from optimal design, the permit writer must determine why, and if the deviation is valid. The permit writer will examine the information provided to determine if the greatest degree of discharge reduction will be achieved, i.e. that the proposed BADCT design will yield the same performance as the optimal design. If the information is deficient or inadequate to make this judgement, the applicant will be so advised, and will be asked to make the necessary corrections or additions for the submittal. It should be noted that there is much opportunity for negotiation during this stage of review.

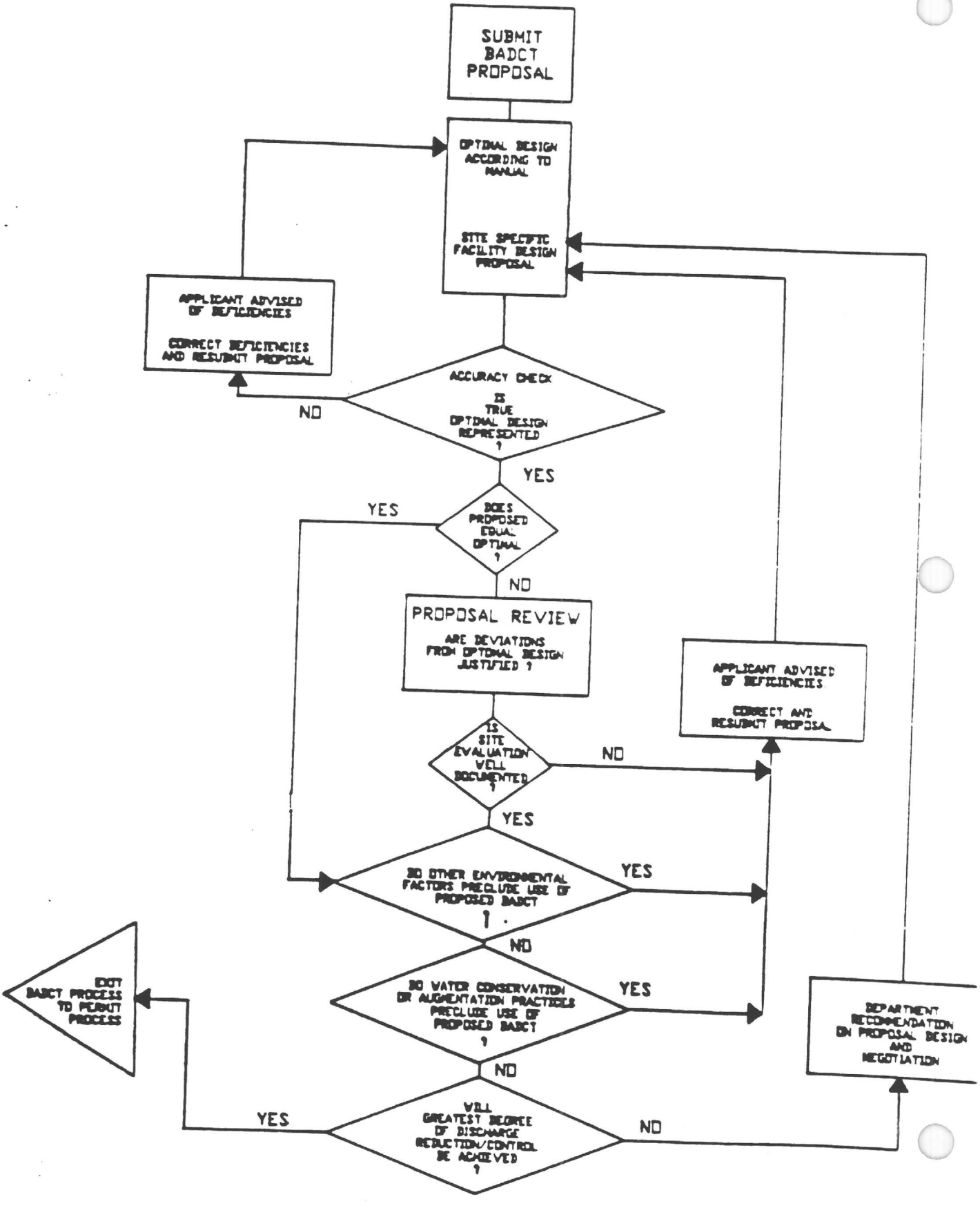

FIGURE 1: BADCT REVIEW PROCESS

At this stage in the review process the proposed design will be evaluated for other environmental factors and water conservation. These other impacts will be weighed against discharge reductions achieved in the design. Conflicting environmental and conservation goals should be resolved at this point.

Following these determinations, the final decision point for DEQ is, "Will the greatest degree of discharge reduction or control be met by these conditions?" This decision is really a culmination of the previous review steps, but is symbolically represented here as the endpoint of the process. If the Department determines that the intent of the law as stated in this decision point will not be met, there is still the opportunity for negotiation combined with a recommendation on the proposed design from the Department. Of course, if the answer is yes, application review proceeds through the remainder of the permit process.

III. HOW TO DETERMINE BADCT FOR YOUR FACILITY

This chapter discusses the process involved in selecting control technologies to assure that they represent BADCT for your specific mining facility. The process outlined in Table II involves starting with a design that incorporates all of the most effective discharge controls available. Once this "optimal" system design is established, the applicant evaluates its performance at the specific site. The applicant may then use site characteristics as "trade-offs" to substitute for specific discharge control design elements of the "optimal" design. These "trade-offs" should achieve a similar level of discharge control to that of the "optimal" design. In Chapter IV.E., Alternate System Designs are presented which may be substituted for the optimal systems when justified by site-specific conditions to achieve a similar level of pollutant control. In this way the performance of the "optimal" design is preserved using lower-cost technologies.

TABLE II: Steps in BADCT Determination

1) Select "optimal" system design applicable to your facility type from Chapter IV.

2) Determine the performance of the "optimal" system design in discharge control. Consider how the system would be fit to the site, to the required capacity, and to the specific characteristics of potential discharges.

3) Evaluate site characteristics for their effectiveness in discharge control.

4) Use discharge control aspects of site characteristics to justify using less than optimal discharge control design components or an alternate system from Chapter IV.E. in final design.

5) Determine whether other environmental factors or water conservation preclude implementing portions of BADCT design.

6) Propose final design.

You can establish the optimal system design for your facility by using the various mining operation discharge control components described in Chapter IV. You should select the most effective: a) containment liner systems; b) leachate collection systems; c) tailings disposal systems; d) mine water disposal systems; e) processing and refining discharge controls; f) mine workings; and g) closure plan; or other control strategies by following the guidance of the discussion of optimal systems presented in Chapter IV. This "optimal" design may appear dramatically "over-engineered" for your facility, but it is intended as a starting point from which you can pare down design elements to arrive at BADCT. Once the optimal system is established, you should determine the system's performance for pollutant control. This performance is the target for the performance level to be achieved in the final design proposed as BADCT.

In order to use site characteristics as a part of BADCT, you must thoroughly understand and quantify the performance of these features. A careful site study, and perhaps, laboratory scale tests may be necessary. Site characteristics and other considerations which may aid in discharge control at a mining operation are discussed in Chapter V along with a summary of the types of data to collect to document their performance.

The process of making a "trade-off" to substitute for an optimal system applicable to your facility type and replace it with an alternate system incorporating site characteristics involves three steps:

1. First, quantify the performance of the design component(s) to be removed, replaced, or modified.

2. Second, quantify the performance of the site characteristic(s) to be substituted.

3. Finally, show how the site characteristic(s), alone or in conjunction with a less-effective design element(s), will achieve similar performance to your "optimal" design.

As an example of this process, consider an "optimal" design for a precious metal heap-leach operation that includes a double flexible membrane pad liner with leachate collection below the top liner. The performance of the bottom liner from manufacturer's data is a permeability of 10^{-7} cm/sec., and the secondary leachate collection system effectively achieves no discharge. At the site, we have a substrate of unfractured, clay-rich, weathered volcanic bedrock for a thickness of 100 feet above the water table. Laboratory leach tests with solutions equivalent to the anticipated leachate concentrations show that the bedrock reacts totally with the leach solution removing contaminants to levels below their detection limits at a depth of 10 feet. We can conclude that removing the bottom liner and leachate collection system from the design still achieves the same performance because of the bedrock unit. The volcanic bedrock unit, then, is part of the proposed BADCT design.

Each site will require a different approach to establishing BADCT. The design process will require some creative thinking and careful weighing of design components and site characteristics. The proposed BADCT should include as much quantitative justification of the use of site characteristics as possible. It is recognized, however, that some of these judgements will be subjective and subject to negotiation between the applicant and the department.

IV. SELECTION OF CONTROL STRATEGIES

A. Introduction

This chapter outlines many of the discharge control strategies available for ten facility types: Base Metal Dump and Heap Leaching; Base Metal Tailings Impoundments; Precious Metals Heap Leaching; Precious Metal Vat Leaching; Precious Metal Tailings Impoundments; Smelting, Electrolytic Processing and Refining; Uranium Mining and Processing; Industrial Minerals; Placer Mining; and In-situ Leaching. We have identified those general design elements or components of mines and mineral processing facilities which are widely used to control discharge: Liners, Leachate collection systems; Surface water diversion features; Impoundments; Tailings dam systems; Chemical storage protection; Minewater treatment and disposal; Leak and spill containment in processing areas; Pipelines; Pits, shafts, adits, and other mine workings; and Closure procedures. Section D discusses some of the characteristics of the design components. Section E presents ways in which some of these components fit into recommended system designs.

The first two sections of this chapter discuss waste type and disposal site selection. These factors are not design components, but they greatly influence the design of the facility. For instance, design elements such as liners must be compatable with the waste type, and the availability of site characteristics used to control discharge will depend on site selection. Thus, while not part of BADCT, waste type and site selection will affect the BADCT determination for a particular facility.

B. Waste Type and Characterization

The types of wastes generated at the mining facility will have considerable impact on design. It is important that the design components be selected to be compatible with the waste type and expected chemical and physical characteristics of any leachate. This necessity for compatibility is the reason that specific materials, thicknesses, etc., cannot be mandated in this document for liner selection or for other features at mining facilities.

A portion of the BADCT proposal prepared by the applicant must define the waste type or mix of types including projected leachate compositions to be generated at the facility. Data that should be presented for waste material should include:

1. Bulk waste analysis.

2. Leach testing (EP toxicity, TCLP, or other methods as appropriate).

3. % Liquid.

4. Volume to be generated on a daily/monthly/yearly basis.

5. Chemical concentrations of liquids.

6. Other relevant parameters.

Examples of typical mine waste, process water, and leachate are given in Tables III - VI. While not fully complete, these tables reflect the general type and format of information to be submitted.

The applicant should show that the projected waste or leachate composition has guided selection of compatible control design elements. For example, if a highly acidic leachate is anticipated, an applicant should choose a liner material that resists acidic attack and should present in the BADCT proposal manufacturer's data that confirm this feature. The life expectancy of the liner under expected leachate conditions should also be taken into account.

Where solutions, wastes, or leachates contain any of the organic pollutants referenced in A.R.S. 49-243.D., the statute requires that BADCT for a new facility be limitation of discharge to "the maximum extent practicable regardless of cost".

TABLE III

Example of Waste Characteristics - Gold Mine

Carbon-in-pulp cyanide vat leach processing is used. Tailings are treated prior to disposal. Leachate is collected and reclaimed for use in mill circuit.

Reagents used in mill circuit:	Consumption (lbs/ton ore)
Sodium Cyanide (NaCN)	1.20
Calcium Hydroxide (CaOH - Lime)	2.00
Sodium Hydroxide (NaOH)	0.05
Nitric Acid (HNO3)	0.10
Fluxes (silica, sand, borax, fluorospar, etc.)	0.02
Carbon	0.03

Treated tailings		
slurry	Total Cyanide	40 mg/l
	Free Cyanide	30 mg/l
Untreated tailings		
slurry	Total Cyanide	1461 mg/l
	Free Cyanide	577 mg/l

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TABLE IV

Example of Waste Characteristics - Copper Heap Leaching Operations (Mined Rock)

Constitutent	Mine Rock (mg/l)	Raffinate (mg/l)
Arsenic	< 0.003	0.07
Barium	0.280	< 0.1
Cadmium	< 0.008	6.2
Chromium (Total)	< 0.001	0.19
Lead	< 0.084	< 0.01
Mercury	< 0.0005	< 0.0004
Nitrate (as N)	No Data	0.1
Selenium	0.0004	0.02
Silver	< 0.002	< 0.01
Fluoride	No Data	0.02
Copper		197
Cyanide		< 0.1
Nickel		2.8
Zinc	0.05	700
Potassium		1
HCO3		< 0.01
Aluminum		1265
Boron		< 0.1
Cobalt		13.2
Molybdenum		0.19
Strontium		0.72
Silicon		134
Tin		< 0.1
SiO_2	67-72	
Al2O3	11.5-15	
CaO	0.24-0.40	
MgO	0.24-0.60	
Na2O	0.13-0.34	
K2O	3.0-5.4	
Sulfur	2.3-6.0	
MoS2	0.005-0.02	
Calcium		556
Chloride		2
Hardness		0.25
Iron	3.2-4.5	1195
Magnesium		770
pH		1.8
Sodium		38
Sulfate		18800
Total Dissolved Solids		28800
Phenol		< 0.001
Other Organic Substances		Not Detected

TABLE V

Example of Waste Characteristics - Copper Tailings Vat Leach Reprocessing

Constituent	Reprocessed Tailings Disposal Concentration mg/l
Arsenic	0.22
Barium	0.34
Cadmium	0.15
Chromium	1.84
Lead	Not Detected
Mercury	0.01
Nitrate (as N)	58
Selenium	0.12
Silver	0.07
Calcium	51.1
Chloride	32
Copper	271
Hardness	1928
Magnesium	437
Manganese	42
pH	2.55
Sodium	211
Sulfate	15800
Total Dissolved Solids	23,990
Zinc	7.14
Organic Substances	Not Detected

TABLE VI

Example of Waste Characteristics - Uranium
Breccia Pipe Ore and Waste Rock - No Processing on Site

Ore Pile:	0.7% U308		
Waste Pile:	0.1% U308		
Radioactivity in water on-site:			
Ra-226	Gross	Gross	K-40
	Alpha	Beta	
Minewaters:	No Data		
Runon from waste piles:		No data	

C. Site Selection

For mining projects, siting is often dictated by the ore body configuration and local topography. However, for certain facets of the surface operations, such as location of tailings ponds, limited siting choices may be available. Site selection and site characteristics will greatly influence BADCT determination since BADCT is site specific. To some extent, the site will control the design of the facility. In addition, some of the site characteristics may be used as a part of BADCT for that site. However, BADCT is not intended to impose specific siting criteria on facilities, nor can site characteristics alone constitute BADCT.

Site selection influences the design of a facility in that each design element must be adapted, or fit, to the dimensions and layout of the chosen site. The adaptation to the site affects the performance of the particular design component being used.

Site selection may influence what the final BADCT design will be for a project. As outlined in Chapter III, site characteristics can be used as "trade-offs" for design components if they serve to control discharge. An ideal site, then, might be one that had an abundance of characteristics which act as discharge controls. If a site is selected where hydrologic and geologic characteristics cannot be used as "trade-offs", then the "optimal" system will be required. If, on the other hand, a site is chosen with many "trade-offs", a less stringent design than the "optimal" system may be proposed as BADCT. The site-specific characteristics which may be used as a part of BADCT and may, therefore, enter into site selection decisions, are described in Chapter V.

D. Discharge Control Component Used at Mining Facilities

1. Liners

The effectiveness of the liner system is an integral part of BADCT for a mining project. Liner design is a rapidly changing technology, and new applications are being found in the mining industry. For this reason the most effective liner design and what is reagrded as BADCT at a site is evolving. The BADCT configuration can be selected by starting with an evaluation of the most effective liner system. If site conditions will allow for a similar level of leachate containment or attenuation, an alternate technology incoroprating site characteristics may be proposed.

