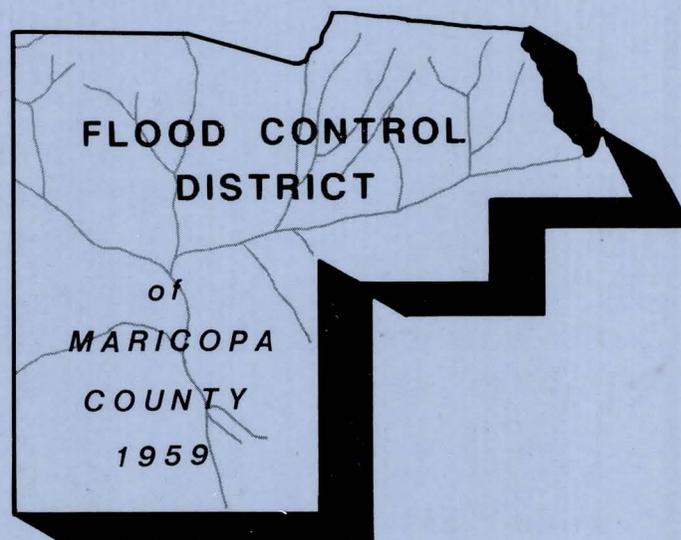


#1

GROUNDWATER RECHARGE FEASIBILITY INVESTIGATION

Appendix D Technical Memorandum No. 4

Legislative Requirements and Permitting Procedures for Artificial Groundwater Recharge Projects



Submitted by

CH2M HILL

in association with

ERROL L. MONTGOMERY & ASSOCIATES

and

L. G. WILSON, RECHARGE SPECIALIST

MARCH 1988

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GROUNDWATER RECHARGE
FEASIBILITY INVESTIGATION
APPENDIX D

TECHNICAL MEMORANDUM NO. 4

LEGISLATIVE REQUIREMENTS AND PERMITTING PROCEDURES
FOR ARTIFICIAL GROUNDWATER RECHARGE PROJECTS

Prepared for

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
PLANNING & PROJECTS
MANAGEMENT DIVISION

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by
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March 1988

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N22984.A0

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P005/036

TECHNICAL MEMORANDUM

TO: Lionel Lewis/Flood Control District of
Maricopa County

PREPARED BY: L. G. Wilson/CH2M HILL
Richard Randall/CH2M HILL
Peter Mock/CH2M HILL

SUBJECT: Maricopa Recharge Feasibility Investigation
Flood Control District of Maricopa County
TECHNICAL MEMORANDUM NO. 4
LEGISLATIVE REQUIREMENTS AND PERMITTING
PROCEDURES FOR ARTIFICIAL GROUNDWATER RE-
CHARGE PROJECTS

DATE: January 14, 1988 (Revised March 21, 1988)

PROJECT: N22984.AO

INTRODUCTION

This technical memorandum summarizes the institutional aspects of artificial groundwater recharge projects that may be undertaken by Maricopa County Flood Control District.

This memorandum is not intended to provide legal advice, and is no substitute for the advice of an attorney.

Specific legislation and permitting requirements that must be considered are reviewed, including: (1) federal legislation, (2) state legislation, (3) rules and regulations of cooperating agencies, and (4) planning and permitting activities for a Maricopa County Flood Control District recharge project.

A NPDES permit will be required for a recharge project involving floodwaters discharged into "waters of the United States". Thus, any of the potential recharge sources (i.e., stormwater runoff, reclaimed wastewater, and CAP water) containing any pollutants will require a NPDES permit. A NPDES permit is not required for recharging any of these sources in off-channel spreading areas.

The need to obtain NPDES permits for stormwater runoff is reinforced by the 1987 amendments to the Clean Water Act, requiring EPA to develop procedures for issuing NPDES permits for sources of municipal and industrial stormwater discharges. Specifically, all cities with populations greater than 250,000 will be required to obtain permits for municipal stormwater discharges within four years.

The regulations and permitting procedures pertaining to city and county floodplain ordinances, zoning, and other local requirements have not been addressed in this memorandum due to the added complexity and volume of material required. The permitting requirements of local agencies and municipalities can vary greatly depending on the location and configuration of the recharge project. Also, it is assumed that the Flood Control District does not need a review of county floodplain ordinances and permit requirements. It is likely that local and county requirements will not impact project feasibility to the extent of state and federal requirements.

The sections on federal and state regulations, and planning and permitting activities are primarily abstracted from the following document: "Institutional and Regulatory Requirements for Recharge" Task 7 of the Tucson Recharge Feasibility Assessment, by CH2M HILL, Montgomery, and Wilson (1987). Institutional changes since the publication of the Tucson report are incorporated in this memorandum.

FEDERAL LEGISLATION PERTAINING TO
ARTIFICIAL GROUNDWATER RECHARGE

Federal legislation affecting the operation of recharge projects and the use of water that is recovered from a recharge project includes the Clean Water Act (CWA) of 1977, and the 1987 amendments; the Safe Drinking Water Act (SDWA) of 1974, and the 1986 amendments; and the Occupational Safety and Health Act.

THE CLEAN WATER ACT

Three provisions of the CWA that are relevant to a recharge project by Maricopa Flood Control District are Section 402, relating to the National Pollutant Discharge Elimination System, Section 319, relating to nonpoint sources, and Section 404, governing the disposal of dredged or fill materials in waters of the United States.

Section 402

Section 402 of the CWA prescribes National Pollutant Discharge Elimination System (NPDES) permits for discharges of wastewaters containing any of a broad class of pollutants to natural surface water bodies and streams. Included as pollutants are sediment, EPA's list of priority pollutants,

microorganisms, and radioactive substances (Palsma, 1987). NPDES permits limit the quantity of such pollutants that are released and require self-monitoring and reporting of discharges. There are penalties for noncompliance. In Arizona, the NPDES permitting program is administered for the U.S. Environmental Protection Agency (EPA), by the Water Permits Unit of the Arizona Department of Environmental Quality (ADEQ). The state will assume a stronger role in the NPDES permitting program when ADEQ assumes primacy of the Clean Water Act.

A NPDES permit may be required for injection wells if water pumped during well redevelopment is discharged into washes or natural stream channels.

Section 319

The 1987 amendments included a new Section 319 requiring each state to develop and control nonpoint sources of pollution, including urban runoff. Within 18 months of enactment, each state is required to submit a report identifying waters that are not expected to meet drinking water quality standards because of nonpoint source pollution and submit a management plan describing methods for controlling nonpoint pollution. States are encouraged to undertake groundwater protection strategies during their overall efforts relating to nonpoint pollution control. Conceivably, the effects of recharging stormwater runoff on groundwater quality will be addressed in such a strategy. Efforts that result in a reduction of nonpoint pollutants in urban runoff may also improve chances of obtaining state water quality permits for recharging these "improved" urban runoff sources.

Section 404: Dredge and Fill Permits

Section 404 permits are issued by the Secretary of the Army under environmental guidance from EPA. The contact agency is the U.S. Army Corps of Engineers (COE). The COE considers the effect of moving and disposing of channel materials on surface flows and quality when issuing a 404 permit. According to Section 404 of the CWA, a Dredge and Fill permit is required if dredging or earthwork for a project (e.g., a recharge project) results in placing dredged or fill material into a natural stream channel. A permit is also required when altering or disturbing stream channel materials and stockpiling in the floodplain (Dixon, 1987). The information required for a 404 Permit is summarized in Table 1. The processing procedure for a 404 Permit is summarized in Table 2. Those experienced with this permit indicate that the process can be quite lengthy (Zeller, 1987).

According to Dixon (1987), the need for a 404 permit will be determined on a case-by-case basis, but will probably be required 80 percent of the time that activities are carried out in a stream channel. Accordingly, when planning in-channel recharge projects, the Maricopa Flood Control District should contact the District Engineer for specific guidance on each case.

It is possible that the permitting process will be modified further as the amended Clean Water Act is implemented. For example, Environmental Impact Statements may be required for new projects.

Ambient Water Quality Standards

The CWA assigned ambient water quality standards for individual surface water bodies adequate to protect the

beneficial uses of such water bodies. Where there are several beneficial uses, as would occur at a multipurpose artificial recharge facility, the use requiring the highest quality water drives the decision making process for the regulation of water quality for a particular water body.

Table 1
INFORMATION REQUIRED FOR A DREDGE AND FILL PERMIT

- o Name and address of applicant
 - o Name, address, and title of authorized agent
 - o Detailed description of the proposed activity
 - o Names and addresses of adjoining property owners
 - o Water body and location on water body where activity exists or is proposed
 - o Location of land where activity exists or is proposed
 - o Other permits required
-

Table 2
PROCESSING PROCEDURE FOR A DREDGE AND FILL PERMIT

- o Preapplication consulting
- o Applicant submits ENG Form 4345 to district regulatory office
- o Application received and assigned identification number
- o Public notice issued (within 15 days of receiving all information)
- o Fifteen to 30-day comment period depending upon nature of activity
- o Proposal is reviewed by Corps and the public, special interest groups, local agencies, state agencies, and federal agencies
- o Corps considers all comments
- o Other federal agencies consulted, if appropriate
- o District engineer may ask applicant to provide additional information
- o Public hearing held, if needed
- o District engineer makes decision
- o Permit issued, or permit denied and applicant advised of the reason

THE SAFE DRINKING WATER ACT OF 1975 INCLUDING 1977 AND 1986 AMENDMENTS

The Safe Drinking Water Act (SDWA) of 1974, along with its 1977 and 1986 amendments is aimed at assuring that public water systems meet minimal standards for the protection of public health. The requirements of this Act relate to the quality of delivered water recovered from a recharge project when the water is used for drinking water sources.

National Primary Drinking Water Regulations

The SDWA requires EPA to establish Maximum Contaminant Level Goals (MCLGs), Maximum Contaminant Levels (MCLs), and National Primary Drinking Water Regulations for individual contaminants including volatile synthetic organic chemicals (VOCs), synthetic organic chemicals (SOCs), inorganic chemicals (IOCs), radionuclide contaminants, and microbiological contaminants. "MCLGs are nonenforceable health goals which are to be set at the level at which no known or anticipated adverse effects on the health of persons occur and which allow an adequate margin of safety" (Thompson, 1986). MCLs are enforceable standards that must be set as close as possible to Recommended Levels Goals (RMCLDs).

