NUREG-0965

NRC Inventory of Dams

U.S. Nuclear Regulatory Commission

Prepared by G. E. Lear, O. O. Thompson

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ABSTRACT

The NRC Inventory of Dams has been prepared as required by the charter of the NRC Dam Safety Officer. The inventory lists 51 dams associated with nuclear power plant sites and 14 uranium mill tailings dams (licensed by NRC) in the U.S. as of February 1, 1982.

Of the 85 listed nuclear power plants (148 units), 26 plants obtain cooling water from impoundments formed by dams. The 51 dams associated with the plants are:

(1) located on a plant site (29 dams at 15 plant sites)

(2) located off site but provide plant cooling water (18 dams at 11 additional plant sites)

(3) located upstream from a plant (4 dams) -- they have been identified as dams whose failure, and ensuing plant flooding, could result in a radiological risk to the public health and safety

The dams that might be considered NRC's responsibility in terms of the Federal dam safety program are identified. This group of dams (20 on nuclear power plant sites and 14 uranium mill tailings dams) was obtained by eliminating dams that do not pose a flooding hazard (e.g., submerged dams) and dams that are regulated by another Federal agency.

The report includes the principal design features of all dams and related useful information.

CONTENTS

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NRC INVENTORY OF DAMS

1 BACKGROUND

The Federal Dam Safety Program was initiated by President Carter in 1977 (Ref. 1). As part of that program, NRC submitted a report on its practices relating to dam safety (Ref. 2) to an interagency committee for their review. After reviewing the input from all participating Federal agencies, the committee prepared the Federal Guidelines for Dam Safety (FGDS) (Ref. 3). In a memorandum to the Chairman of NRC (et al.) dated October 4, 1979 (Ref. 4), President Carter requested that "the head of each Federal Agency responsible for or involved with ...regulation...of dams adopt and implement the Federal Guidelines." The Federal Guidelines recommend that each Agency's Dam Safety Officer should "...maintain an inventory of agency dams..." and, in reports to FEMA on NRC progress in implementing the Federal Guidelines (Refs. 5 and 6), the NRC committed to prepare the inventory.

2 PURPOSE AND SCOPE

The primary purpose of this study was to identify all dams that could, in any way, be considered NRC dams in the context of the Federal Guidelines. A secondary purpose was to identify the particular dams for which the Federal Guidelines may be applicable and for which the NRC might be considered "responsible" in terms of the Federal Guidelines. These dams are described as FGDS dams.

The study included all nuclear power plants that were operating or under construction and all uranium mills licensed by the NRC, as of February 1, 1982. For nuclear power plant sites, the inventory includes water-retaining structures that meet the Federal Guidelines definition of a dam (i.e., more than 25 ft high or retaining more than 50 acre-ft of water) and that

(1) are located onsite (i.e., on a nuclear power plant site), or

(2) are located offsite and provide cooling water for nuclear power plant operations, or

(3) are located offsite, upstream from a nuclear power plant, and have been identified as dams whose failure, and resulting plant flooding, could result in a radiological risk to the public health and safety.

The inventory also includes all dams associated with uranium milling operations that are licensed by the NRC (i.e., uranium mill tailings dams that are not located in Agreement States).

The information provided in this report was obtained from NRC files (primarily license application documents such as Safety Analysis Reports). During the file search, other useful information was recorded. The data provided in this report for reference include

(1) sources of normal and emergency cooling water for each nuclear power plant (Appendix A)

(2) a listing of other onsite water-retaining structures that do not meet the definition of a dam (e.g., ponds, canals, basins) (Appendix A)

(3) identification of the Federal agency that regulates each listed offsite dam--all offsite dams were, coincidentally, found to be regulated by another Federal agency (Appendix A)

(4) the principal design features of all onsite dams (Appendix B) and all uranium mill tailings dams (Appendix C)

(5) descriptive features of listed offsite dams (Appendix D)

(6) a listing of uranium mills located in Agreements States (Appendix E)

This study did not include a rigorous check of actual field conditions for conformance with the information obtained from the NRC documents. Because there are often field changes during construction and operation of a facility, the information provided in this report should be used judiciously.

3 DISCUSSION

3.1 Dams Associated with Nuclear Power Plant Sites

On February 1, 1982, there were 85 nuclear power plants (148 units) operating under construction or proposed in the United States, and 26 of these plants obtain cooling water from impoundments formed by dams; 11 of the 26 plants use preexisting offsite impoundments only, 5 use both onsite and offsite impoundments, and 10 use onsite impoundments only.

Appendix A lists all the plants included in the study and identifies the normal and emergency cooling water sources associated with each plant, and all onsite or offsite dams that impound cooling water.

A listing of other onsite water-retaining structures (ponds, canals, basins, etc., that do not meet the definition of a dam) and related comments are also provided for each plant.

There are 33 impoundments (listed in Appendix A) for the 26 relevant plants because some plants have more than one impoundment. There are 51 dams listed because some impoundments are formed by more than one dam. The details of these groups of dams/impoundments are as follows:

	Onsite Dams		Offsite Dams		Total
	Seismic Category I	Other Than Seismic Category I	Providing Plant Water	Upstream	
Impoundments	4	10	15	4	33
Dams	14	15	18	4	51

3.1.1 Onsite Dams

Of the 29 onsite dams, 14 dams are classified as seismic Category I and 15 are not classified as seismic Category I. The principal design features of these onsite dams are provided in Appendix B. The information was obtained from NRC files (predominantly the PSAR and FSAR), and the details generally include dam height and crest length, reservoir capacity, freeboard, drainage area, inspection programs, and typical cross-sections. Information that is missing from the descriptions was not available in the NRC files reviewed.

3.1.1.1 Dams Classified as Seismic Category I

The 14 seismic Category I dams impound emergency cooling water for 10 plants as follows:

Catawba	McGuire
Clinton	North Anna (2 dams)
Comanche Peak	Oconee
Farley	Summer (3 dams)
Harris (2 dams)	Wolf Creek

Three of these plants (Farley, McGuire, and North Anna) have independent emergency impoundments. At the Harris site, the Main Dam has been designated as seismic Category I, but emergency cooling water is impounded by the Auxiliary Dam that isolates an arm of the main reservoir. The remainder of the seismic Category I impoundments are formed in an arm of a principal reservoir by submerged or partially submerged dams, and they are not included in the listing of FGDS dams in the conclusion of this report because their failure would not pose a flood hazard.

3.1.1.2 Dams Not Classified as Seismic Category I

Of the 15 onsite dams that are not classified as seismic Category I, 14 dams impound normal cooling water for 9 plants, as follows:

Braidwood	Dresden	North Anna*
Clinton	LaSalle	South Texas
Comanche Peak	Midland	Wolf Creek (6 dams)

At one plant (McGuire), the onsite dam that is not seismic Category I provides storage for wastewater.

All of these dams are included in the listing of FGDS dams in the conclusion of this report. Some of these dams are licensed by a State agency.

3.1.2 Offsite Dams

Of the 22 offsite dams listed in Appendix A, 18 form impoundments that provide cooling water for nuclear power plants. The remaining 4 dams are upstream

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*Also used for alternate source of emergency cooling water.

from nuclear power plants, and they have been identified as dams whose failure, and ensuing plant flooding, could result in a radiological risk to the public health and safety. Descriptive features of these offsite dams are provided in Appendix D, based primarily on information obtained from the inventory of dams prepared by the U.S. Army Corps of Engineers (Ref. 7).

3.1.2.1 Offsite Dams Providing Cooling Water

Cooling water for normal operations (and in 4 cases for emergency operation) of nuclear power plants is obtained from 15 offsite impoundments formed by 18 offsite dams. All of the offsite dams are regulated by another Federal agency and therefore are not included in the listing of FGDS dams in the conclusion of this report. The dams in this category (Dam Name, Regulatory Agency, and associated nuclear power plant) are as follows:

Chickamauga Dam (TVA) - Sequoyah and Watts Bar

Conowingo Dam (FERC) - Peach Bottom*

Cowans Ford Dam (FERC) - McGuire

Dardanelle Dam (COE) - Arkansas

Dresden Island Lock and Dam (COE) - Dresden

Frees Creek Dams (3 dams) (FERC) - Summer

Guntersville Dam (TVA) - Bellefonte

Keowee and Little River Dams (Lake Keowee) (FERC) - Oconee

Lake Robinson Dam (FERC) - Robinson*

Lake Wylie Dam (FERC) - Catawba

Pickwick Landing Dam (TVA) - Yellow Creek

Rancho Seco Dam (FERC) -Rancho Seco

Sherman Dam (FERC) - Yankee Rowe*

Vernon Dam (FERC) - Vermont Yankee*

Wheeler Dam (TVA) - Browns Ferry

3.1.2.2 Offsite Dams Located Upstream

Dams located upstream from nuclear power plants are considered in the NRC licensing process if dam failure could lead to flooding of a nuclear power plant that could result in a radiological risk to the public health and safety. Four dams that meet this criterion have been identified in Appendix A and are included in Appendix D. They are (Dam Name, Federal Regulatory Agency, and Plant Name):

Harriman Dam (FERC), 6 miles upstream from Yankee Rowe
Jocassee Dam (FERC), 10 miles upstream from Oconee

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*Impounds normal and emergency cooling water

Montgomery Lock and Dam (FERC), 3 miles upstream from Beaver Valley
Watts Bar Dam (TVA), 2 miles upstream from Watts Bar

All of these dams are regulated by other Federal agencies (FERC or TVA) and therefore are not included in the listing of FGDS dams in the conclusion of this report. In addition, it appears that any other offsite dams upstream from nuclear power plants are not within NRC purview because they are either too small or too far removed from a nuclear power plant to pose a flooding hazard that would result in a radiological risk to the public health and safety.

3.2 Uranium Mill Tailings Dams

The uranium mill tailings dams that are licensed by NRC are as follows:

Uranium Mill	State	Number of Dams	Comments
Bear Creek	Wyoming	1	Licensee investigating raising of dam
Federal American Partners	Wyoming	2	No more raises planned
Gas Hills	Wyoming	1	No more raises planned
Highland	Wyoming	1	No more raises planned
Lisbon	Utah	1	Dam is one of a series
Lucky Mc Gas Hills	Wyoming	1	One more raise planned
Moab	Utah	1	Seepage problems
(Pathfinders) Shirley Basin	Wyoming	1	No more raises planned
(Petrotomics) Shirley Basin	Wyoming	1	None
Shootering Canyon	Utah	1	One more raise planned
Split Rock	Wyoming	1	One more raise planned
Sweetwater	Wyoming	1	None
White Mesa	Utah	1	Dam is one of a series

The listing shows that there are 14 uranium mill tailing dams located at 13 uranium mills that are licensed by NRC. They are located in Wyoming (10 dams) and Utah (4 dams). The TVA Edgemont Uranium Mill in South Dakota was not included in the study because it is no longer operating and is undergoing reclamation. In cases where dams were constructed in a series, so that flow from an upstream failure would be retained by a downstream dam, only the furthermost downstream dam currently being utilized has been included. This is the case at the Lisbon Mine and Mill, the Lucky Mc Gas Hills Mill, the Pathfinder Shirley Basin Mill, and at the White Mesa Uranium Mill.

Appendix C provides the principal design details of each of the uranium mill tailings dams listed above, such as dam height and length, reservoir capacity, surface area, inspection programs, etc. It also provides a typical cross-section of each dam. All sources of information are noted at the bottom of the forms; most of the information was obtained from the latest consultant's construction reports. Missing information was not available in the documents reviewed.

All of these dams are included in the listing of FGDS dams in the conclusion of this report.

Although uranium mill tailings dams in Agreement States have not been included in this inventory, Appendix E identifies the uranium mills in Agreement States where there may be tailings dams. This information was obtained from the "Directory and Profile of Licensed Uranium Recovery Facilities" (Ref. 8).

4 IDENTIFICATION OF FGDS DAMS

The inventory shows that there are 51 dams that form 33 impoundments associated with nuclear power plant sites in the United States, as described in Section 3.1 of this report.

Dams for which the Federal Guidelines may be applicable and for which the NRC might be considered "responsible" in terms of the Federal Guidelines (FGDS dams) were identified by eliminating those dams that are judged to not be in this category, i.e.,

(1) dams that are submerged or isolate an arm of a principal impoundment because their failure would not pose a flood hazard (the principal dam would be the FGDS-designated dam)

(2) dams that are regulated by another Federal agency (Corps of Engineers, Federal Energy Regulatory Commission, or Tennessee Valley Authority) because these agencies already have regulatory authority for Federal Guidelines aspects of these dams

(3) dams that are too small or too far removed from a nuclear power plant site to pose a flooding hazard to a plant because these dams are not within NRC regulatory authority

The NRC inventory of 51 dams (33 impoundments) associated with nuclear power plant sites contains 20 FGDS dams (14 impoundments) as follows (Nuclear Power Plant Name, State, Dam Name):

Onsite, seismic Category I dams (5 dams, 4 impoundments):
- Farley (Ala.) - Category I Holding Pond Embankment
- McGuire (N.C.) - Standby Nuclear Service Water Pond Dam
- North Anna (2 dams) (Va.) - Service Water Dikes 1 and 2
- Harris (N.C.) - Main Dam

Onsite dams that are not seismic Category I (15 dams, 10 impoundments):
- Braidwood (Ill.) - Cooling Pond Embankment
- Clinton (Ill.) - Main Dam

Comamche Peak (Tex.) - Squaw Creek Dam
Dresden (Ill.) - Spray Pond Impoundment
LaSalle (Ill.) - Cooling Pond Dike
McGuire (N.C.) - Wastewater Collection Basin Dam
Midland (Mich.) - Cooling Pond Dike
North Anna (Va.) - North Anna Dam
South Texas (Tex.) - Cooling Pond Embankment
Wolf Creek (6 dams) (Kans.) - Main Dam and Saddle Dams (i) through (v).

All 14 uranium mill tailings dams in the NRC inventory of dams are classified as FGDS dams. They are as follows (Mill Name, State):

Bear Creek (Wyo.)
Federal American Partners (2 dams) (Wyo.)
Gas Hills (Wyo.)
Highland (Wyo.)
Lisbon (Utah)
Lucky Mc Gas Hills (Wyo.)
Moab (Utah)
(Pathfinders) Shirley Basin (Wyo.)
(Petrotomics) Shirley Basin (Wyo.)
Shootering Canyon (Utah)
Split Rock (Wyo.)
Sweetwater (Wyo.)
White Mesa (Utah)

5 REFERENCES

(1) Memorandum from President Carter to the Chairman of the Nuclear Regulatory Commission (and to heads of other Federal agencies dealing with dams), April 23, 1977.

(2) Letter from E. Case (NRC) to P. Smith (Office of Science and Technology Policy, Executive Office of the President), Subject: "Nuclear Regulatory Commission, Summary of Practices Relating to Dam Safety," September 2, 1977.

(3) Federal Coordinating Council for Science, Engineering and Technology, "Federal Guidelines for Dam Safety," June 25, 1979.

(4) Memorandum from President Carter to the Chairman of the Nuclear Regulatory Commission (and to heads of other Federal agencies dealing with dams), October 4, 1979.

(5) Letter from W. Dircks (NRC) to J. Macy, Director (FEMA), Subject: "Progress Report, Implementation of Federal Guidelines for Dam Safety, U.S. Nuclear Regulatory Commission, January 1, 1980," March 12, 1980.

(6) Letter from H. Denton (NRC) to L. Giuffrida, Director (FEMA), Subject: "Second Progress Report, Implementation of Federal Guidelines for Dam Safety, U.S. Nuclear Regulatory Commission, December 31, 1981," December 30, 1981.

(7) U.S. Army Corps of Engineers, "National Program of Inspection of Dams," Office of the Chief of Engineers, May 1975.

(8) Argonne National Laboratory, "Directory and Profile of Licensed Uranium-Recovery Facilities," May 1981 (Final Draft).

Appendix A

Summary of Dams and Water Sources Associated with Nuclear Power Plant Sites

Arkansas
Bailly
Beaver Valley
Bellefonte
Big Rock Point
Braidwood
Browns Ferry
Brunswick
Byron
Callaway
Calvert Cliffs
Catawba
Clinton
Comanche Peak
Cook
Cooper Station
Crystal River
Davis-Besse
Diablo Canyon
Dresden
Duane Arnold
Farley
Fermi
Fitzpatrick
Fort Calhoun
Fort St. Vrain
Ginna
Grand Gulf
Haddam Neck
Harris
Hartsville
Hatch
Hope Creek
Humboldt Bay
Indian Point
Kewaunee
LaCrosse
LaSalle
Limerick
Maine Yankee
Marble Hill
McGuire
Midland
Millstone
Monticello
Nine Mile Point
North Anna
Oconee
Oyster Creek
Palisades
Palo Verde
Peach Bottom
Perry
Pilgrim
Point Beach
Prairie Island
Quad Cities
Rancho Seco
River Bend
Robinson
Salem
San Onofre
Seabrook
Sequoyah
Shoreham
Skagit/Hanford
South Texas
St. Lucie
Summer
Surry
Susquehanna
Three Mile Island
Trojan
Turkey Point
Vermont Yankee
Vogtle
WNP 1, 2, 4
WNP 3, 5
Waterford
Watts Bar
Wolf Creek
Yankee Rowe
Yellow Creek
Zimmer
Zion

Summary of Dams and Water Sources
Associated with Nuclear Power Plant Sites

Plant Name (Units)	On-Site Dams Cat I	On-Site Dams Non-Cat I	Off-Site Dams (Regulatory Agency)	Other Water Sources (Comments)
Arkansas (2)	-	-	Dardanelle (N) (COE)	Dugout spray pond on-site (E)
Bailly (1)	-	-	-	Lake Michigan (B)
Beaver Valley (2)	-	-	Montgomery Lock & Dam (COE)	Ohio River (B) Montgomery Lock & Dam is 3 miles upstream
Bellefonte (2)	-	-	Guntersville (N) (TVA)	Emergency intake in Tennessee River Channel (E)
Big Rock Point (1)	-	-	-	Lake Michigan (B)
Braidwood (2)	-	1(N)	-	Kankakee River supplies on-site impoundment. Emergency water in depression in bottom of impoundment.
Browns Ferry (3)	-	-	Wheeler (N) (TVA)	Emergency intake in Tennessee River Channel (E)
Brunswick (2)	-	-	-	Intake from Snows Marsh, fed from Cape Fear River (B). Discharge to Atlantic Ocean.
Byron (2)	-	-	-	Big Rock River (B)
Callaway (2)	-	-	-	Missouri River (N) Dugout pond on-site (E)

N = water source for normal operations

E = water source for emergency operations

B = water source for both normal and emergency operations

- = no dams

Summary of Dams and Water Sources
Associated with Nuclear Power Plant Sites

Plant Name (Units)	On-Site Dams Cat I	On-Site Dams Non-Cat I	Off-Site Dams (Regulatory Agency)	Other Water Sources (Comments)
Calvert Cliffs (2)	-	-	-	Chesapeake Bay (B)
Catawba (2)	1 (E)	-	Lake Wylie (N) (FERC)	Cat. I dam isolates an arm of Lake Wylie
Clinton (1)	1 (E)	1 (N)	-	Cat. I dam is submerged
Comanche Peak (2)	1 (E)	1 (N)	-	Cat I dam isolates an arm of non-Cat. I (Squaw Creek Reservoir).
Cook (2)	-	-	-	Lake Michigan (B)
Cooper Station (1)	-	-	-	Missouri River (B)
Crystal River (1)	-	-	-	Gulf of Mexico (B)
Davis-Besse (1)	-	-	-	Lake Erie (B) Dike on-site separates marsh from Lake (per Bureau of Sports Fisheries & Wildlife).
Diablo Canyon (2)	-	-	-	Pacific Ocean (B)

N = water source for normal operations

E = water source for emergency operations

B = water source for both normal and emergency operations

- = no dams

Summary of Dams and Water Sources
Associated with Nuclear Power Plant Sites

Plant Name (Units)	On-Site Dams Cat I	On-Site Dams Non-Cat I	Off-Site Dams (Regulatory Agency)	Other Water Sources (Comments)
Dresden (3)	-	1 (N)	Dresden Island (N) (COE)	Cooling water is pumped from Dresden Island reservoir into on-site impoundment (Spray Pond) via canals that hold emergency supply of 9 million gallons (E).
Duane Arnold (1)	-	-	-	Cedar River (B)
Farley (2)	1 (B)	-	-	Chatahoochee River provides make-up for on-site impoundment that supplies cooling towers.
Fermi (1)	-	-	-	Lake Erie (B)
Fitzpatrick (1)	-	-	-	Lake Ontario (B)
Fort Calhoun (1)	-	-	-	Missouri River (B)
Fort St. Vrain (1)	-	-	-	South Platte River and St. Vrain Creek (N) Two dugout spray ponds on-site (E)
Ginna (1)	-	-	-	Lake Ontario (B)
Grand Gulf (2)	-	-	-	Wells beside Mississippi River (N). Basin under cooling towers (E).