The selection of liner materials should be matched to the waste type and leachate characteristics. Flexible membrane liners are available in a variety of materials. The material and thickness should be selected to have resistance to chemical action, retention of tensile strength, and maintenance of low permeability through time. Soils used as liner systems should be selected to resist swelling, shrinkage, or cracking. They should be capable of achieving permeabilities of less than 10^{-7} cm/sec. Soils should be compacted and covered immediately to prevent desiccation. All soil liners should be tested for permeability after installation. Seams

in geomembrane liners should be routinely inspected for quality control of the installation method. ASTM methods should be followed.

Leachate collection is included among the better liner system configurations because leachate collection works in conjunction with a liner. Leachate collection serves both to remove a source of groundwater contamination and to reduce hydraulic pressure on the liner. Thus, leachate collection improves liner efficiency.

Similarly, an overliner of porous sand or geonet/geotextile is necessary in heap leach designs for protecting the top liner. Drainage pipes may also be necessary to reduce head on the top liner, and promote collection of pregnant leach solutions. Figure 2 depicts the typical components of a liner and leachate collection system. It may be necessary to perform compression tests to determine the type of overliner required to protect the geomembrane.

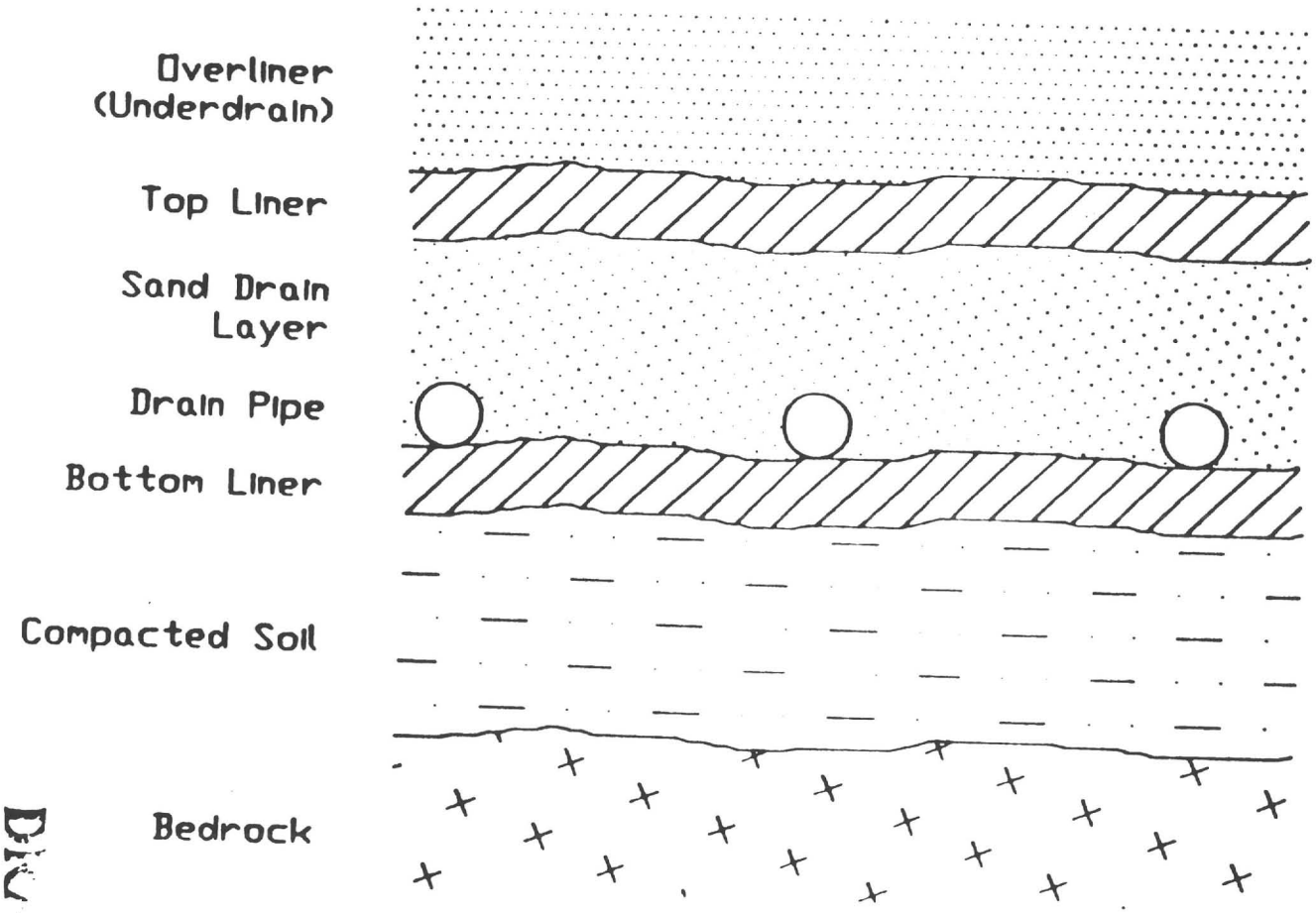

FIGURE 2: LINER COMPONENTS

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2. Leachate Collection Systems

Water that percolates through a heap leach or mine waste pile area is assumed to eventually reach the base of the pile as leachate. A variety of design decisions are necessary to best handle this leachate. The amount of leachate that drains from the base will depend upon the type of liner and the design selected for removing leachate. To assure liner effectiveness and to reduce hydraulic pressure on the liner, some method of underdrain catchment is essential to guard against groundwater contamination. Obviously, for pond liners a catchment system to reduce head on the top liner is not possible.

A leachate collection and removal system should be designed and operated to maintain a leachate depth of one foot or less (U.S. EPA, 1988) above the top liner. A similar drainage system should be used for liquids in the space between dual liners. The design elements presented in this guidance document are expected to accomplish that performance.

The following is a partial list of factors that affect liquid transmission in the drainage layer:

- Impingement rate of liquid on the collection drain layer.
- Drain layer slope.
- Size and spacing of the drainage pipe.
- Hydraulic conductivity of the saturated sand, gravel, or geotextile.

A minimum thickness of 12 inches for the drainage layers is recommended to allow sufficient cross sectional area for transport of drainage leachate. A three-percent minimum slope is also recommended to promote drainage. However, stability of overlying materials may be a competing concern. Materials used as drainage media are commonly coarse enough that their hydraulic conductivity is greater than 1×10^{-2} cm/sec. In many leaching applications, the ore may be coarse enough to act as this drainage layer. Drain pipe diameter, length, and spacing are important because they control the head that builds up on the liner. The pipe diameter should be large enough to efficiently carry off the collected leachate. The length of drainage pipe should be no longer than the maximum length which a clean-out device can effectively reach. However, if clean out is not provided for int he design, a degree of redundancy may compensate for pipe plugging. The spacing of the drainage pipe depends on characteristics of the drainage layer, and on the impingement rate of liquids. DEQ is, therefore, not specifying minimum spacing or pipe diameter in this guidance.

Secondary containment, such as collection sump, is essential for leachate which has been collected and drained from the impoundment. A monitoring proposal for the secondary containment structure must be included in the application. Leachate management shall be addressed to include the method for final disposal use or reuse of the leachate.

Alternative leachate collection systems that provide a similar level of protection, or are more effective than the granular system described preciously, may be used. These alternative systems such as plastic nets can be very thin and still have the drainage capacity of a sand layer one foot thick. These systems should be capable of maintaining a leachate head of one foot or less.

The following features should be evaluated when substituting a non-granular leachate collection system for a granular medium:

- Ability to verify performance
- Hydraulic transmissivity
- Compressibility
- Compatibility with liners and leachate
- Ability to collect leachate and leachate storage
- Useful life of the system

3. Surface Water Diversions

The configuration of surface water diversions for a mining facility depends on the climate and topography of the site area. One major key to controlling leachate generation is design and operation of a mine or mineral processing activity in a manner to exclude surface water from areas where infiltration may affect groundwater quality. During the active stage of operation, prior to closure, uncontrolled runoff may flood the site and increase the potential for leachate generation. The remedy to this problem usually requires a surface water diversion and drainage system, properly designed, operated, and maintained for the specific site. Computer models, such as the HEC series, may guide the assessment of surface water effects.

In general, surface water runoff may be diverted and drained from the mine and process site by using engineered features such as dikes and/or channels. Dikes are usually designed to protect lowlands and excavated areas against periodic inundation by storm flow or high water. They are most commonly constructed with earth, although other materials such as concrete are also used. Open channels or ditches are an alternative to dikes for the diversion of surface water runoff. The choice between dikes and channels mainly depends on topography of the site. Use of a combination of dikes and channels may be necessary for certain sites.

The design considerations of surface water diversions are influenced by: precipitation (intensity, duration, distribution), watershed characteristics (size, shape, topography, geology, vegetation), runoff (peak rate, volumes, time distribution), and degree of protection warranted. Timely maintenance is necessary for the continued satisfactory operation of surface water diversions. The principal causes for failure of surface water diversions are channel and bank erosion, sedimentation, and excessive growth of vegetation. Poor design may also result in failure of these systems if they are not built to handle large enough flows.

Off-site runoff controls prevent stormwater from entering the site while on-site runoff controls prevent discharge caused by precipitation on the facility site It is recommended that natural or constructed features be capable of handling the 100-year, 24-hour, stormwater event, either through containment or diversion.

4. Tailings Treatment, Depositional Processes, and Collection Systems in Tailings Impoundments.

Tailings treatment and depositional processes can effectively reduce potential contaminant levels in tailings leachate, reduce tailings permeability, and reduce the hydraulic head within the tailings pile. Both treatment and depositional processes will depend on the nature of the tailings produced.

All tailings should be thickened prior to deposition to remove the maximum amount of water practical for reuse in the mineral processing operation, using as little water as necessary to transport the tailings to the impoundment yet enough water to minimize pipeline wear. Depending on composition, the thickened tailings may require treatment to neutralize pH, reduce contaminant levels, or neutralize cyanide in the case of precious metal leaching operations.

The thickened tailings should be deposited upstream of the tailings dam in a manner that achieves maximum size separation. In this way, coarse, pervious material may be used as beach deposits near the dam, while fine silt and clay size material is deposited further away from the dam. Cycloning can achieve effective size separation. Deposition through spigoting alone represents a less effective technology because it does not generally accomplish the best and most efficient size separation.

To reduce seepage through the waste material, water should be recycled from the tailings pond where fine sediment has settled out. Several methods are available to collect this water. Removal of the water from the tailings pond and from deposited tailings can lessen the hydraulic head within the tailings pile and can help prevent the infiltration of leachate below the pile.

The use of decant towers respresents a very effective method of collecting tailings pore water and surface fluid from the tailings pond. The systems, usually consist of one or more towers raised progressively to remain operational during the lifetime ofthe facility and into the closure period. In the most effective design, drainage from decant towers is connected to a collection system under the tailings impoundment that drains into a collection pond for subsequent reuse in processing, evaporation, or treatment and disposal. Other decanting systems include the barge-pump method, and the syphon-reclaim system. Both of these methods require more maintenance and do not dewater tailings in-place as the decant towers can.

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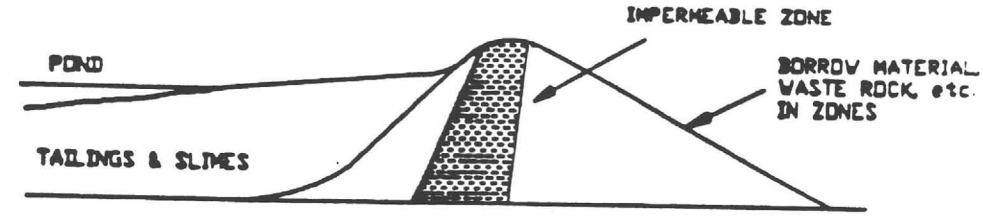
Leachate collection systems at the base of the tailings impoundment are also employed to carry leachate from the tailings through the dam to a collection pond for reuse or treatment and disposal, to further reduce the hydraulic head and infiltration potential below the pile.

5. Tailings Dam Systems

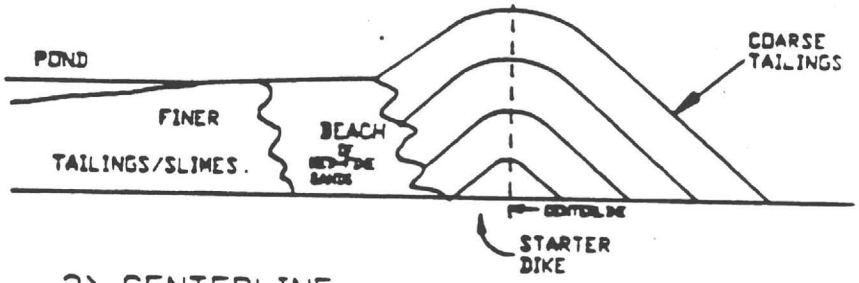
Dam systems should be designed and constructed to prevent failure resulting in a surface discharge. Surface discharges have the potential of adversely affecting groundwater quality through the migration of tailings and wastewaters off-site. The dam must be located in a structurally stable area. The stable substrate must be able to bear the weight of the dam system. All unstripped portions of the site should be cleared and grubbed. If stripping is not practical, control measures should be employed to reduce infiltration beneath the dam. The soil beneath the dam site should be stripped to bedrock where practical.

Tailings dams are commonly constructed in zones or layers, with an impervious dike or zone, and compacted materials consisting of native soils, borrowed fill, overburden, tailings sand, or a combination of these (Figure 3). The types of materials used to construct the dam should be chosen so that when compacted they prevent seepage through the dam. As mentioned previously, leachate can be collected through a drain system, and separated fluids can be decanted from the tailings pond.

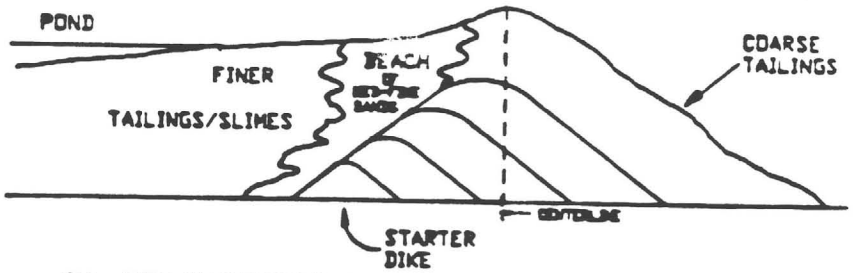
Dam height must be sufficient to maintain enough freeboard to allow for the retention of water in the tailings pond and runon. Dam embankment stability must be ensured through an analysis of the proposed lifetime of the facility and the storage volume needed, dam height, slopes required, construction methods, strength of construction materials, and the potential for earthquakes. Dams should also be protected from erosion and re-vegetated after closure, and where practical, during the operational lifetime of the facility.



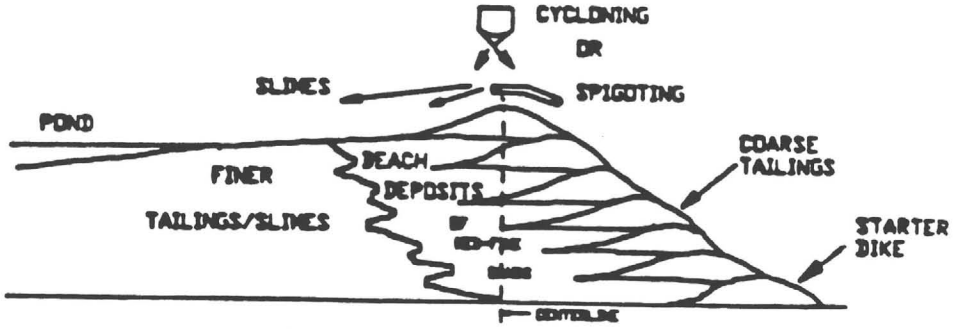
1) ROLLED FILL



2) CENTERLINE



3) DOWNSTREAM



4) UPSTREAM

FIGURE 3: TAILINGS DAM CONFIGURATIONS

TABLE VII

Description of Tailings Dam Systems

1. Substrate: Impermeable or sealed to achieve 10^{-6} cm/sec.

   Construction Materials: Native soils, borrowed fill, or overburden. Tailings not used as dam material.

