STATE OF ARKANSAS
CONTINUING PLANNING PROCESS

UPDATE AND REVISIONS
JANUARY 2000

DEPARTMENT OF ENVIRONMENTAL QUALITY

Water Division

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INTRODUCTION

Section 303(e) of the Clean Water Act (CWA), as amended, requires each state to have a Continuing Planning Process (CPP). Arkansas developed and obtained approval of the CPP on January 24, 1983. Subsequent modifications were made in July 1989 and November 1991, April 1993, and January 1995.

The general purpose of the CPP is to describe the principal management processes of the state's water quality management programs. EPA is encouraging states to review and revise their existing CPP as necessary. Changes in direction of EPA in order to meet water pollution abatement goals has been toward a water quality-based approach. That is, an effort toward those waters that have impaired uses due to poor water quality. In simple terms, this equates to a "worst first" approach. Subsequently, the Arkansas Department of Environmental Quality (ADEQ) has been revising its water program to better identify water pollution problems, develop the means by which the problems can be resolved, and also better define the necessary water quality standards to protect the numerous uses of the waters of the state.

The specific purpose of this CPP revision is to describe the current water quality program and also describe the revisions and new directions being taken by the Department. Because of these current changes and the ones which have resulted from the Stream Reclassification work (as described under the 205(j) Section), it is difficult to incorporate all the guidance provided by EPA for updating the CPP. Thus, following the direction of Appendix "C" of the EPA draft Water Quality Monitoring and Wasteload Allocations Programs Guidance, Arkansas is choosing to determine its own format and scope for the CPP.

WATER QUALITY MANAGEMENT PROGRAM BACKGROUND

The following discussion is a brief overview of the water quality management program.

As part of the continuing planning process, Section 303(e) of the CWA requires the establishment of effluent limitations and schedules of compliance, establishment of total maximum daily loads (TMDLs) for pollutants, the identification of those waters within the state for which technology-based effluent limits would not be stringent enough to meet applicable water quality standards and a priority ranking system for these "water quality limited" segments. All of these requirements have been met in the 303(e) Basin Plans, the Wasteload Allocation Studies for Arkansas's Streams prepared by the U.S. Geological Survey and the Department, and the segment assessment process as published in the Water Quality Inventory (305(b)) reports.

The initial wasteload allocation or more recent wasteload studies provide the effluent limits necessary for the design of municipal sewage treatment plans. They also serve to provide the effluent limits necessary for issuance of state and federal (NPDES) permits. These permits are issued or updated as necessary to insure that water quality standards will be met.

The compliance monitoring and enforcement program insures that the permitted industrial and municipal facilities are meeting the requirements of their permit. Compliance monitoring is done by district field inspectors. These field inspectors also investigate complaints, respond to chemical spills and take the samples for the fixed ambient monitoring network.

The ambient monitoring network provides the basic monitoring data for trend analysis, water quality data for 305(b) report, and serves as a "flag" to implement more intensive sampling as necessary.

The 305(b) report (titled "Arkansas Water Quality Inventory Report") is compiled biennially as required by the Clean Water Act. It is an inventory of water quality in the state and describes water quality and trends, summarizes point and nonpoint sources of pollution, discusses special water quality problem areas and the water pollution control programs necessary for attainment of WQS.

Nonpoint Source (NPS) pollution has been addressed through Chapter V of the Water Quality Management Plan, which assigns implementation of nonpoint source control to the Designated Management Agencies. These are the agencies which were determined to have the capability, authority and willingness to carry out voluntary programs. These programs are Best Management Practices (BMPs) and vary from one type of NPS to another

These aspects of the Water Quality Control Program are addressed in greater detail in the following section.

WATER POLLUTION CONTROL PROGRAMS

Point Source Control Program

In accordance with the Federal Clean Water Act, Section 303(e), Arkansas maintains a "continuous planning process" in order to integrate the NPDES permit program, state permit program and the state water quality standards with the Water Quality Management Plan (WQMP). The WQMP is the controlling document for determining all point source discharge limits statewide. As new information is developed, revisions to the WQMP are made in accordance with the public participation requirements of the Clean Water Act.

The State of Arkansas presently administers the state permits program, which has been in operation since 1949, and also has been authorized by EPA since November 1, 1986, to administer the NPDES program under the Clean Water Act.

The state program involves the issuance of permits for construction or physical modification to a waste treatment or disposal system. It requires (1) that a permit be obtained prior to construction or alteration of the treatment system, (2) submission of an acceptable application showing the character of the waste and (3) submission of plans and specifications concerning the method of treatment to ensure that water quality standards will not be violated.

Enforcement

Enforcement responsibilities for the NPDES permits are divided between EPA, Region VI, and the state NPDES enforcement section. Those facilities which were subject to ongoing enforcement actions by EPA at the time of program authorization remain the responsibility of EPA until the facility is in compliance. The state has enforcement responsibility for the remainder. The primary basis for enforcement is the self-monitoring data submitted by permittees on monthly discharge monitoring reports (DMRs). All DMR data is entered into the national data base system known as the Permit Compliance System (PCS). The state addresses all permit violations reported by major permittees and construction grant facilities by an informal enforcement action first, then an escalation of enforcement if the violation is not resolved. Other violations are judged on their severity and actions are taken as resources allow.

Wastewater Licensing/Training

Another program that is an integral part of the point source control program is the wastewater operator licensing and training effort. The operator licensing program requires an initial test and minimum amount of training on an annual basis to maintain a current license. The training program has been structured to utilize seasoned operators to do the training with an increased emphasis on operation and maintenance. In addition to this effort, the statewide wastewater training center operates at the Arkansas Environmental Academy (on the South Arkansas University Tech campus at East Camden). It provides one advanced seminar per month on different aspects of wastewater treatment to operators across the state. The entire training effort is being conducted with state funds both on and off campus.

ADEQ administrative guidelines require that each person employed as a wastewater treatment plant operator be licensed. A classification of sewage treatment plants has been formulated and licensed operator classifications are determined by the factors involved in the plant operation. Annual training must be documented for license renewal.

The Training Division at ADEQ, in cooperation with the Arkansas Environmental Academy, can provide hands-on technical assistance in all phases of wastewater treatment plant operation. In cooperation with other state and federal agencies, the Training Division also participates in the development of an outreach program for small, unsewered communities. In addition, this division takes part in the quarterly review of wastewater treatment plants that are in the one-year project performance review period.

Construction Assistance

The municipal facility grants program has awarded billions of dollars to cities in an attempt to improve the nation's waters but the effort has not been entirely successful. One reason may be the priority system which awarded the grants based upon factors other than water quality improvements. Such factors as the national requirement for secondary treatment, population, public health needs or a combination of all of these have been the driving force behind a grant award.

However, the majority of the grants awarded have undoubtedly been for the purpose of water quality improvements. Unfortunately, no attempt has been made in the past to measure the water quality improvements in the impaired streams where construction grants have been awarded.
It is generally assumed that significant improvements in water quality are the direct result of a construction grant project. During the early 70's when raw and/or primary discharges were being

eliminated, improvements were certainly obvious. However, as the incremental reduction of pollutants becomes smaller, the justification in terms of water quality improvements becomes less apparent and intensive data-gathering surveys are required to evaluate the level of success.

Changes in the various water programs have recently been made to address the situation. Major modifications to both the grants priority system and the fixed monitoring network have been carried out in an effort to direct grants to cities that cause the greatest water quality impairment, and to provide the monitoring data that will display the resulting improvement in water quality. It is apparent to our agency that improvements to water quality as a result of the construction grants program can be shown, if we make certain that a properly located monitoring station is in place well before construction is completed.

A transition in federal assistance for construction of publicly owned sewage treatment facilities from the traditional grants program to a state managed revolving loan program has been created with the enactment of the 1987 Amendments to the Clean Water Act (Public Law 100-4). With federal dollars provided by capitalization grants from the U.S. Environmental Protection Agency plus 20 percent state match appropriated through the Arkansas legislature, an Arkansas Revolving Loan Fund (RLF) has been established. According to the Interagency Agreement between the Arkansas Department of Environmental Quality (ADEQ) and the Arkansas Development Finance Authority (ADFA), the ADEQ is responsible for administration of the RLF with duties including development of program requirements, priorities for funding, loan administration, engineering reviews, and project inspection services. ADFA will serve as financial manager of the Revolving Loan Fund, loan originator, and procure independent annual audits as well as financial advisor to ADEQ in areas of leveraging, refinancing, loan guarantees, etc.

Household income must fall below $12,100, which is the current federal poverty level figure. The loans must be repaid within 20 years of project completion, and the debt may be serviced from a variety of repayment sources such as sales tax, sewer user charges, etc. As such, the fund will provide an attractive source of financing to local communities. Each year ADEQ will prepare a project priority list and review municipal loan applications to determine which project receive these low-interest loans.

Currently, ADEQ is investigating leveraging the RLF to maximize the federal and state dollars. This mechanism would allow the state to double the federal capitalization amounts available for loans. Leveraging would also enable the fund to operate in perpetuity.

Toxics Strategy

During 1987, the state agreed to implement what has been referred to as the "Third Round NPDES Permit Strategy." A general explanation of the evolution of the NPDES permit system is as follows:

Initial permits utilized a technology-based control approach. The "Second Round" permit addressed water quality as impacted primarily by conventional parameters or specific state water quality standards. The focus of the "Third Round" permits was to move beyond the first two phases of control to insure that adequate safeguards are being implemented to confirm that human health and aquatic life are protected on a site-specific receiving stream basis. The actual intent of the strategy is that there shall be no discharge of any wastewater from any source which:

1. Results in the endangerment of any drinking water supply;
2. Results in aquatic bio-accumulation which endangers human health;
3. Results in any instream acute or chronic aquatic toxicity; or
4. Violates any other applicable general or numerical state water quality standard.

The goal of the regional policy is to assure that there are "no toxic materials in toxic amounts" in waters of the United States. Appendix D includes the "Region VI Post-Third Round NPDES Permit Implementation Strategy" and the "ADEQ Toxics Control Implementation Procedure." These are yet another step in the process to control toxic discharges.

WETLANDS PROTECTION PROGRAM

In Arkansas, as in the nation as a whole, there are numerous initiatives directed at the general goal of "wetland conservation." Wetlands planning in Arkansas has always been a multi-agency effort, which has not necessarily resulted in a coordinated approach to this goal. The obvious need for an integrated, cooperative plan to maximize benefits from existing programs has led to the creation of the Arkansas Wetlands Technical Committee. This committee is co-chaired by the SCORP planner from the Arkansas Department of Parks and Tourism and the Wetlands Coordinator from the Arkansas Game and Fish Commission. In addition to the co-chairs, the Committee is composed of representatives from the following agencies and offices:

U.S. Army Corps of Engineers - Little Rock District
U.S. Army Corps of Engineers - Memphis District
U.S. Wildlife Service - Vicksburg, MS
U.S. Natural Resources Conservation Service

U.S. Environmental Protection Agency - Region VI, Dallas, TX
U.S. National Park Service (ONR) - SW Regional Office,
Sante Fe, NM
Arkansas Natural and Scenic Rivers Commission
Arkansas Natural Heritage Commission
Arkansas Highway and Transportation Department
Arkansas Department of Environmental Quality
Arkansas Soil and Water Conservation Commission
Ducks Unlimited - Arkansas Regional Office, Russellville, AR
The Arkansas Nature Conservancy

The goal of the committee is timely and regular exchange of information, recent events and developments and division of labor, in order to maximize efficiency and produce greater overall results in wetlands conservation. An immediate goal of the committee was to develop a statewide strategy for wetlands conservation, a publication which would serve as an inter-agency guide to wetlands program. This document, which has been prepared in draft form, includes a compilation and identification of existing opportunities and authorities, pertinent existing data bases and identification of information needs for continued progress.

Wetlands Inventory

The basis for any wetlands protection program is an adequate assessment of the resource. A significant portion of the State of Arkansas has been surveyed by the U.S. Fish and Wildlife Service, as part of its National Wetlands Inventory (NWI). In 1986, the Arkansas Natural Heritage Commission began planning a statewide natural resources inventory, including wetlands. The wetlands inventory evolved into a process similar to the NWI, but the Arkansas inventory concentrates on high-quality wetland areas in need of protection.

GROUNDWATER PROTECTION PROGRAM

The goal of the ground water protection program is to protect existing ground-water quality and identify and remediate, where possible, anthropogenic impacts for all uses of ground water including drinking, agricultural, industrial and other uses. This goal is accomplished through several means including monitoring ground-water quality on a regular basis throughout the State, developing guidelines and/or regulations for protection of ground water, and working with other divisions and other departments in formulation ground-water protection policies.

The current goal of the Department's ground-water monitoring program is to have an established ground-water monitoring network within each fresh-water aquifer system in the state and report on ground-water quality by individual aquifer systems. The program currently monitors approximately 200 wells and springs on a regular basis for major and minor inorganic parameters and volatile and semivolatile constituents, where potential sources of contamination contain these parameters. Monitoring areas are sampled on a three-year revolving basis, and in some areas of the State these areas have been sampled over four cycles. This type of monitoring assists in determining trends in ground-water quality and formulating ground-water contamination prevention policies for protection of the resource. Pesticides are also including in the ambient monitoring program in the Mississippi Embayment and Gulf Coastal Plain, where row-crop agricultural practices necessitate the use of large quantities of pesticides. Special pesticide monitoring is also conducted through use of EPA 319 Nonpoint Source Program funding.

Enforcement activities associated with contamination of ground water that are not addressed by established programs including the Solid Waste Division, Hazardous Waste Division, and the Regulated Storage Tank Division are managed by Water Division personnel. In the absence of statewide ground-water standards, the Division uses both federal Maximum Contaminant Limits and Health Advisory Limits for remediating ground-water and/or potential sources of ground-water contamination.

The Ground-Water Protection Program partially funds other ground-water protection programs including the Wellhead Protection Program and the Comprehensive State Ground-Water Protection Plan Program, implemented by the Arkansas Department of Health and the Arkansas Soil and Water Conservation Commission, respectively. Program personnel also offer technical assistance and/or funding to address large scale potential sources of contamination including pesticides, confined animal operations and salt-water intrusion. These activities include joint efforts by other state agencies, federal agencies and universities.

SURFACE WATER MONITORING PROGRAM

The ambient river and stream monitoring program, which the Department operated from 1974-1983, was an expansion and modification of an earlier interstate network. Some of the basic purposes of that monitoring network were to establish background levels and baselines of water quality, including physical, chemical and biological data, as well as seasonal and other variations. The monitoring program helped to establish cause and effect relationships between know point and nonpoint sources of pollution and the quality of the State's waters. The ambient monitoring program will always be vital in evaluating the effectiveness of the Department's pollution control program by assessing overall water quality before and after the implementation of pollution controls, which ultimately helps to update or redirect pollution control efforts.

During 1982, the Department reevaluated the monitoring network and four goals were established for the new network to accomplish. The first was to better assess the effects of point source dischargers upon water quality; the second was to observe the impact of known nonpoint source problems over the long term. The third goal was to continue monitoring our major rivers due to their basic importance to the state. Finally, carefully selected, high quality (least impaired) streams would be monitored to provide long-term chemical data by physiographic region for use in future water quality standards revisions.

Fairly major revisions to the monitoring network were also made at the beginning of FY87. A number of stations were added to assess point sources and few stations were also deleted at this time. When adequate data (3-5 years) is developed from the point source stations which indicate no impairment, the station may be moved to another location. Additional emphasis is now being placed on nonpoint source monitoring.

The current network consists of many general and special purpose stations. There are toxic water column stations, toxic sediment stations, water chemistry stations, macroinvertebrate stations, and toxic fish flesh stations.

Each station is required to accomplish one or more of the following goals before it is established.

1. Point Source Control
2. Long Range Trends (305(b)
3. Nonpoint Source Control
4. Water Quality Standard Revisions

Before a station can be established, two restrictions must be overcome. The first is access. An ambient chemistry station must be sampled on a monthly basis. This requires an all-weather road going directly to the station, which is usually at a bridge or boat ramp. The second restriction is that a field inspector's time is limited, which necessitates an analysis of each specific field inspector's route to determine the time required to run it. If a new station can overcome these restrictions, it is established.

Once a station is established, the Department routinely reevaluates each station to insure that it is achieving its original goal. If conditions in the stream have changed or, to the contrary, have remained the same for a long period, the station may be discontinued.

In general, the following criteria are used to determine if a station needs to be discontinued or moved.

1. Bad location. The station was originally not properly located and cannot meet its selected goals. If another location is available, it is moved.

2. Static water quality. If nothing has changed at a location after several years, the station may be discontinued in favor of a new station in an unknown area. If changes do occur in the stream, the station can easily be reactivated to record them. This policy allows the Department to stretch its resources over a larger area, but still remain responsive to stream changes resulting from new construction or new dischargers.

Biomonitoring

The Department maintains a biomonitoring program for the purpose of identifying environmental impacts from different sources and determining use support status. Various biomonitoring techniques are employed which include bio-assessments of aquatic macroinvertebrate communities, fish tissue collections, bioassays and bacteriological analyses. Any of these methods may be used to locate impacted waters. In situations where problem areas have been identified, a combination of the methods is used in conjunction with chemical analyses of sediment or water column samples on a case-by-case basis. This approach has been useful in providing a diverse data base of water quality information.

Bioassay Program

Toxicity tests are performed in conjunction with Compliance Sampling Inspections (CSI) to determine the presence of toxicity below dischargers. The 24-hour abbreviated definitive test is

performed with Daphnia sp. for determining an LC50. Additional toxicity screening is carried out with a Beckman model 2055 Microtox using fluorescent bacteria. Our lab also has facilities and cultures to conduct a limited number of the 7-day chronic toxicity test using both Ceriodaphnia and fathead minnows.

Bacteriological Program

Monthly analyses of fecal coliform bacteria are performed at selected stations and in conjunction with municipal CSI's. This program was intended to serve as a means of determining the support of swimmable uses of water bodies and to identify sources of human fecal pollution. It has been determined by EPA that the fecal coliform test is inadequate as an indicator of human health hazards with regard to bacteria (USEPA 1986 (A)). As a result, the bacteriological program was temporarily discontinued at the beginning of FY88. Department ecologists are currently conducting a special survey involving parallel fecal coliform/E. coli tests at selected sites for the purpose of determining the applicability of the E. coli criteria for protecting primary contact recreation in lieu of the fecal coliform procedures as recommended by EPA (USEPA 1986 (B)).

Metals Concentrations

The concentrations of metals initially analyzed by the Department were expressed as "Total Recoverable" metals as specified by EPA procedures. The "total recoverable" procedure measures essentially, the potential amount of metals that can possibly interact with the environment, not the immediately available dissolved metals. This technique produces numbers that are compared, in the evaluation process, to criteria or "safe" levels that have been determined on soluble metals. The actual concentration of metals in soils, rocks, etc., varies greatly from area to area and source to source. The concentration of these materials can range from 10 to 10,000 mg/kg (ppm) in soils. With a suspended solids value of 100 mg/l (ppm) which is common for turbid water, the lead in the water sample from the suspended soil would range from 1 to 1,000 µg/l (ppb).

Any evaluation of "total recoverable" metals values should be carefully screened against both turbidity and suspended solids values. If turbidity and suspended solids are both low, any high metals concentrations should be investigated fully.

The Department has switched almost exclusively to analyses of dissolved metals, and current water quality standards are based on dissolved metals values calculated from ecoregion hardness.

Intensive Surveys

Intensive surveys are of two types; one is for the purpose of determining the assimilative capacity of a stream and the other is for the purpose of collecting information to be used in an enforcement action by this agency.

RECLASSIFICATION OF ARKANSAS' STREAMS

This project was designed to provide a sound scientific basis for development, review and adoption of water quality standards. Initially, water quality standards were often nationwide values which did not recognize seasonally or regionally variable water quality. As a result, many of the cleanest streams and lakes in Arkansas had naturally-occurring water quality values that did not meet those standards. The sociopolitical system then directed valuable resources toward those perceived problem areas. In numerous instances where the standard was incorrect, those resources could obviously have been used more wisely.

This apparent disparity between the water quality standards and actual water quality values led to the conclusion that a study should be undertaken to identify water quality conditions in least-impaired streams within the different physiographic regions of Arkansas. Least-impaired streams are those which have the least of disturbance (in terms of agriculture, silviculture or other similar activities) and the fewest pollution sources in their watersheds.

The study has provided valuable background information to measure the effects of dischargers and nonpoint pollution sources and the information necessary to derive appropriate water quality standards and designate realistic uses.

The very framework of any state water quality regulatory agency is the "standards" by which it regulates and manages the state's resources. By necessity, the standards must be correct in order to do an efficient and effective job.

Concept and Results of Study

Arkansas is a state with many diverse landforms which are divided into major physiographic regions (e.g., Delta, Ouachita Mountains, Gulf Coastal Plain, etc.). This diversity in landforms largely determines the biological, physical and chemical nature of the streams draining these regions. The size of a watershed also influences a streams' characteristics. Therefore, the study was structured to evaluate streams seasonally, for different watershed sizes and within the different physiographic regions.

To summarize, the basic concept for the study was to evaluate the physical, chemical and biological characteristics of least-disturbed streams in watersheds of various sizes within each of the physiographic regions. By determining these characteristics for least-disturbed streams throughout the state, the Department now has a much better idea of what these qualities should be for a similar type of stream. As a result of this study the State has developed ecoregion specific water quality standards which correctly reflect least-disturbed and attainable standards.

STATE AND AREAWIDE AGENCIES/PLANNING AREAS

State

The Arkansas Department of Environmental Quality has been designated as the state planning agency on matters pertaining to water quality and will conduct planning on the state level.

Local

The state has been divided into eight planning and development districts and charged with the responsibility of conducting planning at the local level concerning economic development. These agencies do not contribute actively to the Water Quality Management Plan.

Section 208(a)(2) of the Clean Water Act, as amended, required that the governor of each state identify areas within the state which, as a result of urban-industrial concentrations or other factors, have substantial water quality control problems, including those areas which were located in two or more states.

Accordingly, the governor of Arkansas subsequently designated the following areas and agencies for development of areawide waste treatment management plans. The original management plans have all been developed and certified by the governor.

1. June 1975 - Ark-Tex Council of Governments (Texarkana)

2. March 1976 - Arkhoma Regional Planning Commission (Fort Smith)

3. May 1976 - Southwest Arkansas Regional Planning Commission (Pine Bluff) and

4. July 1976 - Metroplan (Little Rock)

The ADEQ has responsibility for water quality management (208) planning in the remaining, non-designated areas of the state.

