

EP 1130-2-550  
15 Nov 96

- (2) Identify any subjects that dominate.....\_\_\_\_\_
- (3) If one subject dominates, is it appropriate?.....Y N
- (4) Are the exhibits arranged in logical order?.....Y N
- (5) Can you define the objectives of the major displays and exhibits?.....Y N
- (6) Do these objectives fit into a central theme?.....Y N
- d. Is the text for interpretive material easy to understand?.....1 2 3 4 5
  - (1) Is it in layman's terms?.....1 2 3 4 5
  - (2) Does it avoid or explain technical jargon?.....1 2 3 4 5
  - (3) Is it too long or tedious?.....1 2 3 4 5
- e. Is the audio visual material easy to understand?.....1 2 3 4 5
  - (1) Is it in layman's terms?.....1 2 3 4 5
  - (2) Does it avoid or explain technical jargon?.....1 2 3 4 5
  - (3) Is it too long or tedious?.....1 2 3 4 5
- f. Are various techniques of displays used, i.e., audio-visual, artifacts, flat wall, etc.?.....1 2 3 4 5
  - (1) Percentage of exhibits that are primarily audiovisual...\_\_\_\_\_%
  - (2) Percentage of exhibits that are primarily auditory.....\_\_\_\_\_%
  - (3) Percentage of exhibits that are primarily text.....\_\_\_\_\_%
  - (4) Percentage of other exhibits.....\_\_\_\_\_%
  - (5) Percentage of exhibits primarily active.....\_\_\_\_\_%
  - (6) Percentage of exhibits primarily passive.....\_\_\_\_\_%
- g. Do most of the exhibits and displays utilize standard off-the-shelf equipment, i.e., video decks, monitors, dissolve units, slide projectors, etc.....\_\_\_\_\_%
  - (1) Percentage of equipment that is standard.....\_\_\_\_\_%
  - (2) Percentage of equipment that is custom built.....\_\_\_\_\_%
- h. Has an interpretive prospectus been prepared?.....Y N
  - (1) Date prospectus scheduled/completed.....\_\_\_\_\_
  - (2) Have recommendations been implemented? If no, explain in Section 6, Comments.....Y N

EP 1130-2-550  
15 Nov 96

C-2. Information Brochures and Folders

- a. Do they include information we wish to convey to the public as well as information the public would like to receive?.....1 2 3 4 5
- b. Are brochures available at visitor facilities?.....Y N
- c. Are they displayed attractively?.....1 2 3 4 5
- d. Is it obvious that these are free to the public?.....Y N

C-3. Operations

- a. Is the staffing (Corps or contractor) adequate?.....1 2 3 4 5
  - (1) Are self-guided tours used?.....Y N
  - (2) Do they stand on their own?.....Y N
  - (3) Can the visitor use the center without additional information from the staff?.....Y N
  - (4) Is the staff readily accessible to the public?.....Y N
  - (5) Is there a reception area near the entrance?.....Y N
  - (6) Is the reception desk manned?.....Y N
  - (7) Is the staff knowledgeable about the displays and the Corps?.....Y N
  - (8) How many people work directly in the center?.....\_\_\_\_\_
  - (9) Is reduced staffing an option?.....Y N
- b. Does the visitor center receive adequate use by the public?.....1 2 3 4 5
  - (1) What is the annual visitation?.....\_\_\_\_\_
  - (2) What is the peak month for visitation?.....\_\_\_\_\_
  - (3) Is the facility visitation appropriate for its location and market area? If no, explain in Section 6, Comments.....Y N
  - (4) Is the facility visitation appropriate for its size? If no, explain in Section 6, Comments.....Y N
  - (5) Is the visitation primarily local, repeat or transient?.....\_\_\_\_\_
  - (6) Is the center made available to school and community groups?.....Y N
  - (7) Does the staff contact schools and groups and invite them to the center?.....Y N
  - (8) Do these groups regularly visit?.....Y N

EP 1130-2-550  
 15 Nov 96

- (9) Is the center available to groups by special arrangements outside of regular office hours?.....Y N
- (10) What other actions have been taken to encourage visitation?.....\_\_\_\_\_
- c. Are hours of operation convenient for the visitor?.....Y N
  - (1) Are the hours of operation posted where they can be seen?.....Y N
  - (2) Summer hours of operation:  
 Days of the week.....S M T W T F S  
 Hours of the day.....\_\_\_\_\_
  - (3) Winter hours of operation:  
 Days of the week.....S M T W T F S  
 Hours of the day.....\_\_\_\_\_
- d. Are the physical conditions in the building appropriate?.....1 2 3 4 5
  - (1) heating.....1 2 3 4 5
  - (2) air conditioning.....1 2 3 4 5
  - (3) lighting.....1 2 3 4 5
  - (4) drinking fountains.....1 2 3 4 5
  - (5) restrooms.....1 2 3 4 5
- e. Is the building adequate in terms of visitor capacity and configuration?.....1 2 3 4 5
- f. Have there been any incidents of vandalism or theft in the past two years?.....Y N
  - (1) how many.....\_\_\_\_\_
  - (2) how severe.....\_\_\_\_\_
  - (3) any particular target? what?.....\_\_\_\_\_
- g. Are adequate security devices installed?.....Y N
  - (1) door and window alarms?.....Y N
  - (2) sound and movement detectors?.....Y N
  - (3) closed circuit TV?.....Y N
  - (4) fire alarms?.....Y N
  - (5) smoke detectors?.....Y N
- h. What percentage of the time are the main exhibits operational?.....\_\_\_\_\_

EP 1130-2-550  
15 Nov 96

- i. If there is a main audiovisual presentation, what percentage of the time is it operational?.....\_\_\_\_\_%
  - j. Is there an adequate supply of all types of backup equipment, e.g., projectors, tape players, etc.?.....1 2 3 4 5
  - k. Are funds adequate for operation of the center?.....Y N
  - l. Are there interpretive facilities outside of the visitor center?.....Y N
    - (1) Are they integrated into the total program?.....Y N
    - (2) Are they effective?.....Y N
    - (3) Do they make maximum use of the natural assets of the site?.....Y N
      - (a) nature trail.....1 2 3 4 5
      - (b) overlook.....1 2 3 4 5
      - (c) physical feature.....1 2 3 4 5
      - (d) nature features.....1 2 3 4 5
      - (e) historical archeological.....1 2 3 4 5
- Overall Rating for the Visitor Center.....1 2 3 4 5

C-4. Comments

\_\_\_\_\_  
Evaluator Title Phone



EP 1130-2-550  
15 Nov 96

APPENDIX D

FOR ILLUSTRATION PURPOSES ONLY  
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CERTIFICATE OF AUTHORITY  
TO ISSUE CITATIONS

BADGE NUMBER:

DATE

By authority of Section 234, Flood Control Act of 1970 (Title II, PL 91-611), I hereby certify that \_\_\_\_\_ is authorized to issue citations for violations of Title 36, CFR Chapter III, for the purpose of executing the provisions of said law.

This authority is derived from the "Designation of Persons Authorized to Issue Citations" made by the Chief of Engineers pursuant to said Section 234, and from my certification as to this employee in accordance with said "Designation":

(a) The employee's principal duties relate to recreation or natural resources management (which may include, but are not limited to, duties as a ranger or resources manager).

(b) The employee needs citation authority in order to perform his/her duties in the most efficient manner.

(c) The employee has the aptitude, temperament, personality, experience, and ability to exercise citation authority properly.

(d) The employee has been adequately trained in citation procedures.

\*Expiration date:

(Signature of District Commander)

\*Note. The date for permanent employees may be indefinite; for temporary employees the date will not exceed the term of appointment.

ENG Form 5036-R, Nov 92.

EP 1130-2-550  
30 Aug 08  
(Change 4)

## APPENDIX E

### Visitor Assistance Training Curriculum

#### E-1. General Requirements.

a. All employees must complete the Basic Visitor Assistance Training Curriculum, Modules 1a through 1d, prior to receiving citation authority. This curriculum is classified as mission-essential mandatory Priority 1 training for those employees having citation authority as part of their job description. These modules may be completed in any order. Districts must temporarily suspend citation authority for any current employee who has not successfully completed the basic training requirements (Modules 1a through 1e). Table E-1 summarizes the Module 1 basic training requirements.

b. Employees who wear the Natural Resources Management (NRM) Park Ranger uniform, but do not have citation authority as a functional responsibility, must receive, at a minimum, training Module 1b (First Aid/CPR), Module 1c (Blood-borne Pathogen) and Module 1e personal protection during their first year of employment.

#### E-2. Module 1: Basic Visitor Assistance Training Curriculum.

##### a. Module 1a: Visitor Assistance Program for Natural Resources Management Course.

(1) All employees requiring citation authority must take the HQUSACE-sponsored PROSPECT Course # 147, *Visitor Assistance Program (VA) for Natural Resources Management* (36 hours). Module 1f (MSC/ District Visitor Assistance Course) may be substituted for temporary citation authority (authority will be valid up to three years).

(2) Course provides basic instruction to execute visitor assistance duties and covers history, philosophy, policy, liability, authority, jurisdiction, enforcement procedures, image, tactical communication, situational analysis, unarmed self-defense, and Pepper Spray certification. This course provides the basic personal protection training requirements necessary to obtain citation authority.

(3) Districts can request an "On-Site" Visitor Assistance PROSPECT Course by contacting the lead instructor and the Registrar, Professional Development Support Center (PDSC), Huntsville at least six months in advance of the training need. The host district is responsible for logistics, student registration, instructor salary, travel per diem charges, and other administrative requirements and costs of the course. Arrangements and confirmation will be based on instructor availability and other factors. An approved On-Site PROSPECT course fully satisfies the Module 1a training requirement.

EP 1130-2-550  
30 Aug 08  
(Change 4)

Table E-1  
Module 1: Basic Visitor Assistance Training Curriculum

	Course Title	Employees Requiring Citation Authority	Employees Wearing the NRM Uniform (who <u>do not</u> have citation authority as a functional duty)
Module 1a	Visitor Assistance for NRM (PROSPECT Course #147) (36 hours)	*	Optional
Module 1b	First Aid/CPR - (minimum 9 hours)	*	**
Module 1c	Blood Borne Pathogen (length varies)	*	**
Module 1d	Local-supplemental (length varies)	*	Optional
Module 1e	Personal Protection	* Module 1a or 1f satisfies this requirement)	** The personal protection training contained in Module 1a, 1f or 2a (Refresher training) satisfies this training requirement
Module 1f	MSC / District Visitor Assistance Course (36-40 hours)	For employees waiting to take Module 1a. Provides citation authority for three years. Course must be approved in advanced by HQUSACE.	Optional
Module 1g	Pepper Spray – Basic Oleoresin Capsicum Aerosol Training (OCAT) Course (6 hours)	For eligible & authorized employees as stipulated in Appendix K. Module 1a (completed after 1 Oct 03) satisfies this requirement	For eligible & authorized employees as stipulated in Appendix K. Module 1a (completed after 1 Oct 2003) satisfies this requirement

\* Required training prior to receiving citation authority

\*\* Required training

b. Module 1b: First Aid / Cardiopulmonary Resuscitation (CPR) Training.

(1) All employees authorized to wear the NRM Uniform must complete the 9-hour *Red Cross Community First Aid and Safety Course* (or equivalent as determined by the operations project manager). This course provides basic instruction to recognize and care for breathing and cardiac emergencies in adults, children and infants. It also provides instruction on how to identify and care for life-threatening bleeding, sudden illness, injuries and the proper use of Automated External Defibrillators. The American Heart Association may be used for CPR instruction.

(2) Advanced first aid training equivalent to the U.S. Department of Health and Human Services "First Responder - National Standard Curriculum Course" (provided by some American Red Cross Chapters as "*Emergency Response*") is recommended for employees with citation authority in locations where the emergency medical response time is 15 minutes or greater.

EP 1130-2-550  
 30 Aug 08  
 (Change 4)

(3) Increased first aid training up to Emergency Medical Technician Basic (EMT Basic) is authorized for a minimum number of selected permanent staff members at the discretion of the operations project manager.

(4) The purchase, training and use of Automated External Defibrillators (AED's) are authorized in accordance with EM 385-1-1, USACE Safety and Health Requirements Manual.

c. Module 1c: Blood Borne Pathogen Training.

(1) All employees authorized to wear the NRM Uniform must complete the standard MSC/District developed blood-borne pathogen training course, or other equivalent training such as the Red Cross Preventing Disease Transmission course, as per EM 385-1-1, USACE Safety and Health Requirements Manual.

(2) Employees shall be offered preventive vaccinations for blood-borne pathogens as per EM 385-1-1 and 29 CFR 1910.1030. Preventive vaccinations are not a condition of employment.

d. Module 1d: Local Supplemental Training.

(1) All employees requiring citation authority must receive district/project level supplemental training to include program implementation guidance, district procedures and project on-the-job training to satisfy regional and local needs. See Table E-2 for a sample training checklist. Offices may expand and otherwise modify the list to fit regional and local requirements. A checklist must be completed and maintained on file for each visitor assistance employee with citation authority.

(2) Training can be accomplished through a mix of centralized classroom instruction, project meetings and actual on-the-job training and exercises with a more senior park ranger who has citation authority.

Table E-2  
 Sample Training Checklist -- Module 1d: Local Supplemental Visitor Assistance

<u>COMPETENCY</u>	<u>DATE</u> (completed)	<u>INITIALS</u> <u>Employee/Supervisor</u>		<u>COMMENTS</u>
VA Policy /Authority				
Report Writing / Fact Finding				
Written Warnings & Citations				
Log / Record Keeping				
Magistrate Court System				
Central Violations Bureau				
Forfeiture Schedule				
Law Enforcement Agreements				
State and Local Laws				
Patrol Procedures				
Emergency Procedures				
Radio / Equipment Operation				
Local Gang / Cult Awareness				
Local Drug Activity				
Cooperating Agencies				

EP 1130-2-550  
30 Aug 08  
(Change 4)

e. Module 1e: Personal Protection Training. Employees who do not have citation authority as part of their functional duties (and who have not attended the Module 1a or 1f course) but wear the NRM uniform must receive, at a minimum, four hours of personal protection training equivalent to the personal protection requirements contained in Module 2a (Refresher Training) course. The Visitor Assistance for NRM PROSPECT Course (Module 1a) and the MSC/District Visitor Assistance Course (Module 1f) meet the initial personal protection training requirements for all NRM employees.

f. Module 1f: MSC/District Visitor Assistance Course.

(1) MSC/Districts may develop and conduct a 36-40 hour regional visitor assistance course for the purposes of providing immediate citation authority for employees waiting to take the *Visitor Assistance Program for NRM* (Module 1a) course or temporary employees with an expected tour of duty of three years or less. This course provides citation authorization for a maximum of three years from the date of the training and cannot be extended beyond the three year period unless the individual attends Module 1a training.

(2) This Course provides basic instruction to execute visitor assistance duties; covers history, philosophy, policy, liability, authority, jurisdiction, enforcement procedures, image and personal protection, as well as the optional Oleoresin Capsicum Aerosol Training (OCAT) Pepper Spray certification program. See Table E-3 for required course content. The initial course must be approved in advance by HQUSACE. Subsequent courses do not require approval unless substantial changes are made to the curriculum or method of instruction.

(3) Employees must also complete Modules 1b-1d prior to receiving citation authority.

(4) This course may be used as a substitute for the Module 2 (Refresher Training) course in order to satisfy the refresher training requirement for employees with current citation authority.

Table E-3  
Required Course Content -- Module 1f: MSC/District VA Citation Authority Course

SUBJECT	HRS	DESCRIPTION	DELIVERY
<b>Visitor Assistance Policy</b>	2-3 hrs	Review regulations governing VA program; identify program boundaries / scope of employment authority; define terms; place emphasis on lowest level of enforcement; relate experiences	USACE VA PROSPECT Course Instructor – travel and diem paid by the host MSC. Training via VA Policy Video or video teleconference is permitted when approved by the lead instructor.
<b>History and Development</b>	.5 - 1 hr	Historical review of USACE and VA program through events, legislation, and regulations; highlight current organizational structure	MSC/District VA coordinator or employee versed in the VA program
<b>Title 36 Code of Federal Regulations</b>	3 - 5 hrs	Full review of Title 36 with emphasis on recent regulation changes and critical areas of concern; exchange experiences and define limits of authority to provide alternative solutions to situations	MSC/District VA coordinator or employee versed in the VA program

EP 1130-2-550  
30 Aug 08  
(Change 4)

<b>Title 18 / Other Rules and Regulations</b>	.5 - 1 hr	Review Title 18 legislation; identify relationship of Title 18 to VA program; describe proper procedures to follow regarding forcible assaults; identify Title 18 situations; and discuss related regulations	MSC/District VA coordinator or employee versed in the VA program
<b>Demographics &amp; Title 36 Results</b>	1 - 2 hrs	Provide overview of project visitors for greater understanding and management; discuss user and visitation trends; identify management concerns and solutions through recent Title 36 results	MSC/District VA coordinator or employee versed in the VA program
<b>Enforcement</b>	3 - 5 hrs	Define USACE policy on enforcement priorities; identify methods for effective patrols and for observing and reporting facts clearly and concisely; discuss proper approach techniques and ways to respond to various enforcement situations and proper completion of warning and citation forms	MSC/District VA coordinator or employee versed in the VA program
<b>Ranger Image</b>	.5 - 1 hr	Discuss importance of maintaining professional appearance, attitude, and the proper wear of the uniform; discuss why ranger actions are magnified to the public; identify unethical and illegal concerns; identify ways a ranger can contribute positively to USACE public relations program	MSC/District VA coordinator or employee versed in the VA program
<b>Magistrates Courts; Authority and Jurisdiction</b>	2 - 3 hrs	Discuss basics steps in the trial of a citation case; identify rules of evidence applied in Magistrate Court; provide guidelines for testifying and proper use of notes and memos in testimony; highlight the four types of Federal jurisdiction	Office of Counsel representative fully knowledgeable of the VA program
<b>Torts / Legal Constraints</b>	1-2 hrs	Discuss circumstances where the government is liable for injuries to others and where the park ranger may be held personally liable	Office of Counsel representative fully knowledgeable of the VA program
<b>Tactical Communication and Situation Analysis</b>	8-10 hrs	Methods to gain compliance through persuasion; defusing situations to avoid conflict; redirecting uncooperative visitors to obtain a positive outcome; recognizing potentially dangerous situations and reducing the risk of attack; identification of gangs, drugs and mental subjects; discussion of local enforcement issues	Corps employee trained and certified in this subject matter or contractor proficient in conducting tactical communication, situational analysis, and personal protection training (private vendor, law enforcement agency, university) *



EP 1130-2-550  
30 Aug 08  
(Change 4)

<b>Personal Protection/ Unarmed Self Defense/ Pepper Spray Certification</b>	8-12 hrs	Conduct unarmed, open-handed self-defense techniques; apply self-defense control and survival techniques; discuss the basic personal protection principles and concepts and how they relate to the VA program. Conduct basic OCAT course to provide Pepper Spray certification (optional).	Pepper Spray training must be conducted by OCAT contractor or by a Corps employee who has completed the OCAT Train-the-Trainer Course* Note: The Corps policy portion of this course must be conducted by a qualified Corps employee
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\* All or a portion of these sessions can be conducted under contract. Subject matter must be in full compliance with USACE policy. Sponsoring office must ensure that the contractor is fully knowledgeable and supportive of the VA program (including philosophy, policy, objectives, authority limitations, etc.) prior to conducting the training.

g. Module 1g: Oleoresin Capsicum (Pepper Spray) Training. All eligible NRM program employees authorized within their MSC command may carry and use Pepper Spray as a self-protection tool in the line of duty. Training must be conducted under the USACE Pepper Spray Training Program in accordance with Oleoresin Capsicum Aerosol Training (OCAT) industry standards as highlighted within this Appendix and as detailed in Appendix K, Oleoresin Capsicum Program. Pepper Spray training can be obtained from Module 1a or 1f, or from an MSC/District-sponsored OCAT course conducted by a qualified contractor or Corps employee.

### E-3. Module 2: Refresher Visitor Assistance Training Curriculum.

a. Module 2a: Annual Refresher Visitor Assistance Training for NRM. All employees with citation authority must receive a minimum of 8 hours of annual refresher training to include visitor assistance policy /authority review, program update, Title 36, enforcement procedures, ranger image, Magistrate Court, authority and jurisdiction, torts / legal consideration, local issues (visitor demographics, gang, cult, drug awareness) and personal protection (tactical communication, situational analysis and hands-on unarmed self defense - minimum 2 hours). All or a portion of the personal protection session can be conducted under contract. Subject matter must be in full compliance with HQUSACE policy. Sponsoring office must ensure that the contractor is fully knowledgeable and supportive of the Visitor Assistance program (including philosophy, policy, objectives, authority limitations, etc.) prior to conducting the training. A HQUSACE-sponsored interactive computer-based training course called *Safe Self*, has been developed and may be used to satisfy the tactical communication training requirement.

b. Module 2b: Personal Protection Training (for employees without citation authority). Personal protection training for employees with citation authority is covered in the above paragraph. All employees who wear the NRM uniform, but do not have citation authority as a functional duty, must receive 4 hours of personal protection training annually. The personal protection training contained in Module 2a or the *Safe Self* interactive computer based training course both satisfy this annual requirement.

c. Module 2c: Medical Training Recertification. All employees with required medical training must receive refresher training necessary to maintain certification in previously acquired medical training courses. CPR and Blood-borne Pathogen training must be taken annually and First Aid training must be taken every two years or as often as necessary to retain vendor required certification and competencies.

d. Module 2d: Pepper Spray Recertification Training. In accordance with Appendix K, paragraph K-11, all employees who are certified to carry Pepper Spray must attend a Corps-

EP 1130-2-550  
30 Aug 08  
(Change 4)

sponsored OCAT refresher training (every two years for employees who have completed the basic course and every four years for employees who have completed the Train-the-Trainer course) to maintain certification. Employees with Train-the-Trainer certification must be re-authorized each year by the vendor.

Table E-4  
Module 2: Refresher Visitor Assistance Training Curriculum

	Course Title	Employees with Citation Authority	Employees Wearing the NRM Uniform, but <u>do not</u> have citation authority as a functional duty
<b>Module 2a</b>	<u>Annual Refresher VA Training for NRM</u> (8 hours)	*	Optional
<b>Module 2b</b>	<u>Personal Protection Training</u> (4 hours)	<u>N/A (training contained in Module 2a)</u>	** The personal protection training in Module 2a or the <i>Self-Safe</i> interactive computer-based training course satisfies this training requirement
<b>Module 2c</b>	<b>Medical Recertification</b> (length varies)	***	***
<b>Module 2d</b>	<b>Pepper Spray Recertification</b> (per industry / OCAT standards)****	***	***

\* Required training to maintain citation authority

\*\* Required training

\*\*\* Required training to maintain certification

\*\*\*\* Course can be conducted by an OCAT contractor or by a Corps employee with OCAT Trainer certification

#### E-4. Module 3: Visitor Assistance Management and Policy.

a. All NRM personnel at the project, district and MSC levels who plan and manage the Visitor Assistance Program must take the 20 hour *Visitor Assistance Management and Policy* PROSPECT course within two years of acquiring this leadership position (except as specified in the following paragraph). Operations project managers, Corps security specialists, Corps military personnel serving in a security capacity, and rangers at the GS-9 level and above are also encourage to attend the course.

b. Employees who have attended the Visitor Assistance Program for NRM (Module 1a) within the past 5 years should not schedule this course.

c. The course provides an overview of the Visitor Assistance Program to promote consistency in Visitor Assistance policy application and explore alternative management techniques and practical applications. Topics covered include policy status and direction of the Visitor Assistance Program, Title 18, Title 36, communications, and legal liabilities. This module does not satisfy any of the requirements for obtaining or maintaining citation authority.



EP 1130-2-550  
15 Nov 96

APPENDIX F

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CANCELLATION OF  
CERTIFICATE OF AUTHORITY  
TO ISSUE CITATIONS

\_\_\_\_\_  
DATE

The "Certificate of Authority to Issue Citations" issued to

\_\_\_\_\_ on \_\_\_\_\_,  
(Name of Employee)

number: \_\_\_\_\_, is hereby canceled.

\_\_\_\_\_  
(Signature and Title of District Commander)

ENG Form 5036-1-R, Nov 92

APPENDIX G  
ALTERNATIVE MANAGEMENT TECHNIQUES

G-1. Physical Control Techniques.

- a. Closing of areas. This includes the closing of areas at night, when capacities have been reached, during off season periods, campgrounds at appropriate hours, or areas where vandalism and rowdyism are frequently encountered.
- b. Fencing or other barriers.
- c. Managing appropriate use of area facilities, e.g., vehicles should be restricted to designated roads and parking facilities and camping to designated sites.
- d. Use of entrance control stations.
- e. Contract gate/park attendants. Volunteer campground hosts.
- f. Security lights.
- g. Use of mechanical and electrical surveillance systems.
- h. Appropriate signing.
- i. Prohibition of alcohol consumption, with appropriate local and district support.
- j. Physical Security Surveys and Crime Prevention Surveys.

G-2. Planning and Design Techniques.

- a. Single entrances to areas.
- b. Vandal resistant facilities.
- c. Road design to control excessive speeds. When performing normal maintenance or during times of major renovation work, roads should be designed with an emphasis on safety.
- d. Separation of user types, i.e., camping versus day use.
- e. Handicapped facilities.
- f. Lighting, or opening, of areas to facilitate visibility.
- g. Providing overflow areas.
- h. Establishing areas for special uses, such as off-road vehicle paths and trails.
- i. Consolidate recreation areas.

EP 1130-2-550  
15 Nov 96

- j. Location of operation and maintenance facilities.
- k. Informational bulletin boards at area entrances.

G-3. Surveillance Techniques.

- a. Computer data system.
- b. Improved reporting systems on violations to enhance field investigations.
- c. Use of authorized user surveys.
- d. Inter and intra-agency data exchange and coordination on common problems and activities.
- e. Expanded alternative surveillance techniques. The routine land surveillance activities should be supplemented with air and water inspections, as required.
- f. Inter-governmental agency coordination on surveillance activities(s).

G-4. Public Involvement.

- a. Cooperative Law Enforcement Agreements.
- b. Contingency plans.
- c. Citizen committees.
- d. Expanded Public Information programs.
- e. Safety councils.
- f. Shoreline/lake cleanup campaigns.

G-5. Project Plans.

- a. Ranger manuals.
- b. Operational Management Plans.
- c. Security plans.
- d. Scheduling personnel to meet project needs.
- e. Immediate vandalism repair and litter removal.

G-6. Employee Training and Professionalism.

G-7. Standardize Vehicles.

EP 1130-2-550  
15 Nov 96

G-8. Service Contracts.

G-9. Communications.

G-3

SAM AR000603

EP 1130-2-550  
15 Nov 96

APPENDIX H

FORMAT FOR AGREEMENT FOR LAW ENFORCEMENT SERVICES

COOPERATIVE AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND  
(STATE OR POLITICAL SUBDIVISION) FOR THE PROVISION OF LAW  
ENFORCEMENT SERVICES

This agreement, entered into this \_\_\_\_\_ day of \_\_\_\_\_ 19\_\_\_\_, by the U.S. Army Corps of Engineers (district) (hereinafter referred to as the Corps) and (state or Political subdivision) (hereinafter referred to as the Cooperator). Witnesseth that:

WHEREAS, the construction of the \_\_\_\_\_ (hereinafter called the "Project") was authorized by the \_\_\_\_\_ Act, approved \_\_\_\_\_ (Public Law \_\_\_\_\_), and the provision of recreation, resources in (state of political subdivision) was authorized by (the same) \*((the provision of (the Federal Water Project Recreation Act of 1965) \*Section 4 of the 1944 Flood Control Act, as amended (16 USC 460d)); and

WHEREAS, it is the responsibility of the Corps, in administering the Project lands, to provide the public with safe and healthful recreational opportunities; and

WHEREAS, the Cooperator has the authority to enforce the state and local laws for (law enforcement jurisdiction) on such lands, and WHEREAS, Section 120 of the Water Resources Development Act of 1976 (Public Law 94-587) authorizes the Corps to contract with states and their political subdivisions for the purpose of obtaining increased law enforcement services on Project lands to meet needs during peak visitation periods; and

WHEREAS, it is in the best interests of the Corps to obtain the assistance of the Cooperator in the enforcement of state and local laws on Project lands.

NOW, THEREFORE, the parties hereto mutually agree as follows:

Article 1. Plan of Operation.

(a) The Corps and the Cooperator have agreed to a Plan of Operation which describes the scope and extent of law enforcement services to be provided by the Cooperator in accordance with this agreement. Such Plan of Operation, as concurred in by the Cooperator, is attached hereto as Appendix A and made a part hereof.

(b) It is recognized and understood that the Corps and the Cooperator may, at the request of either, renegotiate the Plan of Operation. The renegotiated Plan of Operation shall, upon written acceptance thereof by both parties, supersede Appendix A.

Article 2. Obligations of the Cooperator.

(a) The Cooperator agrees to furnish law enforcement services as follows:

---

Select applicable authority for the recreation development.

EP 1130-2-550  
15 Nov 96

(1) Normal, emergency, or unanticipated enforcement of civil and criminal laws of the state and local jurisdiction on Project lands and waters without claim for reimbursement under this agreement.

(2) The enforcement of the civil and criminal laws of the state and (local jurisdiction) on Project lands in accordance with the schedules and duties describe in the Plan of Operation, with payment by the Corps in accordance with Article 3 of this agreement.

(b) The Cooperator agrees to provide personnel, equipment, and supplies which are required in order to provide the law enforcement services requested by the Corps in accordance with subparagraph (a) above.

(c) The Cooperator agrees to prepare a Daily Enforcement Log of a format provided or approved by the Corps and to submit this log to the Corps at least once a month throughout the effective period of the current Plan of Operation.

(d) The Cooperator agrees to assign only those personnel who are qualified and trained pursuant to the requirements of state and local laws and regulations to undertake the law enforcement services to be provided under Article 2(a)(2). Where state and local standards for the qualifications of law enforcement personnel do not exist, the Cooperator will advise the Corps of the experience, qualifications and training of those personnel expected to be assigned law enforcement duties under this agreement and assign such duties to them only with the approval of the Corps.

Article 3. Obligation of the Government. Subject to the availability of funds, the Corps Agrees to pay the Cooperator for the total cost of the law enforcement services to be provided in accordance with the obligations agreed to be undertaken by the Cooperator in Article 2(a)(2), including the costs of operation and maintenance of such equipment as is required for the provision of such services identified in the Plan of Operation under Article I. At the request of the Cooperator, partial payments may be made as the law enforcement services are performed based on billings as identified in the Plan of Operation under Article I and approved by the Corps.

Article 4. Period of Services. The period of this agreement shall be from the date of execution until terminated by mutual agreement, or on written notice from either party to the other, as set forth in Articles 6 and 10.

Article 5. Disputes. (Insert the clause in DAR 7-103.12.)

Article 6. Default. In the event that either party to this agreement fails to meet any of its obligations hereunder, the other party may immediately terminate the whole or any part of this agreement. Such termination shall be effected by written notice of either party to the other.

Article 7. Exclusion of Federal Employee Benefits. It is understood and agreed that the services to be provided by the Cooperator and its employees shall not be considered to fall within the scope of Federal employment, that the Cooperator and its employees shall not be considered as agents or employees of the Federal Government, and that none of the benefits of Federal employment will be conferred under the terms of this agreement.

EP 1130-2-550  
15 Nov 96

Article 8. Release of Claims. The Cooperator agrees to hold and save the Corps, its officers, agents or employees, harmless from liability of any nature or kind, for or on account of any claims for damages that may arise during the performance of the law enforcement services by the Cooperator under this agreement.

Article 9. Transfer or Assignment. The Cooperator shall not transfer or assign this agreement, nor any rights acquired thereunder, nor grant any interest, privilege, or license whatsoever in connection with this agreement without the approval of the Corps.

Article 10. Termination for Convenience. The Corps or Cooperator may, on 30 days written notice, terminate this agreement, in whole or in part, when it is in the best interests of either party. If this agreement is so terminated, the Corps shall be liable only for payment in accordance with the payment provisions of this agreement for services rendered prior to the effective date of termination (DAR 7-1902.16).

Article 11. Equal Opportunity. (Insert the clause in DAR 7-103.18(a).)

Article 12. Gratuities. (Insert the clause in DAR 7-104.16.)

Article 13. Examination of Records by Comptroller General. The Cooperator agrees that the Comptroller General of the United States or any of his duly authorized representatives shall, until the expiration of three years after final payment under this agreement or such less time specified in Appendix M of the Defense Acquisition Regulation have access to and the right to examine any directly pertinent books, documents, papers, and records of the Cooperator involving transactions related to this agreement.

Article 14. Audit by Department of Defense. Upon request, the Cooperator shall provide, and the Corps shall have the right to examine, books, records, documents, and other evidence of accounting procedures and practices, sufficient to reflect properly all direct and indirect costs of whatever nature claimed to have been incurred and anticipated to be incurred for the performance of this agreement.