   Impermeable Zones: Forming the dam core and/or on the upstream side of the dam.

   Construction Method: Rolled Fill.

   Hydrologic Controls: Including the following:

   a. Leachate collection, decant, or other tailings water extraction upstream of the dam.

   b. Toe drain or pressure relief system on the downstream side of the dam.

   c. Collection of fluids in pond downstream of the dam.

2. Substrate: As listed in No. 1 above.

   Construction Materials: Native soils, borrowed fill, or overburden, with coarse separated tailings used in the upper portions of the dam.

   Impermeable Zones: Starter dike constructed to ensure dam stability and prevent seepage through the toe of the dam.

   Construction Method: Centerline, Downstream, or Rolled Fill.

   Hydrologic Controls: As listed in No. 1 above.

(Cont.)

3. Substrate: As listed in No. 1 above.

   Construction Materials: Starter dike of native materials. Compacted sand dikes overlying starter dike. Coarse separated tailings deposited adjacent to dikes. Slimes deposited upstream from the dam.

   Impermeable zones: Compacted tailings sand and slimed layers only.

   Construction Method: Upstream Method where dam wall is progressively raised upstream, building onto deposited coarse tailings fraction. Height is controlled such that the failure radius is maintained within the coarse deposits (beach zone).

   Hydrologic Controls: As listed in No. 1 above.

4. Other dam systems similar to Numbers 1, 2, or 3, with fewer hydrologic controls.

5. Other dam systems similar to Numbers 1, 2, or 3, with fewer hydrologic controls and a more permeable substrate.

6. Dewatering and Pumped Mine Water

Many active mine facilities require dewatering and disposal of pumped mine water. The type of containment or method of discharge, for water produced from mining operations depends on the water quality. Disposal of water pumped from mines or wells to dewater shafts and adits, and reduce infiltration potential should be accomplished in a manner that minimizes pollutant discharge. NPDES permits may be required for this disposal.

7. Pits, Shafts, Adits, and Other Mine Workings

Pits, shafts, adits, and other mine workings should be designed and operated with consideration given to controlling seepage and preventing discharge from these mined areas to the groundwater. The following control measures may be appropriate depending on technical feasibility, cost factors for existing facilities, and the concentration of pollutants in water coursing through mine workings:

a. Underground mine workings sloped for water drainage to lined sumps and/or to the surface where it may be contained or discharged in an acceptable manner based on pollutant concentrations. In many cases, this water may be reused within the mine operation.

b. Major permeable zones such as faults or permeable bedrock sealed where these zones represent potential paths of pollutant migration to groundwater.

c. Drill holes properly abandoned in a manner consistant with Arizona Department of Water Resources specifications.

d. Surface access restricted to prevent illegal dumping or discharge.

e. Pits designed, maintained, and closed in a manner to minimize hydrologic connection with aquifers.

f. Surface water diverted.

8. General Closure Considerations

An Aquifer Protection Permit will include a closure plan. The plan should assure that the closed facility will have no adverse impact on groundwater quality in the future. The design features for discharge control involved in closure are a part of BADCT for the facility. Other portions of the closure plan such as post-closure monitoring are discussed in the closure section of the Aquifer Protection Permit Guidance Document.

a. Tailings Impoundments (All Tailings Disposal Areas)

Post-closure discharge control at a tailings impoundment is accomplished by limiting the amount of water entering the pile

and/or treating or neutralizing the tailings to reduce constituent concentrations in the rinsate. For organic substances referenced under A.R.S. 49-243.D., concentrations must be reduced to the maximum extent praticable regardless of cost. Cover design and maintenance of cover integrity are the focus of BADCT for closure. There are four main components to the design of an effective impoundment cover: 1) Cap Material (acting as a hydraulic barrier); 2) Final Cover Material; 3) Vegetation and other erosion protection; 4) Final Surface Configuration. If the tailings are treated or neutralized, the selection or use of a cover material is not as critical. However, the final surface configuration of the impoundment and revegetation remain as important parts of BADCT for the facility.

The cover material forms a hydraulic barrier to prevent entrance of surface water and precipitation. The performance of a cover material is judged by its permeability. The objective of having a lower permeability in the cover than in the tailings impoundment liner is to prevent accumulation of water in the tailings impoundment. The hydraulic barrier should be installed with grades that will conduct drainage away from the center of the facility to the outer edges where it may leave the site. The barrier should be field-tested for permeability after installation.

The final cover material serves two purposes: to allow water excluded by the hydraulic barrier to flow off-site and to act as a substrate for vegetative stabilization. Also, the final cover can serve to control dust. The most effective cover design includes two layers to perform these functions. The bottom layer is a permeable sand unit. The upper layer should be a cohesive soil that will support plant growth and resist erosion.

The vegetation on a tailings impoundment cover can provide dust control and protect the various layers in the design from erosion. It can also act to transpire moisture out of the soil. It is important to match the vegetation to the climate and soil so that it will grow with minimum irrigation and maintenance. It is also important to select vegetation that does not have deep root penetration because roots may breach the hydraulic barrier. Plans for vegetation may include a scheme to use annual vegetation early to achieve soil stabilization and change to perenials for long-term protection. Additionally, engineered erosion protection using fabrics, etc. can be effective working in conjunction with planned revegetation.

The final surface configuration of a tailings impoundment should be designed to conduct surface water runoff away from the facility. However, grades should not be so steep that they cause excessive erosion of the cover soil. Any future surface land use must be consistent with a strategy to maintain the impoundment cover integrity.

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b. Ponds, Ditches, Trenches, Piping, Tanks, Processing, and Storage Areas

For closure of all ponds, ditches, trenches, piping, tanks, processing and storage areas containing leachate, raffinate, make-up solutions, pregnant solutions, or any other liquids, solutions may be disposed either by discharge or containment and evaporation. If discharge is the chosen option, solutions should be treated or neutralized. For organic substances referenced under A.R.S. 49-243.D, concentrations must be reduced "to the maximum extent practicable regardless of cost". In many cases the solutions may be disposed of by evaporation. Following evaporation, any remaining residues or sludges must be analyzed prior to disposal at an approved site.

All liners should be inspected for holes, tears, rips, or gaps prior to removal and/or backfilling to identify whether site remediation might be necessary. After backfilling, the ground should be restored to its original surface configuration and revegetated. Tanks and piping should be inspected after solutions have been removed to determine integrity prior to closure.

Chemicals should be removed to a safe area for subsequent use, sale, or disposal. All emptied containers should be rinsed, treated, and neutralized, and returned to the supplier or disposed of in an appropriate manner at an approved landfill.

9. Other Recommended Control Features (Not Part of BADCT)

a. Chemical Storage

Chemical storage areas must be designed to prevent the discharge of liquids to the vadose zone. Discharge control at chemical storage facilities should consist of construction of an impervious cement or asphalt pad, compatable with the liquid chemicals stored in containers within the area. The pad should be surrounded by berms or walls made of cement or asphalt. The pad and berms or walls should be free of gaps and cracks, and underlain by a synthetic liner. The berms or walls should be capable of containing at least 10% by volume of the total liquids stored, or the volume of largest liquid container, whichever is greater. The facility should be constructed to protect containers from the weather. Protection should be provided for the entire storage area against run on from the 100-year, 24-hour storm-water event. Dry chemical storage areas, if separated from liquid chemical storage, need only be protected from the weather and run on from the 100-year, 24-hour stormwater event. Incompatible materials, such as acids and bases, should be kept in separate areas.

b. Processing Areas

All processing areas, such as vat leaching, solvent extraction, concentrating, and refining, must be designed to prevent any discharge to the vadose zone. Ideally, containment systems should be sufficient to hold the processing fluids from the largest vessel, vat, or tank within each drainage area or 10% of the total fluid volume, whichever is greater. If the area is uncovered, the volume should also be sufficient to hold the precipitation from a 100-year, 24-hour stormwater event. The areas should be constructed of an impervious cement or asphalt pad compatable with the liquids used in processing, surrounded by berms or walls of the same material free of gaps and cracks, and underlain by a synthetic liner.

c. Pipelines

Pipeline systems should be constructed to contain or recover leaks that may reach the vadose zone with the potential of adversely affecting groundwater quality. In instances requiring maximum protection, the pipeline should be placed within or over a trench or area lined with concrete, asphalt free of gaps or cracks, or synthetic material. The liner system should have lined collection and recovery ponds at low points along the pipeline, with sufficient capacity to contain gravity flow of fluids from adjacent high points. The pipeline should be protected from flows resulting from the 100-year, 24-hour stormwater event. At all water or dry wash crossings the pipeline should be encased in a liner pipe. An automatic pipeline failure - shut down or warning system should be installed for leak prevention.

d. Barrier or Recovery Wells

Some facilities operate a series of wells to reclaim tailings water from the subsurface prior to its intercepting an aquifer or in areas where no natural aquifer exists. These wells are located within the plume of seepage of the tailings pond. The water can be pumped directly to the mill circuit, or it may first be held in a pond or tank. Pump back systems can be used as a secondary or backup control measure as a contingency in the event that discharge has occurred. Because this type of control acts to keep the facility within Aquifer Water Quality Standards at the point(s) of compliance, pump back systems only help the facility comply with A.R.S. 49-243.B.2. and 3.

E. System Design Elements

1. Optimal System: Double lining; leak detection/collection between liners; prepared and compacted subgrade; surface water controls

The optimal technology for precious and base metal leaching and tailings facilities consists of the above elements for those segments and components listed in Section a., Applicability. While all these elements are present in the optimal design, the specific design of any single element is dependent on: 1) site suitability

for the design element and technical feasibility; 2) extent to which site characteristics can function to control discharge; 3) discharge control performance level of other design elements; and 4) the chemical characteristics of the discharge, particularly if constituents referenced in A.R.S. 49-243.D are present. As an example, systems using two synthetic liners and those using a synthetic and clay liner may both be considered as optimal, as could leachate collection systems installed with or without perforated piping, depending on the specific application. In some cases, the relative merits of various technologies may be in direct conflict: the greater impermeability of a synthetic secondary liner may be offset by the cyanide attenuation potential of a clay secondary liner. Additionally, the sophistication of one element of the system, such as the leachate collection system.

a. Applicability: Demonstrated for base and precious metals solution ponds; used on some precious metals leach pads; generally available for solution ditches.

b. Types of Systems

1) Primary liners generally consist of synthetic materials such as high or low density polyethylene (HDPE, LDPE) or polyvinyl chloride (PVC), varying in thickness from 30 to 100 mil depending on the application. Secondary liners may be constructed of these same materials or of natural materials such as clays and silts compacted to achieve 1×10^{-6} cm/s or less (see Section D.1. for discussion of liner design and compatability). More information regarding liner selection for specific facility types is found in Section IV.F.

2) Leak detection/collection systems may consist of a layer of sand, gravel, geotextile or other permeable material located between the two liners and connected to a system capable of removing any collected fluid before significant hydraulic head is imposed on the secondary liner. Perforated pipes can be placed within this layer when necessary to promote drainage, however, such piping is not required for an optimal design if hydraulic performance of the permeable layer is sufficient. Further information regarding leak collection design elements for specific facility types is found in Section IV.F.

3) Site preparation must precede installation of any liner system. Subgrade requirements vary depending on the nature of the liner and the facility type. Further guidance on the optimal level of site preparation is found in Section IV.F.

4) Surface water run-on controls include ditches, berms or other such structures which limit the run-on of precipitation to a facility. The objective of run-on controls should be to control or contain up to the 100-year, 24-hour storm event in such a manner that pollutant

discharge is avoided. While included as part of the optimal technology, the extent and complexity of surface water controls is highly dependent on topography, and also dependent on the sophistication of the other design elements. Section IV.F. offers further guidance of selection of the optimal level of surface water diversion.

2. Alternate System: Single lining; localized double lining and/or leak detection/collection; prepared and compacted subgrade; surface water controls

   These technologies represent both the optimal system for the industry segments and components listed below under "Applicability". Also, they represent an alternate system to the optimal one listed previously, when justified by site-specific conditions to achieve a similar level of pollutant control.

   a. Applicability: Demonstrated for precious metals leach pads if a synthetic liner is used, precious metals tailings ponds

   b. Types of Systems

      1) Single liners may consist of synthetic or natural materials. Liners of natural materials may be constructed with imported clays or silts installed in 6 inch lifts or may consist of scarified and recompacted in-situ material, if suitable. Bentonite or other clay minerals can be added to natural soils to reduce their permeability. Additional information on consideration involved in lining of facilities is found in Section IV.F.

         Some facility types are amenable to localized double lining and leak collection/dectection systems. Two applications of this technology have been demonstrated for precious metals leach operations. Pads with drains internal to a heap can be constructed with a double liner beneath these drains. A pervious material such as sand, and where necessary, perforated pipes, can be placed between the layers to remove this solution and eliminate significant hydraulic head from the secondary liner. When solution ditches are external from the heap, and therefore subject to inspection and repair, a simplified system of double lining and leachate collection is the optimal technology. In such a case, the compacted subgrade serves as the secondary liner and a perforated pipe can be placed directly between the primary and secondary liner without use of a sand or gravel drainage layer.

         Some precious metals tailing ponds are also amenable to localized double lining and seepage collection. When topography and the physical characteristics of the tailings allow use of the sub-areal deposition technique, a localized double lining and leachate collection system can be installed. In this application, the subgrade of the impoundment is reworked to provide a low permeability liner

on the order of 1×10^{-6} cm/s or less. A blanket drain is then placed on top of the liner. In the area where the pond will be maintained, an additional soil liner can be installed. However, this liner is not meant to be "impermeable"; rather, it is tight enough to maintain a pond so that water may be reclaimed for reuse in the mill. Some seepage is transported by the blanket drain to a toe drain pipe and is then piped through the dam to a collection pond.

Another type of double lining for precious metals tailings ponds also involves a compacted subgrade as the bottom liner. A series of finger drains is then cut into the basin and these trenches are filled with drain rock. These drains are then routed to a toe drain and solution is piped throught the dam for collection. A geotextile may be used to prevent clogging with fine material. If the ore and milling practices allow, a layer of tailings slimes should then be deposited in the basin to provide an additional liner. Additional information of leakage or seepage detection/collection systems and their implementation is found in Section IV.F.

2) Regardless of the type of liner system used, some level of site preparation is necessary. See Section IV.F. for further information.

3) See Section IV.F. for a discussion of surface water run-on controls.

3. Alternate System: Single lining; prepared subgrade, surface water controls

This technology represents the optimal system for the facility types listed below and may also be used as alternate system for previously listed facilities if justified by site-specific conditions to achieve a similar level of pollutant control.

a. Applicability: Demonstrated for base metals heap leach pads and tailings impoundments.

b. Types of Systems

1) The single liner for base metals heap leach pads and tailings impoundments may be natural or synthetic material. General information on liners is included in Section IV.F. For base metals tailings impoundments, a base layer of tailings slimes deposited within the impoundment may be adequate to form part of the liner system. The effectiveness of tailings slimes as a barrier to seepage is dependent on the physical characteristics of the ore, the fineness of the grind, and the hydraulics of the impoundment.

2) As with more complex liner systems, subgrade preparation is necessary for single lined facilities. See Section IV.F. for additional information. Some level of site preparation may also be necessary prior to slime sealing of base metal tailings ponds.

3) Control of surface water run-on is routinely practiced except in cases where topography limits the feasibility of such diversions, or where the upgradient water shed does not contribute significant amounts of run-on. However, in water short areas, the facility may be designed to enhance the run-on of surface flows. Section IV.F. provides further guidance on the application of surface water diversions.

4. Alternate System: Prepared subgrade; surface water control

These technologies represent the optimal systems for the industry segments and components listed below. They may also be substituted for previously listed optimal technolgies if justified by site-specific conditions to achieve a similar level of pollutant control.

a. Applicability: Demonstrated for dump leach facilities and base metals tailings impoundments.

b. Types of Systems

1) In applications where liners have not been demonstrated as available technology, such as existing base metals dumps to be leached and tailings impoundments, facilities may be constructed on prepared subgrade. Where dump leach operations make use of near-surface bedrock to promote recovery of leach solution, the level of subgrade preparation may be minimal. Demonstration of low permeability subgrade will be necessary.

