

APPROVED  
By the Board of Directors of  
The Metropolitan Water District  
of Southern California  
at its meeting held

42024

AUG 20 1996

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**MWD**

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

*Stan Chen*  
EXECUTIVE SECRETARY

July 16, 1996

(Special Committee on Water Quality and Environmental  
Compliance--Action)

**To:** Board of Directors (Engineering and Operations Committee--Action)  
(Finance and Insurance Committee--Action)

**From:** FOR General Manager

*Edward J. Meigs*

**Submitted by:** Mark D. Beuhler  
Director of Water Quality

*Roy Wolfe*

**Subject:** Authorization No. 1 to Increase Appropriation No. 703 by \$1.4 Million to a  
Total of \$2.9 Million to Finance All Estimated Costs for the Second Year of a  
Three-Year *Cryptosporidium* Action Plan

**RECOMMENDATION**

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It is recommended that your Board authorize an increase of \$1.4 million in  
Appropriation No. 703 from \$1.5 million to \$2.9 million from the Pay-As-You-Go Fund to  
finance the second year of the three-year *Cryptosporidium* Action Plan.

**EXECUTIVE SUMMARY**

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Approval of this recommendation will authorize an increase of \$1,400,000 in the  
appropriation to a total of \$2,900,000 to cover the second phase of the *Cryptosporidium* Action  
Plan for treatment evaluations, methods development, public outreach, and national  
policy/regulatory development activities. The total estimated cost of the *Cryptosporidium*  
Action Plan is \$4,370,000, including contingency.

**CAPITAL FUNDING REQUEST**

<b>Project Name:</b> <i>Cryptosporidium</i> Action Plan		
<b>Appropriation No.:</b> 703	<b>Funding Request No.:</b> 1	<b>Amount:</b> \$1,400,000
<b>Source of Funds:</b> Pay-As-You-Go Fund		
<b>FY 96-97 Budget:</b> No <input type="checkbox"/> Yes <input checked="" type="checkbox"/> @ \$1,267,700		<b>Capital Program:</b> 5-7030-31 <b>Page No. Reference:</b> 39
<b>Project Justification and Type:</b> (check all applicable)		
<input type="checkbox"/> Meet Water Demands	<input type="checkbox"/> New Facility	<input type="checkbox"/> Replacement
<input type="checkbox"/> Mandated By Law	<input type="checkbox"/> Improvement	<input type="checkbox"/> Expansion
<input type="checkbox"/> Asset Protection/Risk Mgt.		
<input checked="" type="checkbox"/> Cost Avoidance		
<input checked="" type="checkbox"/> Other <u>Water Treatment Optimization</u> _____		

**PROJECT DESCRIPTION**

*Cryptosporidium* is a protozoan organism responsible for several waterborne outbreaks in the United States. The most notable of these outbreaks occurred in Milwaukee, Wisconsin in the spring of 1993 and resulted in approximately 400,000 illnesses and 100 deaths. In 1994, a cryptosporidiosis outbreak was linked to 16 deaths over a four-month period in Las Vegas, Nevada, which treats water from the Colorado River. People with suppressed immune systems are most susceptible to the disease because their immune systems may not be able to stop the infection, and there is no effective medication to treat the disease. Also, traditional disinfectants such as chlorine are ineffective for inactivation of *Cryptosporidium*. Consequently, source water protection and treatment optimization are critical in the control of this organism.

The *Cryptosporidium* Action Plan is designed to place Metropolitan and its Member Agencies in a prudent position on an evolving issue of health significance and to assist

the Board in making decisions related to monitoring, treatment, risk reduction alternatives, and regulatory direction. The goals of this Action Plan are to: (1) assess the extent of *Cryptosporidium* occurrence in Metropolitan's system; (2) identify cost-effective activities that will minimize the exposure of Metropolitan's consumers to *Cryptosporidium*; (3) assist Member Agencies in public outreach to vulnerable populations; and (4) ultimately, help assure that future regulatory mandates are reasonable and avoid unnecessary cost to Metropolitan and its Member Agencies.