N = water source for normal operations

E = water source for emergency operations

B = water source for both normal and emergency operations

- = no dams

Summary of Dams and Water Sources
Associated with Nuclear Power Plant Sites

Plant Name (Units)	On-Site Dams Cat I	On-Site Dams Non-Cat I	Off-Site Dams (Regulatory Agency)	Other Water Sources (Comments)
Haddam Neck (1)	-	-	-	Connecticut River (B)
Harris (4)	1 (E) 1 (N)		-	Cat. I dam isolates an arm of on-site Main Reservoir
Hartsville (2)	-	-	-	No information obtained
Hatch (2)	-	-	-	Altamaha River provides make-up for cooling towers (B)
Hope Creek (2)	-	-	-	Delaware River (B)
Humboldt Bay (1)	-	-	-	Humboldt Bay (B)
Indian Point (3)	-	-	-	Hudson River (B)
Kewaunee (1)	-	-	-	Lake Michigan (B)
LaCrosse (1)	-	-	-	Mississippi River (B)
LaSalle (2)	-	1 (N)	-	Illinois River provides water to impoundment; emergency water in depression at bottom (E).
Limerick (2)	-	-	-	Schuylkill River (N) Dugout spray ponds on-site (E)
Maine Yankee (1)	-	-	-	Black River (B)

N = water source for normal operations

E = water source for emergency operations

B = water source for both normal and emergency operations

- = no dams

Summary of Dams and Water Sources
Associated with Nuclear Power Plant Sites

Plant Name (Units)	On-Site Dams Cat I	On-Site Dams Non-Cat I	Off-Site Dams (Regulatory Agency)	Other Water Sources (Comments)
Marble Hill (2)	-	-	-	Ohio River (B)
McGuire (2)	1 (E)	1	Cowans Ford (N) (FERC)	Non-Category I dam is for wastewater storage
Midland (2)		1 (N)		Tittabawassee River provides water to non-Category I impoundment, emergency water in depression at bottom of impoundment (E).
Millstone (3)	-	-	-	Long Island Sound (B)
Monticello (1)	-	-	-	Mississippi River provides normal make-up water for cooling towers (N). Emergency makeup water beneath cooling towers (E).
Nine Mile Point (2)	-	-	-	Lake Ontario (B)
North Anna (3)	2 (E)	1 (B)	-	North Anna Dam provides normal cooling water. It also provides makeup water to the independent emergency impoundment. Due to its Category I design it operates during both normal and emergency modes.

N = water source for normal operations

E = water source for emergency operations

B = water source for both normal and emergency operations

- = no dams

Summary of Dams and Water Sources
Associated with Nuclear Power Plant Sites

Plant Name (Units)	On-Site Dams Cat I	On-Site Dams Non-Cat I	Off-Site Dams (Regulatory Agency)	Other Water Sources (Comments)
Oconee (3)	1(E)	-	Lake Keowee (N) Little River (N) Jocasse (all FERC)	Jocasse Dam is 10 miles upstream. Cat. I Dam is submerged within Lake Keowee (impounded by both Lake Keowee and Little River Dam).
Oyster Creek (1)	-	-	-	Intake from Forked River (B). discharge to Oyster Creek. Small fire protection pond on-site.
Palisades (1)	-	-	-	Lake Michigan (B)
Palo Verde (3)	-	-	-	City wastewater treatment plants provides make-up for cooling towers which is stored in an on-site pond (N). On-site spray ponds (E).
Peach Bottom (2)	-	-	Conowingo (B) (FERC)	Conowingo Reservoir provides make-up for cooling towers.
Perry (2)	-	-	-	Lake Erie (B)
Pilgrim (1)	-	-	-	Cape Cod Bay (B)
Point Beach (2)	-	-	-	Lake Michigan (B)

N = water source for normal operations

E = water source for emergency operations

B = water source for both normal and emergency operations

- = no dams

Summary of Dams and Water Sources
Associated with Nuclear Power Plant Sites

Plant Name (Units)	On-Site Dams Cat I	On-Site Dams Non-Cat I	Off-Site Dams (Regulatory Agency)	Other Water Sources (Comments)
Prarie Island (2)	-	-	-	Mississippi River (B)
Quad Cities (2)	-	-	-	Mississippi River (B)
Rancho Seco (1)	-	-	Rancho Seco (N) (FERC)	Folsom South Canal (supplemented by Rancho Seco Reservoir) provides make-up water to cooling towers (N). Dugout spray ponds on-site (E).
River Bend (1)	-	-	-	Mississippi River provides make-up for cooling towers (B)
Robinson (1)	-	-	Lake Robinson (B) (FERC)	-
Salem (2)	-	-	-	Delaware River (B)
San Onofre (3)	-	-	-	Pacific Ocean (B)
Seabrook (2)	-	-	-	Atlantic Ocean provides normal make-up for cooling towers (N). Wells on-site provide emergency make-up (E).
Sequoyah (2)	-	-	Chickamauga (N) (TVA)	Emergency intake in Tennessee River channel (E).

N = water source for normal operations

E = water source for emergency operations

B = water source for both normal and emergency operations

- = no dams

Summary of Dams and Water Sources
Associated with Nuclear Power Plant Sites

Plant Name (Units)	On-Site Dams Cat I	On-Site Dams Non-Cat I	Off-Site Dams (Regulatory Agency)	Other Water Sources (Comments)
Shoreham (1)	-	-	-	Long Island Sound (B)
Skagit/Hanford (2)	-	-	-	Columbia River provides normal make-up for cooling towers (N). Buried tank on-site provides emergency make-up. (E).
South Texas (2)		1 (N)	-	Colorado River supplies on-site cooling pond (N). Dugout pond on-site (E).
St. Lucie (2)	-	-	-	Atlantic Ocean (B). Alternate Cat. I intake structure provided.
Summer (1)	3 (E)		(3) Frees Creek (N) (FERC)	3 Category I dams isolate arm of Frees Creek Reservoir.
Surry (2)	-	-		James River (B)
Susquehanna (2)	-	-		Susquehanna River provides normal make-up for cooling towers (N). Dugout pond on-site (E).
Three Mile Island (2)	-	-	-	Susquehanna River (B)
Trojan (1)	-	-	-	Columbia River (B)
Turkey Point (2)	-	-	-	Biscayne Bay provides make-up for 2000 acres of cooling canals (B).

N = water source for normal operations

E = water source for emergency operations

B = water source for both normal and emergency operations

- = no dams

Summary of Dams and Water Sources
Associated with Nuclear Power Plant Sites

Plant Name (Units)	On-Site Dams Cat I	On-Site Dams Non-Cat I	Off-Site Dams (Regulatory Agency)	Other Water Sources (Comments)
Vermont Yankee (1)	-	-	Vernon Lake (B) (FERC)	Lake provides make-up for emerg. cooling towers.
Vogtle (2)	-	-	-	Savannah River (N). Wet cooling tower basin provides emergency make-up for cooling towers (E).
WNP 1, 2, 4 (3)	-	-	-	Columbia River (N). Dugout spray ponds on-site (E).
WNP 3, 5 (2)	-	-	-	Wells on-site provide normal make-up for cooling towers (N) Wet cooling tower basin provides emergency make-up water (E).
Waterford (1)	-	-	-	Mississippi River (N). Wet cooling tower basin provides emergency make-up water for cooling towers (E).
Watts Bar (2)	-	-	Watts Bar, Chickamauga (N) (both TVA)	Emergency intake in Tennessee River channel (E). Watts Bar Dam is 2 miles upstream.
Wolf Creek (1)	1 (E)	6 (N)		Category I Dam is submerged. Main dam and 5 saddle dams form non-Cat. I reservoir.
Yankee Rowe (1)	-	-	Harriman, Sherman (B) (both FERC)	Harriman Dam is 6-miles upstream.

N = water source for normal operations

E = water source for emergency operations

B = water source for both normal and emergency operations

- = no dams

Summary of Dams and Water Sources
Associated with Nuclear Power Plant Sites

Plant Name (Units)	On-Site Dams Cat I	On-Site Dams Non-Cat I	Off-Site Dams (Regulatory Agency)	Other Water Sources (Comments)
Yellow Creek (1)	-	-	Pickwick Landing (N) (TVA)	Dugout spray ponds onsite (E).
Zimmer (1)	-	-	-	Ohio River provides make-up for cooling towers (B).
Zion (2)	-	-	-	Lake Michigan (B).
85 plants 148 units	14	15	22	

N = water source for normal operations

E = water source for emergency operations

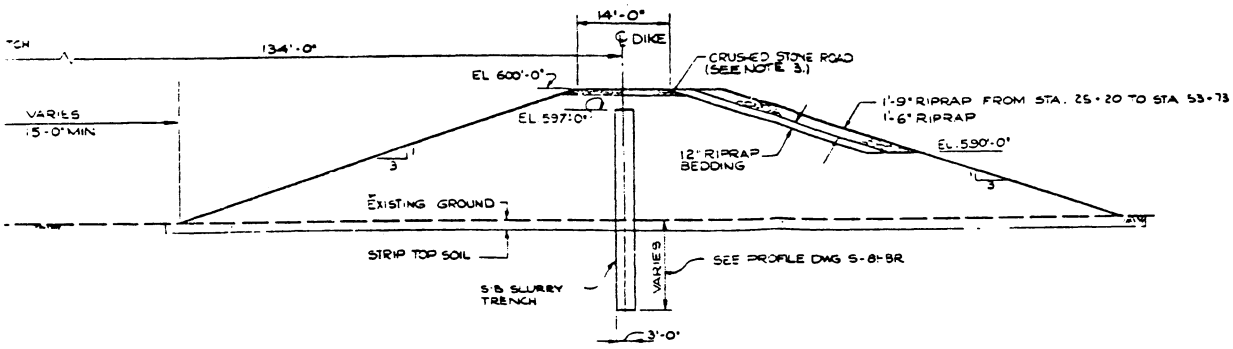
B = water source for both normal and emergency operations

- = no dams

Appendix B

Principal Design Features of Onsite Dams

Braidwood
Catawba
Clinton
Comanche Peak
Dresden
Farley
(Shearon) Harris
LaSalle
McGuire
Midland
North Anna
Oconee
South Texas
Summer
Wolf Creek



SECTION 2-2 (S-59BR & S-67BR

BRAIDWOOD STATION FINAL SAFETY ANALYSIS REPORT
FIGURE 2.4-35 DIKE SECTION AND DETAILS

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Commonwealth Edison Co.
2. Plant name Braidwood Dam name Cooling Pond Embankment

   NRC Docket No. 50-456/457
3. Location: State Illinois County Will 25 miles from Braidwood
4. Downstream population centers

   Name Morris, Ill. Population 8,194 Distance 18 mi +
5. Rad. Hazard (Cat. I): No ; Inundation Hazard (L, M, H) _____
6. Dam Characteristics:

Purpose	Normal cooling water	Elevations:	
Type	Homogenous earthfill	Top	600'
Height	20'	Spillway	595.75'
Length	63,300'	Norm. Pool	595'
Crest Width	14'	Max. Pool	598'
Slopes	3:1	Freeboard	2'

7. Hydrology:

Drainage area	5.3 sq miles	Surface area	2475 acres
Storage: normal	22,300 acre-ft	Maximum	34,000 acre-ft

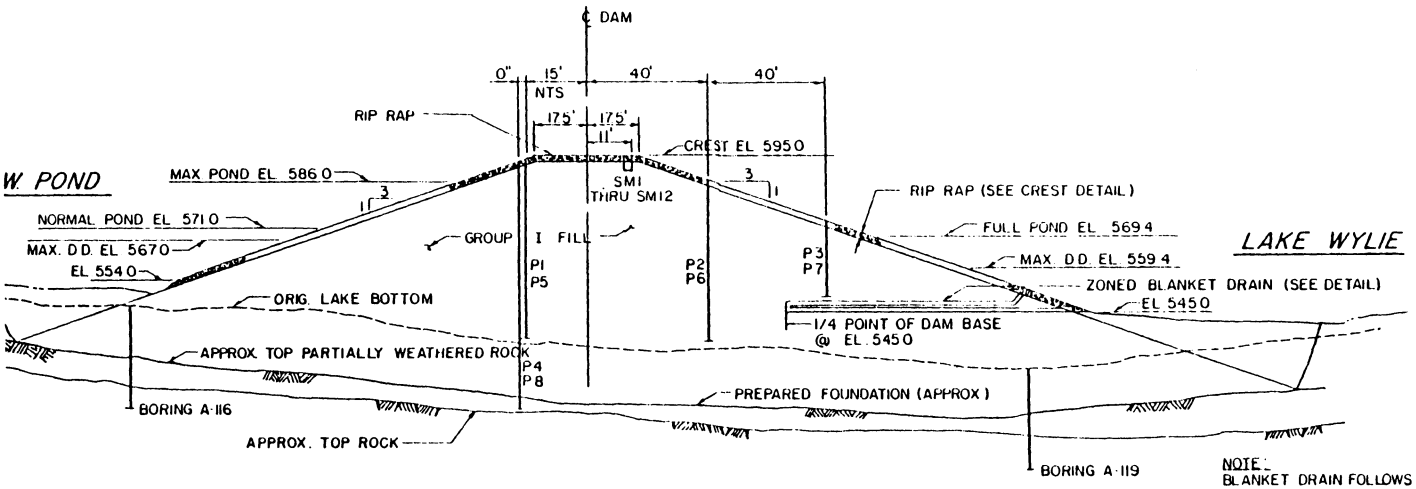
   Spillway type Ogee

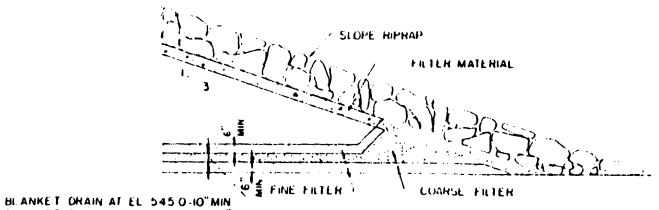
   Discharge Cap. 2290 cfs
8. Year construction started 1976 completed 1980
9. Licensed by _____
10. Regular inspection: Bimonthly water flow (amount of water flow into sample wells around the dam); Bimonthly sedimentation checked.
11. COE Inventory Reference # None
12. References FSAR Section 2.4.8, Region III Paul Pelke
13. Comments _____

Prepared By: _____

S. N. S. W. POND DAM
TYPICAL SECTION

30 0 30 60
scale feet





BLANKET DRAIN DETAIL

4 2 0 4 6 8 10 12
scale feet

NOTE:
BLANKET DRAIN FOLLOWS THE CONTOUR OF THE NATURAL LAKE BOTTOM ABOVE EL 545.0 AND EXISTS BETWEEN EL 545.0 & EL 570.0 ORIGINAL GRADE AS FOLLOWS:
BLANKET DRAIN BEGINS AT EL 570.0 AT STATION 0+50; SLOPES TO EL 545.0 AT STATION 2+00; LEVEL AT EL 545.0 BETWEEN STATIONS 2+00 AND 4+00, SLOPES TO EL 560.0 AT STATION 5+00, THENCE TO EL 570.0 AT STATION 7+00
A TOE DRAIN IS CONSTRUCTED ABOVE EL 570.0 ORIGINAL GRADE.

TYPICAL SECTION, STANDBY NUCLEAR SERVICE WATER POND DAM

CATAWBA NUCLEAR STATION

Figure 2.5.6-1

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Duke Power Co.
2. Plant name Catawba Dam name Standby Nuclear Service Water Dam

   NRC Docket No. 50-413/414
3. Location: State South Carolina County York ___ miles from
4. Downstream population centers

   Name _____ Population _____ Distance _____
5. Rad. Hazard (Cat. I): Yes ; Inundation Hazard (L, M, H) _____
6. Dam Characteristics:

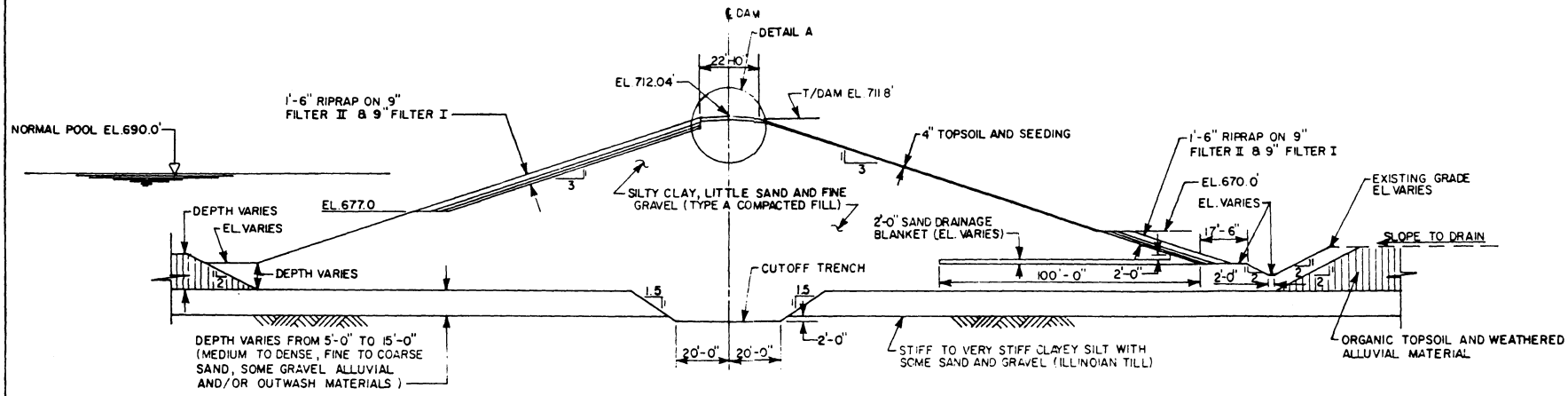
Purpose	Emergency cooling water	Elevations:	
Type	Homogenous earthfill	Top	595'
Height	75'	Spillway	571'
Length	1710'	Norm. Pool	571'
Crest Width	35'	Max. Pool	582.3
Slopes	3:1	Freeboard	12.7' upstream, 2.8' downstream

7. Hydrology:

Drainage area	410 acres	Surface area	46 acres
Storage: normal	560 acre-ft	Maximum	1200 acre-ft
Spillway type	Open pipe		
Discharge Cap.	380 cfs		

8. Year construction started _____ completed 1980 ±
9. Licensed by As per Reg. Guide 1.127
10. Regular inspection: _____
11. COE Inventory Reference # _____
12. References FSAR 2.4, 9.2.1, 9.2.5
13. Comments Standby Nuclear Service Water Dam isolates an area of Lake Wylie. Note differences in upstream/downstream freeboard during Standard Project Flood which would be caused by failure of Cowans Ford Dam.

