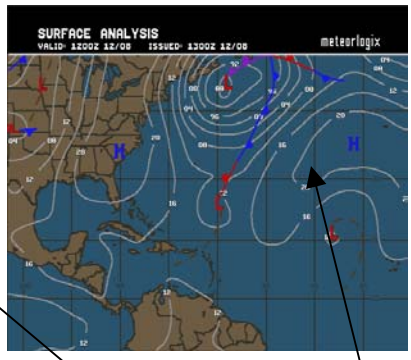
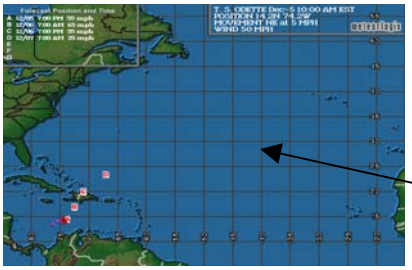
Water Control Management
Annual Report FY 2003





Satellite Telemetry
of Real-Time Radar, Surface,
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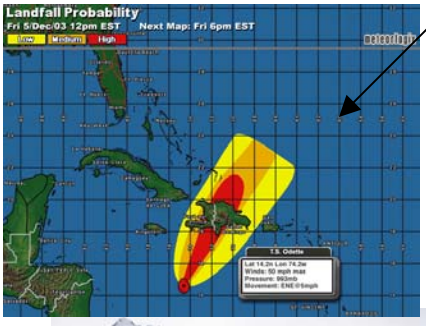

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December 2003

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

WATER CONTROL MANAGEMENT

ANNUAL REPORT

FISCAL YEAR 2003

Prepared by:
Water Management Section
Reservoir Regulation Team

DECEMBER 2003

FOREWORD

This publication, prepared in accordance with OCE guidelines (ER 1110-2-240), summarizes the FY03 reservoir regulation activities of the New England District. This report also describes important accomplishments of the Water Management personnel, reviews the status of the Water Control Data Collection System, and discusses future objectives for FY04.

Annual Reports have been prepared since 1972, and duplication of previous information has been kept to a minimum.

NEW ENGLAND DISTRICT
FY03 ANNUAL REPORT
WATER CONTROL MANAGEMENT

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NEW ENGLAND DISTRICT
FY03 ANNUAL REPORT
WATER CONTROL MANAGEMENT

A. GENERAL INFORMATION

1. Purpose of Report. This report outlines activities and accomplishments of the New England District (NAE), relating to reservoir regulation and water management throughout FY03. It is prepared in accordance with paragraph 13 of ER 1110-2-240, dated 8 October 1982, entitled Water Control Management.

2. Organization for Water Control Management. Water Control Management is the responsibility of the Reservoir Regulation Team of the Water Management Section, Water Resources Branch, Engineering-Planning Division, New England District. The office is located at Concord Park, 696 Virginia Road, Concord, Massachusetts.

New England District's Reservoir Regulation Team (RRT) is responsible for regulation activities at all Corps flood control reservoirs and hurricane barriers, collection of hydrologic and meteorological data associated with regulation, coordination of information, and special studies. Specific responsibilities include the following:

a. Directing regulation of the New England District's reservoirs and hurricane barriers.

b. Collecting, analyzing, and interpreting hydrologic and meteorological data for real time water control/regulation purposes.

c. Preparing and revising regulation plans and manuals for individual reservoirs, systems of reservoirs, and hurricane barriers.

d. Developing products using WEB and GIS technology for data dissemination, public information, and real-time water control decision-making.

e. Periodic meetings with field personnel, as well as other Federal, State, and local authorities, to discuss regulation responsibilities/issues and/or modifications to operating procedures.

During FY03, Mr. Brian Waz was permanently assigned to the Reservoir Regulation Team after completing a 1-year detail. Brian was permanently assigned from the Hydrology & Hydraulics/Coastal

and Water Quality Team, within the Water Management Section, and brings a sound background in water resources to the position. The current staff of the Reservoir Regulation Team is as follows:

RRT Staff			
Name	Position	Telephone No.	Yrs Exp.
Paul Marinelli*, P.E.	Hydraulic Engineer	978-318-8630	29+
Greg Hanlon, P.E.	Hydraulic Engineer	-8632	15
Steven Simmer	Hydraulic Engineer	-8524	15
Daniel Stenstream	Civil Engineer	-8163	13
Brian Waz, P.E.	Hydraulic Engineer	-8603	8
* Team Leader			

The Hydrology & Hydraulics/Coastal and Water Quality Team are other elements of the Water Management Section available to provide technical assistance for special studies and reservoir regulation activities during flood periods. Technical assistance by RRT is also provided to this team. An organization chart of the Water Management Section is shown on Exhibit 1.

3. New England District Background. The New England District (NAE) has constructed 35 flood control dams, 5 hurricane barriers, and 100 local protection projects within New England. In addition, the District has acquired flowage rights on more than 8,000 acres of flood prone lands within the Charles River Natural Valley Storage area. A total of 31 of 35 reservoir projects, and 2 of 5 hurricane barriers are operated and maintained by the Corps, while the remaining projects are operated and maintained by local interests. NAE operates and maintains 10 of the 31 reservoirs for flood control only. Another 17 are operated primarily for flood control, and seasonally for recreational activities, under general authority of the Flood Control Act of 1944 (PL 78-534). The remaining four reservoirs are operated as multipurpose projects, including flood control, water supply, recreation, non-Federal

hydropower, and fishery storage. A total of 28 of the 31 reservoirs, operated and maintained by NAE, are staffed projects, while the remaining three are unstaffed, have fixed opening outlet works, and do not require any daily or periodic regulation operation. NAE reservoirs are not operated for irrigation or navigation; however, non-Federal hydropower facilities have been installed at seven sites on Corps-owned lands, as described in paragraph B.12. The Corps hurricane barriers at Stamford, CT, and New Bedford, MA, are operated for coastal storms and hurricanes by closing navigation gates to prevent high ocean storm surges from entering their respective harbors.

B. WATER CONTROL MANAGEMENT DURING FISCAL YEAR 2003

1. Flood Control. During FY03, the New England region experienced variable weather characterized by a wetter than normal year, especially relative to the previous fiscal year where weather conditions resulted in a dry year having precipitation deficits ranging from 5 to 10 inches at the end of FY02. Annual precipitation in FY03 was considered above normal throughout the region and not only eliminated the deficits in precipitation that the year began with, but actually produced "excesses" at the end of the FY. Precipitation recorded at NAE dams in central and northern watersheds averaged between 92 and 120 percent of normal with excess averaging 2 to 5 inches. Within southern watersheds, NAE dams recorded precipitation averaging from 99 to 116 percent of normal with excess ranging from 3 to 6 inches. Monthly precipitation recorded at NAE dams is presented in Exhibit 2. Winter snowfall started out greater than normal for the entire New England region and remained that way throughout the balance of the winter. By the middle of March 2003, all of the region's major watersheds still had a substantial snowpack ranging from 10 to 30 inches with 4 to 9 inches water equivalent. Water equivalent of the snowpack in southern watersheds peaked between 3.0 and 7.0 inches in mid-March, whereas, northern watersheds peaked between 4.5 and