2) Control of surface water is an important technique in some cases where lining of existing dumps is not feasible. The technique may have minimal importance for dump leaching, where the run-on of precipitation may in fact aid in the leaching process.

5. Alternate System: Natural subgrade; surface water control

These technologies represent the optimal systems for the industry segments and components listed below. They may also be substituted for previously listed optimal technologies if justified by site-specific conditions.

a. Applicability: Demonstrated for dump leach facilities and base metals tailings ponds.

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b. Types of Systems

1) In applications where subgrade preparation is not necessary or feasible, such as where the subgrade is of sufficiently low permeability and where the topography is extreme, the subgrade may be used in its natural state.

2) Control of surface water is an important technique in some cases where lining is not a demonstrated technology. The technique may have minimal importance for dump leaching, where the run-on of precipitation may in fact aid in the leaching process.

F. Specific Design Elements

1. Base Metal Dump and Heap Leaching Systems

a. Facility Description

Within the base metals subcategory, copper leaching facilities extract copper by passing a solution of sulfuric acid or water through a pile of run of mined or crushed ore. The solution dissolves the copper bearing minerals and the leachate is collected at the base of the pile. This pregnant solution is then typically sent to a solvent extraction plant where it is mixed with an organic solvent, usually kerosene based, containing chelating agents to wrest the copper (and some other metals) from the immiscible water based leachate. A concentrated sulfuric acid solution is then used to recover the metals from the organic solvent. The solvent is recycled through the process. The concentrated sulfuric acid becomes the electrolyte for the electrowinning process, which plates the copper out of solution onto cathodes. The leaching solution (raffinate) from the solvent extraction process is recirculated back onto the top of the ore pile for continued leaching.

Copper may also be extracted from pregnant solution in a precipitation plant. In this process, copper is precipitated on scrap iron, and the resulting material is then introduced to a smelter.

Low grade sulfide ores which do not justify the costs of crushing, milling and flotation are subjected to dump leaching. Natural topography and the site geology are employed for collection of the leachate and protection of aquifer quality. Its low grade also requires that haul distance be kept to a minimum, and these dumps are normally constructed adjacent to a pit. Some sulfide dump leach operations require only water to extract copper, as the ore generates its own acid from the oxidation of pyrite and chalcopyrite. Oxide ores require the addition of acid in order to leach effectively.

The key BADCT components in copper leaching operations are those design elements, operating practices and closure measures which control pollutant discharge. These include leach pile liners and leachate collection system, collection ponds and ditches, ponds associated with the solvent extraction and electrowinning operations, disposal of spent solutions, surface water controls, contouring and covering. Each of these components is discussed in detail below.

b. Design, Construction and Operation of Leach Pads

The technologies discribed in this section are generally only feasible for new leaching facilities. Those technologies also applicable to existing facilities are so indicated.

1) Site Preparation: Clearing and grubbing is normally done as preparation for compaction of liner installation in order to minimize the potential pathways for seepage of solution to the subsurface and to groundwater. In some cases, the ground is then treated with a biocide to eliminate plant growth which could affect liner performance. Compaction may serve to inhibit discharge of leaching solutions and to provide a firm, smooth subgrade for installation of liners where necessary. For leach pads, the need for and extent of compaction required is dependent on several factors: a) soil type; b) ability of soil to funtion as liner; and c) chemical attenuation. Installation of synthetic liners requires a smooth, stiff subgrade to avoid punctures and tears of the liner, geotextiles beneath the liner may also protect liner integrity. The degree to which subgrade preparation is necessary is dependent on the liner materials and the thicknesses and the physical characteristics of any overliner (drainage blanket) as well as the characteristics of the ore itself.

In all cases, environmental factors must be considered in developing the appropriate site-specific BADCT. The depth to groundwater along with pollutants attenuation characteristics of the site and the presence of natural barriers to seepage, such as bedrock or relatively impermeable strata, may be factored in to the level of site preparation necessary to control discharge to aquifers.

2) Liners

i. Design: Specific design elements are dependent on the conditions existing at the site. The topography of the available leach site generally determines the pad configuration. In some steep terrain, construction or installation of a liner may be technically infeasible and may not be necessary if site characteristics achieve performance similar to a liner system. In relatively flat areas, pads can be designed to drain to a single solution collection

ditch external to the heap. In mountainous or rolling terrain, modified valley-fill pads take advantage of the existing topography and the leachate is collected in internal ditches which follow the natural drainages. The need for and characteristics of an overliner, which can protect a liner from punctures and promote drainage of the heap, is dependent on the ore size and angularity, and the method of initial pad loading.

ii. Materials: Many leach operations utilize synthetic liners to maximize leach solution recovery. Liner type and thickness should be determined to maximize liner integrity based on consideration of the loading weight of the heap, the puncture properties of the subgrade and the overliner, and the resistance to chemical degradation by the leaching solution. Soils of suitable texture may be reworked and compacted in place to form an effective in-situ liner. Where the native soils cannot be reworked, the choice of a liner material is based on the availability of low permeability natural materials and the physical and chemical properties required of the liner.

iii. Quality Control and Quality Assurance: The effectiveness of any liner can be increased by a program of quality control and quality assurance so that the liner functions as it was designed. Specifics of such a program are dependent on the site itself, the materials being used, and the method of installation. In general, parameters such as density and permeability of soil liners and seam integrity of synthetic liners should be specified and monitored during construction.

3) Leak Detection and Collection: Leak detection and collection methods can be applied to both new and existing facilities. For existing leach pads, seepage can only be detected by aquifer monitoring. These facilities should determine their current impacts on aquifer quality through use of monitoring wells. Although not a part of BADCT, mitigation strategies such as pump-back wells must be considered in the context of the existing aquifer water quality and the requirements of A.R.S. 49-243.B.2. and 3. For new leaching operations at existing dumps, leak detection is likewise only possible through monitoring wells. Leak collection may be accomplished through interceptor systems.

New heap leach facilities constructed on pads can be designed to incorporate leak detection and collection systems. In assessing the potential for significant hydraulic head to form on the liner, consideration must be given to the leaching cycle, the leach solution application rates, the drainage characteristics of the ore and the overliner, the gradient of the pad, and whether or not the

pad was segmented with internal berms to direct leachate to the collection ditches. In most cases it is only beneath the leachate collection ditches that significant hydraulic head is exerted on the liner. A leak detection and collection system can be as simple as the placement of a perforated pipe under the liner of the ditch or as complex as a double liner system with sand or other pervious layer and piping installed to collect any seepage. Internal ditches may require the more elaborate of these designs, since it will not be feasible to repair them if leakage is detected. Solution collected in these systems should be returned to the recovery circuit.

As with all other BADCT determinations, the selection of any leak detection and recovery system may consider site specific factors including the depth to groundwater and the nature of the strata beneath the facility.

4) Surface Water Control: The use of surface water run-on control is generally applicable to both new and existing facilities. Design considerations are influenced by precipitation (intensity, duration, distribution), water shed characterizations (size, shape, topography, geology, vegetation), run-off (peak rate, volume, time distribution), and the degree of protection warranted. A facility's need to "harvest" additional water should be considered. Proper maintenance is necessary for the continued satisfactory operation of surface water run-on controls.

c. Design, Construction and Operation of Solution Ponds and Ditches

The technologies presented in this section are generally appropriate for new facilities. However, it may be feasible at some existing sites to employ some of these controls depending on the amount of discharge reduction which could be achieved.

1) Liners

i. Design: Ponds may be designed and constructed with double liners and leak detection systems installed between the liners, unless site conditions allow use of alternate technologies. A single liner may be installed in solution ditches.

ii. Materials: Solution ponds requiring double liners may be lined with two synthetic liners or with a primary synthetic liner and a natural secondary liner. The choice of synthetic liner material and thickness, and soil liner specifications should be based on site conditions and required chemical and physical parameters.

iii. Quality Control and Quality Assurance: In general, quality control and quality assurance considerations for pond and ditch liners is the same as that for pad liners.

2) Leak Detection and Collection: All new ponds should be designed with leak detection and collection systems. For double lined ponds, these generally consist of a pervious layer between the liners, with any seepage collected and returned to the system. Specifics of the design depend on the site topography. For single lined solution ditches, a more rudimentary system is adequate, since inspection and repair is easier than for ponds.

d. Closure of Pads, Ponds and Ditches

The closure technologies presented below apply to both new and existing copper leach pads, ponds and ditches. Few, if any, copper leaching operations have yet undergone closure, and therefore, these technologies may not be considered to be demonstrated specifically for this type of operation. However, these methods have been used as environmental controls at mine facilities other than copper heap leach operations.

1) Surface Water Diversions: The diversion of run-on around a spent ore pile can limit the amount of infiltration and seepage upon closure of the facility. The need for and type of diversions is dependent on the topography of the site, the area of the watershed above the facility, the relative rates of precipitation and evaporation, and the water retention ability of the spent ore.

2) Flushing of Heaps: Spent oxide ore may be flushed with water to rinse out residual acid. This technique will only be workable if no significant sulfide mineralogy is present. It should be noted that this technique has not been demonstrated in the copper segment of the industry. However, rinsing of residual cyanide is routinely practiced in the precious metals segment.

3) Contouring: Contouring of leach piles can reduce the potential for discharge of seepage to aquifers by reducing ponding on the surface and promoting controlled surface run-off. This is especially true when benches or cells have been constructed on the ore piles to maximize infiltration during the operational phase of the facility. Ponds and ditches can be graded to prevent ponding and infiltration when necessary.

4) Cover: In cases where the diversion of run-on and the removal of cells and benches from spent ore piles is ineffective in controlling pollutant discharge, some type of cover may be appropriate. Covers may range from soil caps to soil and vegetation and in some cases, synthetic membranes. It should be noted that none of these covering

techniques have ever been used for these specific facility types. Therefore, they are not demonstrated and may not be technically or economically feasible.

2. Base Metal Tailings Impoundments

a. Facility Description

Tailings impoundments are used for the disposal of waste material from ore concentrating facilities. In the copper industry, concentrating generally includes the processes of dry crushing, wet grinding and froth flotation. The product of the flotation process, copper concentrate, is then sent to a smelter for further processing, while the waste material, tailings, is sent to a tailings pond for disposal. The concentrate must be dewatered prior to its introduction into the smelter; the water is in almost all cases recycled to the milling circuit. The tailings are normally thickened prior to deposition in the tailings pond, and the excess water is also recycled to the mill. This minimizes the amount of water placed on the pond and thereby minimizes the amount of water lost to evaporation or required to be pumped back to the mill. The thickened tailings must retain sufficient water to allow their continued flow without undue wear on the tailings pipelines. The supernatent pond of water which forms on the tailings after deposition is normally recycled to the mill either directly via a barge mounted pump or after it has been decanted to a separate decant pond.

The disposal of mill tailings and any water associated with the ore concentrating process are subject to application of BADCT. The key elements include depositional practices, tailing dam and impoundment design and construction, reuse of tailings water, and surface water control.

b. Design, Construction and Operation of Copper Tailings Impoundments

The following technologies are generally applicable to both new and existing copper tailings disposal facilities:

1) Thickening: Tailings generally should be thickened prior to deposition to remove the maximum amount of water practical for reuse in the mineral processing operation, and using as little water as necessary to transport the tailings to the impoundment. The abrasive characteristics of the thickened tailings slurry must be considered so as to avoid excessive wear on the tailings pipeline which could shorten the life of the pipeline or lead to pipeline ruptures.

2) Depositional Practices: There are a number of techniques which can be used for deposition of tailings. To varying degrees, these techniques achieve a size separation of the tailings solids. The coarse solids can be deposited on or

near the dam, while the finer silt and clay size fractions can be placed further from the dam and beneath the ponded water. Such practices can aid in minimizing seepage through the tailings and in ensuring the structural stability of the dam itself. The effectiveness of each in reducing the potential for discharge to an aquifer is dependent on a number of parameters, including the physical characteristics of the ore, the fineness of grind in the mill, and the design of the tailings dam and impoundment. The applicability of these techniques is also dependent on the materials and method of dam construction and whether the facility is new or existing. The following methods are typically used in the industry:

i. Cycloning: This technique can be quite effective in achieving a size separation between fine silts and clays and coarse sands but is normally used only in conjunction with dam construction because of the large localized build-up of sands surrounding the cyclones. Once the cyclones are used to raise the dam, the tailings may be deposited by some other technique which spreads the tailings out more evenly across the entire impoundment. The applicability of cycloning is also highly dependent on the particle size distribution of the tailings solids and the pressure head available to operate the cyclones.

ii. Spigots: Spigoting utilizes the differential settling of particles to perform a size separation as tailings are deposited in an impoundment. Its relative effectiveness is dependent on the slope on which deposition takes place and the velocity of the discharge, as well as the grain size distribution of the tailings solids. Spigoting may also be used to direct the ponded water to the selected location within the impoundment.

3) Tailings Dam Design

Tailings dam design considerations for BADCT are applicable only to new facilities. In this industry segment there is no single dam system which can be judged optimal. However, the optimal system is one which meets the objectives of:

i. Retention of waste material under the most intense storm event expected during the life of the facility.

ii. Operation of the pond system to restrict seepage through coarse fraction of the tailings pile and dam.

iii. Integration of the dam design with leachate collection systems.

The specific design of a tailings dam must accomodate a variety of factors, including the topography of the site, the availability and cost of materials, and the required storage capacity of the impoundment.

4) Tailings Impoundment Design

BADCT for copper tailings ponds may include the use of the fines fraction of the tailings, called slimes, as part of the liner system to seal the floor of the impoundment. Depending on the topography and the texture of the soils, preparation of the site such as clearing of vegetation and grubbing of the surface provides an added benefit in seepage reduction. The effectiveness of using slimes as a liner is dependent on the particle size distribution of the tailings solids. Laboratory or, perhaps, pilot-scale tests, can verify that tailings slimes will perform as a low-permeable liner for the impoundment.

If organic pollutants referenced in A.R.S. 49-243.D., such as carbon disulfide, remain in the tailings and will be discharged to the tailings impoundment, the lining and leachate collection system for that impoundment must be designed to limit the discharge of these pollutants to the maximum extent practicable, regardless of cost.

5) Reuse of Tailings Water

As part of BADCT, water should be recycled from the tailings pond where fine sediment has settled out. Removal of water from the tailings pond and from the deposited tailings can lessen the hydraulic head within the tailings pile and can help prevent the infiltration of leachate below the pile. Several methods are available to collect this water, and the relative effectiveness of each is dependent on a number of site-specific factors, the chief one being the configuration of the impoundment itself. Proper maintenance is required for any of these systems to operate effectively.

i. Decant Towers: This system consists of one or more towers which must be continually raised during the operation to prevent inflow of tailings solids. The pond must therefore be sufficiently deep so that raising the tower can be done on a reasonable schedule. The tower is normally connected to a pipeline which transmits the water to a collection pond from which it can be recycled to the milling circuit.

ii. Barge Mounted Pumps: In this system, a pump is mounted on a barge which floats on the pond and recycles tailings water either directly to the mill circuit or to a reclaim pond for subsequent return to the mill. The required pond depth is dependent on

the design of the barge and on the configuration of the pump. A variation on this system is a skid mounted pump. In this arrangement, a side draft pump is used, and it is mounted on a skid which can be advanced up the impoundment as the pond advances.

iii. Siphon Systems: These systems consist of one or more siphon lines to remove tailings water from the pond to a reclaim pond down gradient of the tailings impoundment.