A detailed description of the *Cryptosporidium* Action Plan in Attachment A reflects a comprehensive approach phased over three years. The first phase of the Action Plan, approved by your Board in September 1995, concentrated on better defining the *Cryptosporidium* problem by focusing efforts on improving the analytical methods to identify *Cryptosporidium*, increasing public outreach in coordination with our Member Agencies, and determining the vulnerability of processes in our treatment plants. During the first phase, a patent application on Metropolitan's quantitative methods for rapidly screening for *Cryptosporidium* using gene probes and for measuring oocysts' viability and infectivity using tissue cultures was submitted to the U.S. Patent Office. Metropolitan's brochure on "What you should know about *Cryptosporidium*" has been distributed widely. Also, a regional workshop on health and risk communication issues regarding *Cryptosporidium* was well attended by Member Agencies, state and county health representatives, health care providers, and community groups. Bench-scale tests to optimize turbidity removal during conventional and washwater reclamation treatment were completed. Methods for sampling and analyzing *Cryptosporidium* and surrogates through the treatment process were developed. Using these methods, a preliminary mass balance study to determine treatment process vulnerability was conducted.

The accomplishments attained during the first phase of the Action Plan and the goals for the second phase are described in Attachment B. The second phase builds on the findings of the first phase with additional monitoring data, treatment evaluations, methods development, public outreach, and national policy development efforts. The progress during the first phase and the plans and budget for the second phase of the Action Plan have been reviewed by the Member Agency *Cryptosporidium* Action Plan Advisory Group. A breakdown of all program costs is contained in the Financial Statement as Attachment C.

## **BENEFIT**

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As a result of the *Cryptosporidium* Action Plan, Metropolitan will have better methods to assess concentrations and viability status of pathogens and a more comprehensive understanding of pathogen loading in its source waters. This Action Plan is aiding in the development of public outreach programs to assist Member Agencies in informing the general public, high-risk groups (such as AIDS patients and other immunosuppressed people), and the medical community within their respective service areas about the health risks associated with

*Cryptosporidium*. The Action Plan is providing critical treatment process information, specific to Metropolitan's circumstances, to ensure optimized treatment conditions for effective *Cryptosporidium* removal/inactivation. The net result will be detailed information on cost versus *Cryptosporidium* risk reduction so the Board may consider and select the most appropriate means of addressing *Cryptosporidium*. Information developed by the Action Plan will allow Metropolitan and its Member Agencies to be in a stronger position to positively influence national policy with good scientific data and help avoid unnecessary treatment modifications. A possible indirect benefit may be the financial contribution from grants and patents that will be actively pursued by staff.

## **PROJECT PLAN**

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See Attachment A, Figure 1 for details of the proposed Action Plan schedule.

## **ALTERNATIVES TO PROPOSED ACTION**

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The alternative to the *Cryptosporidium* Action Plan, which is a proactive course of action to define the problem, develop better analytical methods, and provide public outreach, is to await the development of mandatory treatment standards and monitoring requirements which may not be based on good science and may result in onerous impacts on Metropolitan and its Member Agencies that have surface water treatment plants. In addition, Metropolitan would not be properly prepared in case of a *Cryptosporidium* outbreak or not be able to respond adequately to Member Agency and public inquiries regarding *Cryptosporidium*.

## **CEQA COMPLIANCE / ENVIRONMENTAL DOCUMENTATION**

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Approval of the recommendation will not, in and of itself, have any environmental effects. When and as specific steps are proposed for implementation, your Board will be requested to comply, as appropriate, with the California Environmental Quality Act. This program is exempt because it consists of basic data collection, research, experimental management and resource evaluation activities not resulting in a serious or major disturbance to an environmental resource (Title 14 CCR Sec. 15306).

JMB/mi

Attachments

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## Attachment A

### **CRYPTOSPORIDIUM ACTION PLAN**

#### **PURPOSE AND OBJECTIVES**

The *Cryptosporidium* Action Plan is a phased program designed to place Metropolitan and its Member Agencies in a prudent position on an evolving issue of health significance and assist the Board in making decisions on source protection, monitoring, risk reduction treatment measures, and regulatory direction. The *Cryptosporidium* Action Plan has several objectives: (1) assess the extent of *Cryptosporidium* occurrence in Metropolitan's system; (2) identify activities that will minimize the exposure of Metropolitan's consumers to *Cryptosporidium* in a cost-effective manner; (3) assist Member Agencies in public outreach to vulnerable populations; and (4) ultimately, help assure that future regulatory mandates are reasonable and avoid unnecessary cost to Metropolitan and its Member Agencies.