Regulations must be developed for 83 contaminants over the next 3 years. Contaminants requiring regulation under the 1986 amendments are listed in Table 3. Regulation will start with contaminants which already have primary drinking water standards (see Table 4) plus an additional 8 specific VOCs and fluoride. Regulated contaminants (and selected other constituents) will be monitored at the points of entry to the distribution system representative of each well. The importance of this to recharge activities by Maricopa Flood Control District is that federal authority for enforcement of MCLs under the SDWA begins prior to consumption of water recovered from a recharge project rather than before or during recharge. (This is in contrast to the requirements of Arizona's Environmental Quality Act, which applies standards within the aquifer.)

Table 3
CONTAMINANTS REQUIRED TO BE REGULATED
UNDER THE SDWA OF 1986

<u>Volatile Organic Chemicals</u>	
Trichloroethylene	Benzene
Tetrachloroethylene	Chlorobenzene
Carbon tetrachloride	Dichlorobenzene
1,1,1-Trichloroethane	Trichlorobenzene
1,2-Dichloroethane	1,1-Dichloroethylene
Vinyl chloride	trans-1,2,Dichloroethylene
Methylene chloride	cis-1,2,-Dichloroethylene
<u>Microbiology and Turbidity</u>	
Total coliforms	Viruses
Turbidity	Standard plate count
Giardia lamblia	Legionella
<u>Inorganics</u>	
Arsenic	Molybdenum
Barium	Asbestos
Cadmium	Sulfate
Chromium	Copper
Lead	Vanadium
Mercury	Sodium
Nitrate	Nickel
Selenium	Zinc
Silver	Thallium
Fluoride	Beryllium
Aluminum	Cyanide
Antimony	
<u>Organics</u>	
Endrin	1,1,2-Trichloroethane
Lindane	Vydate
Methoxychlor	Simazine
Toxaphene	PAH's
2,4,-D	PCB's
2,4,5-TP	Atrazine
Aldicarb	Phthalates
Chlordane	Acrylamide
Dalapon	Dibromochloropropane (DBCP)
Diquat	1,2-dichlorophenol
Endothall	Pentachlorophenol
Glyphosate	Pichloram
Carbofuran	Dinoseb
Alachlor	Ethylene dibromide (EDB)
Epichlorohydrin	Dibromomethane
Toluene	Xylene
Adipates	Hexachlorocyclopentadiene
2,3,7,8-TCDD (dioxin)	
<u>Radionuclides</u>	
Radium 226 and 228	Gross alpha particle activity
Beta particle & photon radioactivity	Radon
Uranium	

Table 4
EPA MAXIMUM CONTAMINANT LEVELS

Constituent	Maximum Contaminant Level (in mg/l or ppm unless specified)
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
Organic chemicals turbidity	1 tu up to 5 tu*
Coliform bacteria	1/100 ml (mean)
Endrin	0.0002
Lindane	0.004
Methoxychlor	0.1
Toxaphene	0.005
2,4-D	0.1
2,4,5-TP (Silvex)	0.01
Radionuclides	
Radium 226 & 228 (combined)	5pCi/l**
Gross alpha particle activity	15pCi/l
Gross beta particle activity	5 mrem/year***
Total Trihalomethanes	0.1

* tu = turbidity unit

** pCi/l = picuries/liter

***mrem = millirem/year

Source: 40 C.F.R. §§ 141.11 to -.16

The Wellhead Protection Program

Under the Wellhead Protection Program (WHP), each state is required to submit to EPA within 3 years of the enactment of the amended SDWA a program to prevent contamination of public water supplies (U.S. Environmental Protection Agency, 1987). A WHP area is defined as the surface or subsurface area surrounding a well or well field supplying a public water system through which contaminants are reasonably likely to move toward and reach a well or well field. A wellhead protection area can include all or part of the pumping well cone of depression, the recharge area, and the surrounding aquifer (U.S. Environmental Protection Agency, 1987). The state is given broad guidance in determining the WHP's, but generally they are based on the capture zones of well fields and the lands overlying these zones.

Other land areas outside the capture zones of well fields on which activities could result in contaminants being contributed to these capture zones may also be included in the program (Harrison, 1988). Accordingly, a recharge project causing water to migrate into a capture zone might be addressed by the program. The resulting plans are unlikely to be effective. This is because there are few provisions for enforcement in the SDWA.

The wellhead protection program encourages state participation through a grants program. In Arizona, the objectives of the WHP are effectively addressed by the state's Environmental Quality Act (EQA) of 1986. For example, according to the EQA, an aquifer is protected at the point of compliance of an Aquifer Protection Permit. Details on the point of compliance for a recharge project are included in the section on The Environmental Quality Act of 1986.

INDIAN AND FEDERAL WATER RIGHTS

In addition to the federal legislation discussed in the previous sections, the issue of federal and Indian water rights to surface and groundwater in the state may affect a recharge project by Maricopa County FCD. This issue is discussed in the section dealing with state legislation pertaining to artificial recharge.

OCCUPATIONAL SAFETY AND HEALTH ACT

Protection of workers is partly regulated by the federal Occupation Safety and Health Act (OSHA). Federal authorities may monitor activities associated with the construction, operation, and maintenance of artificial recharge facilities for compliance with OSHA provisions.

STATE LEGISLATION PERTAINING TO ARTIFICIAL RECHARGE

Relevant state laws ostensibly affecting a recharge project include Title 45 of the Arizona Revised Statutes, the Groundwater Management Act of 1980, the Recharge and Under-ground Storage Act of 1986, the Environmental Quality Act of 1986, and the Groundwater Recharge District Authority Act of 1987.

TITLE 45 OF THE ARIZONA REVISED STATUTES

Title 45 of the Arizona Revised Statutes establishes the rules for obtaining, perfecting, preserving, and protecting water rights in Arizona. Maricopa County Flood Control District or a cooperative entity will be required to show ADWR that it has a right to each of the four principal water sources available for a recharge project, (i.e., stormwater runoff, reclaimed wastewater, CAP water, and recovered groundwater).

Stormwater Runoff

Stormwater runoff is included within the general class of surface water. The procedure for appropriating surface water for a beneficial use is outlined in ARS 45-142, "Application for a permit to appropriate Public Waters of the State of Arizona." (The Groundwater Recharge and Under-ground Storage Act of 1986 designated artificial recharge as a beneficial activity.) When the permit is approved by the Director of ADWR, recharge facilities can be constructed and water can be diverted to the facilities. Subsequently, a water right certificate is issued. A right is lost if the water is not used beneficially for a period of 5 years.

Surface water is over appropriated in Arizona. Accordingly, appropriation of surface water for a recharge project is not a simple task. The 1979 General Adjudication of Water

Rights Statute required adjudication of the water rights of most water users in Arizona. A primary reason for this adjudication is the need to quantify the water rights of the federal government and the Indian nations of the state. The federal government and the Indians hold a special type of water right: the federal reserved right. The Indian reserved rights have very early priority dates (Arizona Water Information Center, 1986). Eventually, all water rights, including those of the federal government and Indian nations will be determined. Adjudication of the Gila River watershed is currently underway.

Ownership of surface and groundwater in the vicinity of possible recharge projects will remain uncertain until the Gila River adjudication is completed. This may take several years. Meanwhile, the Maricopa FCD is advised to determine that claims have been filed for the rights to the availability and quantity of surface waters that might be used in a recharge project. Other agencies which have already filed may have a prior right. For example, as part of the strategy for Plan 6, the federal government has filed for floodwaters in the area (Warskow, 1987). The Roosevelt Water Conservation District has also filed for floodwater rights.

It is not too late to file for a water right (Erb, 1987). Mr. Dick Gessner of ADWR's Operational Division is available to provide guidance with the process.

Developed Water

Maricopa County may be required to prove ownership of "developed water" when undertaking a recharge project for floodwater containing urban runoff. Developed water is water which has been generated above historical volumes as a consequence of urbanization. There is no law in Arizona addressing the ownership of developed water. Decisions

elsewhere may be helpful in deciding this issue (Harrison, 1987).

Reclaimed Wastewater

The status of rights to appropriate reclaimed wastewater for a recharge project in Maricopa County is currently uncertain. The judge who decided the John F. Long case determined that wastewater discharged from the 91st Avenue Plant in Phoenix is not subject to either the law of prior appropriation or the groundwater law (Harrison, 1987). This case is currently being appealed by ADWR. If the court decides that wastewater retains its original character as surface water or groundwater, then the entities developing the source water retain ownership. The Maricopa Flood Control District should monitor the progress of this case when planning to recharge reclaimed wastewater from a cooperating municipality.

The right to use a streambed to transmit reclaimed wastewater to a recharge project site must also be considered. This is addressed in Section 45-173 of the Arizona Revised Statutes. In particular, a channel may be used to carry water or be used for the location of either a recharge project or an underground storage and recovery project, provided that these activities do not diminish the quantity of water which has been appropriated.

Imported Central Arizona Project Water

The third major water source for a recharge project by Maricopa Flood Control District is Central Arizona Project (CAP) water. Rights to this source are specified in agreements between the Secretary of the Interior and contracting entities. Thus, the rights to use CAP water in a recharge project will become an issue when the District undertakes cooperative recharge projects with any of these entities.

Recovered Groundwater

The rights to recover recharged water are specified in Title 45 of the Arizona Revised Statutes, particularly in recent amendments introduced by the Groundwater Management Act of 1980 and the Groundwater Recharge and Storage Act of 1986. These acts are discussed in subsequent sections.

The right to recover recharged water may also be affected by the ongoing litigation of water rights in the state. The rationale is that groundwater may fall within the category of "water subject to claims based upon federal law." A court decision is required to define the sources of water covered by this definition. The most negative outcome would be that an agency involved in a recharge-related project may have the right to the water used in the project but not to recovered groundwater.