9.2 inches also in mid-March. As a result of these water equivalents, the entire region was characterized as having a high potential flood threat during the March/April time period. Significant runoff occurred in late March as a result of warmer temperatures and 0.5 to 1.5 inches of coincident rainfall. Most of the southern watersheds were void of snowpack at this time due to warm temperatures melting the snowpack just prior to the rainfall event; however, northern watersheds contributed to the majority of the runoff due to the existing snowpack and coincident rainfall. The 2003 hurricane season experienced two anomalies as two named storms occurred outside the traditional season of June through November. Tropical storms Ana and Odette were formed in May and December, respectively, for a total of fifteen names tropical storms/hurricanes forming in the Caribbean and Atlantic Oceans. Of the 15 storms, 6 were hurricanes of which 3 reached the intensity of category 3 or greater. None of the tropical storms/hurricanes affected the New England Coastline. The Stamford Hurricane Barrier was operated on eleven occasions and the New Bedford Hurricane Barrier on twelve occasions.

a. Regulation of Reservoirs. Flood control is the primary function of all NAE Corps dams; therefore, almost all storage is allocated to this purpose. Other limited reservoir uses include water supply, hydropower, conservation, fishery storage, and recreation. Winter pools are maintained at many dry-bed reservoirs to submerge flood control gates and prevent them from freezing. During FY03, one significant runoff event occurred on 28-31 March requiring reservoir regulation activities. Cumulative damages prevented due to Corps dams and local flood protection during this event was $41,050,000 of which about 29 percent was attributed to NAE dams and 71 percent to local flood protection projects. Information on this storm event is presented below and a summary of maximum reservoir levels and percent storage utilized during FY03 are given on Exhibit 3.

Flood Event of 28-31 March 2003

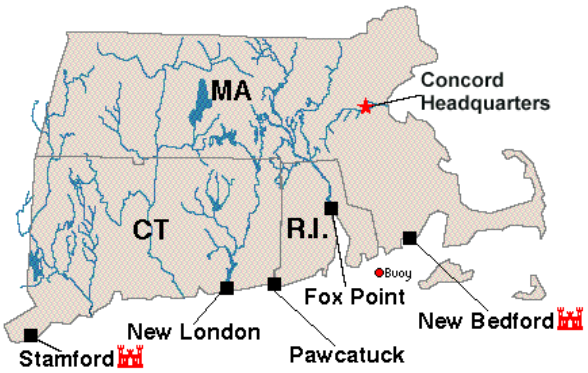
During the period 28 to 31 March 2003, warm temperatures and with rainfall produced snowmelt and runoff in New England watersheds. While most southern New England watersheds were already void of snowpack, the more northern watersheds within the Merrimack and Connecticut River basins still had water equivalents of about 2.0 to 3.0 inches. Only the Merrimack and Connecticut River basins experienced river levels approaching flood stage downstream from our dams. While runoff was also experienced in the Naugatuck, Thames, and Blackstone River basins, no rivers reached damaging levels.

Both the mainstem Connecticut and Merrimack Rivers

experienced rises beginning on the 29th of March and peaking between the 30th and 31st cresting just below flood stage due to snowmelt and approximately 0.5 to 1.5 inches of rainfall between 29 and 31 March. Reductions in stream flows resulting from Corps reservoir regulation activities averaged 14 percent and 27 percent within the Connecticut and Merrimack River Basins, respectively. Flood control storage utilized at Corps reservoirs ranged from 10 to 36 percent in the Connecticut River Basin and 10 to 34 percent in the Merrimack River Basin. Total damages prevented during this runoff event were $41.05 Million, of which $41 Million were in the Connecticut River Basin, and only $50,000 in the Merrimack River Basin. Approximately 29 percent of the damages prevented were associated with NAE dams and the remaining 71 percent attributed to local flood protection projects. A distribution by state and project type is presented below.

Damages Prevented ($) 28-31 March Event			
State	NAE Flood Control Dams	Local Protection	Total
New Hampshire	200,000	--	200,000
Vermont	71,000	--	71,000
Massachusetts	7,415,000	9,633,000	17,048,000
Connecticut	4,110,000	19,621,000	23,731,000
TOTAL	**$11,796,000**	**$29,254,000**	**$41,050,000**

b. Regulation of Hurricane Barriers. During fiscal year 2003 the Stamford Hurricane Barrier was operated on eleven occasions for total damages prevented of $450,000. The New Bedford Hurricane barrier was operated on twelve occasions for total damages prevented of $348,000. The locally operated hurricane barriers in: Providence, RI (Fox Point); New London, CT; and Pawcatuck (Stonington) CT, did not experience damaging tide levels and, therefore, no damages prevented were computed in FY03.



None of the storms of FY03 produced tide levels of a significant height to require further discussion. A summary of total number of operations by fiscal year for Stamford and New Bedford barriers is shown on Exhibit 4.

c. Summary of Flood Control Benefits.

(1) FY03 Benefits. Flood control "damages

prevented" from 1 October 2002 through 30 September 2003 including reservoirs, hurricane barriers and local protection projects totaled $41,848,000. Distribution of FY03 damages

prevented by State is listed below.

FY03 DAMAGES($) PREVENTED				
State	Flood Control Reservoirs	Local Protection	Hurricane Barriers	Total
Massachusetts	7,415,000	9,633,000	348,000	17,396,000
Connecticut	4,110,000	19,621,000	450,000	24,181,000
New Hampshire	200,000	0	N/A	200,000
Vermont	71,000	0	N/A	71,000
Rhode Island	0	0	0	0
Maine	0	0	N/A	0
TOTAL	**11,796,000**	**29,254,000**	**798,000**	**$41,848,000**

(2) Total Cumulative Flood Control Benefits. Flood control damages prevented for all projects, cumulative through 30 September 2003, is summarized below. In addition, Exhibit 5 presents FY03 benefits, as well as cumulative benefits, for all NAE owned and operated flood control storage projects (31 dams) and 2 hurricane barriers.

Cumulative Flood Control Benefits (Through 30 Sep 03)	
Reservoirs	$1,685,187,600
Local Protection	$1,208,213,000
Hurricane Barriers	$46,512,200
TOTAL	**$2,939,912,800**

2. Drought/Low Flow Regulations. The persistent dry conditions experienced during last year did not continue into FY03. The weather pattern during FY03 produced normal to above normal precipitation throughout the year essentially eliminating any precipitation deficits remaining from the previous year. As a result, there were no reports or declarations of drought conditions within the New England region. No drought contingency measures, requiring water storage at our reservoirs, were requested nor implemented during the fiscal year. The year ended with precipitation excesses of 2 to 6 inches, which is currently being carried into the FY04 period and hopefully will likely prevent drought conditions in the upcoming year.

3. Water Supply. Three NAE reservoirs, Littleville Lake,

Colebrook River Lake, and East Brimfield Lake have water supply storage allocated for municipal and industrial use. During FY03, minor low flow conditions along the Farmington River initiated fishery storage releases at Colebrook River Lake for a limited time. A spring and fall fishery pool, each with a maximum storage of 5,000 acre-feet, is maintained at Colebrook River Lake, to release a minimum flow for fish life in the Farmington River. Releases are coordinated with the Connecticut DEP and the Metropolitan District, Hartford, Connecticut. Releases from spring fisheries storage were made intermittently throughout the year with more consistent releases during the summer season. East Brimfield Lake made water supply releases for industrial processes in accordance with contractual obligations with the downstream American Optical, Inc. The American Optical Company of Southbridge, MA owns 1,140 acre-feet of storage between the stages of 9 and 13 feet at East Brimfield Lake. Small releases were requested and provided from this storage during the months of June, July, and August. No releases for water supply were requested by the city of Springfield, MA, which owns water supply storage at Littleville Lake.