Article 15. Any changes in the provisions of this agreement which are necessary and proper will be made by formal amendment signed by both parties.

IN WITNESS HEREOF, the parties hereto have executed this agreement, as of the day and year first written above.

U.S. ARMY CORPS OF ENGINEERS

STATE OR POLITICAL  
SUBDIVISION

BY \_\_\_\_\_  
Colonel, Corps of Engineers  
District Engineer

BY \_\_\_\_\_

DATE \_\_\_\_\_

DATE \_\_\_\_\_

EP 1130-2-550  
15 Nov 96

(Necessary approvals and countersignatures required by state or political subdivisions with respect to execution on behalf of the state or political subdivision must be ascertained by the Cooperator and his counsel and added to the signature block.)



EP 1130-2-550  
15 Nov 96

## APPENDIX I

### REPORTING REQUIREMENTS FOR LAW ENFORCEMENT COOPERATIVE AGREEMENTS THROUGH THE NRMS

I-1. All projects with reporting responsibilities will report the following information through the Natural Resource Management System (NRMS) (RCS CECW-O-39(R2)). Specific reporting details are found in the NRMS users manual.

I-2. Information requirements for annual reports on cooperative agreements for law enforcement services are as follow:

a. Total Number of Cooperative Agreements - Report the total number of cooperative agreements for increased law enforcement services in effect during the fiscal year. In cases where one cooperative agreement is applicable to more than one reporting project, each project will count the agreement in computing the project total.

b. Total Funds Paid to Cooperating Agencies - Report the total amount of funds paid to agencies cooperating for increased law enforcement services during the fiscal year. If one cooperative agreement is applicable to more than one project, each project will report the funds expended in the project's 16.01 account.

c. Total Administrative Costs - Report the total costs associated with the administration of the cooperative agreements for increased law enforcement services. If one cooperative agreement(s) is applicable to more than one project, each project will report the amount of their funds expended in administration of the agreement.

d. Total Man-Hours of Increased Law Enforcement Service - Report the total number of man-hours of increased law enforcement services realized as a result of the fiscal year cooperative agreement(s) for law enforcement service. If one cooperative agreement is applicable to more than one project, each project will report the man-hours of increased service provided to that project.

e. Total Number of Law Enforcement Actions - Report the total number of written warnings, citations, and arrests issued on the project by cooperating agencies while conducting the services specified in the agreement(s) for increased law enforcement. (Note: Two actions against the same person should be reported as two separate actions.)

EP 1130-2-550  
30 Aug 08  
(Change 4)

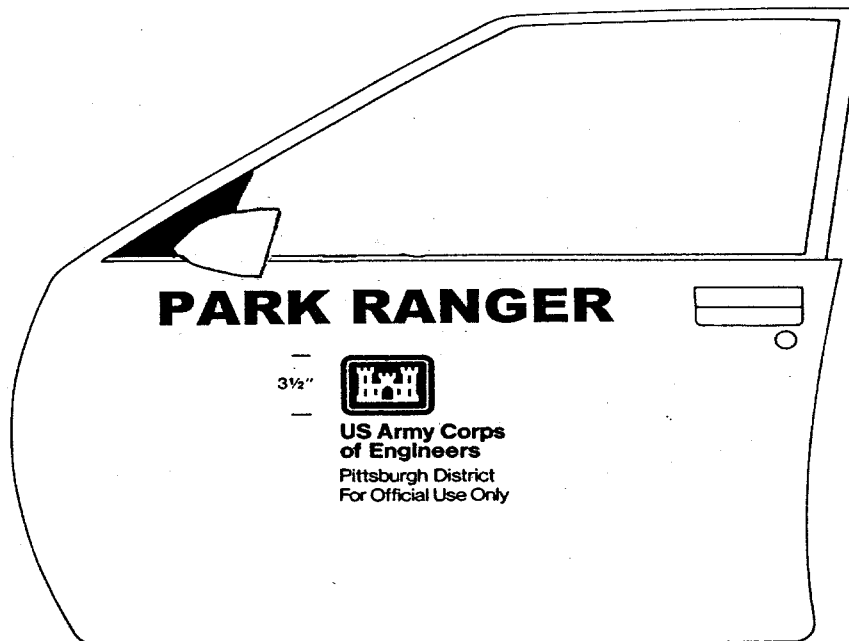
## APPENDIX J

### VISITOR ASSISTANCE VEHICLE MARKING GUIDE

#### J-1. Visitor Assistance Vehicle Marking.

a. The diagram below is a guide for the location of the "PARK RANGER" designation and Corps Communication Mark and Signature which should be placed on the right and left front side doors of Corps vehicles primarily used by Natural Resources Management personnel performing visitor assistance duties.

b. The Corps Communication Mark and Signature decal will be centered with exact placement contingent upon location of door handles, mirrors, and door guard/bumper strips. The Corps Communication Mark will measure 3 ½-inches in height (castle), and the Corps Signature will consist of 7/8-inch, Helvetica Medium type face, upper and lower case black letters for "US Army Corps of Engineers"; 5/8-inch black Helvetica Medium type, upper and lower case letters for "For Official Use Only". District names may be included as an option on the third line, between "US Army Corps of Engineers" and "For Official Use Only", with 5/8-inch Helvetica Medium type, upper and lower case black letters. A "PARK RANGER" decal will be centered above the Corps Communication mark and will consist of 2 ½-inch to 3-inch Helvetica Medium type, all capital black letters on a white reflective backing.



## APPENDIX K

## Oleoresin Capsicum (Pepper Spray) Program

K-1. General Requirements.

a. U.S. Army Corps of Engineers park rangers, and other qualifying employees as stipulated in paragraph K-2, may be authorized to carry and use Oleoresin Capsicum (Pepper Spray) for self-defensive purposes in accordance with the requirements contained in this appendix. The role of the park ranger is defined as a regulatory enforcer with full citation authority of 36 CFR, Chapter III, Part 327 (Title 36). Available use of force options are limited to verbal persuasion/verbal detention and self defensive measures, including unarmed self defense and, where authorized, the use of an approved chemical aerosol spray. Pepper Spray is the approved chemical aerosol spray to be used for self-defensive purposes in the execution of official duties as determined through the district/project risk analysis process. For the purposes of this appendix, all employees who are eligible to receive Pepper Spray authorization will be referred to as “park rangers”.

b. U.S. Code Title 18 specifies that it is a Federal crime to forcibly assault, resist, oppose, impede, intimidate, or interfere with any civilian official or employee of the Corps engaged in the performance of his or her official duties. Failure to comply with a lawful order issued by a Corps employee acting pursuant to enforcing Title 36 shall be considered as interference with that employee while engaged in the performance of his or her official duties. Reasonable self-defensive force, including the use of Pepper Spray, may be used only when such interference constitutes an apparent physical threat to the park ranger. A complete legal review of the liability issues associated with the use of chemical aerosol for park ranger protection was conducted by Headquarters, Office of Counsel.

c. Pepper Spray is considered an available self-defense option to facilitate a park ranger’s withdrawal from an assault by a person or attack by an animal, and is not intended to replace any defensive, avoidance, or control technique that is available within the ranger’s existing levels of enforcement; nor should it be used as an offensive weapon. It should be used only when other reasonable methods have been exhausted. The spray cannot be used for any offensive measure that would constitute the employee’s acting outside his/her scope of employment.

d. Employees may elect not to carry and use Pepper Spray for any reason. However, project offices and districts must maintain written documentation for all eligible employees who have declined the authority to carry Pepper Spray.

K-2. Eligible Employees.

a. Selected USACE park rangers and Natural Resources Management (NRM) Program uniformed employees, who meet all the following conditions, may be eligible to receive authorization to carry Pepper Spray as part of the standard uniform:

(1) Employed at a USACE Water Resources Development Project in a permanent, seasonal or temporary position, including Student Career Experience Program (SCEP), Student Temporary Employment Program (STEP) and summer hire employees;

(2) Hired under the 023, 025, 028 job series or any related natural resource position in the 400 job series;

(3) Authorized to wear the NRM Park Ranger Uniform per ER 1130-2-550, Chapter 8;

(4) Work in one or more job functions that have been determined “at risk” under the District Position and Project Job Hazard Analysis process and;

EP 1130-2-550

30 Aug 08

(Change 4)

(5) Have successfully completed all training and certification requirements

b. Citation authority is not a condition of eligibility to carry and use Pepper Spray.

c. Normally, all park rangers who have received authorization will carry Pepper Spray while in uniform except in school classrooms, airplanes and other locations that prohibit the carrying of a chemical aerosol spray or where such a display is not advisable for other reasons. Pepper Spray may also be carried during unusual circumstances when the uniform is not being worn while performing official duties (i.e. control burns, boundary line maintenance).

**K-3. Hazard Analysis Process.** A comprehensive District Position Analysis and Project Activity Hazard Analysis (as per EM 385-1-1, Safety and Health Requirements Manual) must be conducted to verify which positions/jobs warrant Pepper Spray authorization.

a. A District Position Hazard Analysis (PHA) must be prepared to identify the positions and duties (district-wide) that may warrant the carrying and use of Pepper Spray. This process must identify all positions and duties where the possibility of negative personal confrontations or animal attack may occur and the use of Pepper Spray would be appropriate. See Table K-1 for a sample reference.

b. Operations project managers, who have eligible employees identified in the *Position* paragraph of the PHA, must prepare a Project Activity Hazard Analysis for each duty listed in the PHA. Activities identified in the Activity Hazard Analysis as high-risk activities will warrant the carrying of Pepper Spray. See Table K-2 for a sample reference.

**K-4. Policy Criteria on the Use of Pepper Spray.**

a. General Criteria.

(1) Pepper Spray, when used while on duty as a self-defense measure in compliance with USACE policy, is lawful force within the park ranger's scope of assigned duties for the purposes of defending the ranger from what the employee reasonably believes is imminent personal physical harm and to facilitate escape from danger.

(2) Verbal persuasion (verbalizing) and a verbal warning are required before using Pepper Spray, if circumstances allow verbalizing and warning without risk to the safety of the park ranger or others. Verbalizing and warning are not required when there is a risk to the safety of the park ranger if the use of Pepper Spray is delayed.

(3) All force must be reasonably proportionate to the apparent need to defend against an imminent threat of physical injury. Unreasonable and excessive force is not justified, nor is use of any force when a park ranger knows, or reasonably should know, such force is unlawful or unnecessary. Pepper Spray shall not be used against a citizen who peacefully submits and complies with park ranger instruction during an altercation or threat of an altercation or who has already ceased an assault.

(4) Visitors have a right to express verbal disagreement with a park ranger's actions and no force can be used in response to offensive language alone. Pepper Spray cannot be used to retaliate against language that is merely offensive but is not imminently physically threatening. Threats or threatening actions made to park rangers while performing their duties, which are perceived as life threatening to the ranger, are not considered mere verbal disagreements.

(5) After spraying an individual, the park ranger must immediately notify local law enforcement authorities, request their assistance, and notify his/her supervisor. See Paragraph K-8, After Use Guidelines, for further information.

b. Pepper Spray **CAN BE** used against an individual who acts or reacts violently towards a park ranger under any or all of the following circumstances:

(1) After the park ranger has attempted verbalization and warning techniques (when possible) and the individual continues to act or reacts violently towards the ranger in a life-threatening manner;

(2) When the individual is assaulting a park ranger. However, if a person strikes or assaults the ranger, then ceases the assault and retreats, or is removed from the scene so as not to pose a further threat to the ranger's safety, the ranger may not pursue and use Pepper Spray against the individual;

(3) When the circumstances reasonably indicate that attempting to control or withdraw from the situation may lead to an escalation of force with a risk of serious physical injury to the park ranger;

(4) When the individual is physically assaulting an agent of the U.S. Army Corps of Engineers. For the purpose of this guidance, an "agent" of the Corps of Engineers includes Corps of Engineers employees, volunteers who are officially registered under the Corps Volunteer Program, and contractors who are performing services under a signed contractual agreement with the Corps and law enforcement officers responding to an incident on Corps property. The park ranger is under no obligation to use Pepper Spray to protect any official agent of the Corps of Engineers if such action will place the ranger at greater personal risk.

c. Pepper Spray **SHALL NOT** be used against a person who:

(1) Does not pose a physical threat to the park ranger (i.e., elderly, very young, and disabled in an obvious manner) unless there's a presence of a weapon or other circumstance that reasonably warrants the use of Pepper Spray.

(2) Submits peacefully and complies with park ranger requests and instructions during an altercation or threat of an altercation involving the ranger or park visitor.

(3) Is expressing mere verbal disagreement that does not physically threaten a park ranger.

(4) Is threatening/assaulting another person who is not an official agent of the U.S. Army Corps of Engineers; See paragraph K-4.b. (4) for the definition of an agent.

#### K-5. Guidelines for Use.

a. Manufacturer's instructions and industry training for use, care, and storage of Pepper Spray must be followed. Canisters must be secured at all times to prevent use by unauthorized persons, and must not be stored in vehicles or other locations of extreme temperature variations.

b. Aerosol canisters must be shaken and tested regularly in order to ensure that the aerosol weapon system is properly functioning. Spray only from an upright position. Users should familiarize themselves with their canisters by spraying a short burst with the wind at their backs, so as to establish the distance and width of the spray. Test should be conducted only outdoors and away from people and animals.

c. It is important not to spray upwind, because the effects of blowback upon the user can be severe. Spraying in a crosswind will reduce the effective range, although it will not risk blowing spray upon the user.

d. The park ranger should maintain a distance of four to six feet when spraying an individual. A person can be sprayed directly on the face up to the maximum range allowed on individual delivery systems. Although Pepper Spray can be used at a close range, for immediate

EP 1130-2-550

30 Aug 08

(Change 4)

effect on the respiratory system, it is recommended that spraying be done at a distance of not less than 4 feet. At shorter ranges, the person's eyes will immediately shut and cause incomplete exposure to the spray. Spraying between the minimum range of 4-6 feet and the unit's maximum range will provide instant evaporation, assuring effective impact upon the respiratory system, quickly incapacitating the individual.

K-6. Guidelines for Method of Carry. Pepper Spray will be carried using a clip, belt loop or snap holster designed specifically for two to four-ounce Pepper Spray canisters.

K-7. Guidelines for Tactical Use. When possible, the park ranger's support foot should be forward and the strong foot behind. Feet should be shoulder width apart or wider to create a balanced stance. The head should be directly over the hips and the weight is equal on both feet with knees slightly bent. During an assault, the park ranger should:

- a. Provide verbal warning if appropriate and reasonably safe to do so.
- b. Spray directly into the person's face (eyes, nose, and mouth). In most cases, a direct hit in the face will instantly shut the eyes and effect the respiratory system.
- c. If the attacker continues to be a threat, apply a second spray toward the person's nose and mouth.
- d. Stop spraying when the attacker's resistance ceases. Depart the area and contact/await local law personnel arrival.

K-8. After Use Guidelines. These guidelines are designed primarily to ensure the safety of the park ranger as well as the safety of bystanders and the individual. After using Pepper Spray on an individual, the ranger will:

- a. When necessary, use approved unarmed self-defense techniques to escape from the incident.
- b. Leave the immediate area and remain a safe distance from the individual.
- c. Maintain visual contact with the person if reasonably safe to do so.
- d. Encourage park visitors, bystanders and other persons to move to a safe location.
- e. Contact local law enforcement officials (state that Pepper Spray has been used), other Corps personnel and appropriate medical response team (if appropriate).
- f. Continue to monitor the situation from a safe distance until local law enforcement arrives.
- g. Provide the following optional first aid to the individual only if it is safe to do so (note: the ranger is under no obligation to provide first aid to the individual):
  - (1) Monitor the individual and provide verbal reassurance that all effects are temporary.
  - (2) Move the individual to an uncontaminated area and face him towards the wind when possible. The person should be told to relax, breathe normally and not to walk around.
  - (3) Use cool water (if available) to rinse the resin from the face. Eyes should be flushed with water. Do not rub affective areas. Cool water will allow for a quicker recovery. Cleaning affected skin areas with soap and water will help remove the sticky resin and expedite the recovery process. Contact lenses should be removed by the individual.



(4) Use an authorized decontamination kit (if available) furnished by the training vendor or other approved source.

(5) Ask the person if he/she has a heart or lung problem, diabetes, high blood pressure, or any other serious medical condition. Provide pertinent information to the responding local law enforcement officer or medical personnel.

(6) Assure that the individual receives medical attention if symptoms persist after 30-45 minutes. All symptoms should disappear within 30-45 minutes with no after effects.

h. Contact immediate supervisor or work leader to report the incident

i. Complete all required USACE incident report forms as specified in paragraph K-9 below.

j. Initiate action to file the incident as a Title 18 case or a similar prosecution for assault under state statute if the U.S. Attorney chooses not to prosecute as a Title 18 violation.

#### K-9. Reporting Requirements.

a. All incidences of Pepper Spray use must be properly documented through the use of Oleoresin Capsicum Record of Use Form (see Figure 1) and in accordance with normal reporting procedures for serious incidents. For the purposes of this regulation, "use" is defined as grasping, holding, or spraying the canister when being threatened by a person or animal. This reporting requirement includes situations where, in the opinion of the park ranger, the mere presence of Pepper Spray altered the outcome of the incident. Incidences must be reported through proper channels to HQUSACE within 24 hours. By definition, any incident on an individual requiring Pepper Spray represents a Title 18 assault to the employee and filing actions should be taken accordingly.

b. A review will be made of each incident to determine the circumstances under which Pepper Spray was used and what other actions were pursued prior to the use of Pepper Spray.

#### K-10. Approved Equipment Specifications.

a. The following equipment is approved for all USACE employees authorized to carry Pepper Spray.

(1) Five to ten percent Oleoresin Capsicum concentration level

(2) Two to four-ounce spray canister (three ounce is preferred for most applications)

(3) Cone spray delivery system for all outside applications. Note: In limited circumstances, the stream spray delivery system may be authorized in high windy areas and the foam spray delivery system may be authorized for use inside visitor centers and project office buildings when approved in advance by the operations project manager. The effects of the foam spray on the subject will take longer to occur (as compared to cone spray) and should only be used in enclosed environments. The use of the foam spray will generally not require occupants to evacuate the building. Employees authorized to carry foam, fog, and stream spray should obtain inert canisters for training purposes in order to become familiar with the spray patterns and distances.

(4) Clip, belt loop or snap holster

b. All training must be done in conjunction with the above approved equipment.

EP 1130-2-550

30 Aug 08

(Change 4)

K-11. Training Requirements.

a. All park rangers must complete the basic Oleoresin Capsicum Aerosol Training Course (Pepper Spray Training), including a 6-hour block of instruction, prior to receiving certification and authorization to use Pepper Spray in accordance with Appendix E.

b. The basic 6-hour course requires students to attend classroom training, participate in practical exercises, pass all techniques on a proficiency exam, and complete a written 20+ question exam with a 70% minimum passing score. Course includes the option of the student being sprayed during training or observing someone else being sprayed either in-person or on a video. The actual spraying of students under the basic course is highly recommended for the student to gain a thorough awareness and appreciation of the impact of using pepper spray on an individual and the personal effects of the spray if used accidentally or maliciously on a ranger. Recertification is required every 2 years by passing the written exam and all techniques on the proficiency exam. Successful completion of the Visitor Assistance Program for Natural Resources Management PROSPECT Course (#147) satisfies this training requirement.

c. A select number of employees will attend the vendor-sponsored 8-hour Advanced Pepper Spray Instructor (“Train-The-Trainer”) Course on a voluntary basis. The instructor course requires students to attend classroom training, participate in practical exercises, pass all techniques on a proficiency exam and complete a written 30+ question exam with an 85% minimum passing score. Training authorization is required every year by the vendor and recertification is required every four years by completing the 8-hour advanced course. Completion of this course will qualify the employee to conduct the basic course. Per industry requirements, students who take the instructor course must be sprayed as part of the training process. Each division will be responsible for procuring the advanced training course from an HQUSACE-approved contractor or certified Corps trainer. Each district must submit a course outline and vendor name to HQUSACE for approval prior to conducting the advanced training course.

d. Training courses must meet industry standards and contain, at a minimum, the following subject matter taught in a combination of classroom instruction and practical exercises:

(1) HQUSACE Pepper Spray Policy and Standard Operating Procedures (i.e. self-defensive use only, used within scope of employment, agency/employee liability, local law considerations, reporting requirements, etc.)

(2) Effects of Pepper Spray (on face, eyes, respiratory system, animals, humans)

(3) Properties/Types of Pepper Spray (concentration, delivery system, canister models, storage requirements, replacement requirements)

(4) Carrying methods

(5) Recognizing the threat / situational analysis

(6) When to use Pepper Spray (use of force options)

(7) How to use Pepper Spray (verbal commands, spraying, defensive body positions, movement methods, drawing/spraying techniques)

(8) After Use Guidelines (policy requirements, optional decontamination procedures)

(9) Practical Training Exercises to include the actual spraying of students (mandatory for students in the advanced “Train-The-Trainer” Course and optional for students in the basic course).



e. Students must satisfy the following training performance objectives prior to receiving certification:

(1) Demonstrate a thorough understanding of USACE policy on the use of Pepper Spray for defensive purposes only.

(2) Demonstrate a thorough understanding of when Pepper Spray can be used.

(3) Identify the agency/personal liability when using Pepper Spray outside the scope of employment.

(4) Know and understand any state or local laws and/or ordinances that pertain to the possession and use of chemical aerosol spray.

(5) Identify the effects of Pepper Spray on human beings and animals.

(6) Define a chemical irritant and a chemical inflammatory.

(7) Identify the different models of pepper spray and specific contents and capabilities of each.

(8) Demonstrate the proper way to carry pepper spray in accordance with HQUSACE instructions.

(9) Demonstrate a proper stance and position of the body when holding Pepper Spray in the hand for use or potential use with all techniques taught in the course.

(10) Deliver verbal directions or commands to combative individuals while holding pepper spray device in the hand or using the pepper spray device.

(11) Accurately spray in one-second bursts at simulated physically combative individuals.

(12) Identify the ways to decontaminate an area that has been exposed to Pepper Spray.

(13) Identify the first-aid procedures available for administering to individuals who have been exposed to pepper spray.

(14) Identify the ranger reporting requirements contained in this SOP.

#### K-12. Physiological Effects of Oleoresin Capsicum.

a. Pepper Spray is an organically based aerosol spray designed to incapacitate an attacker with no after effects. It instantly immobilizes an attacking human or animal for up to 45 minutes, regardless of size or strength. Pepper Spray has been successfully proven to be effective on emotionally disturbed people; people under the influence of drugs or alcohol; enraged people who have reduced sensitivity to pain; multiple opponents; as well as domestic and wild animals without causing permanent damage.

b. A one-second burst to the face will affect three major areas upon contact: the eyes, the respiratory system, and the skin. All effects are temporary, and will usually completely disappear within 30-45 minutes.

EP 1130-2-550

30 Aug 08

(Change 4)

(1) A direct spray in the face will cause dilation of the capillaries and instant closing of the eyes and swelling of the eyelids. Effects range from severe twitching or spasmodic concentration of the eyelids to involuntary closing of the eyes. The eyes appear to be red for up to 30 minutes. People with eyeglasses or contact lenses will be equally affected.

(2) A direct spray produces immediate respiratory inflammation, which causes uncontrollable coughing, retching, shortness of breath, and gasping for air with a gagging sensation in the throat. Inflammation of mucous membranes produces difficulty in breathing through the nose. Inflammation of the epiglottis causes shallow breathing through the mouth. As aggression increases, breathing becomes rapid and increases the effects of pepper spray. Respiratory functions return to normal within 10 to 30 minutes.

(3) A direct burst of pepper spray on the face will cause an immediate burning sensation of the skin and mucous membranes inside the nose and mouth. Occasionally, the subject's lips will be swollen and discolored. Depending on the complexion of the individual, skin color will range from slight discoloration to a bright redness. Skin discoloration will disappear within 10 to 45 minutes, depending on the immediacy of decontamination as well as access to soap and cool water. The skin may also turn yellow from the spray, but can easily be washed off.

(4) Pepper Spray has no long-lasting side effects or aftereffect. It can be used to control any high stress situation while producing rapid physiological action, desired effects in low concentration, and permits rapid recovery without lasting effects

c. Although this product is proven to be extremely effective, the reliability cannot be guaranteed 100%.

EP 1130-2-550  
 30 Aug 08  
 (Change 4)

**TABLE K-1**  
**EXAMPLE DISTRICT POSITION HAZARD ANALYSIS FOR PEPPER SPRAY**

**DISTRICT POSITION HAZARD ANALYSIS**  
**Guidance for use of Oleoresin Capsicum (Pepper Spray)**

*Note: This document provides guidance in developing a District Position Hazard Analysis (PHA) for identifying positions and duties that may warrant the carrying and use of pepper spray against humans and animals. A PHA must identify all positions and duties where the possibility of negative personal confrontations may occur and the use of pepper spray might be appropriate. Managers who have employees identified in the Position paragraph of the PHA must prepare a Project Activity Hazard Analysis (AHA) for each duty listed in the PHA. Activities identified in the AHA may require the carrying and use of pepper spray. This action is in compliance with paragraph 01.A.10 of EM 385-1-1, Safety and Health Requirements Manual.*

<b><u>POSITION: Permanent and temporary (Summer hire, SCEP and STEP Employees and other personnel in job series 023, 025, 028, or 400, involved in Visitor Assistance Program activities under ER 1130-2-550, Chapter 6, or Natural Resource Stewardship activities under ER 1130-2-540, Chapter 2, who have one or more of the following responsibilities identified in their Job Description.</u></b>	<b><u>POTENTIAL SAFETY/HEALTH HAZARDS</u></b>	<b><u>RECOMMENDED CONTROLS</u></b>
1.0 Patrol of Project Lands and Waters  2.0 Enforcement of 36 CFR Chapter III, Section 327 (Title 36)  3.0 Handling/Transporting User Revenues  4.0 Shoreline Management  5.0 Boundary Management  6.0 Natural Resources Management  7.0 Interpretation  8.0 Contract/Agreement Administration  9.0 Environmental Protection	Possible physical assault or attack by project visitors, domestic and wild animals.	All employee control measures identified in current project Activity Hazard Analyses that pertain to the tasks specified in the Duty Column herein.  <i>Note: Employees must always work within their scope of duties as defined in ER/EP 1130-2-550, Chapter 6, Visitor Assistance Program.</i>

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EP 1130-2-550  
 30 Aug 08  
 (Change 4)

**TABLE K-2**  
**EXAMPLE PROJECT ACTIVITY HAZARD ANALYSIS FOR PEPPER SPRAY**

**PROJECT ACTIVITY HAZARD ANALYSIS**

**Guidance for carrying and the potential use of Oleoresin Capsicum (Pepper Spray)**

**DUTY:** 1.0 Patrol of Project Lands and Waters

**ACTIVITY:** See list below (Principle Steps 1.1 through 1.4)

**DESCRIPTION:** The following matrix lists major duties and associated activities performed by eligible employees working under the guidelines of Appendix K of EP 1130-2-550. Potential safety/health hazards as well as recommended controls are also detailed.

These jobs are performed by eligible employees in accordance with this Appendix and include a wide variety of duties and activities. Often planned daily activities are regularly interrupted by unique circumstances. Employees are subject to being notified and expected to respond immediately to these situations. Even planned activities involving the public, which normally would not be considered "high risk," may escalate into a "high risk" situation unexpectedly. As such, employees may find themselves in circumstances with the potential for safety and health risks that are unplanned and unexpected. Therefore, authorized safety equipment must be available for immediate and effective use at all times. Because of this, it is felt that pepper spray, if issued as authorized equipment, should be worn at all times while on duty, regardless of the particular planned activity.

1 - PRINCIPLE STEPS/ACTIVITIES	2 - POTENTIAL SAFETY/HEALTH HAZARDS	3-RECOMMENDED CONTROLS
1.1 Patrol in developed recreation areas	Possible confrontation or physical assault or attack by project visitors or other individuals/groups or animals in areas with or without documented incidences of unruly behavior.	Employees must be trained in proper procedures and furnished authorized equipment; maintain liaison with County Sheriff/State Police/Local Police as well as the carrying, use, and storage of pepper spray in accordance with guidelines described in this Appendix.
1.2 Patrol in undeveloped recreation areas	See Above	See Above
1.3 Lake Patrols	See Above	See Above
1.4. Patrol of wildlife and resource management areas.	See Above	See Above
4 - RECOMMENDED EQUIPMENT (Pepper Spray)	5 - INSPECTION REQUIREMENTS (Pepper Spray)	6 - TRAINING REQUIREMENTS (Pepper Spray)
Equipment/procedures identified in EP 1130-2-550, Chapter 2 and 6, plus HQ authorized pepper spray and holster. Type: 2 or 4 oz. aerosol, cone or stream spray or foam as authorized as standard GSA issue in black nylon snap or velcro holster. Follow EP 1130-2-550, recommendations and industry guidelines for the product utilized.	Follow manufacturer's guidelines for inspection, care, and storage of equipment.	Training to comply with ER/EP 1130-2-550, Chapter 6 and district and local requirements. Additional mandatory training for pepper spray to follow HQ-sponsored training course, manufacturer's guidelines, agency regulations, and project training requirements for proper product use and understanding of product limitations. HQUSACE-sponsored training will meet all training/certification requirements.

FIGURE 1

Record of Use Form
Oleoresin Capsicum (OC)
(Pepper Spray)

USE THIS FORM TO DOCUMENT ALL INSTANCES OF OLEORESIN CAPSICUM (OC) USE OR PERCEIVED NEED FOR USE
Record of OC Use Form will be submitted NLT 24 hours following OC use to District OC Representative via e-mail or fax.
"Use" is defined in Paragraph K-9, Appendix K of EP 1130-2-550.

District \_\_\_\_\_ Project/Lake: \_\_\_\_\_

Date of Report: \_\_\_\_\_ Date of Use: \_\_\_\_\_ Time of Use: (use military time) \_\_\_\_\_ hrs.

Ranger(s) Involved: \_\_\_\_\_

Ranger Pepper Spray Certification Date: \_\_\_\_\_ Expiration Date \_\_\_\_\_

Did you feel the: \_\_\_ mere presence of OC, \_\_\_ drawing/not spraying OC, \_\_\_ drawing/ spraying OC, altered the incident outcome.

Subject Information/Condition: \_\_\_\_\_ Human (\_\_\_ Male \_\_\_ Female) \_\_\_\_\_ Animal (check if applicable)
Type of Animal

Name/Owner Name: \_\_\_\_\_

Subjects' Condition prior to OC Spray: \_\_\_\_\_

(Annotate briefly subject s condition: were alcohol or drugs involved; note, threatening signals, attitudes, physical gestures displayed by subject).

Number of minutes OC affected Subject: \_\_\_\_\_ Medical Assistance Requested? \_\_\_ Y/N Assistance Received? \_\_\_ Y/N

Areas of body affected by OC: Eyes \_\_\_ Respiratory \_\_\_ Skin \_\_\_ Other \_\_\_\_\_

Did subject stop aggressive or threatening behavior immediately after use of OC? \_\_\_ Y/N

Was subject arrested? \_\_\_ Y/N If so, name of arresting officer, badge # and agency: \_\_\_\_\_

Condition of Subject when removed from scene: (note injuries resulting from OC use) \_\_\_\_\_

Incident Details:

Location: \_\_\_\_\_

Environmental Factors: \_\_\_ Windy \_\_\_ Humid \_\_\_ Temp above 70 degrees \_\_\_ OC sprayed in an enclosed area \_\_\_ Sprayed in open area.
(Check applicable environmental factors)

Were lower levels of force initiated before spraying OC? \_\_\_ Y/N List force actions taken: \_\_\_\_\_

Type and Model of OC used: \_\_\_\_\_ Distance from subject when sprayed: \_\_\_\_\_ ft.

Eyewitnesses to OC use: \_\_\_ Y/N, (if yes list names address s and phone numbers, use paper for additional names)

Name: \_\_\_\_\_ Address: \_\_\_\_\_ Phone No. \_\_\_\_\_

Name: \_\_\_\_\_ Address: \_\_\_\_\_ Phone No. \_\_\_\_\_

Park Ranger Signature and Date: \_\_\_\_\_

Date of Review: \_\_\_\_\_ Supervisor Signature: \_\_\_\_\_

Date of Review: \_\_\_\_\_ District: \_\_\_\_\_ Date of Review: \_\_\_\_\_ Division \_\_\_\_\_

Date of Review: \_\_\_\_\_ HQ: \_\_\_\_\_

08 July 03

EP 1130-2-550

30 Aug 08

(Change 4)

FIGURE 1, Cont.

**Record of Use Form**  
**Oleoresin Capsicum (OC)**  
*(Pepper Spray)*

Use this page of the Record of Use Form - Oleoresin Capsicum to provide an incident narrative, fully describing where OC was used or drawn but not sprayed or perceived use altered the incident outcome; include recognition of threat factors, levels of force used, subject's demeanor before and after OC use.