Artificial Recharge as a Beneficial Use of Water

As indicated, the Groundwater Recharge and Storage Act of 1986 specified artificial groundwater recharge as a beneficial use. However, in ARS 45-147, recharge is listed as the lowest ranking beneficial use of surface water. The relative use values are as follows:

- o Domestic and municipal uses
- o Irrigation and stock watering
- o Power and mining uses
- o Recreation and wildlife, including fish
- o Artificial groundwater recharge

The concept of "first in time, first in right" dominates the priority of use issue. Conceivably, if downstream surface water users were already diverting floodwater for irrigation, it might be illegal to divert water upstream for a recharge project. Downstream appropriators will triumph in

court if they prove that upstream diversion for a recharge project interfered with their rights. The rights of downstream prior appropriators represent the single largest obstacle to floodwater recharge projects.

Existing rights may be purchased. However, there are restrictions on buying water rights from irrigation districts, agricultural improvement districts, and water users associations.

THE GROUNDWATER MANAGEMENT ACT OF 1980

The Groundwater Management Act also relates to artificial recharge and recovery operations through administrative rules and regulations for well construction and licensing of well drillers. Details are included in Title 12, Chapter 15, Article 8 of the Arizona Administrative Rules and Regulations. The following sections requiring a licensed well driller are germane:

- o Section 45-596 requires a notice of intention to drill an exploration well or monitoring wells when conducting hydrogeological investigations for a project. A variance is required to allow the perforated interval of monitoring wells to extend above the water table. Variances are also required for any modifications to well construction regulations.
- o Section 45-597 requires a notice of intention to deepen or replace an existing nonexempt well in the same location within an Active Management Area. This notice of intention will be required if existing wells are deepened or replaced and used as recovery wells.

- o Section 45-599 requires a permit for drilling or operating a new or replacement service area well within an AMA by a city, town, private water company, or irrigation district and for drilling a nonexempt, nonservice well within an AMA. This permit will be required for new recovery wells.

Additional requirements include:

- o A well driller report and completion report is required for each drilled and equipped well.
- o Adherence to ADWR's regulations dealing with well spacing and well impact (R12-15-830), and with replacement wells in the same location (R12-15-840).
- o Obtaining a permit to withdraw groundwater for hydrological testing purposes within an AMA.
- o Obtaining a hydrological testing permit for testing groundwater quality and for determining aquifer hydraulic properties. This permit is required during hydrogeological studies and monitoring activities for a recharge project. Limits are placed on the amount of groundwater which may be extracted for test purposes.

The Role of Artificial Recharge Projects in AMA Augmentation Plans

As indicated, the Groundwater Management Act endorses artificial recharge as an augmentation technique for the second groundwater management period. The overall goal of augmentation programs is to achieve safe yield in the AMA's. Specific objectives relating to artificial recharge include estimating water availability for artificial groundwater

recharge and determining methods to maximize recharge (Arizona Department of Water Resources, 1986). The Phoenix AMA will not actually operate a recharge project. However, the agency is interested in cooperating with other agencies who will take the lead in constructing and operating recharge operations (Barrios, 1987). Intergovernmental agreements (IGAs) will be required. Inasmuch as the state holds the rights to unappropriated water, an IGA with the state will give the state and cooperating agencies an advantage should downstream users protest (Harrison, 1987).

THE GROUNDWATER RECHARGE AND UNDERGROUND STORAGE ACT OF 1986

The Groundwater Recharge and Underground Storage and Recovery Act of 1986 (ARS 45-651 et seq) allows two distinct classes of projects. These are recharge projects and underground storage and recovery projects. This section reviews the permits required for both types of projects and related water quality permits.

Recharge Projects

"Recharge projects" are projects designed to replenish the groundwater supply. Water recharged by a recharge project becomes part of the common pool of groundwater and the recharging agency does not have special rights to recover that water. Demonstration projects are a subject of the general class of recharge projects.

Certain projects may be categorically excluded as recharge projects. These include mine tailings ponds, septic tank systems, dry wells constructed solely to meet the requirements of city or county flood control ordinances, sand and gravel operations, deep percolation from agricultural practices, unlined irrigation delivery systems, lakes, and source water treatment works (Mitchell, 1987). These categorical exclusions are currently being reviewed by ADWR to

clarify the definitions of recharge projects and underground storage and recovery projects. Since the Recharge Act is relatively recent legislation, there may be opportunities for the FCD to get involved with the policy making.

A recharge project permit is required from ADWR for a recharge project. A demonstration project also requires a recharge project permit from ADWR. The principal difference is that the permit for a demonstration project is of shorter duration than the permit for a full-scale project. ADEQ issues a General Permit for demonstration (pilot-scale) recharge projects.

Recharge Project Permits. The general procedures for obtaining permits, constructing, operating, and monitoring a recharge project are summarized on Figure 1. The application includes items relating to ownership of the recharge water source, financial capability, a hydrological study, and proof that water quality permits have been obtained. Two conditions of the permit are as follows:

- o The applicant must submit an annual report with information on the quantity recharged and days of operation. There are penalties for not reporting.
- o The applicant must measure recharge flows with appropriate devices.

Tables 5 and 6 list the items required for a Recharge Project Permit. This permit is issued for a specific period of time, but no more than 50 years and the periods are renewable.

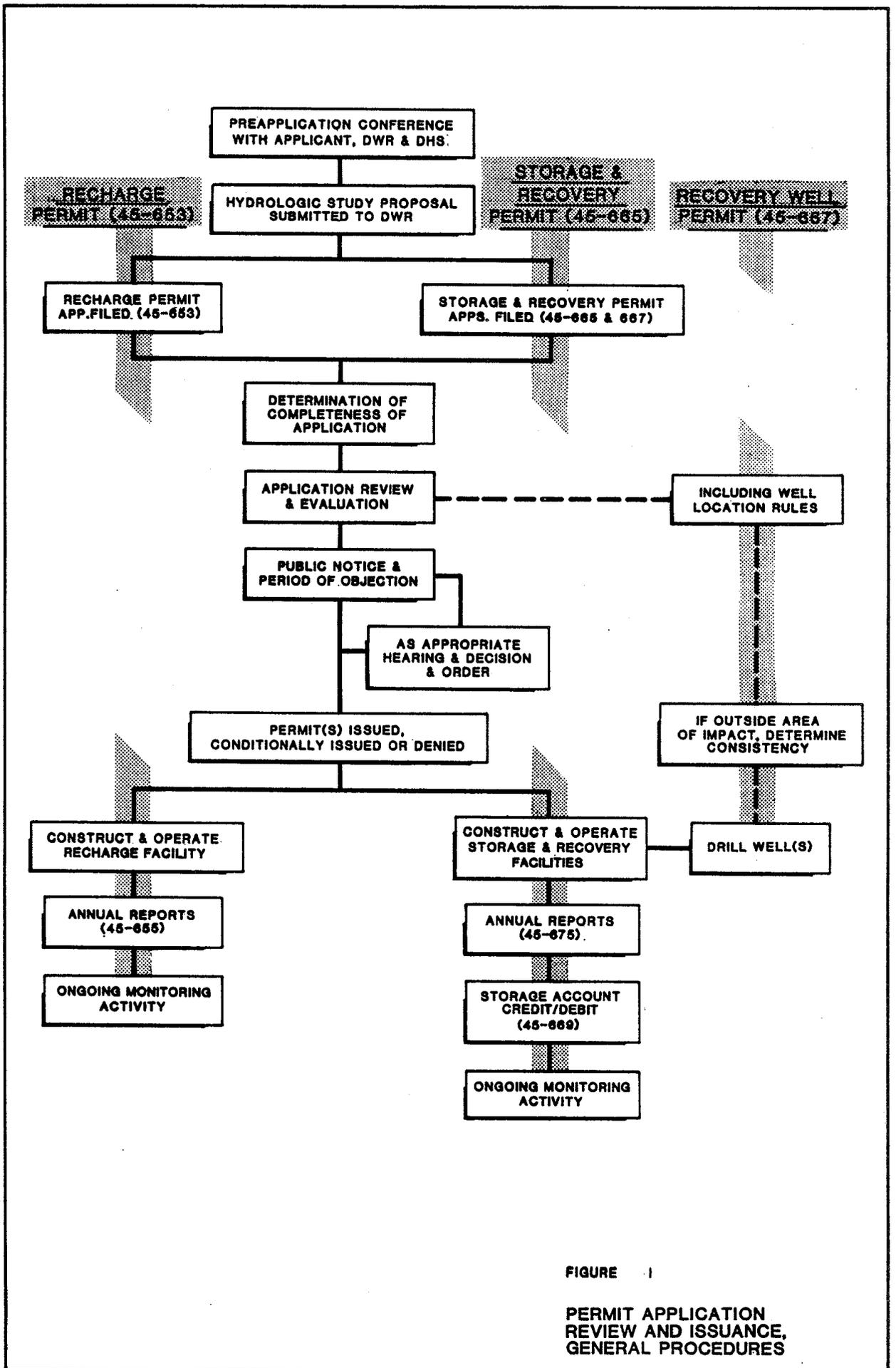


FIGURE 1

PERMIT APPLICATION REVIEW AND ISSUANCE, GENERAL PROCEDURES

Table 5

REQUIREMENTS FOR OBTAINING A RECHARGE PROJECT PERMIT

- o The applicant must have the technical and financial capability to construct and operate a project.
 - o The applicant must have the right to use the proposed source for recharge purposes.
 - o The recharge project is hydrologically feasible.
 - o If in an AMA, the project must "not be inconsistent" with the AMA augmentation goals.
 - o The recharge project will not cause unreasonable harm to land or to other water users within the area of hydrological impact.
 - o The applicant has applied for all necessary water quality permits through ADEQ.
-

Table 6
INFORMATION REQUIRED FOR A RECHARGE PROJECT PERMIT

- o The name and mailing address of the applicant
 - o The name of the Active Management Area, Irrigation Non-Expansion Area, groundwater basin or groundwater subbasin in which the applicant proposes to operate a recharge project
 - o The name and mailing address of the owner of the land on which the applicant proposes to operate the recharge project
 - o The legal description of the location of the proposed project
 - o Such evidence of the financial and technical capability as the Director (of DWR) may require
 - o The source and annual quantity of water proposed to be recharged
 - o The legal basis for acquiring and using the water proposed to be recharge
 - o A description of the proposed recharge project, including the design capacity of the project and the operating plan
 - o A copy of a study that demonstrates the following items:
 - The area of hydrological impact of the project
 - A demonstration of the hydrological feasibility of the project
 - A demonstration that the project will not cause unreasonable harm to land or other water users within the area of hydrological impact of the project
 - o The proposed duration of the project
 - o Evidence that the applicant has applied for any water quality permit required by the ADHS under Title 36, Chapter 16, Article 1
 - o Any other information which the Director may reasonably request
-

Permits for Demonstration Recharge Projects. ADWR and ADEQ are currently developing procedures for issuing permits for demonstration recharge projects. (Note: these permits are only for recharge projects and not for underground storage and recovery projects.) The intent is to bring demonstration projects online quickly by avoiding the detailed information required for full-scale permits. A particular goal is to allow the recharge agency to obtain data for determining the hydrological and economic feasibility of a site. This will expedite obtaining a recharge project permit. Approval of a demonstration project permit does not imply acceptance at a later date of a full-scale recharge project permit or storage and recovery project permit (Recharge Oversight Committee, 1987).