6) Surface Water Controls

Controlling the inflow of surface waters to a tailings impoundment can limit the potential for seepage by reducing the total hydraulic head exerted on the floor of the impoundment. The specific considerations involved in surface water controls for copper tailings ponds are similar to those given in Section E.1.b.4) for leaching operations, with one exception. Because of their size and configuration, tailings impoundments can be effective in collecting surface water for operational purposes, thereby reducing the amount of groundwater which must be pumped. However, the impoundment liner must be capable of handling the excess solution. Where tailings impoundments are designed to capture surface run-on for operational purposes, it is necessary to include the upgradient watershed in calculating the size of the impoundment and in allowing for sufficient freeboard during operations.

c. Closure of Base Metal Tailings Impoundments

The objective in closure is to restrict future leachate generation and migration from tailings disposal facilities. Several techniques can be used depending on site specific conditions. Also, a balance must be struck between the need to control discharge and other non-water quality related issues such as fugitive dust. In areas of low precipitation and high evaporation, limiting the run-on of surface water from the surrounding topography may be sufficient to eliminate significant recharge to the impoundment. In some cases, recontouring of the tailings surface may be necessary to reduce ponding and promote evaporation of direct precipitation.

Most effective in controlling leachate in a closed configuration is the restriction of infiltration from precipitation and run-on. The use of natural or synthetic covers and/or revegetation has been used mainly to address air quality and aesthetic concerns, its effectiveness in reducing seepage over and above that of surface water control and recontouring has not been well documented at this type of facility. Other facilities, such as solid waste landfills, have effectively used capping, cover, and revegetation technologies to control post-closure pollutant discharge.

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However, vegetation established either directly in tailings or on a cover of natural materials can be considered as BADCT to minimize erosion from dam faces and the subsequent potential for impacts on groundwater. The need for irrigation to establish the vegetation must also be considered as it effects the opportunity for water conservation. Recontouring the slopes and/or the construction of benches and check dams can also aid in the control of erosion and sediment transport. Continued operation and maintenance of leachate collection systems are also important aspects of a closed facility.

3. Precious Metals Heap Leaching

a. Facility Description

In the process of precious metals heap leaching, ore is crushed and often agglomerated to bind the fines and minimize channeling before it is placed on a leach pad. Water is usually mixed with caustic soda and sodium cyanide keeping the pH at 10 or higher to keep the formation of hydrogen cyanide gas to a minimum. The solution is then applied or sprayed onto the heap and pregnant solution is collected as it flows down the sloped lined pad base into a collection system of ditches or trenches feeding into a lined pond. The precious metals are stripped from the pregnant solution as it is circulated through beds of activated carbon. The barren solution which flows out of the carbon processing plant is normally held in a lined pond before being brought back to the approprate cyanide strength and recirculated back to the heap (Figure 4). Integrated facilities which have a tailings pond on site, or those with sufficient excess capacity in their pregnant pond, may not employ a barren solution pond.

Leaching may be conducted on single use ("dedicated") or multiple use ("restackable") pads. On a dedicated pad, spent ore is left in place upon closure. A restackable pad is loaded, leached, and the spent ore ("spoil") is rinsed and removed from the pad for disposal elsewhere. The pad can then be used for further leaching. The decision on which type of pad to use is based on a number of parameters including ore mineralogy and available terrain. Ores which can be leached rapidly may be leached on restackable pads. These pads are also utilized where available space for new leaching pads is at a minimum. In most other cases, the use of dedicated pads usually has a distinct economic advantage.

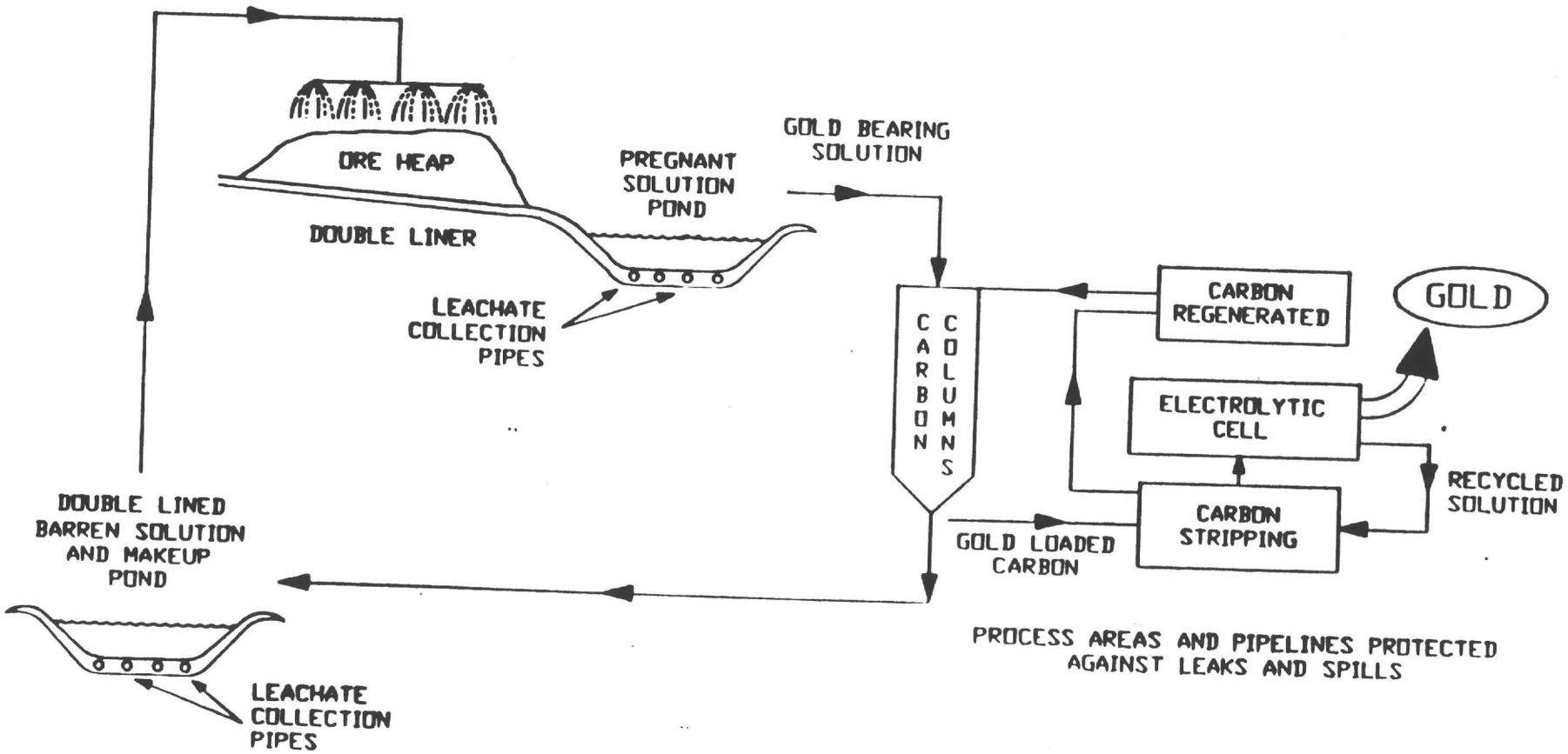

FIGURE 4: CYANIDE HEAP LEACH FLOW DIAGRAM

The key BADCT components in precious metals leaching operations are those design elements, operating practices and closure measures which eliminate the potential for significant discharge to an aquifer. These include liners and leachate collection systems for leach pads, ditches and solution ponds, surface water controls contouring and covering. Two items must be noted in regard to BADCT for precious metals leaching facilities. First, while it is commonplace to categorize these facilities as having "zero discharge" to groundwater, it must be recognized that all materials do in fact leak, and that the concept of a totally non-leaking facility is technically infeasible. These facilities can, however, be constructed such that they present no significant potential to discharge in a manner which could adversely impact aquifer quality. Secondly, in determining BADCT for this segment of the mining industry, cyanide compounds are not considered to be organic chemicals subject to the requirements of A.R.S. 49-243.D.

b. Design, Construction and Operation of Leach Pads

The technologies described in this section are generally only feasible for new leaching facilities. Those technologies also applicable to existing facilities are so indicated.

1) Site Preparation

Clearing and grubbing is generally necessary in preparation for installation of a synthetic liner. Compaction of the surface serves to inhibit discharge of leaching solution and to provide a firm, smooth subgrade on which to install the liner and construct the heap. The extent of surface preparation required is dependent on the characteristics of e liner (including whether the pad is dedicated or restackable), the nature of the overliner material, and the weight of ore which will be placed on the heap. The surface can then be treated with a biocide to eliminate plant growth which could adversely affect liner performance.

2) Liners

i. Design: In most cases, an overliner or drainage blanket must be place on top of the liner of a dedicated pad in order to protect it from punctures and to promote flow of pregnant solution to the collection ditch. Specific design elements are dependent on the conditions existing at the site. The topography of the available leach site generally determines the pad design. In relatively flat areas, pads can be designed to drain to a single collection ditch external to the heap. In such cases, internal berms can be constructed to segment the pad so that solution flows to the ditch as directly as possible. Perforated piping can also be installed within the drainage blanket to further promote flow to the collection ditches.

In mountainous or rolling terrain, valley-fill or modified valley-fill pads can be constructed. Valley-fill pads take advantage of existing topography; rather than constructing the pad as a "tabletop" sloped to one corner, the pad follows the contours of the natural ground surface and the pregnant solution is collected in internal ditches which are built in the natural drainages. The lay of the land and the existing natural gradients can eliminate the need for internal berms and piping. The valley-fill design also uses the pad as the pregnant pond. The downgradient end of the pad is constructed against a berm which functions as a dam. The pregnant solution is collected and stored within the heap, and is either extracted by a pipe through the liner and berm, or is pumped out along the upstream face of the berm. In this design, that portion of the pad which functions as an impoundment must be constructed with the same technology as a pond (See Section IV.E.). The valley-fill design is only feasible where the ore will not degrade the cyanide holding the gold or otherwise "rob" the pregnant solution. In the modified valley-fill design, the pad is similarly constructed, but the pregnant solution is stored in an external pond.

ii. Materials: Pad liners may be constructed from natural or synthetic materials. The type and thickness of a liner should be determined to maximize liner integrity based on consideration of the loading weight of the heap, the puncture properties of the subgrade and the resistance of the liner to chemical and ultraviolet degradation. For restackable pads, the liner must be constructed to withstand the stress of repeated vehicle traffic as the pad is loaded and unloaded. These types of pads are commonly constructed in layers using asphalt and rubberized membranes, and may be 6 inches or more in thickness.

The angularity of the material used as overliner, and the manner in which the pad will be loaded are also factors in determining the liner to be used. The overliner material must be sufficiently permeable to readily transport the pregnant solution with minimal head build-up, and must also be subangular to rounded so as not to risk puncturing the liner during loading of the pad. In some cases, run of mine or crushed and screened ore can provide a suitable drainage blanket.

iii. Quality Control and Quality Assurance: The effectiveness of any liner system can be increased by a program of quality control and quality assurance so that the liner functions as it was designed. Specifications and procedures for parameters such as

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the density testing of soil liners, and such activities as seaming of synthetic liners, should be determined, and a program should be established to monitor and document these activities and parameters during construction.

3) Operations of Restackable Pads: The operation of restackable pads involves a special BADCT consideration because spent leach ore is removed from these pads and disposed of prior to closure. Depending on the potential of the spoils to release residual cyanide, and their method of disposal, the spoils may require rinsing before they can be removed from the pad. In cases where the spoils will be placed within a lined facility such as a tailings pond, no rinsing or further pollutant removal is needed. However, in cases where the spent ore is to be disposed of on unlined ground, it will be necessary to rinse or otherwise detoxify the waste in a manner similar to that described below for closure of dedicated pads.

4) Leak Detection and Collection: Leak detection and collection systems for precious metals heap leach pads have only been demonstrated for dedicated pads. These systems generally focus on those areas of the pad upon which a significant hydraulic head is exerted. Since most pads are designed to promote the rapid flow of pregnant solution to the collection ditches, leak detection and collection systems are normally limited to these portions of the facility. The most sophisticated designs have been used on modified valley-fill pads where the internal collection ditches can neither be visually inspected nor easily repaired. These designs employ a second synthetic membrane beneath the primary liner under the solution collection ditches. Placed between these two liners is a drainage layer of sand or some other pervious material, and corrugated perforated piping is placed within the drainage layer. The system is arranged so that the operator is able to sample any solution found and to quantify the amount of flow prior to routing the solution back to the circuit.

   Less elaborate systems may be appropriate in cases where the collection ditches are external to the pad and allow for visual inspection and repair. Perforated piping can be installed beneath the ditch's primary liner and the compacted subgrade, and routed so that sampling and quantification of any flow is possible prior to routing the solution back to the circuit.

5) Surface Water Control: Control of surface water run-on is generally applicable to both new and existing precious metals heap leach operations. Design considerations are influenced by precipitation (intensity, duration, distribution), water shed characteristics (size, shape, topography, geology, vegetation), runoff (peak rate, volume, time distribution), and the degree of protection

warranted. Berms or ditches should be constructed capable of protecting a leach pad from the 100-year, 24-hour storm event.

c. Design, Construction and Operation of Solution Ponds and Ditches

The technologies presented in this section are generally appropriate for new facilities. However, it may be feasible at some existing sites to employ some of these controls depending on the amount of discharge reduction which could be achieved.

1) Liners

i. Design: A system consisting of two liners and a leak detection and collection system is normally considered to represent BADCT for precious metals pregnant and barren solution ponds. The pond must be of sufficient size to contain the operating volume of solution and the run-on and direct precipitation resulting from the 100-year, 24-hour storm event. For pregnant solution ponds, the area where the collection ditch enters the pond may be subject to extra stress, and energy dissipation measures or reinforcement may be necessary.

ii. Materials: Both liners used for these ponds are normally constructed of synthetic materials. Where site conditions allow, it may be possible to substitute a liner of natural materials for the secondary synthetic liner. The primary liner must be selected to be resistant to ultraviolet light.

iii. Quality Control and Quality Assurance: Quality control and quality assurance considerations for ponds and ditch liners are the same as for pad liners, but are more critical because hydraulic head is exerted on these components at all times.

2) Leak Detection and Collection: New ponds should be designed with leak detection and collection systems. These systems normally consist of a pervious layer installed between the liners, with any seepage collected in a manner which allows sampling and quantification of the flow. The drainage layer may consist of sand, fine gravel, geonet or other similar material. The system should be designed to maximize the volume of leakage which can be withdrawn so that hydraulic head is not transferred to the secondary liner.

3) Surface Water Controls: Ponds and ditches should be protected by berms, dikes or other diversion features capable of withstanding the 100-year, 24-hour storm event.

d. Closure of Precious Metals Leach Pads, Ponds and Ditches

In addition to protecting groundwater quality, the objective in closure of cyanide facilities should incorporate protection of the public from future exposure to this toxic substance. The following closure technologies are applicable to both new and existing precious metals leach pads, ponds and ditches.

1) Leach Pads: Upon closure of a dedicated leach pad, the spent ore must be left in a condition which will not result in a discharge with the potential to cause an exceedance of aquifer quality standards. In many cases, the potential for impacts to groundwater may be mitigated by the intact liner beneath the heap.

The environment in which the heap is located, and the nature of the waste must also be assessed to determine approprate closure measures. The potential of a closed heap to discharge fluid depends in part on the amount and distribution of precipitation and evaporation, the proximity and pathways to surface waters, the depth to groundwater, and the nature of the subsurface lithology. The moisture retaining capacity of the spoils themselves may be factored in to assess the potential for any seepage from the closed heap.

If a potential for seepage exists, the chemical nature of the potential seepage becomes an item of concern. Residual cyanide concentrations within the heap are normally reduced by rinsing with water or rinsing with water followed by a hypochlorite solution. In this manner, most facilities are able to achieve free cyanide concentrations below 0.2 mg/l in the rinsate.

As noted above, rinsing prior to unloading the pad is important for restackable pads, particularly when their disposal will be in an unlined facility. It should also be noted that the process of unloading the pad will result in further degradation of cyanide. Physical agitation of the material will break down some of the more weakly held cyanide complexes, and the exposure of the waste to the air and its contained carbon dioxide will reduce pH and result in volatilization of hydrogen cyanide. Prior to land surface disposal, representative samples of the material must first be analyzed to confirm that soil cleanup levels specifed by ADEQ are met.

