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| Tennessee Valley Authority<br>Chattanooga, Tenn. 37401<br>Mr. J.E. Gilleland | 2-15-74 | 2-20-74 | X | | | |

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DESCRIPTION:
Ltr re our 1-4-74 ltr....furn information concern the proposed intake design for the Bellefonte Nuclear Plant....Trans the following.....

Dist Per: Dittman

PLANT NAME: Bellefonte 1 & 2

ENCLOSURES: FIGURES
"Alternate No. 6 - Cooling Pond"

"Alternate No. 4-A - Deep Water Intake Structure"

(1 cy ea encl rec'd)

FOR ACTION/INFORMATION 2-25-74 JB

| | | | |
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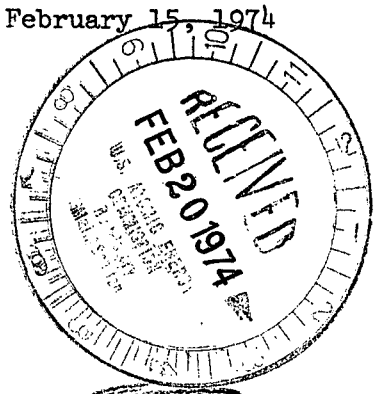
TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE
37401

TVA 40TH ANNIVERSARY OF PEOPLE IN PARTNERSHIP

February 15, 1974




Mr. A. Giambusso
Deputy Director for Reactor Projects
Directorate of Licensing
U.S. Atomic Energy Commission
Washington, D.C. 20545

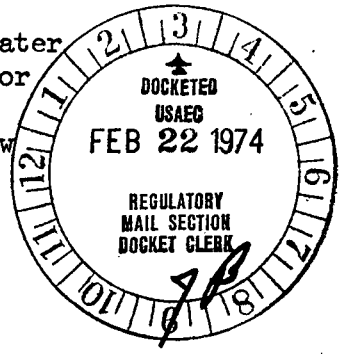
Dear Mr. Giambusso:

In the Matter of Applications ) Docket Nos 50-438
Tennessee Valley Authority 50-439

This is in response to William H. Regan's letter of January 4, 1974, in which it was stated that the proposed intake design for the Bellefonte Nuclear Plant is considered unsatisfactory from an environmental standpoint. It was also stated as a general criterion that water should be taken from a region that has a low density of entrainable organisms, principally fish eggs and larvae, and a low potential for fish congregation and fatigue-producing conditions. The AEC Regulatory Staff then concluded that shoreline intakes, such as proposed for Bellefonte, do not meet this criterion, that they are not satisfactory from an environmental standpoint, and that alternative systems must be studied. We believe that the general criterion is incomplete since it fails to address safety and economic considerations. Moreover, the conclusion reached is not justified when considering the particular circumstances at Bellefonte.

It is TVA's position that, on balance, the proposed shoreline intake structure is the best alternative available, for the following reasons: (1) entrainment losses with the proposed shoreline intake do not constitute a significant adverse impact and (2) the National Environmental Policy Act of 1969 (NEPA) requires a consideration of only those alternatives that provide a significant difference in environmental impact.

At this point it is helpful to review what has happened to date. TVA has proposed a closed-cycle condenser cooling water system using natural draft cooling towers. Makeup water for this system will vary but at its peak will not exceed 148.5 $ft^3/s$ and will average 107 $ft^3/s$. Average streamflow at the site is 35,300 $ft^3/s$.



To provide this makeup, TVA has proposed to construct an intake structure utilizing and expanding a natural embayment. The proposed design would have a maximum channel intake velocity of less than 0.2 ft/s. TVA has estimated the maximum impact of the proposed intake on aquatic biota and has concluded that significant mortalities of fingerling and larger fish from impingement are not expected since the intake velocity is so low. Entrainment of fish larvae is expected; but, in view of the very small volume of water needed for makeup in comparison to the river flow, the fraction of the total population entrained will be too small to have a significant impact on the population of fish in the reservoir.