4. Recreation. Throughout FY03 the following recreational releases were made from our reservoirs in support of downstream whitewater canoeing and kayaking.

a. Ball Mountain Lake. Releases of 1,500 cfs were provided by temporarily raising the pool level at Ball Mountain Lake for downstream canoe/kayak recreation on the weekend of April 26-27 and on September 20.

b. Townshend Lake. Discharges from Ball Mountain Lake were released through Townshend Lake, on the same dates as Ball Mountain Lake.

c. Otter Brook Lake. Releases of 250 cfs were provided for downstream canoeing on the weekends of March 29-30; April 12-13; and May 3-4.

d. Surry Mountain Lake. Releases of 275 cfs were provided for downstream canoeing for one day on May 3.

e. Birch Hill Dam and Tully Lake. Releases of 1,100 cfs at Birch Hill Dam and 300 cfs at Tully Lake were provided by temporarily raising the pool levels at both projects for the weekend of

April 12-13, which included the 40th Annual River Rat Race, held on April 12.

f. Knightville Dam and Littleville Lake. Releases of 1,000 cfs at Knightville Dam and 300 cfs at Littleville Lake were provided by temporarily raising the pool levels at both projects for the 49th Annual Westfield River Wildwater Race, on the weekend of April 19-20.

g. Blackwater Dam. Releases of 600 cfs were provided for the Blackwater Slalom Race on April 25-27, by temporarily raising the pool level.

h. East Brimfield Lake. On April 27 a release of 350 cfs was made by temporarily raising the pool level at East Brimfield Lake for the Sturbridge Lions Club All American River Race.

i. Mansfield Hollow Lake. Releases of 500 to 750 cfs were provided by temporarily raising the pool level at Mansfield Hollow Lake for the Shetucket River Days Canoe Cruise event on June 15.

5. Initial Filling. There are no District reservoir projects presently under construction, or in the initial filling phase. During FY03 the largest storage impoundment (in terms of volume) occurred at Hopkinton Dam located on the Contoocook River in New Hampshire, a major tributary of the Merrimack River. During a late March rainfall and snowmelt event, the project stored over 33,000 acre-feet of runoff, or 48 percent of its' total flood control storage capacity. No dam safety related problems were observed during this impoundment.

6. Constraints on Project Regulation.

a. General. No major constraints occurred during FY03 that inhibited normal regulation procedures at our reservoirs.

b. West Hill Dam. As a result of previous seepage conditions, West Hill Dam has been operated under restricted procedures since 1998. The construction of a concrete cutoff wall through the West Hill Dam embankment began in September 2001 and was completed in early FY03 (December 2002). A maximum pool level of 18.7 ft.(33% full) occurred in early April 2003 and the cutoff wall was tested and determined to be successful. All reservoir regulation restrictions have been removed and operating procedures have returned to normal.

7. Deviations from Water Control Plans. No major deviations were requested for New England District's reservoirs in FY03. Only minor, informal deviations occurred in support of downstream construction efforts. These minor deviations were for only a few hours on occasions throughout the fiscal year.

8. Status of Regulation Manuals. During FY03, the Housatonic River Basin Master Manual was completed via an A-E contract with Hancock Engineering. In-house efforts continue on the Knightville Dam and Littleville Lake project manual. These projects are located in the Westfield River watershed, part of the Connecticut River basin. This manual is currently about 95 percent complete. Work has also commenced in FY03 on the Blackstone River Basin Master Manual, which is about 60 percent complete. Exhibit 6 shows the five-year plan and current status of NAE's reservoir regulation manuals.

9. Data Collection.

a. Data Collection Platforms (DCP).

(1) General. NAE currently owns and operates 92 GOES Data Collection Platforms (DCP's), 45 at river index stations, 44 at NAE dams, including tailwater gages, 2 at NAE hurricane barriers (although the New Bedford barrier DCP is not yet installed), and 1 test site at NAE Concord headquarters. A breakdown of the number of DCP's by river basin is presented below:

DCPs By River Basin	
River Basin	No. DCP's
Connecticut	39
Merrimack	22
Thames	12
Naugatuck	13
Blackstone	3
Hurricane Barriers	2
Test Site at NAE HQ	1
Total:	**92**

(2) Upgrades. During FY03 NAE began the first step in complying with the NESDIS Initiative of high data rate transmissions by 2013. This initiative requires data collection platforms to transmit data in 10-second time windows at 300-baud rate no later than the year 2013. Currently NAE DCPs transmit in 30-second time windows at 100-baud rate. NAE procured Sutron 9210 data loggers and Sutron GPS Satlink GOES

transmitters, which are capable of transmitting at 100, 300, and 1200 baud-rates. During FY03 NAE began replacing the older Sutron 8210 DCPs with these new units; however, the transmission rate has been left at 100-baud rate until coordination with HQUSACE and Corps Districts and Divisions are completed for appropriate time window assignments. In late FY03, RRT replaced 10 existing data collection platforms with these new Sutron units at the following sites.

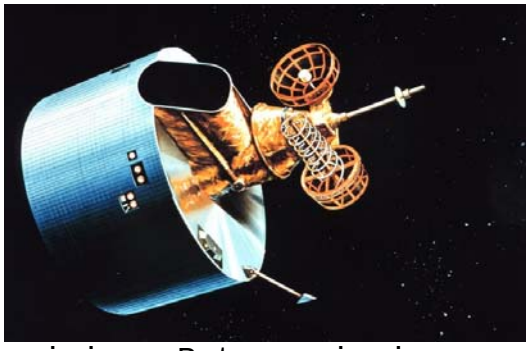
Sutron 9210/Satlinks	
Upper Connecticut River Basin	**Merrimack River Basin**
Connecticut River at West Lebanon, NH	Merrimack River at Lowell, MA
	Naugatuck River Basin
Lower Connecticut River Basin	Thomaston Dam & Tailwater, CT
Connecticut River at Montague City, MA	Hop Brook Dam & Tailwater, CT
Chicopee River at Indian Orchard, MA	Naugatuck River at Waterbury, CT
Thames River Basin	
French River at Webster, MA	

(3) DCP Transmission Mode. NAE currently transmits data in both self-time (channel 31) and random (channel 129) modes from all data collection platforms. At the 45-river index stations DCP data transmits hourly when critical river levels are reached.

(4) Maintenance. The Reservoir Regulation Team renewed its contract for FY03 with the U.S. Geological Survey (USGS) for maintenance and recalibration of NAE's DCP’s during their routine visits to stream gaging stations. The USGS provides this service through their district offices in Massachusetts, Connecticut, New Hampshire, Vermont, and Rhode Island. This service significantly improves data accuracy and reduces the number of emergency site visits required by reservoir regulation personnel. During FY03, as agreed to in previous years, the USGS waived their routine visitation fee for 43 out of a total of 90 sites where NAE-owned data collection equipment is used to collect the stations primary records (DCP’s serve as data transmitters as well as data loggers).

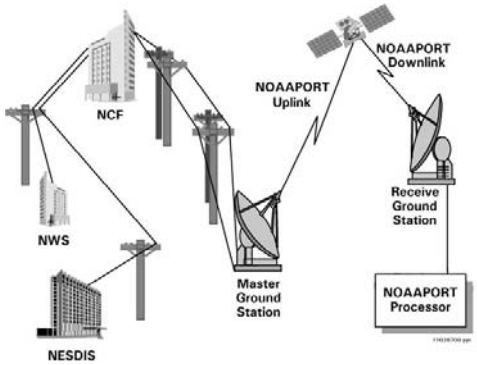
b. Other Data Collection.