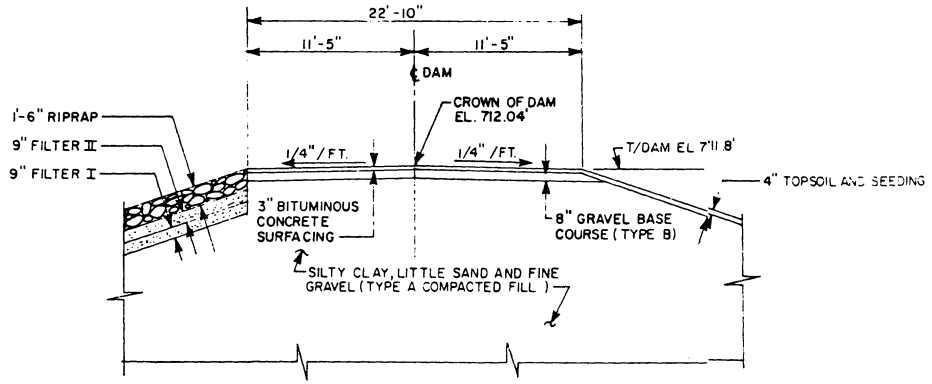
Prepared By: _____



TYPICAL DAM SECTION

40 0 40 80

SCALE IN FEET



DETAIL A

8 0 8 16

SCALE IN FEET

CLINTON POWER STATION
FINAL SAFETY ANALYSIS REPORT

FIGURE 2.4-14

TYPICAL DAM CROSS SECTION

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Clinton Power Co.
2. Plant name Clinton Dam name Main Dam

   NRC Docket No. 50-461/462
3. Location: State Illinois County De Witt 6 miles from Clinton
4. Downstream population centers

   Name Middletown Population _____ Distance 22 mi
5. Rad. Hazard (Cat. I): No ; Inundation Hazard (L, M, H) _____
6. Dam Characteristics:

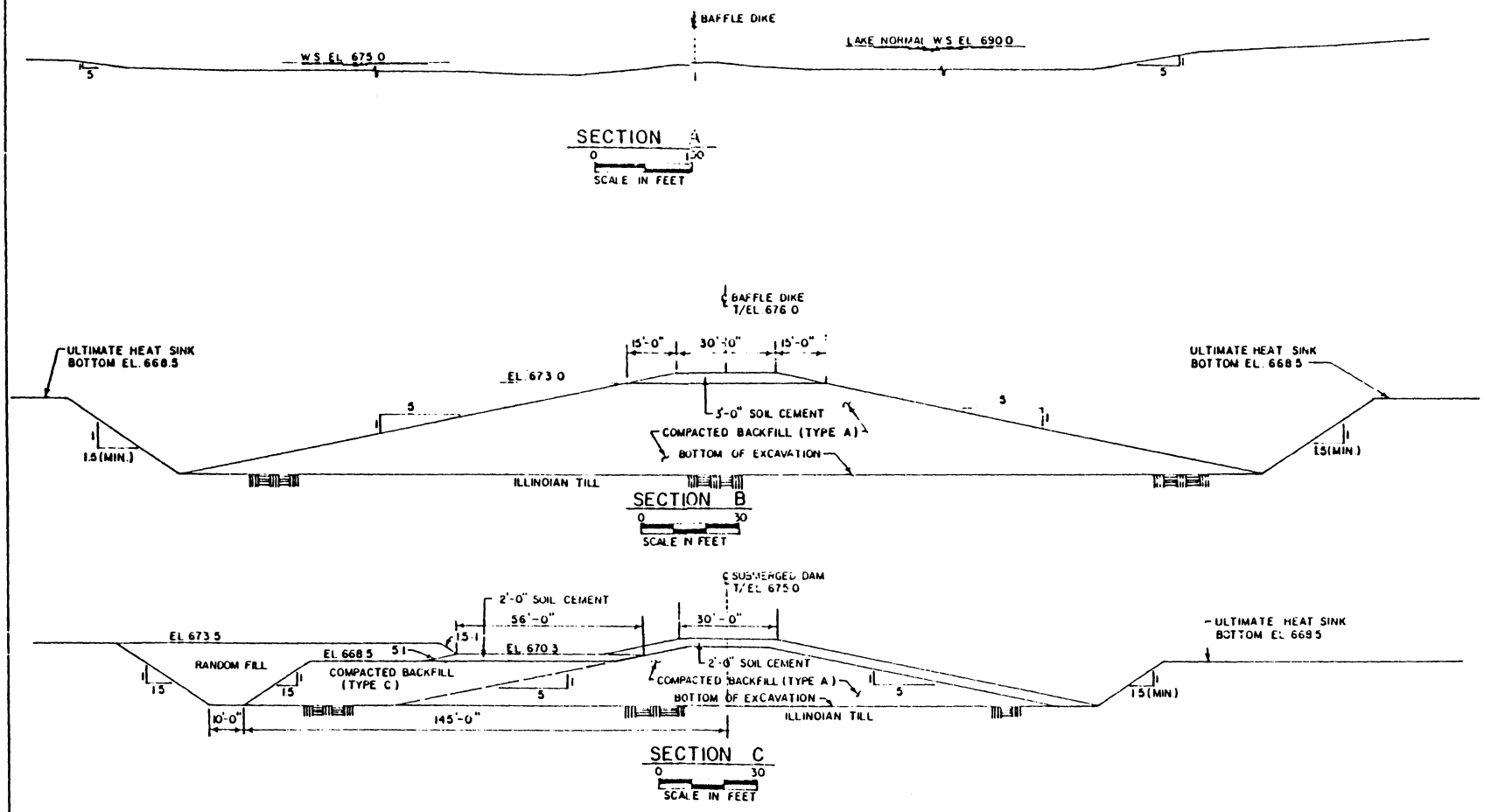
Purpose	Normal cooling water	Elevations:	
Type	Homogenous earthfill	Top	711.8'
Height	56.8'	Spillway	690'
Length	3000'	Norm. Pool	690'
Crest Width	22'	Max. Pool	708.8
Slopes	3:1	Freeboard	3.0'

7. Hydrology:

Drainage area	296 sq miles	Surface area	4895 acres
Storage: normal	74,200 acre ft	Maximum	_____
Spillway type	Ogee (service), Open (emergency)		
Discharge Cap.	33,200 cfs (service), 102,700 (emergency)		

8. Year construction started _____ completed Oct. 12, 1977
9. Licensed by Illinois Dept. of Transportation 4/7/76
10. Regular inspection: Seepage, settlement, horizontal movement. Monitoring frequency unknown.
11. COE Inventory Reference # _____
12. References FSAR Sec. 2.4, 2.5.6, 9.2.5
13. Comments _____

Prepared By: _____



NOTES:

1 REFER TO FIGURE 2.4-23 FOR LOCATION OF SECTIONS.

CLINTON POWER STATION
FINAL SAFETY ANALYSIS REPORT

FIGURE 2.4-24

ULTIMATE HEAT SINK SECTIONS

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Clinton Power Co.
2. Plant name Clinton Dam name Submerged Category I Dam

   NRC Docket No. 50-461/462
3. Location: State Illinois County De Witt 6 miles from Clinton
4. Downstream population centers

   Name Middletown Population 626 Distance 22
5. Rad. Hazard (Cat. I): Yes; Inundation Hazard (L, M, H) None
6. Dam Characteristics:

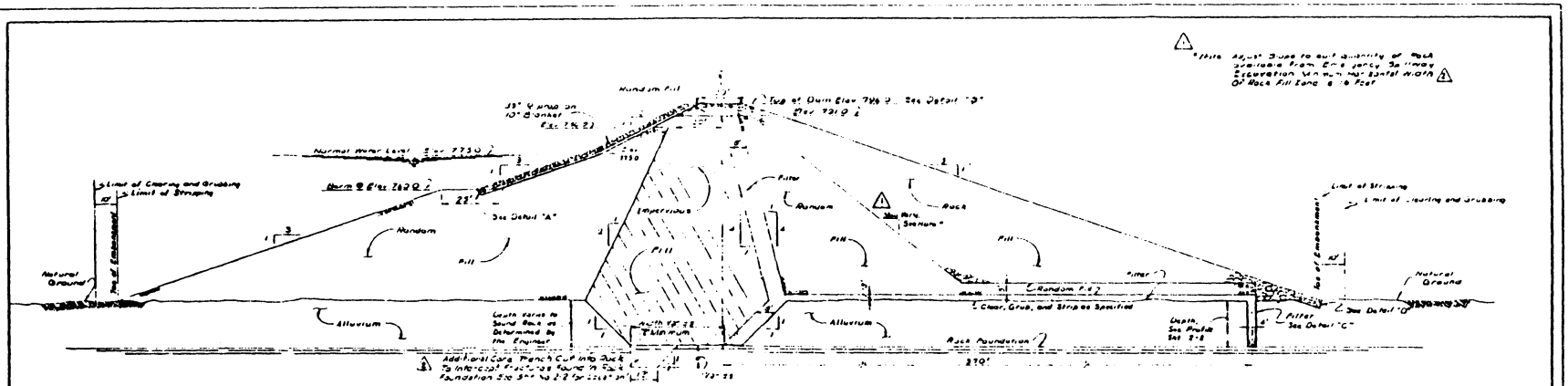
Purpose	Emergency cooling water	Elevations:	
Type	Homogenous earthfill	Top	675'
Height	17'	Spillway	
Length	2350'	Norm. Pool	675'
Crest Width	30'	Max. Pool	675'
Slopes	5:1	Freeboard	

7. Hydrology:

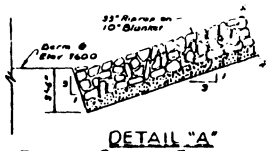
Drainage area		Surface area	112 acres
Storage: normal	650 acre-ft	Maximum	650 acre-ft
Spillway type	None		
Discharge Cap.			

8. Year construction started _____ completed 1977 +
9. Licensed by _____
10. Regular inspection: No routine inspection of submerged dam for seepage or settlement. Monitoring of sedimentation but frequency unknown.
11. COE Inventory Reference # _____
12. References FSAR Sec. 2.4, 2.5.6, 9.2.5
13. Comments Soil-cement mixture, 2 feet thick, covers outside of dam for drawdown and seepage protection. Submerged Category I dam isolates an area of main Reservoir.

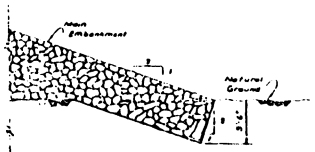
Prepared By: _____



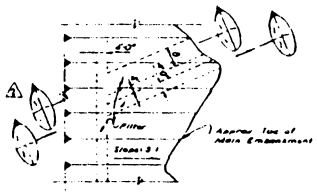
TYPICAL EMBANKMENT SECTION



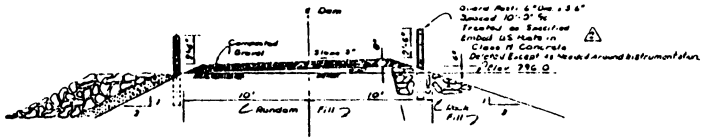
DETAIL "A"
TOE OF RIPRAP EMBEDMENT



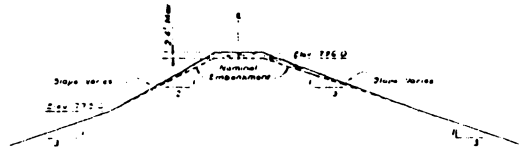
DETAIL "D"
TOE OF MAIN EMBANKMENT



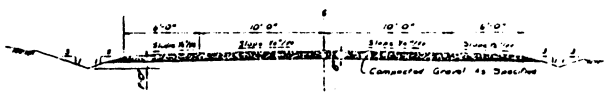
DETAIL "C"
PART PLAN OF TOE DRAIN OUTLET



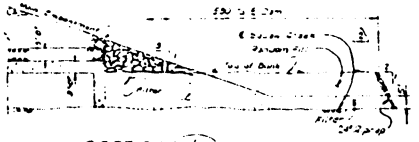
DETAIL "B"
CROWN DETAIL



OVERBUILD DIAGRAM



SECTION (3 of 3)
TYPICAL ROADWAY SECTION



SECTION (1 of 3)

COMANCHE PEAK SES
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

SCR DAM EMBANKMENT
SECTION AND DETAILS

FIGURE 2.4.17

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Texas Utilities Generating Co.
2. Plant name Comanche Peak Dam name Squaw Creek Dam

   NRC Docket No. 50-445/446
3. Location: State Texas County Somervill ___ miles from
4. Downstream population centers

   Name Glen Rose Population 1,550 (year 1970) . Distance 4.5 mi
5. Rad. Hazard (Cat. I): No ; Inundation Hazard (L, M, H) _____
6. Dam Characteristics:

Purpose	Normal cooling water	Elevations:	
Type	Rockfill	Top	796'
Height	150'	Spillway	775'
Length	4360'	Norm. Pool	775'
Crest Width	20'	Max. Pool	790.7
Slopes	3:1	Freeboard	5.3'

7. Hydrology:

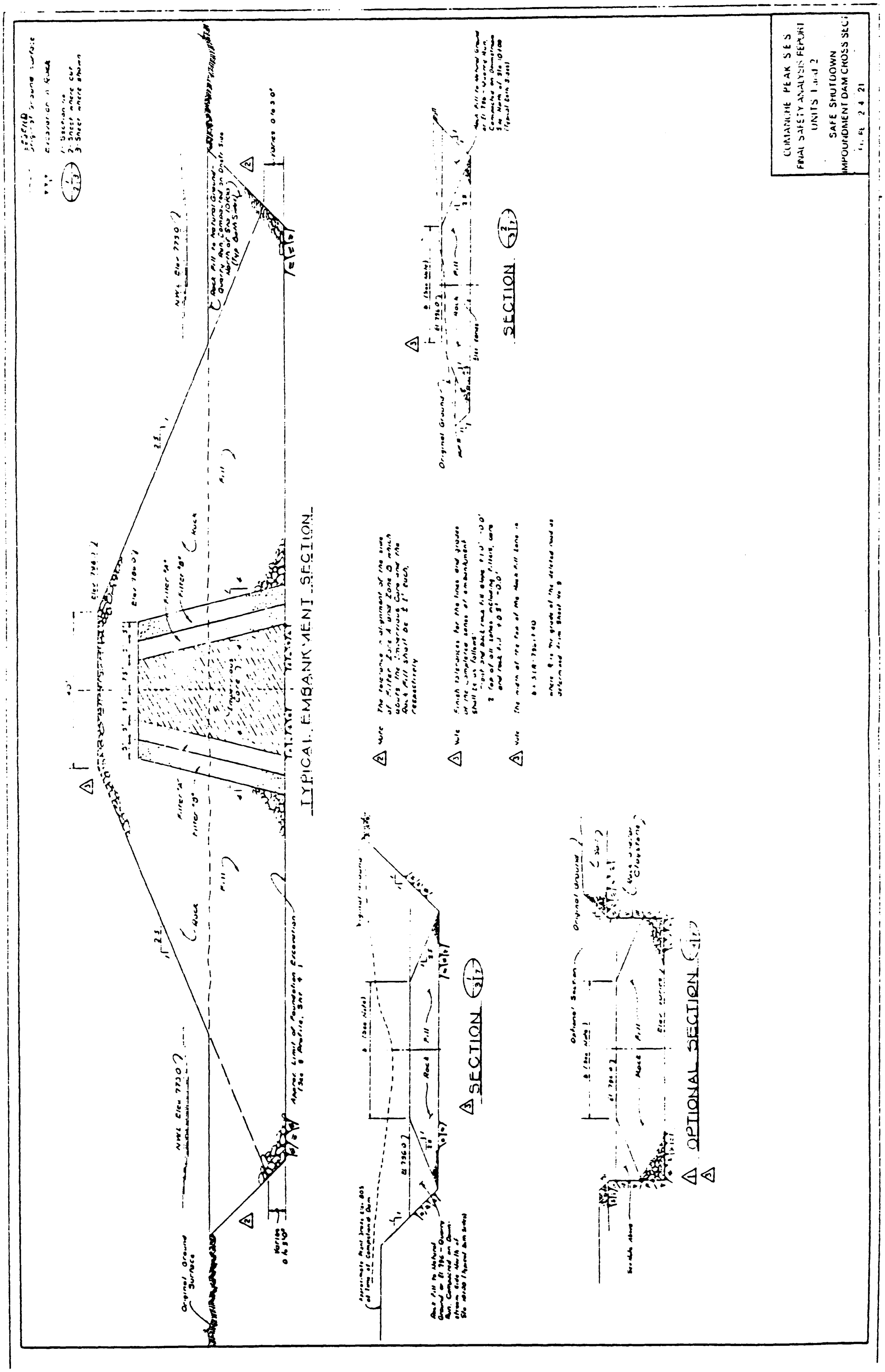
   Drainage area 64 sq mi Surface area _____

   Storage: normal 152,000 acre-ft Maximum _____

   Spillway type Ogee (service), Open channel (emergency), 783' msl

   Discharge Cap. 22,500 cfs (service) 108,600 cfs (emergency)
8. Year construction started _____ completed 1980 ±
9. Licensed by Texas Dept. of Water Resources, #2871
10. Regular inspection: According to the National Dam Safety Inspection Program by the Texas Dept of Water Resources for the COE
11. COE Inventory Reference # _____
12. References SER Sec. 2.4, FSAR Sec. 2.4, 2.5.6
13. Comments _____

Prepared By: _____


COMANCHE PEAK SES
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2
SAFE SHUTDOWN
IMPOUNDMENT DAM CROSS SECT
TYPICAL EMBANKMENT SECTION
SECTION
SECTION
OPTIONAL SECTION

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Texas Utilities Generating Co.
2. Plant name Comanche Peak Dam name Safe Shutdown Dam

   NRC Docket No. 50-445/446
3. Location: State Texas County Somervill ___ miles from
4. Downstream population centers

   Name Glen Rose Population 1,550 (in 1970) Distance 4.5 mi
5. Rad. Hazard (Cat. I): Yes; Inundation Hazard (L, M, H) None
6. Dam Characteristics:

Purpose	Emergency cooling water	Elevations:	
Type	Rockfill	Top	796'
Height	70'	Spillway	769.5'
Length	1470'	Norm. Pool	772.5'
Crest Width	40'	Max. Pool	790.5'
Slopes	2.5:1	Freeboard	5.5'

7. Hydrology:

Drainage area	3.47 sq miles	Surface area	
Storage: normal	367 acre-ft	Maximum	457 acre-ft
Spillway type	Open channel		
Discharge Cap.			