Other Agencies Involved

Planning programs in Arkansas with which water quality management is being coordinate, and the name of some responsible federal and state agencies are listed below:

Solid Waste---------Arkansas Department of Environmental Quality, Arkansas Health Department, U.S. Environmental Agency, Arkansas Highway and Transportation Department;

Air Quality---------Arkansas Department of Environmental Quality, U.S. Environmental Protection Agency;

Water Supply--------Arkansas Department of Environmental Quality, Arkansas Oil & Gas Commission, Arkansas Health Department, Arkansas Soil & Water Conservation Commission, U.S. Environmental Protection Agency, Arkansas Geological Commission, U.S. Geological Survey;

Water Resources-----Arkansas Department of Environmental Quality, Arkansas Geological Commission, Arkansas Soil & Water Conservation Commission, Corps of Engineers, U.S. Geological Survey;

Comprehensive
Regional Planning---Arkansas Department of Environmental Quality, Regional Planning Commissions, Economic Development Districts, local conservation districts, AR Soil and Water Conservation Commission

701 HUD Sewer &
Water Facilities----Arkansas Department of Environmental Quality, Arkansas Health Department, Arkansas Department of Local Services, Economic Development Districts, Regional Planning Commissions;

Soil Conservation---Arkansas Department of Environmental Quality, Arkansas Soil & Water Conservation Commission, Soil & Water Conservation Districts, U.S.D.A. Soil Conservation Service;

Forestry------------Arkansas Department of Environmental Quality, Arkansas Forestry Commission, U.S. Forest Service;

Agriculture---------Arkansas Department of Environmental Quality, State Plant Board, Arkansas Livestock & Poultry Commission, Arkansas Soil & Water Conservation Commission, U.S.D.A. Cooperative Extension Service;

Recreation----------Arkansas Department of Environmental Quality, Arkansas Game & Fish Commission, Arkansas Health Department, Arkansas Department of Parks & Tourism, U.S. Bureau of Sport Fisheries & Wildlife, U.S. Bureau of Outdoor Recreation;

Transportation------Arkansas Department of Environmental Quality, Arkansas Highway & Transportation Department, Arkansas Department of Local Services, Arkansas Waterways Commission, Department of Transportation, Corps of Engineers;

Energy----------Arkansas Department of Environmental Quality, State Office Energy, Federal Office of Energy, Federal Power Commission, and

Mining----------Arkansas Department of Environmental Quality, Arkansas Oil & Gas Commission, Arkansas Geological Commission.

Areawide Plan Update and Revision

On an as-needed basis, the Areawide Water Quality Management Plan Update will be submitted through the formal review and approval process. The steps in this review process are consistent with prevailing regulations of the U.S. Environmental Protection Agency (EPA).

DESIGNATED MANAGEMENT AGENCIES

Management agencies have been designated by the governor. Ninety-five (95) percent of the municipalities in the state have been named by the governor as management agencies and the communities have accepted, by resolution, their Designated Management Agency responsibilities for the collection and/or treatment of domestic wastewater.

A municipality named as a designated management agency must have adequate authority and capability:

- To carry out its assigned portion of the approved plan including those developed for designated 208 water quality planning areas;

- To manage effectively treatment works and related point and nonpoint source facilities and practices serving the area;

- To cause to be designed and constructed new works and to operate new and existing works as required by the water quality management plan;

- To accept and utilize grants and funds from other sources for waste treatment management or nonpoint source control purposes;

- To raise revenue;

- To incur short-term and long-term indebtedness;

- To assure, as part of implementation of an approved water quality management plan, that each participating community pays its proportionate share of the related costs;

- To refuse to accept wastes from any community or private entity which does not comply with provisions of an approved water quality management plan; and

- To accept for treatment industrial wastes.

Through the 208 process, the following agencies have been designated as having responsibility for nonpoint source controls in specific areas:

Agency	Function
Arkansas Soil & Water Conservation Commission Conservation Districts	Agricultural nonpoint source controls
Arkansas Forestry Commission	Silvicultural nonpoint source controls (state)
U.S. Forest Service	Silvicultural nonpoint source controls (federal)
Arkansas Department of Environmental Quality	Mining Controls
State Highway Department	Nonpoint source controls for highway construction
State Health Department	Septic tank controls
Counties and Municipalities	Construction-urban runoff, roadway erosion and collection and treatment of domestic wastewater.

These agencies have accepted their designation. Memoranda of Understanding and Implementation Plans have been negotiated with the agencies and were incorporated into the 208 Plan. These agencies assist the Department in nonpoint source assessment and control needs through monitoring and instruction and voluntary implementation of BMPs.

PUBLIC PARTICIPATION PROCESS

I. Purpose

The purpose of the public participation program will be to:

A. inform affected citizens and organizations of the factors involved and of decisions contemplated in the planning process,

B. incorporate public thinking into planning decisions,

C. provide all citizens and organizations an equal opportunity to influence the design of alternatives and selection of choices,

D. inform those citizens and organizations of the dispositions of their input in the planning process, and

E. produce plans that have substantial community support.

II. Agency

Leadership in the public participation program will be the primary responsibility of the Arkansas Department of Environmental Quality.

III. Description

The following will be part of the public participation program in Arkansas.

A. General

1. The program will be an active program designed to seek out those who can provide useful inputs and those who will be affected by the plan.

2. The program will include provisions for disseminating information to the public. Data and information available to planners is easily accessible to the public. Depositories of documents and data will be clearly identified and remain open for public use at generally convenient times.

3. Costs of the public participation program will be included in the planning budget.

4. Elected officials and representatives of state and federal agencies who must approve or disapprove plans will be informed of all significant planning decisions.

B. Specific

The ADEQ will initiate a public participation program as a basic part of the planning process.

1. Relevant information will be provided as required by EPA public participation guidelines (CFR 40 Part 25) in order to assist the public in understanding and responding to water quality programs. Lengthy documents or complex technical materials that relate to significant decisions will be summarized for public and media uses in the form of fact sheets or newsletters and will be used to provide notice that the materials are available at the Department's central offices or at other convenient locations.

2. A current list of interested persons and organizations to be notified concerning significant actions taken or anticipated will be maintained.

3. Relevant information and evidence, when submitted by citizens, will be respectfully considered.

4. This program will comply with all applicable regulations and guidelines of the FWPCA amendments of 1979 40 CFR, Parts 25 and 35.

C. Local Programs

The Department of Environmental Quality will serve as an advisor for public participation programs conducted by private organizations and local agencies under federal grants.

D. Other Related Programs

In instances of multi-agency planning programs such as 208 Areawide Waste Treatment Planning, the ADEQ will serve as the reviewing arm of the Office of the Governor in the certification process. The ADEQ will coordinate the public participation activities and will provide assistance when possible. Respecting individual jurisdictions, the ADEQ will formalize a mutually agreeable communication system between all water quality management agencies and organizations, and the ADEQ.

WATER QUALITY STANDARDS

WQS Review and Revision Process

The process in Arkansas to develop, review and revise water quality standards and develop and implement a statewide policy on non-degradation pursuant to Section 303(c) of the Federal Act includes the following steps.

I. At least once every three (3) years, starting from September 1972, the ADEQ will review and hold public hearings for the purpose of revising Arkansas' Water Quality Standards. Any revisions adopted and certified by the state will be forwarded to the EPA regional administrator for approval.

II. Water Quality Standards will be established to:

   A. Protect the public health and welfare and enhance water quality;

   B. Specify appropriate water uses to be achieved and protected, taking into consideration the use and value of water for public water supplies, propagation of fish and wildlife, recreation, navigation, and agricultural, industrial and other purposes; and

   C. Specify appropriate water quality criteria necessary to support designated water uses.

III. The ADEQ, in reviewing and revising the state's water quality standards will:

   A. Establish standards which are consistent with the national water quality goals of the Act;

   B. Maintain all existing water uses and, where necessary, upgrade standards to reflect existing water quality.

   C. Maintain those water uses currently designated in water quality standards unless those waters are subjected to the process of modifying site specific standards as provided for in the Water Quality Standards.

INFORMATION REQUIRED IN APPLYING FOR SITE SPECIFIC WATER QUALITY STANDARDS MODIFICATIONS IN ACCORDANCE WITH SECTION 2.306 OF THE WQS

I. Prerequisites

A. May not remove a fishable/swimmable use.

B. May not remove an existing use.

C. May not remove any designated use unless one of the following conditions are met:

1. Naturally occurring pollutant concentrations prevent the attainment of the use; or

2. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or

3. Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or

4. Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or

5. Physical conditions related to their natural features of the water body, such as the lack of proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or

6. Controls more stringent than those required by Sections 301(b) and 306 of the Clean Water Act would result in substantial and widespread economic and social impact.

II. Required Report

A. Introduction

1. Purpose

2. Needs

B. Background

1. Physical Watershed and Waterbody Characteristics

2. Point and Nonpoint Impacts

3. Designated Uses and Existing Uses

4. Sources of Wastewater

C. Results and Conclusions

1. Identification of contaminants which violate criteria or impair use.

a. Sources (natural, man-induced, correctable, irretrievable)

b. Magnitude of contaminants (concentrations, variations, frequency, duration)

c. Potential for correction of sources

2. Technological Treatability of Contaminants

a. Control or confinement of contaminants

b. State-of-the-art treatment technology available

c. Economic feasibility of treatment

d. Materials management

e. Materials substitution

f. Best Management Practices

3. Economic analysis for the local area of closing the operation due to noncompliance.

4. Environmental Benefits of not Removing a Use or Closing the Operation

5. Existing Waterbody Uses

   a. Document the use to be removed is not an existing use as defined in CFR 131.3.

   b. Document that all designated uses and criteria will be met in waters downstream of the area in question

   c. Document that the fishable/swimmable use will be met in affected waterbody

   d. If request is to remove the domestic water supply use, the following is required:

      (1) a letter from Arkansas Department of Health documenting that the waterbody has not been approved or is not known to be considered for use as a domestic water source, and

      (2) a letter from the Arkansas Soil and Water Conservation Commission which documents that the request does not conflict with the Arkansas Water Plan.

6. For site-specific changes in minerals standards, procedures described in the "Administrative Guidance Document" dated January 12, 1994, will also apply (see attached).

7. Any Proposed Changes in Water Quality Standards or Designated Uses are Subject to Public Participation and Intergovernmental Review Process.

ADMINISTRATIVE GUIDANCE DOCUMENT

Section 2.306 of Regulation No. 2 provides a procedure to change the water quality criteria applicable to a specific stream segment. This Administrative Guidance Document provides guidance to the Commission, to the regulated community, and to the general public on the manner in which petitions filed under Section 2.306 to change the water supply use, mineral quality criteria and/or to remove a water supply use will be processed, and the documentation which the Department deems necessary to obtain a favorable recommendation from the Department on the request.

1. Applicable Procedure

(a) All requests shall be submitted to the Department. The Department shall submit its comments and/or its recommendation upon the request in writing to the applicant within thirty (30) days of submission. Upon receipt of the Staff's comments, or after the expiration of thirty (30) days the petitioner may file the request with the Commission, at which time it will be assigned a docket number for third party rulemaking pursuant to Act 165 of 1993 and Regulation No. 8.

(b) Upon filing a request with the Commission, the request will be assigned to and reviewed by the Rules Subcommittee. The Rules Subcommittee may proceed with a rulemaking and refer the matter to the Commission upon completion of the public hearing and development of the rulemaking record, or take such other action as appropriate for the rulemaking proceeding. The petitioner should attend all meetings pertaining to the petition, including meetings of the Rules Subcommittee, the Commission and all public hearings on the petition. The petitioner should be prepared to present the petition, to respond to comments or questions from the public, the Department or the Commission. The petitioner should also be prepared to assist the Commission's Hearing Officer in drafting any documents required in the matter, including any final rule or decision.

2. Documentation Required for All Applications- A request to modify the dissolved minerals criteria and/or remove the water supply use should include the following documentation:

(a) Approximation of the existing effluent loading of dissolved minerals. Sampling data and process information to approximate the highest monthly average and daily maximum contributions of dissolved minerals which could be expected to occur in the effluent under existing conditions, taking into account variability of process, treatment and other factors affecting the final effluent. Data should also include design discharge flows.

(b) A demonstration that existing water supply uses will be maintained. If the petition includes a request to remove the drinking water use, the petitioner should include letters from the Arkansas Department of Health ("ADH") which demonstrates that the stream segment has not been approved as, or is not known to be under consideration for use as a public water system source, and from the Arkansas Soil and Water Conservation Commission which demonstrates that the request does not conflict with the Arkansas Water Plan.

(c) A demonstration that existing aquatic life uses will be maintained.

(i) Bioassessments performed upstream and downstream of the point source which show no significant differences in aquatic life communities due to dissolved minerals. The type and extent of the bioassessment documentation will be site specific and will include data collected within the last five (5) years. Bioassessment activities may include:

1. Historical data analysis

2. Whole effluent toxicity testing, i.e., current (within the last year) whole effluent chronic toxicity testing of effluent using Ceriodaphnia dubia and Pimephales Promelas under critical conditions in accordance with standard requirements for NPDES permits as specified in Attachment XI of the CPP.

3. Benthic community sampling and analysis (e.g., Rapid Bioassessments)

4. Fish collection and analysis

As a general policy, in the majority of cases, collections of macroinvertebrate and fish communities in receiving waters will be required. If the result of the whole effluent toxicity testing indicate no toxicity related to the dissolved minerals at the critical dilutions, the in-stream study documentation can be minimized (e.g., limited rapid bioassessment and/or fish stations). Eco-regional approaches can be used for similar facilities.

(ii) If the point discharge represents the beginning of the receiving stream and no upstream monitoring is possible, the bioassessment data will also be collected at the first confluence where upstream and downstream stations can be established.

3. Additional Documentation for Petitions Seeking to Increase Dissolved Minerals Loadings- The Department may authorize dissolved minerals loadings in NPDES Permits which reflect loadings of dissolved minerals in excess of existing conditions, and will recommend approval of a request to make a corresponding revision to the dissolved mineral water quality criteria, upon submission of the following documentation in addition to that required under paragraph (2) above:

(a) Treatment for the dissolved mineral(s) has been or will be installed to the extent that treatment is technologically available and economically justifiable in comparison to the potential for dissolved mineral(s) removal and the attainment of water quality standards,

(b) The facility will have a sufficient impact on the economy of the area or is essential to the protection and promotion of the public interest, and approval of the petition will accommodate important economic or social development in the stream segment area.

(c) All other feasible processes to reduce minerals contaminants have been investigated, such as product substitution; reduction in wastewater by recycle, reuse or land application; seasonality controlled discharges; improved operations and maintenance of existing treatment systems, alternative discharge locations.

4. Mixing Zone- For purposes of calculating the appropriate water supply dissolved mineral criteria, the instream concentration of dissolved minerals may be calculated as the concentration of dissolved minerals, after mixing, using the harmonic mean flow, 30th percentile flow, or 4 cfs, whichever is greater.

5. Permitting Strategy- A facility whose receiving streams' dissolved minerals criteria are amended under this policy to reflect existing discharge conditions shall be required to monitor and report its effluent dissolved minerals concentrations in NPDES permits.

6. Recommendation- If the bioassessment data submitted under Section 2(c) above demonstrate no impairment of the aquatic community, the Department will recommend approval of the request. If the bioassessment data indicates that the contribution of dissolved minerals impairs the aquatic community, the Department will evaluate all information submitted and make such comment on the request as may be appropriate under the circumstances.

Approved this 12th day of January, 1994.

Randall Mathis, Director

ESTABLISHING USE SUBCATEGORIES
(WQS Section 2.307)

In accordance with Arkansas Water Quality Standards and Federal Regulations 40CFR 131.10(C) the states are allowed to develop subcategories of uses as long as those uses listed in Section 303(C) of the Clean Water Act are included.

Procedures for establishing a use subcategory must be in accordance with USEPA guidance in the Water Quality Standards Handbook: Second Edition, Chapter 2, Section 2.3.

ESTABLISHING SITE SPECIFIC TOXIC POLLUTANTS
(WQS Section 2.308)

In accordance with Arkansas Water Quality Standards and Federal Regulation at 40 CFR 131.11(2)(b) site specific toxic pollutants may be established (a) using water quality criteria established under Section 304(a) of the Clean Water Act; (b) site-specific modifications of 304(a) criteria, including the water effects ratio (WER); or (c) other scientifically defensible methods.

Procedures for establishing site specific, toxic pollutant criteria must be in accordance with USEPA guidance presented in the Water Quality Standards Handbook: Second Edition, Chapter 3.

TEMPORARY VARIANCE FROM WATER QUALITY STANDARDS
(WQS Section 2.309)

In accordance with Arkansas Water Quality Standards in Section 2.309 and as determined to be allowable by USEPA, a temporary variance from the water quality standards may be issued by the Arkansas Pollution Control and Ecology Commission and approved by USEPA when it is determined that water quality standards may ultimately be attained or a site specific amendment to the standards may be appropriate.

Procedures for obtaining a temporary variance must be in accordance with USEPA guidance in the Water Quality Standards Handbook: Second Edition, Chapter 5, Section 5.3.

BIOLOGICAL INTEGRITY
(WQS Section 2.302(F))

It is the expressed goal of the Clean Water Act and the Arkansas Air and Water Pollution Control Act to protect the biological integrity of the waters of the State. Implementation of these goals is provided for in Regulation No. 2, Section 2.302(F) by the creation of specifically described aquatic life communities by waterbody type and ecoregion. Such communities, as described, must be maintained in order to support the designated, fisheries(aquatic life) uses. Unless specifically removed through the use attainability process, all surface waters of the State have been designated to support aquatic life uses. These uses may be seasonal or perennial; they are subcategorized by ecoregion; and they are narratively described primarily by their fish community composition.

This section will be used for the assessment of the status and trends of biological communities in waters of the State. It will also be used for determinations of the support of aquatic life designated uses, problem identification and planning. It will be the Department's task to conduct biological assessments described in this section and utilize the results as described above.

Assessment of the biological integrity of a waterbody will rely on standard, accepted biological sampling techniques, directed primarily toward the macroinvertebrate and fish communities. Sampling will be conducted, in most cases, during times which optimize the sampling efficiency, measure the most critical conditions and provide data consistent with the objectives of the assessment. The magnitude of the sampling effort will be to assure that a representative, random sample is taken.

Procedures for analyses of the macroinvertebrate communities will follow those described in the "Rapid Bioassessment Protocol", EPA guidance document EPA/444/4-89/001, and its updates. Modifications of this procedure will be used as justified to address monitoring objectives or site-specific conditions.

Evaluations of the fish community structure will also rely on multi-metric analyses. These will be consistent with the narrative descriptions of the ecoregion fish communities in subsection 2.302(F) of Regulation No. 2. These include, but are not limited to, fish family distribution; abundance of key species, sensitive species and primary trophic level species; and generally accepted diversity indices and similarity indices. Determination of impairment will be made by comparison to a least-disturbed waterbody segment which may be site specific (e.g., adjacent watershed, upstream-downstream, near field-far field) or ecoregion specific. Currently ADEQ is utilizing data from Ecoregion based reference streams to delineate the scoring ranges for each of the

metrics mentioned above. This information is available from the Department; however, it will be continually updated as additional reference stream data are developed. If site specific reference streams are used, they must be shown to be characteristic of typical ecoregion reference streams. Comparisons will be made between waterbody segments of similar habitat and hydrologic conditions.

Determination of impairment may include graduated levels, such as, slightly impaired, moderately impaired, etc. Corrective actions will be commensurate with the level of impairment and may include: (1) continued, periodic monitoring for trend analyses, (2) more intensive investigations to identify causes and sources for placement on the state 303(d) list, or (3) initiation of immediate corrective action.

SHORT-TERM ACTIVITY AUTHORIZATIONS

Two Major Categories are Considered:

I. Catastrophic situations beyond the control of man. These situations would consist of notification by the party involved of a situation where waters of the state are affected by an emergency. Though the state may not "authorize" the situation it must acknowledge the water quality impacts and make all assurances that any damages are kept to a minimum through the application of best professional judgement. Health-threatening situations will require adequate notice to the public until the situation can be corrected or abated.

II. Activities promoting the public interest which will potentially violate the water quality standard but not cause permanent or long-term injury of the designated beneficial use. Notice may be given to the public with an opportunity to comment on the specific project. Major types of activities dealt with in the past are as follows:

   A. 404 Dredge and Fill Projects - These projects require a public notice from the Corps of Engineers and also a certification from this agency that long-term violation of water quality standards will not occur. A 404 certification by this agency may in some cases infer a short-term activity authorization.

   B. Construction Activities - These projects, the majority of which are pipeline crossings of surface water streams, are normally designed long before the actual work is done. No attempt is actually made by this agency to inform the public that a short-term violation of a water quality standard could occur at a specific location on a

specific date. An effort is made to consider all the information available in a given situation to insure that any violations of the water quality standard are kept to a minimum, before approval.

C. Fishery Management Work - The State Game and Fish Commission routinely conducts "population samples" using the fish toxicant rotenone. The public is not informed of the location or time to insure that the fishery biologist can conduct his work in an efficient manner. On occasions when these population samples indicate that adjustments need to be made within a given population, a larger kill may be scheduled and the public is then informed of the site and time at which it will take place. Historically, the general public has been well represented at these "kills" and reap the benefit of this management technique in the form of fresh fish.

D. Control of Nuisance Conditions - Occurrence is much less frequent than any of the above, but requests do come in for control of algae in specific lakes or waters of the state, or mosquito abatement, etc. Generally, public notice is given by the party or agency involved in the request. Where possible, when approval for a short-term activity authorization is given, any accompanying request for a management plan to reduce or eliminate future problems will be included.

E. Maintenance of Wastewater Treatment Facilities - During major maintenance or renovation of treatment facilities, the level of treatment may temporarily fall below the permitted levels. These planned activities may be authorized under the short-term activity authorization.

F. Hydrologic Studies - The use of highly visible tracer dyes will require authorization under this section.

III. Such authorization shall not be granted for activities which result in the adverse impact on any federally threatened or endangered species or on critical habitat of such species.

USE ATTAINABILITY ANALYSIS

Background

The current EPA regulations governing State Water Quality Standards require a Use Attainability Analysis (UAA) whenever:

a. The state designates or has designated uses that do not include the uses specified in Section 101(a)(2) of the Act, or;

b. The state wishes to remove a designated use that is specified in Section 101(a)(2) of the Act, or to adopt sub-categories os uses specified in Section 101(a)(2) of the Act which require less stringent criteria.

The results of an extensive five year study project which identified the physical, chemical, and biological characteristics of ecoregion reference streams throughout the state was used to accurately determine the "fishable" uses for all waters of the state. Similarly, all streams with greater than 10 square miles of watershed were determined to be "swimmable."

If it is suspected that the "fishable and/or swimmable" designation of a specific waterbody or segment of a waterbody is unattainable, a Use Attainability Analysis must be performed to change these designations.

Use Attainability Analysis Procedures

For each proposal to modify or remove a fishable/swimmable use, a written report shall be submitted to the Arkansas Department of Environmental Quality. Each report shall include the information listed below:

1. The report should specifically document existing uses and also indicate those designated uses which are proposed for removal or modification. In the case of new stream segment designations, Section 101(a)(2) uses not proposed for designation should be stated.

2. Data used in the study should be reasonably current (within the last five years) and should be scientifically defensible.

3. Consideration should be given to uses that would be attainable in the absence of nonpoint source pollution, or with the application of BMPs or implementation of the WQMP.

4. Thorough documentation should be made concerning the cause of non-attainment.

5. When natural flow conditions are being considered as the cause of not attaining a use, the survey work should be conducted during the critical conditions of high temperature and low flow and during the spawning season, if one exists.

6. The watershed size, in square miles, above the point of discharge and at points of confluence within the watershed being considered.