(1) GOES Satellite. NAE has been using GOES-08, launched in April 1994, also known as GOES east, with advanced weather imagery, as it's data collection satellite. The NAE data collection platforms monitor pool, tailwater and river levels, rainfall, and air temperature, recording data every 15 minutes. The data is periodically transmitted to NOAA's Geostationary Operational Environmental Satellite (GOES) then back to earth where it is received by the National Environmental Satellite Data and Information Service (NESDIS) at Wallops Island, Virginia. Retransmissions are made from Wallops Island to DOMSAT, a domestic satellite; where it is received at NAE via a DOMSAT receive station. Raw data is received at NAE within seconds of transmitting from the data collection platform at the river and/or dam. Data from the DOMSAT system is used as NAE's primary datastream. NAE also uses a NOAAPORT receive station, as backup to the DOMSAT system. Data received by Wallops Island are sent to the NWS Gateway system where it is retransmitted to the NOAAPORT Satellite and received at NAE. The NOAAPORT system is considered a backup system because the raw DCP data transmitted by this system can experience delays of several minutes, compared to only seconds with the DOMSAT. NAE's NOAAPORT Receive Station currently provides backup data for the Baltimore, Philadelphia, and Norfolk Districts real-time data networks.



(2) Domestic Communications Satellite (DOMSAT). The Reservoir Regulation Team uses DOMSAT as its primary data source. The DOMSAT receive system is a Dell PC running a LINUX operating system. This equipment was procured from Ilex Engineering (Mike Maloney) in FY02. NAE presently has a "hot-backup" link to Kansas City, Pittsburgh, Little Rock, and Mobile District's DOMSAT LRGS systems as additional backup sources to retrieve NAE DCP transmissions. NAE's DOMSAT system is also available to backup data for all Corps Districts.

(3) NOAAPORT Satellite. As mentioned previously, RRT uses NOOAPORT as its in-house backup data source. NAE's NOAAPORT receiver is similar to the DOMSAT receiver as it is very flexible and can be used to collect data for the entire GOES network. To fully utilize this asset, NAE has setup data collection backup



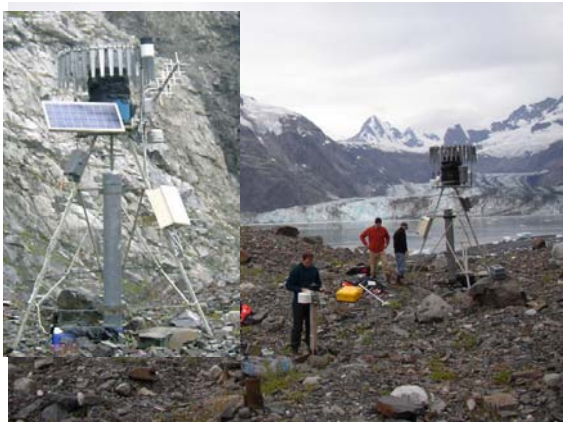
network lists for all Districts within NAD (Baltimore, Philadelphia, and Norfolk). Data from their DCP's are collected at NAE's NOAPORT system and is available as a backup data source for each District.

(4) Radar Imagery. During FY03 NAE replaced the Emergency Managers Weather Information Network (EMWIN) with a new software/receive station from Meteorlogix known as MxVision Storm Sentry. The system receives and displays 6-minute radar imagery for geographic areas considered important to NAE. Additionally, satellite imagery and hurricane tracks are displayed as quickly as NOAA updates/displays the data. Similar to the old EMWIN system, this new system uses satellite telemetry rather than Internet or telephone lines, making the data more reliable and closer to real-time. Storm Sentry updates radar imagery every 6-minutes and is more advantageous than EMWIN which only updated their products every 3-hours.

(5) 42-Inch Plasma Monitor. During FY03 RRT procured a NEC 42-inch plasma monitor to complement and display radar and satellite imagery from the MxVision Storm Sentry. The monitor is wall mounted and is located in the RRT computer room. The large monitor serves as a great "briefing" tool due to its size and ease of viewing. RRT also connected the cable TV system to the monitor where the Weather Channel and other important TV Stations can be viewed.

(6) Data Feed From National Weather Service. During FY00 the Reservoir Regulation Team implemented an automated data feed from the National Weather Service, Northeast River Forecast Center in Taunton, MA. Using an FTP process, river stage forecasts are transferred to NAE's Sun Blade1000 workstation, and posted into the Oracle database via CWMS. This process can accommodate other data such as rainfall. During FY03, this data feed proved to be an efficient way of obtaining forecasted stage data from the NWS and as a result forecasted products were developed on the RRT Web page.

(7) Collecting Meteorological Data for CRREL. RRT worked with CRREL to help update their meteorological data collection equipment in Glacier Bay, Alaska to provide real time data via the GOES satellite. Services provided to CRREL were obtaining NESDIS Ids, adapting NAE's LRGS (DOMSAT) to collect this data, configuring CWMS to store and view the data, and a 5-day field trip accompanying CRREL to Glacier Bay for installation of equipment. One Sutron 9210/Satlink DCP and one Cambell Scientific DCP, transmitting at the high data rate of 300-baud, were installed as part of this field trip. Mr. Greg Hanlon and Dan Stenstream from RRT accompanied CRREL on this trip.



(8) Collection of Snow Survey Data via the Web. During FY03 the Reservoir Regulation Team continued to have field personnel input snow survey data via the web. The data is processed using common gateway interface (CGI) and Arcview GIS software. Snow data is displayed in tabular and graphical format at the following Web address:

http://www.nae.usace.army.mil/usr1/web/static/htmlfiles/snowpage.html

(9) Data Sharing With Other Agencies. Since 1985 hydrologic data collected by RRT has been available via telephone modem, to agencies and organizations requiring this information. Since the development of the World Wide Web all real time hydrologic data is made available on our web page.

(10) New Sun Blade2000 UNIX Platform. During late FY02, early FY03, RRT procured and installed a new Sun Blade2000 UNIX platform to replace the existing Sun Ultra60 platform. This new platform is a dual processor with two 900Mz processors, 108 Gigabytes hard drive, and 1.0 Gigabytes RAM. Working closely with HEC, CWMS software will be loaded onto this new platform

during early FY04.

10. Water Control Data System (WCDS). The Water Control Data System is implemented on the New England District LAN and presently includes the following equipment: three UNIX Sun workstations (one Sun Blade1000, one Sun Blade2000, and one Sun Ultra60), one Dell LINUX DOMSAT Receive Station, one Marta Systems NOAAPORT Receive Station, and five Dell Pentium PCs running Hummingbird Exceed 9.0 software. Other networked equipment includes one HP Color LaserJet printer, a Microtek desktop scanner with a Dell Pentium III PC, and a Meteorlogix MxVision Storm Sentry system for real time weather images. Significant FY03 activities regarding the WCDS are as follows:

a. DOMSAT SCO to DOMSAT LINUX Upgrade. During FY02, NAE replaced the older PC and SCO operating system with a new Dell PC and Linux operating system supporting the new LRGS software as its DOMSAT receive system. The new system, which is extremely user friendly, uses Windows based applications with GUI interfaces allowing remote access to data from desktop PCs. In FY03, NAE configured the system to use Kansas City, Pittsburgh, Little Rock, and Mobile District's LRGS system as backup to its DCP network.

b. Corps Water Management System (CWMS). Deployment of the Corps new modernized water control system began in late FY01. The Sun Blade1000 serves as the primary CWMS workstation for data collection, product development, and modeling applications. The newest version of CWMS software, version 1.2, was installed in September 03 and data is being entered into the Oracle database for CWMS, via DOMSAT and NOOAPORT, and SHEF datastreams. Formal CWMS training, by HEC staff, was held in early FY02 (November 2001). During late FY03, NAD sponsored a weeklong training session for CWMS products hosted by Baltimore District and training conducted by HEC staff.