## APPENDIX M

USE FEE CRITERIA  
GROUP AND SINGLE USER UNIT CAMP AREAS

<u>AREA TYPE &amp; FACILITIES</u>	CLASS E	CLASS D	CLASS C	CLASS B	CLASS A
		Minimum	Minimum	Minimum	Minimum
Group Camp Areas	No Fee	\$20	\$30	\$40	\$50
Single User Unit					
Camp Areas	No Fee	Minimum	Minimum	Minimum	Minimum
		\$5	\$6	\$8	\$10
<u>FACILITY CRITERIA</u>					
Restrooms	<u>2/</u>	<u>1/</u>	Vault	Vault	Flush
Potable Water			Yes	Yes	Yes
Fireplaces <sup>3/</sup>			Yes	Yes	Yes
Refuse Containers			Yes	Yes	Yes
Access Road			Yes	Yes	Yes
Designated tent or Trailer Spaces			Yes	Yes	Yes
Visitor Protection <sup>4/</sup>			Yes	Yes	Yes
Personal Fee					
Collection			No	No	Yes
Picnic tables			Yes	Yes	Yes
Showers			No	No	Yes
Sanitary Disposal Station			No	Yes	Yes
Circulatory Roads			Yes	Yes	Yes

1/ If at least 5 of the first 9 facility criteria are met, the site qualifies for at least a Class D designation and a fee may be charged.

2/ If less than 5 of the first 9 facility criteria are met, the site is a Class E, no-fee site.

3/ A simple device for containing a campfire (where campfires are permitted) e.g. fire ring, fireplace, or grill.

4/ Reasonable control for protection of campers consists of Corps ranger or local law enforcement surveillance.

Note: Individual campsites and group areas within a single campground may vary in quality or desirability due to location and/or campsite amenities. Variable pricing of fee campsites within a single campground may be instituted within the guidelines established above, if such campsite variances are identified.



EP 1130-2-550

Change 3

15 Aug 02

Variable pricing for camping use may also be established based upon time differences, such as different seasons or different days of the week. Examples of variances that might affect quality or desirability of campsites include, but are not limited to:

(1) Proximity to the lake, proximity to attendant facilities, availability of shade, availability of individual water or sewer hookups and size or screening of site.

(2) Certain times which are more desirable for camping use, such as weekends in the summer.

APPENDIX N  
SPECIAL EVENTS

N-1. General. Consideration will be given to permitting special events at Corps lakes such as water carnivals, fishing tournaments, boat regattas, music festivals, dramatic presentations and other special recreational programs of interest to the general public.

N-2. Permit Applications. The sponsoring agency must obtain a receipt/permit (ENG Form 4457) from the operations project manager prior to the event date. Reservations for the use of Corps facilities to host a special event may be obtained in person or by phone from the Corps Operations Project Manager or his/her representative. The receipt/permit will describe the nature of the event, the starting and closing date, the location or area desired for the event, and any other pertinent data.

9-B-3. Qualifications for Permit. In order to qualify for a special event permit, the event must contribute to the enjoyment of the public and comply with established land use classifications.

a. The following requirements will be attached to the receipt/permit issued to the sponsoring agency:

(1) The right to charge is based on the sponsor providing parking assistance, adequate policing for crowd supervision and control, and other services required for the health and welfare of the visitor. The sponsoring agency must meet bonding, insurance, and other requirements unique to the local area.

(2) No costs shall accrue to the government.

(3) Private use of the project lands will not preempt public use of project recreational resources.

(4) The permitted site will be fully restored to prior conditions by the permittee. A performance bond may be provided to cover potential damages and maintenance cost. Forty-eight hours will be allowed in which to clear the permitted site after the event closes.

(5) The operations project manager will determine the number of hours per day the event may take place, however, the permit will be limited to four days with a prohibition against holiday use. District commanders may make special exceptions on a case-by-case basis.

(6) Collection of any funds in connection with the event must be approved by the district commander prior to issuance of the permit. Collections of entry fees in excess of actual total costs will be paid to the Corps for legal disposal unless surplus proceeds are used for benefit to the project. A collection cost analysis will be provided by the sponsor within 30 days following the event. The government reserves the right to audit the sponsor's records.

(7) Concession permits may be granted to requesting organizations only in the absence of a licensed concessionaire at the permitted site or the concessionaire's inability to supply the needs of the proposed activity.

EP 1130-2-550  
15 Nov 96

b. Admission to view the event must not be limited to membership of the sponsoring group, nor will any discrimination be made against a person because of race, creed, sex, or national origin in conducting activities. Special event permits will include the following condition relating to discrimination:

"Admission to view the event will be open to the general public without discrimination on the grounds of race, color, religion, national origin, sex, or age. Participation in the event may be limited to members of the sponsoring group provided that the group does not unlawfully discriminate against participation in the event on grounds of race, color, religion, national origin, sex or age. Request for special events permits citing "special circumstances" for participation requiring gender or age discrimination must be accompanied by an exceedingly persuasive justification. This may be appropriate for activities such as contact sports and sports such as tennis, golf, or competitive swimming. Fishing tournaments do not qualify for discrimination based on gender."

c. The United States Government is not responsible for damage to property for injury to persons attending the event. The permittee will be responsible for health and safety requirements of participants.

d. The permit request must be in accordance with applicable Federal, state, and local laws.

APPENDIX O  
PROGRAM INTEGRITY: HONOR VAULTS

O-1. Honor vaults are very susceptible to fraud and embezzlement. Consequently, honor system programs require diligent audit and quality assurance attention. Controls and methods can be used to better ensure the integrity of honor system collections. Failure to follow physical and operational control methods may cause an auditor to question program integrity and could even open the program to fraud.

O-2. The following controls are suggested to strengthen the integrity of the honor vault fee collection program:

a. Physical Controls: Physical controls can enhance the integrity and quality assurance of the honor vault method of fee collection. It is recommended that honor vaults feature a removable double locked container that would allow for only one designated fee collector to remove the full container and replace it with an empty one. Examples of physical controls include the following:

(1) Double Box System: The fee collector unlocks the honor vault and removes the double-locked fee collection box.

(2) Single Box System with Removable Vault: An alternative to the double box is a system where the entire safe is removable and essentially serves the same purpose as the inner double locked collecting box. The fee collector unlocks the safe from the mounting bracket and replaces it with an empty safe.

(3) Double Locking Honor Vaults: If a removable fee collection container is not provided, accountability can be strengthened by having two individually keyed locks so that two keys from two different persons are needed to open the vault.

(4) Dual Locking Containers: All of the above methods of physical control make use of dual locking containers.

b. Operational Controls.

(1) Dual Control: Having two persons present at all times when fee revenues are accessed is a basic quality assurance method.

(2) Rotating Duties: Dual control can be improved by ensuring that the same two employees are not routinely paired for fee collection activities.

(3) Separation of Duties: A single person should not have complete and individual control of funds and related paperwork from collection through deposit.

EP 1130-2-550

Change 3

15 Aug 02

(4) Fraud Reporting Requirements: Posted notices, written operating procedures, orientations, etc., should make it clear that it is the duty of employees to report matters of known, suspected, or alleged fraud to the appropriate authorities.

(5) Tracking Fee Payment Envelopes: Honor systems envelopes should be subsequently numbered so they can be used to verify payment of use fees.

(6) Supervisory Control: Supervisors should be knowledgeable of fee collection operations and should develop and provide written operating procedures.

c. Auditing Controls: ER 37-2-10 calls for "constant review and examination by internal audit staffs" and provisions for "policing the effectiveness of the prescribed procedures by those responsible for managing government resources," for verifying that envelopes and funds are turned in for deposit.



EP 1130-2-550  
15 Nov 96

DATA REQUIRED BY THE PRIVACY ACT OF 1974

DATA REQUIRED BY THE PRIVACY ACT OF 1974  
(5 U.S.C. 552a)

The Privacy Act of 1974 requires each individual asked or required to furnish personal information to be advised of the following:

Title of Form: Golden Age and Golden Access Passport Record

Authority: P.L. 92-347 (86 Stat. 459) and P.L. 93-303 (88 Stat. 192)

Principal Purpose(s): To provide corroboration of evidence of age or disability required for issuance of "Golden Age Passport" and "Golden Access Passport", and maintain information for auditing of program.

Routine Uses: Golden Age and Golden Access Passports are issued under the direction of the Department of the Interior which receives a yearly report of the total number issued. The name and address of those who obtain the Golden Age or Golden Access Passport is not reported, but maintained on file at the Corps of Engineers project office to provide a spot audit of the validity of Golden Age or Golden Access Passport issuance. This information is not maintained alphabetically or by other personal identifier. It is destroyed 30 days after the end of the calendar year.

Mandatory or Voluntary Disclosure and Effect on Individual Not Providing Information: VOLUNTARY. Failure to provide the requested information will preclude issuance of a Golden Age or Golden Access Passport.

ENG FORM 446BA-R, Jun 85

APPENDIX Q  
DIRECT TRANSMITTAL OF RECREATION USE FEES

Q-1. To implement this program the following procedures are required:

a. Issue fee books, and/or annual day use passes and/or Golden Age Passports with Receipt for Accountable Form. (DA Form 410) to contract or volunteer fee collectors. This is an important means of verification. Fee collectors are accountable for all ENG Form 4457, ENG Form 4839B permits, and Golden Age Passports issued to them. They must either return unused forms or remit monies and documentation for used forms.

b. Fee collectors will prepare all documentation presently required by the servicing F&A office. Fee collectors are responsible for directly mailing this to F&A with fee remittances. Project personnel are responsible for insuring that contract or volunteer fee collectors complete all documentation and remittance transmittals correctly and in a timely manner.

c. Fee collectors contracting under this procedure are responsible for all fee monies from the time they are collected to their receipt by the servicing F&A office. Fee remittances must be transmitted to the F&A office by money order or certified check. Contract or volunteer fee collectors making direct transmittals must be bonded for the maximum amount which may be collected before transmittal to the F&A office. The surety bond for volunteer fee collectors may be paid for by the government. It is the responsibility of the contract/volunteer fee collector to provide an adequate fidelity bond to the Operations Manager prior to beginning work. Note that the required bond is not a security or performance bond.

Q-2. When instituting this program, it is important to have close coordination between Operations Managers and Finance and Accounting personnel.

Q-3. In order to insure the security of collected fees, strict controls must be in place. Unannounced spot audits of each contractor/volunteer by project personnel must be performed and documented on a regular basis. It is essential that project personnel train fee collectors on the necessity of funds security. A complete reconciliation of all ENG Form 4457s and/or ENG Form 4839B's and/or Golden Age Passports issued and monies collected and either currently held or previously transmitted by the contractors/volunteers must be made by Operations Management personnel as often as necessary to insure full accountability. Fee collector contracts must specify that final payment will not be made to the contractor until all funds are reconciled.

Q-4. Fee collectors preparing a transmittal of recreation use fees from a NRRS™ park should refer to the Bill for Collections section of the current Operating Procedures Manual.



APPENDIX R  
MAINTAINING FUNDS SECURITY

R-1. Corps employees, volunteers, and contractors must be provided the following procedural guidance concerning accountability of Government funds:

a. Always be prepared for an audit. Fee collectors and cashiers are accountable for change funds, money collected from the sale of user permits and Golden Age Passports, and permit books and forms. Government change funds will not be provided to contractors or volunteers.

b. Never mix personal funds with government funds. Fees collected, permits books, and collections records must be available for accounting purposes at all times.

c. Use fee permit books must always be issued in sequence and permits sold in sequence.

d. Secure money and books in a permanently installed vault or safe provided by the government.

e. Projects should appoint on-site auditors to check procedures used in collecting, handling, and transmitting fees.

f. Each District must review the intrusion prevention system at money handling offices to determine the need for incorporating alarms or other security devices.

g. All Corps personnel, volunteers, and contractors responsible for collecting, transporting, transmitting, or accounting for fees or user fee permits must be provided a security awareness briefing prior to assignment of these responsibilities. The contractor's security awareness briefing will be provided as part of the pre-work meeting.

R-2. To further limit the amount of cash on hand, the use of credit cards and checks to pay recreation use fees should be encouraged. Name, address, telephone number, and driver's license number must be recorded on the check. Persons should not be asked to furnish Social Security Numbers for any reason. Coordination between Operations Management and Finance and Accounting personnel is necessary to streamline paperwork procedures for remitting checks.

## APPENDIX S

## OUTLINE OF MONITORING PLAN FOR OFF-ROAD VEHICLE AREAS

S-1. Executive Order 11644 requires that each agency monitor the effects of the use of off-road vehicles on lands under its jurisdiction. Data regarding the impact of off-road vehicles on soils, vegetation, water, air wildlife and other recreation activities is very limited. To provide for this recreation activity in harmony with other recreation activities and avoid despoilment of the resource base monitoring of the effects of ORV use will be accomplished as effectively as possible.

S-2. The following outline encompasses significant features which should be monitored in ORV areas within the capability of the District Engineer. It is recognized that a scientific evaluation of the impact or ORV's would encompass a great deal more data collection and analysis. The following encompasses a rather limited approach to guide the District Engineer within his budgetary constraints and manpower ceilings.

S-3. Outline.

- a. Estimate of use of area or trail by both ORV users and non-users.
- b. Impact of ORV use on vegetation, soil and water.
  - (1) Map existing trails in designated ORV area.
  - (2) Record mileage and average width of existing trails.
  - (3) Rate existing trails according to light, medium or heavy use.
  - (4) Select random sample plots on existing trails covering a variety of terrain, vegative and soil conditions.
    - (a) Photograph sample plots.
    - (b) Record width of trail and depth of ruts at selected intervals.
    - (c) Record inventory of vegetative community within the sample plot. Inventory should include species composition and size of woody vegetation.
    - (d) Record general condition of vegetation in sample plot.
    - (5) Record, at intervals of 0, 1, 3, and 5 years, those items included in (4) above.
    - (6) Define control plots near test plots to determine impact with and without ORV use.
    - (7) All control plots and test plots should be permanently but inconspicuously marked so that photographs and data collection can be accomplished on the same area in subsequent years.
    - (8) The following can be determined from test sections:

EP 1130-2-550  
15 Nov 96

- (a) Impact on young vegetative growth.
  - (b) Impact on larger trees and shrubs (compaction, direct damage, root exposure).
  - (c) Impact on soil (erosion, compaction, lateral movement).
  - (d) Trail width variation from year to year.
  - (e) Extent of impact on either side of trail.
  - (f) Comparison of impact of ORV use on test plots with no ORV use on control plots.
  - (g) Annual spot checks of vulnerable areas such as steep slopes, creek banks and lake shoreline, should be conducted.
- c. Impact of ORV use on wildlife.
- (1) Track counts of big game animals such as deer, antelope and elk in ORV area compared to those outside ORV area.
  - (2) Count of songs of game birds and non-game birds.
  - (3) If hunting is permitted, compare wildlife harvest in ORV area to that of other areas in the project.
  - (4) Record sightings of game and non-game species.
- d. Impact of ORV use on other recreation activities.
- (1) Survey type and amount of recreation use on areas adjacent to designated ORV areas.
  - (2) Record attitudinal response of visitors who are surveyed as nearly as possible.
  - (3) Record distance between area where survey is made and the ORV area.

EP 1130-2-550

Change 3

15 Aug 02

**APPENDIX T  
USE FEE REFUND REQUEST  
(EP 1130-2-550)**

Part 1 *(TO BE COMPLETED BY APPLICANT)*

Request a Use Fee Refund in the amount of \$ \_\_\_\_\_ to:

Name \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Reason for request: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
*(Date)*

\_\_\_\_\_  
*(Signature of Applicant)*

***Original User's Copy of Permit Must be Attached to this Request***

Part 2 *(TO BE COMPLETED BY CORPS OF ENGINEERS REPRESENTATIVE)*

The above fee relates to F&A Work Item # \_\_\_\_\_, Park Work Item # \_\_\_\_\_,  
and was transmitted on CEFMS Collection Voucher # \_\_\_\_\_ dated \_\_\_\_\_.

Corps of Engineers Point of Contact is \_\_\_\_\_

\_\_\_\_\_

Phone: \_\_\_\_\_

Approved by:

\_\_\_\_\_  
*(Signature of Operations Manager or Representative)*

\_\_\_\_\_  
*(Date)*

EP 1130-2-550

Change 3

15 Aug 02

APPENDIX U  
FREE-NIGHT CAMPING COUPON

 <b>US Army Corps of Engineers</b> ®	<b>FREE-NIGHT CAMPING COUPON</b>	00012345
		Expiration Date <u>12/31/02</u>

This Camping Coupon allows the bearer one night of free camping at:

Pomona Project/Lake  
Smith's Park

Issued to Merle Wilson

Reason for issuance 10th Lake Anniversary  
Celebration

Operations Manager's signature Charles Miller

Date Issued 5/20/02 Date Used 8/22/02

Figure U-1 Sample: Free-Night Camping Coupon

EP 1130-2-550

Change 5

30 Jan13

## APPENDIX V

Master Plan Compliance With National Environmental Policy Act (NEPA) and EC 1165-2-209

V-1. Compliance With NEPA. Master Plans must be compliant with NEPA. Listed below are examples of how NEPA compliance is achieved within various MP actions. The intent of the EC 1165-2-209 requirements are already satisfied through existing MP review/approval requirements. These requirements include in-house independent QA/QC and independent public and agency review. However, in those rare cases when the NEPA document for a MP is an EIS then the additional EC 1165-2-209 Agency Technical Review (ATR) and Independent External Peer Review (IEPR) are necessary. Consideration should be given to synchronizing the preparation and review of the MP and associated NEPA documents.

V-2. Existing Master Plans Predating NEPA. Certain actions described in a MP that predate NEPA (1969) and/or are not addressed in an O&M NEPA document will require NEPA documentation unless they clearly qualify for a Categorical Exclusion (ER 200-2-2 Para 9). Examples of actions that qualify for categorical exclusions include, but are not limited to: routine operation and maintenance actions, general administration, equipment purchases, custodial actions, erosion control, painting, repair, rehabilitation, replacement or minor expansion of existing structures and facilities such as buildings, roads, levees, groins and utilities, and installation of new buildings utilities, or roadways in developed areas.

V-3. Existing Master Plans Postdating NEPA. According to ER 200-2-2 Para 9, routine O&M actions are categorically excluded from NEPA documentation. Examples of actions that qualify for categorical exclusions include, but are not limited to: routine operation and maintenance actions, general administration, equipment purchases, custodial actions, erosion control, painting, repair, rehabilitation, replacement or minor expansion of existing structures and facilities such as buildings, roads, levees, groins and utilities, and installation of new buildings utilities, or roadways in developed areas.

a. For all other proposals not included in the above paragraph, but already addressed in an existing MP, further NEPA documentation is not required as long as both of the following conditions are met:

- (1) The proposal is compliant with all current/ future national performance measures.
- (2) The proposal is already adequately addressed in an existing finalized NEPA document.

b. For proposals that are not addressed in an existing MP, a MP supplement may be required as described in the paragraphs below.

EP 1130-2-550

Change 5

30 Jan 13

V-4. Master Plan Supplements.

a. If supplementing a master plan solely to administratively update information (e.g., vegetation, cultural, resources) with no change in management actions, new facilities, land classifications, etc., the activity is categorically excluded from additional NEPA compliance (identified in para. G-1 above) and the EC 1165-2-209 requirements do not apply.

b. If a MP supplement is needed to incorporate proposed recreation facilities not addressed in the Categorical Exclusions (identified in para. V-2), change in land use classifications, or change of resource objectives, then the action is not categorically excluded and an individual NEPA compliance document (either Environmental Assessment (EA) and/or an Environmental Impact Statement (EIS)) will be required. Development of the NEPA compliance document by an interdisciplinary team, completion of the master planning QA/QC check list, review of the master plan supplement and associated NEPA document by other peer agencies, and appropriate level District review for the ultimate approval by District Commander fulfills the EC 1165-2-209 district quality control (DQC) requirements.

V-5. Master Plan Revisions. If a complete revision of the existing master plan is required then the NEPA categorical exclusion referenced in V-2. above does not apply. In most cases an EA is sufficient for NEPA compliance. Only under extreme circumstances will the development of an Environmental Impact Statement (EIS) be needed. Development of the NEPA compliance document by an interdisciplinary team, completion of the master planning QA/QC check list, review of the master plan and associated NEPA document by other peer agencies, and appropriate level internal or external District review for the ultimate approval by District Commander fulfills the EC 1165-2-209 district quality control (DQC) requirements.

SAM AR000639-SAM AR000649



CECW-ON

10 May 1996

MEMORANDUM FOR COMMANDERS, MAJOR SUBORDINATE COMMANDS

SUBJECT: Recreation Policy Letter 96-01 -- Visitor/Ranger Safety

1. This memorandum provides policy on a number of issues regarding the U.S. Army Corps of Engineers Visitor Assistance Program as it pertains to visitor and ranger safety. These policies are a result of a comprehensive program review conducted by the Visitor/Ranger Safety Review Task Force in 1995. The task force submitted their report of 54 program recommendations in September 1995.

2. The enclosed policy changes are in response to 26 of these recommendations and are effective immediately. These changes will be incorporated into the next update of the appropriate regulations and pamphlets.

3. Decisions in response to the remaining 28 recommendations will follow the receipt of reports from task forces conducting in depth review and analysis of those issues.

Encl

/s/  
STANLEY G. GENEVA  
Major General, USA  
Director of Civil Works

Visitor Assistance Program Policy Changes

ER 1130-2-400, Paragraph 4 (Project Mission) and Paragraph 5 (Program Objectives) are revised as follows:

4. Mission Statement. The mission of the Natural Resources Management Program is:

"The Army Corps of Engineers is the steward of the lands and waters at Corps water resources projects. Its Natural Resources Management Mission is to manage and conserve those natural resources, consistent with ecosystem management principles, while providing quality public outdoor recreation experiences to serve the needs of present and future generations.

In all aspects of natural and cultural resources management, the Corps promotes awareness of environmental values and adheres to sound environmental stewardship, protection, compliance and restoration practices.

The Corps manages for long-term public access to, and use of, the natural resources in cooperation with other Federal, State, and local agencies as well as the private sector.

The Corps integrates the management of diverse natural reso

5. Program Objectives.

a. The objectives of the Natural Resources Management Program are:

(1) To provide a quality outdoor recreation experience which includes an accessible, safe and healthful environment for a diverse population;

Enclosure 1

Visitor Assistance Program Policy Changes  
Continued

(2) To increase the level of self sufficiency for the Corps recreation program;

(3) To provide outdoor recreation opportunities on Corps of Engineers administered land and water on a sustained basis; and,

(4) To optimize the use of leveraged resources to maintain and provide quality public experiences at Corps water resources projects.

b. To accomplish the program objectives, the Corps manages land and water resources in cooperation with other Federal, State and local agencies, quasi-public organizations and the private sector supplemented by volunteers, contributions and challenge cost sharing programs.

**ER 1130-2-400, Paragraph 12 a. (2) (Outdoor Recreation) is revised as follows:**

(2) Reduce or eliminate public use conflicts by incorporating the management practices identified in Appendix E (Alternative Management Techniques) of ER 1130-2-420 or by applying other measures allowable under authority and policy. Project managers should conduct carrying capacity studies using the Natural Resources Research Program guidance contained in the publication Recreation Carrying Capacity Handbook, Methods and Techniques for Planning Design and Management.

**ER 1130-2-400, Paragraph 12 a. (3) (Outdoor Recreation) is revised as follows:**

(3) Establish a project wide cost effective program to rehabilitate recreational facilities whenever feasible to increase visitor safety and satisfaction while reducing O&M costs. O&M budget Feature Cost Codes 606.1 and 606.3 allow for justified levels of public health and safety at the least cost and Codes 629.1 and 629.9 allow for the insurance of public safety.

**Visitor Assistance Program Policy Changes**  
**Continued**

**ER 1130-2-400, Paragraph 12 (Outdoor Recreation) is revised to include the following additional paragraph:**

d. Night Closures of Day Use Areas. Unattended day-use areas will be closed at night if such a restriction on public access is considered necessary by the manager in order to provide adequate visitor safety and resource protection. Prior to any such closure, consideration will be given to alternatives that accommodate the continued authorized use of the facilities while providing the necessary levels of safety and protection. Users

of those facilities will be fully informed concerning the details of any closure, and wherever appropriate, will be provided opportunities to provide input into such decisions.

**ER 1130-2-400, Paragraph 18 (Sale or Storage of Alcoholic Beverages) is revised to include the following additional paragraph:**

**18. Sale, Storage or Restrictions of Alcoholic Beverages.**  
(new title)

c. District Commanders have the authorization under 36 CFR Chapter III, Part 327.13 (Title 36) to prohibit the possession or use of alcohol at selected areas and projects within their jurisdiction. To determine the need for such restrictions, periodic joint natural resource management and security assessments will be conducted at all water resources development projects, with an annual visitation of 20,000 visitor hours or more, regarding the need to ban alcohol consumption/ possession on project-administered lands and waters. Commanders will insure that initial assessments are completed by 30 May 1997. Additional assessments will be conducted as appropriate.

Visitor Assistance Program Policy Changes  
Continued

ER 1130-2-404, is revised to include the following additional paragraph:

17. Security Measures.

a. Managers will comply with Army regulations governing the security and storage of funds, particularly AR 37-103, Disbursing Operations for Finance and Accounting Offices.

b. As a minimum, managers will consider the following options to enhance the security of personnel handling funds as well as safeguarding the funds themselves:

(1) Collect and deposit funds frequently to reduce the amount stored on-hand.

(2) Vary the times of collection and deposit to avoid developing patterns and becoming a target.

(3) Vary the routes to and from collection and deposit, if possible, to avoid patterns.

(4) Maximize the use of credit cards to reduce the cash stored on hand.

(5) Contract for private security to collect and deposit funds.

(6) Include collection and deposit of funds in cooperative law enforcement agreements.

(7) Ensure personnel collecting and storing funds work in pairs and have reliable communication equipment (radios or cellular phones) available at all times.

c. District security managers will assist operations project managers in assessing the criminal threat to their operation and recommending protective measures.

d. District security managers will review the security of personnel and funds during biennial physical security inspections.

Visitor Assistance Program Policy Changes  
Continued

ER 1130-2-418, Paragraph 5 (Policy) is revised to include the following additional paragraph:

f. In addition to the enforcement of state or local laws, cooperative agreements for law enforcement services may be used

for other related activities such as, but not restricted to, patrols in remote areas, serving bench warrants, fee collection and other services, as determined by the project manager. The activities included in an agreement are dependent on what can be negotiated with the law enforcement agency. In no case will agreements include the provision of water safety patrols or the enforcement of state boating laws.

**ER 1130-2-420, Paragraph 5 (Policy) is revised as follows:**

5. Policy. It is the policy of the Corps of Engineers to provide safe and healthful recreation opportunities while protecting and enhancing project resources. The protection of facilities or the enforcement of rules will always be secondary to the safety of Corps personnel, contract employees, and visitors. Managers and rangers will strive to be visible to the public, primarily to help and assist them, and secondarily, to enforce 36 CFR Chapter III, Part 327 (Title 36).

(Note: Paragraphs 5 a. and 5 b. remain unchanged)

c. The role of the ranger is defined as a Regulation Enforcer with full citation authority of 36 CFR Chapter III, Part 327. Available use of force options includes visual presence, verbal persuasion/detention and unarmed self defense. The authority of managers and park rangers is limited to the enforcement of rules and regulations as designated in Title 36 and does not extend to arrest authority or the enforcement of state and local laws, including game laws. This authority is applicable to:

(1) All water areas of any water resource development project administered by the Chief of Engineers, without regard to ownership of underlying land;

**Visitor Assistance Program Policy Changes**  
**Continued**

(2) All lands owned in fee by the Federal Government; and,

(3) All facilities of any such water resources development project.

**ER 1130-2-420, Paragraphs 11 b,c,d (Vehicles and Vessels), are revised as follows:**

b. Manager and ranger vehicles and vessels may be equipped with a fixed spot light on the operator's side. Vehicles may be equipped with a single removable warning light which is acceptable to the states in terms of color and placement. Lights mounted behind the grill, which are inconspicuous to the public

when not in use, are authorized. Fixed roof or external grill-mounted warning lights are not authorized. The purpose of this equipment is for visitor assistance and not the enforcement of state/local laws. District offices will periodically review the use of these lights to ensure compliance with this paragraph.

c. Managers may equip vehicles and vessels with a public address system and warning siren. The equipment will not be visible to the public and will be used with discretion in emergency situations. Exceptions may be made for vessels depending upon the size and design of the hull.

d. All manager and ranger vehicles will be equipped, at a minimum, with first aid kits, fire extinguishers, blood-borne pathogen handling kits, rescue throw bags, binoculars, camera and flash light. All vessels will be furnished with the same equipment except that they will have US Coast Guard and state-required safety equipment, marine-use fire extinguishers and/or pumps. Districts and projects may provide additional equipment for manager and ranger vehicles and vessels as required.



**Visitor Assistance Program Policy Changes**  
**Continued**

**ER 1130-2-420, Paragraph 12 (Communications), is revised as follows:**

12. Communications.

a. Managers will provide reliable communication equipment in support of natural resources management activities. Authorized communication equipment may include cellular phones and multiple frequency programmable scanning radios (fixed and hand held) with local/state law enforcement interface, state wildlife/boating officer interface, appropriate rescue/fire interface, weather channels, and separate frequencies for overlapping projects. Corps base stations may be located off project lands and local law enforcement agency base stations may be placed on Corps property, as necessary, to obtain reliable communications.

b. Managers will determine the most reliable communication system for their project. However, if radios are selected over cellular phones, project managers will ensure that a base station is staffed continuously while personnel are on duty in the field. If continuous staffing is impossible, cellular phones should be provided.

c. Park attendants will be provided with either telephone or radio communication system to enhance their safety as well as that of visitors. When warranted, park attendants may be issued portable radios.

d. The installation of public telephones at entrance stations, beaches, and other public use areas is encouraged to enhance visitor safety. Where feasible, telephones should permit the caller to contact the operator without depositing coins. A listing of appropriate emergency telephone numbers such as fire, medical, police, rescue, and Corps officials should be placed in recreation areas near the location of public telephones.

e. District commanders will ensure that surveys are conducted periodically to confirm that reliable communication equipment is available to personnel, is located in vehicles and vessels, and is in serviceable condition.

**Visitor Assistance Program Policy Changes**  
**Continued**

**ER 1130-2-420, Paragraph 13e (Other Training), is revised as follows:**

e. Other Training.

(1) All personnel performing visitor assistance duties must

receive a minimum of 24 hours of personal protection/unarmed self defense, situation evaluation and tactical communication training within two years of employment. This training can be obtained through HQUSACE-sponsored courses (where available) or locally-sponsored courses. Local courses must strictly adhere to Corps authority and policy and must be approved by HQUSACE prior to implementation. Instructors must be fully knowledgeable and supportive of the philosophy, objectives and authority limitations of the visitor assistance program.

(2) Managers and supervisors will assure that individuals who perform Visitor Assistance duties are provided first aid, cardiopulmonary resuscitation, blood-borne pathogen and other appropriate health training, and offered preventive inoculations in order that they be qualified to perform immediate, on-site emergency medical treatment to injured personnel and visitors. Employees shall receive the equivalent of Red Cross Advance First Aid and Emergency Care course. Increased first aid training up to Emergency Medical Technician Basic (EMT Basic) is authorized for a minimum number of selected permanent staff members at the discretion of the manager. Refresher medical training may be required to maintain certification.

(3) Obtaining preventive inoculations for blood-borne pathogens is a condition of employment for park rangers and other personnel with visitor assistance responsibilities who are hired on or after the effective date of this policy.

(4) To complement visitor assistance training, manager and permanent ranger personnel shall receive, at the district or project level, training on defensive driving, cultural resource protection, historic property protection, water safety, and boat licensing and operation. Where necessary, training in a second language other than English is highly recommended.

**Visitor Assistance Program Policy Changes**  
**Continued**

**ER 1130-2-420, Paragraph 13 (Training) is revised to include the following additional paragraph:**

g. All Natural Resource Management program staff shall receive training in accordance with this paragraph and EP 690-2-2, Career Development Guide for Civil Works Natural Resources Management Team Members. Project managers are responsible for ensuring that permanent, seasonal and temporary rangers with visitor assistance responsibilities receive the prescribed training. Temporary employees who perform visitor assistance duties and enforce Title 36 will receive the same visitor assistance training provided to permanent and seasonal rangers with similar duties.