Where sediment loading to surface water and subsequent impacts on groundwater are of concern, recontouring of the heap or construction and maintenance of berms may be necessary to limit erosion.

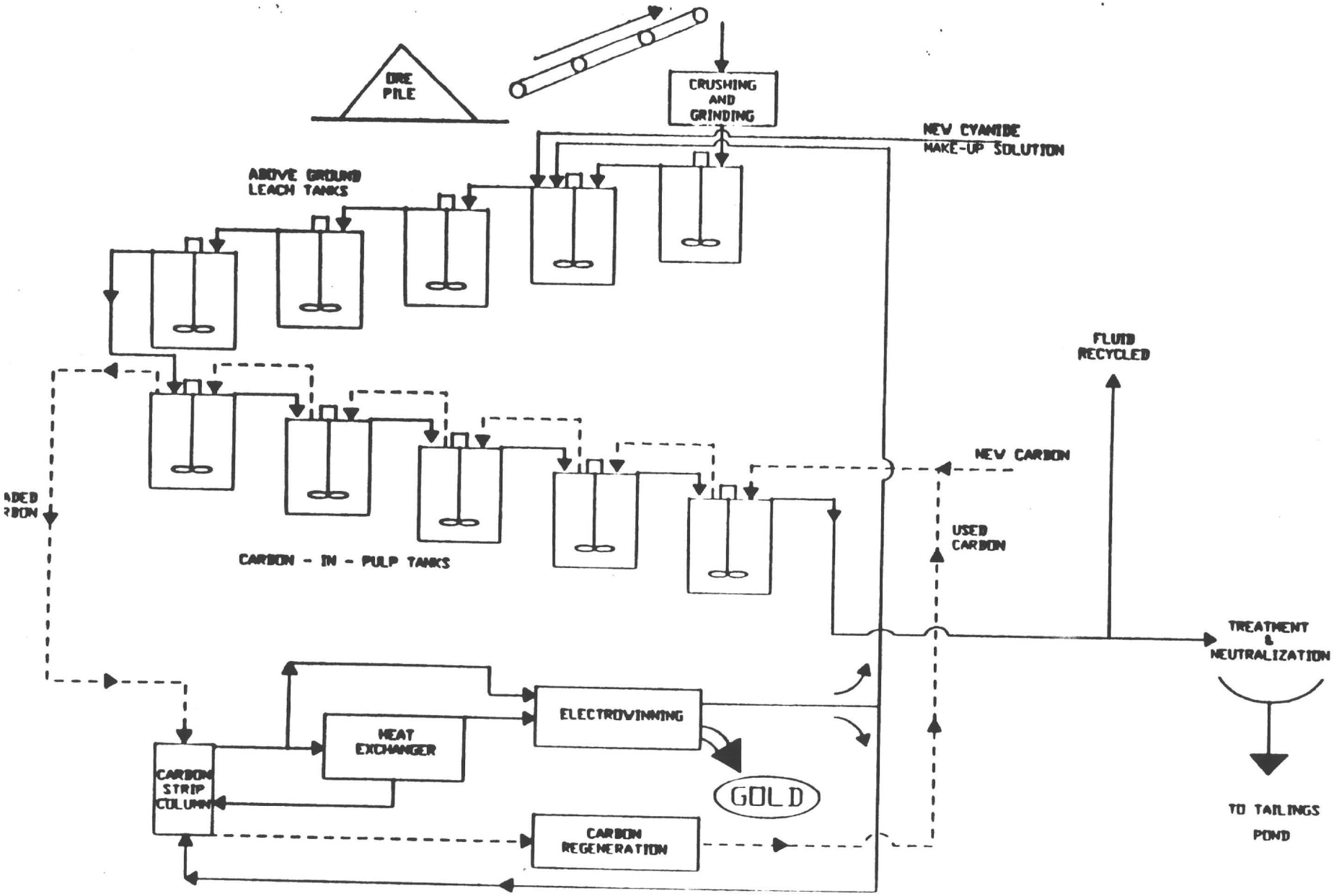
2) Ponds and Ditches: Solutions remaining in ponds after cessation of operations and rinsing of the heap can be allowed to evaporate. Pond liners may then be folded over

upon themselves, thereby encapsulating any solids which are left after evaporation of the solutions. The pond can then be backfilled to avoid future ponding and reduce the potential for any leaching from the liner or the solids. Ditches may be closed in a similar manner. Alternately, liners may be removed and disposed of in accordance with applicable solid waste regulations.

4. Precious Metals Vat Leaching

In the vat leaching process, after crushing and grinding, the finely pulverized ore enters a closed circuit system of cyanide leaching and carbon in pulp (CIP) absorption (Figure 5). The spent ore is carried via pipeline to a tailings disposal area. The optimum technology involves reuse of cyanide in the system, including the use of leachate collection systems in the tailings disposal area with recirculation back to the processing circuit. If the contaminant concentrations and water volume is reduced before the tailings are sent to the tailings disposal area, the potential for affecting groundwater quality will be reduced even further.

Many of the other features associated with vat leaching have been discussed earlier under the Chemical Storage, Proce ing Areas, Pipelines, and General Closure Considerations sectic of this document. (Sections IV.D.8. and 9.).



PROCESS AREA AND PIPELINES PROTECTED AGAINST LEAKS AND SPILLS

5. Precious Metals Tailings Impoundments

a. Facility Description

Tailings ponds are used for the disposal of waste material from precious metals vat leaching facilities. After crushing and grinding, the finely pulverized ore enters a closed circuit system of tanks where cyanide added to the slurry leaches the gold from the ore. Several different variations of the process are in practice, but the features common to all are the use of activated carbon to remove the gold from the cyanide solution, and the disposal of thickened tailings slurry carrying residual cyanide.

The disposal of cyanide bearing tailings are subject to the application of BADCT. The key elements which must be addressed include depositional practices, tailings dam and impoundment design and construction, reuse of tailings water and surface water control.

b. Design, Construction and Operation of Tailings Ponds

The following technologies are applicable to both new and existing precious metals tailings disposal facilities within the constraints of A.R.S. 49-243.B.1., with the exception of dam and impoundment design, which are applicable to new facilities only.

1) Depositional Practices

Depositional practices in the precious metals segment of the mining industry are generally equivalent to those listed in Section E.2.b.2) for the copper segment. However two significant differences exist. First, the technique of thin layer depostion described below is a demonstrated technology for precious metals tailings disposal. Second, since precious metals tailings ponds are generally much smaller in size than copper tailings ponds, they are normally constructed with a higher degree of engineered containment in terms of the impoundment lining and solution reclaim systems. This fact lessens the relative importance of depositional practices as they affect overall seepage reduction in precious metals compared to copper tailings disposal.

The technique of thin layer deposition is applicable to new precious metals tailings disposal facilities. Also known as subareal deposition, the method involves a deposition scheme whereby a series of spigots is used to discharge a thin layer of tailings in one area of the impoundment, and the discharge is then moved to a new area as the previous area is allowed to dry. This rapid drying, due both to the draining of the tailings to the ponded area as well as the enhanced evaporation resulting from the thin layering, can result in an unsaturated mass of tailings which reduces the

potential for seepage. The technique requires large areas in order to effectively rotate the deposition of tailings, and also involves trade-offs in terms of water conservation and potential air quality impacts. Depending on the evaporation rate and the moisture holding capacity of the tailings, this procedure may result in a loss in the amount of water available for reuse in the mill, thereby increasing the facility's total water consumption. These same factors, as well as the tendency of the tailings to form a crust, are important in considering the potential for the tailings to generate excessive amounts of fugitive dust. Additionally, this deposition method is maintenance intensive and requires that tailings slurries be kept at a high solids content.

2) Tailings Dam Design

Tailings dam design considerations for BADCT are applicable only to new facilities. For dam design and construction, the focus of BADCT is to prevent dam failures which could result in a surface discharge with the potential to adversely affect groundwater quality. Dam embankment stability must be insured through an analysis of the proposed lifetime of the facility and the storage volume needed, dam height, slopes required, construction methods, strength of construction materials, and the potential for earthquakes. Dam height must be sufficient to maintain adequate freeboard to allow for the retention of water in the tailings pond and run-on and direct precipitation resulting from the 10-year, 24-hour storm event.

The specific design of a tailings dam must integrate a variety of factors, including the topography of the site, the availability and cost of materials, and the required storage capacity of the impoundment. There is no "optimal" design which is superior to all other designs in all cases.

3) Tailings Impoundment Design

A variety of designs exist for tailings impoundments in the precious metals segment. The design must take into account the complete tailings disposal system, as the dam, liner, reclaim and seepage collection components are all interdependent. The selection of a particular design is also dependent on the depth to groundwater and the nature of the geologic material beneath the impoundment.

The key design feature of any precious metals tailings impoundment is a system which minimizes seepage by a combination of a relatively impermeable liner and a solution recycling or seepage collection system. Both natural and synthetic liners have been demonstrated in this application. Natural liners may consist of the native foundation materials which are scarified and recompacted to achieve a specified permeability, or they may be

constructed of imported clays and silts. A combination of these two techniques may also be used. Synthetic liners of high and low density polyethylene have also been used. The selection of a liner material is based on economics, materials availability, compatability with the waste, hydraulic conductivity in conjuction with expected hydraulic head at the base of the tailings, and engineering considerations. Natural materials may be selected for their capability to attenuate cyanide concentrations while the objective of synthetic lining is to contain leachate for collection.

Most tailings ponds are designed with some sort of drainage system on the floor of the impoundment. This may consist of a series of finger drains cut into a liner of natural material which act to direct solution to a toe drain along the upstream toe of the dam. The finger drains are filled with coarse rock to allow solution flow, and may be covered or encapsulated in filter fabric to exclude fine material from blocking off the drain. The toe drain directs solution to a pipe which penetrates the dam and carries the collected solution to a lined pond from which the water can be recycled to the milling circuit. As an alternate to piping through the dam, solution collected in the toe drain can be pumped out along the upstream face of the dam.

Where a more elaborate drainage system may be required, such as with tailings having a high water content, a full blanket drain can be installed over a natural or synthetic liner. A fabric filter cover may be needed to keep fine tailings from entering the blanket drain. Perforated piping within the rock drain can enhance its capacity to transmit solution. These pipes are connected to a toe drain and routed either through the dam to a lined solution collection and recycle pond or pumped up the face of the dam.

While the above impoundment designs are comprised of solution reclaim systems above the liner, it may sometimes be necessary to install a collection system beneath the liner. Such systems are normally limited to directly below the solution pond or area of saturated tailings, as these areas present the greatest potential for seepage due to their hydraulic head. In these cases, the primary liner can be either natural or synthetic, while the secondary liner is normally made from reworked in-place materials. Piping installed within the drainage blanket between the liners is connected to a collector pipe along the upstream toe of the dam and the solution is either piped through the dam to a lined reclaim pond or pumped up the dam face.

The systems described above should be considered to be solution recycling systems. They are installed for the purpose of collecting and recycling process solution both for water conservation and to limit hydraulic head on the

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liner. Therefore, the presence of solution in these systems is to be expected.

4) Reuse of Tailings Water

Reuse of tailings water reduces the hydraulic head exerted on the liner, thereby limiting the amount of seepage potentially reaching an aquifer. Recycling of this solution is normally achieved in two ways. First, water is routed directly from the tailings pond back to the circuit by use of barge mounted pumps or syphons. However, these systems can only remove the supernatent liquid from the ponded area. Therefore, the reclaim systems described above are necessary to collect solution which has percolated through the tailing to the interface with the liner. This solution can then be directed through or over the tailings dam to a lined pond from which it can be returned to the milling circuit.

The reclaim ponds used to collect water from under-drain and over-liner systems should be of a similar design and construction as that considered BADCT for solution ponds in the precious metals leaching segment, described in Section 3.c.

5) Surface Water Controls

Since the potential for seepage is directly related to the hydraulic head exerted on the liner, BADCT for precious metals tailings ponds involves the minimization of the volume of solution stored in the impoundment. It is therefore generally advisable to control surface drainage to limit the inflow of water resulting from precipitation on the surrounding terrain by use of trenches, dikes and/or berms. However, when determining the applicability of these controls at any given site, consideration must be given to the over-all design of the impoundment and its liner and collection system, and the need to conserve groundwater, as well as engineering considerations.

c. Closure of Precious Metals Tailings Impoundments

The closure of both new and existing precious metals tailings ponds involves the same technologies as listed under Section 2.g. for copper tailings impoundments. Reclaim ponds should be closed in a manner similar to that described in Section 3.d.2).

6. Smelting, Electrolytic Processing and Refining

Base metal smelting, electrolytic processing and refining is a sequence of processes that takes ore concentrate or metal bearing solutions and produce the final pure metallic product. BADCT design should be incorporated in those portions of the process involving industrial chemical storage, waste discharge, waste storage and disposal, or wastewater treament. Chemicals or waste

products that require discharge control include slag, acid plant waste or byproduct, primary electrolyte component chemicals, electrolytic slimes, spent electrolyte, and water used for cooling, washdown, or blowdown.

a. Slag

Base metal slag generated from the smelting process can be disposed of by carrying it to the slag dump or by granulating, mixing with water, and sluicing to a tailings disposal area. Some operations use granulated slag as road construction material. If disposed of on-site, slag waste should be characterized by testing for leachable metalic pollutants, and if a potential for groundwater contamination exists, an appropriate liner system may be required. In the granulation method of disposal, water reuse is considered an optimal technology.

b. Acid Plant

The primary waste or byproduct from acid plants is sulfuric acid. Acid is typically stored on-site and later reused, sold, or disposed of. Acid storage facilities should apply BADCT considerations discussed in the chemical storage section of this document (Section IV.D.6.). Recycling or sale are preferrable discharge control options since they achieve zero discharge.

If disposal is the chosen option, then waste must be treated to neutralize pH and to reduce pollutants such as metals and sulfate. Simple lime addition does not necessarily reduce arsenic, cadmium, lead, mercury, selenium, tellurium, and sulfate to acceptable levels (EPA, 1975). Chemical precipitation, reverse osmosis, ion exchange, or evaporation in a pond design in accordance with BADCT should be employed to eliminate the discharge of pollutants to the groundwater. The specific method employed must be tailored to the waste characteristics. Concentrations in the water discharged to unlined impoundments or surface waters must be below the state action limits. Precipitated and settled solids must be removed to an approved disposal facility on- or off-site.

c. Electrolytic Refining and Electrowinning

Acid solutions used in the electrolytic process should be stored and handled in a manner consistent with the chemical storage BADCT considerations (Section IV.D.6.).

section of this document. Once excess water is evaporated, sludge should be removed to an approved waste disposal facility on or off-site.

Spent electrolyte from the refining cells should be reused or treated and recycled. A less optimal technology would be to dry this waste and dispose of the solid residue in an approved disposal facility.

In base metal leaching operations, spent electrolyte may be used to produce cement copper. Cementation basins should be designed to control discharge in a manner consistent with liner configurations discussed in Section IV.D.1. Electrolyte from the cementation basins should be recycled to the leaching circuit.

d. Water

Water is used in the smelting/refining process for acid plant blowdown, contact cooling, refined product washdown, and washdown of working areas. In all cases where water is used, BADCT shall consist of reuse or treatment and recycling of the water back into the operation. The appropriate treatment to meet the intended industrial reuse application should be applied where treatment is required. Thus, BADCT for the disposition of process water involves no discharge through reuse or recycling. An alternative, less-than-optimal method to dispose of water used in the smelting/refining process is to treat with lime and settling and to collect the water in an evaporation pond designed in accordance with BADCT. Sludges should be removed to an approved on- or off-site disposal facility.

7. Uranium Mining and Concentrating

a. Uranium Mines

Uranium mines should be operated so that there is zero discharge of pollutants to groundwater. The key to achieving this performance at most sites is four fold, including:

- Proper dewatering and sealing of mine shafts, adits, and pits.
- Containment by liners and leachate collection systems for leachate from ore and gangue storage piles and for pumped mine water.
- Surface water diversions.
- Closure considerations.