7. The Q7-10 flow, where available.

8. A map will be provided which displays:

   a. the receiving stream or waterbody under consideration, including the name of such where available;

   b. the location of all existing, proposed and anticipated discharges in the affected watershed, and

   c. the location of the nearest downstream watercourse which will otherwise attain the Section 101(a)(2) uses.

9. For each discharge identified in 8.b., the average daily dry weather and wet weather flow and physical/chemical characteristics of the discharge will be given.

10. A mathematical model following EPA Region VI criteria or other acceptable demonstration shall be formulated to show projected water quality characteristics downstream of the discharge.

11. The report should verify that no other economically and/or technologically feasible alternative exists for the discharger (i.e., land application, discharge to a perennial stream, etc.).

12. Verification will be included to show that the following conditions are met for the receiving waterbody:

   a. a determination of whether or not the watercourse is used as a source of domestic water supply and, if so, the location of withdrawal;

   b. the discharge will not adversely affect a defined karst area or otherwise adversely affect groundwater (treatment beyond secondary will be required in these areas); and

   c. in no case shall the discharge, as proposed, create a public health hazard or nuisance condition.

13. Solicit comments from the Arkansas Department of Health on the effects, if any, of the proposed discharge.

14. Solicit comments from the Arkansas Game and Fish Commission on the adequacy of treatment in protecting fish and wildlife.

All reports will be submitted to the Director of the Arkansas Department of Environmental Quality.

Upon receipt of such a report, the Department or its designee shall evaluate and, if necessary, conduct a field investigation to assess the physical, chemical, and biological characteristics of the

receiving stream (see Outline of Field Survey). This information will be used to determine the use potential of the stream. If, after field evaluation, the removal of a designated use from portions or segments of the stream or waterbody is deemed feasible, then the following will be carried out:

1. Conduct public hearing for the modification or removal of a use, etc.*

2. Submit any determination recommended for approval to the Director of the Department for presentation to the Commission on Pollution Control and Ecology for its concurrence, first giving sufficient prior notice of the meeting at which the Commission will consider the Department's recommendation by placing appropriate notice in local newspapers.*

3. The Department shall submit any determination approved by the Commission on Pollution Control and Ecology through the Governor of Arkansas to the Regional Administrator, U.S. Environmental Protection Agency, for final approval.

*In order to reduce the time and expense of public hearings while also assuring adequate public participation, the Chief of the Water Division shall be responsible for coordinating with the Manager of the Administration Branch to synchronize notices and hearings required by this procedure with notices, hearings and meetings involving other activities of the Department.

Outline of Field Survey to Evaluate Change of Use

As a minimum, the following should be evaluated. Levels of effort greater than this will be proportional to the project involved and the value of the receiving stream.

I. PHYSICAL EVALUATION

Establish where, in relation to the discharge, the physical characteristics of the stream or waterbody could potentially support the use.

A. Fisheries Habitat

1. Sufficient water volume (pool) or flow available?

2. Sufficient cover available?

3. Seasonal aspects of flow?

B. Swimming

1. Analysis of accessibility

2. Depth and velocity of water and bottom characteristics

II. CHEMICAL EVALUATION

Establish water quality characteristics of the waterbody.

A. Fisheries

1. Dissolved oxygen sample

2. Grab sample - parameters to be determined

III. BIOLOGICAL EVALUATION

A. Where feasible, establish the presence or absence of key species of fish

B. Conduct field evaluation of macroinvertebrates

IV. WATERSHED CHARACTERISTICS

Evaluate land use in the watershed by observation and/or discussions with Soil Conservation Service or Agricultural Extension Service personnel.

The data collected from the field survey will be compared to a least-disturbed reference stream of similar size in the same physiographic region to evaluate the stream's attainable uses.

PHYSICAL ALTERATIONS OF HABITAT

Background

The Department of Environmental Quality is required under Sections 401 and 404 of the Clean Water Act to issue "water quality certification" for projects that ditch, dam or cause other physical alterations of the habitat as a result of dredge and fill operations. Prior to providing certification the Department is required to determine if a significant degradation of the water quality or the designated uses will be cased by the project.

The Antidegradation Policy relates directly to water quality degradation although it is clear that the existing uses as defined in the Act must be protected. The use attainability analysis procedure identifies natural conditions, previously constructed man-induced modifications and uneconomical treatment levels of point source discharges which may prohibit attainment of fishable/swimmable uses. It also provides for creation of sub-

categories of these uses which require less stringent water quality criteria. However, there remains a need to evaluate the impact of physical habitat alterations on designated uses.

Therefore, when it is determined that a physical modification of the habitat is proposed in a significant segment of a waterbody, but the segment will continue to meet the "fishable/swimmable" uses, it must be determined that a significant degradation of the use and water quality will not occur.

Procedures

I. This procedure is applicable only when it has been determined by the Department Director that a proposed project will cause a significant segment of a waterbody to be affected by physical alteration of the habitat.

II. Significant physical alterations of the habitat within extraordinary resource waters, ecologically sensitive waterbodies or natural and scenic waterways are not allowed. In other waters, the Department must be assured that no significant degradation of any existing use or water quality will occur.

In order to make such determinations the Department may require a detailed evaluation of the project and all practicable alternatives providing the following information:

A. The applicant must provide an inventory of the existing physical, chemical and biological characteristics of the waterbody. This study must also predict these physical, chemical and biological characteristics of the waterbody after the project has been completed. As a guideline, the study may follow the Department's methodology for evaluating ecoregion reference streams or other approved procedures.

B. The applicant must establish that important social and economic development in the area will result from the proposed project. A detailed economic analysis of the impact of the project on the local area will be required.

C. In addition, an environmental assessment and an engineering and economic analysis of all reasonable alternatives to the project will be required.

JUSTIFICATION REQUIRED FOR SUBSTANTIAL AND WIDESPREAD ECONOMIC AND SOCIAL IMPACT

The following is a suggested list of information to be supplied by the applicant as justification for actions described in Sections 2.303 and 2.306. In some cases this list will not be applicable in its entirety, and in such cases the information required should be customized to the specifics of the case.

1. Listing of available treatment technologies that will meet the required water quality standards and their estimated costs.

2. Certified income statements for last three years for the plant in question.

3. Certification that the plant in question is meeting the treatment requirements of Section 301(h)(2) of the Act. (Best Available Treatment).

4. Detail how the installation of additional environmental controls would effect the plant's future profitability, the availability of funds for future expansion, plans for modernization, the firm's competitive position, and the impact of future price increases.

5. Detail the economic and social impacts of a plant closure and the resulting unemployment on either a local or national scale, whichever is appropriate.

6. Report on the local tax base would be effected by a plant closure.

7. List the current number of permanent employees and the total annual payroll.

8. Report the areawide unemployment rate and how it would be effected by a plant closure.

9. List any other economic impacts that could result from this action.

LOSING STREAM PROCEDURES

Any municipal discharge in the state of Arkansas is required, as a minimum, to provide secondary treatment of its wastewater. In all cases, the discharger is also required to meet the applicable water quality standards for the receiving stream in question. The Department makes a determination of the necessary effluent limits for oxygen demanding constituents to meet water quality standards at each discharge point using a mathematical model called a wasteload allocation.

Assuming that the previously discussed requirements are met, additional limitations will apply if the discharge is to a losing stream. A losing stream is defined as a stream segment, beginning at the point of existing or proposed discharge and extending two miles downstream, distributes 30% or more of its flow at a Q710 flow or 1 cfs, whichever is greater, through natural processes such as permeable subsoil or cavernous bedrock into an aquifer.

Effluent limitations for Discharges into Losing Stream Segments are as follows:

I. Discharges to losing stream segments shall be permitted only after alternatives including (a) land application of wastewater, (b) discharge to a non-losing stream segment, and (c) connection to a regional wastewater treatment facility, have been evaluated and determined to be unacceptable for environmental and/or economic reasons.

II. If the Department agrees to allow a discharge to a losing stream segment, the permit will be written using the limitations described below, as a minimum. Discharges from wastewater treatment facilities, which receive primarily domestic waste, or from publicly owned treatment works (POTWs) shall undergo treatment sufficient to conform to the following limitations:

A. $CBOD_5$ equal to or less than a monthly average of 10 mg/l and a weekly average of 15 mg/l;

B. Total Suspended Solids (TSS) equal to or less than a monthly average of 15 mg/l and a weekly average of 23 mg/l;

C. pH shall be maintained in the range of 6-9 S.U. at all times, subject to the provisions of 40 CFR 133.102(c);

D. the fecal coliform content of discharges shall not exceed a monthly average of 200 colonies per 100 milliliters and a weekly average of 400 colonies per 100 milliliters. However, at no time shall the fecal coliform content

exceed 200 colonies per 100 milliliters in any water defined as an Extraordinary Resource Water or Natural and Scenic Waterway;

E. nitrate plus nitrite nitrogen levels shall not exceed 10 mg/l;

F. ammonia (as N) limitations shall be included as necessary to prevent ammonia toxicity instream and/or to maintain instream dissolved oxygen;

G. other parameters as deemed appropriate by ADEQ.

Implementation of Losing Stream Regulation

1. Existing discharges. At the time of permit renewal, or when deemed necessary by the Department, NPDES permittees discharging to stream segments which may be losing stream segments shall submit documentation as part of the renewal permit application, showing that the segment is or is not a losing stream segment. If the discharge is into a losing stream segment, then the facility must be capable of meeting the effluent limitations described above, as a minimum.

2. New discharges. New facilities proposing to discharge to a stream which may be a losing stream segment shall submit documentation as part of the initial NPDES permit application demonstrating that the segment is or is not a losing stream segment. This documentation includes, but is not limited to, stream studies or other data, showing the stream segment does not does not meet the losing stream definitions. If the proposed discharge is into a losing stream segment, then the facility must be designed and operated to meet the effluent limitations described above, as a minimum.

3. Stream studies for determining classification as a losing stream segment must be conducted during the critical low flow season, when stream flow is at least 1 cfs and representative of seasonal flow. Effluent flow, when existing, can be included in the minimum 1 cfs stream flow.

4. The Department shall determine the requirement for, and the content and level of detail of, stream studies, based on local topography, geological data, file data, other dischargers in area, stream flow, etc.

5. Nothing in this regulation limits the authority of the Arkansas Department of Health to include additional requirements as a prerequisite to its approval of the treatment/disposal system.

(Editor's Note: Act 96 of 1913, and regulations promulgated thereto (Rules and Regulations Pertaining to General Sanitation, Arkansas Department of Health) requires applicants for permits for the discharge of domestic effluents to obtain approval of the plans and specifications from the Arkansas Department of Health).

WATER QUALITY MANAGEMENT PLAN UPDATE PROCEDURES

Effluent limits for potential dischargers are determined by one of the following methods: (1) An approved wasteload allocation study on the receiving stream, (2) limits determined as per the ADEQ Effluent Policy, or (3) discharges to a "losing stream segment" as described in Regulation # 6.

Effluent limits derived from a wasteload allocation study are generally governed by two processes. For facilities with a design flow of 0.1 MGD (million gallons per day) or greater, the wasteload allocation studies must be sent to EPA as TMDL (total maximum daily load) evaluations in draft form. Upon approval of the TMDL studies, the proposed effluent limits will be published in a 30-day statewide public notice. In addition, effluent limits derived by the WLA process for those facilities having a design flow less than 0.1 MGD, and effluent limits determined by Regulation # 6 provisions will be included in the 30-day statewide public notice. If there are no adverse comments at the end of the notice period, the Director, for the Governor, will certify the revisions to the WQMP and the limits will be submitted to EPA for final approval. If there are adverse comments that warrant a public hearing during the notice period, then the effluent limits involved will be withdrawn from the update and will be included in the next statewide WQMP update public hearing. In addition, the above procedure will be used to update the WQMP for a change in location of a discharge.

THE TMDL PROCESS

Background

Section 303(d) of the federal Water Pollution Control Act requires each state to periodically identify those waters which under current controls or technology-based limits will not meet state water quality standards. Additionally, the State must prioritize those water quality-limited waterbodies, taking into account the severity of the pollution, and develop total maximum daily loads (TMDLs) for those parameters not meeting water quality standards. TMDLs are to be developed with considerations for nonpoint source and natural background loading as well as all point source loading to a specific waterbody. Implementation of TMDLs include updates to the Water Quality Management Plan and allocation of loads to all point and nonpoint sources.

NPDES permits and nonpoint source management plans are the primary implementation control vehicles.

Procedures

I. Identification of water quality-limited waterbodies

A. Compare results of statewide ambient monitoring network to existing water quality standards to assess if waters are meeting the numeric water quality standards and the designated uses.

B. Determine if technology-based controls on point source discharges are adequate to meet the water quality standards.

C. List in the biennial 305(b) report those waters which will remain water quality-limited after technology-based discharge limits are in place.

II. Priority Ranking and Targeting

A. Prioritize the water quality-limited waterbodies taking into consideration the severity of the pollution and the uses to be made of the waters. The highest priority waters for implementation of pollution controls will include those with the most serious water quality problems and those with the most valuable resources, such as existing drinking water supplies, extraordinary resource waters and ecologically sensitive waters.

B. Targeting of high priority waters will take into consideration the following:

1. risk to human health and aquatic life
2. degree of public interest and support
3. recreational, economic and aesthetic importance
4. vulnerability or fragility of a particular aquatic habitat
5. coordination with immediate programmatic needs such as new permits, permit renewals or expanded discharges

C. Those waters on which TMDLs will be developed within the upcoming biennium will be designated in the list of targeted waters.

III. Development of TMDLs

A. For those waters which are scheduled for TMDL development within the upcoming biennium a determination will be made if adequate information exists to determine load allocations for point and nonpoint sources.

1. If adequate information <u>does not</u> exist a phased approach TMDL will be developed. This includes confirming existing WLAs for point source discharges and LAs for existing nonpoint source programs. Also included will be a schedule for obtaining additional information on point, nonpoint and background loading; data for assessment of standards attainment and/or data for additional predictive modeling.

2. If adequate information <u>does</u> exist, TMDLs will be developed using either the (a) chemical specific approach; (b) the whole effluent toxicity approach; or (c) the biocriteria/bioassessment approach. For the chemical specific approach the dilution calculations/mass balance modeling approach will be used. For oxygen demanding discharges a steady-state model will be used. Determinations will be made for WLAs for point sources, LAs for nonpoint source and background levels and a margin of safety.

IV. Implementation of Control Actions

A. Update of water quality management plan

B. Implement WLAs for point source dischargers; list waters in highest priority category for nonpoint source control implementation.

V. Assessment of Water Quality-Based Control Actions

A. Initiate or maintain monitoring programs to evaluate the effectiveness of both point and nonpoint source control measures implemented in accordance with TMDLs.

B. Require permit conditions for point source dischargers that provide discharge information to substantiate compliance with WLAs developed in the TMDL process.

APPENDIX A

RESERVED FOR REGULATION NO. 2
(WATER QUALITY STANDARDS)

AVAILABLE AS SEPARATE DOCUMENT

APPENDIX B

EMERGENCY OPERATIONS PLAN AND EMERGENCY RESPONSE PROCEDURES

AVAILABLE AS SEPARATE DOCUMENT

APPENDIX C

CONSTRUCTION ASSISTANCE PROCEDURE AND LIST

AVAILABLE AS SEPARATE DOCUMENT

APPENDIX D

NPDES PERMIT IMPLEMENTATION

APPENDIX D

NPDES PROGRAM (GENERAL)

Arkansas currently operates a state NPDES program. This authority was granted to the state by EPA on November 1, 1986. The NPDES program is patterned very closely after the EPA program., using the federally approved forms for permit applications as well as monitoring reports. In the administration of the program, the Department has adopted by reference, in Regulation No. 6, most of the federal regulations applicable to a wastewater discharge permitting program. In addition, where state law is more stringent, the Department has drafted and implemented analogous provisions in appropriate sections of Regulation No. 6.

Permits are issued in accordance with EPA's commitments under the STARS program and as agreed between EPA and the State in federal grant workplan documents. The general priority for NPDES permit issuance is:

1. New major facilities
2. Carry over major facilities
3. Expiring major facilities (STARS commitments)
4. New minor facilities
5. Expiring minor facilities
6. Modifications of active permits

The State has not accepted administration of the federal program for disposal of residual waste from water treatment processing (503 Sludge Program). However, sludge disposal is regulated under a State Permits Program in accordance with the authority of Act 472 of the State of Arkansas. The requirements of the program are equivalent to or more stringent than federal requirements.

NPDES PERMIT/WQMP COORDINATION PROCEDURE

The following procedures should be followed to insure that permits are consistent with the Arkansas Water Quality Management Plan (WQMP). The procedures provide the reviewing engineer with the methodology to determine if the two are consistent and if not, outline the steps necessary to make them so. For the purposes of these procedures, the WQMP consists of the 303(e) Basin Plans, USGS Wasteload Allocations and approved wasteload studies or TMDL's.

Items 1 through 4, as stated in the permit, should agree item by item with what is in the WQMP. This information is in the 303(e) Basin Plans. However, effluent limits in the 303(e) Basin Plans

have been superseded by USGS Wasteload Allocations or by more current wasteload studies contracted or performed by ADEQ.

Items to Check:

1. Name of facility or discharger
2. Location of the discharge (Section, Range, Township) or
3. Receiving waters
4. Effluent Limits (BOD5/TSS/NH3-N/Eff. D.O.)

The USGS Wasteload Allocations are by river basin planning segment, i.e., 4C, 2F, etc. For a discharge that existed when these WLAs were performed, the effluent limits are listed in Appendix A of the study, by receiving stream. The "adjusted treatment" values give the limits necessary to meet Water Quality Standards according to the modeling.

For a new oxygen-demanding discharge, modeling will be performed to determine the appropriate effluent limits to meet water quality standards. Where appropriate, the Department Policy for Determination of Effluent Limitations will be used to determine effluent limits.

In all cases, a Water Quality Management Plan Update Summary Sheet should be filled out using the final values and forwarded to the Water Division. This will insure that the WQMP will be properly revised at the next plan update.

201 Coordination Procedure

In all cases, the Facility Plan check sheet will be completed before the Facility Plan compliance with the Water Quality Management Plan.

DEPARTMENT POLICY FOR DETERMINATION OF DOMESTIC WASTEWATER EFFLUENT LIMITATIONS

I. General Provisions

A. Effluent limits for all oxygen demanding wastewater effluent discharges of less than or equal to 0.65 MGD shall be determined as outlined below. In all cases applicable water quality standards shall be met. These limits shall include as a minimum BOD5 and TSS. Total ammonia, effluent D.O., and other nutrients shall be included when necessary.

1. Effluent limits for oxygen demanding flows of less than or equal to 0.05 MGD will be 10/15 (BOD5/TSS),

with nutrient removal when appropriate. Limits of 10/15 shall be considered Best Conventional Treatment (BCT) for dischargers in this flow range. However, less stringent effluent limitations may be permitted if stream modeling shows that water quality standards will be maintained.

2. Oxygen demanding effluent flows of greater than 0.05 MGD shall have effluent limits derived by a non-calibrated model, except in situations that warrant a calibrated and/or calibrated/verified model be performed. These situations will be addressed on a case-by-case basis, evaluating factors such as effluent receiving stream ratios, economic factors, and potential detrimental impact on designated uses.

B. Effluent limits for all oxygen demanding wastewater discharges greater than 0.65 MGD (1 cfs) will be derived by a calibrated model, when deemed necessary, following a field evaluation of the treatment facilities and the receiving waterbody(ies). Such facilities will be evaluated with regard to previous modeling, existing effluent limits, stream hydraulics (for determination of the appropriateness of reaction rates agreed upon in the modeling memorandum of agreement between ADEQ and EPA) and the existence of multiple discharges within the zone of impact and evidence of detrimental impacts or existing and designated stream uses. New discharges will be evaluated in a similar manner to determine the level of modeling necessary to adequately protect the water quality and designated uses of the receiving waterbodies.

C. An agreement between this Department and the U.S. Environmental Protection Agency, Region VI detailing reaction coefficients and review procedures is attached.

II. Outstanding National or State Resource Waters

Outstanding State Resource Waters (OSRW) include all waterbodies designated as extraordinary resource waters, natural and scenic waterways, or ecologically sensitive waterbodies.

A. Extraordinary/natural and scenic waterways named in WQS: In all cases, effluent limits must be modeled in accordance with the general provisions of this policy. In no event shall the effluent limits be greater than 10/15 (BOD5/TSS).

B. Tributary to OSRW or ONRW waterbodies, but not listed in WQS: Effluent limits for tributary streams shall be governed by the general policy. However, caution must be exercised to insure that the receiving stream shall comply with the Antidegradation policy, and that all designated uses in the ORWs downstream shall be protected.

C. Ecologically sensitive streams: Limits shall be determined on a case-by-case basis to protect the specific specie residing in the stream.

III. Reservoirs/Domestic Water Supply

A. In all cases applicable water quality standards shall be met.

B. Effluent limits for oxygen demanding flows discharging to any lake or reservoir shall be required to meet effluent limits of at least 10/15 ($CBOD_5$/TSS) with nutrient removal as appropriate.

IV. Oxygen Demanding Model Results

A. For models in which a margin of safety is built-in by several conservative inputs and the most conservative limits are used for the entire year or semi-annually, the model projections for BOD(CBOD) TSS, and ammonia will be utilized as the monthly average limit(AML) in permits. The maximum daily limit(MDL) will be AML x 1.5.

B. For models projecting chronologically segmented limits, e.g., quarterly, monthly, or real-time, the projections will be utilized as the MDL and the AML will be MDL/1.5.

C. All ammonia-nitrogen model projections shall be adjusted as necessary to limits below the acute toxicity values.

D. For model projected D.O. limits the value will be utilized as the AML and the instantaneous minimum will be the D.O. standard for the stream segment modeled.

APPENDIX D

Glossary

Non-calibrated model - A mathematical model which utilizes some field data, but is not calibrated to a measured or observed dissolved oxygen profile.

Calibrated model - A mathematical model which is calibrated to observed field data in the stream.

BOD5 - 5-Day Biochemical oxygen demand.

TSS - Total Suspended Solids.

APPENDIX D

MEMORANDUM OF AGREEMENT
BETWEEN
U.S. ENVIRONMENTAL PROTECTION AGENCY
AND
ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY

The Arkansas Department of Environmental Quality has been performing computer modeling on all oxygen demanding effluents in order to determine effluent limits necessary to meet the State Water Quality Standards. In the past, all modeling efforts were submitted to EPA for review and approval. This process has been time consuming and resource intensive for both agencies. In an effort to reduce the workload involved in this transmittal and review process, the following is proposed:

1. All models performed on discharge flows less than or equal to 0.1 MGD will be taken to Water Quality Management Plan Public Notice without EPA approval, provided that EPA's modeling criteria is followed by ADEQ. In addition, samples of models within this flow range will be reviewed by EPA during the 106 mid-year and end-of-year evaluations. Summary sheets for all facilities will be submitted to EPA at the time these facilities are taken to public notice.