CECW-ON  
SUBJECT: RECREATION POLICY LETTER 96-01 -- VISITOR/RANGER  
SAFETY

WAHUS/761-1790  
FILE: POLICY3.WPD  
T: 22 APR 96

LEWIS  
CECW-ON

TRENT  
CESO

FLEMING  
CEPM

KROMBINE  
CECC-K

BURNS  
CECW-O

GRAF  
CECW-ZC

D'ANIELLO  
CECW-AB

SAM AR000650-SAM AR000661

3055

EN-YR

CESAD-EN-HW (CESAM-EN-YR/10 Sep 93) (1110-2-1150a) 1st End  
Mr. Edmond/lhk/331-6734/DOC:W-CONTRO.004  
SUBJECT: -Revision - Allatoona Control Manual

Commander, South Atlantic Division, U.S. Army Corps of Engineers,  
Room 313, 77 Forsyth Street, SW., Atlanta, Georgia 30335-6801  
15 December 1993

FOR COMMANDER, MOBILE DISTRICT, ATTN: CESAM-EN-YR

1. Reference:

a. CECW-EH-W memorandum, 19 April 1991, subject: Interim Guidance for Implementing Section 310.(b), Water Resources Development Act of 1990 (WRDA 90).

b. CECW-EH-W 1st endorsement, 19 November 1993 to basic memorandum, 26 October 1993, subject: Allatoona Reservoir Water Control Manual, copy enclosed.

2. The District's actions to comply with requirements of WRDA 90 have been approved by HQUSACE.

3. The report has been reviewed by this office and is approved on an interim basis.

4. In accordance with CECW-EH-W comments, a final manual/plan should be completed upon completion of the ACF/ACT Comprehensive Study.

5. The point-of-contact for this action is Mr. Kaiser Edmond, (404) 331-6734.

FOR THE COMMANDER:

*Pat Davis*

C. PAT DAVIS, P.E.  
Acting Director of Engineering

- 2 Encls
- 1. wd
- Added 1 Encl
- 2. as

NK- 12/17/93

Return to CAROLYN  
FOR FILING. GO  
AHEAD WITH REPRODUCING  
MANUAL.

90

SAM AR000650



**DEPARTMENT OF THE ARMY**  
MOBILE DISTRICT, CORPS OF ENGINEERS  
P.O. BOX 2288  
MOBILE, ALABAMA 36628-0001

REPLY TO  
ATTENTION OF:

CESAM-EN-YR

10 Sept 93

MEMORANDUM FOR Commander: South Atlantic Division,  
ATTN: CESAD-EN-HW

SUBJECT: Revision - Allatoona Water Control Manual

1. Based upon consultations with representatives of South Atlantic Division and the Southeastern Power Administration, we have made further modifications to the draft revision of the Allatoona Water Control Manual. This manual has been previously submitted to South Atlantic Division for approval on 4 Nov 92 and informally modified on 30 Jul 93. This final revision modifies the guidelines for operation of the conservation storage in Allatoona reservoir in paragraph 4-08 and shown on Chart 1-11.

2. Under the provisions of the Memorandum of Agreement (MOA) signed by the Governors of the States of Alabama, Florida, and Georgia and the Assistant Secretary of the Army (Civil Works) on 3 January 1992, the Corps agreed to operate its reservoirs on the Apalachicola-Chattahoochee-Flint (ACF) and Alabama-Coosa-Tallapoosa (ACT) Basins "...to maximize the water resource benefits to the basins as a whole." The water control plan described in this manual is consistent with the MOA. It is recognized that the ACF/ACT Comprehensive Study, which is being conducted in partnership with the States of Alabama, Florida, and Georgia, may propose modifications to the water control plan which, if accepted, would require modification of the plan. The study is scheduled for completion in September 1995.

3. Five copies of the revised manual are submitted herewith for your timely consideration. Upon approval copies will be furnished to the states.

FOR THE COMMANDER:

Encls

HAL SMITH, P.E.  
Chief, Engineering Division

SAM AR000651

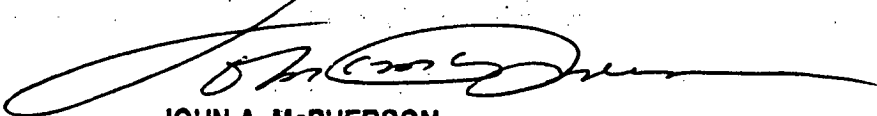
D-00010026.0002

CECW-EH-W (CESAD-EN-HW/26 Oct 93) 1st End  
SULLIVAN/ib/202-272-8509  
SUBJECT: Allatoona Reservoir Water Control Manual

HQUSACE, Washington, DC 20314-1000 19 November 1993

FOR CDR, South Atlantic Division, ATTN: CESAD-EN-HW

The subject manual and the MFR for the public meeting have been reviewed. Based on this review the public involvement required by WRDA 90 has been met. The implementing of the draft manual should be accomplished using normal procedures considering the following comments: The subject manual should be adopted only on an interim basis. The manual should not be finalized until the ACF/ACT Comprehensive Study is completed and the results of that study can be used in the development of the water control plan.



wd encl  
JOHN A. McPHERSON  
Acting Chief  
Engineering Division  
Directorate of Civil Works

PAUL D. BARBER, P.E.  
Chief, Engineering Division  
Directorate of Civil Works





DEPARTMENT OF THE ARMY

SOUTH ATLANTIC DIVISION, CORPS OF ENGINEERS

ROOM 313, 77 FORSYTH ST. S.W.

ATLANTA, GEORGIA 30335-8801

REPLY TO  
ATTENTION OF

CESAD-EN-HW (1110-2-1150a)

26 October 1993

MEMORANDUM FOR CDR, USACE, ATTN: CECW-EH-W, WASH DC 20314-1000

SUBJECT: Allatoona Reservoir Water Control Manual

1. Enclosed is a revised draft Water Control Manual for Allatoona Dam and Lake.
2. A copy of the Mobile District Memorandum for Record (MFR) for the public meeting held in Marietta, Georgia for the Allatoona Reservoir Water Control Plan was forwarded to you on 3 December 1992 with the original draft manual.
3. The revised plan has been coordinated with the Southeastern Power Administration to ensure comments obtained during consultations with the agency had been adequately addressed.
4. It is recognized that the ACE/ACT Comprehensive Study, which is being conducted in partnership with the states of Alabama, Florida, and Georgia, may propose modifications to the water control plan which could require modification of the plan.
5. This study is scheduled for completion in September 1995 and a revised manual in accordance with the format prescribed in EC 1110-2-278 will be provided NLT this date.
6. Please contact Mr. Kaiser Edmond, CESAD-EN-HW, (404) 331-6734 should you have any questions.

FOR THE COMMANDER:

Encls

*Pat Davis*  
C. PAT DAVIS, P.E.  
Acting Director of Engineering



SAMEN-YR

Mr. Karr/cr/690-3382/20 Jan 93

MEMORANDUM TO: See Distribution

SUBJECT: Allatoona Reservoir Manual Distribution

1. This updated manual is being sent out to the various interested parties. Each manual is loose bound and numbered so that any updated corrected pages can be distributed and inserted in the manual as necessary. The Allatoona Water Control Manual had not been updated since 1968 and now includes current data and water control guidelines. The Allatoona Manual is expected to be updated when ACF Comprehensive Study of the water uses in the states is completed in the future.

2. Those outside Mobile District to whom copies have been sent are listed on the attached sheet. Any additional copies of this manual can be requested from Mr. Norman Karr at 205-690-3382.

Encls

EDMUND B. BURKETT  
Chief, Water Management Section

Copies to:

EN

→ EN-Y

EN-YY

EN-YD

EM

OP

OP-H

PD-E

FO-AL

FO-CA

SAM AR000654

D-00010026.0005

#	Name & Address (If Mailed)
1-9	Ed Burkett EN-YR
10-13	Mr. Robert Watson U.S. Army Division, South Atlanta 313 Russell Federal Annex 77 Forsythe Street S.W. Atlanta, GA 30335-6801
14-15	Mr. Jim B. Lloyd Director of Power Operations Southeastern Power Administration, Samuel Elbert Bldg. Elberton, GA 30635
16	Hal Smith EN
17	Howard Whittington EN-Y
18	Gene Russell EN-YY
19	Jack Ward EN-YD
20	Wyne Fuller EM
21	Gerald Purvis OP
22	Charles Snow OP-H
23	Hugh McClellan PD-E
24-25	Mr. David G. Grabensteder ALLATOONA LAKE CESAM-FO-AL U.S. Army, Corps of Engineers, P.O. Box 487 Cartersville, GA 30120-0487
26-28	Mr. Ron Stringfellow ALLATOONA-BUFORD-CARTERS CESAM-FO-CA U.S. Army, Corps of Engineers, Route 3, Box 3358 Chatsworth, GA 30705-9312
29	Mr. Walter Stevenson State Office of Water Resources P.O. Box 5690 Montgomery, AL 36103-5690
30	Mr. Harold Reheis Environmental Protection Division State of Georgia East Tower Sloppy Floyd Bldg. 205 Butler Street SE Atlanta, GA 30334
75	David Miller APC
76	Charles Stover APC

18 January 1994

Mr. Walter Stevenson  
State Office of Water Resources  
P.O. Box 5690  
Montgomery, AL 36103-5690

Dear Sir:

This updated Allatoona Reservoir Water Control Manual is being sent out to the various interested parties. Each manual is loose bound and numbered so that any updated corrected pages can be distributed and inserted in the manual as necessary. The Allatoona Water Control Manual had not been updated since 1968 and now includes current data and water control guidelines. The Allatoona Manual is expected to be updated when ACF Comprehensive Study of the water uses in the states is completed in the future.

Any additional copies of this manual can be requested from Mr. Norman Karr at 205-690-3382.

EDMUND B. BURKETT  
Chief, Water Management Section

*Sent # 29 1/18/94*

*Sent # 36, 37, 39 & 40 1/31/94*

SAM AR000656

D-00010026.0007

18 January 1994

**Mr. Robert Goss  
Southern Power Administration  
Samuel Elbert Bldg.  
Elberton, GA 30635**

Dear Sir:

This updated Allatoona Reservoir Water Control Manual is being sent out to the various interested parties. Each manual is loose bound and numbered so that any updated corrected pages can be distributed and inserted in the manual as necessary. The Allatoona Water Control Manual had not been updated since 1968 and now includes current data and water control guidelines. The Allatoona Manual is expected to be updated when ACF Comprehensive Study of the water uses in the states is completed in the future.

Any additional copies of this manual can be requested from Mr. Norman Karr at 205-690-3382.

**EDMUND B. BURKETT**  
Chief, Water Management Section

SAM AR000657

D-00010026.0008

18 January 1994

**Mr. Harold Reheis**  
**Environmental Protection Division State of Georgia**  
**East Tower Sloppy Floyd Bldg.**  
**205 Butler Street SE**  
**Atlanta, GA 30334**

Dear Sir:

This updated Allatoona Reservoir Water Control Manual is being sent out to the various interested parties. Each manual is loose bound and numbered so that any updated corrected pages can be distributed and inserted in the manual as necessary. The Allatoona Water Control Manual had not been updated since 1968 and now includes current data and water control guidelines. The Allatoona Manual is expected to be updated when ACF Comprehensive Study of the water uses in the states is completed in the future.

Any additional copies of this manual can be requested from Mr. Norman Karr at 205-690-3382.

**EDMUND B. BURKETT**  
Chief, Water Management Section

CESAM-EN-YR

Mr. Karr/cr/690-3382/20 January 1994

MEMORANDUM FOR FO-AL (David Grabensteder)

SUBJECT: Allatoona Reservoir Water Control Manual

1. This updated Allatoona Reservoir Water Control Manual is being sent out to the various interested parties. Each manual is loose bound and numbered so that any updated corrected pages can be distributed and inserted in the manual as necessary. The Allatoona Water Control Manual had not been updated since 1968 and now includes current data and water control guidelines. The Allatoona Manual is expected to be updated when ACF Comprehensive Study of the water uses in the states is completed in the future.

2. Any additional copies of this manual can be requested from Mr. Norman Karr at 205-690-3382.

Encl

EDMUND B. BURKETT  
Chief, Water Management Section

SAM AR000659

D-00010026.0010

CESAM-EN-YR

Mr. Karr/cr/690-3382/20 January 1994

MEMORANDUM FOR FO-CA (Ron Stringfellow)

SUBJECT: Allatoona Reservoir Water Control Manual

1. This updated Allatoona Reservoir Water Control Manual is being sent out to the various interested parties. Each manual is loose bound and numbered so that any updated corrected pages can be distributed and inserted in the manual as necessary. The Allatoona Water Control Manual had not been updated since 1968 and now includes current data and water control guidelines. The Allatoona Manual is expected to be updated when ACF Comprehensive Study of the water uses in the states is completed in the future.
2. Any additional copies of this manual can be requested from Mr. Norman Karr at 205-690-3382.

Encl

EDMUND B. BURKETT  
Chief, Water Management Section

Mr. Billy V. Baker  
Water Department  
Rome, Ga

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Oakman, GA 30732-0096

Mr. Robert Goss  
Southern Power Administration  
Samuel Elbert Bldg.  
Elberton, GA 30635

Mr. David G. Grabensteder  
ALLATOONA LAKE CESAM-FO-AL  
U.S. Army, Corps of Engineers  
P.O. Box 487  
Cartersville, GA 30120-0487

Mr. Gene Holcomb  
Water Department  
Cartersville, Ga

Mr. Phillip Karr  
Cobb County-Marietta Water Authority  
1660 Barnes Mill Road  
Marietta, Ga 30062

Mr. Walter Stevenson  
State of Alabama Office of Water Resources  
P.O. Box 5690  
Montgomery, AL 36103-5690

Mr. Robert Watson

Mr. Charles E. Weassel  
ALLATOONA-BUFORD-CARTERS CESAM-FO-CA  
U.S. Army, Corps of Engineers  
Route 3, Box 3358  
Chatsworth, GA 30705-9312



SAM AR000662-SAM AR000777



**US Army Corps  
of Engineers**  
Mobile District

---

# **ALABAMA-COOSA RIVER BASIN**

## **WATER CONTROL MANUAL**

### **APPENDIX A**

**ALLATOONA RESERVOIR**

**ETOWAH RIVER, GEORGIA**

**MARCH 1952  
REVISED DECEMBER 1993**

**ALABAMA-COOSA RIVER BASIN**

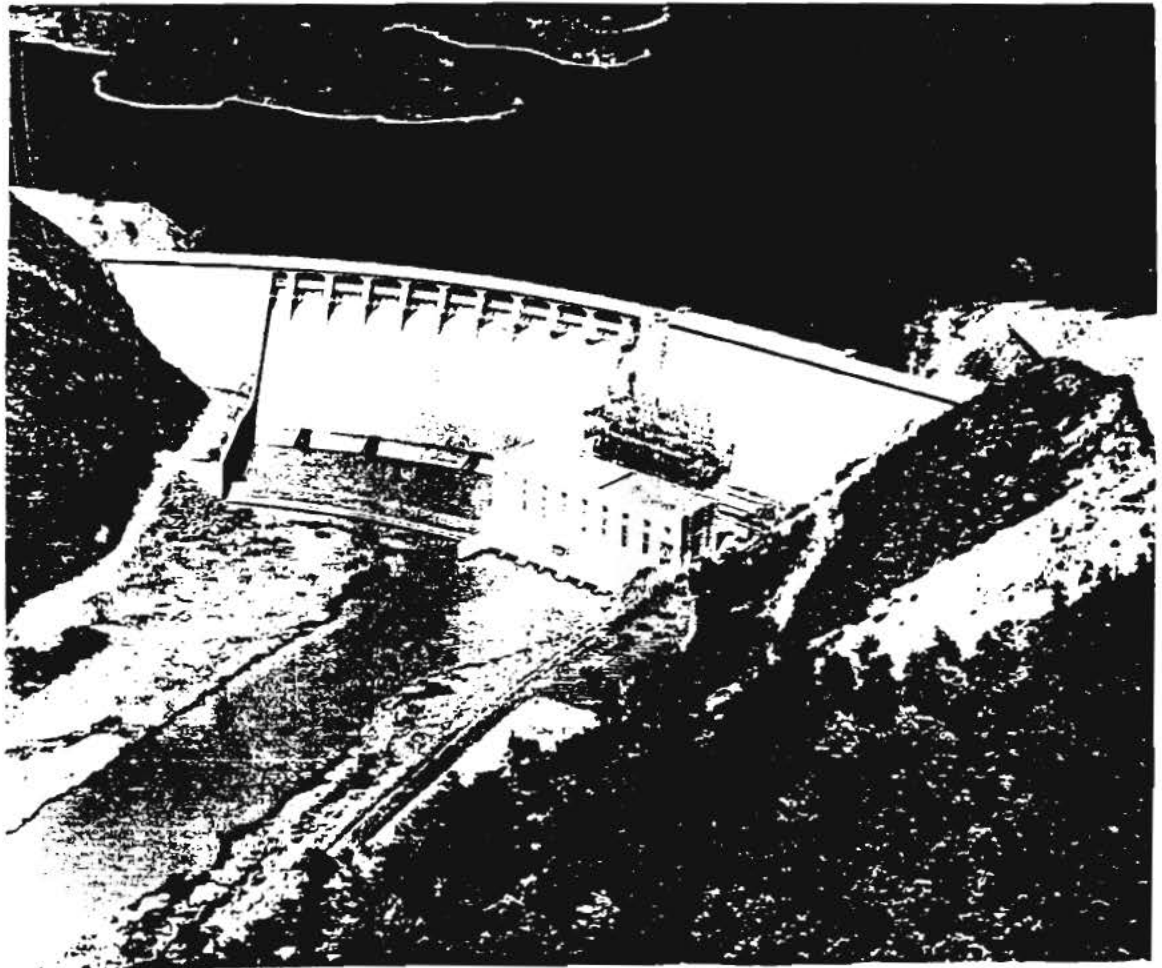
**WATER CONTROL MANUAL**

**APPENDIX A**

**ALLATOONA RESERVOIR**

**ETOWAH RIVER, GEORGIA**

MARCH 1952  
REVISED DECMEBER 1993



ALLATOONA DAM

**NOTICE TO USERS OF THIS MANUAL**

Regulations specify that this Water Control Manual be published looseleaf form, and only those sections, or parts thereof, requiring changes will be revised and printed. Therefore, this copy should be preserved in good condition so that inserts can be made to keep the manual current.

**EMERGENCY REGULATION ASSISTANCE PROCEDURES**

In the event that unusual conditions arise during duty hours, contact can be made by telephone to the Water Management Section, District Office (205-690-2737). During non-duty hours water management personnel may be reached via the powerhouse operating personnel who can be reached by telephoning 706-334-2906.

ALABAMA-COOSA RIVER BASIN  
WATER CONTROL MANUAL

APPENDIX A

ETOWAH RIVER, GEORGIA

	Page
TITLE PAGE	i
PHOTOGRAPH	ii
NOTICE TO USERS OF MANUAL	iii
PERTINENT DATA	A-1

TABLE OF CONTENTS

Paragraph	Title	Page
CHAPTER I INTRODUCTION		
WATER CONTROL MANUAL		
1-01	Authorization	A1-1
1-02	Purpose and scope	A1-1
1-03	Related manuals	A1-1
1-04	Operating and regulation agencies	A1-1
DESCRIPTION OF PROJECT		
1-06	Location	A1-2
1-07	Purpose	A1-2
1-08	General features	A1-2
1-09	Dam	A1-2
1-10	Earth dikes	A1-2
1-11	Reservoir	A1-3
1-12	Spillway	A1-3
1-13	Sluices	A1-3
1-14	Powerhouse and penstocks	A1-3
1-15	Switchyard and transformer substation	A1-4
1-16	Acworth subimpoundment	A1-4
1-17	Recreational development	A1-4
1-19	Real estate acquisition	A1-5



## TABLE OF CONTENTS (Cont'd)

Paragraph	Title	Page
CHAPTER I INTRODUCTION (Cont'd)		
HISTORY OF PROJECT		
1-20	Authorization	A1-5
1-23	Design	A1-5
1-24	Construction	A1-6
1-25	Storage allocation	A1-6
1-29	Current Purposes Authorizations	A1-7
CHAPTER II HYDROMETEOROLOGY		
DESCRIPTION OF RIVER BASIN		
2-01	Location	A2-1
2-02	Purposes	A2-1
2-03	Basin description	A2-1
2-04	Current streamgages	A2-1
2-05	Flood routings	A2-2
CLIMATE AND RUNOFF		
2-06	Temperature	A2-2
2-07	Precipitation	A2-3
2-08	Runoff characteristics	A2-3
FLOODS		
2-09	Observed floods	A2-4
2-10	Reservoir top of conservation pool	A2-4
2-11	Spillway Design Flood	A2-5
2-12	Standard Project Flood	A2-7
2-13	Other considerations	A2-7
FLOWS AND FREQUENCIES		
2-14	Streamflow at Allatoona dam site	A2-7
2-15	Frequency curves	A2-8
2-16	Flow duration curves	A2-8
2-17	Rating curves	A2-8
CHAPTER III DATA COLLECTION AND COMMUNICATION		
GENERAL		
3-01	Role of regulation office	A3-1
3-02	Role of project operators	A3-1

A-b

## TABLE OF CONTENTS (Cont'd)

Paragraph	Title	Page
CHAPTER III DATA COLLECTION AND COMMUNICATION (Cont'd)		
DATA COLLECTION AND REPORTING		
3-03	Automatic radio reporting hydrologic network	A3-1
3-04	River-stage reporting networks	A3-1
3-05	Rainfall reporting network	A3-2
3-06	Sedimentation and retrogression surveys	A3-2
3-07	Communications network	A3-2
CHAPTER IV WATER CONTROL PLAN		
EXTENT OF CONTROL		
4-01	General	A4-1
4-02	Degree of control	A4-1
4-03	Correlation with other projects	A4-1
REGULATION PLAN		
4-04	General	A4-2
4-05	Reservoir operation for power	A4-2
4-09	Continuous release	A4-4
4-10	Normal flood control regulation	A4-4
4-11	Channel capacity	A4-4
4-12	Flood control guidelines	A4-5
4-13	Induced surcharge operations	A4-5
4-15	Instructions for crest gates and sluice	A4-6
4-16	Emergency flood control regulation	A4-6
4-17	Mosquito control operations	A4-7
4-18	Fish and wildlife management	A4-7
4-19	Recreation impact levels	A4-7
4-20	Minor deviations	A4-8
4-21	Examples of regulation	A4-8
CHAPTER V DROUGHT CONTINGENCY PLAN		
DROUGHT REGULATION		
5-01	General	A5-1
5-02	Critical drought considerations	A5-1
5-06	Drought occurrence and lakeside development	A5-2
5-07	Drought coordination	A5-2
5-08	Drought public information	A5-3

A-c



## TABLE OF CONTENTS (Cont'd)

Paragraph	Title	Page
CHAPTER V DROUGHT CONTINGENCY PLAN (Cont'd)		
5-09	Recognition of drought	A5-3
5-10	Drought comparisons	A5-3
5-11	Drought plan	A5-3
5-12	Further studies	A5-4
CHAPTER VI HYDROLOGIC FORECASTS		
FORECASTING		
6-01	General	A6-1
6-02	Issuing forecasts to public	A6-1
6-03	Forecasting procedure	A6-1
6-05	Effects of power releases	A6-2
MODELLING		
6-06	History	A6-3
6-07	Daily models	A6-3
6-08	Other models	A6-3
CHAPTER VII WATER RESOURCE MANAGEMENT		
GENERAL		
7-01	Correlation with other projects	A7-1
7-02	Downstream benefits	A7-1
7-03	Headwater benefits	A7-2
7-04	Navigation/low flow	A7-2
7-05	Future plans and considerations	A7-2

## LIST OF TABLES

Number	Table Name	Page
1-1	Allatoona Available Storage in Acre-Feet	A1-8
1-2	Allatoona Lake Purposes	A1-8
2-1	River Mile and Drainage Area for Dams	A2-2
2-2	Normal Monthly and Annual Precipitation	A2-3
2-3	Allatoona Peak 6-hr Inflows, Discharges & Pools	A2-5
2-4	Maximum Pool Elevation and Daily & 6-hr Inflow	A2-6
2-5	Average of Monthly Max and Min Volume Durations	A2-9
2-6	Brief Description of Streamgages	A2-9

A-d

## TABLE OF CONTENTS (Cont'd)

## LIST OF TABLES (Cont'd)

Number	Table Name	Page
3-1	River Stage Network at Rome	A3-3
3-2	Rainfall Reporting Network at Rome	A3-4
5-1	Allatoona Monthly Inflows during Droughts	A5-4
6-1	Rainfall-Runoff Table at Rome	A6-2
6-2	Unit Hydrographs at Allatoona and Local Areas	A6-4
6-3	Effects of Power Releases at Cartersville-Rome	A6-5
7-1	Energy Produced from One Acre-Foot of Water Released from Allatoona Dam	A7-1

## LISTS OF CHARTS

Number	Chart Name
1-1	Alabama-Coosa Rivers
1-2	Plan and Sections of Dam and Powerhouse
1-3	Area and Capacity Curves
1-4	Reservoir Map Sedimentation and Retrogression Ranges
1-5	Recreational Development
1-6	Spillway Rating Curves for One 40'X26' Tainter Gate
1-7	Spillway Rating Tables
1-8	Rating Curves for One 5'8"X10'0" Sluice
1-9	Performance Curves Main Turbogenerator Unit
1-10	Performance Curves Small Turbogenerator Unit
1-11	Allatoona Top of Conservation Pool and Conservation Action Zones
1-12	Allatoona Flood Control Action Zones and Top of Conservation Pool
1-13	Allatoona Daily Top of Conservation and Flood Control Action Zones
2-1	General Hydrological Map
2-2	Rainfall and River Stage Reports
2-3	Flow, Discharge and Pool for April 1964 Flood
2-4	Observed April 1964 Stages below Allatoona
2-5	Flow, Discharge and Pool for April 1979 Flood
2-6	Observed April 1979 Stages below Allatoona
2-7	Flow, Discharge and Pool for March 1990 Flood
2-8	Observed March 1990 Stages below Allatoona
2-9	Flow, Discharge and Pool for Probable Maximum Flood

A-e

## TABLE OF CONTENTS (Cont'd)

## LISTS OF CHARTS (Cont'd)

Number	Chart Name
2-10	Flow, Discharge and Pool for Standard Project Flood
2-11	Allatoona Monthly Mean Inflow (1896-1990)
2-12	Allatoona Max, Min and Mean Daily Inflow (1950-1990)
2-13	Daily Discharge at Dam Site (1897-1920)
2-14	Daily Discharge at Dam Site (1921-45)
2-15	Daily Inflow at Allatoona Dam (1946-60)
2-16	Daily Inflow at Allatoona Dam (1961-75)
2-17	Daily Inflow at Allatoona Dam (1976-90)
2-18	Allatoona Max, Min and Mean Daily Outflow (1950-1990)
2-19	Daily Discharge at Allatoona Dam (1950-65)
2-20	Daily Discharge at Allatoona Dam (1966-80)
2-21	Daily Discharge at Allatoona Dam (1981-90)
2-22	Allatoona Max, Min and Mean Daily Pool (1950-1990)
2-23	Daily Pool at Allatoona Dam (1950-65)
2-24	Daily Pool at Allatoona Dam (1966-80)
2-25	Daily Pool at Allatoona Dam (1981-90)
2-26	Allatoona Inflow-Frequency Curve (1950-1990)
2-27	Allatoona Average Daily Inflow (1950-1990)
2-28	Allatoona Pool-Frequency Curve (1957-1990)
2-29	Allatoona Average Daily Pool (1957-1990)
2-30	Allatoona Daily Flow Duration Curve (1950-1990)
2-31	Rating for Etowah River at Canton
2-32	Rating for Etowah River at Allatoona ab Cartersville
2-33	Rating for Etowah River at Kingston
2-34	Rating for Etowah River at Rome
2-35	Rating for Oostanaula River at Resaca
2-36	Rating for Oostanaula River near Rome
2-37	Rating for Coosa River near Rome
2-38	Estimated Rating for Coosa River at Rome using Rome 5th Avenue
4-1	Operator Instruction if District Contact Lost
4-2	Induced Surcharge Schedule
4-3	Limiting Gate-Opening Schedule for Induced Surcharge
6-1	Effect at Rome of Power Releases from Allatoona



## PERTINENT DATA

## STREAM FLOW

Drainage area at dam site-square miles	1,110
Minimum natural flow(19 Oct 1931)-cfs	180
Minimum mean monthly flow(Oct 1931)-cfs	240
Average natural daily flow(1896-1990)-cfs	2,043
Discharge at bankfull stage-cfs	9,500
Maximum monthly natural flow(Dec 1932)-cfs	9,358
Maximum recorded daily flow(8 Jan 1946)-cfs	40,400
Maximum computed 6-hour inflow(3 Feb 1982)-cfs	57,754

## SPILLWAY-DESIGN FLOOD

National Weather Service 72-hr storm at Long.84° 23', Lat.34° 18'	
Total rainfall-inches	30.7
Total storm runoff-inches	25.3
Total volume of storm runoff-acre feet	1,496,000
Peak rates of flow	
Reservoir inflow-cfs	382,000
Reservoir outflow-cfs	333,000
Duration of flood-days	9

## RESERVOIR

Pool Elevations-feet msl	
Maximum pool, spillway design flood	872.1
Top of flood control pool	860.0
Summer top of conservation pool, Apr 30-Sep 30*	840.0
Winter top of conservation pool, Dec 15-Jan 15*	823.0
Bottom of conservation pool	800.0
Storage volumes-acre feet	
Maximum pool, spillway design flood	886,200
Total storage-elev. 860	670,050
Total storage-elev. 840	367,470
Total storage-elev. 823	202,770
Dead storage, below elev. 800	82,890
Summer flood control storage, 840-860(5.11")	302,580
Summer conservation storage, 800-840(4.81")	284,580
Winter flood control storage, 823-860(7.89")	467,280
Winter conservation storage, 800-823(2.03")	119,880
*Top of Conservation increases .16'/day after 15 Jan and decreases .22'/day after Sep 30	

## PERTINENT DATA (Cont'd)

## RESERVOIR (Cont'd)

Reservoir areas-acres	Area within taking line-acres	
Maximum pool, spillway design flood		25,670
Top of flood control pool, elev 860		19,200
Top of conservation pool, elev 840, summer pool		11,860
Top of conservation pool, elev 823, winter pool		7,610
Top of dead storage, elev 800		3,250
Purchased in fee simple		37,742
River bed		500
Total		38,242
Flowage easement		208
Parks and campgrounds		6,291
Wildlife areas (state)		11,683
Length of shore line-miles		
Top of conservation pool, elev 840, summer pool		270
Length of reservoir at elevation 840-river miles		28

## DAM

Type, main dam	Concrete gravity
Length overall-feet	1250
Length non-overflow section-feet	750
Height of main dam above river bed-feet	200
Elevation, top of dam-feet msl	880
Elevation, top of earth dikes-feet msl	875

## SPILLWAY

Net length-feet	400
Crest elevation-feet ngvd	835
Crest tainter gates	9-40'x26'; 2-20'x26'
Elevation, top of crest gates, closed-feet ngvd	860
Total discharge capacity (pool elev. 870.3)-cfs	321,000
Total discharge capacity (pool elev. 860.0)-cfs	184,000

## FLOOD CONTROL SLUICE

Number of sluices-5'8"x10'0"	4
Discharge capacity at elev. 860-cfs	17,300
Discharge capacity at elev. 840-cfs	16,200
Discharge capacity at elev. 823-cfs	15,100
Discharge capacity at elev. 800-cfs	13,600

## PERTINENT DATA (Cont'd)

## POWER PLANT

## Present installation-kw

2 units at 36,000 each\* and 1 service unit at 2,400 74,400  
 Penstocks 3-20' and 1-5.5' dia. steel pipes

\* Stator failure on Dec 90 has reduced Unit 2 kw.

## POWER DATA

Gross static head-feet at full pool	145.5
Minimum gross (bottom of conservation) head-feet	110.0
Average designed head-feet	138.0
Tailwater elevations, feet msl (Chart 2-32 & Table 2-6)	
Maximum, design storm-outflow 321,000 cfs	733.1
Sump Wall Limit, Turbines and Sluice-outflow 11,200	697.0
Downstream bankfull capacity-outflow 9,500 cfs	694.6
Normal, 2 large units operating-outflow 6,500 cfs	692.4
Normal, 1 large unit operating-outflow 3,250 cfs	689.8
Minimum, outflow 203 cfs	690.0
Plant output	
Installed capacity, at rated power factor-kw	74,000
Installed capacity, at unity power factor-kw	82,500
Designed dependable capacity-kw	73,000
Overload capacity, at unity power factor-kw	95,000
Designed average annual energy-kwh	169,000,000
Designed average annual primary energy-kwh	87,600,000

CHAPTER I

INTRODUCTION

WATER CONTROL MANUAL

Authorization

Purpose and scope

Related manuals

Operating and regulation agencies

DESCRIPTION OF PROJECT

Location

Purpose

General features

Dam

Earth dikes

Reservoir

Spillway

Sluices

Powerhouse and penstocks

Switchyard and transformer substation

Acworth subimpoundment

Recreational development

Real Estate Acquisition

HISTORY OF PROJECT

Authorization

Design

Construction

Storage allocation

Current Purposes Authorizations



## WATER CONTROL MANUAL

1-01. **Authorization.** This water control manual is prepared in accordance with ER 1110-2-240, ETL 1110-2-251, and paragraphs 6-01 through 6-03 of EM 1110-2-3600, "Reservoir Regulation".