The AEC Regulatory Staff on three occasions has requested TVA to examine alternate intake designs. TVA responded to the first request by giving the conditions by which the environmental impacts were judged to be insignificant. The second request was responded to with descriptions of alternate designs, the development of which required significant additional expenditures of engineering effort. The deepwater designs included in these studies were considered to the extent that the total cost (both environmental and capital) of the deepwater intakes were approximately equal to the total cost of the proposed shoreline design. These deepwater intake designs could not be considered safe and dependable, and it was obvious that additional modifications to the deepwater intake designs necessary to make them safe would also increase their cost above that of the proposed shoreline design.

The Regulatory Staff in the third request indicated that only safe designs should be considered viable and requested that TVA pursue the deepwater intake design studies further to the extent that they could be considered safe, even though the costs of the deepwater designs would increase significantly. In order to prevent delays in the licensing process, TVA again complied with the Staff's request and has carried the design studies, after significant additional commitments of manpower, to the extent requested by the Staff. The results of these studies show what was obvious earlier; namely, that any of the deepwater intake alternatives would require considerably more expenditure than is justified. The results of these latest studies are discussed below.

Entrainment losses with the proposed shoreline intake do not constitute a significant adverse impact. TVA has previously analyzed the significance of entrainment losses and concluded that, while the proposed shoreline intake has a somewhat greater environmental impact than other possible deepwater intake designs, no significant adverse impact on the reservoir fishery resource will result from entrainment losses from the proposed design. (Additional TVA Responses to Second Set of AEC Comments on Bellefonte Draft Environmental Statement, p. 20-7, October 25, 1973.) Entrainment losses at TVA's Browns Ferry Nuclear Plant have been estimated to be 2.8 percent of the total population, utilizing once-through cooling. Entrainment losses at Bellefonte, which utilizes closed-cycle cooling, are not expected to exceed this percentage. TVA does not judge this loss to constitute a significant adverse impact, nor is the loss likely to be irreversible and irretrievable in terms of adult biomass.

It should be noted that § 5.8 of Regulatory Guide 4.2 recognizes that the degree of significance of such a loss may vary depending on the total population in the immediate region. We note also that the Atomic Safety and Licensing Appeal Board has specifically recognized that the description of anticipated environmental impacts of a proposed action is subject to a rule of reason and that reasonable forecasting and speculation of environmental impacts is implicit in NEPA. (Long Island Lighting Co. [Shoreham Nuclear Power Station], ALAB-156, RAI-73-10, 831, 838 [Oct. 26, 1973]. Moreover, neither NEPA nor the Commission's regulations mandate the quantification of an environmental effect which is found to be insubstantial. Consumers Power Co. [Midland Plant, Units 1 and 2] ALAB-123, RAI-73-5, 331, 351 [May 18, 1973]: Cf. City of New York v. United States, 344 F. Supp. 929, 939 [E.D.N.Y. 1972] [three-judgecourt]; EDF v. Corps of Engineers, 325 F. Supp. 749, 758 [E.D. Ark. 1971], aff'd 470 F2d 289 [8th Cir. 1972].)

The environmental effects of the proposed shoreline intake have been investigated sufficiently to make a reasonable forecast and have been quantified to some extent. Based on these analyses, it has been concluded that the impacts are not significant.

The Regulatory Staff in the January 14, 1974, letter has stated however, that the proposed shoreline intake is "unsatisfactory" from an environmental standpoint. Apparently this is based on the assumption that the entrainment losses result in a significant adverse environmental impact. It is TVA's position that closed-cycle cooling with its associated very small makeup requirement in

relation to streamflow and the very small percentage of entrainment in relation to the total population results in an insignificant environmental impact resulting from the proposed shoreline intake.

NEPA requires a consideration on only those alternatives that provide a significant difference in environmental impact. The Appeal Board has also stated that there is no absolute requirement that every conceivable alternative be explicitly addressed in an environmental review and that it is sufficient to focus upon those alternatives which, if adopted, would provide a significant difference in environmental impact. (Maine Yankee Atomic Power Co. [Maine Yankee Atomic Power Station] ALAB-161, RAI-73-11, 1003, 1014, [Nov. 30, 1973].) TVA has reevaluated alternates 4 and 5, which were discussed previously in the October 25, 1973, submittal, in order to make them viable alternatives with regard to safety. In addition, alternate 6 has been added to provide a 60-acre cooling pond as a backup for alternate 4 (in response to question 20), should the deepwater intake become blocked. These alternatives are as described below.