Pollutants of concern are not restricted to Uranium and the decay products of Uranium, but may also include vanadium, silver, barium, and base metals. Uranium is of particular

concern because of its ready solubility under oxidizing conditions and over a wide range of pH.

1) Dewatering

Many of the uranium mines in Arizona are underground with shafts and adits that may transect partially saturated formations or even aquifers. Section IV.D.7. discusses BADCT design considerations for sealing and dewatering. Water should be collected within the mine in lined sumps and pumped to the surface for disposal in a lined impoundment.

2) Containment

All water that contacts metal bearing materials and pumped mine water should be contained at the surface in lined impoundments.

Piles of ore and waste should be stored on a base or "pad" composed of natural materials of a type and thickness necessary to reduce infiltration potential and precipitate out Uranium from leachate thereby restricting the flow of uranium bea ing fluid to the subsurface. The pad should be sloped to carry any rainwater falling on the pad toward the lined impoundment.

3) Surface Water Diversion

All surface waters should be prevented from entering mine workings or from flowing onto ore and waste piles, in keeping with the BADCT considerations outlined in Section IV.D.3.

4) Closure

For most of the Uranium mines operating or under consideration in Arizona, it is practical to return all uranium bearing waste rock material to the mine upon closure rren rock containing leachable pollutants may also ne be returned to the mine upon closure. If sealing has been completed properly during closure, this backfilling technique should essentially achieve zero discharge. The pad beneath the ore and waste rock storage piles should be excavated and removed for processing as ore or returned to the mine if it is below ore grade. Removal of all mine materials from the surface upon closure ensures that environmental effects other than groundwater concerns will also be kept to a minimum.

b. Ore Concentrating Facilities

For facilities that include ore concentrating and tailings disposal at the surface, including any facilities that produce Uranium concentrate as a byproduct in conjunction with base

metal concentration, all BADCT considerations outlined in Section IV.D. and Section IV.E.2. should be followed with the objective of achieving zero discharge. Wastewater discharged as a result of the ion exchange process is of particular concern in Uranium concentration facilities. Wastewater discharged as raffinate and from flushing of the columns must be contained in a lined impoundment consistent with the hierarchy in Table VII. As with base metal leaching operations, the presence or absence of organic pollutants in the wastewater or tailings, as referenced in A.R.S. 49-243.D. will determine the type of liners and leachate collection systems required for containment.

8. Industrial Minerals

BADCT design for industrial minerals will be developed on a facility-by-facility basis due to the widely varying character of such operations. Although specific guidance is not offered here, many of the BADCT considerations outlined in the general sections of this document can be applied to analogous design elements for discharge control at industrial mineral extraction operations.

Sand and gravel mining facilities may be operated under general permit for discharge of wash water, under conditions specified in the Aquifer Protection Permit Rules. Facilities varying from the conditions of the general permit must obtain an individual permit and must propose a BADCT design in the application process.

9. Placer Mining

Placer mining facilities may be operated under a general permit for wash water discharge, specified in the Aquifer Protection Permit Rules. Facilities varying from the conditions of the general permit must obtain an individual permit and propose a BADCT design in the application process.

If a placer recovery facility involves chemical separation or extraction of metals from concentrates on-site, an individual Aquifer Protection Permit for this part of the facility may be required. Sections of this document that may apply to chemical separation or extraction are General Closure Considerations; Chemical Storage; Processing Areas; and Precious Metal Leaching Facilities (Section IV.D.8., 9.a., and 9.b. and Section IV.F.).

10. In-Situ Leaching

In-situ leaching is a relatively new and innovative concept in mineral extraction, and, as such, does not lend itself to development of a well defined BADCT at this time. In-situ leach operations are those in which mineralized rock is left in place, sometimes fractured or altered to increase porosity and permeability, and subjected to infiltration of solutions to dissolve metals for recovery. The in-situ extraction process often involves a purposeful discharge of pollutants to groundwater and recovery of contaminated fluids. The ore zone targeted for

leaching may be located above or within the aquifer used for recovery of metal-bearing solution. In some cases, injection is used to extract metals from an ore zone beneath another aquifer. In such a setting, pollutant discharge may also result from the migration of contaminants from one aquifer to another.

Controlling vertical migration of injected leach fluids within and between aquifers is an important consideration and should be incorporated into a BADCT design. To help reduce the potential for vertical migration, the following items should be considered in the system design:

a. Abandonment of old exploration holes, or wells completed in several aquifers. If left unplugged these wells could serve as conduits for pollutant migration to adjacent aquifers.

b. Proper grout sealing of injection and recovery wells used in project operation.

c. Controlling recovery volumes so that they exceed injection volumes and act to contain injected fluids within a restricted area of the aquifer.

d. Predictive groundwater modelling in conjunction with pilot testing should be used to determine well placement and injection and recovery rates.

Since the objective of the leach process is the enhanced discharge of metals such as Copper, Lead, Zinc, Silver, Gold, and possibly other heavy metals, these constituents that are meant for economic recovery will not be subject to BADCT considerations. However, BADCT for the leaching process should incorporate technologies and operating methods designed to limit the discharge of all other pollutants by controlling the chemistry of the leaching solution.

Surface facilities for processing recovered fluids at an in-situ leaching operation should meet BADCT limitations as outlined in this document for other metal leaching and processing facilities. Additionally, in-situ leach operations, like all other discharging facilities, must meet the point of compliance requirements for an Aquifer Protection Permit, as discussed in the General Guidance Document for Aquifer Protection Permits. In most circumstances, in-situ leach operations will have to maintain groundwater elevations and flow directions by pumping to meet Aquifer Water Quality Standards at the appropriate points of compliance around the facility.

In block-cave leach operations, care should be taken to design and operate the systems to minimize the amount of leach solutions that by-pass the recovery zones. Because the leaching is done in disturbed, highly fractured ore above the water table, controlling the path and subsequent recovery of leach solutions may be much more diffcult than in underground injection leaching.

Upon closure, special consideration should be given to aquifer restoration. The zone affected by leach solutions should be flushed with water or other neutralizing solutions. Metals and other pollutants mobilized by the injection and recirculation of water and lixiviant should be reduced to their ambient concentrations upon closure.

Further guidance will be developed as more information is gathered about in-situ methods and the environmental affects. The U.S. Bureau of Mines, Twin Cities Research Center in Minneapolis, Minnesota, is conducting research in this area through a pilot project in the State of Arizona. A Draft Generic Design Mannual for in-situ operations has been developed by them, and is currently available.

G. Other Alternatives

Many alternatives are available for the handling of wastes from mineral extraction and processing. These alternative methods may or may not be technically or economically feasible for specific situations. There may also be significant environmental impacts that preclude the use of alternatives. The Environmental Quality Act (ARS 49-243 B.1) requires that alternatives be considered along with BADCT.

Applicants should submit, with their proposed BADCT facility design, feasibility studies showing that they have evaluated the following alternatives, if applicable:

- Recycling of fluids
- Reclaiming waste material (raffinate, spent electrolyte, etc.)
- Reclaim metals from tailings leachate
- Selling byproducts rather than disposal as waste
- Alternative extraction or concentrating processes, ie. vat leach vs. heap leach vs. in-situ leach, or precipitation vs. solvent extraction
- Underground mining vs. open pit
- Using slag or other solid waste as road or building material
- Backfilling mine workings with tailings material and waste rock

This constitutes a partial list of the many alternatives that may be available. If one or a combination of these alternatives are feasible, they should be incorporated into the proposed BADCT facility plan. If they are judged to be infeasible, the reasoning behind this judgement should be discussed in the application.

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V. SITE CHARACTERISTICS AND OTHER CONSIDERATIONS

A. Site Specific Hydrogeologic Characteristics

In order to obtain an Aquifer Protection Permit, an applicant must make two demonstrations (A.R.S. 49-243 B.):

1. That the best available demonstrated control technology (BADCT), processes, operating methods, or other alternatives are applied to the discharge; and

2. That pollutants discharged will not cause or contribute to a violation of Aquifer Water Quality Standards at the applicable point of compliance, or if standards are already violated that no further degradation will occur.

Site characteristics are a part of BADCT only to the extent that they control the quality and/or quantity of discharge before it reaches groundwater.

In evaluating BADCT for a given site, the permit applicant may consider site specific hydrologic and geologic characteristics which may contribute to reduction in the amount of discharge or may reduce contaminant levels in the discharge. If site characteristics are to be used as part of BADCT for a facility, the applicant must provide specific data regarding those characteristics and must demonstrate the degree of discharge reduction that will be accomplished.

The site specific characteristics which may be considered as part of the BADCT determination along with data requirements are discussed below. This discussion is not intended to cover all site aspects of a permit application, but only those relative to BADCT determination. Additional site specific characteristics will be needed in a permit application to determine point of compliance and compliance with standards at that point. These aspects of a permit application are discussed in the Aquifer Protection Permit Guidance Document.

Site specific characteristics for the determination of BADCT include: (1) soil properties, (2) vadose zone properties in conjunction with vadose zone thickness, (3) surface water, and (4) climate. A discussion of each characteristic follows:

1. Soil Properties

   Soil is the upper portion of the vadose zone characterized by: relatively high organic content, biologic activity by roots and microorganisms, and concentration of weathering products left by leaching, evaporation, or transportation.

   Soils may reduce discharge by limiting infiltration due to low permeability, by physically removing pollutants through filtration, by chemically removing pollutants through precipitation, adsorption, ion exchange or other chemical reactions, or by biodegradation due to microbial interaction with the pollutant.

Soil properties which indicate a soil's potential to reduce discharge include: soil type, distribution, and thickness at the site, soil structure, grain-size distribution, organic carbon content, chemical composition, mineralogy and permeability. The applicant should evaluate any changes to soil characteristics that may result from interaction with the discharge.

Data which may be presented to support soil properties as a factor in BADCT determination includes:

a. Soil boring logs with location map.

b. Batch or column tests showing quality of discharge after reaction with soil material.

c. Infiltration tests.

d. Permeability tests.

e. Chemical analyses (pH, EC, inorganic analyses, organic analyses).

f. Material property tests (grain size analyses, moisture content, bulk density, Atterburg Limits).

g. Maps of soil distribution and depth.

h. Biodegradation studies.

i. Other pertinent soil information including reference to published research data regarding pollutant attenuation.

2. Vadose Zone Properties and Depth to Groundwater

Properties of the vadose zone, the unsaturated zone between the soil surface and the saturated zone, may reduce discharge in a number of ways. The presence of impervious layers within the zone may retard the movement of the discharge to the water table; fine grained layers within the zone may physically remove some types of pollutants; chemical reactions between the discharge and materials in the zone may remove some pollutants; or biodegradation due to microbial interaction with the pollutant may degrade the pollutant.

If the vadose zone consists of layers or lenses of different materials, such as stratified soil horizons or rock units, the properties of each unit considered for BADCT evaluation must be considered separately in addition to describing the general properties of the vadose zone. The lateral and vertical extent of the geologic units and the type of contacts between the units should be identified (i.e. gradational, fault, unconformity, facies change).

Data which may be submitted to support the vadose zone or any unit of the vadose zone for consideration in determining BADCT include:

a. Borings and/or well logs describing, where applicable, rock-type, grain-size distribution, degree of sorting, type and degree of cementation and thickness of unit.

b. Description of structure including any faults, fractures, joints, folds, or bedding orientation.

c. Geologic maps and cross-sections which identify significant strata/formations, structural features, strategraphic contacts.

d. Geophysical well logs.

e. Surface geophysical surveys.

f. Lateral and vertical permeability and porosity measurements.

g. Chemical analyses (pH, Ece, inorganic and/or organic analyses).

h. Results of batch or column tests showing quality of discharge after reacting with vadose zone material.

i. Material property tests (grain size analyses, moisture content, Atterburg limits, bulk density).

j. Analyses of fluid movement and/or chemical transport through the zone e.g., lysimeter or neutron log measurements.

The thickness of the vadose zone or depth to groundwater may be a factor in determining whether or not a discharge will reach groundwater. Thickness also may control the amount of pollutant removal that will occur prior to a discharge reaching groundwater. Long residence time in the vadose zone, in many cases, produces greater potential for pollutant removal. However, a large depth to groundwater alone is not sufficient to assure protection of the groundwater quality. The degree of protection provided by depth will depend on several variables including: depth, the volume and rate of discharge, the properties of the pollutants in the discharge, the properties of the vadose zone (discussed above), and the length of time a discharge may continue. Any considerations of depth to water as a part of BADCT will have to show how the hydrologic and geochemical character of the vadose zone in conjunction with its thickness will act to control discharge.

Data for evaluating the effectiveness of depth to water include:

a. Static water elevation measurements (date of measurement, location of well, location of measuring point).

b. Well hydrographs to document long term and seasonal trends.

c. Location of pumping wells in vicinity of measured well.

d. Well construction data (total depth and location of perforations).

e. Geophysical surveys such as seismic and resistivity.

3. Surface Water

Surface water mixing with a facility discharge represents an increased potential for the discharge to reach groundwater. Therefore, documentation that surface water is not likely to mix with the discharge may be of consideration in determining BADCT.

Data that may be presented to evaluate the potential for surface water mixing include:

a. Location of any perennial or ephemeral water bodies including unlined surface impoundments, ponds or ditches, irrigation canals or conduits.

b. Flow characteristics, volumes, and rates.

c. Location of 100 year flood plain.

d. Site topography.

4. Climate

In areas where precipitation is low and/or evaporation is high the potential for some surface discharges to impact groundwater is reduced. For many solid waste disposal facilities, the relationship between precipitation and evaporation rates will determine the potential for leachate generation.

Data that may be presented to support that the climate at a site should be considered in the BADCT determination include:

a. Precipitation values (monthly mean and annual mean);

b. Evaporation (monthly mean and annual mean);

c. Site modifications to divert rainfall and run off from discharge areas and prevent ponding;

d. Transpiration rates (if appropriate);

e. Water balance calculations.

B. Environmental Factors

In the process of determining BADCT for a facility, most of the water quality environmental impact factors will be addressed in the site specific hydrologic and geologic characteristics and design elements section. However, non-water quality environmental impact factors will also have to be addressed. The non-water quality environmental impact factors will be site specific and may or may not effect the determination of BADCT for a proposed facility site. Some non-water quality environmental impact factors which may need to be addressed depending on the site selected are: air quality, land usages, aesthetics, environmentally sensitive areas, endangered species, noise, etc. If the optimal design or proposed BADCT have a direct impact on

any non-water quality environmental factors, an alternative BADCT may need to be developed.

C. Water Conservation

Because mining generally necessitates the use of large quantities of water, conservation plays a major role in the BADCT design. Water conservation is based on the efficient use of the available water and recycling of water used in processing. Recycling of process water should be maximized in the BADCT design. Pumped mine water should be used in operational practices wherever possible. While dust control is a primary concern, the use of water for this purpose should be kept to a minimum. Where evaporation is chosen as the method of disposal, justification must be provided that recycling or treatment and recharge are not viable options. If another method of disposal is chosen, the simple dilution of a waste stream to achieve lower discharge concentrations will not meet BADCT. Technologies which consume or alter the quality of large amounts of water will not be considered appropriate.

D. Economics

In regard to new facilities, the statute directs DEQ only to consider the economic impact of the application of BADCT on an industry-wide basis. Thus, ts of implementing BADCT at a specific facility are not relevant . permit decision. Financial feasibility is judged by the economic impact of a particular BADCT on the typical facility representing an industry class of that facility type. DEQ considers that use of a technology at many other similar facilities nationwide indicates financial feasibility. In preparing the list of design elements for Section IV.D. and E. of this guidance document, DEQ has selected technologies that are in widespread use. Thus, DEQ considers all of these technologies to be economically feasible on an industry-wide basis.

VI. EXISTING FACILITIES

A. Introduction

In contrast to new facilities, the EQA statute provides a different approach for determining BADCT for an existing facility. A facility is considered existing, (rather than new) if it was constructed, under construction, or had binding contracts for construction prior to August 13, 1985. Major modifications to existing facilities are considered to be new facilities.