1-02. **Purpose and scope.** This manual presents the water control plan for the Allatoona project. Included items are the descriptions of physical components of the dam, operating procedures, historical facts and other pertinent data. The general characteristics of the area are the flood frequencies, meteorology, examples of water control and river forecasting. Allatoona Dam operations must be coordinated with the multiple projects in the Alabama-Coosa River Basin to insure the optimum benefits consistent with the physical characteristics and purposes for which the system was authorized. This manual documents these operations. In conjunction with the master reservoir regulation manual for the entire basin, this manual provides a reference source and for the training of new personnel.

1-03. **Related manuals.** While the intent of this manual is to document water control procedures and other pertinent information concerning Allatoona Dam, the discussion of other water control manuals are presented to furnish guidance in their operation and maintenance as related to Allatoona. The other projects in the Coosa system are Carters Dams and Millers Ferry, RF Henry (Jones Bluff) and Claiborne Locks & Dams along with Alabama Power Company dams on the Coosa and Tallapoosa Rivers (Chart 1-1).

1-04. **Operating and regulation agencies.** Allatoona project is operated by the U.S. Army Corps of Engineers. The Mobile District, as part of the South Atlantic Division, is assigned responsibility for operating the project. Operation and maintenance are under the supervision of Operations Division and formal operating instructions are normally issued through the Chief of that Division. It is the responsibility of the Water Management Section of the Engineering Division to develop operating procedures for the Allatoona project for both flood and non-flood conditions. The regulating instructions herein are issued by the Section with approval from the South Atlantic Division. Plans are developed to most fully utilize the water resources at the project within the constraints of authorized functions. Up-to-date information on current and anticipated conditions is collected and this set of data on precipitation and river stages provides the background necessary for daily operation. Communication with the various reservoir operators in the Alabama-Coosa River system allows continuous monitoring and adjusting for current conditions. A continuous program of hydrologic investigation is conducted relative to improvement of water control management techniques. Computer programs have been developed in conjunction with these investigations.

1-05. The preparation and updating of water control manuals and reports are carried on as part of the routine operation of the Water Management Section. Arrangements are made by the Section for communication channels to the project personnel and other necessary personnel. Instructions pertaining to reservoir regulation are issued by the Section to the project personnel and a plan for delivery of all important messages concerning emergency regulation is developed. The office telephone number for the section is: 205-690-2737



## DESCRIPTION OF PROJECT

1-06. **Location.** Allatoona Dam is located on the Etowah River in Bartow County, Georgia, about 32 miles northwest of Atlanta and 26 miles northeast of Rome, Georgia. The location of the project, about 48 river miles upstream of Rome, is shown on Charts 1-1 and 1-2. The Etowah River joins at Rome with the Oostanaula River to become the Coosa River. The Coosa River later becomes the Alabama River and then the Mobile River before draining into the Gulf of Mexico. The reservoir lies within Bartow, Cobb, and Cherokee Counties. The 1110 square miles drainage area lies on the southern slopes of the Blue Ridge Mountains and consists of steep sloping mountain terrain.

1-07. **Purpose.** Allatoona Dam is a multiple purpose project with principal purposes of flood control, hydropower, navigation, water quality, water supply, fish and wildlife enhancement and recreation. Its major flood protection area is Rome, Georgia, about 48 river miles downstream; Allatoona Dam operations along with those of Carters Dam on the Coosawattee River, which contributes to flow at Rome, provide flood stage reductions at Rome. This flood stage reduction in conjunction with a levee provide flood damage reduction at Rome. Also, Allatoona flood control operation reduces the flood inflows to Alabama Power Company's Weiss Dam on the Coosa River, 60 miles below Rome. The release of stored water at Allatoona in low-flow seasons increases the power production at the Alabama Power Company plants on the Coosa River. Allatoona produces hydroelectric energy, operating as a peaking power plant. The increased flow in dry seasons also provides for an increased water supply and water quality for municipal and industrial uses in the metropolitan areas of Rome further downstream. The operation of Allatoona improves navigation on the Alabama River up to Montgomery by allowing additional releases above natural flow during the dry periods. Recreation has been developed around the lake and consists of marinas, camping sites, parks and other recreational development around the lake. The authorizing laws for the purposes are covered later.

1-08. **General features.** The project consists of the lake extending 28 miles up the Etowah River at full summer conservation pool of 840 feet, a concrete gravity-type dam with gated spillway, earth dikes, a 74,400 kw power plant and appurtenances. The principal features of the dam are described in detail in later sections.

1-09. **Dam.** The dam is a concrete gravity-type structure with curved axis convex upstream, having a top elevation of 880 feet ngvd and an overall length of approximately 1,250 feet. The maximum height above the existing river bed is 190 feet. An 18-foot wide roadway is provided across the entire length of the dam. Sections and plan of the dam and appurtenant works are shown on Chart 1-2. The dam is located east of Interstate 75 approximately 30 miles northwest of downtown Atlanta.

1-10. **Earth dikes.** The left bank (south) basin divide at the dam site between Allatoona and Pumpkinvine Creeks has three low saddle dikes. In order to prevent overflow into the Pumpkinvine Creek drainage basin, it was necessary to construct earth dikes at these locations. These dikes are designated on Chart 1-4 as plug dam (3 1/4 miles south of dam), saddle dike No. 1 (1 mile ESE of plug dam), and saddle dike No. 2 (1 1/2 miles SWS of #2). Built along the abandoned line of the Western and Atlantic Railroad

near the divide, the dikes have been constructed to elevation 875 feet with a 12-foot top width and side slopes of 1:3 on the water side and 1:2 1/2 on the land side. The side facing the reservoir is completely covered with 2 feet of riprap on a 1-foot gravel blanket. The total length of the two dikes is about 4,200 feet. The plug dam is built similarly.

**1-11. Reservoirs.** The reservoir formed by Allatoona Dam has a total storage capacity of 670,050 acre-feet at full flood-control pool, elevation 860 feet ngvd. At this elevation the reservoir covers a surface area of 19,201 acres (30.0 square miles) or 2.7% of the dam site drainage area. The local area below the Canton USGS streamgage, not including the lake surface, has a drainage area of 475 square miles (42.9% of total). At full summer-level conservation pool, elevation 840 feet ngvd, the reservoir covers 11,862 acres and has a total storage capacity of 367,470 acre-feet; at minimum conservation pool, elevation 800 feet, the area covered is 3,251 acres and the capacity is 82,890 acre-feet. Area-capacity curves and tables are shown on Chart 1-3. The total surface area within the taking line, 36,630 acres, is outlined on Chart 1-5. Allatoona Creek, a major arm of the lake, extends southward into Cobb County near Acworth and water is pumped out of the lake there by the Cobb-Marietta Water Authority at its Wcykoff plant, located in Cobb County, to be used in the Atlanta region. Return water back to the lake is provided by the sewage treatment plants located on Noonday Creek and on Little River, which are near the Cobb-Cherokee County line. The Howell-Bunger sluice, located in the dam, is presently used by the City of Cartersville for its water intake.

**1-12. Spillway.** The spillway section of the dam, with a crest at elevation 835 feet ngvd, has a total flow length of 500 feet, a net length of 400 feet, and a discharge capacity of 184,000 cfs at elevation 860 feet, full flood-control pool. It is equipped with 11 tainter gates of which nine gates are 40 feet wide by 26 feet high and two gates are 20 feet wide by 26 feet high. The top of gates closed is at elevation 860 feet, the top of flood control pool. Protection against erosion below the spillway is provided by a concrete apron which will produce the depth required for a hydraulic jump at a discharge of about 65,000 cfs. The spillway rating curves are shown on Charts 1-6 and 1-7.

**1-13. Sluices.** The four sluices, 5'-8" wide by 10' high, and one sluice 48" diameter Howell-Bunger valve were intended to release water instead of through the turbines or the spillway (when the lake level is below the spillway crest elevation of 835 feet). However, the Howell-Bunger valve was removed from service and its conduit is presently used as an intake for water supply for the city of Cartersville. The present capacity of the sluice is 16,200 cfs at elevation of 840 feet as shown on Chart 1-8. The sump wall, in the future Unit #3 draft tube, should not be overtopped by total release over 11,200 csf from the turbines and sluices which causes the tailwater to exceed elevation of 697.0 feet.

**1-14. Powerhouse and penstocks.** The powerhouse and penstock intake are located on the left (south) bank of the river. Two 36,000 kw main units and one 2,000 kw service unit were installed, making a total power installation of 74,000 kw. The service unit was reconditioned in 1985 and its capacity increased to about 2,400 kw, increasing the installed capacity for the plant to 74,400 kw. The penstocks are steel-lines and are controlled by a hoist operated tractor-type head gates. The penstock to



the service unit has a diameter of 5 1/2 feet and the penstocks to the main units are 20 feet in diameter at the intake and reduced to 18 feet at an elbow under the switchyard. Space has been allotted for a future unit of 36,000 kw capacity. However, the channel capacity would have to be increased to allow the operation of a third large unit. Discharge rating curves for the main units are shown on Chart 1-9 and for the service unit on Chart 1-10.

1-15. **Switchyard and transformer substation.** The switchyard and transformer substation are located in the area between the dam and powerhouse. The main transformer gallery with deck at elevation 736 feet ngvd is immediately adjacent to the upstream wall of the powerhouse and the switchyard deck at elevation 744 feet adjoins the downstream face of the dam. There are two banks of three 45,000 kva, 13.8/115-kv single-phase transformers and full provision has been made for the installation of an additional bank of three transformers. Two busses have been installed in the switchyard complete with switching equipment, protective devices, relays, and accessories which could ultimately extend over three transformer bays and four line bays. At present, the busses extend over only two transformer bays and two line bays. A 3-phase 2,500-kva, 2.3/115-kv transformer with its accessory equipment is located at the spillway end of the bus nearer the powerhouse. This transformer is fed from the bus as a source of station service when the service unit is not in operation or feeds to the bus when surplus power is available from the unit.

1-16. **Acworth subimpoundment.** The Acworth development is situated on the Proctor Creek arm of Allatoona Reservoir, as shown on Charts 1-4 and 1-5, and enhances the reservoir purposes for recreation and conservation of fish and wildlife. The subimpoundment dam stabilizes a lake of 325 acres and provides a road across Allatoona Reservoir, connecting Acworth with U.S. Highway 41. The dam is 1,500 feet long and consists of earth fill with a 60-foot concrete spillway flanked on each side by concrete non-overflow sections 61 feet long, which form a transition and connection between the earth fill and spillway. The maximum height of the earth fill is 45 feet and the slopes are covered with 1 foot of riprap on a 6-inch gravel filter blanket. The ungated spillway has its crest at elevation 848 feet ngvd and is bridged in a single span by the road crossing the dam. Stilling action at the toe is accomplished by means of a bucket which deflects the water upward. Two 24-inch sluices, one at each end of the spillway, are provided to allow fluctuation of the upper pool during low flow for mosquito control and to drain the reservoir.

1-17. **Recreation development.** The master plan for the recreational development of the Allatoona project was prepared by the Corps of Engineers and coordinated with other Federal agencies and with state, county and municipal governments who are sharing in recreational development. One state park, five county parks and eight commercial boat dock concessions are being operated on the reservoir under license agreements. The Acworth subimpoundment, with a constant-pool level, is leased to the Acworth Lake Authority and Cobb County Parks Department which are operating this area as a public park. Other areas, designated for second, third, and fourth priority use, have been leased to organized non-profit groups, semi-public organized groups and to private clubs.

1-18. Additional development has been provided by the Corps of Engineers at thirty public access areas to meet the increased demands for

picnicking, camping, sight-seeing, boating, and fishing. Tracts on the north bank and on Little River have been licensed to the Georgia Department of Natural Resources for game management. The recreation development plan on Chart 1-5 shows the distribution of recreational areas around the reservoir. Other areas will be developed as public needs are demonstrated and funds become available.

1-19. **Real estate acquisitions.** Since the 1940's, the Federal Government has acquired lands for Allatoona Lake and flowage easements for flood-prone areas. The guideline to acquiring the lands within the pool was set at the top of the flood control storage of elevation 860 feet plus three feet of freeboard. This 863 elevation provides for wave runup on the dam and a factor of safety in preventing overtopping of the dam and the plug dam and two dikes along the divide with Pumpkinvine Creek. These land purchases are referred to as fee simple and have a building restriction of elevation 863 feet for any structures to be used for human habitation. Fee lands were acquired in a "block-out" fashion to include all land below the 863 contour. The total fee acquisition for the project was 37,742 acres. The government leases 6,291 acres for park and campground uses and 11,683 acres to the State of Georgia as a wildlife area. The flowage easements are used in flooding areas where the government does not own the land but wants to prevent structures from being built in flood-prone areas. The government pays the owner a fee (flow easements) which allows the owner to use the land without holding the government liable for flood damages. The present total easements are 208 acres consisting of small parcels in the Canton area, the recreational cottage areas and downstream of the dam. Charts 1-2 and 1-5 show project property lines and recreation sites.

#### HISTORY OF PROJECT

1-20. **Authorization.** The site of Allatoona Dam on the Etowah River near Cartersville, Georgia, has long appealed to engineers as being outstanding for its present purpose, although no record can be found as to who first realized its potential. The first official recognition is revealed in a document entitled, "Reports on Examination and Survey of Etowah, Coosa, Tallapoosa and Alabama Rivers", which was prepared in 1910 under the direction of Capt. Harley B. Ferguson, Corps of Engineers, U.S. Army, later President of the Mississippi River Commission. The site was considered suitable for a dam of any height up to 200 feet. It is interesting to note that Allatoona Dam rises 190 feet above the river bed.

1-21. In the late 1920's, the Georgia Power Company became seriously interested in the Allatoona site and conducted extensive surveys and studies thereon. In 1934, the Corps of Engineers, under the provisions of House Document No. 306, 69th Congress, 1st session, developed a general plan for overall development of the Alabama-Coosa River system. That report, published in House Document No. 66, 74th Congress, 1st session, included Allatoona Dam, but the economic aspect of the project appeared unfavorable at that time.

1-22. Further studies were directed by Congress in resolutions adopted by the Committee on Rivers and Harbors, House of Representatives, on 1 April 1936 and 28 April 1936, and by the Committee on Commerce, United States Senate, on 18 January 1939. In response to those resolutions, an interim report on Allatoona Dam was submitted to Congress in 1940. That



report, published in House Document No. 674, 76th Congress, 3rd session, recommended the construction of Allatoona Dam and Reservoir as a dual purpose flood-control and power project with an estimated total storage capacity of 630,000 acre-feet to be utilized as follows: flood-control storage, 422,500 acre-feet between elevations 821 and 855 feet; conservation storage, 182,500 acre-feet between elevations 771 and 821 feet; and dead storage, 25,000 acre-feet below elevation 771 feet.

1-23. **Design.** Construction was authorized in the Flood Control Act of 18 August 1941, now known as Public Law No. 228, 77th Congress, 1st session, H. R. 4911. In December 1941, the district engineer submitted to the Chief of Engineers a report entitled "Definite Project Report, Allatoona Dam and Reservoir, Etowah River, in the Alabama-Coosa River Basin, Georgia", and work was initiated on plans and specifications. The proposals presented in the definite project report were substantially in agreement with those in the interim report except that the estimated total storage was increased to 722,000 acre-feet by raising the full flood-control pool from elevation 855 to 860 feet. This total storage was allocated as follows: flood control storage, 212,000 acre-feet between elevations 848 and 860 feet; conservation storage, 456,000 acre-feet between elevations 788 and 848 feet; and dead storage, 54,000 acre-feet below elevation 788 feet. During final plans and specifications after the submission of the definite project report, a number of changes were made in the design of the structure which will not be enumerated in this manual.

1-24. **Construction.** Project construction was delayed during World War II and the construction had to be restarted on 8 February 1946, using hired labor. The contract for the construction of the main dam was awarded on 29 April 1946 to National Constructors, Inc. The main dam was essentially complete in late 1949, and filling the reservoir commenced 27 December 1949. The reservoir pool reached elevation 835 feet in June 1950 and normal reservoir operation was assumed at that time.

1-25. **Storage allocation.** Shortly after construction started, the storage allocation was reconsidered and the Office, Chief of Engineers, in 4th Endorsement dated 21 October 1946 to letter from OCE dated 6 May 1946, subject "Storage Allocation for Flood Control in Allatoona Reservoir, Etowah River, Georgia", set the top of conservation pool at elevation 835 feet, with estimated storages of 389,000 acre-feet between elevation 835 and 860 feet allocated for flood control and 253,000 acre-feet between elevations 800 and 835 feet reserved for power generation and conservation. The dead storage below minimum conservation pool, elevation 800 feet, was estimated at 80,000 acre-feet.

1-26. The storage curve previously used was revised in 1950 as a result of more detailed data. According to this revised curve the total storage in the reservoir at elevation 860 feet is 670,050 acre-feet. Of this total, 587,160 acre-feet between elevations 860 and 800 feet is usable storage and 82,890 acre-feet below elevation 800 feet is dead storage.

1-27. Studies made in 1952 showed that the overall benefits from the project could be increased appreciably by varying the storage allocations in the reservoir on a seasonal basis. Raising the top of conservation pool during the summer with a compulsory drawdown prior to the flood season would result in considerable increase in power revenue with no reduction in flood control benefits. An operating plan based on seasonal variation of

storage allocations was approved by the Office, Chief of Engineers, in 2nd Endorsement dated 27 November 1956 to the Mobile District letter dated 2 November 1956, subject "Seasonal Variations of Storage Allocations in Allatoona Reservoir". Under this plan the top of conservation pool is at elevation 840 feet during the months May through August, varies linear from 840 to 820 feet during September through December, and from 820 to 840 feet during January through April. The flood control storage at elevation 840 feet is 302,580 acre-feet and at 820 feet, 489,060 acre-feet; and the conservation storage is 284,580 acre-feet at elevation 840 feet and 98,100 acre-feet at elevation 820 feet.

1-28. In 1967 another study of the top of conservation pool was made to determine the desirability of allowing the pool level to remain at elevation 840 feet until the end of September whenever flow conditions are favorable. Such an operation would be particularly desirable from the standpoint of recreation and would provide some benefits to power, low-flow control and navigation. Another change considered was the elimination of the sharp drawdown and immediate refilling in late December and early January. The study showed that the changes could be made without depreciating flood control benefits. On 28 March 1968 the Chief of Engineers approved a revised top of conservation curve which has a top level at elevation 840 feet during the months May through September, varies uniformly from elevation 840 to 823 feet during 1 October through 15 December, remains at elevation 823 feet from 15 December through 15 January, then varies uniformly from 823 feet on 15 January to 840 feet at the end of April. The flood control storage at elevation 823 feet is 467,280 acre-feet and the conservation storage is 119,880 acre-feet. The curve delineating the top of conservation pool is shown on Charts 1-11 and 1-12. Table 1-1 summarizes the changes in Allatoona storages.

1-29. **Current Purpose Authorizations.** Section 311 of the Water Resources Development Act of 1990 directed the Secretary of the Army to review and report upon the authorized and operating purposes of reservoirs under his control. The U.S. Army Corps of Engineers report, "Authorized and Operating Purposes of Corps of Engineers Reservoirs" dated July 1992 identifies the authorized and operating purposes of 541 federally owned reservoirs. On page 2 of that report, it states that:

The purposes that a reservoir is to serve are given in laws that may be grouped into three categories: (1) laws initially authorizing construction of the project; (2) laws specific to the project passed subsequent to construction; and (3) laws that apply generally to all Corps reservoirs. In the latter category, the following laws have the greatest relevance to Corps reservoirs:

PL 78-534, Flood Control Act of 1944 (provides authority to add recreation as a purpose and to contract for use of surplus water for domestic purposes); PL 85-500, Title III, Water Supply Act of 1958 (provides authority to include storage for municipal and industrial water supply); PL 85-624, Fish and Wildlife Coordination Act of 1958 (provides authority to modify projects to conserve fish and wildlife); PL 92-500, Federal Water Pollution Control Act Amendments of 1972 (establishes goal to restore and maintain the quality of the Nation's waters); PL 93-205, Endangered Species Act of 1973 (provides authority for operating projects to protect threatened or endangered fish/wildlife)"



The authorized and operating purposes of Allatoona are shown in Table 1-2.

Table 1-1

**Allatoona Available Storage in Acre-Feet**

Approval by	Year	Available Storage <sup>®</sup>	Purpose	Elevation Range	Period
HD674,76th,3rd+	1940	422500	Flood Control	821-855	Jan-Dec
		182500	Power&	771-821	Jan-Dec
		25000	Inactive	Below 771	Jan-Dec
Flood Control Act+	1941	212000	Flood Control	848-860	Jan-Dec
		456000	Power&	788-848	Jan-Dec
		54000	Inactive	Below 788	Jan-Dec
OCE*	1946	389000	Flood Control	835-860	Jan-Dec
		253000	Power&	800-835	Jan-Dec
		80000	Inactive	Below 800	Jan-Dec
OCE*	1956	489100	Flood Control	820-860	Sep-Apr
		302600		840-860	May-Aug
		98100	Power&	800-820	Sep-Apr
		284600		800-840	May-Aug
		82900	Inactive	Below 800	Jan-Dec
OCE*	1968	467300	Flood Control	823-860	Oct-Apr#
		302600		840-860	May-Sep#
		119900	Power&	800-823	Oct-Apr#
		284600		800-840	May-Sep
		82900	Inactive	Below 800	Jan-Dec

+Congress

\*Office of Chief of Engineers, COE

&Power becomes conservation with other purposes.

#Conservation is set at 823 feet from 15 Dec-15 Jan.

®Total storage is 630,000 acre-feet (1940), 722,000 (1941&46) and 670,100.

Table 1-2

**ALLATOONA LAKE Purposes, South Atlantic Division,  
Mobile District, Etowah River, GA**

Operating Purposes	Authorized Purposes	Authorizing Laws
Flood Control	Flood Control	PL 77-228
Recreation	Recreation	PL 78-534
Water Quality	Water Quality	PL 92-500
Water Supply	Water Supply	PL 85-500
Fish/Wildlife	Fish/Wildlife	PL 85-624
	Navigation	PL 77-228
Hydroelectric Power	Hydroelectric Power	PL 77-228

1. The project is not regulated for navigation because it is located distant from the navigation channel and any releases for that purpose would be captured and reregulated by the Alabama Power Co. reservoirs located downstream. Navigation benefits indirectly from the operation of the project for the other authorized purposes.

CHAPTER II

HYDROMETEOROLOGY

DESCRIPTION OF RIVER BASIN

Location

Purposes

Basin description

Current streamgages

Flood routings

CLIMATE AND RUNOFF

Temperature

Precipitation

Runoff characteristics

FLOODS

Observed floods

Reservoir top of conservation pool

Spillway Design Flood

Standard Project Flood

Other considerations

FLOWS AND FREQUENCIES

Streamflow at Allatoona dam site

Frequency curves

Flow duration curves

Rating curves



## DESCRIPTION OF RIVER BASIN

2-01. **Location.** Allatoona Dam site is located 32 miles northwest of Atlanta, Georgia, on the Etowah River, 48 river miles above the Coosa River and can be reached by driving north from Atlanta on Interstate 75 (towards Chattanooga). The Etowah and Oostanaula Rivers combine at river mile 645.2 near Rome, Georgia, to form the Coosa River which has a drainage area at that point of 4010 square miles. Further downstream, the Tallapoosa River joins with the Coosa River at river mile 359.4 near Montgomery, Alabama, to form the Alabama River. The Alabama and Tombigbee Rivers combine at river mile 45.0 and becomes the Mobile River, which drains through Mobile Bay to the Gulf of Mexico (See Chart 1-1).

2-02. **Purposes.** Allatoona Reservoir is one of a number of reservoirs in the Coosa basin which include Corps of Engineers projects at Allatoona, Carters, Robert F. Henry (Jones Bluff), Millers Ferry, and Claiborne. These projects provide flood control, water supply, water quality, hydropower, recreation, navigation, and fish and wildlife enhancement. Alabama Power Company has hydropower plants at Weiss, H. Neely Henry, Logan Martin, Lay, Mitchell, and Walter Bouldin and Jordan on the Coosa River downstream of the Allatoona and Carters projects and above Robert F. Henry. Alabama Power also has the R. L. Harris, Martin, Yates, and Thurlow dams on the Tallapoosa River. The Alabama River is navigable to Montgomery near river mile 342.0. Studies have been made of extending navigation on the Coosa River to Gadsden, Alabama (See Chart 1-1).

2-03. **Basin description.** Etowah River and its upstream tributaries originate in the Blue Ridge Mountains of northern Georgia, near the western tip of South Carolina. The northern boundary of the Allatoona drainage area is shared with the Carters Dam drainage area along a high ridge varying from elevation 1300 to 3800 feet ngvd and with the Tennessee and Chattahoochee Rivers along the eastern and southern boundaries along a lower ridge varying from elevation 1200 to 1900 feet ngvd. The U.S. Geological Survey Canton streamgauge on the Etowah River is about 30 miles above Allatoona Dam and measures the headwater flows into the reservoir. The Canton gage has a 605 square miles drainage area. Water surface elevations at the gage becomes effected by the Allatoona flood control pool when the Allatoona pool is above elevation 845. The creeks along the upper Etowah River have steep mountainous slopes which produce rapid runoff. However, the main stem above the reservoir is more than 70 miles long which produces large flood inflows which persist for several days. Ungaged local drainage areas into Allatoona Lake amounts to 505 square miles of relatively flat-sloped terrain. Between Allatoona Dam and Rome, the Etowah River Basin is about 30 miles wide. The Etowah River drops from elevation 687 feet at the toe of the dam to 562 feet at Rome. This lower portion of the basin has a wider flood plain and flatter stream slope than the upper basin. The drainage area and river miles are shown in Table 2-1. Additional drainage areas are given in Table 3-1.

2-04. **Current streamgages.** Data from several streamgages is used daily to help manage the operation of Allatoona Reservoir. The Etowah gages are located at Canton, Allatoona Dam, Cartersville, Highway 61, and Kingston. For control purposes at Rome, the Coosawattee gages are at Ellijay, Carters Dam, Carters Reregulation Dam, Carters 411 Bridge and Redbud (Pine Chapel), the Conasauga gages at Eton and at Tilton, the

Oostanaula gage at Resaca and Rome 5th Avenue and the Coosa gage at Mayos Bar are also observed daily. Specific information on these stream gages is given in Table 3-1.

**Table 2-1**

**River Mile and Drainage Areas for Dams  
in Miles and Square Miles**

Mile	River	Location	Area	Owner
693.0	Etowah	Allatoona	1110	COE
645.2	Etowah	Mouth	1810	
672.0	Coosawattee	Carters	373	COE
645.2	Oostanaula	Mouth	2200	
638.1	Coosa	Mayos Bar	4040	
585.1	Coosa	Weiss Dam	5284	APC
506.2	Coosa	H Neely Henry Dam	6596	APC
457.4	Coosa	Logan Martin Dam	7743	APC
410.2	Coosa	Lay Dam	9053	APC
396.2	Coosa	Mitchell Dam	9776	APC
378.3	Coosa	Jordan Dam	10102	APC
497.4	Tallapoosa	R. L. Harris	1453	APC
420.0	Tallapoosa	Martin	2984	APC
412.1	Tallapoosa	Yates	3293	APC
409.1	Tallapoosa	Thurlow	3308	APC
281.2	Alabama	Robert F Henry Dam*	16233	COE
178.0	Alabama	Millers Ferry Dam*	20637	COE
117.5	Alabama	Claiborne Dam*	21473	COE

\*Navigation lock is located there also.

COE-Corps of Engineers; APC-Alabama Power Company.

2-05. **Flood routings.** The major flood damage reaches are above Allatoona lake, Allatoona Dam to Rome and below Rome. The city of Canton experiences some flooding from the Etowah River due to a low channel capacity. Backwater from Allatoona reservoir may affect flood heights at Canton and the Corps has acquired real estate on lands which may be affected. Since the drainage area has a long travel reach, the flood hydrograph peaks at Canton occur one or two days after the maximum rainfall and tend to continue many days. There are few flood damages above Canton. Below the dam the channel capacity is 9,500 cfs. The city of Cartersville below the dam experiences some flooding if the local runoff plus the outflow from the dam become too large. Rome is the major flood damage area protected by the Allatoona project. The U.S. Geological Survey gages for the Etowah River at Rome 5th Ave and Coosa River at Mayos Bar (Weiss Reservoir) are used in guiding operations of Allatoona Reservoir to insure maximum flood reductions. The effects of water releases from Allatoona start occurring 12 hours later at Rome. Carters Dam and Reregulation Dam are located northeast of Rome on the Coosawattee River and its operation also provides flood control for Rome.

**CLIMATE AND RUNOFF**

2-06. **Temperature.** The Blue Ridge Mountains protect the Etowah River basin in the vicinity of Allatoona Dam from the more rigorous winters



prevailing across the divide in the Tennessee Valley and tend to assure a milder climate. The average annual temperature in the vicinity of Allatoona Reservoir is about 60 degree Fahrenheit, based on records at six stations averaged for the 30-year period of 1951-80, inclusive. The stations are Gainesville, Dahlonega, Jasper, Cedartown, Cartersville and Rome, Georgia. The maximum of record is 109 degrees at Rome and the minimum is -14 degrees at Jasper. The summer average is about 76 degrees and the winter average is about 43 degrees. The normal frost-free period lasts from April through October and extended periods of below freezing temperature are unusual.

2-07. **Precipitation.** Due to the topographic lift of the Blue Ridge Mountains, the upland slopes are subject to intense local storms and to general storms of heavy rainfall lasting days. Heavy rains may occur at any time during the year, but are most frequent between late fall and mid-spring, when the majority of the large floods in the basin have been recorded. The large flood of March 1990 occurred when a storm front extended from Mobile to Montgomery to Rome and subtropical moisture was continuously drawn along the line producing an extended period of heavy rain. The normal monthly precipitation above Allatoona Dam is based on the 1951-80 means of the National Weather Service at Cumming, Dahlonega, Cartersville, Jasper, Canton and Woodstock. The maximum, minimum, and normal annual precipitation at four stations are shown in Table 2-2. About 41 percent of the normal annual precipitation occurs from January through April, while only about 27 percent occurs during the dry period August through November. The average annual snowfall is 3 to 4 inches, usually in January and February, but is unimportant in producing floods. Rainfall gage locations are shown and tabulated on Charts 2-1 and 2-2.

Table 2-2

**Normal Monthly and Annual Precipitation  
for Allatoona and Selected Stations in Inches**

Allatoona Basin			Selected Rainfall Stations				
Mon	Rain	%	Location	Record	Annual	Max	Min
Jan	5.61	10.0	Basin		56.20		
Feb	4.94	8.8	Canton	94	56.42	83.25	38.94
Mar	6.87	12.2	Cumming	42	56.28	82.12	42.56
Apr	5.39	9.6	Dahlonega	93	64.29	86.12	39.22
May	4.46	7.9	Cartersville	48	50.09	68.45	33.18
Jun	3.77	6.7					
Jul	4.90	8.7					
Aug	3.93	7.0					
Sep	4.03	7.2					
Oct	3.27	5.8					
Nov	3.93	7.0					
Dec	5.10	9.1					
Sum	56.20	100.0					

2-08. **Runoff characteristics.** Runoff characteristics of the Etowah River and its major tributaries above the dam site are those of mountain streams with rapid rise and recession of the flood hydrographs. Peak flood discharge at Rome is usually caused by local inflow from tributary streams downstream of Allatoona Dam. The retention of flood

waters in Allatoona Reservoir essentially reduces flood stages in the latter portion of a flood and prevents the flows from the Oostanuala causing a secondary flood peak. Carters Dam, located in the Oostanuala basin, has some flood control capacity for the upper Oostanuala and is operated to reduce flood peaks at Resaca and Calhoun. The Carters project provides some flood control at Rome. Of the 4010 square miles of drainage area at Rome, 376 square miles are controlled by the Carters Dam and 110 square miles are controlled by Allatoona. This leaves 63 percent of the drainage area at Rome unregulated. A levee system was completed on 13 February 1939 which has protected the city along with flood control operations at Allatoona and Carters projects. Allatoona Dam retains most floods and evacuates these waters at no greater than bankfull rates. The largest flood ever experienced at Allatoona occurred as a series of floods in April 1964. This series of floods completely filled the flood control zone and resulted in a pool elevation of 861.19 feet.