Alternate 4 (upgraded)

This alternate is essentially the same as alternate 4 shown by Figure 20-3 given previously in TVA's response to question 20. (Additional TVA Responses to Second Set of AEC Comments on Bellefonte Draft Environmental Statement, October 25, 1973.) The upgrading requires the use of four 60-inch steel pipes (rather than four 54-inch pipes) to provide a flow area equivalent to that provided by the channel in alternate 1. In addition, at the deepwater intake the pipes turn downstream into a concrete intake structure which takes water from the downstream face. The details of the deepwater intake structure are given in Figure 10SNF42 (enclosed). This alternate requires the use of a cofferdam for construction, whereas alternate 4 does not. Trashracks are fitted on the intake openings, and the openings are sized so that the maximum velocity through the trashracks is 0.5 ft/s. This upgrading results in a cost increase of about $1.55 million.

Alternate 5 (upgraded)

This alternate is the same as alternate 5 shown by Figure 20-4 given previously in TVA's response to question 20 but upgraded with the same items as described above for alternate 4 (upgraded). This upgrading also results in a cost increase of about $1.55 million.

Alternate 6

This alternate consists of a deepwater intake as shown by Figure 20-3 identified as alternate 4 (except redundant inlet piping was not provided) in the response to question 20, together with a 60-acre cooling pond as a backup in the event the deepwater intake becomes blocked. The layout is given in Figure 10SNF43 (enclosed) consisting of dikes to form the pond, and a water conduit with a control valve to pass water from the pond to the intake forebay. The pumping station connects to the reservoir as shown in Figure 20-3 of the October 25 submittal.

If the deepwater submerged intake becomes blocked, shutting off the flow to the pumping station, then the control valve under the pumping station opens at a predetermined water level in the intake channel permitting the cooling water to be circulated from the intake forebay to the plant, the plant to the cooling pond, and the cooling pond to the intake forebay. These modifications would result in a cost increase of about $1.45 million.

The environmental cost has also been reevaluated to reflect the actual intake flow requirements which occur for the months of April, May, and June. The table below presents the results of the reevaluation with regard to both the environmental cost and safety standpoint.

TVA recognizes that there may be other alternatives to the six given, but no design studies for any others have been made at this time. TVA's selection of a proposed design remains as alternate 1, the alternative with the least total evaluated cost as shown in the table below. The table shows that the capital cost of any of the deepwater intakes exceeds that of the proposed design by nearly $4 million, while even a conservative estimate of environmental costs over the 35-year life of the plant attributable to the proposed design barely exceeds $2 million. The total evaluated cost (capital plus environmental) of alternate 1 is $1,690,000 less than alternate 6, the lowest cost alternative with the least environmental cost. Selection of a design for which the environmental cost is least cannot be justified because it would require the additional expenditure of almost $2 in capital cost to achieve a reduction of $1 in environmental cost. TVA does not consider this as an acceptable trade-off.

COST (In Thousands of Dollars)

| Alternate | Capital | Environmental | Total |
|---|---|---|---|
| 1 | $4,450 | $2,140 | $ 6,590 |
| 2 | 4,550 | 2,140 | 6,690 |
| 3 | 9,300 | 2,140 | 11,440 |
| 4 (upgraded) | 8,250 | 130 | 8,380 |
| 5 (upgraded) | 9,300 | 130 | 9,430 |
| 6 | 8,150 | 130 | 8,280 |

It is TVA's position, therefore, that on balance the shoreline intake structure is the best alternative available. As you know, we have already expended a great deal of time and effort in studying these alternatives; and in our opinion, any additional effort would be unproductive. In addition, further studies would tend to increase the licensing and review time.