c. New Sun Blade2000 Workstation. During late FY02, and early FY03, procurement and delivery of a new Sun Blade2000 Solaris Unix workstation was completed. The workstation is a dual processor 900MHz with 108 GB of hard drive and 1.0 GB RAM. It will replace the Ultra60 and become a CWMS platform, complementing the Sun Blade1000. Experiencing delays by HEC staff in loading CWMS software onto this new platform, it is currently anticipated that it will be configured and become operational during FY04.

d. RRT's Web Site. During FY03 RRT continued updating and revising the existing website. Web pages were developed in a "Frames" format using Macromedia Dreamweaver software. Data presented includes real-time hydrologic plots, REPGEN summary

tables, historic pool stage, outflow, and frequency data, RRT administrative information, and links to other web sites frequently used for reservoir regulation. The site is image map driven and is available to the public through the NAE home page at the following URL address:

http://www.nae.usace.army.mil/usr1/static/rccframe.html

All Project personnel at Corps Dams have access to this site and use the data frequently. There are currently interactive links between project web sites and RRT's web site.

e. Sun Operating System (Solaris). NAE's Sun Blade1000 workstation runs Solaris 8 with the Sun Ultra60 workstation running Solaris 7, and Sun Balde2000 workstation running Solaris 9, with all current security patches installed.

f. Precipitation Validation. During FY03, validation procedures were implemented for the NAE precipitation gage network. The validation uses maximum value, duration and station comparison techniques. The accuracy and success of this validation is still being evaluated.

g. GIS Arc Map Products. During FY03, RRT developed mapping products downstream from our flood control dams identifying areas of concern during flood events. The maps were developed with ArcGIS and used USGS quads as well as ortho photos of rivers below our dams including mainstem rivers. Besides accessing the maps with ArcGIS, they were also converted to pdf format and placed on the RRT Web Page.

h. Web Camera at Stamford Hurricane Barrier. During FY03 RRT installed the first District Web camera at one of our projects. A Pelco camera, with Axis server, connected to a District network connection was installed at our Hurricane Barrier in Stamford,

Connecticut. The camera is programmed to take photos of 6 different locations, every 30-minutes, showing condition at the barrier. The photos and sample operation of the barrier can be found on our Web page.

11. Environmental Initiatives. During FY03, meetings with the Vermont Agency of Natural Resources and the U.S. Fish and Wildlife Service (USFWS) continued to focus attention on the operational procedures of NAE flood control dams. In the interest of improving watershed biodiversity, the agencies requested that NAE modify the way the dams are operated in an effort to mimic the natural flow conditions. Discussions included day-to-day operations, recreational whitewater releases, maintenance activities, and flood control. A 3-year adaptive management plan was agreed to that essentially modifies day-to-day outflow ramping by making smaller incremental releases to avoid unnecessary rapid fluctuations in outflow. In addition, the USFWS Seasonal Aquatic Base Flow (ABF) values were used to determine new minimum outflows for each project. Although this new guidance will require more gate changes and therefore, more time by the project personnel at the dams, NAE agreed to implement these modifications. The changes will be evaluated over a 3-year period with annual meetings to discuss their effectiveness. In order to preserve the flood control effectiveness of NAE's dams, and maintain the individual projects approved water control plan, no compromises or modifications to the way the dams are operated during flood control activities were made part of this 3-year adaptive management plan.

12. Federal Energy Regulatory Commission (FERC). The Reservoir Regulation Team reviews and comments on all FERC inquiries concerning preliminary permits, exemptions, and license applications for hydropower activities at both Federal and non-Federal projects. This review is undertaken to ensure that hydropower projects have no significant impact on New England District's flood control activities. During FY03 there were no formal inquiries to this office. The status of non-Federal hydropower developments through September 2003 at NAE Corps sites is briefly summarized on Exhibit 7. It is noted that although the non-Federal hydropower plant at North Hartland Lake is listed as operational, it has been inactive for the past four years due to the owners, Vermont Electrical Cooperative, filing bankruptcy in FY96; however, in FY04, new prospective owners may make this plant operational.

13. Training Personnel.

a. Field Personnel. During FY03 RRT personnel visited projects within each basin to train field personnel on the use of various features of Sutron DCP's, access to data via PC

connections, and the use of NAE's Web site. Reservoir regulation discussions were held periodically throughout the year and informational meetings were held at each dam to explain the new outflow guidance developed as part of the 3-year adaptive management process with VT-ANR and USFWS.

b. RRT Personnel. On-the-job training continued during FY03, outside training for RRT personnel included:

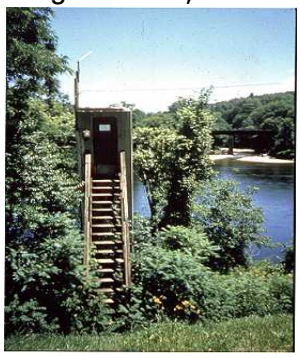
(1) Attended various Sun sponsored training sessions pertaining to the Solaris operating system.

(2) Attended CWMS development and applications training at Baltimore District in September 2003.

c. Other. Although not considered formal training, most RRT personnel gave formal presentations to local colleges, and visiting guests outside of NAE, on Water Management activities within New England. This participation is a very effective exercise in reinforcing our mission and sharpening our communication skills.

14. Funding. The Reservoir Regulation Team obtains funds from several sources for its varied activities. The annual Operation and Maintenance budget includes salaries for personnel involved in reservoir control operations, costs for the USGS Cooperative Stream Gaging Program and DCP Maintenance Program, and monies for leasing, purchasing, and amortizing equipment used in water management activities. General Investigations provides limited funding for review of FERC inquiries and planning studies. Funds are also available from the Plant Replacement and Improvement Program for purchases of major items such as computer workstations. The FY03 O&M budget for reservoir regulation activities was $1,500,000. The FY04 budget for reservoir regulation activities is approximately $1,550,000. The total Reservoir Regulation budgets for FY03 through FY05 are shown on Exhibit 8.

15. Cooperative Hydrologic Program. The FY03 Cooperative Stream Gaging Program with the New England Districts of the U.S. Geological Survey was a success. Under contract to the Corps of Engineers, the U.S. Geological Survey maintains and calibrates discharge-stage relationships for a total of 65 gages throughout New England, which are directly funded by NAE. In addition, the existing equipment at each gaging station is maintained by the USGS to insure accurate flow measurements. The cost of the FY03 program, chargeable to NAE, was $295,105.



Coordination has been accomplished with New England District Chiefs of the U.S. Geological Survey for the FY04 Cooperative Stream Gaging Program. Total cost associated with this program, chargeable to NAE is $317,215, an increase of about 7 percent from the FY03 program. Currently, NAE has no cooperative program with the National Weather Service. In accordance with OCE guidance, payments for the FY04 USGS Cooperative Stream Gaging Program will be made as soon as Congress approves the FY04 budget.

16. Data Collection Platform(DCP) Maintenance Program. The FY03 DCP Maintenance Program with the New England Districts of the U.S. Geological Survey was a success. The New England District pays the USGS for service and calibration of data collection platforms in NAE's water control data system. The required service includes testing, calibrating, and making routine adjustments to the DCP's while on normal gage visits at approximately 6-week intervals and on-call servicing of DCP's that are inoperative or improperly functioning. On-call service is generally provided within 24-hours during high water periods and within 3 working days at other times. The cost of the FY03 program was $23,500 and included 90 data collection platforms. The FY04 program has been fully coordinated and finalized for the same cost as FY03 of $23,500 for 90 platforms.

17. Support to NAD Water Control Mission. During FY03, NAE forwarded $74,000 to NAD in support of MSC Water Control Management Activities. In FY04, the cost to NAE for this activity is currently not known.