8. Year construction started _____ completed May 1979
9. Licensed by _____
10. Regular inspection: _____
11. COE Inventory Reference # _____
12. References SER Sec. 2.4, 3.8, FSAR Sec. 2.5.6, 9.2.5
13. Comments The Safe Shutdown Dam isolates an area of Squaw Creek Reservoir

Prepared By: _____

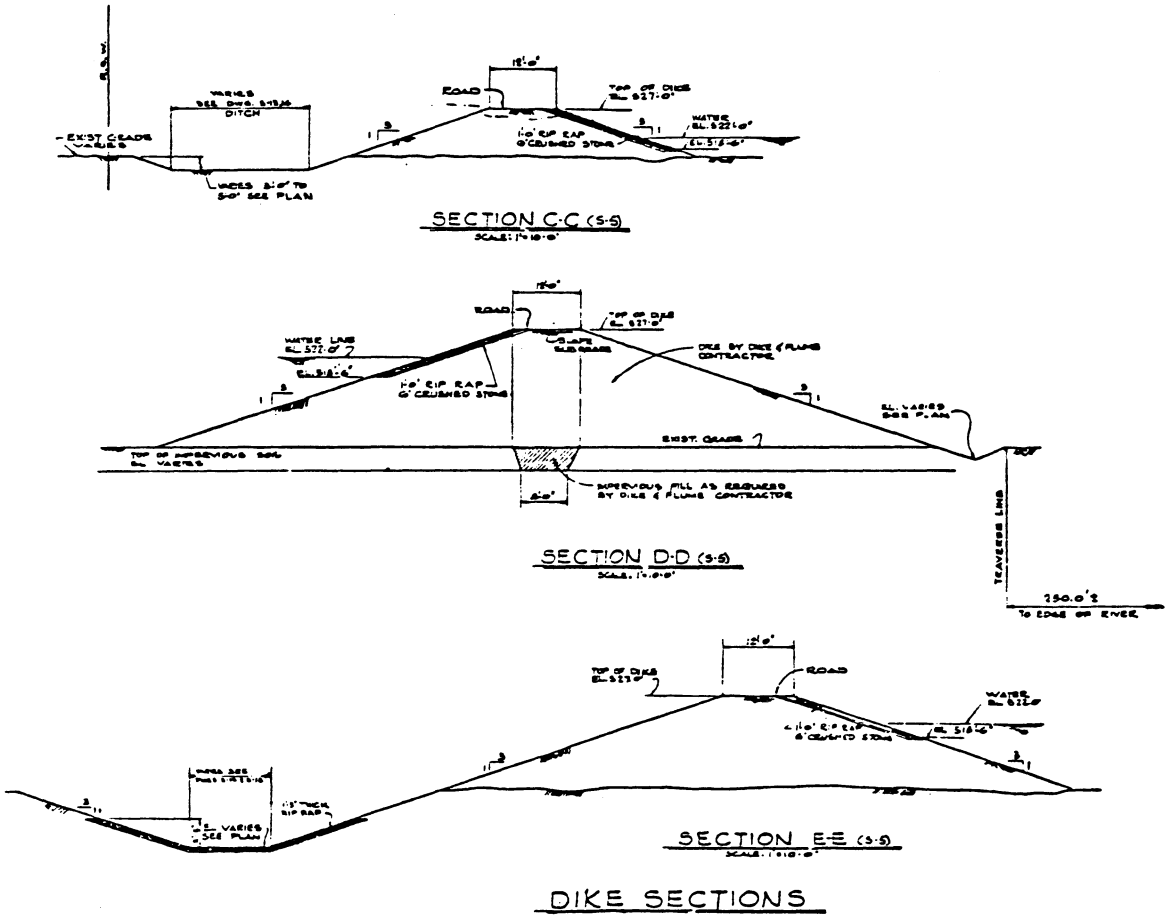


Figure 3.9 Dresden

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Commonwealth Edison Co.
2. Plant name Dresden Dam name Spray Pond Impoundment

   NRC Docket No. 50-237/249
3. Location: State Illinois County Grundy 9 miles from Morris
4. Downstream population centers

   Name Morris, Ill. Population 8,194 Distance 9 mi.
5. Rad. Hazard (Cat. I): No ; Inundation Hazard (L, M, H) H
6. Dam Characteristics:

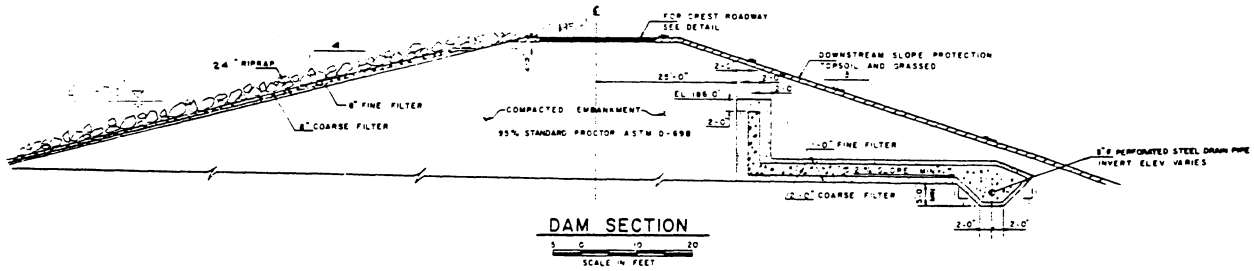
Purpose	Normal cooling water	Elevations:	
Type	Earthfill	Top	527'
Height	17'	Spillway	
Length		Norm. Pool	522'
Crest Width		Max. Pool	
Slopes	3:1	Freeboard	5'

7. Hydrology:

Drainage area		Surface area	1275 acres
Storage: normal	8,100 acre-ft	Maximum	12,250 acre-ft
Spillway type			
Discharge Cap.			

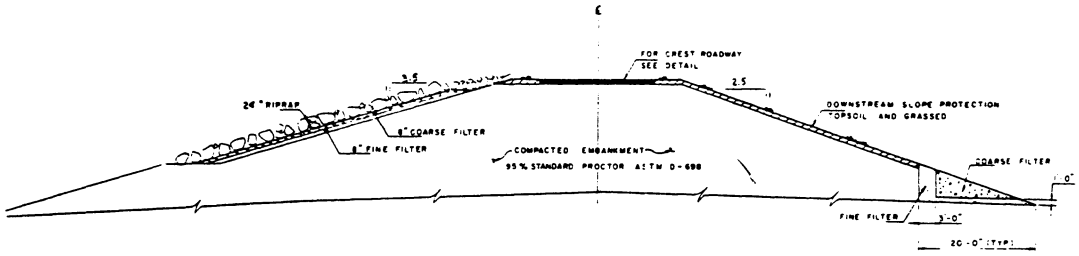
8. Year construction started _____ completed 1971
9. Licensed by _____
10. Regular inspection: _____
11. COE Inventory Reference # IL 439
12. References FSAR, Region III Paul Pelke
13. Comments Embankment has failed in past and is a hazard to nearby school on the west. Spray pond is filled by water pumped from Dresden Island Reservoir.

Prepared By: _____



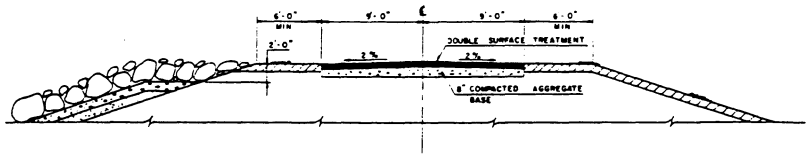
DAM SECTION

SCALE IN FEET



DIKE SECTION

SCALE IN FEET



CREST DETAIL

ALABAMA POWER COMPANY JOSEPH M. FARLEY NUCLEAR PLANT FINAL SAFETY ANALYSIS REPORT
STORAGE POND EMBANKMENT CREST DETAIL AND COMPACTION DATA FIGURE 2B7-17

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Alabama Power Co.
2. Plant name Farley Dam name Category I Holding Pond Embankment

   NRC Docket No. 50-348/364
3. Location: State Alabama County Houston ___ miles from
4. Downstream population centers

   Name _____ Population _____ Distance _____
5. Rad. Hazard (Cat. I): Yes; Inundation Hazard (L, M, H) _____
6. Dam Characteristics:

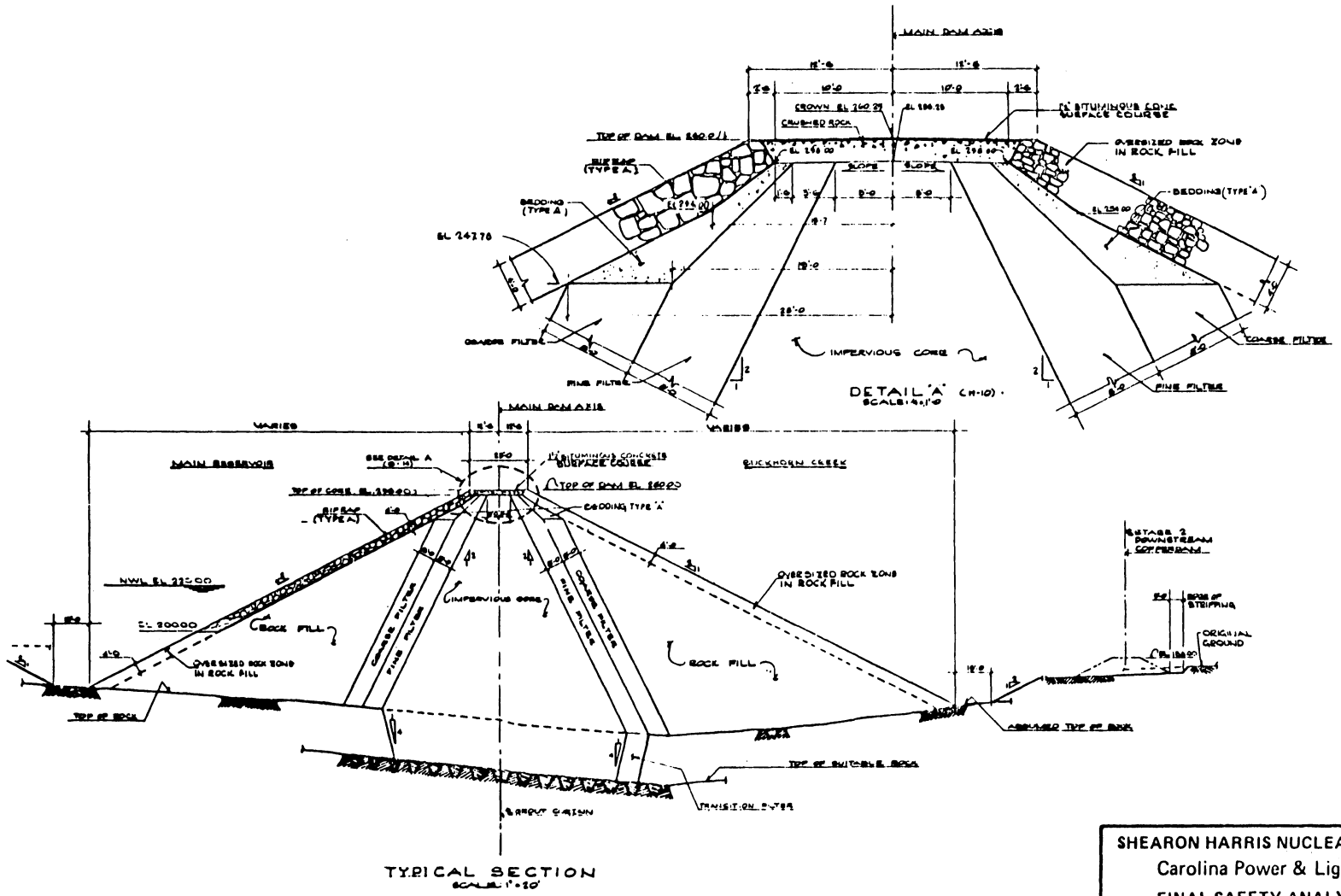
Purpose	Cooling towers makeup, emerg.	Elevations:	
Type	Homogenous earthfill	Top	195'
Height	55'	Spillway	186'
Length	3900'	Norm. Pool	185'
Crest Width	30'	Max. Pool	192.2'
Slopes	4:1, 3:1	Freeboard	2.8'

7. Hydrology:

Drainage area	325 acres	Surface area	100 acres
Storage: normal	1570 acre-ft	Maximum	2370 acre-ft
Spillway type			
Discharge Cap.	2020 cfs		

8. Year construction started _____ completed 1979 +
9. Licensed by _____
10. Regular inspection: _____
11. COE Inventory Reference # _____
12. References FSAR Sec. 2.4.8, 9.2.5
13. Comments Failure of embankment would drain right into Chatahoochie River. Pond is filled by pumping from river.

Prepared By: _____



B-18

REF DWG: CAR-2167-G-6241 (REV 2)

SHEARON HARRIS NUCLEAR POWER PL
Carolina Power & Light Company
FINAL SAFETY ANALYSIS REPORT

MAIN DAM
PROFILE & TYPICAL SECTION
FIGURE 2.5.6-2

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Carolina Power & Light Co.
2. Plant name (Shearon) Harris Dam name Main Dam

   NRC Docket No. 50-400/401/402/403
3. Location: State North Carolina County Wake ___ miles from
4. Downstream population centers

   Name Lillington Population 1242 Distance 15 mi.
5. Rad. Hazard (Cat. I): No/Yes; Inundation Hazard (L, M, H) ___
   Not by function but by design
6. Dam Characteristics:

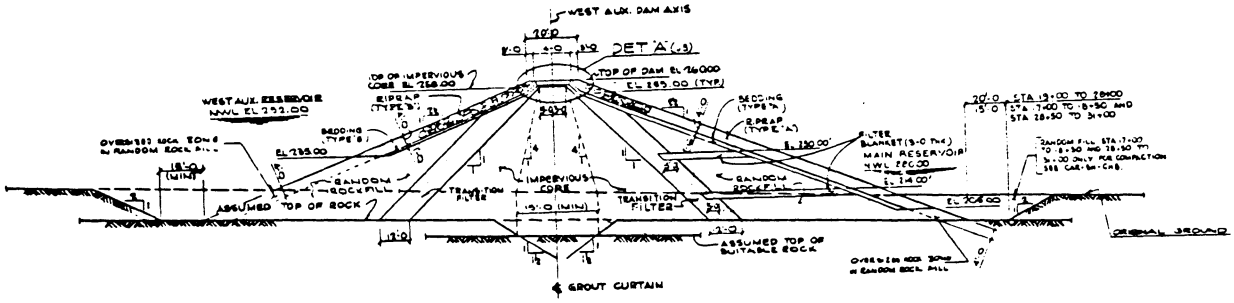
Purpose	Normal cooling water	Elevations:	
Type	Rockfill	Top	260'
Height	108'	Spillway	220'
Length	1550'	Norm. Pool	220'
Crest Width	25'	Max. Pool	249'
Slopes	2:1	Freeboard	11.1'

7. Hydrology:

Drainage area	71 sq miles	Surface area	
Storage: normal	70,000 acre-ft	Maximum	270,000 acre-ft
Spillway type	Ogee (2)		
Discharge Cap.	14,190 cfs		

8. Year construction started ___ completed 1979 +
9. Licensed by ___
10. Regular inspection: Contains settlement monuments, piezometers and seepage monitors. Monitoring frequency unknown.
11. COE Inventory Reference # ___
12. References FSAR Vol. 4 Sec. 2.5.6, Vol. 3 Sec. 2.4
13. Comments ___

Prepared By: ___



TYPICAL SECTION
STA 17+00 THRU 31+00

SHEARON HARRIS NUCLEAR POWER PLANT Carolina Power & Light Company FINAL SAFETY ANALYSIS REPORT
AUXILIARY DAM – PROFILE AND TYPICAL SECTIONS FIGURE 2.5.6-4

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Carolina Power and Light Co.
2. Plant name (Shearon) Harris Dam name Auxiliary Dam

   NRC Docket No. 50-400/401/402/403
3. Location: State North Carolina County Wake ___ miles from
4. Downstream population centers

   Name Lillington Population 1242 Distance 15 mi
5. Rad. Hazard (Cat. I): Yes ; Inundation Hazard (L, M, H) _____
6. Dam Characteristics:

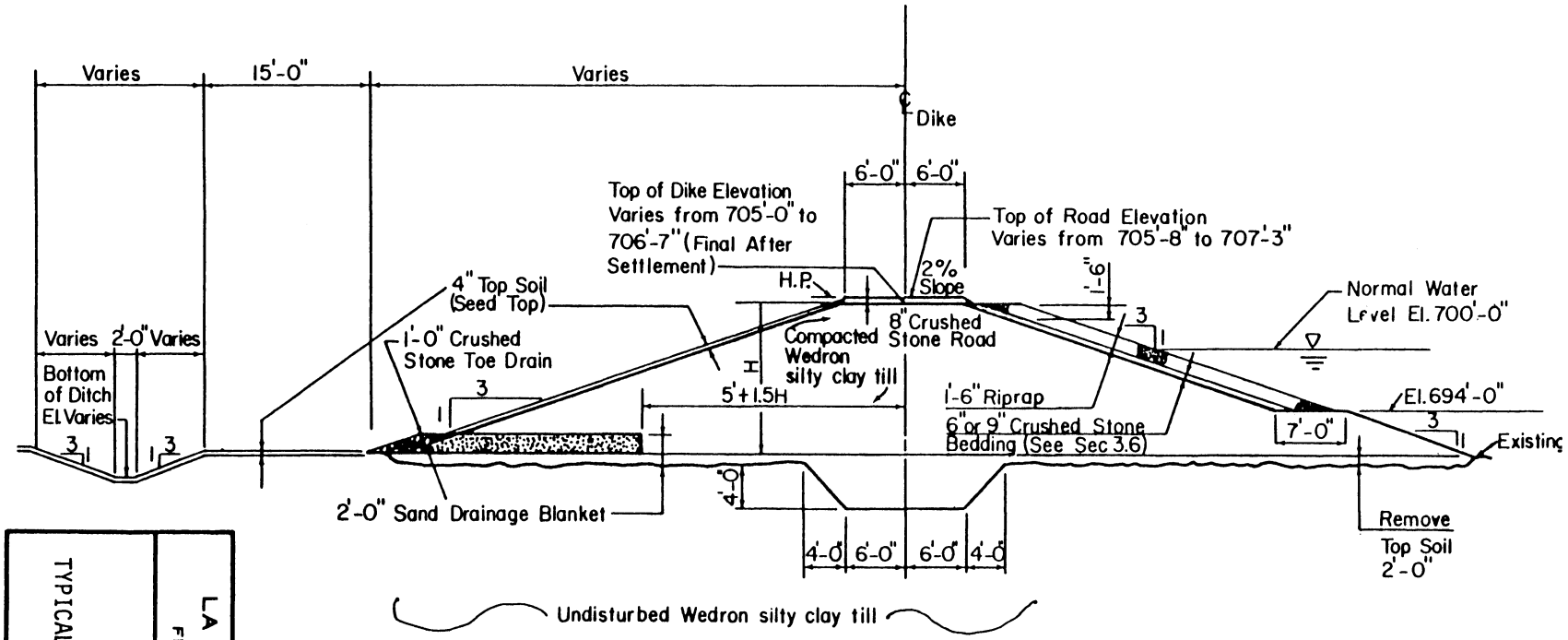
Purpose	Emergency cooling water	Elevations:	
Type	Rockfill	Top	260'
Height	73'	Spillway	252'
Length	4060'	Norm. Pool	252'
Crest Width	20'	Max. Pool	256'
Slopes	2.5:1	Freeboard	4.0'

7. Hydrology:

Drainage area	2.43 sq miles	Surface area	
Storage: normal	5250 acre-ft	Maximum	7,200 acre-ft
Spillway type	Ogee		
Discharge Cap.	5030 cfs		

8. Year construction started _____ completed 1979 +
9. Licensed by _____
10. Regular inspection: Settlement monuments and piezometers. No seepage monitors. Monitoring frequency unknown.
11. COE Inventory Reference # _____
12. References FSAR Sec. 2.5.6, 2.4
13. Comments Auxiliary Dam isolates an arm of Main Reservoir

Prepared By: _____



LEGEND

1. Not to scale.

LA SALLE COUNTY STATION
FINAL SAFETY ANALYSIS REPORT

FIGURE 2.5-70

TYPICAL PERIPHERAL DIKE CROSS SECTION

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Commonwealth Edison Co.
2. Plant name LaSalle Dam name Cooling Pond Dike

   NRC Docket No. 50-373/374
3. Location: State Illinois County LaSalle ___ miles from
4. Downstream population centers

   Name _____ Population _____ Distance _____
5. Rad. Hazard (Cat. I): No ; Inundation Hazard (L, M, H) _____
6. Dam Characteristics:

Purpose Normal cooling water	Elevations:
Type Homogenous earthfill	Top 707'
Height 40'	Spillway _____
Length 37,942'	Norm. Pool 700'
Crest Width 12'	Max. Pool _____
Slopes 3:1	Freeboard _____

7. Hydrology:

Drainage area _____	Surface area 2,058 acres
Storage: normal 31,706 acre ft	Maximum _____