From ADWR's perspective the key conditions for obtaining a demonstration recharge project permit are as follows (Recharge Oversight Committee, 1987):

- o Only water clearly and easily determined to be the permittee's will be considered. This excludes stormwater runoff.
- o An abridged hydrological report.
- o The project must be consistent with the management plan and achievement of the management goal of the AMA.
- o Projects limited to recharging no more than 2,000 acre-feet per year.
- o Permit approval conditional on ADEQ Water Quality Permit.

Short-term storage and recovery permits may be issued for large demonstration projects (i.e., for amounts exceeding 2,000 af/yr). These are discussed later in this section.

ADEQ is planning to issue a general permit for pilot scale recharge projects in June or July, 1988 (DuBois, 1987). Until then, ADEQ is permitting most pilot scale projects through the existing Groundwater Quality Protection Permit process with minimal hydrological data requirements. The proposed ADEQ conditions will include the following:

- o Only CAP water and water meeting Aquifer Quality Standards are allowed. Effluent and urban stormwater runoff are specifically excluded.
- o The project must not violate or contribute to violations of Aquifer Water Quality standards at the applicable point of compliance (a discussion of point of compliance is included in a subsequent section of this memorandum.)
- o The point of compliance for pilot scale projects shall be located to ensure the protection of all current and reasonable foreseeable future uses of the aquifer.
- o Pilot scale projects shall not be closer than one-half mile to any permitted hazardous waste landfill, solid waste landfill, surface impoundments or ongoing remedial action areas or any source of surface area contamination.
- o Total amount recharged shall not exceed 2,000 acre-feet per year.

- o Well owners within a one mile radius of the project shall be notified prior to commencing recharge.

Effect of Augmentation Plans During the Second Management Plan on a Recharge Project. The Phoenix AMA will implement augmentation plans during the second management period. Maricopa Flood Control District should coordinate permitting of recharge projects with the Phoenix AMA to ensure that proposed recharge projects are consistent with these plans. Such projects may be required to be consistent with the management plans and achievement of the management goals of the AMA. Siting requirements may exclude projects where recharged water will cause polluted plumes to migrate into potable groundwater regions (O'Hare, 1987).

The augmentation plans are expected to interpret the meaning of the term "area of hydrological impact" of recharge projects. Both temporal and spatial aspects of the term will be considered. Currently, the Act defines the area of hydrological impact as the areal extent "projected on the land surface...of the migration of water recharged pursuant to a recharge project...." The operational definition will stress the temporal changes in the recharge plume. This will account for the possible movement of existing pollution plumes during a recharge project.

Underground Storage and Recovery Projects

Underground Storage and Recovery Projects are intended to store water underground for future use of the project sponsors. Water that is stored underground is defined as stored water. When stored water is recovered, it may be used for its planned purpose. Agencies intending to undertake these projects must obtain an underground storage and recovery

project permit. The projects excluded from classification as recharge projects are also excluded from the class of underground storage and recovery projects.

Underground Storage and Recovery Permits. The requirements for an underground storage and recovery permit are identical to those for a recharge project permit, except that the statement requiring compliance with AMA goals is excluded. The relationship of an underground storage and recovery project to AMA goals is included in the recovery well permitting process. The Act (see Section 45-808) states: "The holder of an underground storage and recovery project permit may use or exchange stored water recovered pursuant to the permit...only in the manner in which it was permissible for the holder to use or exchange the water before it was stored underground." This requirement is intended only to maintain the character of the water for accounting purposes relative to AMA regulations.

[Note: The question of compliance of underground storage and recovery projects with AMA goals is also addressed in Section 45-807-Alb, dealing with recovery of stored water. According to O'Hare (1988), ADWR has interpreted this section to mean that the storage and recovery project as a whole must be consistent with AMA goals. This means that the storage activity (when recovery is outside the area of hydrologic impact) will also be subjected to the "consistency criteria" (O'Hare, 1988).]

The holder of an underground storage and recovery permit may be required to monitor the operation of a project, and the impact of the project on the land and other water users within the area of hydrologic impact of the project. Monitoring activities for an underground storage and recovery project will be coordinated with ADEQ. The involvement of

ADEQ in the permitting process is described in a following section.

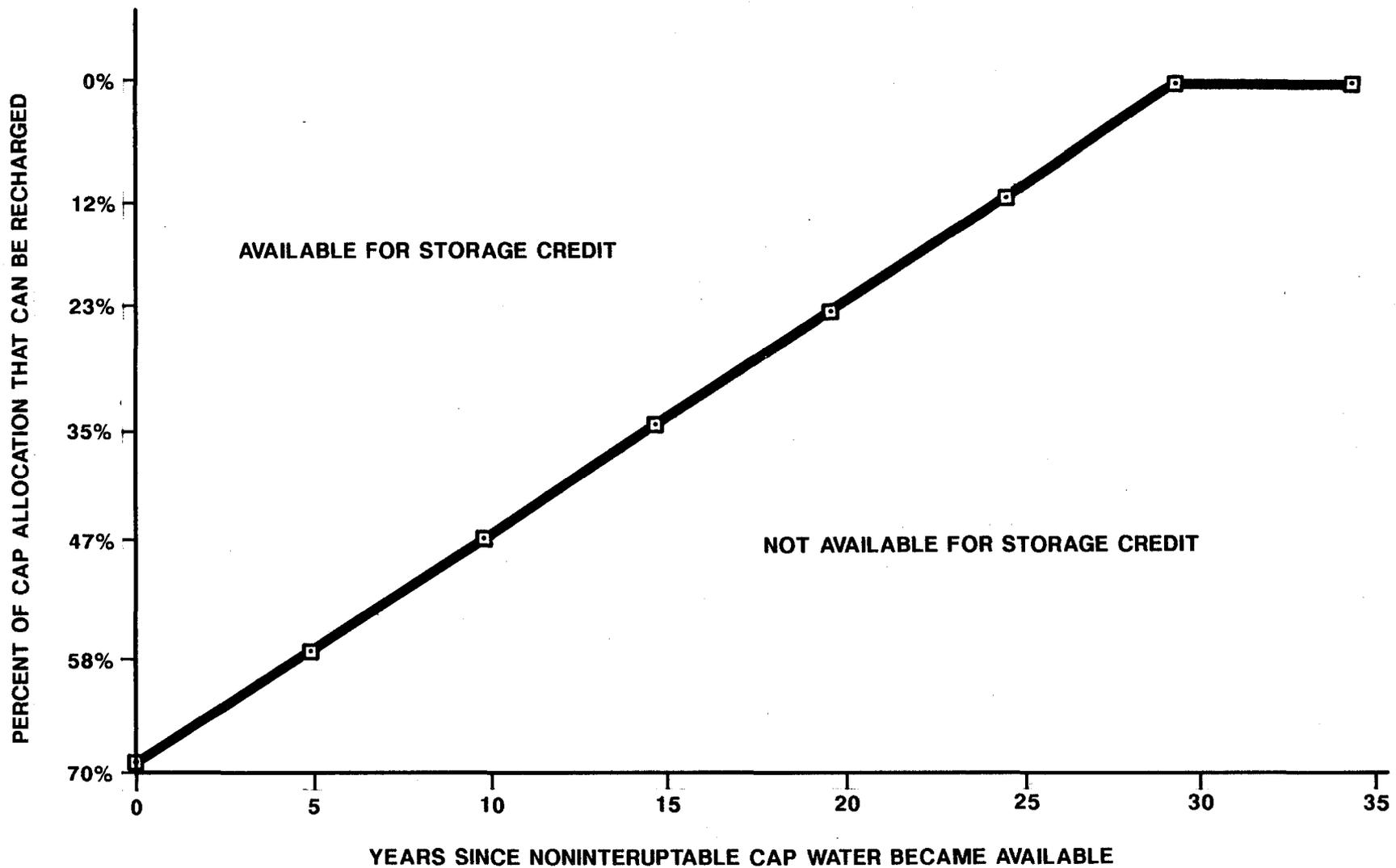
Storage Accounts. A holder of a Recharge Project Permit does not acquire special rights to recover recharged groundwater. In contrast, a storage account is established for the holder of a Storage and Recovery Project Permit. A storage account will include subaccounts for each source of water stored during the project. Only water which has been credited by ADWR to the storage account may be withdrawn by the permit holder in accordance with the storage and recovery permit. Water is credited to the account that is recoverable from storage, that would not have been naturally recharged, and that could not reasonably be used directly. The permit holder must demonstrate, using standard hydrological procedures, the amount of recoverable water as well as the water which cannot reasonably be used directly. "Recoverable amount" is defined as the amount of water which has reached the aquifer.

CAP Storage Accounts: Credits and Debits--Section 45-809 C(2) of the Code defines the amount of CAP water that could not reasonably be used directly as the amount which exceeds a straight line function illustrated in Figure 2. The steps for obtaining this linear function are summarized in Table 7.