18. Federal and Non-Federal Partners. In FY99 NAE entered into a Partnering Agreement with the Vermont Agency of Natural Resources (ANR). In this agreement, NAE agrees to regulate five flood control dams in the State of Vermont in the interest of protecting and preserving Vermont's natural resources by fully complying with State and Federal environmental laws. Ongoing discussions with the state of Vermont and USFWS regarding modifications to our normal regulation procedures have continued into FY03. More detailed discussions of items agreed to during FY03, as well as other partnering initiatives, are described in paragraph B.11.

C. FUTURE OBJECTIVES (FY04)

1. Corps Water Management System (CWMS). Migration of the NAE Water Control Data System into CWMS will comprise a significant portion of RRT activities during FY04. Specific projects include:

a. RRT will implement the CWMS software on the Sun Blade2000 which, when complete, will provide hardware redundancy. RRT will also install new versions of the CWMS software package due to be released this FY.

b. Complete development and calibration of CWMS models for the Ware River Watershed. This will be NAE's first watershed model and will serve as a learning project for future model development.

c. Work with CRREL personnel to implement a proxy server to provide web users, outside the CEAP network, direct access to the RRT web server. This will eliminate the machine overhead and data lag inherent with the NAE-IM public server currently used by RRT.

d. Work with CRREL personnel to streamline web data flow. Provide direct web access to the data in the Oracle database by allowing web users to run sql scripts that generate real time data products directly from Oracle. This will greatly reduce external, manual processing while allowing users to tailor the data to meet their needs.

e. Develop web based Oracle data input processes to allow authorized web users access to input data into the Oracle database. These processes can be used to collect data such as site photos, snow data, reservoir monthly summaries, etc.

2. GOES Data Collection System. NAE's GOES data collection system has and will continue to evolve, incorporating new technology to improve the overall accuracy and reliability of the system while reducing cost and maintenance.

a. Purchase new data collection equipment including Sutron 9210 DCPs, Satlink transmitters and various new sensors. This equipment will be used to upgrade old or outdated field equipment.

b. Continue upgrading the RRT DCP network with new Sutron 9210 DCPs and Satlink transmitters. These new DCPs will fulfill all new NESDIS DCP requirements including 300-baud rate transmissions.

c. Continue upgrades to data collection sites currently using coniflow, nitrogen gas systems. RCC will continue replacing the outdated nitrogen systems with Design Analysis H355 smart gas systems, eliminating the need for periodic nitrogen tank replacements. Sites using Inventron Acoustic sensors will also be considered for upgrade with H355s, as was done at the Naugatuck Rivet at Waterbury. Radar sensors

will also be considered at these sites.

d. Hold a meeting/training session with USGS personnel to discuss implementation and programming of new DCP equipment.

e. Explore feasibility of using Ethernet connections, where available, to communicate with DCPs at Corps projects. The network lines will eliminate the need to dialup the DCPs via telephone modem and provide fast, reliable connectivity for troubleshooting and maintenance by making the DCPs available over the NAE WAN. These connections may also be able to provide data every 15 minutes to CWMS, making NAE's data more real-time.

3. Training. RRT personnel are scheduled to attend the following training courses.

a. The Corps Hydrologic Engineering Center in Davis, CA is likely to hold CWMS related training and working sessions. RRT personnel will plan to attend these sessions as appropriate.

b. Participate in GIS application training courses where appropriate.

c. Other seminars, computer courses, etc. as they become available.

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Reservoir Management
Reservoir Regulation
Reservoir Manuals
Hydrologic Equipment
Coordination

Data Collection
Coordinate with USGS, NWS
GOES Reporting
Data Analysis
DOMSAT System
Water Control Data System

Special Studies
Real-Time Hydrologic Modeling
Real-Time River Forecasting
Review of FERC Licenses
Special Reservoir Studies
RCC Home Page Development

Planning
River Basin and Reservoir System Studies
Urban Stormwater Modeling Studies
Coastal and Riverine Flood Control Investigations
Coastal and Riverine Erosion Studies
Navigation Studies - Currents
Environmental Restoration Studies
Hydropower & Water Supply Investigations

Design
Multi-Purpose Reservoirs, Water Control Structures
Channels, Conduits, Dikes and Walls
Coastal and Riverine Local Protection Projects
Hurricane Barriers and Tidal Flood Gates
Coastal and Riverine Erosion Projects
Navigation Improvement Projects - Currents
HTRW/Superfund Projects

Water Quality Management
Water Quality Data Collection
Coastal, Lake and Stream Studies
Mathematical Modeling
Groundwater Quality Analysis
Beaches and Potable Water

Informational Studies
Coastal and Riverine Flood Plain Management
Coastal and Hyd Engr for Flood Insurance Program
River Basin Models
Periodic Dam Inspections & Reports
Dam Break Flood Analysis
Tidal/Wetland/Environmental Restoration
Hurricane Evacuation Planning
ERGO Assessments

MONTHLY PRECIPITATION AT NEW ENGLAND DISTRICT'S LAKES & DAMS - FY 2003
(RAINFALL IN INCHES)

PROJECT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTALS	%AVG
UPPER CONNECTICUT RIVER BASIN														
UNION VILLAGE	3.03	3.66	2.77	1.50	1.48	1.89	1.65	4.21	1.91	4.15	5.14	5.38	36.77	107%
N. HARTLAND	3.07	4.24	2.73	2.06	1.70	2.20	2.48	2.94	1.41	2.98	4.70	4.70	35.21	102%
N. SPRINGFLD	3.71	4.38	2.73	2.04	2.28	2.33	3.03	3.07	2.01	3.17	5.85	5.74	40.34	109%
BALL MOUNTAIN LAKE	6.12	6.16	4.04	2.59	2.99	3.26	3.98	4.15	1.21	3.89	6.91	5.39	50.69	106%
TOWNSHEND	5.30	5.39	4.10	3.39	2.61	2.69	3.38	4.26	1.50	2.88	5.67	7.08	48.25	114%
SURRY MTN	3.16	4.95	1.52	2.63	2.04	3.03	2.85	4.39	2.75	2.80	10.70	6.25	47.07	121%
OTTER BROOK	3.43	5.22	3.05	2.88	2.43	3.12	2.85	4.56	3.05	2.73	6.19	5.86	45.37	112%
LOWER CONNECTICUT RIVER BASIN														
BIRCH HILL	2.96	5.09	3.96	3.42	3.70	3.41	3.59	5.49	4.47	1.42	4.05	5.35	46.91	111%
TULLY	2.57	5.01	2.19	2.06	2.37	3.35	2.58	4.45	4.33	1.95	6.80	5.18	42.84	99%
BARRE FALLS	3.27	4.57	4.29	2.96	4.10	3.84	3.56	4.10	6.18	1.31	6.80	5.56	50.54	119%
KNIGHTVILLE	5.02	6.23	1.84	3.24	2.73	3.19	3.97	4.12	4.92	1.36	4.69	9.47	50.78	112%
LITTLEVILLE	5.56	5.78	2.66	3.18	2.52	3.87	3.07	4.01	5.97	1.30	5.46	9.27	52.65	113%
COLEBROOK	4.44	6.03	2.46	3.29	3.34	4.28	2.41	4.92	9.23	4.74	6.96	11.00	63.10	116%
MERRIMACK RIVER BASIN														
FRANKLIN FLLS	2.89	4.58	3.46	2.59	2.60	2.77	3.55	4.76	1.33	2.54	6.82	5.14	43.03	107%
BLACKWATER	2.40	4.94	2.56	2.64	2.61	2.96	3.40	5.15	2.04	2.98	5.77	4.38	41.83	100%
MACDOWELL	2.97	5.42	3.60	2.89	1.64	3.27	3.02	5.55	2.44	2.10	6.60	5.12	44.62	98%
HOPKINTON	4.04	5.63	3.96	3.11	2.49	1.56	1.68	4.89	1.94	2.22	5.48	5.09	42.09	100%
EVERETT	4.29	5.87	3.80	1.44	2.50	1.80	1.56	3.47	1.43	2.44	6.09	4.68	39.37	92%
THAMES RIVER BASIN														
EAST BRIMFLD	3.79	4.55	4.53	2.35	3.53	4.09	3.20	3.41	6.39	3.04	6.49	6.14	51.51	115%
WESTVILLE	3.78	4.59	4.62	2.27	3.58	4.95	3.11	4.02	6.32	2.59	6.70	4.87	51.40	103%
WEST THOMPSON	3.12	5.47	5.37	2.73	4.20	4.96	3.08	4.18	7.32	3.40	3.60	4.52	51.95	107%
BUFFUMVILLE	4.24	4.52	5.76	2.48	3.78	4.18	3.76	4.13	6.02	3.12	3.90	4.49	50.38	110%
HODGES V.	4.18	3.95	5.15	2.44	3.67	4.02	3.57	3.75	6.14	3.12	4.33	4.50	48.82	106%
M. HOLLOW	3.13	6.16	4.55	2.43	4.06	3.98	2.59	4.40	6.20	1.90	2.46	4.36	46.22	99%
NAUGATUCK RIVER BASIN														
THOMASTON	4.49	4.94	3.64	2.53	3.28	3.93	2.12	5.10	7.76	3.05	4.98	9.08	54.90	118%
BLACK ROCK	4.09	5.76	4.02	2.76	3.92	4.31	2.19	5.02	7.92	3.24	5.83	9.64	58.70	116%
HOP BROOK	4.73	4.57	3.26	1.75	2.79	3.48	2.86	4.53	6.67	2.09	4.89	7.18	48.80	100%
BLACKSTONE RIVER BASIN														
WEST HILL	4.24	6.15	7.06	2.49	4.55	4.65	4.14	4.77	6.98	3.89	3.93	3.81	56.66	116%