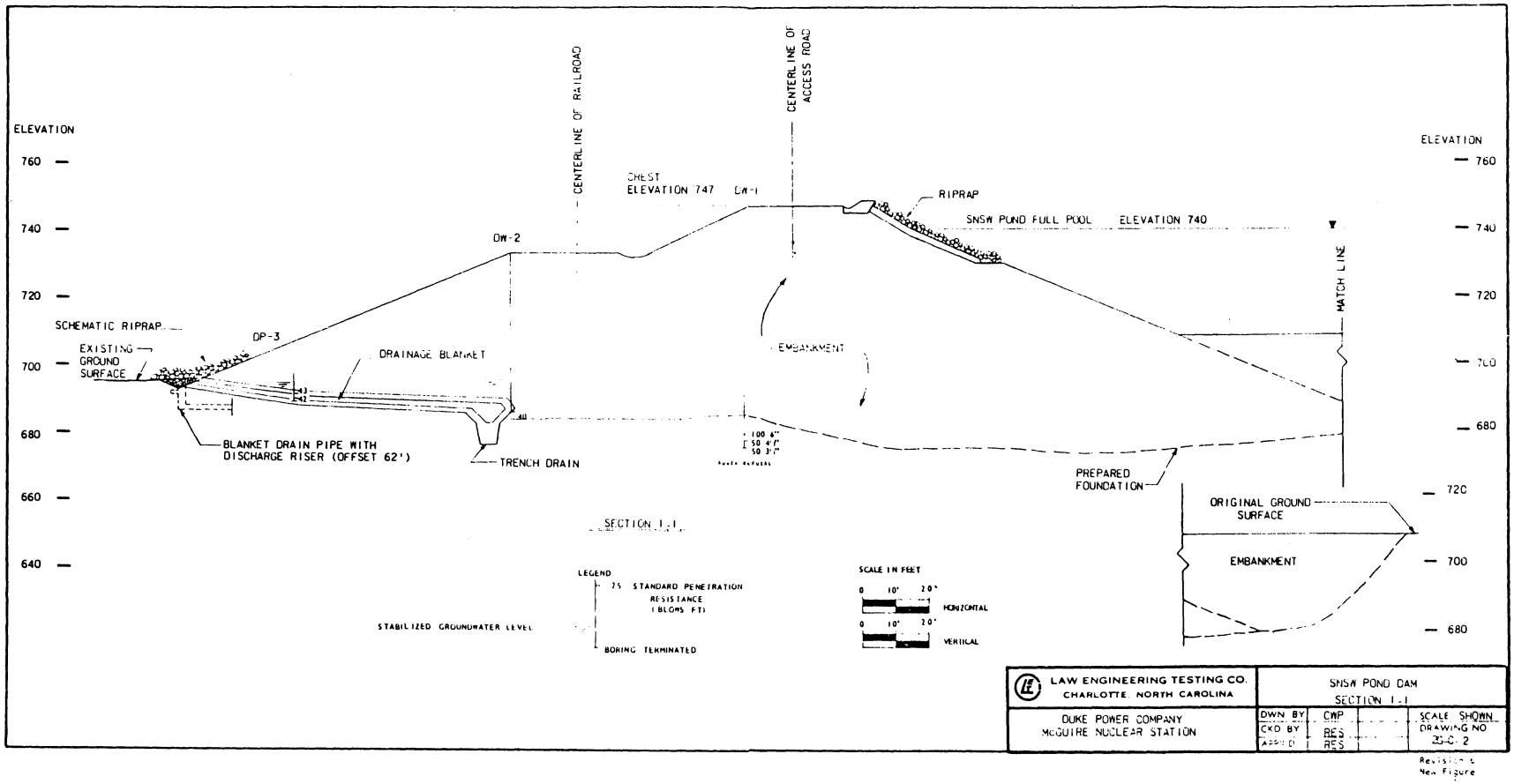
   Spillway type _____

   Discharge Cap. _____
8. Year construction started _____ completed 82+
9. Licensed by _____
10. Regular inspection: _____

    _____

    _____
11. COE Inventory Reference # _____
12. References FSAR Sec. 2.4, 2.5.6
13. Comments Cooling pond contains an excavated depression for emergency cooling water purposes.

Prepared By: _____



LAW ENGINEERING TESTING CO. CHARLOTTE, NORTH CAROLINA	SNSW POND DAM SECTION I-I
DUKE POWER COMPANY McGUIRE NUCLEAR STATION	DWN BY: CWP; CKD BY: RES; APP'D: RES; SCALE SHOWN; DRAWING NO 23-C-2

Revision 6
New Figure

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Duke Power Co.
2. Plant name McGuire Dam name Standby Nuclear Service Water Dam

   NRC Docket No. 50-369/370
3. Location: State North Carolina County Lincoln ___ miles from
4. Downstream population centers

   Name _____ Population _____ Distance _____
5. Rad. Hazard (Cat. I): Yes; Inundation Hazard (L, M, H) _____
6. Dam Characteristics:

Purpose	Emergency cooling water	Elevations:	
Type	Homogenous earthfill	Top	748.5
Height	60'	Spillway	
Length	1260'	Norm. Pool	740'
Crest Width	36'	Max. Pool	742.5'
Slopes	2.5:1	Freeboard	6.0'

7. Hydrology:

Drainage area	171 acres	Surface area	
Storage: normal	578 acre-ft	Maximum	
Spillway type			
Discharge Cap.			

8. Year construction started _____ completed 1980 +
9. Licensed by _____
10. Regular inspection: Piezometers-weekly (6 mos.), monthly (6 mos), "quarterly thereafter until 1 year after initial unit 1 operation". Vertical and Horizontal movement and V. Notched Wier (seepage). Monthly (6 mos) and quarterly until 1 year after ~~unit 1 operation~~
11. COE Inventory Reference # _____
12. References FSAR Appendix 2G
13. Comments Monitoring frequency after 1 year after initial unit 1 operation is unknown.

Prepared By: _____

Typical cross-section not available

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Duke Power Co.
2. Plant name McGuire Dam name Wastewater Collection Basin Dam

   NRC Docket No. 50-369/370
3. Location: State North Carolina County Lincoln ___ miles from
4. Downstream population centers

   Name _____ Population _____ Distance _____
5. Rad. Hazard (Cat. I): No ; Inundation Hazard (L, M, H) _____
6. Dam Characteristics:

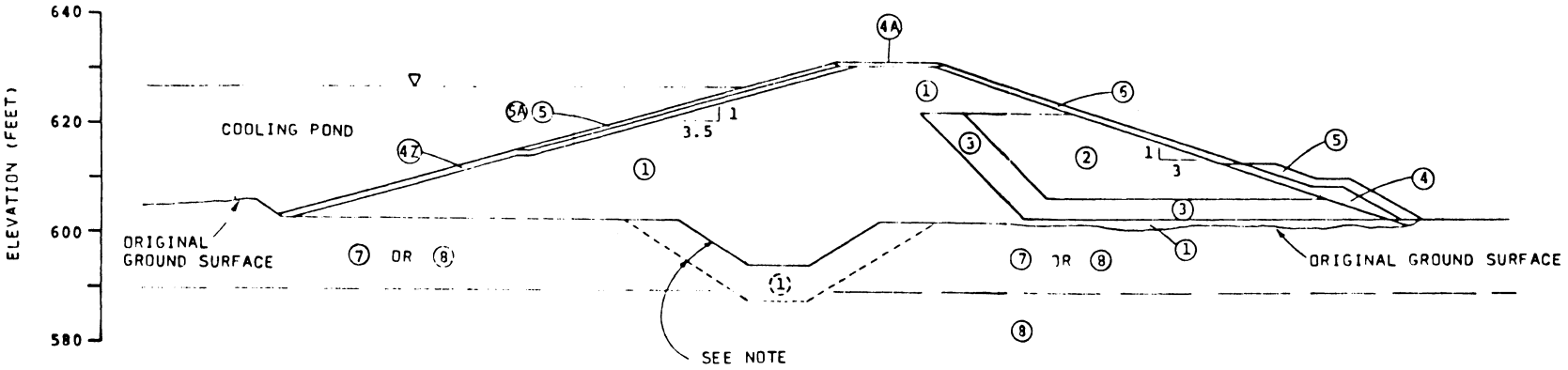
Purpose	Wastewater Storage	Elevations:	
Type	Homogenous earthfill	Top	697'
Height	32'	Spillway	
Length	190'	Norm. Pool	
Crest Width	20'	Max. Pool	
Slopes	2:1	Freeboard	7'

7. Hydrology:

Drainage area	171 acres	Surface area	
Storage: normal		Maximum	
Spillway type			
Discharge Cap.			

8. Year construction started _____ completed 1980 ±
9. Licensed by _____
10. Regular inspection: _____
11. COE Inventory Reference # _____
12. References FSAR App. 2G
13. Comments _____

Prepared By: _____



REFERENCE:
SEE FIGURE 2.5-46 FOR LOCATION OF CROSS SECTION

0 10 20 40 60
SCALE IN FEET

EXPLANATION

ZONE	MATERIAL
1 (1)	IMPERVIOUS FILL
2	RANDOM FILL
3	SAND DRAIN
4 4A 4Z	GRAVEL
5 5A	RIPRAP
6	TOPSOIL & SEEDING
7	FOUNDATION (LOOSE SAND, SILT AND FIRM CLAY)
8	FOUNDATION (GLACIAL TILL)

NOTE
1. WHERE ZONE 7 MATERIAL OCCURS, THE CUTOFF TRENCH INTERCEPTS ZONE 7 AND PENETRATES 2 FEET INTO ZONE 8 ZONE 7 WAS ASSUMED AS SHOWN FOR CONSERVATISM IN SLOPE STABILITY ANALYSIS.
2. FOR DESCRIPTION OF THE 8 ZONES SEE FIGURE 2.5-19.

CONSUMERS POWER COMPANY
MIDLAND PLANT UNITS 1 & 2
FINAL SAFETY ANALYSIS REPORT

Dike Section G

(SK-G-125, Rev 2)

FSAR Figure 2.5-53

1/91 Revision 1

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Consumers Power Co.
2. Plant name Midland Dam name Cooling Pond Dike

   NRC Docket No. 50-329/330
3. Location: State Michigan County Midland 0 miles from Midland
4. Downstream population centers

   Name _____ Population _____ Distance _____
5. Rad. Hazard (Cat. I): No ; Inundation Hazard (L, M, H) _____
6. Dam Characteristics:

Purpose	Normal cooling water	Elevations:	
Type	Earthfill	Top	632'
Height	28'	Spillway	627'
Length		Norm. Pool	627'
Crest Width		Max. Pool	627'
Slopes	3:1, 3.5:1	Freeboard	5.0'

7. Hydrology:

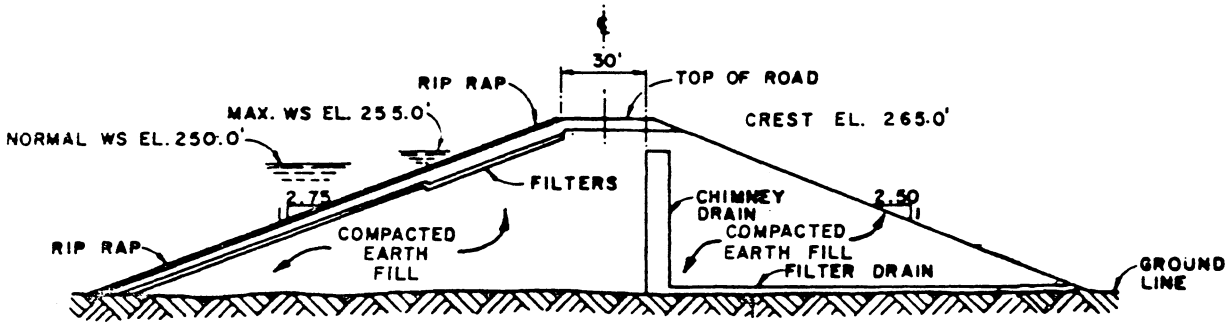
   Drainage area _____ Surface area 880 acres

   Storage: normal 12,600 acre-ft Maximum 12,600 acre-ft

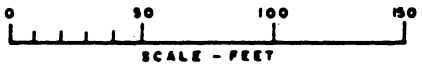
   Spillway type _____

   Discharge Cap. _____
8. Year construction started _____ completed 1978
9. Licensed by _____
10. Regular inspection: _____
11. COE Inventory Reference # _____
12. References FSAR
13. Comments The cooling pond contains an excavated depression for emergency cooling water purposes.

Prepared By: _____



TYPICAL CROSS SECTION



DAM AND SPILLWAY

NORTH ANNA RIVER

NORTH ANNA POWER STATION
UNITS 1 AND 2

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Virginia Electric Power Co.
2. Plant name North Anna Dam name North Anna Dam

   NRC Docket No. 50-404/405
3. Location: State Virginia County Spotsylvania ___ miles from
4. Downstream population centers

   Name _____ Population _____ Distance _____
5. Rad. Hazard (Cat. I): No/Yes; Not by function but by design Inundation Hazard (L, M, H) _____
6. Dam Characteristics:

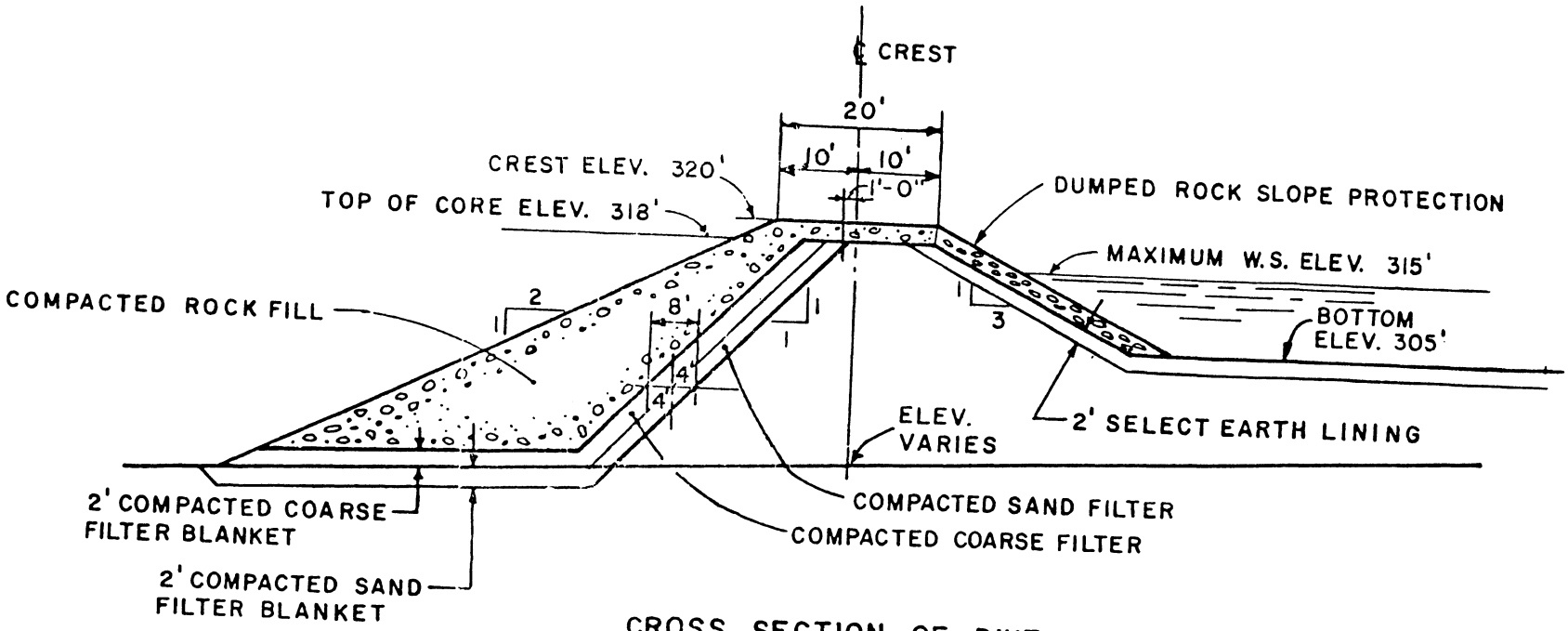
Purpose	Normal cooling water	Elevations:	
Type	Homogenous earthfill	Top	265'
Height	95'	Spillway	
Length	5000'	Norm. Pool	250'
Crest Width	30'	Max. Pool	255'
Slopes	2.5:1	Freeboard	10'

7. Hydrology:

Drainage area	343 sq miles	Surface area	
Storage: normal	305,000 acre-ft	Maximum	373,000 acre-ft
Spillway type	concrete gravity		
Discharge Cap.	105,000 cfs		

8. Year construction started _____ completed 1975 +
9. Licensed by _____
10. Regular inspection: Horizontal and vertical displacement, seepage, pore pressure. Monitoring frequency unknown.
11. COE Inventory Reference # VA 17702
12. References FSAR Sec. 2.4, 3.8.3
13. Comments This reservoir provides normal cooling and make-up water to the standby service reservoir.

Prepared By: _____



CROSS SECTION OF DIKE

SCALE 1" = 20'

IMPOUNDING DIKE
SERVICE WATER RESERVOIR
NORTH ANNA POWER STATION
UNITS 1 AND 2

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Virginia Electric Power Co.
2. Plant name North Anna Dam name Service Water Dikes 1 & 2

   NRC Docket No. 50-404/405
3. Location: State Virginia County _____ ___ miles from
4. Downstream population centers

   Name _____ Population _____ Distance _____
5. Rad. Hazard (Cat. I): Yes; Inundation Hazard (L, M, H) _____
6. Dam Characteristics:

Purpose	Emergency cooling water	Elevations:	
Type	Rockfill	Top	320'
Height	20'	Spillway	
Length		Norm. Pool	310'
Crest Width		Max. Pool	315'
Slopes	2:1, 3:1	Freeboard	5.0'

7. Hydrology:

   Drainage area 9 acres Surface area _____

   Storage: normal 88 acre-ft Maximum _____

   Spillway type _____

   Discharge Cap. _____
8. Year construction started _____ completed _____
9. Licensed by _____
10. Regular inspection: Horizontal and vertical displacement, seepage. Monitoring frequency unknown.
11. COE Inventory Reference # _____
12. References FSAR Sec. 9.2, 3.8.4.
13. Comments Service Water Dikes 1 and 2 impound a separate reservoir which obtains make-up water from Lake Anna.

Prepared By: _____

Typical cross-section not available

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Duke Power Co.
2. Plant name Oconee Dam name Submerged Dam

   NRC Docket No. 50-287
3. Location: State South Carolina County _____ ___ miles from
4. Downstream population centers

   Name _____ Population _____ Distance _____
5. Rad. Hazard (Cat. I): Yes; Inundation Hazard (L, M, H) None
6. Dam Characteristics:

Purpose Emergency cooling water	Elevations:
Type _____	Top _____
Height _____	Spillway _____
Length _____	Norm. Pool _____
Crest Width _____	Max. Pool _____
Slopes _____	Freeboard _____

7. Hydrology:

Drainage area _____	Surface area _____
Storage: normal _____	Maximum _____

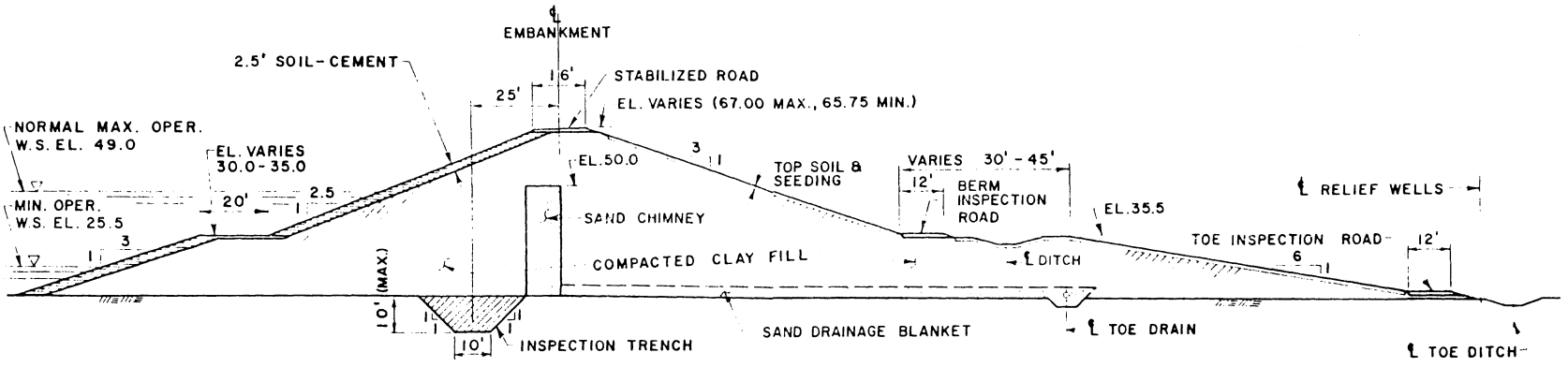
   Spillway type _____

   Discharge Cap. _____
8. Year construction started _____ completed _____
9. Licensed by _____
10. Regular inspection: _____

    _____

    _____
11. COE Inventory Reference # _____
12. References _____
13. Comments Dam isolates an arm of Lake Keowee created by Lake Keowee Dam and Little River Dam.