2. Models and summary sheets of dischargers having flows greater than 0.1 MGD will be submitted to EPA for review and approval prior to Water Quality Management Plan update,

3. The Arkansas Department of Environmental Quality will use EPA modeling procedures outlined in Appendix A of Technical Guidance Manual for Performing Wasteload Allocations for determination of reaction coefficients. The following coefficient ranges will generally be applied:

   Kd - CBOD decay rates of 0.5-0.8/day will be used in small streams with generally rocky substrates, The higher values within the range may be assigned to streams with high stream slopes. Decay rates of 0.3-0.4/day will be used for streams having sandy substrates. Values less than 0.3/day will be used in large, deep rivers due to dilution ratios.

   Ka - Reaeration rates used in computer modeling, can be derived from numerous formulas, most of which incorporate stream depth and velocity or stream velocity and slope. Of those formulas incorporating depth and velocity, we have found that the Owens formula and the O'Connor-Dobbins formula tend to fit the lowland Arkansas streams, while the Tsivoglou formula, incorporating slope and velocity, is generally applicable to the upland free flowing streams. Any deviations

from using reaeration rates derived from these formulas will be justified on a case by case basis. In addition, all reaeration rates greater than 15/day will be justified by inclusion of pertinent stream data such as stream slope, stream velocity, or other factors that might create a high Ka. In most all situations the reaeration rates will be less than 15/day.

Kn - The nitrogenous decay rate used in modeling will generally be in the 0.3-0.4/day range for most Arkansas streams. Kn's of 0.1-0.2/day will be used in the major rivers of the State which have large flows and high stream depths.

Benthal Demand - In accordance with Appendix A guidelines, benthal demand for most Arkansas streams receiving advanced treated water will be in the 0.3-0.5 gm/m2/day range at the 10-15 (BOD_5-TSS) level and 0.5-0.8 gm/m^2/day range at the 20-20 level. The values at the lower end of the range will apply to rocky-gravelly streams while the upper end values will apply to sand substrates. Secondary treatment benthal demand will be in the 1.0-1.5 gm/m^2/day range based on the concentration of the TSS component and the nature of the streambed.

Deviations from these rate applications may take place in situations of high instream dilution, which significantly reduces the impact of the benthal deposits on oxygen consumption. In these situations, justification on a case by case basis will be provided.

APPENDIX D

Nutrient Control Implementation Plan

The control of nutrients (nitrogen and phosphorus) in waters of the State is a complex process due to:

(1) the difficulty in measuring impacts from these elements - impacts most often manifest themselves as an indirect response, e.g., excessive periphyton growth in streams causing substantial dissolved oxygen fluctuations, or excessive phytoplankton production in lakes which produce taste and odor problems in public drinking water supplies.

(2) the variation of responses in different waterbodies - responses are relatively short-term , spatially and temporally, in streams and relatively long-term in impounded waters due primarily to the longer retention time in reservoirs.

(3) difficulty in measuring the assimilation process - these elements change state rapidly through the oxidation/reduction process and within the food chain of aquatic organisms, and they continuously recycle within the environment unless removed to another environment.

(4) the expense of treatment and the disposal of treatment by-products(sludge) - the expense of treatment must be weighed against the benefits of the treatment; current treatments involve changing the state of these elements from dissolved in liquid to attached to solids. The latter state is also very capable of returning to the liquid state. True controls, therefore, include prevention from entering a basin of removal from the basin.

Nutrient standards do not exist at the national level or in State Regulation No. 2; however, guidelines from EPA guidance are listed in the water quality standards and include a maximum of 0.1 mg/L of total phosphorus for streams and 0.05 mg/L for lakes and reservoirs. In addition, the Safe Drinking Water Act MCL (maximum contaminant level) of 10 mg/L nitrate - nitrogen is used to limit point source discharges to protect the drinking water designated use in surface waters. Regulation No. 6 also limits discharges to 10 mg/L of NO_3-N for discharges which enter the ground water (losing streams). It is also established in this CPP that nutrient removal(both N and P) may be required as appropriate for discharges directly into reservoirs.

APPENDIX D

National Plan

A national plan for nutrient control is being developed as a result of the charge from Vice President Gore on October 18, 1997, which is, "EPA will establish a schedule so that EPA and the States are implementing a criteria system for nitrogen and phosphorus runoff for lakes, rivers and estuaries by the year 2000."

The national plan calls for the development of a national nutrient strategy, development of waterbody specific guidance, development of an ecoregion/waterbody data base, establishment of ecoregion nutrient ranges and implementation of nutrient controls through water quality standards and TMDL's.

State Plan

In anticipation of the national plan, the state will begin to develop data concerning nutrient levels in waters of the state. The existing statewide, ambient, water quality monitoring network has an abundance of in-stream nutrient concentration data. Loading data, however, is somewhat less dependable due to the lack of more frequent flow determinations at most stations. In contrast, concentration and loading data from point source discharges is very limited.

In order to establish a data base of point source loadings of nutrients to waters of the state, NPDES permit requirements will include nutrient monitoring as follows:

Parameters - nitrite + nitrate - nitrogen (630)
total phosphorus (665)
soluable reactive phosphorus (70507)

Frequency - same as BOD

Facilities -
(1) all major municipal facilities,
(2) all minor municipals with food processing plants as industrial users,
(3) all food processing facilities, and
(4) all other major facilities with significant organic waste in process water.

APPENDIX D

MIXING ZONE POLICY

Background

The establishment of a mixing zone for application in determining waste discharge limits is an option of the State. The Environmental Protection Agency does not propose a mixing zone, but allows the State to establish a mixing zone if it chooses. The alternative to a state-designed mixing zone is no mixing zone. With no mixing zone all water quality standards would apply at the end of the discharge pipe. Arkansas' mixing zone is based on a flow volume which is used in calculation of discharge limits (using mass balance calculations) from instream waste limits established by the water quality standards. Additionally, limitations may apply to mixing zones to provide a zone-of-passage for aquatic organisms.

Definition

A mixing zone is an area where an effluent discharge undergoes mixing with the receiving waterbody. For toxic discharges, a zone of initial dilution (ZID) may be allowed within the mixing zone; however, acute toxicity* standards may not be exceeded outside the zone of initial dilution. Within the ZID acute toxicity standards may be exceeded, but acute toxicity may not occur. Chronic toxicity* shall not exist at, or beyond, the edge of the mixing zone.
*As defined in Regulation No. 2

Procedures

Where mixing zones are allowed, the effects of wastes on the receiving stream shall be determined after the wastes have been thoroughly mixed with the stream water. Outfall structures should be designed to minimize the extent of mixing zones to ensure rapid and complete mixing.

For aquatic life toxic substances in larger streams (those with Q7-10 flows equal to or greater than 100 cfs), the zone of mixing shall not exceed 1/4 of the cross-sectional area or critical flow volume of the stream. The remaining 3/4 of the stream shall be maintained as a zone of passage for swimming and drifting organisms, and shall remain of such quality that stream ecosystems are not significantly affected.
In the smaller streams (Q7-10 flows less than 100 cfs), because of varying local physical and chemical conditions and biological phenomena, a site-specific determination shall be made on the

percentage of river width necessary to allow passage of critical free-swimming and drifting organisms so that negligible or no effects are produced on their populations. As a guideline, no more than 2/3 of the cross-sectional area or critical flow volume of smaller streams should be devoted to mixing zones thus leaving at least 1/3 of the cross-sectional area free as a zone of passage.

The size of a mixing zone for streams or run-of-river reservoirs with a critical season residence time of less than 20 days shall be calculated as a flow volume as follows:

1. Numeric Standards for Aquatic Life Toxicity [As listed in Section 2.507 of Water Quality Standards] - For large streams 25 percent of the critical flow shall be used for mixing. In small streams 67 percent of the critical flow shall be used as the mixing zone. The ZID shall be 50 percent of the mixing zone in all streams except those listed below. The ZID shall be 25 percent of the mixing zone in the following waters:

   Mississippi River
   Arkansas River
   White River below confluence of Black River
   Ouachita River below confluence with Little Missouri River
   Red River

   However, when a high rate diffuser is used in the above named waters, the ZID may equal 50 percent of the mixing zone.

2. Whole Effluent Toxicity (for all aquatic life toxics not listed in Section 2.507 of Water Quality Standards) - For large streams 25 percent of the critical flow shall be used for the mixing zone for chronic toxicity requirements; a ZID for acute toxicity requirements shall be 10 percent of the mixing zone. In small streams 67 percent of the critical flow shall be used as the mixing zone for chronic toxicity requirements; a ZID of 10 percent of the mixing zone shall be used for acute toxicity requirements.

3. Human Health Criteria - The stream volume calculated at the critical flow shall be used for mixing.

4. Bacteria, Oil and Grease - No mixing zone allowed.

5. All Other Pollutants - The total critical flow volume shall be used as a mixing zone for all size streams. A zone of initial dilution (ZID) is not applicable.

In lakes and reservoirs the size of mixing zones shall be defined by the Department of Environmental Quality on an individual basis, and may be determined by site-specific studies using appropriate dispersion or jet-mix models.

Mixing zones shall not prevent the free passage of fish or significantly affect aquatic ecosystems, and a mixing zone shall not include any domestic water supply intake.

MINERALS IMPLEMENTATION POLICY

Mineral standards are viewed as more similar to human health criteria and are designed to protect against long-term exposure, which in some cases includes the lifetime of the organism.

Minerals, at least in the low concentrations designated in the water quality standards, do not cause discernable effects to the aquatic community. Rather, as mineral concentrations are modified from low to high concentrations over long periods of time, certain species may be impacted and usually disappear to be replaced by other species. This effect takes place over the long-term, chronological flow hydrograph instead of at short-term, low flow concentrations.

Criteria for long-term effects such as human health criteria for consumption of aquatic life are converted to permit limits by using a statistically determined flow condition where 30% to 50% of the time the instream concentration will be less than the criteria. EPA headquarters has decided that the critical flow condition for human health criteria is derived by determining the harmonic mean flow for the receiving stream.

To treat minerals in a similar manner requires that some flow condition other than Q_7-10 be considered in determining permit limits. Although several options are available, such as long term average, geometric mean, and percent flow exceedances. None has the advantage of EPA acceptability, other than harmonic mean.

Once harmonic mean flows were selected as the critical flow for minerals, all available flow data was grouped by ecoregion and analyzed to determine if a regression model could be constructed to

accurately predict harmonic mean flows by drainage basin size. Unfortunately there was not enough flow data available from small stream basins to accurately extrapolate to the small watershed streams upon which many dischargers are located. However, adequate flow data was available from medium and large size watersheds.

The State's water quality standards require that the ecoregion perennial fishery be protected in waters with watershed size equal to or greater than 10 mi^2. A review of the limited number of flow data from the smallest watershed sizes within each ecoregion indicate that the median flow for 10 mi^2 watershed streams range from just less than 3 cfs to just over 7 cfs. Ecoregion averages are from about 3 to 5 cfs. Therefore, a statewide median flow of 4 cfs was selected to be used in place of harmonic mean flows were insufficient data exists to establish such flows. This provides for maintenance of the ecoregion mineral standard in all perennial fishery streams 50 percent or more of the time.

To summarize: 1) it was determined that harmonic mean flow best represented the critical flow to be used for mineral discharge limits; 2) insufficient data exists to develop a regression model by stream size and ecoregion to predict harmonic mean flow for small watershed streams; and 3) in the absence of sufficient data to establish a harmonic mean flow in the small watersheds a critical flow of 4 cfs will be used.

MINERAL PERMITTING STRATEGY

A. In accordance with Arkansas Water Quality Standards, instream mineral standards, after mixing, shall be the ecoregion values listed plus one third of these values or a total of 15 mg/l for chlorides and sulfates, whichever is larger. Additionally, the sum of the amount added to the ecoregion values for chlorides and sulfates may also be added to the TDS to determine that standard.

B. Instream criteria shall not be allowed to exceed secondary drinking water standards of 250 mg/l of CL, 250 mg/l of SO_4 and 500 mg/l of TDS. This criteria shall be applied at the critical flow of 7Q10 for all streams. This requirement is necessary to insure that for streams having a 7Q10 flow of zero the instream concentration of minerals will not exceed the secondary drinking water standards and therefore, impair the drinking water use.

C. Harmonic mean flow, or 4 cfs if insufficient data exist, shall be the critical flow used for determining mineral discharge limits for protecting aquatic life uses.

D. When considering mixing zones, the entire critical stream flow shall be used for mixing.

E. When insufficient flow data exists at the stream location in question to determine the harmonic mean flow such as on the majority of small watershed streams that have not been gauged due to frequent periods of zero flow, the critical flow value of 4 cfs shall be used for protection of aquatic life uses.

F. Final effluent limits derived by this policy shall be considered to be monthly average effluent limits. Maximum daily discharge limits shall be 1.5 times greater.

G. The mass balance equation requires that a background concentration be used in determining final effluent limits.

APPENDIX D

Following is a table displaying values to be used in this equation. For small streams (a 7Q10 less than 100 cfs) a mean concentration by ecoregion shall be used.

	Chlorides	Sulfates	TDS
Gulf Coastal Plain	5	13	67
Ouachita Mountains	3	6	53
Arkansas River Valley	4	4	51
Boston Mountains	3	3	37
Ozark Highlands	6	6	143
Delta	9	10	188

For large streams the closest upstream station in the following table shall be used. These values are period of record mean values.

	Chlorides	Sulfates	TDS
Red River			
RED25	152	116	565
At Index	182	133	635
RED09	93	65	387
Ouachita River			
OUA08A	38	13	127
At Camden	13	7	68
OUA30	10	12	60
Arkansas River			
ARK38	96	47	341
ARK33	99	48	347
ARK32	100	49	350
ARK31	99	47	346
ARK30	92	44	315
ARK29	88	43	294
ARK46	83	50	304
ARK49	73	46	294
ARK48	78	46	298
ARK20	77	40	298
White River			
WHI36	6	7	146
WHI31	6	6	146
WHI29	5	7	157
At Calico Rock	4	7	153

WHI46	5	6	146
St. Francis FRA13	8	14	141

H. In order to assure that instream toxicity does not occur from minerals discharges allowed under this procedure, the following permitting steps will be taken:

1) Calculate discharge permit limits using ecoregion standards, the above described background values, and the critical flow.

2) If there is a reasonable potential that the ecoregion-based, water quality standards will be exceeded, permit limits which meet ecoregion standards will be developed.

3) If ecoregion standards are met utilizing the procedure discussed above, the following options apply:

A) For discharges into streams equal to or less than 10 $mi.^2$ watershed, issue permit without limits.

B) For discharges into streams with watersheds greater than 10 $mi.^2$, one of the following will apply:

a) If the IWC at Q7-10 flow is equal to or less than 100/100/500(chlorides/sulfates/total dissolved solids) the permit is issued without limits.

b) If IWC at Q7-10 flow is greater than 100/100/500 but less than 230/250/500 issue permit with calculated limits based on 4 cfs background flow.

c) If IWC at Q7-10 flow exceeds 230/250/500, actions must be taken to remove the drinking water designation from the receiving waterbody if it is designated as a domestic drinking water supply; additionally, chronic toxicity testing must be conducted no less than every other month for one year to demonstrate that no toxicity exist.

APPENDIX D

IMPLEMENTATION PROCEDURES FOR TOXIC SUBSTANCES

The Department has adopted the Region VI "Post-Third Round Permitting Strategy" as an implementation procedure. Additionally, specific discharge permit implementation procedures are prepared for both the narrative and numeric toxicity standards.

POST-THIRD ROUND NPDES PERMIT IMPLEMENTATION STRATEGY

I. Preamble

A. Background

Over the history of the NPDES permit program, the Environmental Protection Agency (EPA) has focused on two primary concepts to abate the discharge of pollutants. First, EPA has utilized a technology-based control approach. This was reflected in permits originally issued with requirements for secondary treatment (municipalities) and Best Practicable Control Technology Currently Available (industries). More recently permits have required implementation of the Best Conventional Pollutant Control Technology, Best Available Technology Economically Achievable (industries) and pretreatment program development (municipalities).

Secondly, EPA has addressed water quality as impacted primarily by conventional (or oxygen demanding) parameters. This has occurred through the use of specific state water quality standards (and the resulting water quality management plans) for specific pollutants.

EPA Region 6 moved into the "third round" of NPDES permits in 1987. The focus of these "post BAT" permits was to move beyond our first two phases of control and insure that adequate controls are being implemented to confirm that human health and aquatic life are being adequately protected on a site-specific receiving stream basis. Region 6 developed its third round policy on March 11, 1987, and adopted a strategy to implement this policy on April 1, 1987, revised October 31, 1989.

On October 1, 1992, and in support of the National Policy, Region 6 adopted the "Policy for Post Third Round NPDES Permitting".

B. EPA National Policy

The Clean Water Act states that "...it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited." In addressing this, the EPA outlined the national policy objectives for development of post-BAT NPDES permit limitations (third round) in the March 9, 1984, Federal Register. This policy states that "to control pollutants beyond Best Available Technology Economically Achievable (BAT), secondary treatment, and other Clean Water Technology-based requirements in order to meet state water quality standards, the EPA will use an integrated strategy consisting of both biological and chemical methods to address toxic and nonconventional pollutants from industrial and municipal sources. Where State standards contain numerical criteria for toxic pollutants, NPDES permits will contain limits as necessary to assure compliance with these standards.

In addition to enforcing specific numerical criteria, EPA and the States will use biological techniques and available data on chemical effects to assess impacts and human health hazards based on the general standards of 'no toxic materials in toxic amounts'."

"Where violations of water quality standards are identified or projected, EPA and the States will develop water quality based effluent limits for inclusion in any issued permit. Where there is a significant likelihood of toxic effects to biota in the receiving stream, EPA and the States may impose permit limits on effluent toxicity and may require a NPDES permittee to conduct a toxicity reduction evaluation. Where toxic effects are present but there is a significant likelihood that compliance with technology based requirements will sufficiently mitigate the effects, EPA and the States may require chemical and toxicity testing after installation of treatment and may reopen the permit to incorporate additional limitations if needed to meet water quality standards."

C. National Regulations

Section 122.44(d)(1) of Title 40 of the Code of Federal Regulations requires EPA and the delegated states to evaluate each NPDES permit for the potential to exceed a state numerical or narrative water quality standards, including those for toxics, and to establish effluent limits for those facilities with the "reasonable potential" to exceed those standards. These regulations require chemical specific limits, based on state numerical water quality standards or other criteria developed by EPA, and whole effluent toxicity effluent limits.

D. Implementation Strategy

The intent of this strategy is that there shall be no discharge of any wastewater from any source (industrial, municipal, or federal facility) which:

1. Results in the endangerment of any drinking water supply;
2. Results in aquatic bioaccumulation which endangers human health;
3. Results in any instream acute or chronic aquatic toxicity after dilution; or
4. Violates any other applicable general or numerical state water quality standard.

The State of Arkansas is currently implementing EPA's Post Third Round Policy in conformance with the EPA Regional strategy. The 5-year NPDES permits contain technology-based effluent limitations reflecting the best controls available. Where these technology-based permit limits do not protect water quality or the designated uses, or where there are no applicable technology-based limits, additional water quality based effluent limitations and/or conditions are included in the NPDES permits. State narrative and numerical water quality standards from Regulation No. 2 are used in conjunction with EPA criteria and other available toxicity information to determine the adequacy of technology-based permit limits and the need for additional water quality-based controls.

II. Overview

A. The goal of the regional policy is to assure that there are "no toxic materials in toxic amounts" in waters of the United States; this is stated in the Water Quality Act as the national policy. The specific areas of concern are human health protection and aquatic biota protection.

B. General Implementation Procedure

1. In accordance with the priorities listed below, all potential significant contributors to toxicity will be evaluated at permit issuance or when modifications are requested for new processes or expansions. Also, the discharges in known areas of ambient toxicity will be evaluated. This evaluation will consist of a review of both specific chemical data and toxicity testing data representative of the facility's discharge into the receiving water. The review will consist of a projection of ambient impacts at appropriate critical low river flow conditions or at the appropriate mixing zone conditions for lakes.

2. Routine biomonitoring and, where appropriate, chemical specific monitoring of discharges will be required for all major dischargers.

3. Increased monitoring of discharges may be required in areas of suspected ambient toxicity problems to confirm the presence and causes of ambient toxicity. Suspected toxicity will be verified by toxicity testing, specific chemical evaluations and/or bioassessments.

4. Appropriate controls will be established to correct identified problems at permit reissuance, or by reopening the permit, if necessary to prevent ambient toxicity.

C. Priorities

The regional policy will be implemented to the maximum extent possible given available EPA and state resources in accordance with the following priorities:

1. Facilities with known or suspected toxicity problems.

2. Other major industrial, municipal and federal facilities.

3. Other minor industrial and federal facilities.

4. Other minor municipal facilities.

5. Stormwater only facilities

D. Control Measures

The following general control measures will be utilized to implement the policy:

1. Specific chemical effluent limits in accordance with water quality standards; and/or

2. Whole effluent toxicity testing on a flow weighted composite sample of <u>all</u> discharges from a facility into a receiving stream. The results of such testing may trigger a requirement to conduct a toxicity reduction evaluation and/or the imposition of whole effluent toxicity limitations; and/or

3. Pollution prevention measures and best management practices; and/or

4. No facility will be allowed to discharge in excess of the technology based limit for that specific chemical and discharge type.

III. Human Health Protection (Specific Chemical)

A. State Numerical Standards: Permits written under this strategy will establish effluent limits, if specific chemical state water quality standards, established for protection of human health, have a reasonable potential to be exceeded.

B. Food Consumption: For pollutants for which there are no applicable state water quality standards:

1. The State will calculate the instream concentrations of all Priority Pollutant for which EPA has published human health criteria in the current edition of EPA's "Quality Criteria for Water." These calculations will use an appropriate flow or mixing zone condition.

2. In using these criteria and information, the State will follow the cancer risk level of 10^{-5} and fish consumption rate of 7.5 g/day.

3. Where these dilution calculations indicate that instream pollutant concentrations may exceed the criteria referenced in paragraph III.B.1, the facility will be required to monitor for those pollutants. NPDES permits may be reopened for point sources that are shown to cause or significantly contribute to these ambient problems.

C. Fish Tissue Information:

1. If available fish or shellfish tissue information identifies the potential threat to human health at a cancer risk greater than those specified in III.B.2, permittees discharging into the waterbody may be required, by way of a permit requirement or request for information under Section 308 of the Clean Water Act, to analyze their effluents for the subject pollutants. The permits for facilities found to be causing or significantly contributing to this problem may be reopened to establish effluent limits based on the appropriate state water quality standards.

2. Enforcement action will be considered under Arkansas Act 472 and ADEQ Regulation #8 if

available fish or shellfish flesh information confirms the existence of an imminent and substantial endangerment to the health or welfare of persons, such as an exceedance of the FDA Action Levels.

IV. Chemical Specific Controls for Aquatic Biota Protection

A. State Numerical Standards: Permits written under this strategy will establish effluent limits, if specific chemical water quality standards are or have a reasonable potential to be exceeded.

B. Chlorine: Permits for facilities with the potential for a continuous discharge of chlorine will be regulated through the State's Whole Effluent Toxicity Monitoring Program.

C. Pretreatment: POTWs with approved pretreatment programs controlling indirect discharges of toxic pollutants will be required to develop and adopt technically based local limits (or demonstrate that they are not necessary) which will protect against pass-through, interference and sludge contamination. Additionally, POTWs with approved pretreatment programs will be required to monitor the influent, effluent and sludge concentration of toxic and hazardous pollutants, as applicable, in order to evaluate the adequacy of the local limits on an ongoing basis. Some non-pretreatment POTWs with substantial industrial contributions may be required to monitor influent and effluent for toxic pollutants on a case-specific basis.