## FLOODS

2-09. **Observed floods.** Allatoona project began filling on 27 December 1949 and the pool reached elevation 835 feet ngvd in June 1950. Because Allatoona has a seasonally varied conservation level, the maximum pool elevation does not always correspond with the maximum inflow. A long series of floods could cause the pool to rise steadily above elevation 840 feet, because of releases being limited by the downstream flood conditions. Then, an average flood inflow towards the end of the flood series could cause the maximum pool for that event. As a rule, the larger volume floods normally impact the reservoir elevation more than a short-period high inflow does. The maximum pool elevation of record (861.19) occurred during the April 1964 flood while the maximum daily inflow of 45,845 day-second-feet occurred during February 1982 with a resulting peak pool of 848.01 feet. The April 1964 event was a series of storms which occurred during early 1964 and caused the local runoff below the dam to stay near bankfull through most of the period. The flood waters into the dam could not be evacuated without causing flood damages. Thus, the pool elevations were high for several weeks. The April 1964 peak inflow occurred during the period of maximum elevation and produced a higher elevation than would have been expected based on single storm inflow alone. The bankfull capacity below the dam was reevaluated due to the flooding at Cartersville and downstream and was reduced from 12,000 cfs to 9,500 cfs due to the downstream flood damages of the April 1964 flood. The change in channel capacity would drive the pool level higher if the April 1964 flood series occurs again. The April 1964 operation is shown on Charts 2-3 and 2-4. The March 1990 and April 1979 flood events were large areal storms which caused the pool to be in the top five of maximum annual pools. The April 1979 and March 1990 floods are typical flood events which show the current rule curves, storage allocation and basin conditions; Charts 2-5 and 2-7 present the pool inflow and outflow and Charts 2-6 and 2-8 presents the downstream stages. The water year maximum pool elevations and daily inflows are shown on Tables 2-3 and 2-4 and later used in the frequency analysis for the inflows and pool elevations.

2-10. **Reservoir top of conservation pool.** Until November 1956, the conservation pool was the zone from elevation 800 to 835 feet and did not provide any seasonal variations. In November 1956 the top of conservation pool was changed seasonally from elevation 840 to elevation 820 feet ngvd to allow more flood control during the wet season. The



latest top of conservation pool was approved by SAD in March 1968; the new curve changes linearly from elevation 823 to 840 feet from 15 January to the end of April, stays at elevation 840 feet until the end of September, decreases linearly from elevation 840 to 823 feet by 15 December, and stays at elevation 823 feet until 15 January. The conservation pool reflects the probability of flooding from October through April and sets the top of conservation pool to be higher during drier periods. The actual pool may be different than the guide curve in many instances. Lower elevations can not be avoided whenever the inflows decrease appreciably or the demands on the lake increase greatly. The top of conservation pool can be seen on Charts 1-11 and 1-12. The original downstream bankfull capacity was assumed to be 12,000 cfs but was changed to 9,500 cfs after the April 1964 flood based on observed conditions.

Table 2-3

**Allatoona 6-Hour Inflows, Discharges and  
Elevations in CFS and Feet**

Flood	Natural Inflow	Reservoir Inflow	Reservoir Outflow	Pool Elev	Cartvl Flow	Kingst Flow	Rome Flow
Spillway Des	280000	382000#	333000	872.1	342000	343000	345000
Standard Proj		184000#	180000	864.7	192000	192000	192000
April 1964		40370	11800	861.2	16300	27500	29700
April 1979		40324	6700	856.2		23600	56900
March 1990		57754	9500*	855.8		65800	65400

\*Downstream Bankfull Discharge below Allatoona Dam

#6 Hour Average Inflow

2-11. **Spillway Design Flood.** Spillway Design Floods (SPF) is the criteria used by the Corps of Engineers to design the spillway on a dam to prevent its overtopping due to the occurrence of an extremely rare flood. The basis of this SDF is the Probable Maximum Precipitation (PMP) in the National Weather Service Hydrometeorological Report Nos. 51 and 52. The pattern was computed by centering the hypothetical storm over the drainage area above the dam site to get the largest runoff at the dam site. This latest hydrological storm differs from the SDF in the old manual. The original SDF was a transposed December 1932 storm based on the observed rainfall, selected centering and orientation, and adjusted runoff volume to provide a flood which was considered to be of that magnitude. The Spillway Design Flood is not assigned a frequency of occurrence. The PMP was started with the pool at elevation 859.5 feet, the bottom of induced surcharge, and only the spillway gates were used to pass inflows. After the pool starts to fall, the gate openings would be maintained until the pool reaches elevation 859.5. At that point the outflows would gradually be reduced until the channel capacity of 9500 cfs is reached. The latest spillway design flood has a peak pool elevation of 872.1 feet with a maximum inflow and discharge of 382,000 and 333,000 cfs. This elevation is 37.1 feet above the crest of the spillway at elevation 835.0 feet ngvd and 7.9 feet below top of the dam at elevation 880.0 feet. The 4-day storm in six hour intervals would average 30.7 inches of rainfall above the dam. Maximum stages at Cartersville, Kingston, and Rome 5th Avenue gages were not determined due to the lack of river section or routing data for flows of this magnitude. In a flood of this magnitude, the flood control capabilities of Allatoona Reservoir would be quickly exhausted. Effects of

reservoir regulation on the spillway design flood are shown on Chart 2-9 and in Table 2-3. The surcharge release schedule will dictate releases when the pool reaches elevation 859.5 feet. (or sooner depending on inflows)

Table 2-4

**Maximum Pool in Feet NGVD & Daily Inflow and  
6-Hour Inflow for 1952-1986 Operation in CFS**

Rank	Date	Peak Elev	Date	Daily Inflow	Date	6-Hr Inflow
1	4-10-64	861.19	2-3-82	45845	2-3-82	57754
2	3-30-80	857.68	3-17-90	40699	3-17-90	51139
3	4-11-77	857.50	2-25-61	37786	2-21-61	43170
4	4-18-79	856.16	4-13-79	37510	3-31-76	42310
5	3-23-90	855.82	3-26-64	36612	3-26-64	40370
6	19-4-89	854.11	3-31-76	32908	4-13-79	40324
7	3-11-61	853.54	3-30-77	31417	3-23-52	37740
8	5-6-63	851.46	4-30-63	31366	4-30-63	35087
9	4-4-76	851.35	12-6-83	29688	3-3-77	34564
10	2-7-82	848.01	3-4-66	29630	12-6-83	32961
11	8-28-67	847.91	3-23-52	29225	3-4-66	32863
12	6-3-73	847.63	3-8-80	26397	4-5-57	32497
13	4-9-57	846.78	4-5-57	26214	4-4-74	32416
14	8-3-84	846.75	1-11-72	22963	12-12-62	29153
15	5-16-72	845.83	4-4-74	21897	7-5-89	26641
16	3-19-66	845.61	1-16-54	21347	1-11-72	26420
17	4-17-62	845.43	8-24-67	19840	2-28-88	25949
18	5-11-78	845.34	12-21-51	19535	4-13-80	24806
19	12-12-83	844.74	3-14-75	19198	1-16-54	24220
20	4-8-74	844.34	1-20-88	18365	1-26-78	23766
21	6-9-81	842.98	2-22-62	17297	3-14-75	23298
22	6-4-59	842.96	2-28-87	17147	12-21-51	23147
23	4-3-75	842.66	3-17-73	16873	3-17-73	21548
24	8-3-71	842.54	2-7-55	16577	2-28-87	19919
25	5-20-69	841.86	6-21-89	15791	2-7-55	18775
26	7-6-87	841.81	1-10-68	15782	4-9-83	18124
27	6-17-65	841.40	3-16-56	12168	3-12-68	16028
28	6-8-70	841.22	7-31-84	11964	3-13-50	15647
29	5-12-58	841.08	3-20-70	11889	3-20-70	14406
30	5-20-68	841.04	3-13-50	11787	3-25-65	14216
31	7-8-85	840.45	2-13-69	11667	3-3-71	13561
32	6-13-60	840.07	1-10-53	11475	2-3-69	13158
33	6-1-88	838.60	3-25-65	11391	3-16-56	12522
34	12-15-86	832.24	2-11-81	10436	1-10-53	12158
35			3-3-71	10014	2-11-81	11818
36			10-26-86	9669	1-31-60	11192
37			1-31-60	9639	6-6-67	10947
38			2-1-85	9298	2-1-85	10239
39			5-31-59	8559	5-31-59	10194
40			3-10-78	8335	2-27-58	8703
41			2-27-58	7367	5-29-86	4267

NOTE: The present pool guide curve was adopted in 1957. (See Par. 2-10)



2-12. **Standard Project Flood.** Corps of Engineers Standard Project Flood (SPF) is a theoretical flood, based on rainfall criteria, that would be reasonably possible and has been used in hydrologic analyses of reservoirs and river reaches. The original SPF was based on a September 1929 storm transposed to produce the most severe rainfall. The basis of the current SPF is one half of the flow of the Spillway Design Flood. The routing of the Standard Project Flood assumes a normal flood control operation in which flood waters are retained and discharge as downstream channel capacity permits. A large flood was assumed to have occurred a week before the SPF. Thus, surcharge releases would occur early in the SPF. The SPF is not assigned a frequency of occurrence and is only used as a comparison in any discharge-frequency analysis. The standard project flood would have a peak inflow of 183,700 cfs and produce a pool elevation of 864.7 feet with a maximum discharge of 180,000 cfs. This pool elevation is 29.1 feet above the crest of the spillway at elevation 835.0 feet and 15.9 feet below the top of the dam and saddle dikes at elevation 880.0 feet. Maximum flows at Cartersville, Kingston, and Rome 5th Avenue gages would be near 192,000 cfs. The antecedent flood added 6,000 cfs to the baseflow of the SPF and started the pool at elevation 854.0 feet. The effects of reservoir regulation on the standard project flood are depicted on Chart 2-10 and shown in Table 2-3.

2-13. **Other considerations.** Three other considerations must be included within the manual to understand the logic behind the particular flood control plans and floods. These are (1) safety of dam, (2) use of historic floods and (3) regional long-term equations of flow vs. drainage area. The Spillway Design and Standard Project Floods along with the corresponding antecedent conditions and pool levels were used in the design of the dam to insure that there would be no overtopping or failure of the structure. Therefore, the described flood control operation in Chapter IV must be followed for the large floods. Secondly, the historic floods were reviewed in the formulation of the action zones and top of conservation guide curve in Charts 1-11 and 1-12; the original manual is updated with the revised manual in response to the operating experience and record. Thirdly, the flow vs. area of a regional equation for the region was determined to be reasonable. That is, the average flow rates for Allatoona compare favorable with other drainage areas in the region and represent the results from some of the longer period of record gages.

## FLWS AND FREQUENCIES

2-14. **Streamflow at Allatoona dam site.** Streamflow has been measured at the Allatoona gage since September 1938. The station was operated by the Mobile District up to the late 1970's. The U.S. Geological Survey operates the gage and publishes the daily values in their annual water surface reports. Flows for the pre-record period, 1897-1938, have been estimated from records for other stations in and near the Etowah River. Mean monthly inflows into the Allatoona pool are shown on Chart 2-11. Average daily flows at the dam site for the period 1897-1990 are shown on Charts 2-13 through 2-17. The reservoir pool maximum, minimum, and average elevations are presented in Chart 2-22; the daily discharges and pool are plotted on Charts 2-19 through 2-21 and Charts 2-23 through 2-25, respectively.

2-15. **Frequency curves.** Frequency curves have been computed for Allatoona Reservoir 6-hour and daily inflow and pool elevations. Since the 1890's, the daily inflows can be estimated to that time but only the inflows from 1950 through 1990 (41 years) and the pool elevations from 1957 through 1990 (34 years) were used in the frequency analysis to insure a consistent data base. The pool started filling in December 1949 and quickly filled to elevation 835 feet by June 1950; the pool level of 835 feet was the top of conservation pool at that time. In November 1956, the top of conservation pool was increased five feet to the present elevation of 840 feet. The drought of 1986 had lowered the elevations by as much as 12 feet below normal throughout the summer of 1986 and was considered to be low outliers (Water Resources Council Bulletin 13 B criteria that indicates the lowest value of a data set to be used). The drought of 1988 also had a drastic effect on the pool levels but did not produce the same low pool level because the power generations in April and May were cut to minimum amounts, by agreement of all parties. A volume duration study with estimated one month to 24-month volumes since 1896 indicated that the 1986 and 1988 droughts were similar to the 50-year droughts. The droughts of 1950-54 and of 1980-81 were less severe than the 1986 and 1988 drought events and blended better with the rest of the data. The annual maximum pool elevations and reservoir inflows frequency curves were computed by Water Resources Council Bulletin 13B with Charts 2-12 and 2-22 data, the results are plotted on Charts 2-26 and 2-28. Expected probability must be used to adjust any period of records less than 100 years to insure that the frequency curve reflects the long term record at the site. Average daily inflow for 1950-1990 and average daily pool for 1957-1990 are shown on Charts 2-27 and 2-29, respectively.

2-16. **Flow duration curves.** A flow duration curve was computed for Allatoona daily inflows. The maximum and minimum flow rates for several time durations were computed for each month for the 1950-90 record. The flow duration curves which show the average of each month's maximum and minimum 1-, 3-, 5-, 7-, 10-, 15- and 30-day flow rate at Allatoona are presented on Table 2-5. A flow-duration curve for Allatoona is shown on Chart 2-30 and gives the percent of time that a certain discharge or greater is exceeded.

2-17. **Rating curves.** Seven stage-discharge relationships are provided in charts to this manual. By monitoring the Canton gage on the Etowah River above Allatoona Reservoir, the timing, peak and quantity of runoff into Allatoona Lake can be forecasted. The Etowah River gages at Allatoona Dam (above Cartersville), near Kingston and at Rome are used to track the local runoff plus the routed Allatoona releases. The Oostanaula River gages at Resaca and near Rome provide more detail about the Carters project and the remaining uncontrolled drainage areas above Rome. The Coosa River near Rome (Mayo's Bar) gage is used in conjunction with the 5th Avenue Bridge gage (4.5 miles upstream of the Etowah River junction) and the Etowah River gages near Cartersville (State Route 61). The streamgages are discussed in more detail in Chapter III and shown in Tables 2-6 and 3-1. The seven rating tables are shown on Charts 2-31 through 2-37. A derived rating table for the combined flow of the Oostanaula and Etowah Rivers (Coosa River) using Rome 5th Avenue was computed by plotting the peak-to-peak stages at 5th Avenue and Mayo's Bar and is given on Chart 2-38.



Table 2-5

**Average of Monthly Maximum and Minimum  
Volume Duration Inflows for 1950-1990**

Days	Jan*	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum Volumes in Average DSF												
1	1148	1360	1498	1530	1082	702	511	391	306	345	523	778
3	1265	1507	1654	1664	1204	792	631	457	368	437	600	886
5	1332	1507	1761	1757	1265	849	679	484	398	467	654	949
7	1397	1693	1859	1843	1319	895	734	513	419	491	682	990
10	1487	1801	2091	1925	1405	942	812	572	471	527	725	1065
15	1669	2073	2435	2100	1547	1018	906	664	552	603	775	1309
30	2445	2799	3346	2963	2014	1343	1140	924	747	920	1088	1767
Maximum Volumes in Average DSF												
1	9226	9498	13226	10775	6248	3557	3262	2952	2797	4267	3435	5859
3	6601	6843	9455	7360	4350	2615	2476	2166	1941	2471	2650	4240
5	5109	5670	7198	5885	3554	2215	2085	1792	1519	1878	2093	3462
7	4398	4933	6032	5037	3143	2008	1839	1567	1289	1598	1806	3128
10	3781	4213	5060	4301	2774	1837	1612	1375	1105	1355	1583	2764
15	3138	3497	4335	3694	2447	1620	1399	1178	955	1143	1355	2334
30	2445	2799	3346	2963	2014	1343	1140	924	747	920	1080	1767

\*If each maximum 1-day volume of each of the years are added and averaged, then the January 1-day max volume would be 9226 dsf.

Table 2-6

**Brief Description of Streamgages**

River/Site	Type	Area	USGS02	Started	Yrs	Avg Flow	Peak Flow	Peak Stage
Oostanaula River								
at Resaca#	1	1600	387500	Oct 1892	98	2810	54800	34.6
near Rome#	2	2120	388500	Oct 1939	51	3623	47000	34.1
at 5th Ave (Rome)	3	2150	388530	Oct 1939	@	&	&	34.5
Etowah River								
at Canton#	1	613	392000	Mar 1892	63	1234	32300	26.7
at Allatoona Dam#	4	1120	394000	Sep 1938	52	1899	40400	20.8
near Cartersville(61)	1	1345	394670	Nov 1985	*	&	&	18.0
at Euharlee	2	1598	394969	Dec 1985	+	&	&	18.1
near Kingston#	1	1630	395000	Jul 1928	57	2562	42700	27.7
at Rome#	2	1820	396000	Jul 1902	68	2944	55000	28.0
Coosa River								
near Rome (Mayos Bar)#	3	4040	397000	Oct 1896	59	6691	71000	37.0

# USGS Charts

@ Rome 5th Ave stages included in USGS reports since 1971; data found in National Weather Service reports starting in 1890.

&amp; No flows were computed at these stations.

\* Stages from May 1937-1961 kept at National Weather Service and Mobile Corps of Engineers have data from August 1945-May 1975.

+ Corps has recorded Euharlee since 1980.

Ty 1 instantaneous value from Carters Powerhouse; 2 Recording tape at gage picked up by USGS upon request; 3 1-hour Handar readings in Mobile Corps; 4 1-hour computed by Carters Powerhouse and USGS tape

CHAPTER III

DATA COLLECTION AND COMMUNICATION

GENERAL

Role of regulation office

Role of project operators

DATA COLLECTION AND REPORTING

Automatic radio reporting hydrologic network

River-stage reporting network

Rainfall reporting network

Sedimentation and retrogression surveys

Communications network

## GENERAL

3-01. **Role of regulation office.** It is the responsibility of the Water Management Section of the Mobile District to develop operating procedures for both flood and non-flood conditions. Plans are developed to most fully utilize the water resources potential of each project within the constraints of authorized functions. Time is devoted to maintaining up-to-date information on current and anticipated conditions, and to the collection of data on precipitation and river stages to provide the background necessary for best overall operation. A continuous program of hydrologic investigation is conducted relative to improvement of water control management techniques. The preparation and updating of water control manuals and reports is carried on as part of the routine operations of the section. Arrangements are made by the Water Management Section for communication channels to the project operator and other necessary personnel. Instructions pertaining to reservoir regulation are issued to the operator, and a plan for delivery of all important messages concerning emergency regulation is developed.

3-02. **Role of project operators.** The project operators should be completely familiar with the approved operating plan for the project. Training sessions should be held as needed to insure that an adequate number of other dam operating personnel are informed of proper operating procedures for reservoir regulation. The operator is expected to maintain and furnish records requested from him by the Water Management Section. Unforeseen or emergency conditions at the project that require unscheduled manipulation of the reservoir should be reported to the Water Management Section as soon as possible.

## DATA COLLECTION AND REPORTING

3-03. **Automatic radio reporting hydrologic network.** An automatic reporting network has been installed in the basin above Rome in connection with the operation of Allatoona and Carters Dams. The network consists of three rainfall gages, Amicalola, Wahsega and Mountaintown; five river gages, Cartersville, Kingston, Redbud, Carters and Tilton; and five river stage-rainfall gages, Rome, Resaca, Ellijay, Canton and Talking Rock. The data is collected by project personnel and tabulated at the Carters powerhouse to be transmitted over the phone to Mobile District. The Allatoona project is remotely operated and interrogated from Carters Dam. A microwave system between Carters and Allatoona Dam exists which provides for continuous monitoring and regulation of the project. Information such as pool, tailwater, and other pertinent data needed for regulation is continuously transmitted through the microwave system. The microwave, in conjunction with a VHF radio network, also provides for interrogation of river stage and rainfall stations in the Etowah and Oostanaula basins. The stations report on call and are interrogated at 7 a.m. (EST). Gages may be interrogated more frequently during flood or other critical periods. Locations are shown on Chart 2-1. Other data, such as water temperature and lake pan evaporation, are given to Water Management Section daily.

3-04. **River-stage reporting network.** The Water Management Section presently receives daily river-stage reports from stations in the



Etowah River basin. Other river-stage stations within the general hydrologic network do not report daily, but records are available on a periodic basis. All active river-stage stations within the basin are shown on Chart 2-1 and listed in Table 3-1. Normally the river-stage at each of the reporting stations is reported to the District office each morning at approximately 7:00 a.m. (EST). Personnel of the Water Management Section receive these reports by telephone-computer interrogation or by calling the Carters powerhouse. Additional reports can be received by calling the individual projects and requesting the needed data or by requesting Operations Division in Mobile to establish a pattern of more frequent observations.

3-05. **Rainfall reporting network.** There are 34 current active rainfall stations above Rome included in the Mobile District rainfall reporting network. Reports from these stations are received daily by the Water Management Section and tabulated each morning to give an overall picture of runoff conditions. Stations within the rainfall reporting network are listed in Table 3-2 and the locations are shown on Chart 2-1. The radio reporting stations may be interrogated at anytime while the other stations report in accordance with Standard Weather Service Reporting Instructions, WB Form 612-20. These instructions call for an initial report at 7:00 a.m., 1:00 p.m., or 7:00 p.m. whenever rainfall since last measurement totals 0.50 inch or more and thereafter at 7:00 a.m., 1:00 p.m., and 7:00 p.m. until the rain stops.

3-06. **Sedimentation and retrogression surveys.** In order to provide an adequate surveillance of sedimentation, a network of reservoir ranges has been installed for the Allatoona Reservoir. Quantitative computations can be made from these ranges to compute storage depletion rates. The network also serves as an index of any bank sloughing that may occur. General conditions and changes have been measured and recorded using this network. This network is shown on Chart 1-4 entitled "Reservoir Map-Sedimentation Ranges". To study changes below Allatoona Dam, river cross-sections were taken to determine existing bank shapes and the stream bed profile before operations began. A network of tailwater ranges has been installed to monitor degradation and gradation below the dam. This network is shown on Chart 1-4 entitled "Retrogression Ranges". Sedimentation and retrogression surveys were conducted in 1956 and further resurveys were planned on a periodic basis. If isolated trouble areas appear, a reconnaissance survey will be made to determine the degree and extent of the problem. The first resurvey (using the same cross-section locations) was made in 1960 and showed no large deposits in the principal reservoir. Although a June 1960 study of these downstream ranges shows that the channel below the dam is fairly stable, some isolated areas of bank caving are still noted several miles below the dam. It is planned to make studies of suspended materials, in samples to be obtained at several points and at various discharges, to determine the effect, if any, that construction and operation of Allatoona has on the extreme turbidity of the Etowah River at Rome. Partial studies in 1981 and 1983 were done and the most recent study in 1986 has not been analyzed completely.

3-07. **Communication network.** Communication between the District office and Allatoona is done by telephone. The radio installation at the dam is part of the Mobile District radio communications network. For local communications in the reservoir area there is a VHF radio network consisting of a fixed station at Buford Dam and various mobile stations.

Reports from the National Weather Service are transmitted to the Water Management Section by computer-to-computer land line communication with a Data General S-140 computer located in the Atlanta River Forecast Center or by voice over the telephone. The Water Management Section maintains a State Weather Wire teletype, as well as a Facsimile recorder for receiving reports from the National Weather Service.

Table 3-1

## River Stage Network above Rome

Stream	Station(1)	River Mile	Area sqmi	Datum Elev ft ngvd	Flood Stage ft (2)	Type Gage	Operated
		Etowah River*					
Etowah	Dawsonville	129.17	107	1050.00		Rec	USGS
Etowah	CANTON	77.80	613	844.55	17	Rec	USGS
Etowah	ALLATOONA (Pool)	47.80	1120	0.00		Rec	COE (3)
Etowah	ALLATOONA (TW)	47.73	1120	0.00		Rec	USGS (3)
Etowah	ALLATOONA	47.00	1120	686.92		Rec	USGS
Etowah	CARTERSVILLE	38.22	1330	650.81		Rec	USGS
Etowah	Euharlee	30.54	1598	638.15		Rec	USGS
Etowah	KINGSTON	21.40	1630	609.97		Rec	USGS
Two Run	Kingston (nr)	NA	33.1	730.00		Rec	USGS
Etowah	Rome (SRR)	1.80	1810	561.70		Rec	USGS
Etowah	Rome (2nd Ave)	0.90	1819	561.70		Rec	USGS
		Oostanaula River*					
Coosawattee	ELLIJAY	93.30	236	1216.04		Rec	USGS
Coosawattee	CARTERS (Pool)	73.75	373	0.00		Rec	COE (3)
Coosawattee	CARTERS (TW)	73.55	373	0.00		Rec	COE (3)
Talking Rock	HINTON (NR)	NA	119	890.00		Rec	USGS
Coosawattee	CARTERS REREG	72.25	520	0.00		Rec	COE (3)
Coosawattee	CARTERS (411)	71.86	521	650.67		Rec	USGS
Coosawattee	Pine Chapel (nr)	53.55	856	616.16		Rec	USGS
Conasauga	ETON (NR)	89.62	252	672.64		Rec	USGS
Holly	Chatsworth (nr)	NA	64	690.00		Rec	USGS
Conasauga	TILTON	59.09	682	622.28		Rec	USGS
Oostanaula	RESACA	43.16	1600	604.14	22	Rec	USGS
Oostanaula	ROME (NR)	0.50	2120	561.70		Rec	USGS
Oostanaula	ROME (5th AVE)	0.35	2150	561.70		Rec	USGS
Oostanaula	ROME (5th AVE)	0.35	2150	561.70	25	Rec	USWB

NA-Not Available

(1) Reporting stations indicated by capital letters.

(2) NWS official flood stage.

(3) Gage zero not yet determined.

\*Etowah and Oostanaula Rivers start 645.18 river miles above Mobile, Al and 285.78 river miles above the mouth of Coosa River. All gage miles refer to river miles above Rome, Ga; for instances, the junction of the Coosawattee and Conasauga Rivers is 46.95 river miles above Rome.



Table 3-2

## Rainfall Reporting Network above Rome

Station (1)	Lat+	Long+	Elev	Type	Observer
Etowah River					
CLEVELAND	34 36	83 46	1570	Non-rec	Miss Mary L Sutton
DAHLONEGA	34 32	83 59	1430	Non-rec	Joe W Woodward
Dahlonega (nr)*	34 32	83 56	1170	Radio	COE
DUNCAN BRIDGE	34 32	83 37	1160	Radio	COE
AMICALOLA	34 33	84 15	1350	Radio	COE
WAHSEGA	34 38	84 05	1600	Radio	COE
Dawsonville*	34 25	84 07	1370	Rec	Mrs. Thelma F Cox
Jasper (Inne)	34 29	84 27	1465	Non-rec	Howard L Dilbeck
Ball Ground	34 21	84 23	1175	Non-rec	Miss Lora M Mitchell
Waleska	34 19	84 33	1100	Non-rec	Mrs. Mary B Cline
Canton	34 14	84 29	890	Rec	C B Teasley
CANTON	34 14	84 30	870	Radio	COE
Woodstock*	34 07	84 31	1055	Non-rec	W G Booth
ALLATOONA	34 10	84 44	975	Rec	COE
Cartersville3sw	34 09	84 50	685	Non-rec	G P Tatum
Dallas 7NE*	33 59	84 45	1100	Rec	L Douglas Griffith
Taylorville	34 05	84 59	710	Non-rec	Thomas F Cousins
Kingston	34 14	84 56	720	Non-rec	Susan Hargis
Cedartown	34 01	85 15	785	Non-rec	Ralph H Ayers
Oostanaula River					
Conasaug1N	35 01	84 44	727	Rec	T F Browder
Dalton	34 46	84 57	720	Non-rec	John S Andrews
Chatsworth	34 46	84 47	765	Rec	Mrs. Lois J Cole
Ellijay	34 42	84 29	1300	Non-rec	Mrs. Lora Dover
CARTERS	34 38	84 32	685	Non-rec	COE
Fairmont	34 26	84 42	735	Non-rec	Dymple D Warmack
Resaca	34 34	84 57	650	Non-rec	William W Pollock
RESACA	34 34	84 57	650	Radio	COE
Lafayette	34 42	85 16	810	Rec	J L Moss
Adairsville	34 21	84 56	720	Rec	Mrs. C T Jarrett
Curryville2W	34 27	85 06	650	Non-rec	Joseph B Davis
Summerville	34 29	85 22	780	Non-rec	James R Burgess
Rome Airport	34 21	85 10	637	Rec	NWS
Rome	34 15	85 10	610	Non-rec	William M Towers III
ROME	34 16	85 10	610	Radio	COE

+Latitude and Longitude in degrees and minutes.

(1) Daily reporting stations indicated by capital letters.

\*Rainfall data sent to NWS River Forecast Center in Atlanta.

CHAPTER IV

WATER CONTROL PLAN

EXTENT OF CONTROL

General

Degree of control

Correlation with other projects

REGULATION PLAN

General

Reservoir operation for power

Continuous release

Normal flood control regulation

Flood control guidelines

Channel capacity

Induced surcharge operations

Instructions for crest gates and sluices

Emergency flood control regulation

Mosquito control operations

Fish and wildlife management

Recreation impact levels

Minor deviations

Examples of flood regulation



## EXTENT OF CONTROL

4-01. **General.** Allatoona Reservoir on the Etowah River controls the runoff from a drainage area of 1110 square miles and releases its flows downstream to Rome, Georgia, where the Etowah joins the Oostanaula River to form the Coosa River. The areas which are appreciably affected by flood-control operations at Allatoona Reservoir includes the 48 mile long flood plain between the dam and Rome, Georgia, and the upper portion of the Coosa River flood plain between Rome and the Alabama Power Company's Weiss Dam. The drainage area controlled by Allatoona Dam amounts to about 61 percent of the total Etowah River basin area of 1,810 square miles or 28 percent of the combined total Etowah and Oostanaula River basin area of 4,010 square miles at Rome, and 21 percent of the total Coosa River basin area of 5,270 square miles above Weiss Dam. On the other hand, Carters Dam (376 square miles) controls 9 percent of the area at Rome and 7 percent at Weiss. Drainage areas at other principal points and tributary junctions affected by Allatoona are listed in Table 3-1.

4-02. **Degree of control.** Flood control operations at Allatoona Dam reduces peak stages of the Etowah River below the dam downstream to its confluence with the Oostanaula River at Rome. Releases of stored flood waters will not be made until Rome stage falls below flood stage. Except for large floods as the March 1990 event, the Allatoona flood storage can usually be evacuated in several weeks. Flood level reductions at Rome are primarily effected by Allatoona with Carters project usually providing incidental flood stage reductions at Rome. The flood operation also provides assistance in the flood control operation at Weiss Dam on the Coosa River by reducing the inflow into that project. Weiss Dam is described in detail in Appendix B of the Alabama-Coosa River Basin Reservoir Regulation Manual and Carters is covered in Appendix H. The extent that Allatoona can provide protection from a given storm depends on the rainfall distribution and movement, storm centering and flood characteristics. General area storms tend to be better controlled since the local runoff below Allatoona Dam will have flowed through Weiss Dam before the flood evacuation releases are required at Allatoona Dam. The flood control storage between pool levels 840 and 860 feet (302,580 acre-feet or 5.11 inches of runoff) would completely control a flood equal to 40 percent of the standard project flood. If the initial Allatoona pool were at elevation 823 feet (467,280 acre-feet or 7.89 inches of runoff) a flood equal to 62 percent of the standard project flood could be completely controlled at the dam. Since the beginning of operations, the maximum 1-day inflow of 45,845 cfs occurred on 3 February 1982. If the project had been operated since 1891, the highest pool level attained before 1950 would have been elevation 860.3 feet ngvd in July 1916. The observed maximum pool was 861.19 feet on 10 April 1964. This maximum elevation was reached in part because of a series of floods that limited the flood evacuation releases. For floods larger than the April 1964 event, there is always the possibility that the induced surcharge curve (high pool and inflows) would be required to pass large flows downstream. In such a case the project would provide less than maximum flood control at Rome and there might be flood damages around the lake since many facilities have been built based upon the 863 level.

4-03. **Correlation with other projects.** Weiss Dam below Rome, the levee system in the Rome area and Carters Dam above Rome are affected

in varying degrees by flood control operations at Allatoona Dam. Flood control operations at Allatoona, Carters and Weiss Dams during the rising phase of a flood will normally be independent of each other. Following a flood, the emptying of flood storage at Allatoona may prolong the time required to evacuate flood storage at Weiss Dam. Allatoona releases will be made so as to minimize any undesirable conditions that might be created by the emptying operation and maintain its flood control objective at Rome. The Corps of Engineers and Alabama Power Company have arranged for regular and rapid exchange of data concerning the two projects. This will permit the fullest coordination of their operation. Carters Dam is located on the Coosawattee River, a tributary of the Oostanaula River, 73.8 river miles above Rome. It is a multiple-purpose project with principal functions of flood control and hydropower. The evacuation of flood storage at the Allatoona and Carters Dams is coordinated so that the combined discharges will not cause or aggravate flooding at Rome. The effect at Rome of routine power operations at the two projects will be discussed in the section on low flow operations. The levee system at Rome was built by the Corps of Engineers for the protection of the Fourth Ward in Rome, the flood plain area north of the Coosa and west of the Oostanaula Rivers. The elevation of the top of levee is 605 feet ngvd, corresponding to a stage of 43.3 feet on the National Weather Service gage at the 5 th Avenue Bridge across the Oostanaula River. Since flow from the dam will ordinarily be stopped whenever a stage of 25 feet or higher is expected, there must be the fullest coordination possible between the Allatoona and Carters projects. As a rule, the Allatoona flood inflows will be stored longer than the Carters floods inflows because Allatoona has a larger flood control storage and a shorter routing time to Rome.