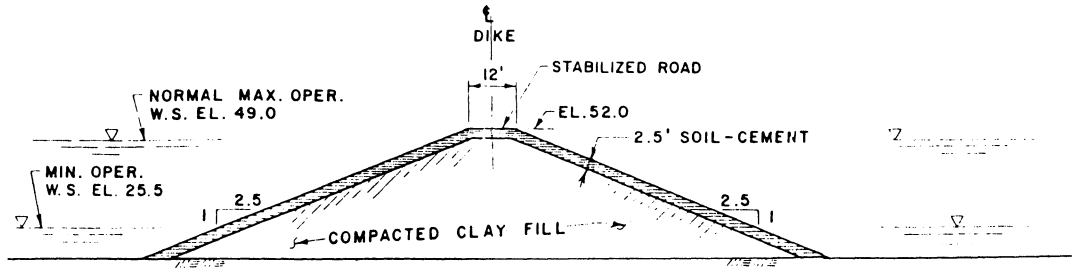
Prepared By: _____



TYPICAL SECTION THROUGH EMBANKMENT

SCALE: 1"=30'

NOTE: SECTION SHOWN REPRESENTS TYPICAL SECTION. SAND DRAINAGE BLANKET AND TOE DRAIN APPLIES TO APPROXIMATELY 6 % OF EMBANKMENT PERIMETER FOR MORE DETAILS OF VARIATIONS IN THIS CROSSECTION SEE F.S.A.R. SECTION 2.5.6.



TYPICAL SECTION THROUGH DIKE

SCALE: 1"=30'

SOUTH TEXAS PROJECT
UNITS 1 & 2

COOLING RESERVOIR
EMBANKMENT AND INTERIOR DIKE:
TYPICAL SECTIONS

FIGURE 2.4.8-3

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Houston Lighting and Power Co.
2. Plant name South Texas Dam name Cooling Pond Embankment

   NRC Docket No. 50-498/499
3. Location: State Texas County Matagorda ___ miles from
4. Downstream population centers

   Name _____ Population _____ Distance _____
5. Rad. Hazard (Cat. I): No ; Inundation Hazard (L, M, H) _____
6. Dam Characteristics:

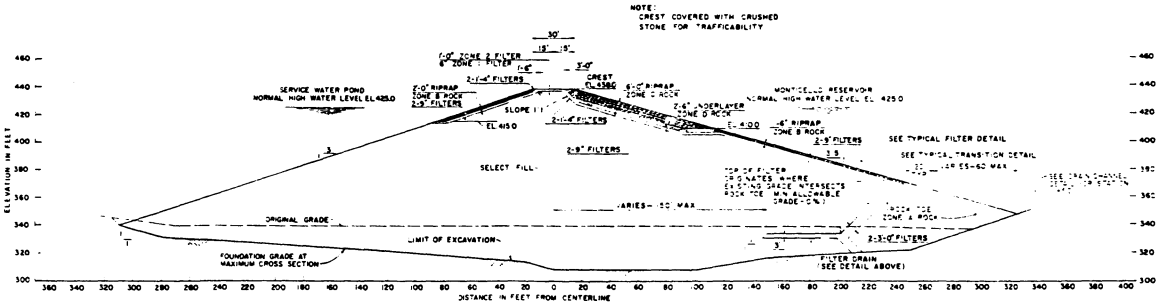
Purpose	Normal cooling water	Elevations:	
Type	Earthfill	Top	66'
Height	40' ±	Spillway	49.5'
Length		Norm. Pool	49'
Crest Width	16'	Max. Pool	51'
Slopes	2.5:1, 3:1	Freeboard	15'

7. Hydrology:

Drainage area		Surface area	7,000 acres
Storage: normal	200,000 acre-ft	Maximum	220,000 acre-ft
Spillway type	Ogee, sliding gates		
Discharge Cap.	4,000 cfs		

8. Year construction started _____ completed _____
9. Licensed by _____
10. Regular inspection: Piezometers, seepage monitors, vertical and horizontal movement. Monitoring frequency unknown.
11. COE Inventory Reference # _____
12. References FSAR Sec 2.4, 2.5.6
13. Comments Design basis flood will cause embankment to fail. Surrounding area is a barren flood plain. Cooling pond filled by Colorado River by pump.

Prepared By: _____

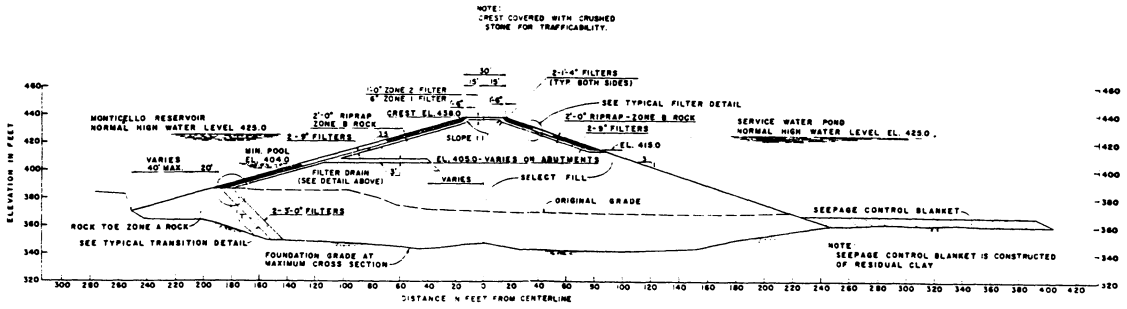


TYPICAL SECTION – NORTH DAM

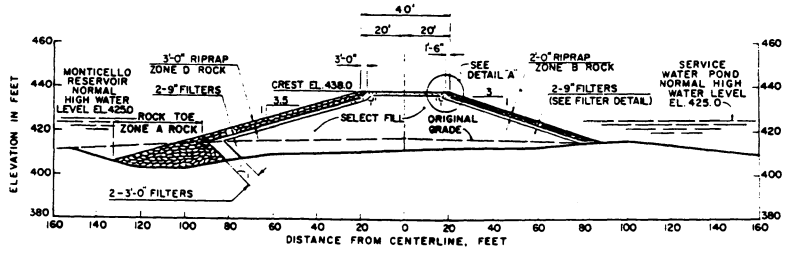
SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Typical Section North Dam

Figure 2.5-133



TYPICAL SECTION - SOUTH DAM



TYPICAL SECTION–EAST DAM

AMENDMENT 7
AUGUST, 1978

SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Typical Section East Dam

Figure 2.5-135

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) South Carolina Electric and Gas Co.
2. Plant name Summer Dam name North-West, South & East Dams

   NRC Docket No. 50-395
3. Location: State South Carolina County Fairfield ___ miles from
4. Downstream population centers

   Name Peak Population 580 Distance 2 miles
5. Rad. Hazard (Cat. I): Yes; Inundation Hazard (L, M, H) _____
6. Dam Characteristics:

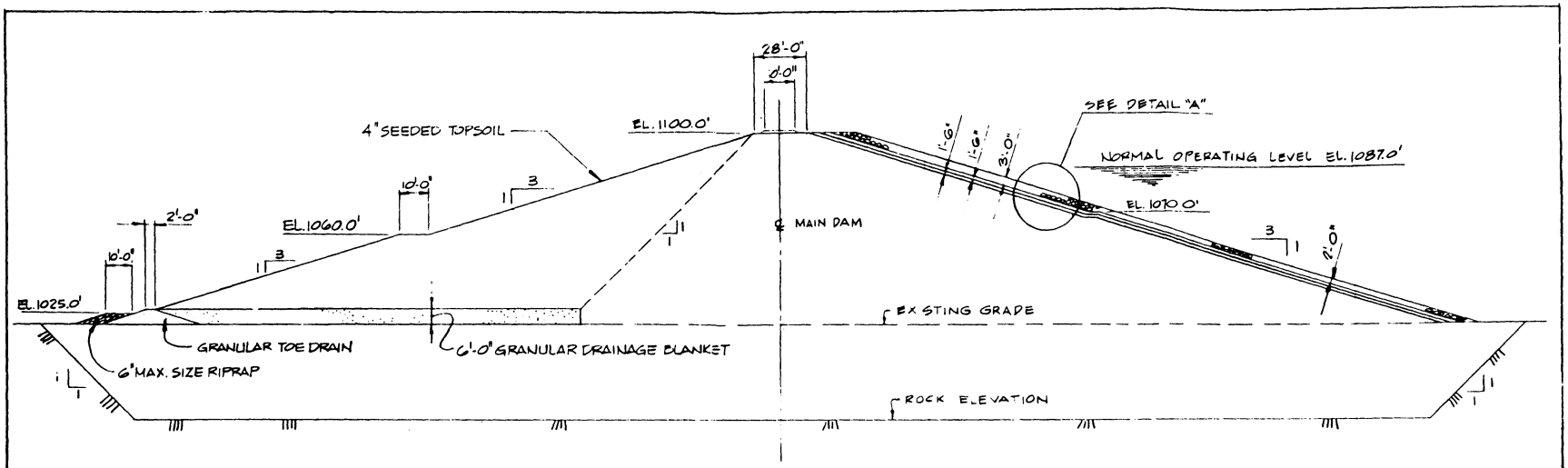
Purpose	Emergency cooling water	Elevations:	
Type	Homogenous earthfill	Top	438'
Height	129', 98', 28'	Spillway	
Length	3400', 765', 1150'	Norm. Pool	425'
Crest Width		Max. Pool	430'
Slopes	3:1	Freeboard	1.4'

7. Hydrology:

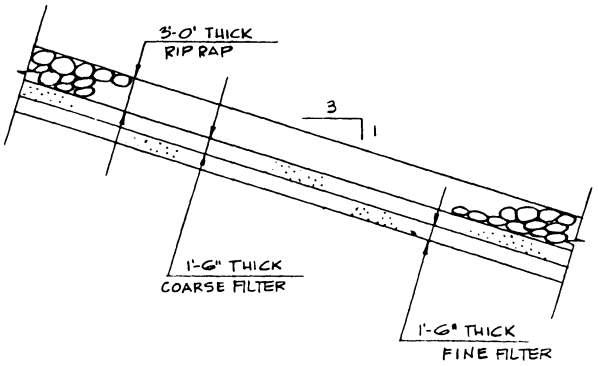
Drainage area		Surface area	
Storage: normal	1,200 acre-ft	Maximum	1,600 acre-ft
Spillway type	None		
Discharge Cap.			

8. Year construction started _____ completed December 1979
9. Licensed by _____
10. Regular inspection: Vertical and horizontal movement, piezometers, slope stability, drains. Monitoring frequency unknown.
11. COE Inventory Reference # _____
12. References FSAR Sec. 2.4, 9.2.5
13. Comments These 3 seismic Category I dams isolate an arm of Frees Creek Reservior.

Prepared By: _____



TYPICAL SECTION
MAIN DAM



DETAIL "A"

Rev. 6
10/81

WOLF CREEK GENERATING STATION
UNIT NO. 1
FINAL SAFETY ANALYSIS REPORT

FIGURE 2.5-115a

TYPICAL SECTION - MAIN DAM

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Kansas Gas & Electric Co.
2. Plant name Wolf Creek Dam name Main Dam

   NRC Docket No. 50-482
3. Location: State Kansas County Coffey ___ miles from
4. Downstream population centers

   Name _____ Population _____ Distance _____
5. Rad. Hazard (Cat. I): No ; Inundation Hazard (L, M, H) _____
6. Dam Characteristics:

Purpose	Normal cooling water	Elevations:	
Type	Homogenous earthfill	Top	1100'
Height	100'	Spillway	1088'
Length	12,260'	Norm. Pool	1087'
Crest Width	28'	Max. Pool	1095'
Slopes	3:1	Freeboard	5.0'

7. Hydrology:

Drainage area	27.4 sq miles	Surface area	
Storage: normal	111,280 acre-ft	Maximum	
Spillway type	100' Ogee (service), 500' Open cut (emerg)		
Discharge Cap.	20,076 cfs (combined)		

8. Year construction started _____ completed 1982 ±
9. Licensed by _____
10. Regular inspection: Pore water pressure, settlement, piezometers, and horizontal movement is monitored as per Reg. Guide 1.70.
11. COE Inventory Reference # _____
12. References FSAR Sec. 2.3, SER Sec. 2.4.
13. Comments The non-seismic Category I reservoir is formed by the Main Dam and Saddle Dams I through V.

Prepared By: _____

Typical cross-section not available

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Kansas Gas & Electric Co.
2. Plant name Wolf Creek Dam name Saddle Dam I through V

   NRC Docket No. 50-482
3. Location: State Kansas County Coffey ___ miles from
4. Downstream population centers

   Name _____ Population _____ Distance _____
5. Rad. Hazard (Cat. I): No ; Inundation Hazard (L, M, H) _____
6. Dam Characteristics:

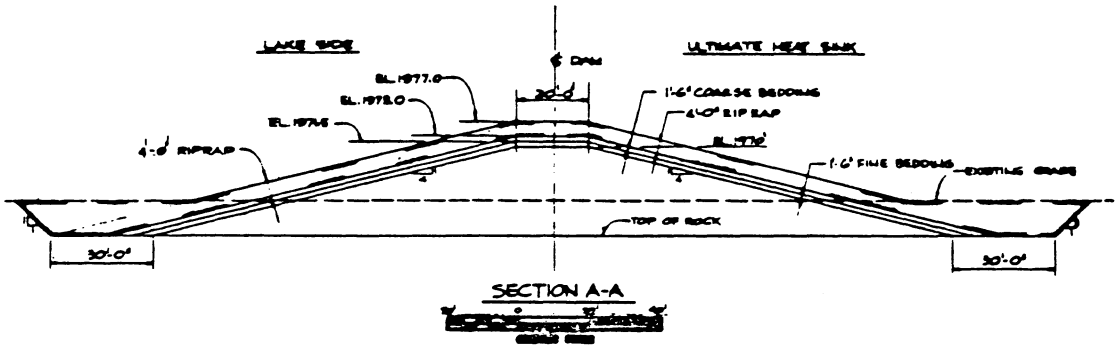
Purpose	Cooling lake retainers	Elevations:	
Type	Homogenous earthfill	Top	1100'
Height	5' - 38'	Spillway	None
Length		Norm. Pool	1087'
Crest Width		Max. Pool	1095'
Slopes	3:1	Freeboard	5.0'

7. Hydrology:

Drainage area	27.4 sq miles	Surface area	
Storage: normal		Maximum	
Spillway type	None		
Discharge Cap.			

8. Year construction started _____ completed 1982 ±
9. Licensed by _____
10. Regular inspection: Settlement monuments only. Dam No. 4 also has piezometers. Monitoring frequency unknown.
11. COE Inventory Reference # _____
12. References FSAR Sec 2.3
13. Comments All but Saddle Dam #4 are founded above elev. 1087' which is the normal water level. These dams act only to retain the reservoir during severe flooding. See also Wolf Creek Main Dam.

Prepared By: _____



WOLF CREEK GENERATING STATION UNIT NO. 1 FINAL SAFETY ANALYSIS REPORT
FIGURE 2.5-117 TYPICAL SECTION - UHS DAM

Principal Design Features of

On-Site Dams

Date: June 1982

1. Licensee (Owner) Kansas Gas & Electric Co.
2. Plant name Wolf Creek Dam name Submerged Category I Cooling Dam

   NRC Docket No. 50-482
3. Location: State Kansas County Coffey ___ miles from
4. Downstream population centers

   Name _____ Population _____ Distance _____
5. Rad. Hazard (Cat. I): Yes; Inundation Hazard (L, M, H) None
6. Dam Characteristics:

Purpose Emergency cooling water	Elevations:
Type Homogenous earthfill	Top 1076'
Height 18'	Spillway None
Length 1700'	Norm. Pool 1087'
Crest Width 20'	Max. Pool
Slopes 4:1	Freeboard

7. Hydrology:

Drainage area	Surface area 95 acres
Storage: normal	Maximum
Spillway type None	
Discharge Cap.	

8. Year construction started 9/78 completed _____
9. Licensed by _____
10. Regular inspection: Lateral movements, seepage and sedimentation buildup. Monitoring frequency unknown.
11. COE Inventory Reference # _____
12. References FSAR Sec. 2.3
13. Comments Submerged Category I Cooling Dam is within the on-site Main Reservoir.

Prepared By: _____

Appendix C

Principal Design Features of Uranium Mill Tailings Dams Located in Non-Agreement States

Bear Creek Uranium Mill
Fed. American Partners Uranium Mill
Gas Hills Uranium Mill
Highland Uranium Mill
Lisbon Mine and Mill
Lucky McGas Hills Uranium Mill
Moab Uranium Mill
Shirley Basin Uranium Mill
Shootering Canyon Uranium Mill
Split Rock Uranium Mill
Sweetwater Uranium Mill
White Mesa Uranium Mill

Principal Design Features of

Uranium Mill Tailings Dams

Date July 1982

1. Licensee (Owner) Rocky Mountain Energy Co. (Bear Creek Uranium Co.)
2. Mill Name Bear Creek Uranium Mill Dam Name
3. NRC Docket # 40-8452
4. Location: State Wyoming County Converse
5. Dam Characteristics:

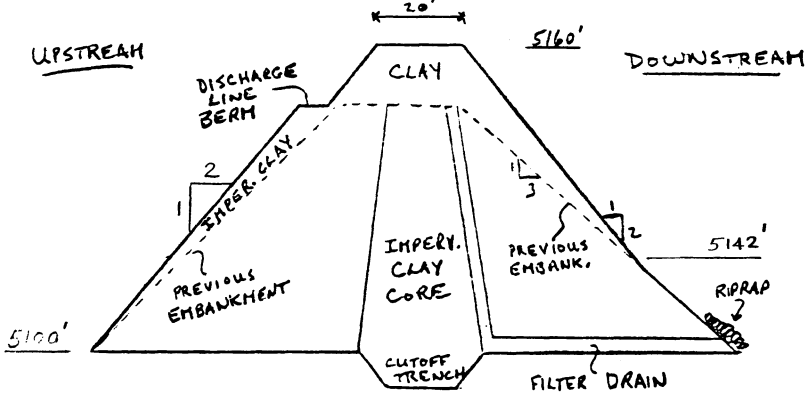
   Type Earthfill Crest Width 20'

   Height 60' Slopes 2:1, 3:1

   Length 1500' Freeboard 10.0'

   Present top elev. 5160 Proposed final elev.

   Typical Cross-Section



6. Hydrology:

   Surface area 26 acres

   Storage: normal 2770 acre-ft max. 3570 acre-ft

7. Year construction started stage 1, 1977 completed stage 2, 1981
8. Regular inspection Daily inspection for any release of radioactive materials.

9. References Chen and Associates Construction Reports Feb. 2, 1981 and April 21, 1978.
10. Comments Before the addition, slopes were 3:1 and 2.5:1, they now are 2:1. Licensee will raise the dam to 5180' in 1983.