#### **POLICY BASIS**

The *Cryptosporidium* Action Plan represents a proactive course of action to develop better monitoring methods, assist Member Agencies to broaden public outreach, actively participate in national policy development, and identify cost-effective treatment controls. This is in keeping with the Board's adopted Water Quality Goal that "Metropolitan will participate in legislative and regulatory processes and pursue applied research programs to devise creative, economically feasible solutions to water quality problems."

#### **RATIONALE FOR THE *CRYPTOSPORIDIUM* ACTION PLAN**

*Cryptosporidium* is a protozoan organism capable of infecting animals and humans and has recently been recognized as an important source of waterborne outbreaks in the United States. *Cryptosporidium* is acquired by consuming water or food contaminated with oocysts (the environmentally resistant stage of the organism). The illness caused by *Cryptosporidium* is called cryptosporidiosis, and in healthy individuals may result in severe gastrointestinal distress for a period of 1 to 2 weeks. In persons with suppressed immune systems (e.g., Acquired Immune Deficiency Syndrome (AIDS) patients, infants, elderly, and individuals on chemotherapy), cryptosporidiosis may be life threatening because their immune systems may not be able to stop the infection, and there is no effective medication for the treatment of this disease. Also, traditional disinfectants such as chlorine are ineffective for inactivation of the oocysts. Consequently, source-water protection and treatment optimization are critical in the control of this organism.

## APPROACH

The first phase of the Action Plan concentrated on better defining the *Cryptosporidium* problem by focusing efforts on improving analytical methods to identify *Cryptosporidium*, increasing public outreach in coordination with our Member Agencies, and determining the vulnerability of processes in our treatment plants. The efforts in the subsequent phases of the Action Plan will continue the efforts in source protection, treatment optimization, and methods development.

The approach described below reflects a comprehensive three-year plan. The *Cryptosporidium* Action Plan includes three main approaches for addressing *Cryptosporidium* in Metropolitan's source and finished waters: (1) developing multiple barrier protection (e.g., monitoring, treatment optimization studies, and methods development); (2) providing public outreach programs to assist member agencies in informing the general public, high-risk groups (such as AIDS patients and other immunosuppressed people), and the medical community about *Cryptosporidium*; and (3) helping to develop regulatory and non-regulatory mechanisms to control *Cryptosporidium* through nationwide initiatives such as the Partnership for Safe Water.

### Multiple Barrier Protection

#### Strategy 1: Source Water Monitoring

The purpose of this strategy is to assess pathogen loading in Metropolitan's source waters.

*Task 1: Pathogen Monitoring* - Conduct pathogen monitoring in our reservoirs and other source waters. Sanitary surveys of the Colorado River Aqueduct and State Water Project watersheds and pathogen monitoring of the treatment plant influents and effluents are currently being conducted and are not included in this task.

#### Strategy 2: Treatment Evaluation

The purpose of this strategy is to evaluate existing treatment and, if necessary, implement treatment modifications that will maximize the removal of *Cryptosporidium* from Metropolitan's source waters.

*Task 1: Cryptosporidium Mass Balance Studies* - Conduct mass balance studies of *Cryptosporidium* removal at Metropolitan's plants. Examine surrogate indicators such as Bacillus subtilis and particle counts.

*Task 2: Optimization of Wastewater Reclamation Plants (WWRP)* - Identify the current WWRP operations and their impact on *Cryptosporidium* inactivation/removal. Examine coagulants, operational practices, tube settlers, filtration, ozonation, and microfiltration.

*Task 3: Optimization of Coagulation and Filtration* - Examine coagulation chemicals, methods, and efficiency. Investigate sedimentation practices. Study filter media type and configuration, filtration rate, backwash practices, surface wash, filter-to-waste practices, and filter aids. Evaluate alternative filtration performance measures. Conduct these studies on bench, pilot, and full scale conditions.

*Task 4: Optimization of Disinfection* - Evaluate ozone/PEROXONE and alternative disinfectants for *Cryptosporidium* inactivation. Perform these studies on a bench-scale with *Cryptosporidium* viability assessed by animal infectivity tests.

### Strategy 3: Methods Development

The purpose of this strategy is to develop new methods for detecting and determining the viability of *Cryptosporidium*.

*Task 1: Methods Development* - Examine the use of gene probe techniques coupled with cell culture methods to improve *Cryptosporidium* detection sensitivity and viability assessment.