V. Biological Controls for Aquatic Biota Protection

A. Specific state required effluent limits or monitoring for whole effluent toxicity will be imposed as required by the state water quality standards and implementation plan.

B. Where toxicity is identified as a result of a facility discharge, the State will proceed with permit whole effluent toxicity limits to regulate controllable pollutants.

1. Effluent limits will be established using available state water quality standards and implementation

procedures, which may include whole effluent toxicity limits.

2. "Toxicity Reduction Evaluations" may be initially required to identify the source(s) of the toxicity and determine how the toxicity can be reduced as a part of a schedule leading to compliance with effluent limits.

C. Permits issued to dischargers with a potential for causing ambient toxicity will require that the permittee perform periodic toxicity screening using whole effluent biomonitoring techniques.

1. Permittees may be required to monitor for the duration of the permit if indications of toxicity occur. The monitoring frequency will be based on toxicity potential and effluent variability.

2. State implementation procedures will determine the applicability of acute or chronic test methods.

3. Discharge samples used for biomonitoring analysis will consist of flow weighted composite samples representative of a 24-hour operating day.

4. Required biomonitoring will be performed in accordance with methods published in references 2, 3, and 4 in the attached bibliography. The permit will require a dilution series necessary to calculate the NOEL. One dilution will be reflective of the critical low flow dilution.

5. Tests on more than one species will be required. Some combination of the following test methods or methods will be required for biomonitoring:

Freshwater receiving streams (salinity <2000 ppm)
- -48-hour Daphnia acute survival
- -48-hour Fathead Minnow acute survival
- -7-day Ceriodaphnia chronic survival/ reproduction
- -7-day Fathead Minnow chronic survival/growth

6. Dilution water used in the biomonitoring test will be receiving stream water collected at a point

upstream of the discharge point(s) or other stream water if approved by the permitting authority. Synthetic laboratory water will be used if the upstream water is shown to already be toxic or if there is no acceptable natural water.

D. When the biomonitoring data shows actual or potential toxicity after dilution with the receiving stream, permittees will be required to retest their effluent to determine if toxicity is consistent or occurs on a periodic basis. If effluent toxicity is persistent, whole effluent toxicity limits and/or a TRE requirement will be applied, as appropriate.

ADEQ DISCHARGE PERMIT, TOXIC CONTROL IMPLEMENTATION PROCEDURE

I. GENERAL PROVISION

Arkansas Regulation No. 2 (Regulation Establishing Water Quality Standards for Surface Waters of the State of Arkansas) states that "toxic materials shall not be present in receiving water, after mixing in such quantities as to be toxic to human, animal, plant or aquatic life, as to interfere with the normal propagation, growth and survival of the indigenous aquatic biota". There may be a zone of initial dilution (ZID) where acute toxicity standards may be exceeded. In no instance shall the entire mixing zone be acutely toxic."

II. DEFINING MIXING ZONE AND ZONE OF INITIAL DILUTION [Section 2.404 of Regulation No. 2]

A. Aquatic Life Toxicity for Specific Toxic Pollutants

1. Streams and Rivers

Mixing zones (MZ) and the zone of initial dilution (ZID) are expressed in the permit calculations as a percent of the receiving stream flow. The mixing zone for large streams (7Q10>100CFS) constitutes 25% of the critical flow.

For small streams (7Q10<100CFS) the mixing zone constitutes 67% of the critical flow.

The zone of initial dilution (ZID) is defined as 50% of the mixing zone in all streams except those listed below.

The zone of initial dilution (ZID) is defined as 25% of the mixing zone in the following waters:

Mississippi River
Arkansas River
White River below confluence with Black River
Ouachita River below confluence with Little
Missouri River
Red River

However, when a high rate diffuser is used in the above named water, the ZID may equal 50% of the mixing zone.

2. Lakes and Reservoirs

Mixing zones for lakes must be minimized and may not be allowed in lakes heavily used for recreation. A mixing zone for a lake is estimated using a jet mix model or Best Engineering Judgement.

B. Whole Effluent Toxicity Testing

1. Streams and Rivers

Mixing zones (MZ) and the zone of initial dilution (ZID) are expressed in the permit calculations as a percent of the receiving stream flow which is used as the critical dilution for toxicity testing. The mixing zone for large streams (7Q10>100CFS) constitutes 25% of the critical flow.

For small streams (7Q10<100CFS) the mixing zone constitutes 67% of the critical flow. ZIDs (for use in calculating critical dilution for acute testing) will be 10% of the mixing zone.

C. Human Health Criteria

For human health criteria, the stream harmonic mean flow shall be used as the mixing zone. The long term average flow may be used if the harmonic mean flow is unavailable and for the purpose of screening non-carcinogens.

D. Fecal Coliform Bacteria, Oil & Grease, pH

No mixing zone is allowed.

III. WHOLE EFFLUENT TOXICITY

Generally, all major facilities are subject to whole effluent toxicity testing (biomonitoring). Other facilities may be required to conduct such testing if the ADEQ determines the discharge to have significant potential for exerting toxicity.

A. Applicability of Acute or Chronic Test Methods

If facility discharges to large stream (7Q10>100CFS) and background flow to effluent flow is greater than 100 : 1 (7Q10:Q_d >100), Acute Biomonitoring is required. In all other cases, chronic testing is required.

B. Critical Dilution and Dilution Series

Critical dilution (low flow dilution) must be calculated using the following formula:

1. Acute toxicity:

$(Q_d/(Q_d + (0.25 \times 0.1 \times c.f.*)) \times 100$ (large stream)
$(Q_d/(Q_d + (0.67 \times 0.1 \times c.f.)) \times 100$ (small stream)

2. Chronic toxicity:

$(Q_d/(Q_d + (0.25 \times c f.)) \times 100$ (large stream)
$(Q_d/(Q_d + (0.67 \times c.f.)) \times 100$ (small stream)

*c.f. = critical flow

C. Dilution Series

Use calculated critical dilution and a chart of the 0.75 factor dilution series (See Attachment I).

D. Biomonitoring Options - See Attachment II

E. Frequency of Testing

1. Major Municipal

a. For permittees with a design flow greater than 1 MGD but less than 2 MGD and no known problems, the toxicity testing frequency shall be twice a year for both species.

b. For permittees with a design flow greater than or equal to 2 MGD and no known problems, the toxicity testing frequency shall be four times a year for both species.

c. For permittees with a design flow greater than or equal to 1 MGD and potential toxicity problems (e.g. failed pre-permit test, substantial industrial contribution and no pretreatment) the toxicity testing frequency may be twelve times a year for both species.

2. Major Industrial

a. If the permittee passed all previous toxicity tests, toxicity testing frequency shall be four times a year for both species.

b. If the permittee has a history of sporadic toxicity, toxicity testing frequency shall be twelve times a year for both species.

c. If no toxicity testing data exists, toxicity testing frequency shall be at a minimum four times a year for both species. If a potential problem exists, the permit writer may require more frequent testing.

All Minors

Toxicity testing requirements and the frequency of toxicity testing will be determined on a case-by-case basis. Emphasis will be given to minors with known or potential toxicity.

If a permittee required to test quarterly or semi-annually completes four consecutive toxicity tests, with no excursions, reduction of requirements may be authorized. If a permittee

required to test monthly completes one year of toxicity tests, with no excursions, these requirements also may be reduced.

F. Permit Limitations for Whole Effluent Toxicity

Reasonable potential for whole effluent toxicity is defined as the demonstration of significant toxic effects in two toxicity tests performed within a relatively short period of time. Generally this will be a failure in a permit-scheduled test followed by a failure in one of two required toxicity confirmation tests, also required by the permit. There may be occasional exceptions to this definition including a finding of reasonable potential based on several isolated toxic events, or a finding of no reasonable potential based on a more intensive data review. If there are sufficient historical data showing that the discharge is toxic to aquatic organisms in the receiving stream and/or after the permittee completes TRE, the permit must be reopened to establish effluent limitations for toxicity. Whole Effluent Toxicity limits for lethality will be expressed as 48-hour acute or 7-day chronic NOEC - no observed effect concentration based on the designed use and the appropriate percent effluent (calculated as critical dilution). A schedule of compliance may also be included in the permit.

IV. CHEMICAL SPECIFIC STANDARDS AND CRITERIA

A. Screening Procedure

Upon application for permit renewal, the submitted priority pollutant scan (major municipalities) or application form 2C (industries) must be reviewed for appropriateness of the analytical methods and Method Quantification Levels (MQLs - see Attachment III). Instream waste concentration IWC(concentration of each pollutant after mixing with the receiving stream) is compared with the applicable Arkansas Water Quality Standards as established in Reg. No. 2, and with the aquatic toxicity, drinking water and human health criteria obtained from the Quality Criteria for Water, 1986 (Gold Book).

APPENDIX D

The following expression is used to calculate the pollutant Instream Waste Concentration:

$$IWC = (C_d \times Q_d + C_b \times Q_b) / (Q_d + Q_b)$$

Where:

C_d - pollutant concentration in the effluent

The submitted analytical data from the effluent is screened against EPA's approved methods and appropriate Method Detection Levels (MQL's). If the MQL and analytical method for the specific pollutant with one available data point is acceptable, and the datum is greater than or equal to the MQL, the pollutant is determined as likely to be present in the effluent and an evaluation of its potential toxicity is necessary. For those specific pollutants with one datum shown as "non-detect"(ND), providing the level of detection is equal to or lower than the MQL, they will be determined as not potentially present in the effluent and no additional evaluation is necessary. However, if a detectable value is shown, even if below the MQL, this value must be entered in the PPS and the potential evaluated.

For those pollutants with multiple data values and all values are determined to be non-detect, no further evaluation is necessary. In cases where the data set includes some detectable concentrations and some values as ND, one-half of the detection level is used for those values below the level of detection to calculate the geometric mean of the data set.

A single detectable value, the geometric mean of a group of data points or the highest reported value (if less than 20 data points) must be multiplied by the factor of 2.13 (see Attachment IV for details of a procedure developed by EPA and adopted by the Department to extrapolate limited datasets to better evaluate the potential for the higher effluent concentrations to exceed water quality standards); where 20 or more data points are available, do not multiply by 2.13, but instead use the highest value reported over the last two years.

Q_d - effluent flow (mgd)

The design flow for municipalities and the highest monthly average flow for the last two years for industrial discharges is used as a default. However in cases where information exists to indicate that increased production is planned and/or projected and will ultimately require increased effluent discharge, the alternative projected increased effluent flow may be used to calculate permit parameters.

C_b - pollutant concentration upstream (mg/l),

Background concentrations are based on the EPA's "Strategy for Addressing Background Contributions, September 21, 1994" (See below). Also, if limits for one of the heavy metals with the existing standards is included in the permit, a reopener clause to allow permit modification when the total maximum daily loads and/or wasteload allocation study is finalized must be included.

Q_b - upstream flow (mgd)

- for comparison with chronic aquatic toxicity:
  25% of critical flow (large stream)
  67% of critical flow (small stream)

- for comparison with acute aquatic toxicity:
  13% of critical flow (large stream)
  33% of critical flow (small stream)

Except: 6% of critical flow in the Mississippi, Arkansas, White (below confluence with Black River), Ouachita (below confluence with Little Missouri R.), Red Rivers. If high rate diffuser is used in the above named water, use ZID of 13% of 7Q10.

- for comparison with bioaccumulation criterion:
  LTA or harmonic mean if available

- for comparison with drinking water criterion:
  Use 7Q10

APPENDIX D

STRATEGY FOR ADDRESSING BACKGROUND CONTRIBUTIONS
09/21/94

BACKGROUND: Region 6 has, during the past several years, issued NPDES permits containing effluent limits for pollutants which have an established numerical water quality standard and where the discharge has a reasonable potential to cause an exceedance of a water quality standard. This determination was made using the stream critical low flow as dilution. Consideration of background pollutant contribution in the receiving stream potentially results in a reduction in the mass and concentration limits for the discharge. To date the lack of accurate and representative stream data has prevented routine development of NPDES permit limits accounting for background pollutant concentrations. Additionally, the Region realizes the need to have Total Maximum Daily Load (TMDL) developed in segments containing multiple dischargers.

SCOPE: This Strategy applies to Major NPDES facilities discharging into perennial streams, lakes, bays, estuaries and tidal water bodies, and demonstrating a contribution of a pollutant regulated by a water quality standard. Discharges into open coastal waters and intermittent streams are not considered in this strategy. Additionally, "once through noncontact cooling water" dischargers will be required to conduct monitoring of the influent/effluent only when the intake water is drawn from the same body of water into which the discharge is made. Where multiple dischargers to a receiving stream impair an accurate assessment of background contributions, i.e., tidal water bodies or lakes, the State, affected Tribe or an established group of permittees with a common receiving stream may be requested to collect additional data on background contributions. As with any strategy, case specific situations may require best professional judgement during permit development. A reopener will be included to allow the modification and/or revocation and reissuance of the NPDES permit if a TMDL is performed or additional information indicates the permittee is causing or contributing to a water quality criteria exceedance.

States or affected Tribes which specify background data, via permit certification or through identification in the approved water quality standards implementation plan, may require the establishment of a water quality based limit in lieu of the monitoring program presented herein. Permit limits will not be established at a level less than the water quality criteria at end-of-pipe, except as a condition of permit certification. Compliance schedules for these facilities must comply with the State's or affected Tribe's approved water quality standards and implementation procedures. A reopener will be included to allow

the modification and/or revocation and reissuance of the NPDES permit if a TMDL is performed. However, if a TMDL is not performed the permit limit will become effective.

STRATEGY: When drafting NPDES permits, the permit writer will, on a pollutant by pollutant basis, review the available effluent data to determine if pollutants are present and regulated under the applicable State or affected Tribe water quality standards. The permit writer will also determine if there are pollutant data available on the receiving stream. All available data will be considered in this strategy.

Where available data is of reliable accuracy sufficient to support the development of a water quality based effluent limit based on the Water Quality Standards, Water Quality Standards Implementation Procedures and receiving stream background contributions a permit limit will be imposed. The permit writer will review and evaluate the available data and consider if the State or affected Tribe has specified background data, via permit certification or as identified in the implementation plan, to make a determination if the data support a water quality based permit limit. A permit limit will not be imposed that is more stringent than the water quality standard at end-of-pipe, thereby prohibiting the permittee from contributing to an exceedance. Additionally a compliance schedule will be provided, if applicable.

Where the background data do not support an effluent limit the permit writer will determine the need for a permit limit based solely on effluent data, after utilization of the reasonable potential factor for effluent variability and after compensation for the dilution effect of the receiving stream (accounting for the critical dilution effect without considering the background contribution of the pollutant). Where the effluent alone demonstrates a reasonable potential to cause an exceedance of a water quality standard an NPDES permit limit, with compliance schedule, will be established. Upstream monitoring and reporting of the limited pollutant will be required to establish background pollutant contributions.

When the effluent alone does not demonstrate a reasonable potential to cause a water quality exceedance, but an exceedance results when the receiving stream background contribution of that pollutant is considered in the calculation of the receiving water concentration (formerly known as "instream waste concentration"), a monitor and report requirement will be imposed on the permittee for that pollutant in both the effluent and receiving stream. This calculation involves using the geometric mean of the receiving

stream and effluent data, where available, or the arithmetic mean if the database can provide only summary information. While the reasonable potential factor for effluent variability is appropriate for this determination, receiving stream data will not be manipulated using a factor to account for variability.

All available receiving stream data must also be evaluated for appropriateness. Data which are determined to be inappropriate will not be used in the evaluation process. Data typically maintained and published by the State or affected Tribe will be considered appropriate for this strategy. Where data are not available or the pollutants were not detected, the background contribution will be assumed to be zero. Where appropriate data, with similar detection limits/Minimum Quantification Levels (MQLs), are collected indicating some measured and unmeasured quantities, an assumed value of one-half the reported detection limit/MQL will be used for unmeasured quantities.

Permittees required to monitor for State or affected Tribe water quality criteria shall monitor and report metal data as total recoverable. In situations where the receiving stream is not well characterized, the permittee may be required to or elect to monitor for water quality parameters which directly influence the water quality standard. As an example, when copper is monitored in the receiving stream the permittee may also be required to monitor and report Hardness (as CaCO3) and if the water quality standard is expressed as dissolved, Total Suspended Solids (TSS).

Data collection will require the permittee to monitor the receiving stream in an area that is representative of the receiving stream, upstream of and unaffected by the permitted discharge, This general description of the monitoring location will be established in the permit, or when appropriate a specific point may be identified.

Permit language will typically require the permittee to monitor the effluent and receiving stream quarterly (except for more frequent effluent monitoring as required in State or affected Tribe implementation procedures) during the life of the permit, with instructions to submit the data on periodic Discharge Monitoring Reports (DMRs). This will allow the collection of twenty data points for use in establishing appropriate water quality based effluent limits in future permit reissuance. This is not meant to preclude the use of other data collected in addition to the data collected by the permittee under this strategy. Where more data are needed or less data are determined to be sufficient, the State, affected Tribe or permit writer may establish a Best Professional Judgement frequency.

While the permittee will be instructed to collect information at representative seasonal flow conditions, it is anticipated that permittees may not be able to schedule sampling at optimum conditions. The information collected by the permittee should, however, approximate representative seasonal receiving stream flow conditions.

All permits issued under this strategy will contain a reopener clause. This will allow the permit to be modified and/or revoked and reissued if additional information becomes available or a TMDL is performed indicating a modification is necessary.

Lastly, when the permit writer determines water quality criteria are potentially being exceeded the Permits Branch will notify the Water Quality Management Branch of the pollutants and stream segment for inclusion in the appropriate segment attainment listing (304(1) or 305(b)) and the Water Quality Management Branch will be requested to coordinate the development of TMDLs with the appropriate State(s) or affected Tribe(s).

IMPLEMENTATION The strategy presented herein will be required of NPDES permits drafted after October 1, 1994, and will continue in effect until affected NPDES permits are reissued or until the State or affected Tribe performed TMDLs are approved for NPDES permitting.

LONG RANGE PERSPECTIVE Implementation of this strategy will allow the Region, States and affected Tribes to begin addressing background contributions in water quality based permitting through the collection of data necessary for the development of TMDLs. The TMDLs are necessary for the future issuance of NPDES permits with technically sound and defensible effluent limits. Additionally, this strategy avoids issuance of NPDES permits which direct the permittee to address water quality exceedances in the receiving stream for which the cause or significant contribution may be attributable to another permittee, a controllable point/nonpoint source, or have been addressed through NPDES permitting but current conditions are not reflected in the available data.

The Region recognizes a water quality based permit limit not considering background pollutant contributions may not represent the level of treatment ultimately necessary for compliance with an accurate water quality based effluent limit, after TMDL development. The Region cannot, however, permit a facility to continue to cause an exceedance of State or affected Tribe water quality standards, Therefore, facilities will be required to meet an "interim" water quality based limit until a TMDL is performed or

additional background data are collected which may determine additional treatment is necessary to maintain State or affected Tribe water quality standards.

B. Compliance With State Numerical Aquatic Toxicity Standards

The Pollution Control and Ecology Commission has adopted specific numeric criteria for protection of aquatic life from acute and chronic toxicity. (Section 2.508 of Reg. No. 2) Implementation of these standards into discharge permit limits will be as provided in "Region 6 Implementation Guidance for Arkansas Water Quality Standards" which is Attachment V.

The water-effect ratio is assigned a value of 1.0 unless scientifically defensible study clearly demonstrates that a value less than 1.0 is necessary or a value greater than 1.0 is sufficient to fully protect the designated uses of the receiving stream from the toxic effects of the pollutant.

The WER approach compares bioavailability and toxicity of a specific pollutant in receiving water and in laboratory test water. It involves running toxicity tests for at least two species, measuring LC50 for the pollutant using the local receiving water collected from the site where the criterion is being implemented, and laboratory toxicity testing water made comparable to the site water in terms of chemical hardness. The ratio between site water and lab water LC50 is used to adjust the national acute and chronic criteria to site specific values.

If calculated Instream Waste Concentrations exceed the water quality (WQ) standard you must assume that there is a reasonable potential for the discharge to cause an instream excursion above the allowable ambient concentration of the numeric standard and therefore, based on 40 CFR 122.44(d)(1)(iii), the permit must contain effluent limits for the pollutant.

PERMIT LIMIT DERIVATION (based on the procedure recommended in the Chapter 5.4 of Technical Support Document for Water Quality-based Toxics Control (TSD), EPA, March 1991):

o Calculate instream chronic waste load allocation

(WLA_c) i.e. the level of effluent concentration that would comply with water quality standards (WQS) in the receiving stream

$$WLA_c = [[WQS \times (Q_d + Q_b)] - (Q_b \times C_b)]/Q_d$$

Where:

Q_d - the discharge flow in mgd (cfs)
Q_b - 0.25 X critical flow for large streams in mgd (cfs)
- 0.67 X critical flow for small streams in mgd (cfs)
C_b - the background concentration in mg/l

WQS- the aquatic toxicity standards which are functions of hardness must be calculated at the hardness values found in Attachment VI.

o Calculate instream acute waste load allocation (WLA_a) i. e. the level of effluent concentration that would comply with water quality standards (WQS) in the receiving stream.

$$WLA_a = [[WQS \times (Q_d + Q_b)] - (Q_b \times C_b)]/Q_d$$

Where:

Q_d - the discharge flow in mgd (cfs)
Q_b - 0.13 X critical flow (lrg st)
0.33 X critical flow (sm st)

Except:

0.06 X critical flow in the Mississippi, Arkansas, White (below confluence with Black R.), Ouachita (below confluence with Little Missouri R.), Red Rivers. If high rate diffuser is used in the above named water, use ZID of 0.13 X 7Q10.

C_b - the background concentration in mg/l

o Calculate Long Term Average (LTA) effluent concentration based on the chronic WLA_c and WLA_a:

$LTA_c = 0.72 \times WLA_c$
$LTA_a = 0.57 \times WLA_a$

o Select the limiting LTA (LTA with lower value)

o Calculate monthly average (AML) and daily maximum (MDL) final permit limit.

AML = LTA X 1.55*
MDL = LTA X 3.11

* AML factor is dependant on the number of samples per month. For less than four samples per month the factor of 1.55 is appropriate, if number of samples per month is greater than 4, recalculate for correct number of samples per month. See Table 5-2 on page 103 of the TSD. Assume CV of 0.6 and 95th percentile probability basis.

See Attachment VII for full derivation of LTA, AML and MDL factors.

If the calculated permit limit for any pollutant is less than MQL, the calculated value is used as the permit limit and a footnote is added to the limit which says that the method MQL will be used to determine compliance. To do this, permittee will need to use the appropriate test method.

Example of the footnote: "If any individual analytical test result is less than "MQL" and EPA method "(insert method NO.)" is used, then a value of zero(0) shall be used for the discharge monitoring report (DMR) calculations and reporting requirements".

Any permit which has "first-time" water quality based limits for dissolved metals and/or cyanide will include a compliance schedule of no more than three years and a reopener clause allowing for the permit to be reopened for final limits, and may include any adjustment of limits based on site-specific data collection or a water effects ratio study.