Prepared by

Principal Design Features of

Uranium Mill Tailings Dams

Date July 1982

1. Licensee (Owner) Federal American Partners
2. Mill Name Fed. American Partners Uranium Mill Dam Name Tailings Dam No. 1
3. NRC Docket # 40-4492
4. Location: State Wyoming County Fremont
5. Dam Characteristics:

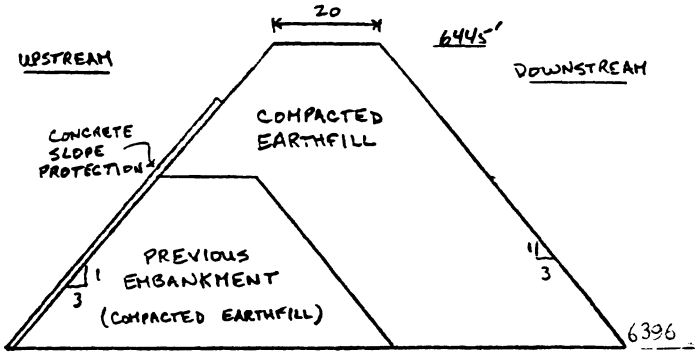
   Type Homogenous earthfill Crest Width 20'

   Height 49' Slopes 3:1

   Length 980' Freeboard 5.0'

   Present top elev. 6445 Proposed final elev. 6445

Typical Cross-Section



6. Hydrology:

   Surface area 23 acres +

   Storage: normal _____ max. 419.2 acre-ft

7. Year construction started _____ completed 1978
8. Regular inspection Daily visual inspection (documented)

9. References F. M. Fox and Associates "Proposed Extensions of Tailings Dams 1 & 2" May 5, 1978
10. Comments This pond is used for storing fluids which are pumped from tailings pond No. 2 (see next page). No more raises are planned.

Prepared by _____

Principal Design Features of

Uranium Mill Tailings Dams

Date July 1982

1. Licensee (Owner) Federal Americal Partners
2. Mill Name Fed. American Partners Uranium Mill Dam Name Tailings Dam No. 2
3. NRC Docket # 40-4492
4. Location: State Wyoming County Fremont
5. Dam Characteristics:

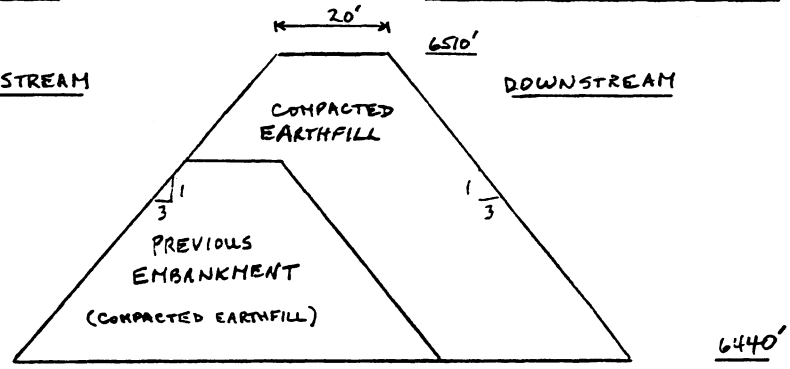
   Type Homogenous earthfill Crest Width 20'

   Height 70' Slopes 3:1

   Length _____ Freeboard 5.0'

   Present top elev. 6510 Proposed final elev. 6510'

Typical Cross-Section



6. Hydrology:

   Surface area 70 acres

   Storage: normal _____ max. _____

7. Year construction started _____ completed 1978
8. Regular inspection Daily visual inspection (documented)

9. References F. M. Fox and Associates, "Revision of Design for Tailings Dam #2," July 19, 1978
10. Comments Fluids are decanted to pond #1. No more raises are planned.

Prepared by _____

Principal Design Features of

Uranium Mill Tailings Dams

Date July 1982

1. Licensee (Owner) Union Carbide Corp.
2. Mill Name Gas Hills Uranium Mill Dam Name _____
3. NRC Docket # 40-299
4. Location: State Wyoming County Natrona
5. Dam Characteristics:

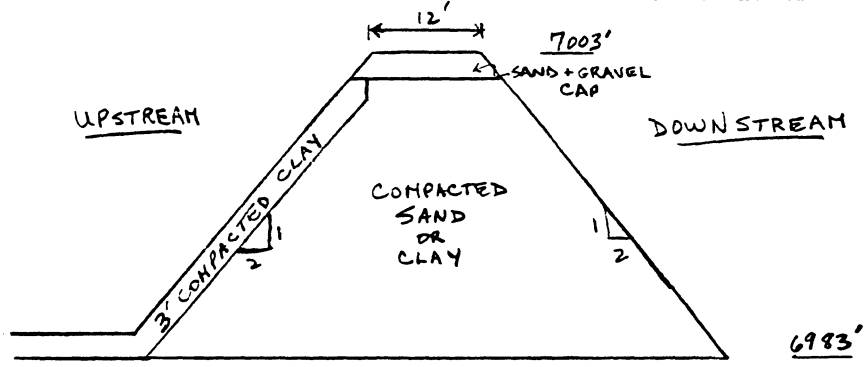
   Type Zoned earthfill Crest Width 12'

   Height 20' Slopes 3:1 upstream, 2:1 downstream

   Length _____ Freeboard 5.0'

   Present top elev. 7003' Proposed final elev. 7003'

   Typical Cross-Section



6. Hydrology:

   Surface area 24 acres

   Storage: normal 300 acre-ft max. 420 acre-ft

7. Year construction started _____ completed 1979
8. Regular inspection Daily, weekly and monthly documented inspections.
9. References Final Environmental Statement (NRC) July 1980. Dames and Moore Report Sept. 10, 1979.
10. Comments This pond is part of an underground disposal system and contains only liquids. One other disposal site is being reclaimed at present. All future disposal will be underground. Open pipe spillway at elev. 6998.

Prepared by _____

Principal Design Features of

Uranium Mill Tailings Dams

Date July 1982

1. Licensee (Owner) Exxon Minerals Corps.
2. Mill Name Highland Uranium Mill Dam Name _____
3. NRC Docket # 40-8102
4. Location: State Wyoming County Converse
5. Dam Characteristics:

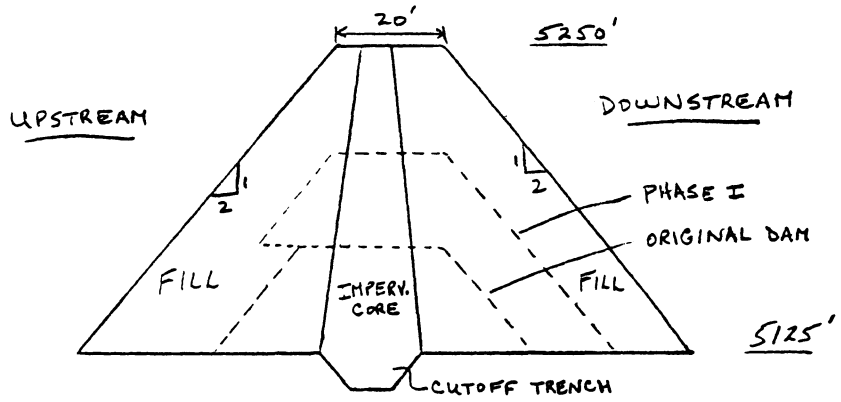
   Type Earthfill Crest Width 20'

   Height 125' Slopes 2:1 upstream, 2.5:1 downstream

   Length _____ Freeboard _____

   Present top elev. 5250' Proposed final elev. 5250'

Typical Cross-Section



6. Hydrology:

   Surface area _____

   Storage: normal _____ max. 920 acre-ft

7. Year construction started _____ completed 1981
8. Regular inspection _____

9. References Dames and Moore Report "Design of Centerline Constructed Height Increases" Oct 26, 1976
10. Comments Phase 2 of raising was completed in 1981 at elev. 5250'. No more raises are planned.

Prepared by _____

Principal Design Features of

Uranium Mill Tailings Dams

Date July 1982

1. Licensee (Owner) Rio Algom Corp
2. Mill Name Lisbon Mine and Mill Dam Name Lower Pond Dam
3. NRC Docket # 40-8084
4. Location: State Utah County San Juan
5. Dam Characteristics:

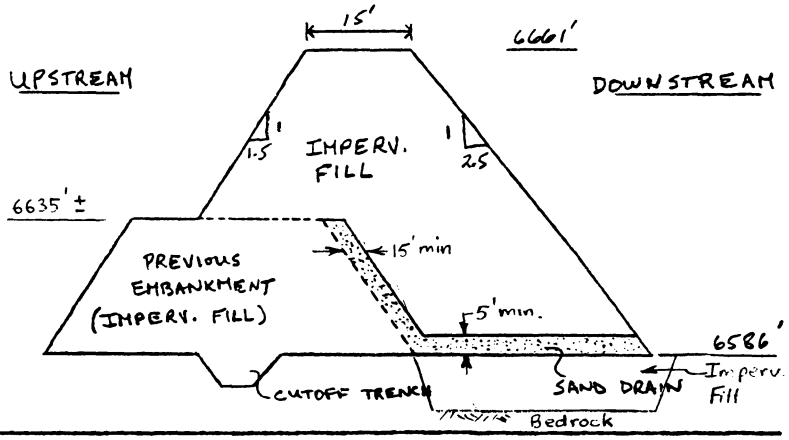
   Type Homogenous earthfill Crest Width 15'

   Height 75' Slopes 1.5:1 upstream, 2.5:1 downstream

   Length _____ Freeboard 12.0'

   Present top elev. 6661' Proposed final elev. 6671'

   Typical Cross-Section



6. Hydrology:

   Surface area _____

   Storage: normal _____ max. 1200 acre-ft

7. Year construction started _____ completed 1981
8. Regular inspection _____

9. References Dames and Moore Report "Proposed Raise of Lower Tailings Dam," March 17, 1981.
10. Comments A 55' upper pond dam also exists and would flow into the lower pond if it failed. Dam was raised by the downstream method. No more raises are planned.

Prepared by _____

Principal Design Features of

Uranium Mill Tailings Dams

Date July 1982

1. Licensee (Owner) Pathfinder Mines Corp.
2. Mill Name Lucky McGas Hills Uranium Mill Dam Name #4 Dam
3. NRC Docket # 40-2259
4. Location: State Wyoming County Fremont
5. Dam Characteristics:

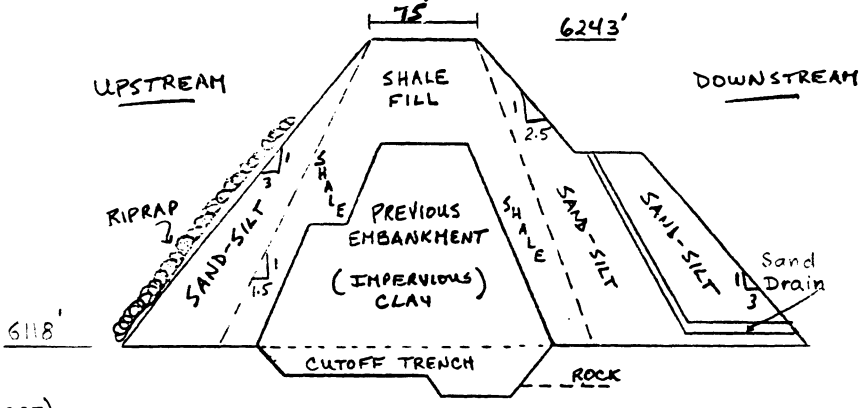
   Type Zoned earthfill Crest Width 75'

   Height 125' (above fdn), 82' (above orig. grade) Slopes 3:1 (up); 2.5:1 (down)

   Length 2200' Freeboard 6.0' (above Max. HWL)

   Present top elev. 6243' Proposed final elev. 6256'

   Typical Cross-Section



6. Hydrology:

   Surface area 145 ac. (El. 6237)

   Storage: normal 1030 ac. ft (El. 6218); 3240 ac. ft (El. 6237) max. 4,000 acre-ft (elev. 6243)

7. Year construction started 1961 (1980 - #5) completed elev 6243', 1981
8. Regular inspection Weekly by the owner, monthly by a qualified mine engineer. Daily visual inspections.
9. References Chen and Associates Soil and Foundation Investigation April 1978. "Staged Construction #4" June 12, 1981.
10. Comments Proposed final elev. is 6256' msl. Dams are situated in series at this mill, with plans for a total of 5 dams.

Prepared by

Principal Design Features of

Uranium Mill Tailings Dams

Date July 1982

1. Licensee (Owner) Atlas Minerals
2. Mill Name Moab Uranium Mill Dam Name
3. NRC Docket # 40-3453
4. Location: State Utah County Grand
5. Dam Characteristics:

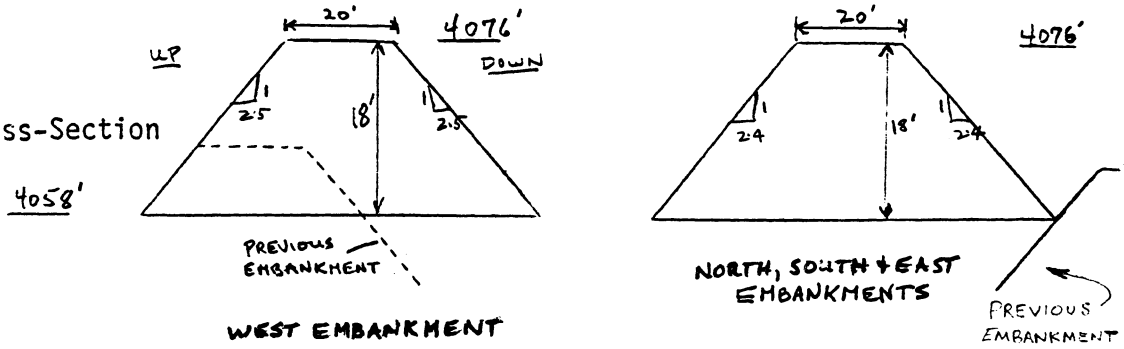
   Type Homogenous earthfill Crest Width 20'

   Height Slopes 2.5:1 ; 2.4:1

   Length 7600' Freeboard 6.0'

   Present top elev. 4058 Proposed final elev. 4076'

Typical Cross-Section



6. Hydrology:

   Surface area

   Storage: normal max.

7. Year construction started completed 1982 ±
8. Regular inspection Monthly piezometer readings at 28 points. Daily visual and quarterly documented inspections, annual technical evaluation.
9. References Dames and Moore Report of Stability Analysis June 4, 1981.
10. Comments Bordered by the Colorado River. Three seepage areas have been observed; one on Northern, Western and Southern embankments. Dam raised by upstream method on N, S, E sides and by downstream method on west side.

Prepared by

Principal Design Features of

Uranium Mill Tailings Dams

Date July 1982

1. Licensee (Owner) Pathfinder Mines Corp.
2. Mill Name Shirley Basin Uranium Mill Dam Name #5 Dam
3. NRC Docket # 40-6622
4. Location: State Wyoming County Carbon
5. Dam Characteristics:

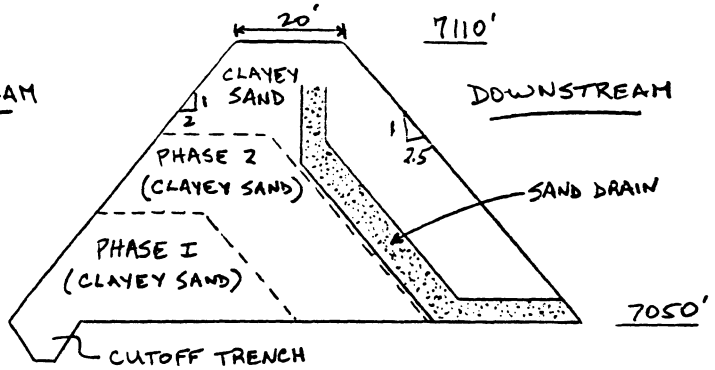
   Type Homogenous earthfill Crest Width 20'

   Height 60' Slopes 2:1 upstream, 2.5:1 downstream

   Length 6,000' Freeboard 3.5'

   Present top elev. 7110' Proposed final elev. 7110'

   Typical Cross-Section



6. Hydrology:

   Surface area

   Storage: normal max. 3300 acre-ft

7. Year construction started 1975 completed 1977
8. Regular inspection Daily visual inspections, weekly water levels and monument measurements, and monthly piezometer water levels.
9. References Dames and Moore Report "Redesign Final Stage No. 5 Tailings Dam", Dec 3, 1976.
10. Comments Dam built by downstream method. Where height of dam is less than 30', no chimney drain has been installed. Dams are situated in series at this mill.

Prepared by

Principal Design Features of

Uranium Mill Tailings Dams

Date July 1982

1. Licensee (Owner) Petrotomics Co.
2. Mill Name Shirley Basin Uranium Mill Dam Name _____
3. NRC Docket # 40-6659
4. Location: State Wyoming County Carbon
5. Dam Characteristics:

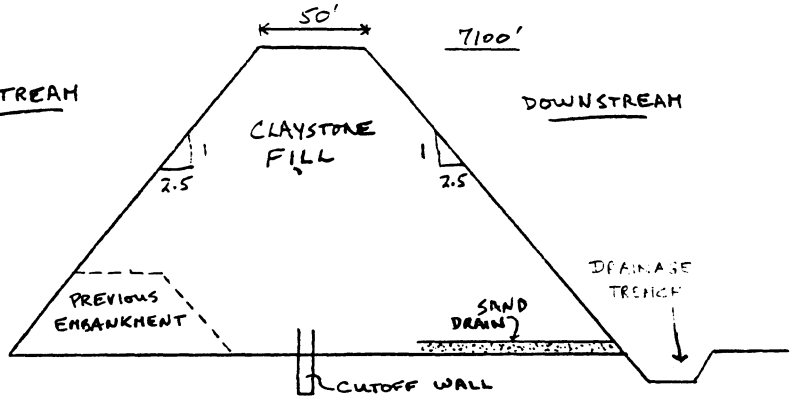
   Type Homogenous earthfill Crest Width 50'

   Height 75' Slopes 2.5:1

   Length 6,900' Freeboard 12'

   Present top elev. 7100' Proposed final elev. _____

Typical Cross-Section



6. Hydrology:

   Surface area 160 acres

   Storage: normal _____ max. _____

7. Year construction started 1963 completed 1980
8. Regular inspection As per Reg. Guide 3.11.

9. References Chen and Associates Construction Report and Drawings, Jan. 16, 1980.

10. Comments Do not know if future raises are planned.

Prepared by _____

Principal Design Features of

Uranium Mill Tailings Dams

Date July 1982

1. Licensee (Owner) Plateau Resources Inc.
2. Mill Name Shootering Canyon Uranium Mill. Dam Name _____
3. NRC Docket # 40-8698
4. Location: State Utah County Garfield
5. Dam Characteristics:

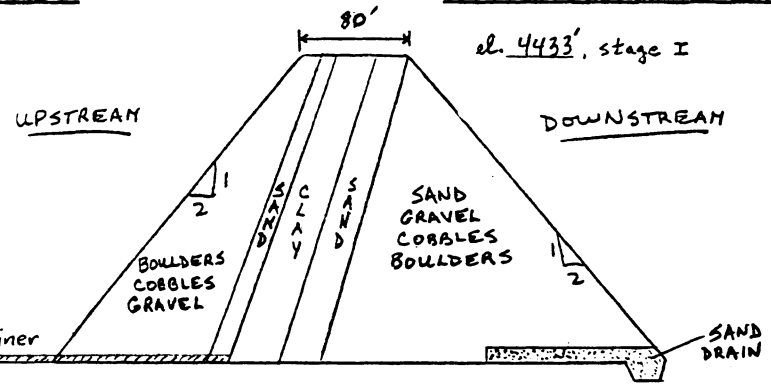
   Type Zoned earthfill Crest Width Stage I - 80' Stage II - 20'

   Height 85' (Stage I), 118' (Stage II) Slopes 2:1

   Length _____ Freeboard 13'

   Present top elev. 4433' Proposed final elev. 4466' (Stage II)

   Typical Cross-Section



6. Hydrology:

   Surface area 68 acres (Drainage area - 222 acres)

   Storage: normal _____ max. at elev. 4466', 2800 acre-ft

7. Year construction started _____ completed 1980
8. Regular inspection Visual inspection every work shift

9. References Woodward-Clyde, Stage I Final Design report May 1979.

10. Comments Dam to be constructed in two stages, stage I to elev. 4433' and stage 2 to elev. 4466'. Tailings will not be placed against the dam until stage II. During stage II, piezometers and slope indicators will be monitored.