### **Public Outreach/Education**

#### Strategy: Public Outreach/Education

The purpose of this strategy is to educate the public, vulnerable subpopulations, and the medical community about *Cryptosporidium* to minimize the potential for illness. The focus will be on providing Member Agencies with assistance and tools needed to accomplish this. Efforts will include the following: (1) preparation of language on *Cryptosporidium* for annual water quality reports; (2) development of an informational brochure on *Cryptosporidium* for member agencies to use to respond to public inquiries; (3) providing presentations at meetings when requested by member agencies and others; (4) sponsoring a region-wide workshop with member agencies and health officials to develop consensus on communication issues with the public; (5) preparation of a public information video on *Cryptosporidium* and drinking water safety in Southern California; and (6) participation in national, state, and regional forums on *Cryptosporidium*.

### **National Policy and/or Regulatory Development**

#### Strategy: Participation in National Policy/Regulatory Development Activities

The purpose of this strategy is to promote research and help develop regulatory and non-regulatory mechanisms to control *Cryptosporidium*. This involves active participation in the "Partnership for Safe Water", a nationwide initiative between the USEPA and the water industry to encourage and help water suppliers to voluntarily optimize their microbial-control treatment processes. Also, Metropolitan will participate in national forums and discussions on *Cryptosporidium* because of the information developed throughout this Action Plan.

## **ACTION PLAN ORGANIZATION**

The Member Agency *Cryptosporidium* Action Plan Advisory Group meets regularly to provide technical advice and oversight and to revise the scope and budget throughout the three-year Action Plan. The Board of Directors are kept apprised of the progress of the Action Plan quarterly and at key milestones. In addition, the Board is asked to approve and appropriate funding for the Action Plan annually.

## **SCHEDULE AND BUDGET**

The *Cryptosporidium* Action Plan is proposed as a \$4.2 million program phased over three years. Figure 1 shows the proposed schedule for the Action Plan. The Metropolitan Board of Director's approved the first phase's funding in September 1995. The requested budget for the second year of the Action Plan is \$1.4 million (including contingency.) Figure 2 shows the allocation of funds by activity for fiscal year 1996-97. The Water Quality Division is aggressively pursuing external funding, such as research grants from the U.S. Environmental Protection Agency, U.S. Department of Agriculture, and the American Water Works Association Research Foundation, to offset some of the costs in the Action Plan. Consequently, the budget may be modified contingent on the acquisition of these funds.

**Figure 1**  
**CRYPTOSPORIDIUM ACTION PLAN**  
**PROPOSED SCHEDULE**

	FY 95-96	FY 96-97	FY 97-98
<b>Source Water Monitoring</b>		*	
<b>Methods Development</b>			
<b>Treatment Evaluation</b>			
<b>Mass Balance</b>			
<b>Bench/Pilot/Full Scale Testing</b>		*	
<b>Wastewater Reclamation</b>			
<b>Disinfection</b>			
<b>Public Outreach</b>			
<b>National Policy Development</b>			