In a majority of situations a singular datum will be available for the initial screening and the Department will have to assume that the available datum is representative of the effluent characteristics of the respective pollutant. In some cases the evaluation will result in the inclusion of the limit in the draft permit. If, prior to finalization of the permit, the permittee submits the additional data showing that in fact the pollutant is not present in the effluent, the dataset will be reviewed again and the limit will be reassessed.

C. Protection of Aquatic Life (Pollutants for which there are no applicable state water standards)

For all pollutants for which there are no applicable state water standards, IWCs are compared with the Gold Book chronic and acute criteria. If dilution calculations show that in-stream concentration exceeds Gold Book criteria for chronic and/or acute toxicity, the permit will require the permittee to monitor and report for the pollutant of concern once per quarter for one year. A reopener clause will be included in the permit to provide permit limits if state water quality standards are developed for the applicable pollutants.

D. Compliance with State Numerical Human Health Criteria

Arkansas Water Quality Standards, Reg. No. 2 established specific human health criteria for 7 pollutants (see Regulation #2, Section 2.507). Use procedure as described in Paragraph IV.A above for screening purposes. If there is a reasonable potential for discharge to cause an instream excursion above the human health criterion, the permit must include an effluent limit for the pollutant.

PERMIT LIMIT DERIVATION (based on the procedure recommended in Paragraph 5.4.4 of TSD):

o Calculate instream waste load allocation (WLA):

$$WLA = [[WQS \times (Q_d + Q_b)] - (Q_b \times C_b)]/Q_d$$

where:
Q_d - the discharge flow in mgd (cfs)
Q_b - long term average flow or harmonic mean flow, if available
C_b - the background concentration in mg/l

o Calculate monthly average (AML) and daily maximum (MDL) final limitations:

$$AML = WLA$$

$$MDL = AML \times \frac{MDL}{AML}$$ (from Table 5-3, p.106

"Technical Support Document For Water Quality-based Toxics Control"(see Attachment VIII)

E. Protection of Human Health Criteria (fish consumption only; pollutants for which there are no applicable standards)

Use procedure as described in Paragraph IV.C.

F. Protection of Drinking Water Supply

IWCs are calculated for all pollutants discharged for which EPA has promulgated a Maximum Contaminant Level (MCL). If Instream Waste Concentration calculated using the critical flow exceeds MCL, it is assumed that the drinking water use will be impaired; therefore, a permit limit to prevent such impairment must be established.

G. Industrial Facilities

If technology based limits calculated for a facility do not protect water quality or the designated uses, additional water quality based effluent limitations are included in the permit.

H. LIMITATIONS FOR FECAL COLIFORM BACTERIA, OIL & GREASE, PH

Fecal Coliform Bacteria, oil and grease, and pH standards, as defined in Sections 2.507, 2.510, and 2.504 of Reg. No. 2 respectively, must be applied as end-of-pipe.

V. CHLORINATION/DECHLORINATION

For facilities NOT dechlorinating after using chlorine for disinfection, toxicity test results are reviewed to determine the necessity of corrective actions. If the chlorinated effluent is non-toxic and significant dilution is provided in the receiving stream (e.g., the Arkansas or Mississippi River)the permit will rely on biomonitoring to evaluate potential impacts from chlorine. If the toxicity test results show toxicity problems, a schedule of compliance to install dechlorination is required. The permit limit for chlorine will become effective when dechlorination is in place.

However, if discharge is to a small stream, inform the permittee of the toxic properties of chlorine (chances of failing biomonitoring testing) and suggest dechlorination. If the permittee agrees, include schedule of compliance, and limit of no measurable chlorine (0.1 mg/l as inst. max)

effective after dechlorination unit is in place. In the interim, monitoring and reporting for TRC must be required. If the facility disagrees, rely solely on biomonitoring. However, require monitoring and reporting of TRC levels.

VI. ESTABLISHING EFFLUENT LIMITATIONS WHEN THE AVERAGE BACKGROUND LEVEL EXCEEDS THE STATE WATER QUALITY STANDARD

The permit is issued with a water quality based limitation equivalent to the water quality standard at the end of pipe. This allows for a permit that does not contribute to or cause an exceedance of a water quality standard (40 CFR 122.44 (d)(1)(iii)). The permit may include reopener clause to allow permit modification if, as a result of UAA, water quality standards are revised.

VII. SCHEDULES OF COMPLIANCE

Section 2.104 of Reg. No. 2 allows "a reasonable time for an existing facility to comply with new or revised water quality standards. Compliance schedules may be included in NPDES permits at the time of renewal to require compliance with new water quality standards at the earliest practicable time; but not to exceed three years from the effective date of the permit".

An existing facility is allowed time to comply with the WQ based limitations only if those limits are new, i.e., they have never been previously included in the permit. The following policy applies to all permits:

A. New permits

Interim limitations and compliance schedules may be included in the permit, if:

1. The existing facility does not have adequate treatment system, or

2. There are insufficient monitoring data showing the ability of the existing system to meet new effluent limitations.

A schedule of compliance includes reasonable deadlines for submitting plans and specs, beginning and completing construction, and meeting final effluent limitations. In the interim, a monitor and report requirement is imposed; or,

interim limits based on the actual removal efficiency of the existing treatment system are established.

B. Renewal permit
Interim limitations and compliance schedule may be included in the permit only, if:

1. Water quality based limitations are imposed on parameters which have not been regulated in the previous permit and it is not known if the limit can be met with the existing treatment system.

   Interim monitoring and reporting only requirement or limit based on the actual levels of treatment may be imposed.

2. New more stringent WQ based limitations are proposed for parameters limited in the previous permit.

   If standards have been revised or more stringent limits are necessary and the existing treatment system may be incapable of meeting those limits, a schedule of compliance and interim limits may be considered. In the interim the most stringent of; effluent limits reflecting previous permit requirements, existing discharge level, or technology requirements are applied. [A monitor and report requirement would violate anti-backsliding provisions of the CWA and 40 CFR 122.41.]

APPENDIX D

Requirements for Development of Water Effect Ratio

Background

Amendments to 40 CFR Part 131, "Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; State Compliance," was published in the Federal Register Volume 57, No. 246, pp. 60848-60923 on December 22, 1992, and became effective February 5, 1993. This was later amended on May 4,1995 (FR Vol. 60, No. 86). This "National Toxics Rule" promulgates toxic pollutant criteria necessary to bring all states into compliance with the requirements of Section 303(c)(2)(B) of the Clean Water Act.

In Arkansas, water quality standards have been adopted for the following compounds: cadmium, chromium(III), chromium(VI), copper, lead, mercury, nickel, selenium, silver, zinc, and cyanide. All of the above named metals except chromium(VI), mercury, selenium, and cyanide exhibit toxicity inversely related to water hardness. For those metals the criteria is an equation expressed as a function of total hardness.

Interim Guidance on Interpretation and Implementation of Aquatic Life Criteria for Metals was published by EPA in May, 1992. This document lists the principal issue as the correlation between metals that are quantitatively measured and metals that are biologically available. Toxicity of metals is dependent on the form of the metal, which in turn varies with chemical and physical characteristics of the surrounding water matrix. This guidance provides some flexibility in the implementation of aquatic life criteria for metals by describing the use of water effect ratio (WER) as a mechanism for implementing metals criteria in waters of significantly different quality.

It is computed as a specific pollutant's acute (or chronic) value measured in water from the site covered by the standard, divided by the respective acute or (chronic) toxicity value in laboratory water. The acute value used is the LC50 generated by standard toxicity testing protocol. More simply, the WER is the LC50 of receiving stream-effluent mix (site water) versus the LC50 of laboratory water. An LC50 is the concentration of a toxicant (metal) which is lethal to 50 percent of the test organisms.

A WER of one (1) is assigned to the criteria calculation equation unless the permitting authority (ADEQ) assigns a different value that protects the designated uses of the receiving waterbody. To assign a value other than 1, the permittee must provide adequate studies to support the use of a different value. The WER will be used to adjust the standard to a site-specific value.

APPENDIX D

Specific Requirements

1. The LC50 of the receiving stream (above the discharge) must be greater than 100 percent; if the effluent is 100 percent of the critical stream flow, the LC50 for the effluent must be 100 percent. Discharge must be meeting WET requirements of permit, if not, TRE should be developed

2. Each WER determined must be specific for a single metal.

3. For discharges into streams with 7Q-10 equal to zero, a WER must be determined

   (a) for 100 percent effluent, and

   (b) when receiving stream flows approximate discharge design flows, use a receiving stream to effluent mix of 1:1.

4. For discharges into streams with 7Q-10 greater than zero;

   (a) a WER must be determined when the receiving stream flow is no higher than the average annual low flow; however, the appropriate mixing zone dilution for the critical flow shall be used, and

   (b) a WER must be determined when the receiving stream is at approximately the average annual flow (i.e. primary channel full); however, the appropriate mixing zone dilution for the critical flow shall be used.

5. All toxicity test organisms, procedures, and quality assurance requirements used shall be in accordance with the latest revision of "Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms", EPA/600/4-90/027. The following tests shall be used:

   (a) Acute static renewal 48-hour definitive toxicity test using Ceriodaphnia dubia. A minimum of five (5) replicates with a minimum of eight (8) organisms per replicate must be used for this test.

   (b) Acute static renewal 48-hour definitive toxicity test using fathead minnow (Pimephales promelas). A minimum of five (5) replicates with a minimum of eight (8) organisms per replicate must be used for this test.

6. The LC50 estimate and 95 percent confidence interval will be determined by the Probit, Spearman-Karber, or Trimmed

Spearman-Karber Method as outlined in the above referenced methods manual.

7. Water quality analyses of laboratory water and receiving stream-effluent mix shall be performed for the WER-metal (as dissolved), hardness (Ca and Mg by direct measurement and calculation), pH, alkalinity, total suspended solids, total organic carbon, and dissolved organic carbon.

8. Hardness values are to be determined as calcium and magnesium hardness only, which requires the separate determination of calcium and magnesium concentrations to produce calculated hardness as CaCO3 equivalent.

9. Results from LC50 determinations in site water and laboratory water must be from equivalent hardness values.

10. All metals values used in calculating WER will be the dissolved portion.

11. Metal concentrations in the dilution series for all LC50 determinations will be obtained by the addition of a highly soluble inorganic salt of the metal of concern, (e.g. nitrate, chloride, or sulfate).

12. The final WER is calculated as the geometric mean of the WER values for the most sensitive test species.

13. Since the WER reflects differences in water chemistry, it is acceptable to apply the WER derived from acute LC50's to both acute and chronic criteria.

14. The final report of WER determination will include a complete description of methods and materials used including raw data of all toxicity tests; all required chemical analyses with specified analytical method used; calculations used in determining mixing zone dilutions, metal concentrations in all dilutions; and procedures for any chemical or computational normalization of hardness values.

15. Submission of the final report for WER determination must be at least 12 months prior to the effective date of final permit limits for metals of concern to allow for review and resolution of concerns, any verification testing that may be necessary, and modification of permit if necessary.

ATTACHMENT I

0.75 DILUTION SERIES

After determining the Critical Dilution (CD), find that number in column 4. The dilution series is established in the row that number appears in. Example, for a CD of 30%, the series would be 13%, 17%, 23%, 30% and 40%, plus the required 0% Control. This ensures that there will be only 1 dilution above the CD, which aids the statistical analysis* For facilities with CDs greatar than 75%, the CD is the highest dilution and there will be four dilutions and the 0% control below the CD.

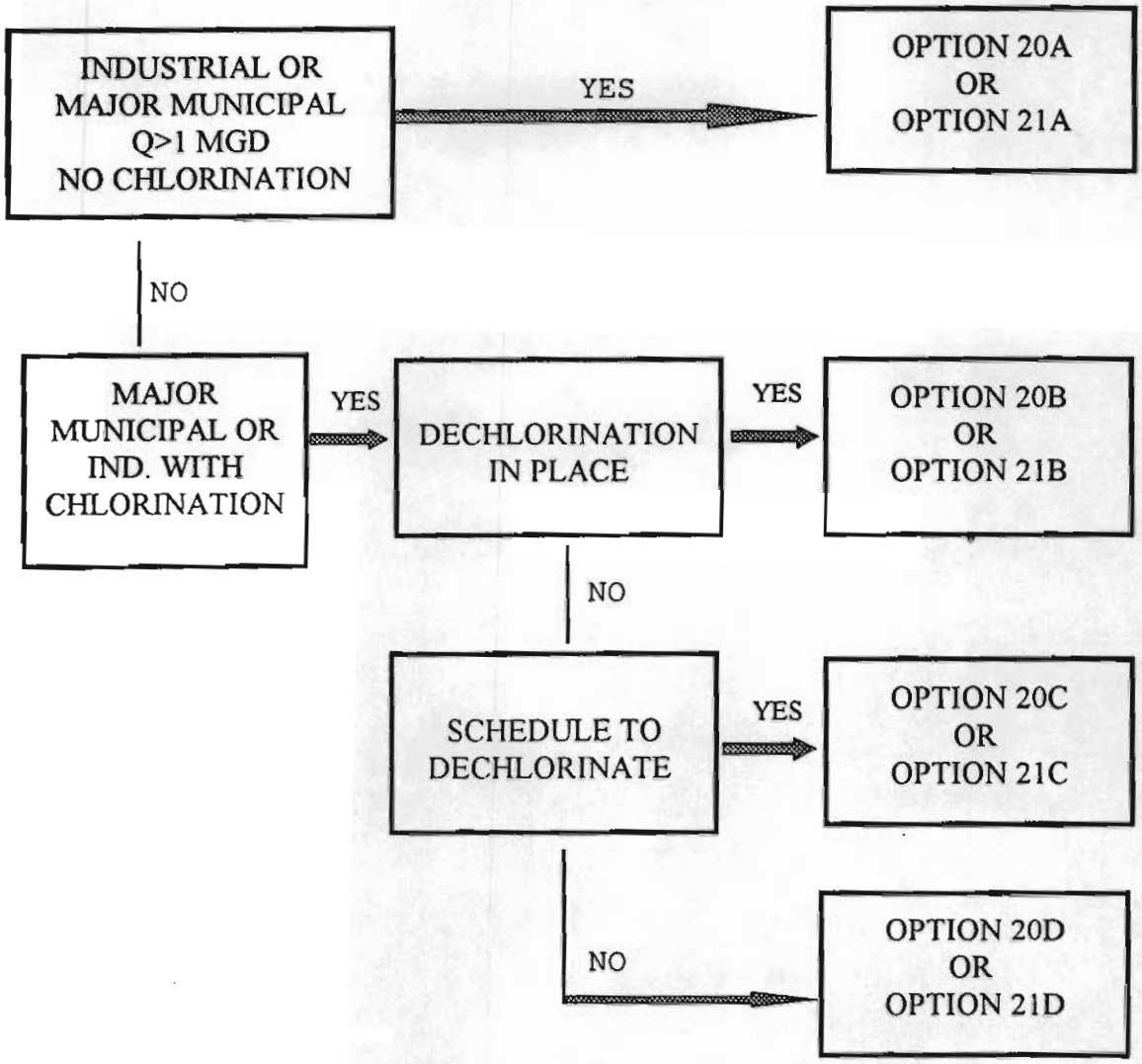
CONTROL 0%	1	2	3	CD 4	5
	0.4	0.6	0.8	1.0	1.3
	0.8	1.1	1.5	2.0	2.7
	1.3	1.7	2.3	3.0	4.0
	1.7	2.3	3.0	4.0	5.3
	2.1	2.8	6	5.0	6.7
	2.5	3.4	4.5	6.0	8.0
	3	4	5	7	9
	3	5	6	8	11
	4	5	7	9	12
	4	6	8	10	13
	5	6	8	11	25
	5	7	9	12	16
	5	7	10	13	17
	6	8	11	14	19
	6	8	11	15	20
	7	9	12	16	21
	7	10	13	17	23
	8	10	14	15	24
	8	11	14	19	25
	8	11	15	20	27
	9	12	16	21	28
	9	12	17	22	29
	10	13	17	23	31
	10	14	18	24	32
	11	14	19	25	33
	11	15	20	26	35
	11	15	20	27	36
	12	16	21	28	37
	12	16	22	29	39
	13	17	23	30	40
	13	17	23	31	41
	14	18	24	32	43
	14	19	25	33	44
	14	19	26	34	45
	15	20	26	35	47
	15	20	27	36	48
	16	21	28	37	49
	16	21	29	38	51
	16	22	29	39	52
	17	23	30	40	53
	17	23	31	41	55
	15	24	32	42	56
	15	24	32	43	57
	19	25	33	44	59
	19	25	34	45	60
	19	26	35	46	61
	20	26	35	47	63
	20	27	36	48	64

ATTACHMENT 1 (cont.)

CONTROL	CD				
08	1	2	3	4	5
	21	28	37	49	65
	21	28	38	50	67
	22	29	38	51	68
	22	29	39	52	69
	22	30	40	53	71
	23	30	41	54	72
	23	31	41	55	73
	24	32	42	56	75
	24	32	43	57	76
	24	33	44	58	77
	25	33	44	59	79
	25	34	45	60	80
	26	34	46	61	81
	26	35	47	62	83
	27	35	47	63	84
	27	36	48	64	85
	27	37	49	65	87
	28	37	50	66	88
	28	38	50	67	89
	29	38	51	68	91
	29	39	52	69	92
	30	39	53	70	93
	30	40	53	71	95
	30	41	54	72	96
	31	41	55	73	97
	31	42	56	74	99
	32	42	56	75	100
24	32	43	57	76	
24	32	43	58	77	
25	33	44	59	78	
25	33	44	59	79	
25	34	45	60	50	
26	34	46	61	51	
26	35	46	62	82	
26	35	47	62	83	
27	35	47	63	84	
27	36	48	64	85	
27	36	48	65	86	
28	37	49	65	87	
28	37	50	66	88	
28	38	50	67	89	
28	38	51	68	90	
29	38	51	68	91	
29	39	52	69	92	
29	39	52	70	93	
30	40	53	71	94	
30	40	53	71	95	
30	41	54	72	96	
31	41	55	73	97	
31	41	55	74	98	
32	42	56	74	99	
32	42	56	75	100	

ATTACHMENT II

Biomonitoring Options



ATTACHMENT III

MINIMUM QUANTIFICATION LEVELS (MQLS)

METALS AND CYANIDE		REQUIRED MQL (µg/L)	EPA METHOD
Antimony	(Total)[1]	60	200.7
Arsenic	(Total)[1]	10	206.2
Beryllium	(Total)[1]	5	200.7
Cadmium	(Total)[2]	1	213.2
Chromium	(Total)[1]	10	200.7
Chromium	(3+)[1]	10	200.7
Chromium	(6+)[1]	10	200.7
Copper	(Total)[2]	10	220.2
Lead	(Total)[2]	5	239.2
Mercury	(Total)[1]	.2	245.1
Nickel	(Total)[1]	[Freshwater]40	200.7
Nickel	(Total)[2]	[Marine] 5	249.2
Selenium	(Total)[1]	5	270.2
Silver	(Total)[2]	2	272.2
Thallium	(Total)[1]	10	279.2
Zinc	(Total)[1]	20	200.7
Cyanide	(Total)[1]	10	335.2
DIOXIN			
2,3,7,8-Tetrachloro-dibenzo-p-dioxin (TCDD)[3]		.00001	1613
VOLATILE COMPOUNDS			
Acrolein[4]		50	624
Acrylonitrile[4]		50	624
Benzene[4]		10	624
Bromoform[5]		10	624
Carbon Tetrachloride[5]		10	624
Chlorobenzene[5]		10	624
Chlorodibromomethane[5]		10	624
Chloroethane[6]		50	624
2-Chloroethyl vinyl ether[4]		10	624
Chloroform[5]		10	624
Dichlorobromomethane[5]		10	624
1,I- Dichloroethane[5]		10	624
1,2-Dichloroethane[5]		10	624
1,1-Dichloroethylene[5]		10	624
1,2-Dichloropropane[5]		10	624
1,3-Dichloropropylene[5]		10	624
Ethylbenzene[5]		10	624
Methyl Bromide (Bromomethane)[6]		50	624

	REQUIRED MQL (µg/L)	EPA METHOD
Methyl Chloride (Chloromethane)[6]	50	624
Methylene Chloride[5]	20	624
1,1,2,2-Tetrachloroethane[5]	10	624
Tetrachloroethylene[5]	10	624
Toluene[5]	10	624
1,2-trans-Dichloroethylene[5]	10	624
1,1,1-Trichloroethane[5]	10	624
1,1,2-Trichloroethane[5]	10	624
Trichloroethylene[5]	10	624
Vinyl Chloride[5]	10	624
ACID COMPOUNDS		
2-Chlorophenol[5]	10	625
2,4-Dichlorophenol[5]	10	625
2,4-Dimethylphenol[7]	10	625
4,6-Dinitro-o-Cresol [2 methyl 4,6-dinitrophenol][8]	50	625
2,4-Dinitrophenol[5]	50	625
2-Nitrophenol[6]	20	625
4-Nitrophenol[5]	50	625
p-Chloro-m-Cresol [4 chloro-3-methylphenol][5]	20	625
Pentachlorophenol[5]	50	625
Phenol[5]	10	625
2,4,6-Trichlorophenol[5]	10	625
BASE/NEUTRAL COMPOUNDS		
Acenaphthene[5]	10	625
Acenaphthylene[5]	10	625
Anthracene[5]	10	625
Benzidine4	50	625
Benzo(a)anthracene[5]	10	625
Benzo(a)pyrene[5]	10	625
3,4-Benzofluoranthene[5]	10	625
Benzo(ghi)perylene[6]	20	625
Benzo(k)fluoranthene[5]	10	625
Bis(2-chloroethoxy) methane[5]	10	625
Bis(2 -chloroethyl) ether[5]	10	625
Bis(2-chloroisopropyl) ether[5]	10	625
Bis(2-ethylhexyl) phthalate[5]	10	625
4-Bromophenyl phenyl ether5	10	625
Butyl benzyl phthalate[5]	10	625
2-Chloronapthalene[5]	10	625

Attachment III(cont.)