Prepared by _____

Principal Design Features of

Uranium Mill Tailings Dams

Date July 1982

1. Licensee (Owner) Western Nuclear Inc.
2. Mill Name Split Rock Uranium Mill Dam Name _____
3. NRC Docket # 40-1162
4. Location: State Wyoming County Fremont
5. Dam Characteristics:

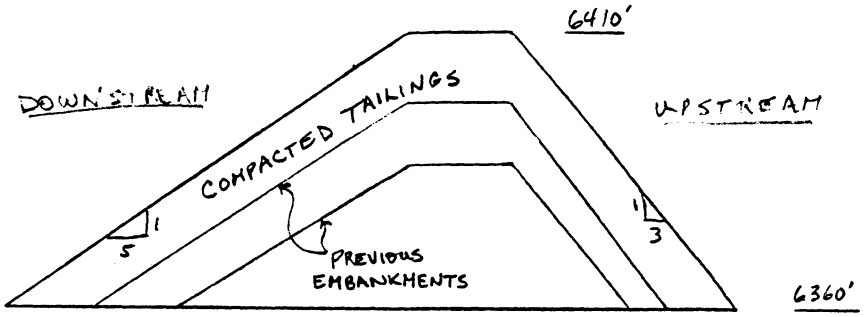
   Type Earthfill Crest Width _____

   Height 50' Slopes 5:1 upstream, 3:1, downstream

   Length _____ Freeboard 3-5'

   Present top elev. 6410' Proposed final elev. 6444'

   Typical Cross-Section



6. Hydrology:

   Surface area _____

   Storage: normal 225 x 10^6 ft^3 (elev. 6410') max. 300 x 10^6 ft^3 (elev. 6444)

7. Year construction started _____ completed _____
8. Regular inspection Daily and quarterly documented inspections; annual technical evaluation.
9. References D'Appolonia Construction Report, Feb. 1980
10. Comments Dam raised by centerline method using coarser grained tailings for fill. Final raise (to elev. 6444) estimated to be in 1990.

Prepared by _____

Principal Design Features of

Uranium Mill Tailings Dams

Date July 1982

1. Licensee (Owner) Minerals Exploration Co.
2. Mill Name Sweetwater Uranium Mill Dam Name _____
3. NRC Docket # 40-8584
4. Location: State Wyoming County Sweetwater
5. Dam Characteristics:

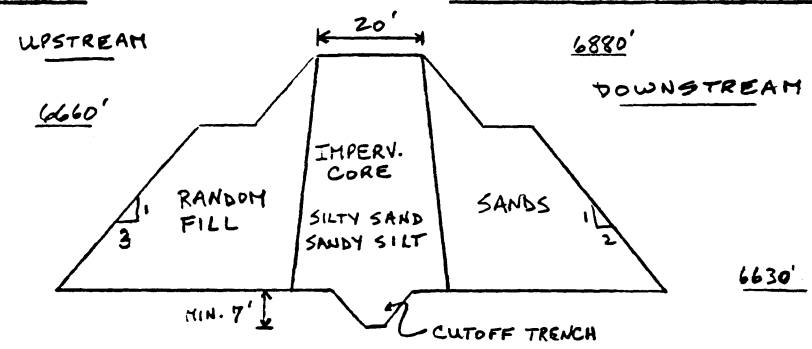
   Type Zoned earthfill Crest Width 20'

   Height 50' Slopes 2:1

   Length 6,300' perimeter (1450' x 1700') Freeboard 5.0'

   Present top elev. 6680 Proposed final elev. _____

Typical Cross-Section



6. Hydrology:

   Surface area 60 acres

   Storage: normal 2,000 acre-ft max. 2,500 acre-ft

7. Year construction started 1977 completed 1977
8. Regular inspection Quarterly piezometer readings and regular visual inspection for seepage, cracking etc. Full annual inspection.
9. References Dames and Moore Report "Design of Tailings Retention Basin", March 16, 1977
10. Comments The bench on upstream side is for placement of tailings pipe and will eventually be covered. Estimated life of dam before it is filled with tailings is 11 years.

Prepared by _____

Principal Design Features of

Uranium Mill Tailings Dams

Date July 1982

1. Licensee (Owner) Energy Fuels Nuclear Inc.
2. Mill Name White Mesa Uranium Mill Dam Name Cell 3 dike
3. NRC Docket # 40-8681
4. Location: State Utah County San Juan
5. Dam Characteristics:

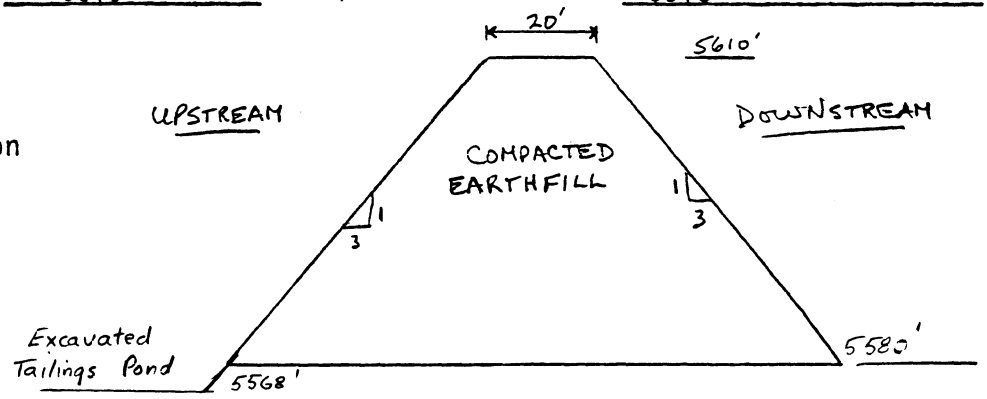
   Type Homogenous earthfill Crest Width 20'

   Height 42' Slopes 3:1

   Length 2,500 ± Freeboard 5.0'

   Present top elev. 5610 Proposed final elev. 5610

Typical Cross-Section



6. Hydrology:

   Surface area each cell 50 ac to 60 ac.

   Storage: normal _____ max. _____

7. Year construction started 1978 completed 1979
8. Regular inspection Daily, monthly, and quarterly documented inspections. Annual technical evaluation.
9. References D'Appolonia Engineers Report. Tailings Management System. June 1979.
10. Comments Tailings are deposited in cells formed by successive downstream embankments. Cell 1 (upstream) is used for evaporation; Cell 2 is being filled; Cell 3 dike is a safety dike to retain spills from cell 2. A total of 5 cells is planned. Dams do have spillways.

Prepared by _____

Appendix D

Principal Design Features of Offsite Dams Associated with Nuclear Power Plant Sites

(Alphabetically by dam name)

Principal Design Features of

Off-Site Dams

Dam Name - Chickamauga Dam
Owners/Regulatory Agency - TVA/TVA
Associated Nuclear Power Plants - Sequoyah and Watts Bar
Relevance to Nuclear Power Plants - Normal cooling water
Type - Gravity/Earth
Year Completed - 1940
Height - 103', 5,800' long
Capacity - 739,000 acre-feet
River Impounded - Tennessee
Principal Function - Hydroelectric
COE Inundation Hazard - High
COE Inventory # - TN6504

Dam Name - Conowingo Dam
Owner/Regulatory Agency - Susquehanna Power Co/FERC
Associated Nuclear Power Plants - Peach Bottom
Relevance to Nuclear Power Plant - Normal cooling water
Type - Concrete gravity
Year Completed - 1928
Height - 98'
Capacity - 310,000 acre-feet
River Impounded - Susquehanna
Principal Function - Hydroelectric
COE Inundation Hazard - High
COE Inventory # - MD97

Dam Name - Cowans Ford Dam
Owner/Regulatory Agency - Duke Power Co/FERC
Associated Nuclear Power Plant - McGuire
Relevance to Nuclear Power Plants - Normal cooling water
Type - Gravity/Earth
Year Completed - 1963
Height - 115'
Capacity - 1,092,429 acre-feet
River Impounded - Catawba
Principal Function - Hydroelectric
COE Inundation Hazard - High
COE Inventory # - NC132

Principal Design Features of

Off-Site Dams

Dam Name - Dardanelle Dam
Owner/Regulatory Agency - Corps of Engineers/ COE
Associated Nuclear Power Plants - Arkansas
Relevance to Nuclear Power Plants - Normal cooling water
Type - Concrete gravity
Year Completed - 1969
Height - 66'
Capacity - 486,200 acre-feet
River Impounded - Arkansas
Principal Function- Hydroelectric
COE Inundation Hazard - High
COE Inventory # - AR162

Dam Name - Dresden Island Lock and Dam
Owner/Regulatory Agency - Corps of Engineers/COE
Associated Nuclear Power Plant - Dresden
Relevance to Nuclear Power Plants - Normal cooling water
Type - Concrete gravity
Year completed - 1933
Height - 29'
Capacity - 12,000 acre-feet
River Impounded - Illinois
Principal Function - Navigation
COE Inundation Hazard - Medium
COE Inventory # - IL2

Dam Name - Frees Creek (3 dams)
Owner/Regulatory Agency - South Caroline Electric & Gas Co./FERC
Associated Nuclear Plants - Summer
Relevance to Nuclear Power Plants - Normal cooling water
Type -
Year Completed - 1976
Height -
Capacity - 400,000 acre-feet
River Impounded -
Principal Function - Hydroelectric
COE Inundation Hazard -
COE Inventory # - (Built after 1973 inventory)

Principal Design Features of

Off-Site Dams

Dam Name - Guntersville Dam
Owner/Regulatory Agency - TVA/TVA
Associated Nuclear Power Plant - Bellefonte
Relevance to Nuclear Power Plants - Normal cooling water
Type - Gravity/Earth
Year Completed - 1939
Height - 74'
Capacity - 1,052,000 acre-feet
River Impounded - Tennessee
Principal Function - Hydroelectric
COE Inundation Hazard - High
COE Inventory # - AL1412

Dam Name - Harriman Dam
Owner/Regulatory Agency - New England Power Co./FERC
Associated Nuclear Power Plant - Yankee Rowe
Relevance to Nuclear Power Plants - Upstream flood potential
Type - Hydraulic Earthfill
Year Completed - 1924
Height - 196'
Capacity - 116,000 acre-feet
River Impounded - Deerfield
Principal Function - Hydroelectric
COE Inundation Hazard - High
COE Inventory # - VT25

Dam Name - Jocasse Dam
Owner/Regulatory Agency - Duke Power Co/FERC
Associated Nuclear Power Plants - Oconee
Relevance to Nuclear Power Plants - Upstream flood hazard
Type - Rockfill
Year Completed - 1973
Height - 385'
Capacity - 1,315,670 acre-feet
River Impounded - Keowee
Principal Function - Hydroelectric
COE Inundation Hazard - High
COE Inventory # - SC529

Principal Design Features of

Off-Site Dams

Dam Name - Lake Keowee
Owner/Regulatory Agency - Duke Power Co./FERC
Associated Nuclear Power Plant - Oconee
Relevance to Nuclear Power Plants - Normal cooling water
Type - Gravity/Earth
Year Completed - 1970
Height - 70'
Capacity - 500,000 acre-feet
River Impounded - Keowee
Principal Function - Hydroelectric
COE Inundation Hazard - High
COE Inventory # - SC706

Dam Name - Lake Robinson
Owner/Regulatory Agency - Carolina Power & Light Co/FERC
Associated Nuclear Power Plants - Robinson
Relevance to Nuclear Power Plants - Normal and emergency cooling water
Type - Earthfill
Year Completed - 1900
Height - 50'
Capacity - 31,000 acre feet
River Impounded - Black Creek
Principal Function - Hydroelectric
COE Inundation Hazard - High
COE Inventory # - SC632

Dam Name - Lake Wylie Dam
Owner/Regulatory Agency - Duke Power Co./FERC
Associated Nuclear Power Plants - Catawba
Relevance to Nuclear Power Plants - Normal cooling water
Type - Earthfill
Year Completed - 1900
Height - 57'
Capacity - 282,000 acre-feet
River Impounded - Catawba
Principal Function - Hydroelectric
COE Inundation Hazard - High
COE Inventory # - SC687

Principal Design Features of

Off-Site Dams

Dam Name - Little River Dam
Owner/Regulatory Agency - Duke Power Co./FERC
Associated Nuclear Power Plants - Oconee
Relevance to Nuclear Power Plants - Normal cooling water
Type - Earthfill
Year Completed - 1969
Height - 155'
Capacity - 1,273,000 acre feet
River Impounded - Little River
Principal Function - Hydroelectric
COE Inundation Hazard - High
COE Inventory # - SC531

Dam Name - Montgomery Lock and Dam
Owner/Regulatory Agency - COE/COE
Associated Nuclear Power Plant - Beaver Valley
Relevance to Nuclear Power Plant - Upstream flood potential
Type - Concrete gravity
Height - 35'
Capacity - 57,500 acre-feet
River Impounded - Ohio
Principal Function - Navigation
COE Inundation Hazard - Low
COE Inventory # - PA128

Dam Name - Pickwick Landing Dam
Owner/Regulatory Agency - TVA/TVA
Associated Nuclear Power Plants - Yellow Creek
Relevance to Nuclear Power Plants - Normal cooling water
Type - Gravity/Earth
Year Completed - 1938
Height - 91'
Capacity - 1,105,000 acre-feet
River Impounded - Tennessee
Principal Function - Hydroelectric
COE Inundation Hazard - High
COE Inventory # - TN7101

Principal Design Features of

Off-Site Dams

Dam Name - Rancho Seco Dam
Owner/Regulatory Agency - Sacramento Municipal Utility District/FERC
Associated Nuclear Power Plant - Rancho Seco
Relevance to Nuclear Power Plants - Emergency cooling water
Type - Earthfill
Year Completed - 1972
Height - 50'
Capacity - 2,850 acre-feet
River Impounded - Hadselville Creek
Principal Function - Hydroelectric
COE Inundation Hazard - Low
COE Inventory # - CA825

Dam Name - Sherman Dam
Owner/Regulatory Agency - New England Power Co/FERC
Associated Nuclear Power Plants - Yankee Rowe
Relevance to Nuclear Power Plants - Normal and emergency cooling water
Type - Gravity/Earth
Year Completed - 1927
Height - 110'
Capacity - 5,540 acre-feet
River Impounded - Deerfield
Principal Function - Hydroelectric
COE Inundation Hazard - Low
COE Inventory # - MA43

Dam Name - Vernon Dam
Owner/Regulatory Agency - Connecticut River Power Co./FERC
Associated Nuclear Power Plant -- Vermont Yankee
Relevance to Nuclear Power Plants - Normal cooling water
Type - Gravity/Other
Year Completed - 1937
Height - 60'
Capacity - 222,000 acre-feet
River Impounded - Connecticut
Principal Function - Hydroelectric
COE Inundation Hazard - High
COE Inventory # - NH97

Principal Design Features of

Off-Site Dams

Dam Name - Watts Bar Dam
Owner/Regulatory Agency - TVA/TVA
Associated Nuclear Power Plants - Watts Bar
Relevance to Nuclear Power Plants - Upstream flood potential
Type - Gravity/Earth
Year Completed - 1942
Height - 105'
Capacity - 1,175,000 acre-feet
River Impounded - Tennessee
Principal Function - Hydroelectric
COE Inundation Hazard - High
COE Inventory # - TN12102

Dam Name - Wheeler Dam
Owner/Regulatory Agency - TVA/TVA
Associated Nuclear Power Plants - Browns Ferry
Relevance to Nuclear Power Plants - Normal cooling water
Type - Concrete gravity
Year Completed - 1936
Height - 60'
Capacity - 1,071,000 acre-feet
River Impounded - Tennessee
Principal Function - Hydroelectric
COE Inundation Hazard - High
COE Inventory # - AL1411

Appendix E

Uranium Mills Located in Agreement States

Uranium Mills Located in Agreement States

State	Contact	Uranium Mill Owner/Mill Name
Colorado	Mr. Albert J. Hagle, Director Radiation & Hazardous Waste Control Division Office of Health Protection Dept. of Public Health 4210 East 11th Ave. Denver, Colorado 80220 (303 320-8333 ext. 6246	1. Cotter Corporation/ Canyon City Mill 2. Homestake Mining Co./ Pitch Mill 3. Union Carbide Corp./ Uravan Mill
New Mexico	Mr. Alfonso Topp, Chief Radiation Protection Bureau Environmental Improvement Div. P.O. Box 968 Santa Fe, New Mexico 87504 (505) 827-5271 ext. 279	1. Anaconda Co./ Bluewater Mill 2. Homestyle Mining Co./ Grants Mill 3. Kerr-McGee Nuclear Corp./ Ambrosia Lake Mill 4. Sohio-Reserve Co./ L-Bar Mill 5. United Nuclear Corp./ Church Rock Mill
Texas	Mr. David K. Lacker, Chief Bureau of Radiation Control Texas Dept. of Health 1100 West 49th Street Austin, Texas 78756 (512) 835-7000	1. Chevron Resources Co./ Panna Maria Mill 2. Continental Oil, Pioneer Nuclear/Conquista Mill
Washington	Mrs. Nancy Kirner, Supervisor Radioactive Materials Dept. of Social & Health Services Mail Stop LD-11 Olympia, Washington 98504 (206) 753-3459	1. Dawn Mining Co./ Ford Mill 2. Western Nuclear Inc./ Sherwood Mill

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2. *(Leave blank)*

3. RECIPIENT'S ACCESSION NO.

7. AUTHOR(S): George E. Lear, NRC Dam Safety Officer; Owen O. Thompson, NRC Deputy Dam Safety Officer

5. DATE REPORT COMPLETED: MONTH Nov. YEAR 1982

9. PERFORMING ORGANIZATION NAME AND MAILING ADDRESS *(Include Zip Code)*:
U.S. Nuclear Regulatory Commission
Dam Safety Officer
Mail Stop P-214
Washington, D.C. 20555

DATE REPORT ISSUED: MONTH Jan. YEAR 1983

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12. SPONSORING ORGANIZATION NAME AND MAILING ADDRESS *(Include Zip Code)*:
U.S. Nuclear Regulatory Commission
Dam Safety Officer
Mail Stop P-214
Washington, D.C. 20555

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16. ABSTRACT *(200 words or less)*

The NRC Inventory of Dams has been prepared as required by the charter of the NRC Dam Safety Officer. The inventory lists 51 dams associated with nuclear power plant sites and 14 uranium mill tailings dams (licensed by NRC) in the U.S. as of February 1, 1982. Of the 85 listed nuclear power plants (148 units), 26 plants obtain cooling water from impoundments formed by dams. The 51 dams associated with the plants are: (a) located on a plant site (29 dams at 15 plant sites), (b) located off-site but provide plant cooling water (18 dams at 11 additional plant sites), (c) located upstream from a plant (4 dams) -- they have been identified as dams whose failure, and ensuing plant flooding, could result in a radiological risk to the public health and safety. The dams that might be considered NRC's responsibility in terms of the Federal dam safety program are identified; this group of dams (20 on nuclear power plant sites and 14 uranium mill tailings dams) was obtained by eliminating dams that do not pose a flooding hazard (e.g. submerged dams) and dams that are regulated by another Federal agency. The report includes the principal design features of all dams and related useful information.

17. KEY WORDS AND DOCUMENT ANALYSIS

17a. DESCRIPTORS

Dam Safety
Nuclear Power Plant Dams
Tailings Dams
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17b. IDENTIFIERS/OPEN-ENDED TERMS

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