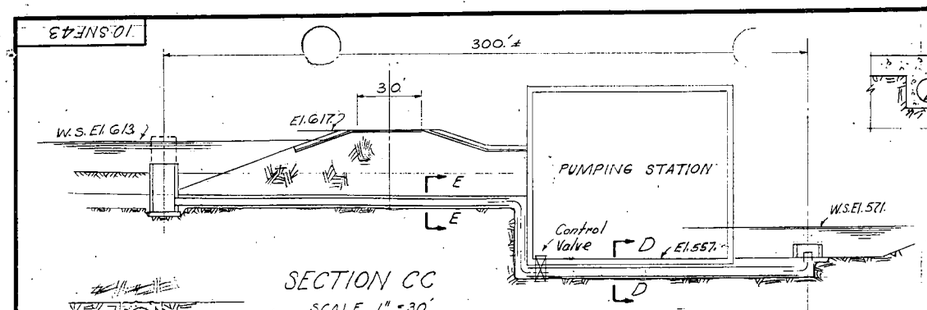
Should the Staff, in view of the matters set forth herein, conclude that further consideration of a deepwater intake should be undertaken, then TVA suggests that an AEC senior management reviewer be appointed forthwith and an informal appeal initiated. If the Staff chooses this course, TVA would expect that review of the application would not be delayed during the appeal procedure.

Sincerely yours,

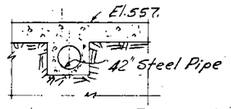
J. E. Gilleland
Assistant to the Manager of Power

Enclosures
CC: William H. Regan, Jr., Chief
Environmental Projects Branch 4
Directorate of Licensing
U.S. Atomic Energy Commission
Washington, D.C. 20545

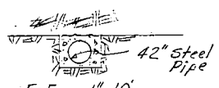
10 SNF43



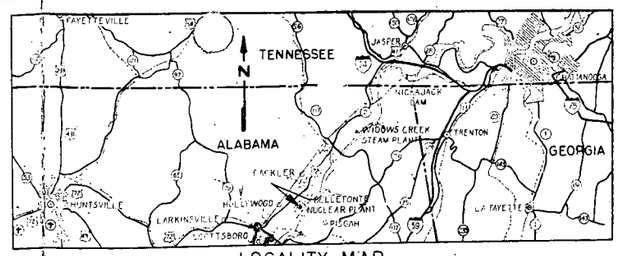

SECTION CC
SCALE 1" = 30'




D-D
1"=10'