CAP storage accounts are debited according to the following formula:

$$\text{Amount of water withdrawn} \times 1.05 = \text{Amount debited to account}$$

Other Storage Accounts: Credits and Debits--Other water sources that could not reasonably have been used directly



Note: Assuming the Users Demand for the First Year is Greater than 40 Percent of Their CAP Allocation.

FIGURE 2
EXAMPLE OF CAP STORAGE ACCOUNT



Table 7
STEPS FOR DETERMINING THE AMOUNT OF CAP WATER THAT COULD
NOT REASONABLY BE USED DIRECTLY

- o Step 1. Determine the permit holder's CAP allocation in af/yr
- o Step 2. Calculate 30 percent of the CAP allocation in af/yr
- o Step 3. Determine the year which the permit holder will have noninterruptible CAP water available
- o Step 4. Calculate permit holder's groundwater demand for the first noninterruptible CAP year in af/yr
- o Step 5. Calculate 75 percent of the result of Step 4
- o Step 6. If the result of Step 2 is greater than Step 4 or Step 5, the director will determine the amount of CAP water which can be used directly (between the results of Steps 4 and 5), considering economic and engineering feasibility, in af/yr
- o Step 7. Determine the lesser of Step 2 and Step 6, in af/yr
- o Step 8. Calculate and plot as a linear function the amount of CAP water which can reasonably be used directly in each year starting with the results of Step 7 in year 1 and ending with the amount from Step 1 in the 30th year
- o Step 9. The amount of CAP water deemed to be water that the holder could not reasonably have used directly is the amount in excess of the calculations of Step 7.

Source: Lester Snow, Director TAMA

include surface water made available by dams, effluent, water from outside the AMA that would not have reached the AMA without the efforts of the holder of the permit, and CAP water not accepted by other subcontractees, if this exceeds the capacity of the permit holder's treatment plant and water demands.

These accounts are debited for each calendar year as follows:

- o Effluent: 100 percent of the amount recovered
- o Stored water from outside an AMA imported from outside the AMA by the operator: 100 percent of the amount recovered
- o Stored water imported from outside the AMA and outside the groundwater basin of the project: 100 percent of the amount recovered
- o Stored water from outside the area of hydrological impact of a project in an AMA (except for the first two categories): 110 percent of the amount recovered
- o The amount of water that has migrated to a location either inside or outside the groundwater basin of the project where the water cannot be reasonably used by others
- o The amount of water included in a certificate of an assured water supply

Stored effluent will not be counted against a permittee's per capita water consumption goal, specified in the AMA's

first management plan. This means that a permittee can store effluent at one location in their service area and recover an equal amount of groundwater elsewhere in their service area, subject to the approval of the director of ADWR. In addition, recovered wastewater will not be charged the GMA Pump Tax.

[Note: In the municipal programs section of the Active Management Area's Second Management Plan, it is proposed that effluent recovered outside the area of hydrologic impact will be counted against a provider's per capita target (O'Hare, 1988).]

Recovery Well Permits. There are no special requirements in the Act for recovering water from a recharge project because the purpose of such a project is replenishment and not storage. In contrast, the holder of a storage and recovery permit has constraints on the use of recovery wells. If existing wells are used, they must either be within the area of hydrological impact of the project, or, if the water is withdrawn within the permittee's service area but outside of the area of hydrological impact, then the permittee must demonstrate that the withdrawals are consistent with the management plan and achievement of the management goals of the AMA. A recovery well permit is required for either new wells or existing wells to be "relabelled" as recovery wells. The application for the recovery well permit is obtained from ADWR.

Short Term Storage and Recovery Permits. ADWR also allows short term permits for large scale storage and recovery projects (> 2,000 af/yr) intended to determine recharge feasibility and to obtain hydrological information for a longer term project (Mitchell, 1987). In contrast to the demonstration recharge project permits, an in-depth hydrologic

study is required for the demonstration storage and recovery permits because of the larger volumes proposed and greater potential for adverse impacts. However, the requirements for the hydrogeological report are more relaxed than those required for long-term storage and recovery projects, with the understanding that additional data must be collected to demonstrate project feasibility. It is expected that these demonstration permits would expire in 2 to 4 years. The recharging agency may receive credit for the water recharged during the demonstration period.

ADWR plans to issue a draft rules package dealing with recharge-related projects in May or June of 1988 (O'Hare, 1988). These rules will cover a number of aspects of recharge and underground storage and recovery projects, including definitions, area of hydrologic impact, storage accounting procedures, etc.

WATER QUALITY PERMITS

Eventually recharge projects and underground storage and recovery projects will require Aquifer Protection Permits based on Aquifer Water Quality Standards. ADEQ is presently developing rules for setting these standards. It is expected that ADEQ will issue these rules in the first quarter of 1989. At the present time a two-phased permit process first requires the submittal of a Notice of Disposal (NOD) and then submittal of an application for a Groundwater Quality Permit.

Notice of Disposal Submittal

To determine the need for a Groundwater Quality Permit, a Notice of Disposal (NOD) must first be submitted. Owners or operators of new facilities that may affect groundwater in

Arizona must file a NOD with ADHS at least 180 days before the discharge or disposal is to begin. ADHS personnel recommend submitting a NOD with a recharge project proposal to cut down on the overall processing time. The procedure for obtaining an NOD is summarized in Figure 3. The NOD must include information specified in Table 8.

Within 30 days, the director of ADHS is required to notify the owner or operator of the facility that either a permit will be issued or the applicant must submit to the permit application process. A permit will be issued based on a NOD only if it is demonstrated that the facility will comply with the following criteria:

- o The facility will be designed and constructed so there will be no migration of wastes either into the vadose zone or directly into groundwater.
- o It will not dispose of wastes either into the vadose zone or directly into groundwater
 - There are not aquifers in the discharge impact area
 - Constituent concentrations of the disposal are less than or equal to ambient groundwater concentrations for primary and secondary drinking water standards

Obviously, a recharge project and a storage and recovery project fail the first criterion because the purpose of such projects is to recharge groundwater. Each of three sources of water for a recharge project (flood water, reclaimed wastewater, and CAP water) will fail to meet some of the water quality criterion. For example, the total dissolved

NOD PERMIT PROCEDURE

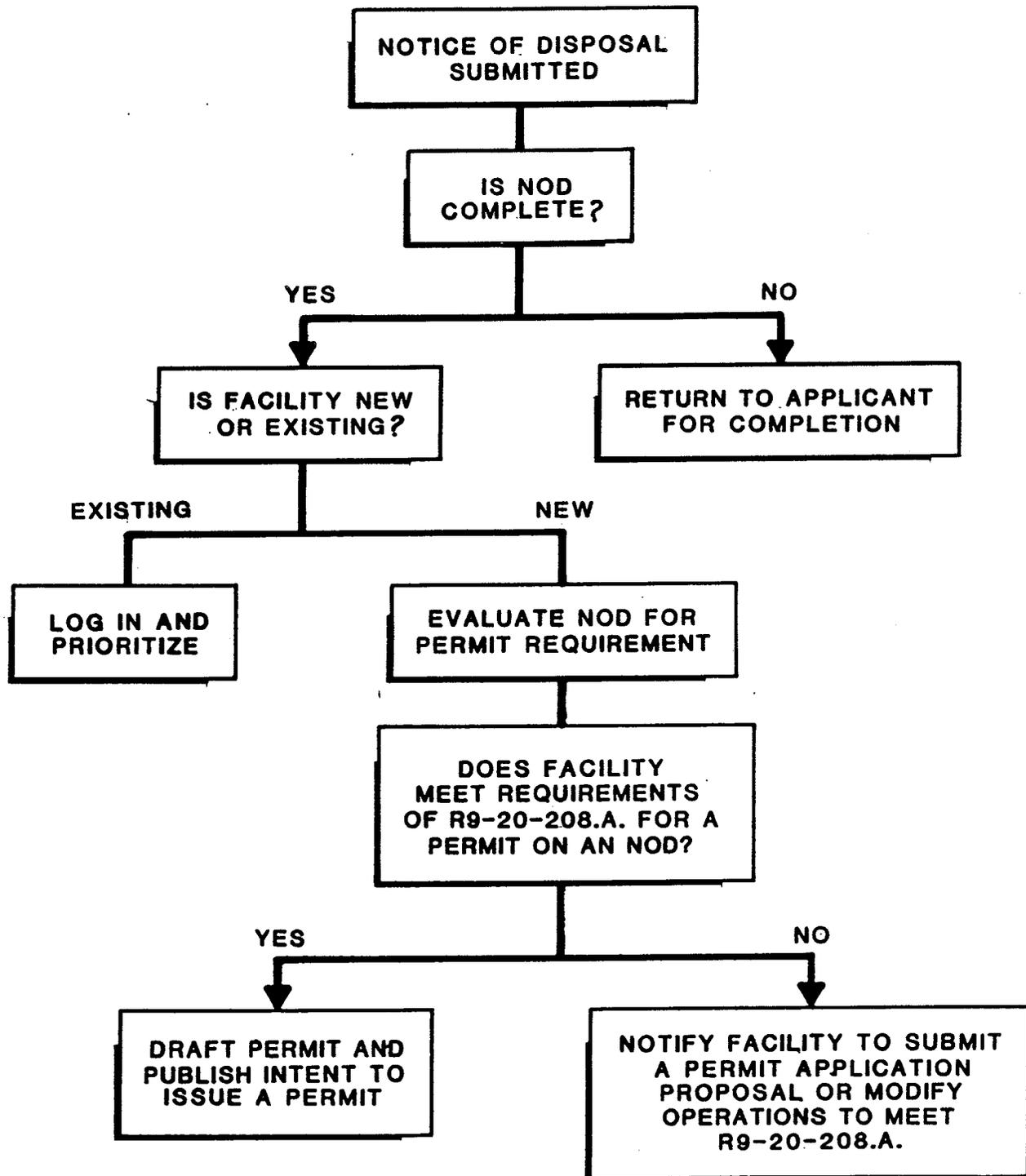


FIGURE 3

NOTICE OF DISPOSAL
PERMIT-FLOW DIAGRAM

Table 8
INFORMATION REQUIRED FOR A NOD

- o Identification of the facility, and owner or operator
- o Topographic map showing the location of the facility
- o Type of facility and nature of the activity
- o Date of expected operation
- o Expected operational lifetime of the facility
- o Listing of other environmental permits issued
- o Description of disposal activities and control measures to protect groundwater quality
- o Description of wastes, pollutants, and flow rates, including an analysis of the chemical, biological, and physical properties of the waste
- o Description of the groundwater monitoring programs.
- o Other information showing that the facility should be permitted

solids (TDS) of imported CAP water will be considered a secondary contaminant specified in ACRRL R9-8-222. The secondary contaminant level for TDS is 500 mg/l. The criteria for permitting based on a NOD will not be met. Thus, a Groundwater Quality Permit will be required for recharge projects.