EXHIBIT 2

SUMMARY OF MAXIMUM POOL LEVELS IN FEET

Reservoir	Fiscal Year 2003 Pool Level (FT)	Fiscal Year 2003 %Full	Fiscal Year 2003 Date	Highest of Record Pool Level (FT)	Highest of Record %Full	Highest of Record Date	Second Highest Pool Level (FT)	Second Highest %Full	Second Highest Date	Placed in Operation
Union Village Dam	54.2	7	Mar 03	114.2	53	Apr 69	103.8	40	Jun 84	1950
North Hartland Lake	72.7	18	Mar 03	135.8	71	Apr 87	128.2	63	Apr 69	1961
North Springfield Lake	39.1	15	Mar 03	85.2	82	Apr 87	78.8	69	Apr 69	1960
Ball Mountain Lake	117.6	18	Mar 03	213.9	100+	Apr 87	197.8	82	Apr 69	1961
Townshend Lake	55.5	26	Mar 03	98.6	100+	Apr 87	82.0	70	Feb 81	1961
Surry Mountain Lake	39.4	35	Apr 03	66.1	100+	Apr 87	61.4	89	Jun 84	1941
Otter Brook Lake	55.1	30	Apr 03	99.4	100+	Apr 87	88.7	82	Jun 84	1958
Birch Hill Dam	17.9	20	Apr 03	33.8	80	Apr 87	30.6	64	Jun 84	1941
Tully Lake	20.9	14	Mar 03	35.3	62	Apr 87	35.0	61	Jun 84	1949
Barre Falls Dam*	783.9	12	Mar 03	801.4	70	Apr 87	799.7	64	Jun 84	1958
Conant Brook Dam	12.3	3	Mar 03	27.0	16	Jun 84	24.5	13	Jun 8	1966
Knightville Dam	63.3	15	Mar 03	132.4	100+	Apr 87	130.2	100+	Jan 49	1941
Littleville Lake*	530.8	18	Mar 03	571.7	89	Apr 87	568.9	83	Jun 84	1965
Colebrook River Lake*	715.7	12	Jun 03	757.5	90	Jun 84	747.1	68	Apr 83	1969
Mad River Dam	43.3	5	Mar 03	74.6	25	Jun 84	74.4	25	Apr 87	1963
Sucker Brook Dam	5.7	1	Sep 03	25.2	24	Dec 73	24.9	24	Apr 87	1970
East Branch Dam	9.6	1	Sep 03	39.8	31	Apr 87	38.8	29	Jun 84	1964
Hall Meadow Brook Dam	14.6	9	Mar 03	23.5	24	Jun 84	21.6	19	Apr 87	1962
Thomaston Dam	40.7	7	Sep 03	87.2	50	Jun 84	75.6	34	Apr 87	1960
Northfield Brook Lake	37.0	9	Mar 03	67.4	40	Jun 84	62(est)	32	Apr 87	1965
Black Rock Lake	42.5	6	Mar 03	93.4	65	Jun 84	84.5	50	Jun 82	1970
Hancock Brook Lake	8.6	4	Jun o3	23.4	58	Jun 82	19(est)	37	Apr 87	1966
Hop Brook Lake	25.2	3	Jun 03	57.7	53	Jun 82	55.4	47	Jun 84	1968
Franklin Falls Dam*	324.7	9	Mar 03	375.7	76	Mar 53	375.4	76	Apr 87	1943
Blackwater Dam*	540.2	7	Mar 03	564.1	90	Apr 87	561.6	74	Apr 69	1941
Edward MacDowell Lake*	927.6	34	Apr 03	949.8	100+	Apr 87	943.2	85	Jun 84	1950
Hopkinton Lake*	404.6	48	Mar 03	415.8	95	Apr 87	407.5	59	Jun 84	1962
Everett Lake*	382.9	23	Apr 03	415.8	95	Apr 87	405.5	59	Jun 84	1961
Buffumville Lake	17.7	14	Mar 03	32.5	58	Apr 87	28.4	43	Mar 68	1958
Hodges Village Dam	11.5	8	Mar 03	27.4	59	Apr 87	23.4	44	Mar 68	1959
East Brimfield Lake	16.8	7	Mar 03	26.1	47	Jun 84	26.0	47	Apr 87	1960
Westville Lake	19.8	4	Dec 02	50.5	56	Jun 84	49.2	48	Apr 87	1962
West Thompson Lake	20.5	8	Mar 03	40.9	60	Apr 87	38.9	53	Jun 84	1965
Mansfield Hollow Lake	25.0	10	May 03	52.6	66	Jun 82	51.8	65	Aug 55	1952
West Hill Dam	18.7	33	Apr 03	25.5	67	Apr 87	24.3	59	Mar 68	1961

- Elevation of pool in feet NGVD

EXHIBIT 3

SUMMARY OF NEW ENGLAND DISTRICT HURRICANE BARRIER OPERATIONS

Fiscal Year	Number of Operations Stamford	New Bedford	Fiscal Year	Number of Operations Stamford	New Bedford
1966	--	4	1986	7	2
1967	--	3	1987	11	3
1968	6	3	1988	6	3
1969	8	1	1989	8	4
1970	9	5	1990	1	5
1971	14	12	1991	5	11
1972	36	18	1992	16	17
1973	13	9	1993	6	20
1974	16	5	1994	2	19
1975	9	6	1995	6	26
1976	7	6	1996	10	32
1977	16	10	1997	4	23
1978	13	5	1998	19	25
1979	17	14	1999	9	17
1980	13	8	2000	10	9
1981	6	2	2001	14	11
1982	4	4	2002	7	6
1983	12	7	2003	11	12
1984	15	4			
1985	10	6			