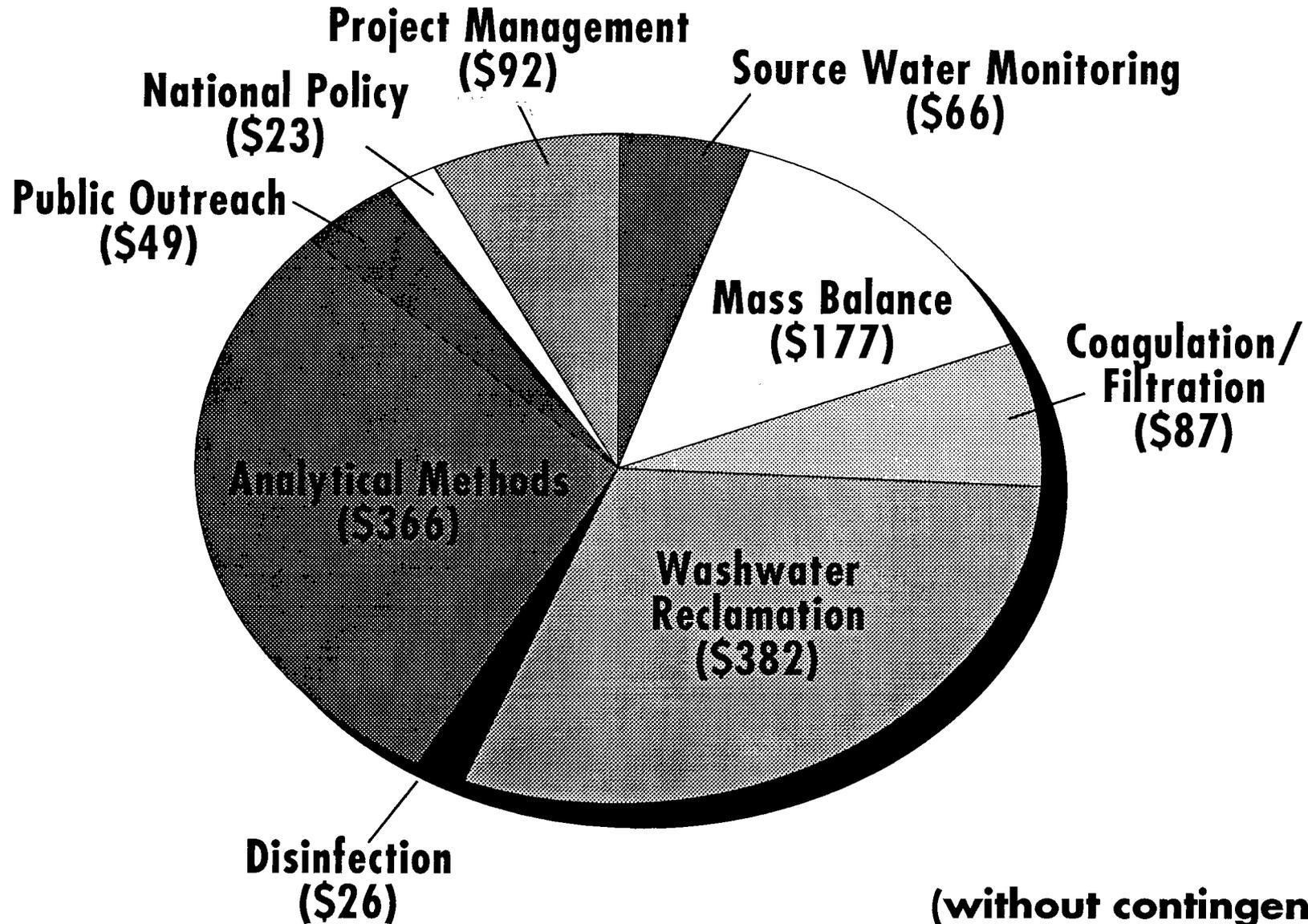
\*Effort shifted to O & M budget.

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**Figure 2**

**CRYPTOSPORIDIUM ACTION PLAN  
PROPOSED BUDGET FOR FISCAL YEAR 1996-97 (\$1000s)**



**(without contingency)**

**Attachment B**  
**CRYPTOSPORIDIUM ACTION PLAN**  
**ACCOMPLISHMENTS AND GOALS**

Action Plan Tasks	First Phase Accomplishments (October 95 - September 96)	Second Phase Goals
<b>SOURCE WATER MONITORING</b>	<ul style="list-style-type: none"> <li>- Monthly plant influent/effluent <i>Crypto</i> data</li> <li>- Source water monitoring plan</li> </ul>	<ul style="list-style-type: none"> <li>- Monthly plant influent/effluent <i>Crypto</i> data</li> <li>- Source water <i>Crypto</i> data</li> </ul>
<b>TREATMENT EVALUATION</b>  Mass Balance	<ul style="list-style-type: none"> <li>- Development of sampling and analytical methods for <i>Crypto</i> surrogates</li> <li>- Preliminary assessment of <i>Crypto</i> concentrations through Diemer treatment train</li> </ul>	<ul style="list-style-type: none"> <li>- Establish relationship between <i>Crypto</i> and surrogates</li> <li>- Evaluate the impact of washwater reclamation plant flows</li> <li>- Assess <i>Crypto</i> concentrations at other plants</li> </ul>
Washwater Reclamation Plants (WWRP)	<ul style="list-style-type: none"> <li>- Optimized coagulation conditions for <i>Crypto</i> removal at Diemer's WWRP</li> </ul>	<ul style="list-style-type: none"> <li>- Optimized coagulation conditions for 3 other WWRPs</li> <li>- Literature review of other <i>Crypto</i> removal processes</li> </ul>
Coagulation/Filtration	<ul style="list-style-type: none"> <li>- Optimized bench-scale coagulation conditions</li> <li>- Preliminary pilot-scale test results</li> </ul>	<ul style="list-style-type: none"> <li>- Optimized pilot-scale coagulation conditions</li> <li>- Preliminary full-scale test results</li> <li>- Installation of particle counters at plants</li> </ul>
Disinfection	<ul style="list-style-type: none"> <li>- Contract to perform initial disinfection screening</li> </ul>	<ul style="list-style-type: none"> <li>- Initial Disinfection screening results</li> <li>- Completed literature review</li> <li>- Disinfection inactivation results on WWRP</li> </ul>