Groundwater Quality Permit

The procedure for obtaining a Groundwater Quality Permit is summarized on the flow diagram, Figure 4. Before submitting the Application for a Groundwater Quality Permit, the operators of the proposed facility must submit a Permit Application Proposal, outlining the information that will be contained in the permit application. The proposed application proposal should be discussed with ADHS before the actual proposal is submitted. The following items will be discussed at this presubmittal meeting:

- o Information documented in the NOD
- o Existing hydrogeological information
- o Scope of Work

The application for a Groundwater Quality Permit must contain items specified in Table 9.

The drafted permit is submitted to the applicant and to appropriate federal, state, and local agencies for review and comment. The time allotted for this process is 30 days. The permit may also be subjected to a public hearing. Figure 5 shows the steps involved in the public participation process.

PERMIT APPLICATION

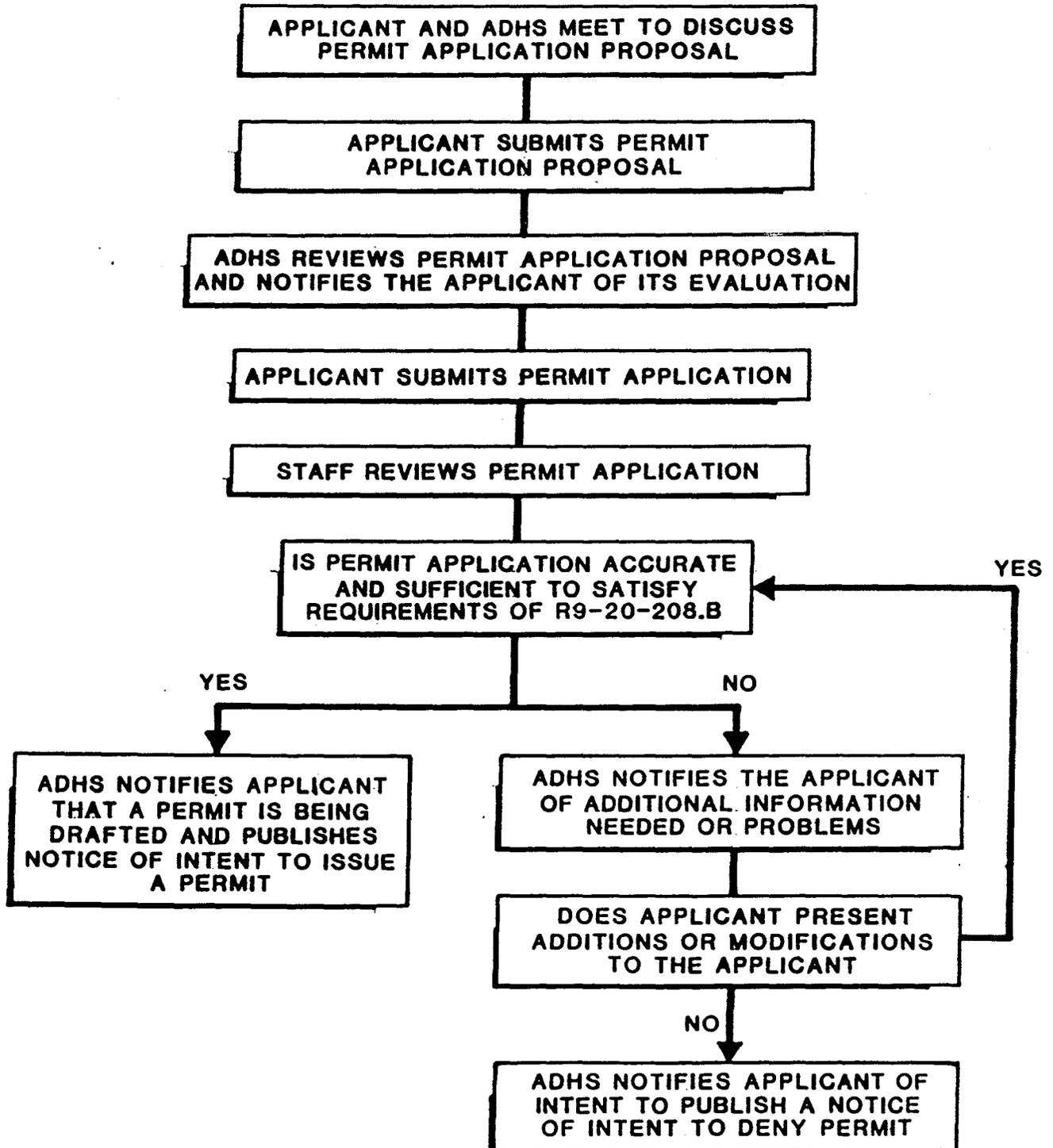


FIGURE 4

ADHS GROUNDWATER
QUALITY PROTECTION
PERMIT PROCEDURES-

Table 9
INFORMATION REQUESTED FOR A GROUNDWATER QUALITY PERMIT
APPLICATION

- o Formal application form containing signed certification
 - o Maps and Plans
 - o Summary of disposal activity
 - o Environmental setting
 - o Site hydrogeology
 - o Discharge impact assessment
 - o Monitoring plan
 - o Contingency plan
 - o Remedial action plan
 - o Closure and post-closure plans
-

PUBLIC PARTICIPATION

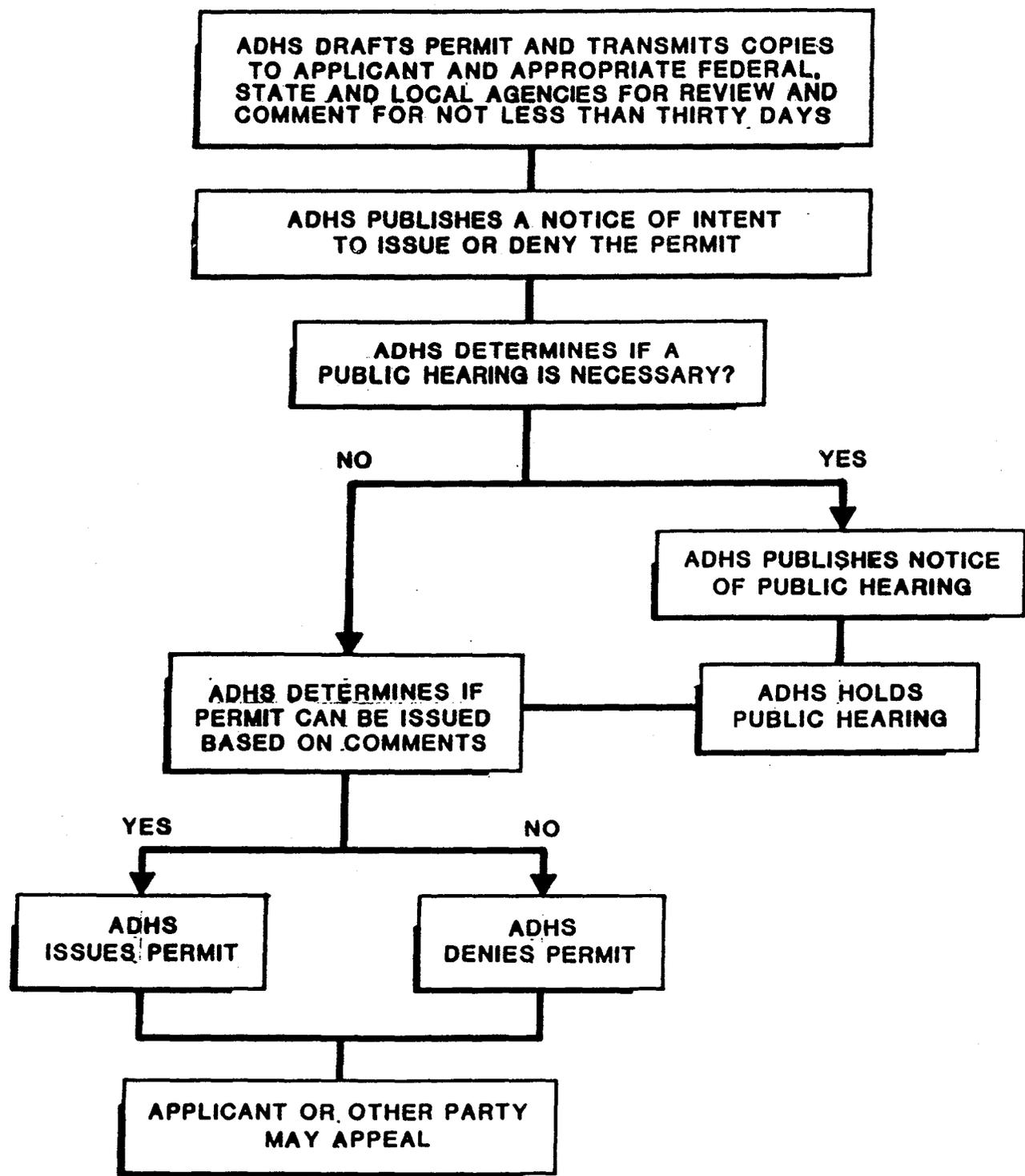


FIGURE 5

ADHS GROUNDWATER QUALITY PROTECTION PERMIT- PUBLIC PARTICIPATION PROCESS

According to ACRR: R9-20-208 B, a permit will be issued when it is determined that the characteristics of the waste stream, the facility design, the hydrogeological characteristics of the discharge impact area, the present and future uses of groundwater, and the ambient groundwater quality are such that "no wastes or pollutants will enter an aquifer in sufficient quantities to violate adopted groundwater quality standards." The applicable standards, specified in R9-21-403, are listed in Table 10.