#### REGULATION PLAN

4-04. **General.** The Allatoona project will be operated to provide hydroelectric power and to maintain a continuous release of at least 240 cfs during non-generating periods. During low flow periods regulation will provide increased flow downstream for water quality requirements and other purposes. Storage allocated for conservation uses varies from 119,880 to 284,580 acre-feet between the minimum conservation pool elevation of 800.0 feet and the top of conservation pool that varies from elevation 823.0 to 840.0 feet. This varying storage from 302,580 to 467,280 acre-feet between the top of conservation pool (840 to 823) and elevation 860.0 feet has been reserved exclusively for retention of flood waters. Additional flood storage of 100,600 acre-feet between elevation 860 and 865 feet is available for induced surcharge routing operations. Above elevation 865, the spillway curve is followed with the spillway gates opened. The regulation plan for Allatoona flood control operations reduces the flows along the lower Etowah River, Rome and Weiss Dam. The area and capacity curves are shown on Chart 1-3.

4-05. **Reservoir operation for power.** The powerhouse operation is under the direction of the Power Project Superintendent for the Allatoona-Buford-Carters Power Projects, located at the Carters powerhouse. The starting and stopping of hydropower turbines at Allatoona Dam is controlled from there by remote control. The Allatoona project is manned with minimum personnel needed for maintenance and emergency operations. Provisions are made to operate the project on site should control or communications equipment be inoperative.



4-06. Energy and capacity produced at the project are marketed by the Southeastern Power Administration (SEPA) in accordance with the Flood Control Act of 1944. Power from Allatoona is marketed as part of a system of hydropower resources known as the Georgia-Alabama-South Carolina system. A system contract for these resources provides a portion of the power needs for a number of preference (cooperatives and municipals) customers throughout the Southeast. The projects which make up this system are Hartwell, Richard B. Russell, and Thurmond Dams on the Savannah River, Buford, West Point, and Walter F. George Dams on the Chattahoochee River, Allatoona Dam on the Etowah River, Carters Dam on the Coosawattee River and Jones Bluff and Millers Ferry Dams on the Alabama River.

4-07. Water Management Section (WMS) will furnish weekly to the South Atlantic Division declaration of energy generation and capacity available for the upcoming week at Allatoona (and other projects). The power capacity will be based on generating units and net head available while the amount of energy will be based on lake level, the time of year, weather conditions, inflows and requirement of or impact to other authorized functions of the project. SEPA will have furnished on Friday to the project operator a daily generation schedule for the period from Saturday through Friday that should equal the generation declared by WMS. Once the daily schedule has been received at Mobile District, there may be changes either requested by the Corps or by the power company. In the case of changes by the power company the Corps' operator will notify the Water Management Section of the changes to ensure that the increased or decreased generation schedules are not inconsistent with flood control or other water management objectives. During flood events or extreme weather conditions, the daily schedule may be cancelled by the WMS. During the first critical days of flood storage evacuation the daily and hourly operation will be directed by WMS until the conditions return to normal.

4-08. A top of conservation pool curve has been developed for the project as shown on Chart 1-11. The pool normally will be operated to maintain a level at or below the curve except when storing flood waters. The compulsory drawdown to elevation 823 feet in advance of flood season provides 467,280 acre-feet of flood control (elevation 823 to 860) as compared to 302,580 acre-feet of storage (elevation 840 to 860) during the summer season. The maximum drawdown is to elevation 800 feet ngvd, the minimum conservation pool level. Chart 1-11 show two zones within the conservation pool. Unless this chart is superseded by a basin-wide plan for storage utilization, these zones will be used as a guide to the generation to be provided from the Allatoona project towards meeting the system hydropower contract. While Allatoona is in Zone 1, the project conditions are normal to wetter than normal. Most likely, other projects within the basin or within the federal hydropower system are similarly normal to wetter than normal. Therefore full consideration will be given to meeting the power contract amounts developed by SEPA. This consideration will be weighed with the other purposes of the project to insure the appropriate project utilization. Other operational considerations when the pool is in Zone 1 will be to balance the drawdown of Allatoona with other lakes in the basin and other lakes in the hydropower system. Recreational impact levels (see paragraph 4-19) will be considered in making outflow decisions during the recreation season. Water quality and fish and wildlife factors will also be given full consideration while in Zone 1. More conservative operations would be followed when in Zone 2. A pool level in Zone 2 will indicate dry or impending drought conditions. Careful, long range, analyses and projections of inflows, pool



levels, and upstream and downstream water needs will be made when pool levels fall in Zone 2. In Zone 2 the minimum generation to support dependable hydropower capacity would generally be run. If drought conditions become severe Zone 2 would be reserved for emergency needs, either hydropower or downstream water supply, water quality or other extreme needs. When projected conditions indicate a significant possibility of exhausting conservation storage routine hydropower generation may be suspended and other conservative measures taken which would be appropriate to the drought severity. Continuous streamflow releases would probably be continued throughout any drought condition. The line demarcating Zones 1 and 2 is a guideline. When forecasts indicate the pool level will be moving from one zone to another the Corps will make release decisions to bring about a smooth transition in outflow between the zones. The transition will typically occur over a one foot pool elevation and within this transition zone the generation will typically be four hours per day.

4-09. **Continuous release.** A minimum continuous release from Allatoona Dam is accomplished by operating the small turbine-generator unit continuously. If the small unit is out of service, a large unit release for 20 minutes every few hours may be made to insure a daily minimum flow of 240 cfs. During long periods of only minimum flow release it is advisable to periodically release some water from the large turbines. Doing so will both keep the turbine-generators in good operating condition and also provide streamflow diversity for environmental purposes. In addition to the turbines releasing water for continuous minimum streamflow maintenance, releases can be made through the spillway or through sluices. It is preferable for water quality reasons to release through the spillway particularly during periods when the lake would be stratified.

4-10. **Normal flood control regulation.** Flood control instructions are provided to the project operators by the Water Management Section in the Mobile District Office as described in Chart 1-12 and paragraph 4-12. Releases depend on the Allatoona pool level and on stages forecasted for the Etowah River below Allatoona Dam, Oostanaula River at Rome and Coosa River at Rome. During the rising phase of a flood, normal power operation as a peaking plant will be permitted unless predictions indicate that the power releases added to the uncontrolled area runoff would cause or aggravate damaging flood stages along the lower Etowah River and at Rome. Whenever it is considered appropriate the Water Management Section will furnish the operator with estimates of rainfall amounts which would be sufficient to cause flooding with instructions to contact someone in WMS immediately if such rainfall should occur. Runoff will be retained in the flood control space if the releases must be restricted downstream. When the flood is receding downstream, the water in flood control storage will be released in accordance with the rules on Chart 1-12 without exceeding the bankfull capacity downstream. There may be minor deviations from the evacuation rules when the pool approaches the top of conservation pool in order to permit realistic scheduling of power generation which is done on a weekly basis.

4-11. **Channel capacity.** The channel capacity below Allatoona has been determined through actual operating experience from the April 1964 floods to be about 9,500 cfs. This capacity has been reconfirmed in flood water evacuations in 1990. When the project went into operation in 1949, the top of conservation pool was at elevation 835 feet and the regulation



plan called for evacuation of flood waters stored above that level as soon as practicable by releasing at rates not to exceed the downstream bankfull capacity estimated at 12,000 cfs. A survey and real estate appraisal was made to determine the acreage involved and the cost of acquiring easements to permit emptying releases up to 12,000 cfs. This higher release rate, which would expedite the evacuation of flood storage, would be necessary to permit operation of the power plant at full capacity if the third generating unit were installed. Until such easements are acquired flood storage will be emptied at a maximum rate of 9,500 cfs. A late 1960's review of the April 1964 floods showed that an emptying release rate of 9,500 cfs, as compared to the 12,000 cfs rate, had no diminishing effect on flood control benefits.

**4-12. Flood control guidelines.** From 1961 until 1989 with the exception of the 1964 flood event all flood zone evacuations were accomplished with full powerhouse releases unless a turbine was unavailable. However, floods in late 1980's in combination with restrictions to powerhouse capability dictated a review of the plan and past practice. Full channel-capacity outflow is prudent when a high percentage of flood storage is filled. The flood control plan for Allatoona is essentially described on Chart 1-12. The prime objective of flood control is to retain flood waters in Allatoona when the Rome stage is above the flood stage of 25 feet and to release stored waters without causing or unduly prolonging downstream flood damages. In revising the guidelines for Allatoona the new Zones D and E were added. Zone E would require channel capacity (9500cfs) release whenever downstream conditions allow. Zones D and C would be zones in which the release of about 9500 cfs would be the standard minimum flood evacuating release with discretionary reduction to powerhouse capacity of 6500 cfs based upon present and expected conditions for the downstream reaches and weather conditions. If the pool can be significantly lowered by peaking power releases then such reduced daily releases may be made if so doing is prudent in light of expected weather condition.

**4-13. Induced surcharge operations.** If current pool levels and inflow rates indicate that runoff from a storm will appreciably exceed the storage capacity remaining below elevation 860 feet; the flood control operation will be directed by the induced surcharge schedule shown on Chart 4-2. This schedule will follow the objectives set forth in EM 1110-2-3600: "(1) Peak rate of reservoir release during damaging floods should not exceed peak rates of the corresponding floods that would have occurred under runoff conditions prevailing before construction of the reservoir. (2) The rate of increase in reservoir releases during significant increment of time should be limited to values that would not constitute a major hazard to downstream interests." A lower outflow can be released in the earlier stages of the flood event if there is a possibility that the flood wave would create a hazard downstream; however, a release up to channel capacity of 9500 cfs would be feasible before the actual use of the induced surcharge curve if weather and flow conditions indicate a need to postpone the rapid increase of discharge shown in the induced surcharge curve.

**4-14.** The induced surcharge operation during floods which exceed the available flood storage is a departure from the operating plan outlined in the Definite Project Report. In that report the pool level would be maintained at elevation 860.0 feet by regulating the gates to make outflow equal to inflow until all spillway gates were opened, after which the outflow becomes uncontrolled until the pool level dropped back to elevation



860 feet. A study of induced surcharge operation was done in February 1947 to determine the most desirable plan for Allatoona Dam. Since Allatoona Dam was under construction at the time, induced surcharge operation was limited by the pool elevation-gate opening curve, shown on Chart 4-3, so that the maximum pool for the spillway design flood could be held to a level that would not necessitate major changes in the structure. The gate operating machinery is provided with limit switches which will open gates in 0.5 foot increments up to a 12 foot opening. In following the induced surcharge schedule the gates will be opened as uniformly as practicable with no gate opening more than 0.5 foot larger than any other gate opening. Routing of the spillway design flood through the reservoir is shown on Chart 2-9. The maximum pool elevation is 872.1 feet as compared with 870.2 feet for the original induced surcharge plan and 868.4 for the constant pool operating plan. Special considerations of spillway gate openings after a probable maximum flood (PMF) are based upon concerns about the safety of Allatoona Dam. Under current induced surcharge operations, gates would be maintained at gate openings to discharge the amount required by Chart 4-2 until pool levels recede to 859.5 feet, NGVD. Then the greater of the inflow or the maximum allowable under the regular flood control schedule would be released. Allatoona releases then will be made through turbines, as explained in Charts 4-2. Hydropower generation will continue according to Zone E criteria on Chart 1-12. The routing of another large flood, the Standard Project Flood, is shown on Chart 2-10 and is an example of the induced surcharge operation which is less severe than the PMF; the SPF will exceed the maximum flood stage of 863 feet for buildings on federal lands within Allatoona Lake.

**4-15. Instructions for crest gates and sluices.** When it is necessary to release water other than through the turbines, the following instructions apply:

a. If pool is above elevation 835.0 feet (spillway crest) the discharge will be made preferably through crest gates. Discharge uniformly across spillway (or as nearly so as possible) by setting gates so that no gate opening is more than 0.5 foot larger or smaller than any other gate opening. Gates will be opened in the following order: 11, 1, 6, 8, 4, 10, 2, 7, 5, 3, 9: this order of operation will be reversed when closing. Gates are numbered in order across the spillway commencing with No. 1 adjacent to the powerhouse. The gate operating schedule is given on Charts 1-6 and 1-7.

b. When the pool is above elevation 835.0 feet and the required discharge can not be maintained through crest gates, or if pool is below elevation 835.0 feet, it will be necessary to discharge through the sluices. The four 5'-8"x 10'-0" sluices will be opened in steps not exceeding 5 feet so that no sluice is opened more than 5 feet until all sluices are opened that amount. The sluices may be operated in any order. Sluice outflow capacity is shown on Chart 1-8. Short-time releases of 11,200 cfs may be made as long as the tailwater does not exceed elevation 697.0 feet and cause overtopping of the sump wall in the future Unit #3 draft tube.

c. The 48-inch sluice (Howell-Bunger valve) has been removed from service and not available to release water from the reservoir.

**4-16. Emergency flood control regulation.** If a storm of flood producing magnitude occurs and all communications are disrupted between the



District Office and Allatoona Dam, the emergency operating instructions given in Chart 4-1 will be followed. If communication is broken after some instructions have been received from the district office, those instructions will be followed for as long as they are applicable, after which the emergency schedule will be used. It will be the responsibility of the powerhouse operator to obtain the gage readings at Cartersville and Rome by whatever means possible before any power releases are made. The Cartersville gage is located on the downstream side of State Highway No. 61 bridge on the Etowah River and the gage at Rome is on the 5th Avenue Bridge on the Oostanaula River. The critical stages listed in Chart 4-1 for Cartersville and Rome are the natural stages at those points caused by the local inflow from the uncontrolled area with no releases from the dam. The two gages have been selected to determine if the additional flow from power releases will not result in stages above bankfull. The average time of travel and rates of rise have been taken into account. Power operations will be curtailed by the powerhouse superintendent when they would contribute appreciably to above bankfull stages downstream. Bankfull stage corresponds to a stage of 15 feet on the Cartersville gage and 20 feet on the Rome 5 th Avenue gage. If it is impossible to obtain (or estimate) stages at Rome and Cartersville, all outflow from the dam will be stopped, except for that through the service unit, until the pool reaches a level which requires releases according to the induced surcharge schedule on Chart 4-2. The operating instructions on Chart 4-2 will be followed whenever applicable, regardless of downstream conditions.

4-17. **Mosquito-control operations.** The need and extent of mosquito-control operations at Allatoona Reservoir during the mosquito season from May through September was discontinued in 1983 when a review indicated that controlling of plant growths by use of herbicides, removing drift and trash and normal fluctuation of the water levels accomplished that mosquito control. Power operations will generally cause a gradual drawdown after 30 June and will eliminate the major portion of mosquito areas as the water moves away from the annual growths of weeds and grasses, leaving a clean shoreline.

4-18. **Fish and wildlife management.** Regulating the water levels to control rough fish, to aid game fish reproduction should be attempted whenever possible. Mobile District fisheries biologists in cooperation with the fish and game personnel of the state will determine the beginning and ending of the bass fish spawning period. This spawning period will usually occur in April or May and lasts 1 to 3 weeks. By the terms of South Atlantic Division SAD DR 1130-2-16 dated 26 June 1978 project personnel will commence taking daily water temperatures in the reservoir during early spring when water temperatures reach 60 to 65 degrees Fahrenheit (F) and report values to the Water Management Section. Bass spawn shortly after the water temperature reaches 70 degrees F. The spawning period generally begins when the water temperature reaches 65 degrees F and the water level will be controlled to drop no more than six inches below the level at that time. Other game fish such as blue gills, redbreast, and warmouth bass will spawn after the water reaches 80 degrees F without further water level management.

4-19. **Recreation impact Levels.** During peak recreation season, generally Memorial Day through Labor Day, consideration will be given to recreational needs in making water management decisions. Project resources management personnel have developed a series of threshold impact elevations

which will be useful guides to understanding the recreational impact of water management decisions. These levels and definitions are given in the following paragraphs:

Initial Impact Line (IIL)-837. This is the elevation at which the recreational usage and recreation-related economy will begin to notice impact. Swimming areas will be reduced in size. Private docks will need adjusting and some boating hazards may become evident in remote areas of the reservoir. Marina concessionaires will begin to need to move docks and water related business will decline.

Recreation Impact Line (RIL)-835. Recreation will be more severely affected at this level. All regular swimming areas will be exposed. Two boat ramps will be closed. Almost half of the private docks will be affected. Marina business will be severely reduced.

Water Access Line (WAL)-828. Recreation will be severely restricted. Only half of boat ramps will be usable. Private docks will be totally unusable. Hazards to navigation will be numerous. Marinas will have severe problems such as gas docks being grounded and some slips being unusable. There will be reduction in recreational business activity.

4-20. **Minor deviations.** Occasionally, a temporary deviation from the normal regulation of the lake is needed to accommodate a special activity within the lake area or downstream; those minor deviations should be requested and documented, although they are not considered emergencies. Construction accounts for the major portion of these incidents and includes utility stream crossings, bridge work, improvements to recreation structures, tailrace surveying and major construction contracts. Stream measurements by Corps or U.S. Geological Survey personnel should be coordinated through Water Management Section in advance. Changes in releases are sometimes necessary for maintenance and inspection. The requests for release changes are usually for a few hours or days and each request should be considered on its own merit taking into account the upstream watershed conditions, potential flood threat, conditions of downstream lakes, water supply or hydropower needs, and possible alternative measures. Any extended change in lake operation should be approved by South Atlantic Division by telephone if there are no adverse effects on the overall reservoir regulation. Personnel requesting deviations from the water control plan should do so in writing whenever the deviations are significant.

4-21. **Examples of regulation.** The effects of reservoir regulation on the probable maximum and standard project floods and three floods are shown on Charts 2-3 through 2-10. Allatoona Reservoir has flood control storage for the equivalent of 5.1 inches of runoff from the drainage basin at elevation 840 feet and can easily store most storm runoff; however, the outflow is usually reduced to the 7Q10 outflow of 240 cfs whenever the Rome 5th Avenue stages exceeds its flood stage of 25 feet, provided that Induced Surcharge releases are not required from Chart 4-2. The April 1964 series flood caused the highest pool elevation of record due the prolonged series of floods with very little flood evacuation between storms. The April 1979 and March 1990 floods represent a large single peak flood with a high resulting pool. The 16-18 March 1990 flood at Rome is a good example of flood control usage at Allatoona to lower the flood damages at Rome. The retention of the 40,700 cfs daily peak inflow



into the pool reduced the natural Rome stage by 7 feet and by 17 feet at Kingston. The rainfall of 5.3" on March 16-17, 1990, and the storing of water at Allatoona Lake resulted in the inflow exceeding the releases from the 17th through the 23rd. The pool rose to 855.82 feet; induced surcharge releases were not required since the inflow had decreased significantly by the time the pool had risen to elevation 855 feet. Rome stage fell below 25' early on the afternoon of the 23rd and the full powerhouse release began that morning, considering the travel time of 12 hours to Rome for the discharge (Table 6-3). About two days later an additional spill of 1500 cfs was begun to help lower the pool more quickly. The initial pool for the standard project flood would probably occur sometime in January through March since that is the period of the maximum floods since 1950. Table 2-4 shows the yearly maximum pool and daily discharge resulting from Allatoona operations. A top of conservation pool level is shown on Chart 1-11.

CHAPTER V

DROUGHT CONTINGENCY PLAN

DROUGHT MANAGEMENT

General

Critical drought considerations

Drought occurrence and lakeside development

Drought public information

Recognition of drought

Drought comparisons

Drought plan

Further studies



## DROUGHT MANAGEMENT

5-01. **General.** Development of a drought contingency plan is referenced in Engineering Regulation ER 1110-2-1941 dated 15 September 1981. Chart 1-11 presents guidelines for water releases for Lake Allatoona. Whenever the pool elevation reaches the lower zone shown on the chart, outflows are reduced as indicated. The chart was developed by studying the 1986 and 1988 droughts and the other flows since the start of operation in 1950. The reservoir operation during 1988 followed the general guidelines shown on Chart 1-11. During 1988, the pool was below elevation 830 feet by the end of March and the release for April and May was reduced to that which could be discharged through the small turbine alone plus a short period of peaking to provide flow diversity and produce a daily average release volume of 330 cfs. The 7Q10 releases (a requirement to pass the once in ten-year seven-day continuous natural flow at the dam site) of 240 cfs below the dam and the needed inflow at the city of Rome intake were maintained by generating parts of an hour with a large unit when needed. Water managers will closely monitor streamflow and weather conditions to be aware of any impending drought conditions. In addition, water managers will as much as possible remain cognizant of downstream uses of water which can be affected during drought. The 1980-81 and 1985-86 droughts affected the Chattahoochee River as well and caused some problems with the energy contracts by which the Corps operates Allatoona, Carters, the Chattahoochee River projects and the Savannah River projects.

5-02. **Critical drought considerations.** During a drought, the Allatoona Lake level will be lower and lake releases will be less. Considerations of flow and elevation which are not normally relevant will become important. Environmental maintenance of the downstream reach of the Etowah River will be an important consideration in future droughts. An endangered species, the amber darter, has been suspected to possibly exist downstream of Lake Allatoona. Maintaining an aquatic environment in the Etowah River is accomplished by continuous small turbine releases of about 220 to 250 cubic feet per second. Additional leakage and seepage from the Dam and powerhouse adds about 40 to 60 cfs. The resultant total continuous flow ranges from 260 to 310 cfs as measured by the USGS immediately below the dam. This is the release provided whenever large turbine releases are not scheduled. Releases of 260-310 cfs may persist for several days. During droughts, particularly in the late spring refill period, there may be extended periods when only the continuous release is being made. The published 7Q10 of 240 cfs is normally always exceeded by the continuous release. In the late 1970's a study by the USGS for the Georgia Department of Natural Resources concluded that the natural 7Q10 for the Allatoona dam site was 330 cfs. However, in recent discussions with the state pertaining to reallocations of reservoir storage for water supply it was revealed that the state still accepts the 240 cfs as the 7Q10 flow. We have generally accepted the minimum continuous flow as sufficient for maintaining the stream environment. In the occurrence of future droughts during which the continuous release may be the only release for a number of days or weeks, careful review in consultation with environmental agencies will be given to the adequacy of continuous releases.

5-03. A major thermal-electric generating facility is located on the Etowah River near Euharlee, about 16 miles downstream of Lake Allatoona. Plant Bowen generates a large portion of the power supply of Georgia. The Etowah River is the source of cooling water for the plant and during very dry

periods water releases from Allatoona storage may be necessary to assure sufficient flow in the Etowah to allow for cooling water withdrawals.

5-04. The Coosa River downstream of Rome has historically experienced water quality problems in low flow periods. A review of water quality records from the summer of 1986 revealed that there were high stream temperatures and low dissolved oxygen concentrations in the river. Releases from Lake Allatoona can at least partially mitigate water quality deficiencies in the Coosa River.

5-05. Cobb-Marietta Water Authority and the City of Cartersville use Lake Allatoona as a source of water supply. In a drought, there will be serious concern about protecting these supplies. The use of contracted water supply storage space will be carefully monitored. The purpose of the monitoring is to determine whether contracted water supply storage is exhausted. If contracted storage space were exhausted there would be no legal basis for continued withdrawals and Mobile District would confer with higher authority for instructions. From a physical perspective the Cobb-Marietta intake can be operable down to elevation 805 to 810. The Cartersville intake is at the face of the dam and could operate down to the minimum conservation level of 800.

5-06. **Drought occurrence and lakeshore development.** Lake Allatoona has a conservation storage between elevation 800 and 840 feet but the lake has only rarely been drawn below elevation 820. In fact, the elevation has not been below elevation 820 since 1963. Because of this long history of not evacuating the conservation pool, public expectations and awareness about low pool elevations are inconsistent with the minimum authorized levels. Many private, public, and Corps of Engineers facilities have been developed which will not be useable during the occurrence of a major drought drawdown. An occurrence of a significant drought could, however, provide an opportunity to extend and/or repair boat ramps, modify docks and other facilities and in general increase the public awareness that the authorized conservation pool limits can be reached in very severe droughts.

5-07. **Drought coordination.** A drought will affect many interest groups, organizations, and other government agencies throughout the basin. Coordination of the different organizations responsible for drought response will be beneficial to present unified and responsive drought management. Some of the organizations which may be included in special drought coordination activities for Allatoona are:

1. Lake property owners associations.
2. Marina and marine trade organizations.
3. Water supply utility managers, both within the Lake and downstream.
4. Southeastern Power Administration and power customer organization.
5. Georgia Power Company.
6. Alabama Power Company.
7. State water supply and water quality agencies.
8. Industrial water users.
9. State and Federal fish and game agencies.
10. Environmental conservation organizations.
11. Local county and community governments.
12. Regional governmental planning agencies.
13. State and local emergency management agencies.
14. National Weather Service and U.S. Geological Survey.



To assure compliance with the Federal Advisory Committee Act, all coordination will be done on an ad-hoc basis. Coordination will be scoped to fit the situation. Not all parties mentioned above will necessarily be involved in coordination meetings. Meeting frequency will vary according to circumstances. Generally coordination meetings should be no less frequent than every three months nor more frequent than monthly. The Corps of Engineers is engaged in a Comprehensive Study of Alabama-Coosa River Basin. One intent of the study is to develop institutional arrangements for water management. Perhaps some coordination structure similar to that used in the Apalachicola-Chattahoochee-Flint system during the '86 and '88 droughts might be adopted for drought coordination.

5-08. **Drought public information.** Various segments of the general public will be acutely interested in water management activities during a drought. Public information programs such as news releases, news conferences, and public meetings will be provided as necessary. Every effort will be made in the public information program to be factual and open, in describing present and expected water actions.

5-09. **Recognition of drought.** No predictive tool has been developed which will indicate that a drought will occur in the near future but several parameters can signal the start of a drought period. University of Alabama has developed a water availability index for Lake Lanier which considers the last four monthly rain shortages and the current and average historic pool elevations. National Weather Service has developed an Extended Streamflow Prediction model which predicts inflows based on climate, streamflow and soil moisture. NWS also computes a Palmer Drought Index that indicates the availability of moisture for plants. Reservoir operations with storages and inflows do not correlate closely with the Palmer index. Other factors are the percent flow required to meet hydropower, water supply and quality demands, the groundwater levels and the weather patterns.

5-10. **Drought comparisons.** Table 5-1 illustrates the Allatoona inflows and percent of monthly inflows to the long-term average monthly flows for 1952-56, 1980-81 and 1985-86. The preceding summer and spring flows were very low at the start of the second summer for 1954-56, 1981-82 and 1985-86. In Table 5-1 those droughts had 10, 19 and 11 months below half the average monthly inflow and 3, 14 and 4 months near or below 33% of average. The 1985-86 drought was more wide spread than the 1980-81 in the Southeast United States. The Corps has been studying water supply reallocation of storage at Allatoona reservoir and increased water withdrawals should be expected in the future. Allatoona conservation storage of 285,000 acre-feet is 22 percent of the average annual inflow and the low ratio means that two months from December through April of normal inflow could refill the reservoir without releasing any water. By comparison, Lake Lanier has conservation storage of over one million acre-feet which is 130 percent of the average annual inflow.

5-11. **Drought plan.** The drought plan was based on several observations. Lake Allatoona has a low storage to drainage runoff ratio and can be refilled in two wet months. The pool refilled the year after the 1986 and 1988 droughts. Lake Lanier, on the other hand, did not recover from the 1986 drought before the 1988 drought affected the lake. Charts 1-11 and 1-12 were drawn from data gathered for 1986 and from a study of storage and inflows from the project. A volume duration of inflow was used to determine the chance to fill the pool if the pool started at the end of month at a certain

pool level. By following the curve based on volume duration the percent of inflow has a meaning when it is used for predictive purposes. The 1-in-10 inflow predicts very dry conditions and 1-in-2 inflow predicts the median condition. From a study of the two droughts, all large unit generation stops when the pool drops five feet during January and December and twelve feet during May through September below the top of conservation. At the end of May, the pool should be above elevation 836 feet to insure that minimum releases for hydropower and downstream water quality, water supply, and other minimum needs can be made from stored water in the event that inflows are significantly below normal. A minimum generation of 2 hours/day is allowed if the pool is in Zone 2. Zone 1 represent more normal circumstances and maximum generation would normally be two to six hours per day.

5-12. **Further studies.** The Corps has underway a Comprehensive Study of the Apalachicola-Chattahoochee-Flint and the Coosa-Alabama River Basins. This study is being highly coordinated with the involved states. The study offers an opportunity to develop a basin-wide water management plan, including droughts, which would provide guidelines for use of storage in all Federal and Federally-licensed reservoirs in the basin.

**Table 5-1**  
**Allatoona Monthly Inflows during Droughts in CFS**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Allatoona Inflow (1110 square miles)											
1954	3867	1701	2151	2115	1460	924	560	449	216	235	499	946
%avg	160	61	68	69	70	68	49	46	29	27	45	52
1955	1321	3113	1760	2292	1331	779	916	651	256	399	668	648
%avg	55	111	56	75	63	58	80	67	35	46	61	35
1956	630	2292	2466	2690	2020	792	1048	456	537	556	600	1596
%avg	26	82	79	88	96	59	91	47	73	65	55	87
1980	276	219	832	405	298	188	91	56	74	92	79	66
%avg	11	8	27	13	14	14	8	6	10	11	7	4
1981	619	2601	1394	1281	1446	1176	326	490	338	342	390	983
%avg	26	93	45	42	69	87	28	51	46	40	35	54
1985	1155	3093	1383	1185	1315	719	1040	1142	456	589	761	1059
%avg	48	111	44	39	63	53	91	118	62	68	69	58
1986	828	940	1185	644	727	284	163	171	430	1084	1134	1122
%avg	34	34	38	21	35	21	14	18	59	126	103	61
AVG	2425	2796	3119	3075	2102	1351	1146	965	734	861	1101	1833

NOTE: Average monthly project inflow from Chart 2-12 was used (1950-90).



CHAPTER VI

HYDROLOGIC FORECASTS

FORECASTING

General

Issuing forecasts to public

Forecasting procedure

Effects of power releases

MODELLING

History

Daily models

Other models

## FORECASTING

6-01. **General.** The operation of Allatoona Dam will be scheduled by the Water Management Section in accordance with forecasts of reservoir inflow and pool and river stages. Carters Dam operations will also need to be done at the same time and in conjunction with the operation of Allatoona Dam to reduce the flood damage at Rome and between the dams. During daily data collection, a forecast program provides the next ten daily values; the same program on Wednesday is used to determine the amount of the coming Monday-Friday generation. All features of the forecasting procedure are subject to modification and refinement as additional data and operating experience are accumulated.

6-02. **Issuing stage forecast to public.** The issuing to the general public of stage forecasts is the legal responsibility of the National Weather Service. Forecasts for the Alabama-Coosa River basin are prepared by the National Weather Service's River Forecast Center in Atlanta, Georgia and issued by Weather Service Forecast Offices in Atlanta, Georgia, and Birmingham, Alabama. Water Management Section maintains close liaison with the offices at all times to exchange information. This exchange includes information on pool levels, inflows and anticipated outflows from the Allatoona Reservoir. During flood emergencies, the National Weather Service is advised regularly of conditions upstream and downstream of the Allatoona Reservoir for the purpose of preparing forecasts for dissemination to the general public.

6-03. **Forecasting procedure.** Because Lake Allatoona is located 48 river miles above the primary damage point at Rome, the forecasting procedure is based on routing Allatoona releases with moving average method and adding the local runoff at Rome. The problem of forecasting stage at Rome is further complicated by being located at the junction of the Etowah and Oostanaula Rivers. Carters area is about 17 percent of Oostanaula basin and routes 36 hours to Rome, while the Allatoona area is about 61 percent of the Etowah basin and routes 18 hours. Flood events of several days produce double peak floods and at times both rivers are at very different water surfaces. Rainfall runoff relationships for the two basins have been derived from past records for various antecedent conditions and are shown as Table 6-1. By using the rainfall volumes in inches for the area above Allatoona and applying the Etowah River rainfall-runoff ratio, the flood volumes and stages can be estimated. Inflow hydrograph computation and flood routing is now done by the computer. Adjustments to the reservoir outflows are then made if the resulting downstream reaches are shown to be out of the channel.

6-04. If contact is lost with the District, Chart 4-1 provides the project operator five conditions by which some action is taken if stages downstream are near flood stage. The first three conditions are based on the stage at Rome being at bankfull and above and states what to do with scheduled generation. Condition four restricts releases from Allatoona whenever the stages at Rome (25'), Kingston (11') and Cartersville (18') are at flood stage or greater. Condition five, of course, provides for the situation wherein the safety of the dam is threatened by the high inflow and pool level. Under this condition induced surcharge releases are to be made without regard to downstream conditions. Chart 6-1 and Table 6-3 show

that one unit operating seven hours will produce 4,000 cfs downstream. Under normal conditions, generation should be stopped twelve hours before the Rome stage exceeds 25 feet. Therefore, the routed flow at Rome must be added to the local runoff. Etowah and Oostanaula Rivers total flood hydrographs at Rome are computed and those discharges are converted to stages by use of Chart 2-37. The predicted stage hydrograph and the corresponding release limitations will be modified as warranted by subsequent stage reports, due allowance being made for the contribution of actual releases from the dam.