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**Attachment B**  
**CRYPTOSPORIDIUM ACTION PLAN**  
**ACCOMPLISHMENTS AND GOALS**

Action Plan Tasks	First Phase Accomplishments (October 95 - September 96)	Second Phase Goals
<b>METHODS DEVELOPMENT</b>	<ul style="list-style-type: none"> <li>- Specific detection of <i>Crypto parvum</i></li> <li>- First stage rapid screen method</li> <li>- Optimized growth conditions for cell lines receptive to <i>Crypto parvum</i></li> <li>- Intermediate method for monitoring <i>Crypto</i> infection of cell cultures</li> <li>- Patent application submittal to the US Patent Office</li> </ul>	<ul style="list-style-type: none"> <li>- Common sample clean-up method for rapid screen and infectivity assay</li> <li>- Second stage rapid screen method</li> <li>- Optimized infectivity assay for quantitation</li> <li>- Rapid screen method applied on source water samples</li> </ul>
<b>PUBLIC OUTREACH/EDUCATION</b>	<ul style="list-style-type: none"> <li>- Information for annual water quality reports</li> <li>- <i>Crypto</i> brochure</li> <li>- <i>Crypto</i> video</li> <li>- Regional <i>Crypto</i> workshop</li> <li>- County-by-county meetings</li> <li>- Outreach to organizations</li> <li>- Newsletter/Internet</li> </ul>	<ul style="list-style-type: none"> <li>- Information for annual water quality reports</li> <li>- National, state, and regional coordination on <i>Crypto</i> issues</li> <li>- County-by-county meetings</li> <li>- Outreach to organizations</li> <li>- Newsletter/Internet</li> </ul>
<b>NATIONAL POLICY DEVELOPMENT</b>	<ul style="list-style-type: none"> <li>- Participation in Partnership for Safe Water</li> <li>- ICR/ESWTR review</li> </ul>	<ul style="list-style-type: none"> <li>- Participation in Partnership for Safe Water</li> <li>- ICR/ESWTR review</li> </ul>

Attachment C

**FINANCIAL STATEMENT**  
(FY 1996/97 Capital Program No. 5-7030-31)

The total estimated cost breakdowns for the Initial Funding and Authorization No. 1 of Appropriation No. 703 are shown below:

	<u>Initial Funding</u>	<u>Authorization No. 1</u>
Labor		
Water Quality	\$533,200	\$1,026,100
Operations	39,700	\$56,400
Total Labor	<hr/> \$572,900	<hr/> \$1,082,500
Materials	\$283,200	\$412,300
Professional & Technical	\$192,000	\$461,400
Operating Equipment	\$0	\$157,500
Administrative Overhead	\$316,100	\$518,200
Contingency	\$136,400	\$268,700
Total	<hr/> \$1,500,600	<hr/> \$2,900,600

**Source of Funds:** Pay-As-You-Go Fund

**Summary of Authorized Funding:**

Initial Funding	\$1,500,600
Authorization No. 1	\$1,400,000
Additional Funding	<u>\$1,466,600</u>
Total:	\$4,367,200

**Capital Program for Fiscal Year 1996/97:**  
(Program No. 5-7030-31)

Total Program Estimate	\$4,367,200
Program Estimate for FY 1996/97	\$1,267,700

**Class:** 1--Projects directly related to delivery of water, required for health and safety or mandated by governmental requirements.

**Actual and Projected Expenditure of Funds:**

Through Fiscal Year:		
	1995/96	\$1,076,400
	1996/97	\$1,267,700
	1997/98	\$1,619,800
	Contingency	\$403,300
	Total	<hr/> \$4,367,200