It should be pointed out that the standards in Article 2 are narrative. Numeric standards will apply once the Aquifer Protection Permit program is implemented as provided by the Environmental Quality Act (EQA) of 1986 (see the next section of this report). Meanwhile, the EQA specifies that issuance of permits for both recharge projects and underground storage and recovery projects requires designing such projects to ensure that aquifer quality standards will not be violated at the project's point of compliance (POC). Aquifer water quality standards are numeric.

If groundwater quality monitoring is required, all monitoring wells must be constructed in accordance with ADWR Well Regulations (A.C.C.R. Title 12, Chapter 15, Article 8). ADWR also requires a permit for drilling a well. ADEQ may also have specific construction requirements.

If groundwater quality monitoring is required, all monitoring wells must be constructed in accordance with ADWR Well Regulations (A.C.C.R. Title 12, Chapter 15, Article 8). A permit to drill will also be required.

Table 10
STANDARDS SPECIFIED IN R9-21-403

- o Discharges of any pollutants and disposal of any wastes shall not impair the uses which have been made, are being made, or will be made of groundwater for every purpose.
- o Discharges of any pollutants and disposal of any wastes to groundwaters of the State shall not cause a public health hazard.
- o Disposal of any hazardous waste, radioactive waste, or other waste shall not cause toxic substances to be present in groundwaters of the State in concentrations which are or may be hazardous to public health or which interfere with present and future uses of the groundwater.
- o Discharges of any pollutants and disposal of any wastes to groundwaters of the State shall not directly or indirectly cause violation of surface water quality standards established in Article 2 of this Chapter.

THE ENVIRONMENTAL QUALITY ACT OF 1986

Groundwater quality protection is the basic goal of the Environmental Quality Act (EQA) of 1986. The Act classifies

all aquifers of the state for drinking water protected use. The EQA organized and streamlined environmental regulations, authority, and enforcement in a new agency, ADEQ. ADEQ is essentially a state level EPA. One responsibility of ADEQ is to establish an Aquifer Protection Program and to adopt Aquifer Quality Standards.

The EQA affects recharge-related projects through water quality standards, permitting requirements, and establishment of points of compliance.

Water Quality Standards

The EQA applies drinking water standards within aquifers rather than at the tap, as in the Safe Drinking Water Act. The 23 Maximum Contaminant Levels (MCLs) which comprise the current State Aquifer Water Quality Standards are listed in Table 4. Under the SDWA amendments, EPA is required to adopt 83 additional MCLs by July 1989. These are listed in Table 3. The director of ADEQ is required to adopt any new MCLs within a year after they are issued by EPA. Thus, ADEQ proposes to adopt 8 MCLs adopted by EPA in June, 1987. The director of EQA may also adopt numeric standards for pollutants lacking primary (i.e., health-based) MCLs. After July, 1988, any person is allowed to petition the director to adopt a numeric standard for a drinking water aquifer for pollutants that lack standards.

A narrative health based Aquifer Water Quality Standard has been proposed by the Water Quality Advisory Council for pollutants lacking numeric standards. Basically, the narrative standards require that a disposal operation (including a recharge-related) project shall not cause pollutants to be present in water within aquifers in concentrations that are hazardous to human health. These standards are unlikely to

be a problem for the recharge water sources proposed for the Maricopa County Flood Control District unless concentrations are increased by leaching of native salts in the vadose zone.

Permitting

The permitting requirements of the 1986 recharge legislation will be supplanted with the requirements of the EQA. The existing Groundwater Quality Permit rules remain in effect until superceded by the Aquifer Protection Permit rules. An Aquifer Protection Permit will be required for recharge projects and underground storage and recovery projects. A general permit will be required for pilot recharge projects.

Information required for the Aquifer Protection Permit includes (1) a proposed Best Available Demonstrated Control Technology (BADCT) for the facility, (2) the points of compliance and demonstration that the facility complies with Aquifer Water Quality Standards, (3) a map of the facility and environs, a facility site plan, (4) a hydrologic study, (5) a proposed contingency plan, (6) a description of the proposed aquifer monitoring plan, and (7) closure and post-closure plans. Recharge-related projects must also include a written statement of the project purpose, and operational procedures to enhance infiltration. Area permits may be obtained for facilities under common ownership and located in a contiguous geographic area.

BADCT Requirements. BADCT is not required for artificial recharge facilities. BADCT may not apply to reclaimed wastewater and urban runoff (Daniel, 1987). Treatment will be necessary if it is determined that BADCT requirements apply. Pretreatment of urban runoff would be required in settling basins ahead of the principal recharge basins.

Bypassing the first flush of urban runoff would minimize pretreatment needs.

Point of Compliance. The point of compliance (POC) of a project is the point at which compliance with aquifer water quality standards is determined (ARS 49-244). The POC for hazardous substances is the limit of the pollutant management area. (Note: ARS 49-201.6 defines hazardous substances as substances from disposal activities which may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or pose a substantial present or potential hazard to human health or the environment. Solid and dissolved material in domestic sewage, irrigation return flows, and permitted industrial wastes are excluded.) The pollutant management area is a vertical plane downgradient of a facility extending through the uppermost aquifer underlying the facility. No one may violate Aquifer Quality Standards at points of compliance. For waste disposal projects recharging hazardous substances the POC is the edge of dikes enclosing the disposal facility. Based on monitoring needs, an alternative POC up to 750 feet from the dikes of the disposal area is possible.

It appears that greater flexibility is allowed in selecting the POC for recharge-related projects using sources considered to be nonhazardous. Selection of the POC for such projects will be determined on a case-by-case basis (DuBois, 1987). For example, the POC may be considered to be the nearest point of use, such as the closest downgradient well. (Note: in some cases monitoring wells between the recharge area and POC will be required.) However, three items will always be considered by the permitting agencies when approving a POC for a recharge-related project: (1) the effects of source water quality on downgradient groundwater users,

(2) the effect of the recharge operation on existing contaminant plumes (DuBois, 1987), and (3) assurance that the present and future uses of groundwater will be protected.

Zoning Requirements. The 1987 Water Quality Act Corrections Bill of 1986 requires that applicants for individual aquifer protection permits must show that the discharging facilities (e.g., recharge projects) comply with municipal and county zoning ordinances.

THE OWNERSHIP OF STREAMBEDS ACT OF 1987

This Act relinquishes state claims to smaller streams in the state. It also relinquishes the state's rights to ownership of the Salt, Gila, and Verde Rivers, as the beds of these rivers existed on January 1, 1987. Ostensibly, some of these streambeds could be purchased for recharge purposes. The constitutionality of this Act is in question.

THE GROUNDWATER RECHARGE DISTRICT AUTHORITY ACT OF 1987

The Groundwater Recharge District Authority Act, summarized in Table 11, was signed into law in May, 1987. This act amends several provisions in Title 48 relating to special taxing districts. The amendments relating to artificial recharge and underground storage and recovery projects are primarily to the benefit of the Flood Control District of Maricopa County and the Central Arizona Water Conservation District. County flood control districts may construct, operate, and maintain artificial groundwater recharge facilities. However, only counties with populations greater than 1.5 million persons are entitled to develop underground storage and recovery projects, provided that there is a flood control benefit. County flood control districts are allowed to acquire property for groundwater recharge

Table 11
SUMMARY OF RECHARGE-RELATED FEATURES OF THE
GROUNDWATER RECHARGE DISTRICT AUTHORITY ACT

- o State land may be leased for underground storage and recovery projects and for underground recharge purposes.
- o County flood control districts may construct, operate, and maintain artificial groundwater recharge facilities.
- o County flood control districts organized in a county having a population of more than one million five hundred thousand persons may construct, operate, and maintain underground storage and recovery facilities if they have flood control benefits.
- o County flood control districts may contract and join with the United States and other governmental units for the purpose of constructing, operating, and maintaining multipurpose groundwater recharge, underground storage and recovery, and flood control facilities, except that a district shall not expend district funds for any underground storage and recovery facility that does not have flood control benefits.
- o County flood control districts may acquire property by purchase, donation, dedication, exchange or other lawful means, except by eminent domain, in areas suitable for groundwater recharge projects.
- o Multicounty water conservation districts may contract with the United States to be the operating agent for the CAP.
- o Multicounty water conservation districts may acquire, develop, construct, and acquire permits for underground storage and recovery projects including recovery wells, using surplus CAP water.
- o Multicounty water conservation districts may enter contracts with other agencies to acquire, permit, develop, construct, operate, and maintain underground storage and recovery projects using CAP water., provided that the other agencies have the right to either recharge or store underground and recover.

- o CAP water for a storage and recovery project operated by a multicounty district is limited to water which would not have been delivered for direct use. The cost of this water shall not be less than the cost of CAP agricultural water delivered to the same site.

projects by purchase, donation, dedication, and other lawful means, except by eminent domain. The Act allows the District to contract with other government agencies for recharge-related projects. If no tax benefits can be identified, then it appears that such projects must be wholly supported from other revenue sources, such as a state appropriation or a contract with another governmental agency (Smith, 1987).

Another major provision of the act allows the Central Arizona Water Conservation District to undertake underground storage and recovery projects in addition to conducting feasibility studies for such projects. Water placed into underground storage by the Central Arizona Water Conservation District is limited to water which would not have been used directly. The cost of this water cannot be less than the cost of agricultural water delivered to the same location.

STATE LIABILITY LAWS

According to Harrison and Humphrey (1987), artificial recharge projects can cause liability by nuisance (smell, aesthetics, insects), tort (flood damage to property, breeding disease), attractive nuisance (attracting and causing harm to children and others), conversion (inappropriate use of some else's property), and natural resource damage. Although the state recently passed legislation doing away with joint and several liability, the District should assess the

potential liability of a recharge project. Furthermore, projects should be designed and operated to result in minimal potential for liability.