	REQUIRED MQL (µg/L)	EPA METHOD
4-Chlorophenyl phenyl ether[5]	10	625
Chrysene[5]	10	625
Dibenzo (a,h) anthracene[6]	20	625
2,2-Dichlorobenzene[5]	10	625
1,3-Dichlorobenzene[5]	10	625
1,4-Dichlorobenzene[5]	10	625
3,3'-Dichlorobenzidine[6]	50	625
Diethyl Phthalate[5]	10	625
Dimethyl Phthalate[5]	10	625
Di-n-Butyl Phthalate[5]	10	625
2,4-Dinitrotoluene[5]	10	625
2,6-Dinltrotoluene[5]	10	625
Di-n-octyl Phthalate[5]	10	625
1,2-Diphenylhydrazine[4]	20	625
Fluoranthene[5]	10	625
Fluorene[5]	10	625
Hexachlorobenzene[5]	10	625
Hexacehlorobutadiene[5]	10	625
Hexachlorocyclopentadiene[5]	10	625
Hexachloroethane[6]	20	625
Indeno (1,2,3-cd) pyrene[6] (2,3-o-phenylene pyrene)	20	625
Isophorone[5]	10	625
Naphthalene[5]	10	625
Nitrabenzene[5]	10	625
N-nitrosodimethylamine[6]	50	625
N-nitrosodi-n-propylamine[6]	20	625
N-nitrosodiphenylamine[6]	20	625
Phenanthrene[5]	10	625
Pyrene[5]	20	625
1,2,4-Trichlorobenzene[5]	10	625
PESTICIDES		
Aldrin[5]	.05	608
Alpha-RHC[5]	.05	608
Beta-BHC[5]	.05	608
Gamma-BHC (Lindane)[5]	.05	608
Delta-BHC[5]	.05	608
Chlordane[5]	.2	608
4,4'-DDT[5]	.1	608
4,4'-DDE (p,p-DDX)[5]	.1	608
4,4'-DDD (p,p-TDE)[5]	.1	608
Dieldrin[5]	.1	608

ATTACHMENT IV

Region 6 Approach
Determining Reasonable Potential

Region 6 has developed a procedure to extrapolate limited datasets to better evaluate the potential for the higher effluent concentrations to exceed a State water quality standard, Our method yields an estimate of a selected upper percentile value. We believe that the most statistically valid estimate of an upper percentile value is a maximum likelihood estimator which is proportional to the population geometric mean, If one assumes the population of effluent concentrations to fit a lognormal distribution, this relationship is given by:

$$C_p = C_{mean} * \exp(Z_p * \sigma - 0.5 * \sigma^2)$$

where: Z_p = normal distribution factor at p^{th} percentile

$$\sigma^2 = \ln(CV^2 + 1)$$

To calculate the maximum likelihood estimator of the 95^{th} percentile, the specific relationship becomes:

$$C_{95} = C_{mean} * \exp(1.645 * \sigma - 0.5 * \sigma^2)$$

if CV is assumed = 0.6,

$$\sigma^2 = 0.307$$

The ratio of the estimated 95th percentile value to the mean (C_{95}/C_{mean}) is calculated:

$$C_{95}/C_{mean} = 2.13$$

A single effluent value or the geometric mean of a group of values is multiplied by the ratio to yield the estimate of the 95^{th} percentile value.

The following table shows the ratio of the upper percentile to the mean for the 90^{th}, 95^{th}, and 99^{th} percentiles

Ratio of Upper Percentiles to Geometric Mean

Percentile	Z	C_{90} / C_{mean}
90	1.283	1.74
95	1.645	2.13
99	2.386	3.11

ATTACHMENT V

IMPLEMENTATION GUIDANCE FOR
STATE OF ARKANSAS STANDARDS
PROMULGATED AT 40 CFR 131
(THE NATIONAL TOXICS RULE)

Compliance With State Numerical Aquatic Toxicity Standards

I. INTRODUCTION

On December 22, 1992, the National Toxics Rule (NTR), that established numerical criteria for toxics pollutants, was published in the Federal Register (FR 57(246):60848)) and became effective Feb 5, 1993. Promulgation of the Rule was the result of noncompliance of several States with section 303 of the Clean Water Act (CWA) that requires all states to adopt water quality criteria for all 126 priority pollutants. The following were affected by the National Toxics Rule: Vermont, Rhode Island, New Jersey, Puerto Rico, District of Columbia, Florida, Michigan, Arkansas, Kansas, California, Nevada, Alaska, Idaho, and Washington.

The Rule established aquatic life numerical water quality standards for the following metals, expressed as total recoverable: Cadmium, Chromium, Copper, Lead, Mercury, Nickel Silver, Selenium, Zinc, and Cyanide. These new criteria applied to permitting activities in Arkansas by the Arkansas Department of Pollution Control and Ecology (ADPCE).

After extensive comment from the regulated and scientific communities, this rule was modified on May 4, 1995 (FR 60(86):22228) to convert the total recoverable metals in the 1993 rule to dissolved metals. It was felt that the dissolved measurement more accurately reflects the biologically available fraction of water borne metals to aquatic life.

However, Federal Regulations cited at 40 CFR 122.45(c) require that effluent limits for metals in NPDES permits be expressed as total. The problem of converting, or translating, thus presents itself as it is necessary to write a total permit limit to predict a dissolved water quality standard. Therefore, it is the purpose of this document to describe how this translation may be accomplished to implement water quality standards promulgated for Arkansas by EPA in the National Toxics Rule. This guidance document applies to discharges occurring during dry-weather, critical low flow conditions, and as appropriate, is based on the current State of Arkansas: Continuing Planning Process Document; The Technical Support Document for Water Quality-based Toxics Control (TSD)(EPA/505/2-90-001); and the EPA Region 6 Post Third Round NPDES Permit Implementation Strategy adopted October 1, 1992, or the most current revisions thereof. Although all applications for wastewater discharge permits are considered on a case-by-case basis, a consistent approach to application review is important.

II. SCREENING PROCEDURE:

The National Toxics Rule (NTR) dissolved metal criteria is converted to total using the translator mechanism using statewide partition coefficient outlined below prior to comparison with the Instream waste concentration (IWC) calculated using total effluent data. Refer also to the screening procedure specified in the current Arkansas Continuing Planning Process document.

III. TRANSLATOR MECHANISM USING STATEWIDE PARTITION COEFFICIENT

Dissolved water quality standards establish in the National Toxics Rule (May 4, 1995) will be converted to total values by the use of statewide linear partition coefficients for streams and lakes, using site-specific TSS values/measurements [Delos et., al, 1984, Technical Guidance for performing wasteload Allocation Book II: Streams and Rivers. Chapter 3: Toxic Substances, for U.S. Environmental Protection Agency (EPA-440/4-84-022). This translator mechanism involves determining a linear partition coefficient for the metal of concern and using this to determine the fraction of metal dissolved, so that the dissolved metal ambient criteria may be eventually translated to a total effluent limit. The mechanism has been adopted and is widely used in other State Agencies within the region. Hardness (mg/l $CaCO_3$) and TSS (mg/l) are a function of the conversion. The **linear partition coefficient** formula for streams and lakes is as follows:

K_p	=	Linear partition coefficient
K_{po} and α	=	from Table I
TSS	=	total suspended solids concentration found in receiving stream or approximation thereof (nearest most representative site, mg/l), lowest 15th percentile
C/C_T	=	Fraction of metal dissolved
Cr	=	Dissolved criteria value for metal in water quality standards **at point of application**

$$K_p = K_{po} \times TSS^{\alpha}$$

then,

$$\frac{C}{C_T} = \frac{1}{1 + (K_p)(TSS)(10^{-6})}$$

therefore,

$$\text{Total Metal} = \frac{Cr}{(C/C_T)}$$

Linear Partition Coefficients (Freshwater)

TABLE I

LINEAR PARTITION COEFFICIENTS
FOR PRIORITY METALS IN STREAMS AND LAKES
(Delos et. al, 1984) (*1)

METAL	STREAMS		LAKES	
	K_{po}	α	K_{po}	α
Arsenic	0.48×10^6	-0.73	0.48×10^6	-0.73
Cadmium	4.00×10^6	-1.13	3.52×10^6	-0.92
Chromium (*2)	3.36×10^6	-0.93	2.17×10^6	-0.27
Copper	1.04×10^6	-0.74	2.85×10^6	-0.90
Lead **	2.80×10^6	-0.80	2.04×10^6	-0.53
Mercury	2.90×10^6	-1.14	1.97×10^6	-1.17
Nickel	0.49×10^6	-0.57	2.21×10^6	-0.76
Silver (*3)	2.40×10^6	-1.03	Assume equal to stream	
Zinc	1.25×10^6	-0.70	3.34×10^6	-0.68

(*1) Delos, C. G., W. L. Richardson, J. V. DePinto, R. B. Ambrose, P. W. Rogers, K. Rygwelski, J. P. St. John, W. J. Shaughnessey, T. A. Faha, W.N. Christie. Technical Guidance for performing Waste Load Allocations, Book II: Streams and Rivers. Chapter 3: Toxic Substances, for the U. S. Environmental Protection Agency. (EPA-440/4-84-022).

** reference page 18 of EPA memo dated March 3, 1992, from Margaret J. Staiskowski (WH-586) to Water Management Division Directors, Region I-IX.

(*2) Linear partition coefficients shall not apply to the Chromium VI numerical criterion. The approved analytical method for Chromium VI measures only the dissolved form. Therefore, permit limits for Chromium VI shall be expressed in the dissolved form. See 40 CFR 122.45(c)(3).

(*3) Texas Environmental Advisory Council, 1994.

Input into the models are the lowest 15th percentile TSS data from the ecoregion or from specific segments, of the larger streams. See attached report " Total Suspended Solids from

Ambient Water Quality Monitoring Network ". A reopener clause shall be placed in the permit in the event the permittee develops a site-specific partition coefficient. The permit may be reopened to include the revised permit limits based on a site-specific partition coefficient. In cases where no partitioning coefficient is available, direct application of the standard is used unless a site-specific partitioning coefficient is developed. Calculate the effluent limit based on the dissolved standard but express the effluent limit as "total".

The calculated total metal criteria will be used to compare with the Instream Waste Concentration (IWC). The limiting long term average (LTA) and average and maximum permit limits will be determined using the procedure described in the current Arkansas CPP document.

IV. PROCEDURES FOR LAKES AND RESERVOIRS

Points of standards application and permit limits for lakes and reservoirs will be determined using the jet mix model:

$$\text{dilution factor (\% effluent at distance X)} = \frac{(2.8)(D)(n^{1/2})}{X} \times 100$$

D = discharge pipe diameter

X = aquatic life criteria - 25 feet for ZID
100 feet for mixing zone
(human health criteria - 200 feet for mixing zone)

Alternative site-specific lake and/or reservoir regulatory mixing zone assessments may be determined and submitted to ADEQ/EPA for review and approval.

V. ADDRESSING EFFLUENT LIMITS THAT ARE LESS THAN MINIMUM QUANTIFICATION LEVELS

Where a calculated effluent limit is less than the current EPA Region 6 Minimum Quantification Level (MQL), the permit writer must include the calculated effluent limit in the permit. If included, the limit will be footnoted with the following language:

> "If any individual analytical test result is less than [insert the MQL for that parameter], then a value of zero (0) may be used for Discharge Monitoring Report (DMR) calculations and reporting requirements for [insert the name of the parameter]."

VI. COMPLIANCE SCHEDULES FOR PERMITTED EFFLUENT LIMITS

Compliance schedules will be established by ADEQ in accordance with Arkansas' Regulations No. 2 and CPP.

VII. REVISING THE NTR IMPLEMENTATION GUIDANCE

This Guidance will be reviewed and revised as needed in order to reflect changes to the Arkansas Water Quality Standards or State/Federal statutes, regulations, policy statements or guidance.

TOTAL SUSPENDED SOLIDS FROM AMBIENT WATER QUALITY MONITORING NETWORK

In an attempt to determine the 15th percentile of total suspended solid values from Arkansas' waters for compliance with EPA Region VI implementation policy for permitting dissolved metals, two different methods were used to develop these numbers. The first method shown as LIMITED in the table below, included retrieving data from four, relatively undisturbed sample stations from each ecoregion for the entire period of record. The 15th percentile of the TSS data was determined for each station data set and an average of the four stations was used. Stations were also selected from segments of the large rivers.

The second method retrieved TSS data from "ALL" stations within each ecoregion, except for a few stations which were located below a major point source discharger. Data from the last 10 years from all stations within the ecoregion were combined and the 15th percentile value was determined. Results from both methods were similar, although the "ALL" data were often slightly lower except for the Delta Ecoregion.

Under the **USE** column is the suggested value to be used in the permitting procedure. This value is the highest value of the two methods and includes values from the big rivers or segments of them.

	LIMITED	"ALL"	USE
OUACHITA MTS. ECOREGION	2.0	1.0	2.0
OZARK HIGHLANDS ECOREGION	2.5	1.5	2.5
BOSTON MTS. ECOREGION	1.3	1.0	1.3
ARKANSAS RIVER VALLEY ECOREGION	3.0	3.0	3.0
GULF COASTAL ECOREGION	5.5	4.0	5.5
DELTA ECOREGION	5.8	8.0	8.0
ARKANSAS RIVER - FT.SMITH TO DARDANELLE DAM			12.0
ARKANSAS RIVER - DARDANELLE DAM TO TERRY L&D			10.5
ARKANSAS RIVER - TERRY L&D TO L&D NO.5			8.3
ARKANSAS RIVER - L&D NO.5 TO MOUTH			9.0
WHITE RIVER ABOVE BEAVER LAKE			ECORGN.
WHITE RIVER BELOW BULL SHOALS LAKE TO BLACK RIVER			3.3
WHITE RIVER FROM BLACK RIVER TO MOUTH			18.5
ST. FRANCIS RIVER			18.0
OUACHITA RIVER ABOVE CADDO RIVER			OUA.MT ECORGN.
OUACHITA RIVER BELOW CADDO RIVER			GLF.CST ECORGN
RED RIVER			33.0

ATTACHMENT VI

MEAN HARDNESS by RECEIVING STREAM and ECOREGION

For direct discharges to the Arkansas, Red, Ouachita, White, St. Francis Rivers use the following mean values:

Arkansas River	125 mg/l
Red River	211 mg/l
Ouachita River	28 mg/l
White River	116 mg/l
St. Francis River	103 mg/l

For all other discharges use the following mean ecoregion hardness:

Gulf Coastal	31 mg/l
Ouachita	31 mg/l
Arkansas River Valley	21 mg/l, use 25 mg/l*
Boston Mountains	22 mg/l, use 25 mg/l*
Ozark Highlands	148 mg/l
Delta	81 mg/l

* based on 40 CFR Part 131(c)(4)(i) the minimum hardness allowed in calculating criteria for metals shall not be less than 25 mg/l, as calcium carbonate, even if the actual ambient hardness is less than 25 mg/l.

ATTACHMENT VII

LONG TERM AVERAGE EFFLUENT CONCENTRATION*

o Assume:

1. Effluent concentrations are described by a log normal probability distribution(the logarithm of the effluent concentrations are normally distributed).

2. The coefficient of variation of the effluent concentrations is 0.6 (CV = Standard Deviation / Mean).

3. The effluent should satisfy the WLA 90 percent of time.

o Acute LTA

$LTA_a = WLA_a \times \exp(0.5\sigma^2 - z\sigma)$, where:

$\sigma^2 = \ln(CV^2 + 1)$
$CV = 0.6$
$z = 1.282$ for 90th percentile probability basis
$\sigma^2 = 0.307$
$\sigma = 0.554$

$LTA_a = WLA_a \times \exp(0.5X0.307 - 1.282X0.554) = 0.57 \times WLA_a$

o Chronic LTA

$LTA_c = WLA_c \times \exp(0.5\sigma_4^2 - z\sigma_4)$, where:

$\sigma_4^2 = \ln(CV^2/4 + 1)$
$CV = 0.6$
$\sigma_4^2 = \ln(0.6^2/4 + 1) = 0.08617$
$\sigma_4 = 0.2935$
$z = 1.282$ for 90th percentile probability basis

$LTA_c = WLA_c \times \exp(0.5X0.08617 - 1.282X0.2935) = 0.72 \times WLA_c$

* Based on "Technical Support Document for Water Quality-based Toxics Control". United States Environmental Protection Agency. March 1991.

Attachment VII (cont.)

PERMIT LIMITATIONS

o Assume:

1. The permit limits are set at the 99th percentile for the MDL and the 95th percentile for the AML. (If effluent achieves LTA, then limits will be violated one percent of the time).

2. Four samples per month for heavy metals and cyanide.

o Average Monthly Limit

$AML = LTA \times \exp(zo_n - 0.5o_n^2)$, where:

$o_n^2 = \ln(CV^2/n + 1)$
$CV = 0.6$
$z = 1.645$ for 95th percentile probability basis
$o_n^2 = \ln(0.6^2/4 + 1) = 0.086$
$o_n = 0.293$

$AML = LTA \times \exp(1.645 \times 0.293 - 0.5 \times 0.086) = LTA \times 1.55$**

Please note that AML factor is n dependable; 1.55 is appropriate only if four or less samples a month are required. For all other frequencies the factor must be found in Table 5-2 (page 103) of TSD.

o Maximum Daily Limit

$MDL = LTA \times \exp(zo - 0.5o^2)$, where: $o^2 = \ln(CV^2 + 1)$
$MDL = LTA \times \exp(2.326 \times 0.554 - 0.5 \times 0.307) = LTA \times 3.11$

ATTACHMENT VIII

Multipliers for Calculating Maximum Daily Permit Limit for Protection of Human Health Criteria

To obtain the maximum daily permit limit (MDL) for a bioconcentratable pollutant, multiply the average monthly permit limit (AML) (the wasteload allocation) by the appropriate value in the following table.

Each value in the table is the ratio of the MDL to the AML as calculated by the following relationship derived from Step 4 of the statistically based permit limit calculation procedure.

$$\frac{MDL}{AML} = \frac{\exp [z_m\sigma - 0.5\sigma^2]}{\exp [z_a\sigma_n - 0.5\sigma_n^2]}$$

where

$\sigma_n^2 = \ln (CV^2/n + 1)$
$\sigma^2 = \ln (CV^2 + 1)$
CV = the coefficient of variation of the effluent concentration
n = the number of samples per month
z_m = the percentile exceedance probability for the MDL
z_a = the percentile exceedance probability for the AML.

	Ratio Between Maximum Daily and Average Monthly Permit Limits									
	Maximum = 99th percentile Average = 95th percentile					Maximum = 99th percentile Average = 99th percentile				
CV	n=1	n=2	n=4	n=8	n=30	n=1	n=2	n=4	n=8	n=30
0.1	1.07	1.13	1.16	1.18	1.22	1.00	1.07	1.12	1.16	1.20
0.2	1.14	1.25	1.33	1.39	1.46	1.00	1.13	1.24	1.32	1.43
0.3	1.22	1.37	1.50	1.60	1.74	1.00	1.19	1.36	1.49	1.67
0.4	1.30	1.50	1.67	1.82	2.02	1.00	1.24	1.46	1.66	1.92
0.5	1.38	1.622	1.84	2.04	2.32	1.00	1.28	1.56	1.81	2.18
0.6	1.46	1.73	2.01	2.25	2.62	1.00	1.31	1.64	1.95	2.43
0.7	1.54	1.84	2.16	2.45	2.91	1.00	1.34	1.71	2.08	2.67
0.8	1.61	1.94	2.29	2.64	3.19	1.00	1.35	1.76	2.19	2.89
0.9	1.69	2.03	2.41	2.81	3.45	1.00	1.36	1.80	2.27	3.09
1.0	1.76	2.11	2.52	2.96	3.70	1.00	1.37	1.83	2.34	3.27
1.1	1.83	2.18	2.62	3.09	3.93	1.00	1.37	1.84	2.39	3.43
1.2	1.90	2.25	2.70	3.20	4.13	1.00	1.36	1.85	2.43	3.56
1.3	1.97	2.31	2.77	3.30	4.31	1.00	1.36	1.85	2.45	3.68
1.4	2.03	2.37	2.83	3.39	4.47	1.00	1.35	1.84	2.46	3.77
1.5	2.09	2.42	2.89	3.46	4.62	1.00	1.34	1.83	2.46	3.84
1.6	2.15	2.42	2.89	3.46	4.62	1.00	1.33	1.82	2.46	3.90
1.7	2.21	2.52	2.98	3.57	4.85	1.00	1.32	1.80	2.45	3.94
1.8	2.27	2.56	3.01	3.61	4.94	1.00	1.31	1.78	2.43	3.97
1.9	2.32	2.60	3.05	3.65	5.02	1.00	1.30	1.76	2.41	3.99
2.0	2.37	2.64	3.07	3.67	5.09	1.00	1.29	1.74	2.38	4.00

ATTACHMENT IX

WHOLE EFFLUENT TOXICITY TESTING (48-HOUR ACUTE NOEC FRESHWATER)

1. SCOPE AND METHODOLOGY

a. The permittee shall test the effluent for toxicity in accordance with the provisions in this section.

APPLICABLE TO FINAL OUTFALL(S):{??}

REPORTED ON DMR AS FINAL OUTFALL:{PRIMARY OUTFALL}

CRITICAL DILUTION (%): {??}

EFFLUENT DILUTION SERIES (%): {??}

COMPOSITE SAMPLE TYPE: Defined at PART I

TEST SPECIES/METHODS:

40 CFR Part 136

Daphnia pulex acute static renewal 48-hour definitive toxicity test using EPA/600/4-90/027F, or the latest update thereof. A minimum of five (5) replicates with eight (8) organisms per replicate must be used in the control and in each effluent dilution of this test.

Pimephales promelas (Fathead minnow) acute static renewal 48-hour definitive toxicity test using EPA/600/4-90/027F, or the latest update thereof. A minimum of five (5) replicates with eight (8) organisms per replicate must be used in the control and in each effluent dilution of this test.

b. The NOEC (No Observed Effect Concentration) is defined as the greatest effluent dilution which does not result in lethality that is statistically different from the control (0% effluent) at the 95% confidence level.

c. This permit may be reopened to require whole effluent toxicity limits, chemical specific effluent limits, additional testing, and/or other appropriate actions to address toxicity.

2. PERSISTENT LETHALITY

The requirements of this subsection apply only when a toxicity test demonstrates significant lethal effects at the critical

dilution. Significant lethal effects are herein defined as a statistically significant difference at the 95% confidence level between the survival of the appropriate test organism in a specified effluent dilution and the control (0% effluent).

a. PART I TESTING FREQUENCY OTHER THAN MONTHLY

i. The permittee shall conduct a total of two (2) additional tests for any species that demonstrates significant lethal effects at the critical dilution. The two additional tests shall be conducted monthly during the next two consecutive months. The permittee shall not substitute either of the two additional tests in lieu of routine toxicity testing. The full report shall be prepared for each test required by this section in accordance with procedures outlined in Item 4 of this section.

ii. If one or both of the two additional tests demonstrates significant lethal effects at the critical dilution, the permittee shall initiate Toxicity Reduction Evaluation (TRE) requirements as specified in Item 5 of this section. The permittee shall notify the Department in writing within 15 days of the failure of any retest, and the TRE initiation date will be the test completion date of the first failed retest.

iii. If one or both of the two additional tests demonstrates significant lethal effects at the critical dilution, the permittee shall henceforth increase the frequency of testing for this species to once per quarter for the life of the permit.

iv. The provisions of Item 2.a are suspended upon submittal of the TRE Action Plan.

b. PART I TESTING FREQUENCY OF MONTHLY

The permittee shall initiate the Toxicity Reduction Evaluation (TRE) requirements as specified in Item 5 of this section when any two of three consecutive monthly toxicity tests exhibit significant lethal effects at the critical dilution.

ATTACHMENT IX

3. REQUIRED TOXICITY TESTING CONDITIONS

a. TEST ACCEPTANCE

The permittee shall repeat a test, including the control and all effluent dilutions, if the procedures and quality assurance requirements defined in the test methods or in this permit are not satisfied, including the following additional criteria:

i. Each toxicity test control (0% effluent) must have a survival equal to or greater than 90%.

ii. The percent coefficient of variation between replicates shall be 40% or less in the control (0% effluent) for: Daphnia pulex survival test; and Fathead minnow survival test.

iii. The percent coefficient of variation between replicates shall be 40% or less in the critical dilution, unless significant lethal effects are exhibited for: Daphnia pulex survival test; and Fathead minnow survival test.