EXHIBIT 4

FLOOD DAMAGES PREVENTED BY NEW ENGLAND DISTRICT RESERVOIRS AND HURRICANE BARRIERS

($1,000)

	FY03	CUMULATIVE INCLUDING FY03
DAMS AND RESERVOIRS		
UNION VILLAGE DAM	530	33,151
NORTH HARTLAND LAKE	1,786	90,229
NORTH SPRINGFIELD LAKE	1,260	90,774
BALL MOUNTAIN LAKE	1,540	105,465
TOWNSHEND LAKE	2,885	71,992
SURRY MOUNTAIN LAKE	578	64,460
OTTER BROOK LAKE	285	28,998
BIRCH HILL DAM	429	60,567
TULLY LAKE	178	22,511
BARRE FALLS DAM	94	23,567
CONANT BROOK DAM	14	2,333
KNIGHTVILLE DAM	1,437	147,754
LITTLEVILLE LAKE	515	55,687
COLEBROOK RIVER LAKE	215	37,941
MAD RIVER DAM *	1	2,796
SUCKER BROOK DAM *	0.2	172
EAST BRANCH DAM *	0	10,512
HALL MEADOW BROOK DAM *	0	9,596
THOMASTON DAM	0	242,362
NORTHFIELD BROOK LAKE	0	22,420
BLACK ROCK LAKE	0	65,060
HANCOCK BROOK LAKE	0	29,894
HOP BROOK LAKE	0	31,076
FRANKLIN FALLS DAM	8	69,143
BLACKWATER DAM	1	19,853
EDWARD MACDOWELL LAKE	16	7,862
HOPKINTON-EVERETT LAKES	25	63,326
BUFFUMVILLE LAKE	0	54,684
HODGES VILLAGE DAM	0	52,218
EAST BRIMFIELD LAKE	0	46,474
WESTVILLE LAKE	0	25,521
WEST THOMPSON LAKE	0	18,708
MANSFIELD HOLLOW LAKE	0	43,611
WEST HILL DAM	0	34,471
* Owned & Maintained by CT DEP		
DAMS AND RESERVOIRS TOTAL:	**11,796**	**1,685,188**
HURRICANE BARRIERS		
NEW BEDFORD HURRICANE BARRIER	348	18,139
STAMFORD HURRICANE BARRIER	450	25,719
HURRICANE BARRIERS TOTAL:	**798**	**43,858**
GRAND TOTAL:	**12,594**	**1,729,046**

EXHIBIT 5

STATUS OF WATER CONTROL MANUALS
NEW ENGLAND DISTRICT
FY03 THRU FY08

	CURRENT DATE	SCHEDULED UPDATE	APPROVED
CONNECTICUT RIVER BASIN			
Master Manual *	Jan 84	FY07	
Union Village Dam	Apr 94	--	
North Hartland Lake	Dec 85	FY05	
North Springfield Lake	Oct 68	FY99	**Sep-99**
Ball Mountain Lake	Sep 73	FY05	
Townshend Lake	Sep 73	FY05	
Surry Mountain Lake	Jan 72	FY06	
Otter Brook Lake	Jan 72	FY06	
Birch Hill Dam	May 74	FY99	**Sep-00**
Tully Lake	May 74	FY99	**Sep-00**
Barre Falls Dam	Feb 79	FY04	
Conant Brook Dam	Feb 79	FY04	
Knightville Dam	Jan 78	FY04	
Litleville Lake	Jan 78	FY04	
Colebrook River Lake	Mar 90	FY07	
Mad River Dam	Mar 90	FY07	
Sucker Brook Dam	Mar 90	FY07	
MERRIMACK RIVER BASIN			
Master Manual	Aug 77	FY00	**Sep-99**
Franklin Falls Dam	Aug 77	FY00	**Sep-99**
Blackwater Dam	Aug 77	FY00	**Sep-99**
Edward MacDowell Dam	Aug 77	FY00	**Sep-99**
Hopkinton-Everett Lakes	Aug 77	FY00	**Sep-99**

	CURRENT DATE	SCHEDULED UPDATE	APPROVED
THAMES RIVER BASIN			
Master Manual	Jul 80	FY02	Oct-01
Mansfield Hollow Lake	Jul 80	FY02	Oct-01
Buffumville Lake	Jul 80	FY02	Oct-01
Hodges Village Dam	Jul 80	FY02	Oct-01
East Brimfield Lake	Jul 80	FY02	Oct-01
Westville Lake	Jul 80	FY02	Oct-01
West Thompson Lake	Jul 80	FY02	Oct-01
BLACKSTONE RIVER BASIN			
Master Manual	Jul 80	FY04	
West Hill Dam	Jul 80	FY04	
HOUSATONIC RIVER BASIN			
Master Manual	Oct 76	FY03	**Sep-03**
Hall Meadow Brook Dam	Oct 76	FY03	**Sep-03**
East Branch Dam	Oct 76	FY03	**Sep-03**
Thomaston Dam	Oct 76	FY03	**Sep-03**
Black Rock Lake	Oct 76	FY03	**Sep-03**
Northfield Brook Lake	Oct 76	FY03	**Sep-03**
Hancock Brook Lake	Oct 76	FY03	**Sep-03**
Hop Brook Lake	Oct 76	FY03	**Sep-03**
HURRICANE BARRIERS			
New Bedford-Fairhaven	Aug 83	FY05	
Stamford	Sep 98	FY98	**Oct-98**

* Expect to Contract to A-E Firm

EXHIBIT 6

NON-FEDERAL LICENSED HYDROPOWER PLANT INSTALLATIONS AT CORPS PROJECTS

FERC LIC NO.	CORPS FLOOD CONTROL PROJ	LICENSEE	DATE OF LICENSE	STATUS(1)
2816	N. HARTLAND LAKE ,VT	VT ELECT. COOP	11/24/81	0 (2)
4117	COLEBROOK RIVER LAKE, CT	HARTFORD MDC	3/27/84	0
5313	N. HARTLAND, VT (DEWEY MILLS)	HYDRO-ENERGIES	1/20/83	0
5735	HOPKINTON LAKE, NH	TOWN OF HOPKINTON, NH	3/14/84	0
7410	EDW. MACDOWELL LAKE, NH (VERNEY MILLS)	AMERICAN HYDRO, INC.	8/18/84	0
7248	FRANKLIN FALLS DAM, NH	FRANKLIN FALLS HYDRO	4/16/83 (3)	0
3107	FRANKLIN FALLS DAM, NH	NEWFOUND ELECT	11/16/81	0
9085	UNION VILLAGE DAM, VT	RICHARD BALAGUR	5/4/89	P

(1) O – Operational, P – Proposed
(2) Project inactive; however, new owners anticipated in FY04
(3) Date of FERC order issuing exemption from licensing

EXHIBIT 7

NEW ENGLAND DISTRICT
WATER CONTROL MANAGEMENT BUDGET ($1,000)
(FY03 - FY05)

		FY 03		**FY 04**		**FY 05**
DISTRICT / ITEM	**BUDGET**	**RECEIVED**	**EXPEND**	**BUDGET**	**RECEIVED**	**BUDGET**
NEW ENGLAND DISTRICT						
Cooperative Stream Gaging Program (1)	295	295	295	317	317	300
Al Other O&M Funding	1205	1205	1205	1233	1233	1300
All Other PRIP Funding	0	0	0	0	0	0
TOTAL (CENAE)	1500	1500	1500	1550	1550	1600

(1) Total cost to District from all funding sources.

EXHIBIT 8