RULES AND REGULATIONS OF COOPERATING AGENCIES

Agencies which could cooperate with the Maricopa FCD on a recharge project include water districts, irrigation districts, and municipalities. There are numerous ways in which a cooperative agency could become involved in a recharge project. Physically, an agency could contribute by providing canal capacity for transport of recharge water to the project site and/or providing a source of recharge water. Funding could be provided through the cooperative agency through taxation, user fees, bonds, or by qualifying for federal and state grants or loans.

Depending on the nature of the recharge project, a cooperative agency could assume the lead role and act as the primary beneficiary of the project or the Maricopa FCD could take the lead. Potential cooperative agencies are discussed briefly in the paragraphs following.

THE SALT RIVER PROJECT

The use of Salt River Project (SRP) canals for delivery of water depends to a large extent on the time of year and the availability of freeboard capacity (Warskow, 1987). SRP will review any proposals for transporting CAP water on a case-by-case basis (Warskow, 1987). The policy regarding sale of Project water for a recharge project is well defined. Basically, the Project does not own the water because "the water belongs to the land." Thus, to obtain SRP water, the site of a recharge-related project must be on land that has a right to SRP water. However, lawful exchanges are possible (Warskow, 1987).

MARICOPA WATER DISTRICT

Maricopa Water District (MWD) is currently studying alternatives for allowing use of their canal system to transport water by other agencies for recharge projects (Anderson, 1987). Excess water in Lake Pleasanton will be available for sale. However, the lake must be full before excess water will be made available. Although the lake was filled during wet periods in the early 1980's, this rarely occurs (Anderson, 1987).

CENTRAL ARIZONA WATER CONSERVATION DISTRICT

The Central Arizona Water Conservation District (CAWCD) is the multicounty water district responsible for delivery of Colorado River water through the CAP aqueduct. The CAWCD board recognizes that in the early years of operation the capabilities of the District to divert and deliver water will far exceed the ability of water users to use directly. The board has directed staff to investigate the potential for recharge of CAP water in Central Arizona and to make recommendations on how the District could singly or cooperatively acquire and operate groundwater recharge projects (Dozier, 1987). A report, Opportunities for Groundwater Recharge in Central Arizona, was recently completed for the District by Ungerman Engineering, Inc.

The report discusses the District's interest in conducting recharge activities, gives an overview of the concepts and physical means for accomplishing artificial groundwater recharge, and discusses the potential recharge projects previously identified or currently being studied that could use CAP water. The study area included sites near the CAP aqueduct from La Paz County to the terminus in Pima County.

HARQUAHALA VALLEY IRRIGATION DISTRICT

The Harquahala Valley Irrigation District (HVID) serves CAP water to 23,000 acres of irrigated farmland west of Phoenix. The new canal system began delivering CAP water in 1985. The potential exists for transporting CAP water through the HVID canal system for recharge purposes. The legalities of an irrigation district with a non-Indian irrigation water supply contract purchasing CAP water for recharge purposes would need to be determined.

MUNICIPALITIES

Several municipalities in Maricopa County are pursuing groundwater storage and recovery projects. Others are considering the possibilities and have expressed an interest in cooperating with the Maricopa FCD on a joint recharge project. Most of these municipalities currently deliver groundwater pumped to their water users, have sewage effluent available for reuse, and also have CAP allocations. These are typically in an excellent position institutionally for developing a groundwater storage and recovery program.

PLANNING ACTIVITIES FOR A RECHARGE-RELATED PROJECT BY
MARICOPA COUNTY FLOOD CONTROL DISTRICT

The following items must be considered when planning a recharge-related project:

- o Scheduling a preapplication conference with ADWR and ADEQ.
- o Submitting permits under the Recharge Act and the Environmental Quality Act.
- o Obtaining permits for site-specific hydrogeological studies.
- o Obtaining permits for monitoring activities.
- o Obtaining special permits for water spreading projects.
- o Obtaining local zoning permits, land use permits, and interparty agreements.
- o Monitoring activities during the Gila River adjudication potentially affecting a recharge project.

The permits and notices of intention for recharge-related activities are summarized in Table 12. The stages for obtaining permits for a recharge project and an underground storage and recovery project are summarized on Figure 1.

PREAPPLICATION MEETINGS

The first step is to arrange a preapplication meeting between Maricopa Flood Control District, cooperating agencies,

Table 12

PERMITS AND NOTICES OF INTENTION FOR RECHARGE PROJECTS

Associated Legislation	Permit or Notice	Responsible Agency
Federal		
Clean Water Act	NPDES	ADHS
Clean Water Act	Dredge and Fill	COE
State		
Title 45	Appropriation of Public Waters	ADWR
Groundwater Management Act	Permit to Drill a Well in AMA	ADWR
GWMA	Permit to Drill a Nonexempt, Nonservice Area Well	ADWR
GWMA	Hydrologic Testing Permit	ADWR
GWMA	Notice of Intention to Drill Exploration Well	ADWR
GWMA	Notice of Intention to Drill Monitor/Piezometer Well	ADWR
Recharge Act	Recharge Permit	ADWR
Recharge Act	Storage and Recovery Permit	ADWR
Recharge Act	Recovery Well Permit	ADWR
Title 9	Notice of Disposal	ADHS
Title 9	Groundwater Quality Permit	ADHS
Environmental Quality Act	Aquifer Protection Permit	ADEQ

the Director of the Phoenix AMA, an ADWR hydrologist, a representative from ADEQ, and legal representatives. The purpose of this meeting is to summarize the proposed plans and to discuss impediments. The requisite permits will be reviewed at this meeting.

SUBMISSION OF PERMITS REQUIRED BY THE RECHARGE ACT AND THE ENVIRONMENTAL QUALITY ACT

The second step is to submit permit applications to ADWR for the planned project (i.e., a Recharge Project, including full-scale and demonstration projects, and an Underground Storage and Recovery project). A copy of the hydrological study for the proposed project must be included. This report will be minimal for pilot scale projects and for short term underground storage and recovery projects, whose goals are to obtain hydrological information. Until Aquifer Protection Permits come online, a Groundwater Quality Protection Permit is required from ADEQ. Accordingly, a Notice of Disposal for a Groundwater Quality Protection Permit should be included with the general application. Similarly, a Groundwater Quality Protection Permit is required until the General Permits for pilot scale projects are available.

The Flood Control District and associated agencies must also demonstrate the following:

- o The technical and financial capability to construct and operate a recharge project.
- o The right to use the water source for a project.

- o The goals of the project are consistent with the goals of the AMA.
- o The project will not harm others.

Hydrological Testing Permits

The third step is to obtain Hydrological Testing Permits. These permits are required for site-specific hydrogeological studies.

Permits for Monitoring Activities

The fourth step is to use the results of the hydrogeological studies to design a monitoring and recovery well network. The requisite permits and Notices of Intention are as follows:

- o Permit to Drill a Service Area Well in an AMA
- o Permit to Drill a Nonexempt, Nonservice Area Well
- o Notice of Intention to Drill a Monitoring/Piezometer Well
- o Notice of Intention to Drill an Exploration Well

Well driller reports and well completion reports are required for each well. A well spacing and well impact study may also be required.

A NPDES permit may be required during hydrological testing if it is deemed that pumped water contains pollutants that may join tributaries of waters of the United States.

Permits for Water Spreading Projects

Additional permits are required for water spreading projects in floodplains, including:

- o A NPDES permit, pursuant to Section 402 of the Clean Water Act.
- o A Dredge and Fill Permit, pursuant to Section 404 of the Clean Water Act.
- o County and City Flood Plain Use Permits.
- o An Application for a Permit to Appropriate Water of the State of Arizona, if floodwaters are the intended source.

ZONING PERMITS, LAND USE PERMITS, AND INTERAGENCY AGREEMENTS

The Flood Control District should obtain all necessary zoning permits, land use permits, and interagency agreements before submitting a permit application for a recharge-related project. Land ownership of proposed sites should be determined. Similarly, the necessary insurance policies should be obtained.

ONGOING ACTIVITIES ASSOCIATED WITH THE GILA RIVER ADJUDICATION

The process of adjudicating both surface water and groundwater rights during the Gila River suit is proving to be highly volatile. Indeed, as the process unfolds, there is a great deal of uncertainty regarding ownership of these water sources. Accordingly, the Maricopa Flood Control District is strongly advised to follow the progress of the Gila River

Adjudication to monitor outcome affecting a recharge-related project.

TIME REQUIRED TO OBTAIN PERMITS

The time requirements for obtaining permits are affected by a number of variables too numerous to mention. Typically, the larger, more complex, and projects of longer duration will require the most time for permitting. The completeness of the application and degree of coordination with permitting agencies will also affect the time required. The permits that would be expected to require the most time are those required by the State Recharge Act and the Dredge and Fill Permit required by the Army Corps of Engineers (COE) if stream channel modifications are needed.

Dredge and Fill Permits are now handled at the COE Phoenix branch office. Individual permits generally required 60 to 90 days. The average for the district, which encompasses Southern California and Arizona, is 100 days. This is assuming that the environmental assessment completed by the COE does not turn up any significant impacts. If an Environmental Impact Statement is required than a minimum of one year is usually required.

The permit applications required by ADWR and ADEQ under the Recharge Act are intended to be filed simultaneously and it is anticipated that the individual permits can all be obtained within the same time frame. The following estimates for permitting times are the times required to issue the permit after a completed application is submitted. These are reasonable times assuming that the applications submitted are complete, that requests for additional information and clarification are minimal, and that public comments are minimal with no need for public hearings.

A permit for a demonstration recharge project could be obtained in as little as two months. Storage and recovery permits for a short-term project duration will require four to six months. Long term storage and recovery permits will require six to eight months to obtain.

PROBLEMS EXPERIENCED IN OBTAINING RECHARGE-RELATED PERMITS

According to permitting staff members at ADWR and ADEQ (1987), the major problems in processing recharge-related permits are as follows: (1) submission of incomplete applications, especially those lacking complete hydrogeologic information; (2) failure of applicants to schedule preapplication meetings with ADEQ and ADWR; (3) failure of applicants to coordinate with permitting agencies; and (4) submission of applications before local zoning, land use, and interparty agreements are completed. Recognizing the unique set of circumstances that surround each specific recharge proposal, ADWR and ADEQ staff members emphasized the need for ongoing dialogue during project development.

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