Table 6-1

## Rainfall-Runoff Table at Rome

Rainfall	Runoff in inches over Drainage Area*										
	Etowah Basin					Oostanaula Basin					
	0	.2	.4	.6	.8	0	.2	.4	.6	.8	
Wet	0	0	.01	.03	.05	.08	0	.04	.09	.15	.21
	1	.12	.16	.20	.24	.30	.28	.36	.44	.54	.64
	2	.37	.44	.51	.58	.66	.74	.84	.96	1.08	1.22
	3	.75	.84	.93	1.02	1.14	1.37	1.52	1.67	1.81	1.97
	4	1.27	1.44	1.62	1.80	1.98	2.12	2.27	2.41	2.56	2.71
	5	2.16	2.34	2.52	2.70	2.88	2.85	3.00	3.15	3.30	3.45
	6	3.06	3.26	3.46	3.66	3.86	3.60	3.75	3.89	4.04	4.19
Normal	0	0	.01	.02	.04	.06	0	.03	.06	.08	.11
	1	.08	.10	.13	.16	.20	.14	.18	.22	.26	.30
	2	.24	.30	.36	.42	.47	.36	.40	.44	.50	.58
	3	.53	.59	.67	.72	.77	.65	.73	.81	.90	.98
	4	.83	.90	.97	1.05	1.14	1.07	1.14	1.21	1.29	1.38
	5	1.22	1.32	1.43	1.56	1.68	1.46	1.56	1.67	1.80	1.92
	6	1.80	1.94	2.08	2.22	2.36	2.04	2.18	2.32	2.48	2.60
Dry	0	0	0	.01	.02	.04	0	.02	.04	.05	.06
	1	.05	.07	.08	.09	.11	.08	.10	.12	.14	.16
	2	.13	.15	.18	.20	.23	.18	.20	.23	.27	.32
	3	.25	.28	.31	.34	.37	.38	.44	.50	.57	.64
	4	.40	.43	.46	.49	.52	.72	.80	.88	.96	1.04
	5	.56	.60	.64	.69	.75	1.12	1.20	1.29	1.37	1.45
	6	.82	.90	.98	1.06	1.14	1.54	1.60	1.70	1.78	1.86

\*Use appropriate unit hydrograph (Table 6-2) to compute flow at a point by picking the excess runoff by first estimating the basin average rain.

6-05. **Effect of power releases.** In order to schedule power operations during flood periods so as to obtain maximum use of the plant without causing or aggravating downstream flooding, the effect of the power releases at downstream control points should be known. Since conventional flood routing procedures have not given satisfactory results in determining these effects, a study was made of actual operations. The effects of various power releases have been plotted as discharge hydrographs at Cartersville and Rome. The 1-hour ordinates of these hydrographs have been tabulated for convenient use by the Water Management Section. Table 6-3 shows peak effects in cfs and time of the peaks at Cartersville and Rome from Allatoona power releases.



## MODELLING

6-06. **History.** Water Management Section started calling the various projects years ago to provide a log and to make flow predictions and recorded weather data and project data on self-made forms. The frequency of data supplied was dependent upon the particular project. WMS would call more frequently during a flood condition so that the project could be better utilized. As the process became more sophisticated and more dams were added, the data was plotted on graphs and extended into the future. During planning stages of Lake Allatoona, the historical floods were routed through the lake and downstream by means of the unit hydrographs (Table 6-2) with runoff (Table 6-1 with observed rain) and the resulting hydrographs were then routed by means of routing parameters (Table 6-3). The planning method was combined with a graph of the stages to obtain better answers. In the 1960's, the desk calculator was used to compute the flood hydrographs by means of the unit graphs. In the 1970's, Mobile District began using minicomputers and quantified the rainfall-runoff method into computer language. In the 1980's, the computer programs became more complex and the data collection became automated in some cases. In the late 1980's, the personal computer became more useful and its software was capable of handling the tasks of the earlier models. The future objective of the next water management models is to set up real-time models which can operate with little if any user action and transmit over a personal computer network.

6-07. **Daily models.** Presently, the section obtains data from various telemetered gages and reports from the projects. The data collected each morning, is input to a program which makes a ten day forecast of the inflows and pools at Allatoona, Carters, Buford, West Point, George and Woodruff, sends a copy of the morning data to the Division (SAD) in Atlanta and to National Weather Service River Forecast Center (RFC) in Atlanta, and saves the data into a data-storage-system (DSS). Of course, the data can be plotted by the DSS system for any period on the system. The computer automatically calls RFC to retrieve additional data and stores it in Data Storage System (DSS). During flood conditions, the projects are called as needed to obtain more recent data. For Allatoona and Carters, the river stages at Carters Rereg (411 Bridge), Red Bud, Tilton, Resaca, Cartersville, Kingston, Rome, and Mayo's Bar are plotted every three hours to keep track of the trend of the flood and to allow for release changes at Carters and Allatoona. To check the trend, other similar flood plots are compared. The flood data is also put into a personal computer spreadsheet, along with the data from Tables 6-1, 6-2 and 6-3, to make short duration projections.

6-08. **Other models.** The daily computer models and methods are useful under most conditions but a more sophisticated model was designed for flood forecasting and operations. Therefore, Mobile District contracted to develop a rainfall-runoff model that would automate the data collection, projections and various operating schemes for the Allatoona and Carters projects. The Alabama Rainfall-Runoff Model (ARRM) provides real-time flood forecasts, provides graphs of the data and projections, and allows changes to future outflows and rainfall. The model will compute and predict the stage and flow at several locations above Rome by analyzing the observed data input into the model. After the model has simulated the hydrologic response, the stages and flow predicted at selected points can



be shown by the graphical software incorporated in the model and additional analyses can be started. This model can be modified to adjust subarea parameters and to add new subareas.

Table 6-2

## 6-Hour Unit Hydrograph at Allatoona Dam and Local Areas

Time Hour	ETOWAH			COOSAWATTEE			CONSAUGA	OOSTANTAULA		
	Alla- toona (1110)	Carter- sville* (230)	King- ston* (290)	Rome * (180)	Carters (376)	Rereg * (154)	Redbud * (335)	Tilton (682)	Resaca * (72)	Rome * (510)
6	15600	2600	1660	2860	1740	960	2470	190	1810	820
12	20000	4370	5110	5550	5900	3100	7740	690	2800	2170
18	17000	3640	6340	4320	9050	4190	9830	1360	1500	4200
24	14000	3400	4980	2610	8260	3290	7090	2120	780	6400
30	11400	2920	3620	1580	5530	1990	3940	2910	400	8040
36	9100	2300	2620	960	3550	1200	2190	3710	210	8160
42	7100	1760	1900	570	2280	720	1220	4460	110	6990
48	5550	1320	1380	350	1470	440	680	5050	60	5390
54	4300	920	1000	210	940	260	380	5420	30	3880
60	3400	600	730	130	610	160	210	5590		2720
66	2600	360	530	80	390	100	120	5560		1920
72	2100	240	380	40	250	60		5300		1370
78	1700	160	280		160	40		4730		990
84	1350	100	200		100			4020		720
90	1000	40	150					3410		520
96	800	10	110					2880		370
102	600		80					2440		270
108	500		60					2070		200
114	400							1750		150
120	300							1480		120
126	200							1250		90
132	150							1060		60
138	100							900		30
144	70							760		
150	50							640		
156	20							550		
162								460		
168								390		
174								330		
180								280		
186								240		
192								210		
198								180		
204								150		
210								120		
216								100		
222								80		
228								60		

\*Route Allatoona outflow to Cartersville Hwy 61 and add local runoff (230 square mile); route Cartersville total to Kingston and add local runoff; and route that total to Rome and add local runoff. Route Carters rereg outflow to Redbud and add local runoff; route Redbud total to Resaca and add routed Tilton total and local runoff; route Resaca total to Rome and add local runoff; and combine Etowah and Oostanaula totals.

Table 6-3

**Effect of Allatoona Power Releases  
at Cartersville Hwy 61, Kingston and Rome**

Hours Power	Time to Peak	Peak Increase in Discharge (cfs)-Due to Power						
		2000	4000	6000	7000	8000	8500	8900
2 hrs from start at dam to rise at Cartersville Hwy61								
1	4	800	1440	2040	2380	2720	2810	2940
2	4.5	1400	2560	3540	4200	4960	5360	5610
3	5	1680	3200	4620	5530	6480	6800	7120
4	6	1960	3680	5340	6230	7120	7570	7920
5	7	2000	3880	5700	6650	7600	8080	8280
6	8		4000	5880	6830	7760	8250	8630
7	9			6000	6930	7920	8420	8810
8	10				7000	8000	8500	8900
7 hrs from start at dam to rise at Kingston								
1	9	520	960	1320	1540	1760	1870	1960
2	10	940	1760	2460	2870	3360	3570	3740
3	11	1240	2320	3300	3850	4480	4760	4980
4	12	1420	2720	3900	4550	5200	5530	5790
5	13	1580	3040	4380	5110	5840	6210	6500
6	14	1700	3280	4740	5460	6160	6550	6850
7	15	1960	3680	4980	5770	6560	6970	7300
8	16	2000	3880	5160	6020	6880	7310	7650
9	17		4000	5640	6720	7840	8330	8720
10	18			6000	6970	7920	8420	8810
11	19				7000	8000	8500	9000
12 hrs from start at dam to rise at Rome								
1	14	300	460	670	770	880	940	980
2	15	550	900	1320	1510	1720	1830	1900
3	16	780	1300	1920	2230	2540	2700	2830
4	17	980	1720	2520	2910	3320	3530	3690
5	18	1160	2080	3050	3500	4010	4250	4450
6	19	1320	2400	3510	4050	4630	4920	5150
7	20	1460	2680	3900	4590	5240	5570	5830
8	21	1580	2940	4280	5030	5740	6100	6390
9	22	1760	3350	4880	5670	6490	6890	7210
10	23	1880	3630	5300	6150	7020	7460	7810
11	24	1950	3820	5620	6510	7460	7910	8280
12	25	1980	3940	5840	6780	7740	8230	8620
13	26	2000	3980	5960	6920	7900	8400	8790
14	27		4000	6000	7000	7980	8480	8880
15	28					8000	8500	8900

\* Column 1 = time Allatoona units are running.

Column 2 = flow at point downstream after start of generation.

\*\* The 2, 7 and 12 hours are the time for the power wave to get there

CHAPTER VII

WATER RESOURCE MANAGEMENT

GENERAL

Correlation with other projects  
Downstream benefits  
Headwater benefits  
Navigation/low flow  
Future plans and considerations

## GENERAL

7-01. **Correlation with other projects.** Operation of the Allatoona project affects the flood stages downstream to Rome, provides water supply to the Atlanta area, generates peak hydropower, maintains a minimum continuous outflow, contributes flow to Alabama Power Company hydropower projects downstream, and supports navigation on the Alabama River below Montgomery. The project increases the average monthly flows below the dam during the minimum flow period of September through December. This flow, in addition to flow augmentation from Carters Reservoir, assists in maintaining a navigable channel extending up the Alabama River to Montgomery, Alabama. Flood control operations at Allatoona and Carters enhance the protection of the levee system in Rome, Ga. Therefore, the overall operation of Lake Allatoona must be coordinated with other concerns.

7-02. **Downstream benefits.** The Allatoona project is a headwater storage project in a system with many uses of water that is highly controlled by other dams. Consequently, releases of water from Allatoona Reservoir can serve a number of uses as it passes downstream. One important use is the generation of hydroelectric power. The normal summer water surface of Allatoona is 840 feet above sea level. Of the 840 feet of fall to the Gulf of Mexico approximately 540 feet, or sixty-four percent, flows through 8 hydroelectric power plants. Seven of these plants representing about 450 feet of fall belong to Alabama Power Company. To illustrate the power benefit produced by Allatoona Reservoir, Table 7-1 shows the amount of power generated by each acre-foot of stored water released from Allatoona Dam.

Table 7-1

**Energy Produced from One Acre-Foot of  
Water Released from Allatoona Dam**

Dam	Energy, KWH
Allatoona	134
Weiss	37
H. Neely Henry	31
Logan Martin	49
Lay	71
Mitchell	52
Bouldin/Jordan	101
R.F. Henry	30
Millers Ferry	34

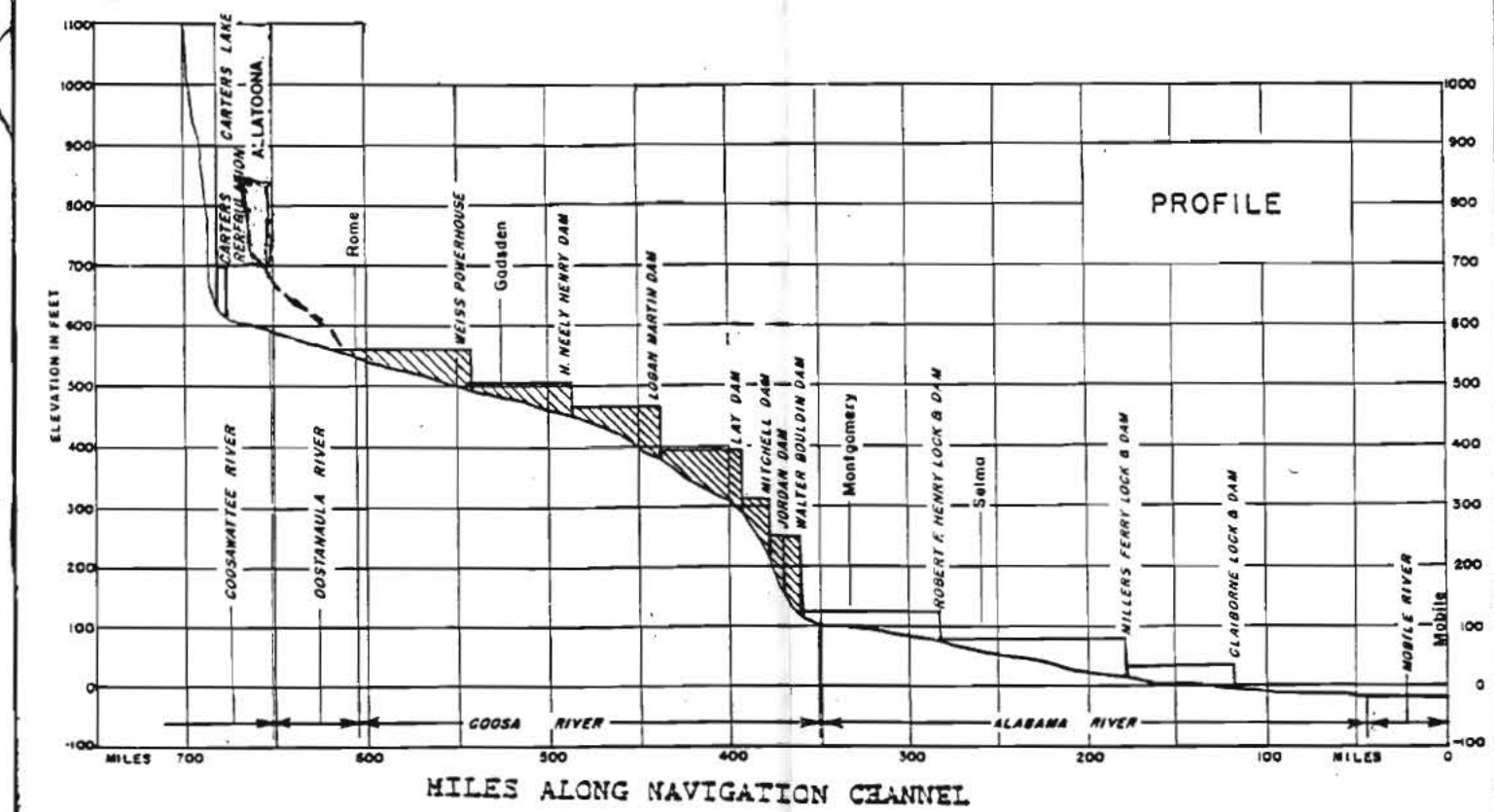
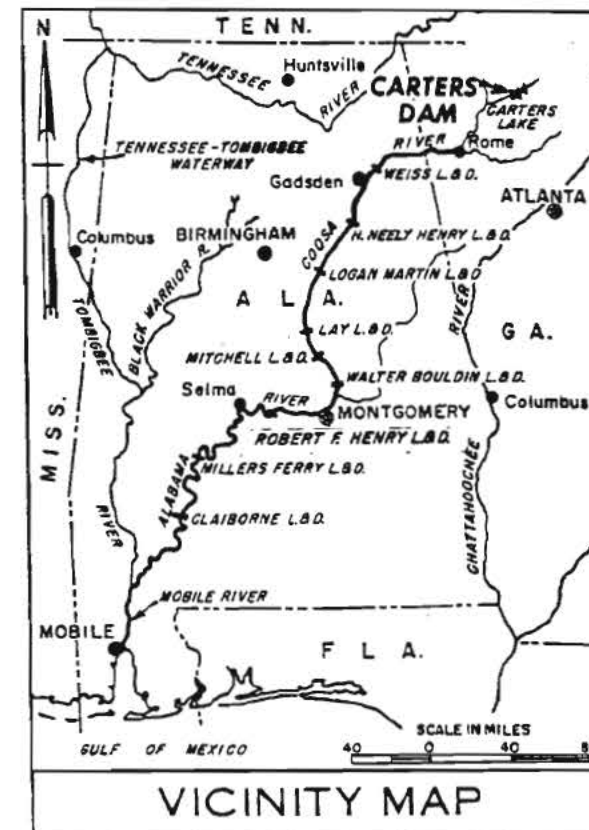
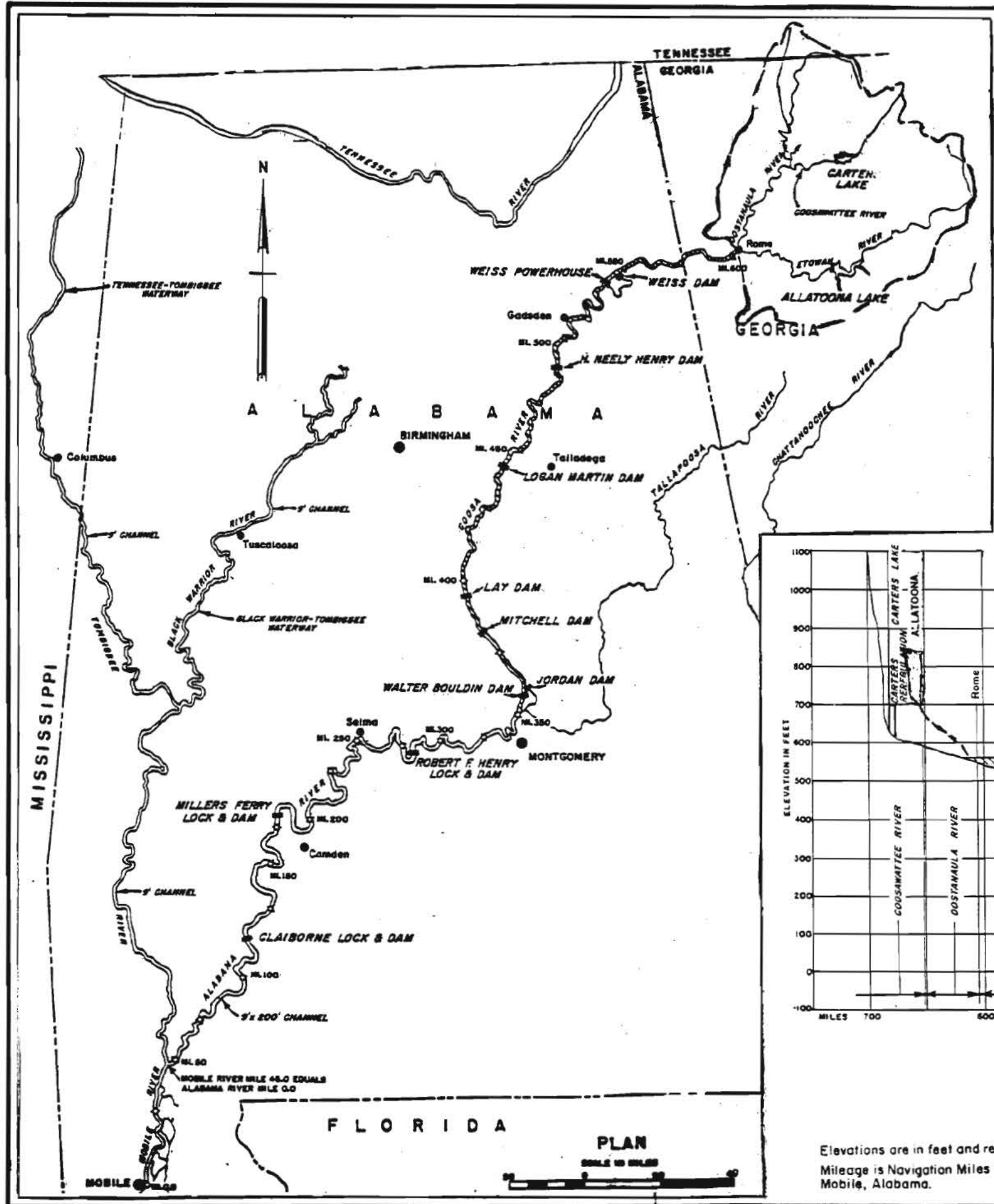
Table 7-1 shows that for every kilowatt hour generated at Allatoona three additional kilowatt hours are generated at downstream powerplants. An additional benefit to downstream hydropower projects results from the flood control operation of Allatoona Dam. Water that might otherwise be spilled at downstream power plants is stored in Allatoona. When released a few days later this water generates power at these downstream powerplants.



7-03. **Headwater benefits.** Under provisions of the Federal Power Act downstream beneficiaries of an upstream Federal reservoir project are required to pay a portion of the joint use costs of the upstream project. This payment is known as headwater benefit payments. Alabama Power Company makes a payment for the benefits to their Coosa River projects resulting from the operation of Allatoona Dam. The amount of the payment is computed periodically by the Federal Energy Regulatory Commission (FERC).

7-04. **Navigation/low flow.** Minimum flows in the Alabama River are dependent on an agreement between the Corps of Engineers and the Alabama Power Company to provide a total seven-day flow volume equivalent to 4640 cfs from the Tallapoosa and Coosa River basins. The Allatoona project releases can often provide a significant proportion of this flow.

7-05. **Future plans and considerations.** There are presently no plans to extend navigation upstream of Montgomery on the Coosa River although a navigation study had at one time considered this. Several privately owned and operated dams are located above Montgomery which would have to be modified for navigation. Between Montgomery, Alabama, and Rome, Georgia, Alabama Power Company operates their dams which include Walter Bouldin, Jordan, Mitchell, Lay, Logan Martin, H. Neely Henry, and Weiss (See Chart 1-1). The possibility of a reregulation dam below Allatoona has been studied but proved unfeasible. Space for a third large turbine-generator is included in the Allatoona powerhouse. However, hydraulic capacity of the channel downstream would have to be increased. The Corps has studied a water supply dam for Dalton on the Conasauga River, which combines with the Coosawatee River (Carters) to form the Oostanaula River; that project, if built, would increase the base flow but decrease the flood peaks very little. The December through January conservation pool of elevation 823 feet might be studied in the future but such an adjustment to the pool would decrease flood control space and not appreciably improve water supply or hydropower. A "Comprehensive Basin Study" of the Apalachicola-Chattahoochee-Flint (ACF) River and Alabama-Coosa-Tallapoosa (ACT) River Basins will be completed in the next few years and could affect the use of lake storages, the operations of or the coordination between the various projects in the ACT basin.



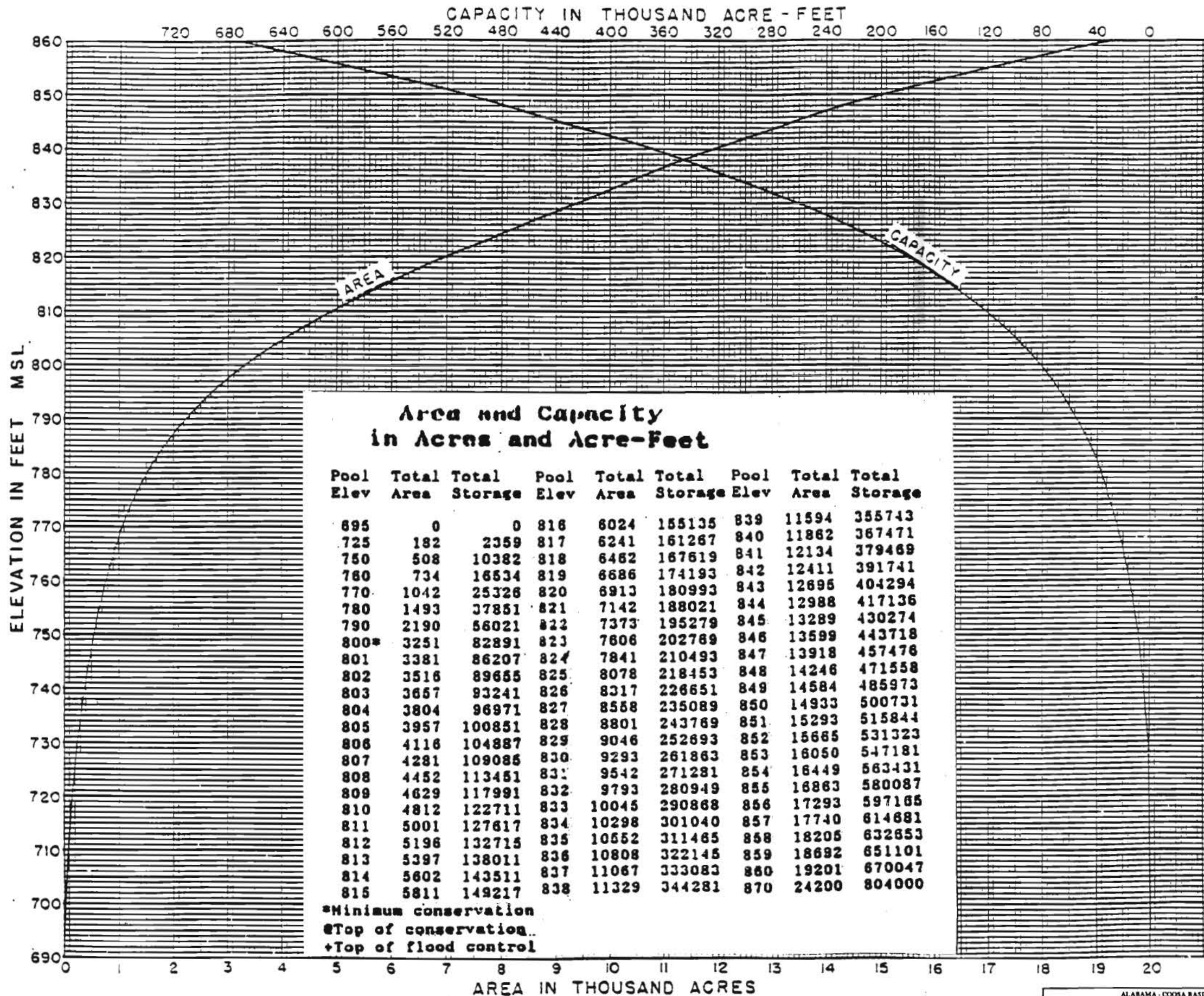
Elevations are in feet and refer to National Geodetic Vertical Datum.  
Mileage is Navigation Miles from the Bankhead Tunnel (U. S. Hwy. 90),  
Mobile, Alabama.

ALABAMA - COOSA BASIN  
WATER CONTROL MANUAL  
ALLATOONA RESERVOIR, ETOWAH RIVER, GA  
ALABAMA - COOSA RIVERS









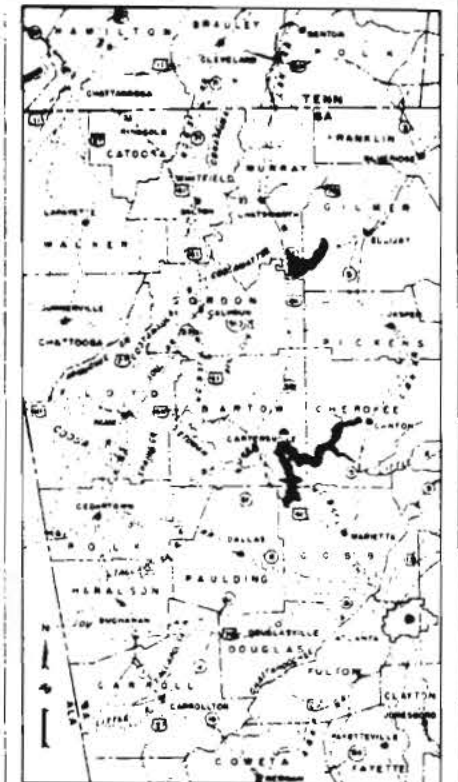
**Area and Capacity  
in Acres and Acre-Feet**

Pool Elev	Total Area	Total Storage	Pool Elev	Total Area	Total Storage	Pool Elev	Total Area	Total Storage
695	0	0	816	6024	155135	839	11594	355743
725	182	2359	817	6241	161267	840	11862	367471
750	508	10382	818	6462	167619	841	12134	379469
760	734	16534	819	6686	174193	842	12411	391741
770	1042	25326	820	6913	180993	843	12696	404294
780	1493	37851	821	7142	188021	844	12988	417136
790	2190	56021	822	7373	195279	845	13289	430274
800*	3251	82891	823	7606	202769	846	13599	443718
801	3381	86207	824	7841	210493	847	13918	457476
802	3516	89655	825	8078	218453	848	14246	471558
803	3657	93241	826	8317	226651	849	14584	485973
804	3804	96971	827	8558	235089	850	14933	500731
805	3957	100851	828	8801	243769	851	15293	515844
806	4116	104887	829	9046	252693	852	15665	531323
807	4281	109086	830	9293	261863	853	16050	547181
808	4452	113451	831	9542	271281	854	16449	563431
809	4629	117991	832	9793	280949	855	16863	580087
810	4812	122711	833	10045	290868	856	17293	597165
811	5001	127617	834	10298	301040	857	17740	614681
812	5196	132715	835	10552	311465	858	18206	632653
813	5397	138011	836	10808	322145	859	18692	651101
814	5602	143511	837	11067	333083	860	19201	670047
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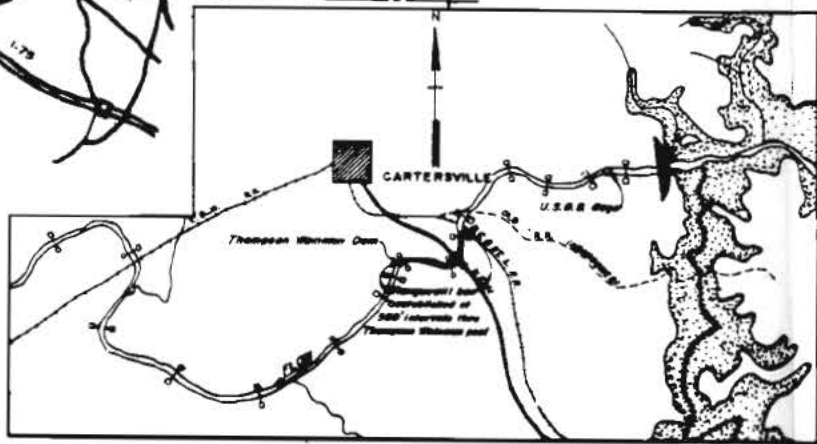
\*Minimum conservation  
 @Top of conservation  
 †Top of flood control

ALABAMA-COOSA BASIN  
 WATER CONTROL MANUAL  
 ALLATOONA RESERVOIR, ETOWAH RIVER, GA  
**AREA AND CAPACITY CURVES**  
 SAM AR000725





- LEGEND**
- HARD SURFACED ROADS
  - - GRAVELED ROADS
  - - - GRADED ROADS
  - - - - DIRT ROADS
  - - - - RAIL ROADS
  - - - - POWER LINE
  - - - - COUNTY LINE
  - - - - 840 CONTOUR
  - - - - 880 CONTOUR
  - DENOTES SEDIMENTATION RANGE MONUMENT. RANGE NUMBERS APPEAR AT ZERO END.
- COORDINATES ARE PLANE COORDINATES. TRANSVERSE MERCATOR PROJECTION FOR THE STATE OF GEORGIA, WEST ZONE.



ALABAMA - COOSA BASIN  
WATER CONTROL MANUAL  
ALLATOONA RESERVOIR, ETOWAH RIVER, GA  
**RESERVOIR MAP SEDIMENTATION  
AND RETROGRESSION RANGES**