Test failure may not be construed or reported as invalid due to a coefficient of variation value of greater than 40%. A repeat test shall be conducted within the required reporting period of any test determined to be invalid.

b. STATISTICAL INTERPRETATION

For the Daphnia pulex survival test and the Fathead minnow survival test, the statistical analyses used to determine if there is a statistically significant difference between the control and the critical dilution shall be in accordance with the methods for determining the No Observed Effect Concentration (NOEC) as described in EPA/600/4-90/027F or the most recent update thereof.

If the conditions of Test Acceptability are met in Item 3.a above and the percent survival of the test organism is equal to or greater than 80% in the critical dilution concentration and all lower dilution concentrations, the test shall be considered to be a passing test, and the permittee shall report an NOEC of not less than the critical dilution for the DMR reporting requirements found in Item 4 below.

c. DILUTION WATER

i. Dilution water used in the toxicity tests will be receiving water collected as close to the point of discharge as possible but unaffected by the discharge. The permittee shall substitute synthetic dilution water of similar pH, hardness, and alkalinity to the closest downstream perennial water for;

(A) toxicity tests conducted on effluent discharges to receiving water classified as intermittent streams; and

(B) toxicity tests conducted on effluent discharges where no receiving water is available due to zero flow conditions.

ii. If the receiving water is unsatisfactory as a result of instream toxicity (fails to fulfill the test acceptance criteria of Item 3.a), the permittee may substitute synthetic dilution water for the receiving water in all subsequent tests provided the unacceptable receiving water test met the following stipulations:

(A) a synthetic dilution water control which fulfills the test acceptance requirements of Item 3.a was run concurrently with the receiving water control;

(B) the test indicating receiving water toxicity has been carried out to completion (i.e., 48 hours);

(C) the permittee includes all test results indicating receiving water toxicity with the full report and information required by Item 4 below; and

(D) the synthetic dilution water shall have a pH, hardness, and alkalinity similar to that of the receiving water AND shall be prepared in accordance with the procedures in EPA/600/4-91/002 using ecoregion water characteristics as follows:

For discharges located in the Gulf Coastal, Arkansas River Valley, Boston Mountains, or Ouachita Mountains

Ecoregions, and discharges to the Ouachita River, use SOFT water:

For discharges located in the Delta or Ozark Highlands Ecoregions, and discharges to the White, Arkansas, Mississippi, and St. Francis Rivers, use MODERATELY HARD water:

For discharges to the Red River, use HARD water.

d. SAMPLES AND COMPOSITES

i. The permittee shall collect two flow-weighted composite samples from the outfall(s) listed at Item 1.a above.

ii. The permittee shall collect a second composite sample for use during the 24-hour renewal of each dilution concentration the for both tests. The permittee must collect the composite samples so that the maximum holding time for any effluent sample shall not exceed 36 hours. The permittee must have initiated the toxicity test within 36 hours after the collection of the last portion of the first composite sample. Samples shall be chilled to 4 degrees Centigrade during collection, shipping, and/or storage.

iii. The permittee must collect the composite samples such that the effluent samples are representative of any periodic episode of chlorination, biocide usage or other potentially toxic substance discharged on an intermittent basis.

iv. If the flow from the outfall(s) being tested ceases during the collection of effluent samples, the requirements for the minimum number of effluent samples, the minimum number of effluent portions and the sample holding time are waived during that sampling period. However, the permittee must collect an effluent composite sample volume during the period of discharge that is sufficient to complete the required toxicity tests with daily renewal of effluent. When possible, the effluent samples used for the toxicity tests shall be collected on separate days. The effluent composite sample collection duration and the static renewal protocol associated with the abbreviated sample

collection must be documented in the full report required in Item 4 of this section.

v. MULTIPLE OUTFALLS: If the provisions of this section are applicable to multiple outfalls, the permittee shall combine the composite effluent samples in proportion to the average flow from the outfalls listed in Item 1.a above for the day the sample was collected. The permittee shall perform the toxicity test on the flow-weighted composite of the outfall samples.

4. REPORTING

a. The permittee shall prepare a full report of the results of all tests conducted pursuant to this Part in accordance with the Report Preparation Section of EPA/600/4-90/027F, for every valid or invalid toxicity test initiated, whether carried to completion or not. The permittee shall retain each full report pursuant to the provisions of PART III.C.3 of this permit. The permittee shall submit full reports only upon the specific request of the Department.

b. A valid test for each species must be reported on the DMR during each reporting period specified in PART I of this permit unless the permittee is performing a TRE which may increase the frequency of testing and reporting. Only ONE set of biomonitoring data for each species is to be recorded on the DMR for each reporting period. The data submitted should reflect the LOWEST Survival results for each species during the reporting period. All invalid tests, repeat tests (for invalid tests), and retests (for tests previously failed) performed during the reporting period must be attached to the DMR for ADEQ review.

c. The permittee shall report the following results of each valid toxicity test on the subsequent monthly DMR for that reporting period in accordance with PART III.D.4 of this permit. Submit retest information clearly marked as such with the following month's DMR. Only results of valid tests are to be reported on the DMR.

i. Pimephales promelas (Fathead minnow)

(A) If the No Observed Effect Concentration (NOEC) for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter No. TEM6C.

(B) Report the NOEC value for survival, Parameter No. TOM6C.

ii. Daphnia pulex

(A) If the NOEC for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter No. TEM3D.

(B) Report the NOEC value for survival, Parameter No. TOM3D.

5. NO TOXICITY CERTIFICATION

If the toxicity tests for specific test organism(s) do not indicate toxicity at the critical effluent concentration during the first year or four consecutive test (whichever occurs later), the permittee shall certify this information in writing to ADEQ, and the biomonitoring requirements for that organism(s) may be reduced upon written authorization by the Department.

6. TOXICITY REDUCTION EVALUATION (TRE)

a. Within ninety (90) days of confirming lethality in the retests, the permittee shall submit a Toxicity Reduction Evaluation (TRE) Action Plan and Schedule for conducting a TRE. The TRE Action Plan shall specify the approach and methodology to be used in performing the TRE. A Toxicity Reduction Evaluation is an investigation intended to determine those actions necessary to achieve compliance with water quality-based effluent limits by reducing an effluent's toxicity to an acceptable level. A TRE is defined as a step-wise process which combines toxicity testing and analyses of the physical and chemical characteristics of a toxic effluent to identify the constituents causing effluent toxicity and/or treatment methods which will reduce the effluent toxicity. The TRE Action Plan shall lead to the successful elimination of effluent toxicity at the critical dilution and include the following:

i. Specific Activities. The plan shall detail the specific approach the permittee intends to utilize in conducting the TRE. The approach may include toxicity characterizations, identifications and confirmation activities, source evaluation, treatability studies, or alternative approaches. When the permittee conducts Toxicity Charac-

terization Procedures the permittee shall perform multiple characterizations and follow the procedures specified in the documents "Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures" (EPA-600/6-91/003) or alternate procedures. When the permittee conducts Toxicity Identification Evaluations and Confirmations, the permittee shall perform multiple identifications and follow the methods specified in the documents "Methods for Aquatic Toxicity Identification Evaluations, Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity" (EPA/600/R-92/080) and "Methods for Aquatic Toxicity Identification Evaluations, Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity" (EPA/600/R-92/081), as appropriate.

The documents referenced above may be obtained through the National Technical Information Service (NTIS) by phone at (703) 487-4650, or by writing:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

ii. Sampling Plan (e.g., locations, methods, holding times, chain of custody, preservation, etc.). The effluent sample volume collected for all tests shall be adequate to perform the toxicity test, toxicity characterization, identification and confirmation procedures, and conduct chemical specific analyses when a probable toxicant has been identified;

Where the permittee has identified or suspects specific pollutant(s) and/or source(s) of effluent toxicity, the permittee shall conduct, concurrent with toxicity testing, chemical specific analyses for the identified and/or suspected pollutant(s) and/or source(s) of effluent toxicity. Where lethality was demonstrated within 24 hours of test initiation, each composite sample shall be analyzed independently. Otherwise the permittee may substitute a composite sample, comprised of equal portions of the individual composite samples, for the chemical specific analysis;

iii. Quality Assurance Plan (e.g., QA/QC implementation, corrective actions, etc.); and

iv. Project Organization (e.g., project staff, project manager, consulting services, etc.).

b. The permittee shall initiate the TRE Action Plan within thirty (30) days of plan and schedule submittal. The permittee shall assume all risks for failure to achieve the required toxicity reduction.

c. The permittee shall submit a quarterly TRE Activities Report, with the Discharge Monitoring Report in the months of January, April, July and October, containing information on toxicity reduction evaluation activities including:

i. any data and/or substantiating documentation which identifies the pollutant(s) and/or source(s) of effluent toxicity;

ii. any studies/evaluations and results on the treatability of the facility's effluent toxicity; and

iii. any data which identifies effluent toxicity control mechanisms that will reduce effluent toxicity to the level necessary to meet no significant lethality at the critical dilution.

d. The permittee shall submit a Final Report on Toxicity Reduction Evaluation Activities no later than twenty-eight (28) months from confirming lethality in the retests, which provides information pertaining to the specific control mechanism selected that will, when implemented, result in reduction of effluent toxicity to no significant lethality at the critical dilution. The report will also provide a specific corrective action schedule for implementing the selected control mechanism.

ATTACHMENT X

WHOLE EFFLUENT TOXICITY TESTING (7-DAY CHRONIC NOEC FRESHWATER)

1. SCOPE AND METHODOLOGY

a. The permittee shall test the effluent for toxicity in accordance with the provisions in this section.

APPLICABLE TO FINAL OUTFALL(S):{??}

REPORTED ON DMR AS FINAL OUTFALL:{PRIMARY OUTFALL}

CRITICAL DILUTION (%): {??}

EFFLUENT DILUTION SERIES (%): {??}

COMPOSITE SAMPLE TYPE: Defined at PART I

TEST SPECIES/METHODS: 40 CFR Part 136

Ceriodaphnia dubia chronic static renewal survival and reproduction test, Method 1002.0, EPA/600/4--91/002 or the most recent update thereof. This test should be terminated when 60% of the surviving adults in the control produce three broods.

Pimephales promelas (Fathead minnow) chronic static renewal 7-day larval survival and growth test, Method 1000.0, EPA/600/4-91/002, or the most recent update thereof. A minimum of five (5) replicates with eight (8) organisms per replicate must be used in the control and in each effluent dilution of this test.

b. The NOEC (No Observed Effect Concentration) is defined as the greatest effluent dilution which does not result in lethality that is statistically different from the control (0% effluent) at the 95% confidence level.

c. This permit may be reopened to require whole effluent toxicity limits, chemical specific effluent limits, additional testing, and/or other appropriate actions to address toxicity.

2. PERSISTENT LETHALITY

The requirements of this subsection apply only when a toxicity test demonstrates significant lethal effects at the critical dilution. Significant lethal effects are herein defined as a statistically significant difference at the 95% confidence

level between the survival of the appropriate test organism in a specified effluent dilution and the control (0% effluent).

a. PART I TESTING FREQUENCY OTHER THAN MONTHLY

i. The permittee shall conduct a total of two (2) additional tests for any species that demonstrates significant lethal effects at the critical dilution. The two additional tests shall be conducted monthly during the next two consecutive months. The permittee shall not substitute either of the two additional tests in lieu of routine toxicity testing. The full report shall be prepared for each test required by this section in accordance with procedures outlined in Item 4 of this section.

ii. If one or both of the two additional tests demonstrates significant lethal effects at the critical dilution, the permittee shall initiate Toxicity Reduction Evaluation (TRE) requirements as specified in Item 6 of this section. The permittee shall notify the Department in writing within 15 days of the failure of any retest, and the TRE initiation date will be the test completion date of the first failed retest.

iii. If one or both of the two additional tests demonstrates significant lethal effects at the critical dilution, the permittee shall henceforth increase the frequency of testing for this species to once per quarter for the life of the permit.

iv. The provisions of Item 2.a are suspended upon submittal of the TRE Action Plan.

b. PART I TESTING FREQUENCY OF MONTHLY

The permittee shall initiate the Toxicity Reduction Evaluation (TRE) requirements as specified in Item 6 of this section when any two of three consecutive monthly toxicity tests exhibit significant lethal effects at the critical dilution.

ATTACHMENT X

3. REQUIRED TOXICITY TESTING CONDITIONS

a. TEST ACCEPTANCE

The permittee shall repeat a test, including the control and all effluent dilutions, if the procedures and quality assurance requirements defined in the test methods or in this permit are not satisfied, including the following additional criteria:

i. The toxicity test control (0% effluent) must have survival equal to or greater than 80%.

ii. The mean number of Ceriodaphnia dubia neonates produced per surviving adult in the control (0% effluent) must be 15 or more.

iii. The mean dry weight of surviving Fathead minnow larvae at the end of the 7 days in the control (0% effluent) must be 0.25 mg per larva or greater.

iv. The percent coefficient of variation between replicates shall be 40% or less in the control (0% effluent) for: the young of surviving females in the Ceriodaphnia dubia reproduction test; the growth and survival endpoints of the Fathead minnow test.

v. The percent coefficient of variation between replicates shall be 40% or less in the critical dilution, unless significant lethal or nonlethal effects are exhibited for: the young of surviving females in the Ceriodaphnia dubia reproduction test; the growth and survival endpoints of the Fathead minnow test.

Test failure may not be construed or reported as invalid due to a coefficient of variation value of greater than 40%. A repeat test shall be conducted within the required reporting period of any test determined to be invalid.

b. STATISTICAL INTERPRETATION

i. For the Ceriodaphnia dubia survival test, the statistical analyses used to determine if there is a significant difference between the control and the critical dilution shall be Fisher's Exact Test

as described in EPA/600/4-91/002 or the most recent update thereof.

ii. For the Ceriodaphnia dubia reproduction test and the Fathead minnow larval survival and growth test, the statistical analyses used to determine if there is a significant difference between the control and the critical dilution shall be in accordance with the methods for determining the No Observed Effect Concentration (NOEC) as described in EPA/600/4-91/002 or the most recent update thereof.

iii. If the conditions of Test Acceptability are met in Item 3.a above and the percent survival of the test organism is equal to or greater than 80% in the critical dilution concentration and all lower dilution concentrations, the test shall be considered to be a passing test, and the permittee shall report an NOEC of not less than the critical dilution for the DMR reporting requirements found in Item 4 below.

c. DILUTION WATER

i. Dilution water used in the toxicity tests will be receiving water collected as close to the point of discharge as possible but unaffected by the discharge. The permittee shall substitute synthetic dilution water of similar pH, hardness, and alkalinity to the closest downstream perennial water for;

(A) toxicity tests conducted on effluent discharges to receiving water classified as intermittent streams; and

(B) toxicity tests conducted on effluent discharges where no receiving water is available due to zero flow conditions.

ii. If the receiving water is unsatisfactory as a result of instream toxicity (fails to fulfill the test acceptance criteria of Item 3.a), the permittee may substitute synthetic dilution water for the receiving water in all subsequent tests provided the unacceptable receiving water test met the following stipulations:

(A) a synthetic dilution water control which fulfills the test acceptance requirements of Item 3.a was run concurrently with the receiving water control;

(B) the test indicating receiving water toxicity has been carried out to completion (i.e., 7 days);

(C) the permittee includes all test results indicating receiving water toxicity with the full report and information required by Item 4 below; and

(D) the synthetic dilution water shall have a pH, hardness, and alkalinity similar to that of the receiving water and shall be prepared in accordance with the procedures in EPA/600/4-91/002 using ecoregion water characteristics as follows:

For discharges located in the Gulf Coastal, Arkansas River Valley, Boston Mountains, or Ouachita Mountains Ecoregions, and discharges to the Ouachita River, use SOFT water:

For discharges located in the Delta or Ozark Highlands Ecoregions, and discharges to the White, Arkansas, Mississippi, and St. Francis Rivers, use MODERATELY HARD water:

For discharges to the Red River, use HARD water.

d. SAMPLES AND COMPOSITES

i. The permittee shall collect a minimum of three flow-weighted composite samples from the outfall(s) listed at Item 1.a above.

ii. The permittee shall collect second and third composite samples for use during 24-hour renewals of each dilution concentration for each test. The permittee must collect the composite samples such that the effluent samples are representative of any periodic episode of chlorination, biocide usage or other potentially toxic substance discharged on an intermittent basis.

iii. The permittee must collect the composite samples so that the maximum holding time for any effluent sample shall not exceed 72 hours. The permittee must have initiated the toxicity test within 36 hours after the collection of the last portion of the first composite sample. Samples shall be chilled to 4 degrees Centigrade during collection, shipping, and/or storage.

iv. If the flow from the outfall(s) being tested ceases during the collection of effluent samples, the requirements for the minimum number of effluent samples, the minimum number of effluent portions and the sample holding time are waived during that sampling period. However, the permittee must collect an effluent composite sample volume during the period of discharge that is sufficient to complete the required toxicity tests with daily renewal of effluent. When possible, the effluent samples used for the toxicity tests shall be collected on separate days if the discharge occurs over multiple days. The effluent composite sample collection duration and the static renewal protocol associated with the abbreviated sample collection must be documented in the full report required in Item 4 of this section.

v. MULTIPLE OUTFALLS: If the provisions of this section are applicable to multiple outfalls, the permittee shall combine the composite effluent samples in proportion to the average flow from the outfalls listed in Item 1.a above for the day the sample was collected. The permittee shall perform the toxicity test on the flow-weighted composite of the outfall samples.

4. REPORTING

a. The permittee shall prepare a full report of the results of all tests conducted pursuant to this section in accordance with the Report Preparation Section of EPA/600/4-91/002, or the most current publication, for every valid or invalid toxicity test initiated whether carried to completion or not. The permittee shall retain each full report pursuant to the provisions of PART III.C.3 of this permit. The permittee shall submit full reports only upon the specific request of the Department.

b. A valid test for each species must be reported on the DMR during each reporting period specified in PART I of this permit unless the permittee is performing a TRE which may increase the frequency of testing and reporting. Only ONE set of biomonitoring data for each species is to be recorded on the DMR for each reporting period. The data submitted should reflect the LOWEST Survival results for each species during the reporting period. All invalid tests, repeat tests (for invalid tests), and retests (for tests previously failed) performed during the reporting period must be attached to the DMR for ADEQ review.

c. The permittee shall submit the results of each valid toxicity test on the subsequent monthly DMR for that reporting period in accordance with PART III.D.4 of this permit, as follows below. Submit retest information clearly marked as such with the following month's DMR. Only results of valid tests are to be reported on the DMR.

i. Pimephales promelas (Fathead Minnow)

(A) If the No Observed Effect Concentration (NOEC) for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter No. TLP6C.

(B) Report the NOEC value for survival, Parameter No. TOP6C.

(C) Report the NOEC value for growth, Parameter No. TPP6C.

ii. Ceriodaphnia dubia

(A) If the NOEC for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter No. TLP3B.

(B) Report the NOEC value for survival, Parameter No. TOP3B.

(C) Report the NOEC value for reproduction, Parameter No. TPP3B.

5. NO TOXICITY CERTIFICATION

If the toxicity tests for specific test organism(s) do not indicate toxicity at the critical effluent concentration during the first year or four consecutive test (whichever occurs later), the permittee shall certify this information in writing to ADEQ, and the biomonitoring requirements for that organism(s) may be reduced upon written authorization by the Department.

6. TOXICITY REDUCTION EVALUATION (TRE)

a. Within ninety (90) days of confirming lethality in the retests, the permittee shall submit a Toxicity Reduction Evaluation (TRE) Action Plan and Schedule for conducting a TRE. The TRE Action Plan shall specify the approach and methodology to be used in performing the TRE. A Toxicity Reduction Evaluation is an investigation intended to determine those actions necessary to achieve compliance with water quality-based effluent limits by reducing an effluent's toxicity to an acceptable level. A TRE is defined as a step-wise process which combines toxicity testing and analyses of the physical and chemical characteristics of a toxic effluent to identify the constituents causing effluent toxicity and/or treatment methods which will reduce the effluent toxicity. The TRE Action Plan shall lead to the successful elimination of effluent toxicity at the critical dilution and include the following:

i. Specific Activities. The plan shall detail the specific approach the permittee intends to utilize in conducting the TRE. The approach may include toxicity characterizations, identifications and confirmation activities, source evaluation, treatability studies, or alternative approaches. When the permittee conducts Toxicity Characterization Procedures the permittee shall perform multiple characterizations and follow the procedures specified in the documents "Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures" (EPA-600/6-91/003) and "Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents, Phase I" (EPA-600/6-91/005F), or alternate procedures. When the permittee conducts Toxicity Identification Evaluations and Confirmations, the permittee shall perform multiple identifications and follow the methods specified in

the documents "Methods for Aquatic Toxicity Identification Evaluations, Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity" (EPA/600/R-92/080) and "Methods for Aquatic Toxicity Identification Evaluations, Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity" (EPA/600/R-92/081), as appropriate.

The documents referenced above may be obtained through the National Technical Information Service (NTIS) by phone at (703) 487-4650, or by writing:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

ii. Sampling Plan (e.g., locations, methods, holding times, chain of custody, preservation, etc.). The effluent sample volume collected for all tests shall be adequate to perform the toxicity test, toxicity characterization, identification and confirmation procedures, and conduct chemical specific analyses when a probable toxicant has been identified;

Where the permittee has identified or suspects specific pollutant(s) and/or source(s) of effluent toxicity, the permittee shall conduct, concurrent with toxicity testing, chemical specific analyses for the identified and/or suspected pollutant(s) and/or source(s) of effluent toxicity. Where lethality was demonstrated within 48 hours of test initiation, each composite sample shall be analyzed independently. Otherwise the permittee may substitute a composite sample, comprised of equal portions of the individual composite samples, for the chemical specific analysis;

iii. Quality Assurance Plan (e.g., QA/QC implementation, corrective actions, etc.); and

iv. Project Organization (e.g., project staff, project manager, consulting services, etc.).

b. The permittee shall initiate the TRE Action Plan within thirty (30) days of plan and schedule submittal. The

permittee shall assume all risks for failure to achieve the required toxicity reduction.

c. The permittee shall submit a quarterly TRE Activities Report, with the Discharge Monitoring Report in the months of January, April, July and October, containing information on toxicity reduction evaluation activities including:

i. any data and/or substantiating documentation which identifies the pollutant(s) and/or source(s) of effluent toxicity;

ii. any studies/evaluations and results on the treatability of the facility's effluent toxicity; and

iii. any data which identifies effluent toxicity control mechanisms that will reduce effluent toxicity to the level necessary to meet no significant lethality at the critical dilution.

d. The permittee shall submit a Final Report on Toxicity Reduction Evaluation Activities no later than twenty-eight (28) months from confirming lethality in the retests, which provides information pertaining to the specific control mechanism selected that will, when implemented, result in reduction of effluent toxicity to no significant lethality at the critical dilution. The report will also provide a specific corrective action schedule for implementing the selected control mechanism.