Basically, the difference in BADCT determination for an existing facility involves evaluating the technical and economic feasibility of retrofitting the facility with more effective discharge controls. To do this, an applicant must first identify their waste and the control technologies currently in use. Next, the applicant should evaluate the discharge control performance of their facility. Steps toward more advanced discharge control technology must then be considered, taking into account engineering feasibility, water conservation, non-groundwater environmental effects, amount of performance gain, and cost.

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B. Assessment of Current Control Technology

As with new facilities, BADCT determination for existing facilities depends on an adequate characterization of the waste quantity and type. Please refer to Section IV.B. for discussion of this task.

The applicant should provide a description of the industrial practices and the control processes presently in use at the existing facility. The control processes can be identified according to the design elements described in Section IV.D. and E. The applicant should rank each currently utilized discharge control design element according to where they fall in the hierarchies presented in Section IV.D. Placement in the hierarchy will indicate which higher levels of control technologies are available, i.e., those having a higher position on the list.

Once the control processes are identified, the applicant should evaluate the overall discharge control performance of the facility. Where practicable, this step should involve direct measurement of discharge quantity and quality. Otherwise, the applicant may calculate expected performance based on industry standards for the engineered controls, on manufacturers' test data for components, and on site characteristics (discussed in Section V.A.) determined from field or laboratory testing.

If it can be shown that the combination of pollutant concentrations, discharge quality, discharge control technology, and site characteristics, assures that there is no reasonable probability of pollutants reaching the water table, then the application of BADCT at that site has been demonstrated. If this performance is not being achieved, the applicant must evaluate whether more effective technologies can be implemented.

C. Considering New Control Technologies

The BADCT design for an existing facility may involve instituting new technologies that rank higher on the hierarchies from Section IV.D. and E. than those in current use. The applicant should establish whether implementing a higher technology on each list of design elements is feasible from an engineering standpoint. In many situations, new controls are not feasible, such as installation of a new liner system for an existing tailings pile. In such cases, an applicant should look to other design elements to achieve increased discharge control. In cases where the change to more effective discharge controls is feasible from an engineering standpoint, the applicant should proceed to determining the complete ramifications of the new design regarding water conservation, other non-water environmental factors, performance gain in discharge control, and costs, as outlined below.

Water conservation may be a factor for deciding whether or not a change in discharge control technology is favorable and should be implemented as BADCT. The dilution of a waste stream for the sole purpose of achieving lower discharge concentrations will not meet BADCT. Technologies which consume or alter the quality of large amounts of water will not be considered appropriate.

Use of a new discharge control technology at an existing facility may have other environmental impacts that are not directly related to aquifer water quality. An example of such a technology is air stripping to remove volatile substances from water and mobilize them in the air. These environmental trade-offs must be assessed on a case-by-case basis and judgements about whether they outweigh discharge reduction are likely to be subjective, such as evaluating the impact of contaminants in the groundwater versus their impact in the air. Some of the additional environmental impacts which should be assessed are air quality, surface water impacts, noise levels, land use, aesthetics, environmentally sensitive areas, and endangered species.

D. Economic Aspects - Weighing Costs and Discharge Reduction

Economic evaluation plays an important role in determining BADCT for an existing facility. The law requires that the Department compare the cost of retrofitting the facility against the reduction in discharge that would be achieved by a particular control strategy. This section describes how the costs and benefits of a discharge control technology will be estimated. Methods for weighing costs with discharge reduction are also discussed.

Cost Estimation Method

Costs will be broken down into three separate categories: capital and development costs; operation and maintenance costs; and closure and post-closure care costs (Table VIII). Keep in mind that only the costs for installing the discharge control technology under consideration are applicable. Other costs, such as transportation, land acquisition (except as described below), local taxes, and other site specific costs that are not related to the installation or implementation of the technology should not be included in the cost estimate. While the inapplicable costs are important for economics of the particular mining activity, they should be the same, regardless.

Capital and development costs include all costs necessary to develop the facility up to the point that it becomes operational. The costs of obtaining the permit are not applicable, as these costs would be the same for any alternative for a facility. The cost for developing technical plans for plan review by the Department are applicable. Costs of land acquisition are only applicable if it can be shown that instituting a new discharge control technology requires land acquisition to achieve special site characteristics. All capital and development costs will be amortized using current market rates.

The stream of operation and maintenance (O&M) costs will be considered in terms of current dollars only, for the life of the facility. Care should be taken to include increased costs of maintenance on and replacement for depreciated equipment. Costs will be tracked in terms of industry-wide experience for O&M for a facility of similar configuration and age. Labor, energy and materials necessary for O&M will be estimated based on current market value, applied for the life of the facility.

Closure and post-closure care costs will be estimated based on what it would cost to currently close a simliar facility, plus perpetual care costs. The salvage value of the facility in current dollars must be subtracted from the closure cost. Perpetual care costs will be estimated on the same basis as O&M costs. These costs may be discounted if the permittee creates a closure/post-closure care surety bond or other similiar financial mechanism for assuring that closure and post-closure will be adequately funded. In this case, discounting will be estimated based on compounded interest, at current market rates, that may be accrued in such an account, rather than through the use of standard present-value techniques.

Discounting, using present-value techniques, is not acceptable because these methods, by definition, undervalue future costs. This overemphasizes current costs, and has a tendency to favor BADCTs with high closure, post-closure costs and low capital costs. This is not felt to be appropriate for preservation of groundwater as a renewable resource.

Table VIII

Cost Components

Capital and Development Costs

Site planning and design

Materials and equipment

Site preparation and construction

Debt retirement and management

Operation and Maintenance

Depreciation

Labor, Energy, and Materials

Facility renovation

Equipment replace

Closure and Post-Closure

Construction and closure

Remedial activities

Perpetual care and monitoring

Costs may be classified on a qualitative basis as High, Medium, or Low based on comparison with cost data for the entire industry. DEQ will consider the cost of implementing a discharge control technology on a per-unit basis above the ninetieth percentile (greater than two standard deviations above the average using normalized data) for the industry as being High. Any cost that is above the mean industry cost and below the ninetieth percentile will be considered Medium. Any cost below the mean for the industry will be considered Low. The permittee may propose an alternate analysis demonstrating that the cost for the particular BADCT is significantly above the industry average. In this event, the permittee must justify why a cost below the ninetieth percentile is significantly higher than the industry average, and why their comparative analysis is a method. The Department may choose to reject the alternate analysis if it is found to be methodologically flawed.

DEQ recognizes that there may be some difficulty in separating pollution control costs from overall costs for an industry. A good faith effort to estimate cost is acceptable. Alternative cost analyses methods to those presented here, such as methods not using current market rates or current dollars, may be presented if adequate justification is supplied.

E. Estimating Amount of Discharge Reduction for Existing Facilities

Estimation of the amount of discharge reduction achieved by instituting a new control technology is a qualitive judgement. This section outlines a means of classifying the predicted discharge reduction as either High, Medium, or Low based on the category of pollutant and current pollutant concentrations in the facility's discharge. A strategy of non-degradation of aquifer water quality is intended. Categories for classifying the amount of discharge reduction are presented in Table IX.

First, the applicant must determine the type and concentration of pollutants in the facility's discharge in it's current configuration. The discharge pollutant type and concentration place the facility in one of three categories: 1) Carcinogens and acute organic hazardous substances with concentrations above standards; 2) Other pollutants with concentrations above standards; 3) All pollutants with concentrations below standards. The applicant should next, quantify the expected discharge concentrations achievable through new discharge control technologies. The concentrations can be projected using industry standards, manufacturers test data for components, and site characteristics determined from field or laboratory tests. The projected new discharge concentrations allow the discharge reduction to be classified as High, Medium, or Low with the appropriate category on Table IX.

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Table IX

Categories for Evaluating the Amount of Discharge Reduction

Note: Your facility with its current operational scheme will fall into either category A, B, or C. Under these categories, find the reduction you expect to achieve by instituting a new discharge control technology being considered for BADCT. The classification as High, Medium, or Low can be used in the decision matrix with cost factors in Table X.

A. For known or suspected carcinogens and acute organic hazardous substances listed, in A.R.S. 49-243.D. where current discharge exceeds MCLs or Action Levels:

High -	Reduction to same order of magnitude as MCL or Action Level or to below MCL or Action Level
Medium -	Any other reduction
Low -	No change in discharge concentrations

B. For all other pollutants where current discharge is above MCL's or Action Levels:

High -	Reduction to below MCL or Action Level
Medium -	Reduction to same order of magnitude as MCL or Action Level
Low -	Any other reduction

C. For all other pollutant levels:

High -	Reduction to ambient groundwater quality
Medium -	Reduction by one order of magnitude
Low -	Any other reduction

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F. Comparing Cost to Discharge Reduction

Table X shows a decision matrix identifying how to evaluate the cost and discharge reduction factors when considering a new design for BADCT. Scenarios involving Low Costs and Medium to High Discharge Reductions or Medium Costs with High Discharge Reduction should be proposed as BADCT. Scenarios involving High or Medium Cost and Low Discharge Reduction should not be required at existing facilities and their current configuration will be considered BADCT. Implementing other combinations such as High Cost with Medium Discharge Reduction or Medium Cost with Medium Discharge Reduction should be negotiated between DEQ and the applicant.

Table X

Decision Matrix for

Discharge Reduction vs. Cost

		Discharge		
		High	Medium	Low
C				
O	High	Negotiate	Negotiate	Design is Not BADCT
S	Medium	Propose Design as BADCT	Negotiate	Design is Not BADCT
T	Low	Propose Design as BADCT	Propose Design as BADCT	Negotiate

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VIII. FREQUENTLY ASKED QUESTIONS ABOUT BADCT

1. What are the constituents referenced in A.R.S. 49-243.D.?

   These are organic substances from the following lists:

   1) 42 U.S. Code Subsection 241(b)(4) - known carcinogens or reasonably anticipated to be carcinogens.

   2) 40 CFR, Subsection 261.33(e).

   3) Additional organic toxic pollutants listed by the Director by rule in the future.

   ADEQ is in the process of compiling one common list of the compounds from 1) and 2) above.

2. Are cyanide - metal compounds in 243.D. constituents?

   No.

3. After closure of a disposal site, and following that period of time during which monitoring of groundwater must be performed, will there be any additional required monitoring following that post-closure period as found in the operation permit?

   No. Monitoring falls under the point of compliance portion of an Aquifer Protection Permit and has little to do with BADCT requirements.

4. As new groundwater quality standards arise, will any portion of the permits be amended?

   Once issued, an Aquifer Protection Permit, will only be amended if it comes up for review. In general, existing permits are a low priority for permit review by DEQ. However, if there is a change in the analytical standards or contamination problem or other permit violation at a facility, DEQ will examine that facility's permit and recommend amendments.

5. If there is no evidence of groundwater contamination at a given site, and compliance with BADCT was achieved in the past, is it required that a facility meet an amended BADCT?

   An existing facility with no evidence of groundwater contamination may be considered BADCT. BADCT criteria changes would apply only to long term projects, and would be applicable as long as there was no problem with deposited wastes.

6. Has it been decided when the point of compliance definition will be finalized?

   This definition will be made by the time new regulations for the Aquifer Protection Program are issued. Point of compliance is defined in ARS 49-244 and is site-specific for non-hazardous discharge. Point of compliance is not a part of BADCT.

7. Will the facility applying for an Aquifer Protection Permit be required to complete a hydrogeological study, or will similar studies previously undertaken by DEQ or other agencies be regarded as sufficient?

It will be the Director's decision to determine adequacy of existing studies. If site conditions are to be used as a part of the BADCT for a facility, a hydrogeologic study will be necessary.

8. Are there requirements from other DEQ programs that are being pulled into BADCT? Is other statutory authority being used to bolster this program?

Yes, most of the sections within DEQ will participate in the development of BADCT. These aspects of other programs which relate to groundwater discharge control will be integrated into BADCT.

9. Are closure, hydrogeological analysis, and other costs being considered in economic impacts associated with BADCT?

No, not as far as an economical burden to the applicant of a new facility. Yes, in the category of existing facilities.

10. How will post closure financial responsibility be addressed?

Facilities may be required to post bonds guaranteeing post closure compliance to permit provisions.

11. Can site characteristics alone constitute BADCT?

Site characteristics which lend themselves to discharge reduction at a disposal site do not in themselves constitute BADCT.

12. When is a facility regarded as existing and when is it regarded as closed?

A disposal facility is regarded as existing if constructed, under construction, or plans were approved for construction prior to August 13, 1986. A facility is considered closed if closed prior to January 1, 1986 with no intent to reopen.

13. What is the purpose of the BADCT Guidance Document?

This information is a guidance document not a rule or a law -- The BADCT Guidance Document is designed to help both the permittee as well as the permit writer.

14. What constitutes a "major modification" that will cause an existing facility to be treated as a new facility for BADCT determination?

The rules currently being developed will clarify this point.

IX. APPENDIX

Exemptions, Facilities Requiring Permits, and Draft General Permit Criteria Related to the Mining Industry

A. Exemptions

Certain exemptions that may apply to segments of the mining industry, as listed under A.R.S. Title 49, Section 250.B, are noted below. The following classes of facilities are exempt from the aquifer protection permit requirements.

Subsection B.5. "Mining overburden returned to the excavation site, including any common material which has been excavated and removed from the excavation site and has not been subjected to any chemical or leaching agent or process of any kind".

Subsection B.6. "Facilities used soley for surface transportation or storage of waters for beneficial uses, or pumped from the groundwater, if effluent from any waste treatment facility is not added after the original point of diversion."

Subsection B.8. "Facilities which are defined and required to obtain a permit to reuse reclaimed wastewater".

Subsection B.9. "Leachate resulting from the direct, natural infiltration of precipation through undisturbed regolith or bedrock if pollutants are not added to the leachate as a result of any material or activity placed or conducted by man on the ground surface".

Subsection B.10. "Surface impoundments used soley to contain storm runoff."

Subsection B.11 " Closed facilities. However, if the facility ever resumes operation, the facility shall obtain an aquifer protection permit and the facility shall be treated as a new facility for the purposes of 49-243".

Section 49-243, referenced above, pertains to the information and criteria for issuing an individual permit.

B. Facilities requiring permits

Under A.R.S. Title 49, Section 241.A. and B. those facilities that are required to obtain a permit are defined. Section 241.A. states that "unless otherwise provided by this article, any person who discharges or who owns or operates a facility that discharges shall obtain an aquifer protection permit from the director". Section 24.B. states that "unless exempted under 49-250, the following are considered to be discharging facilities and shall be operated pursuant to either an individual permit or general permit, including agricultural general permits, under this article:

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1. Surface impoundments including holding, storage settling, treatment, or disposal pits, ponds, or lagoons.

2. Solid waste disposal facilities.

3. Injection wells.

4. Land treatment facilities.

5. Facilities which add a pollutant to a salt dome formation, salt bed formation, dry well, or underground cave or mine.

6. Mine tailings piles or ponds.

7. Mine leaching operations.

8. Septic tank systems with a capacity of greater than two thousand gallons per day.

9. Groundwater recharge projects and underground storage and recovery projects.

10. Point source discharges to navigable waters.

11. Sewage or sludge ponds and wastewater treatment facilities.".

Many of these facilities may be included in a mining operation.

C. Draft General Permit Criteria

1. Sand and Gravel Placer Mining

The draft rules state that "a general permit is issued for the discharge of wash water from sand and gravel operations, and placer mining operations, if only physical processes are employed and no hazardous substances have been added or exposed during the processing or removal of the sand and gravel".

2. Pipeline and Well Testing

According to the draft rules a general permit may also be issued for discharges from hydrostatic tests of pipelines provided that certain conditions are met. These conditions depend on whether or not the pipeline has been previously used. General permits may also be issued for surface impoundments receiving waters from well testing and development, provided that the discharged water does not violate Aquifer Water Quality Standards or further degrade the quality of water in the effected aquifer.