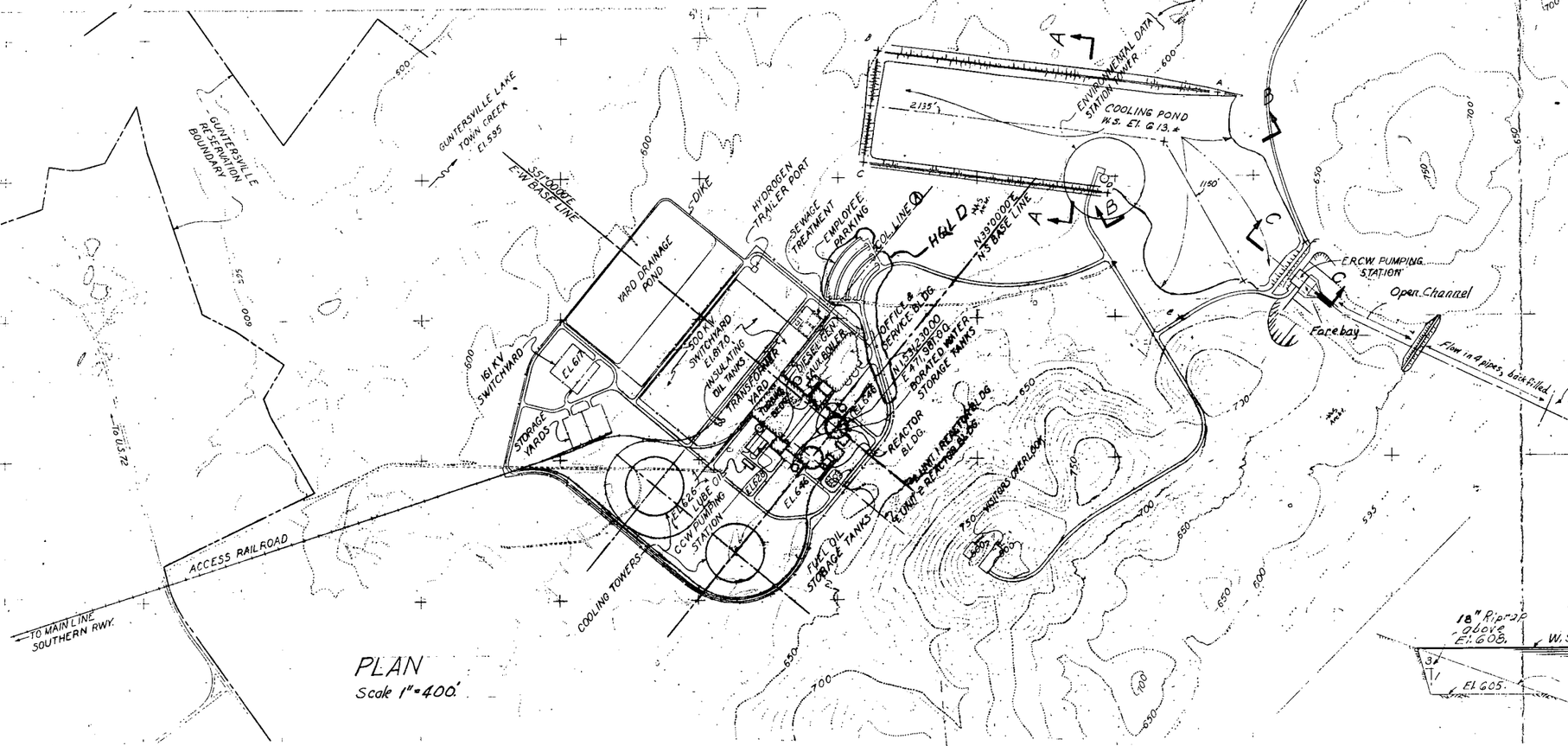



E-E 1" 10'

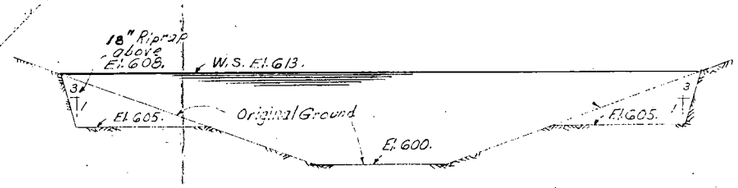



LOCALITY MAP

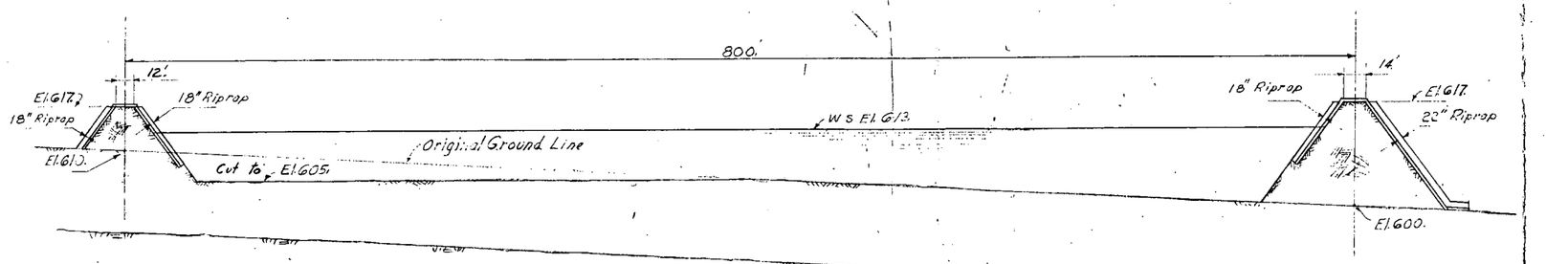
Scale of Miles




PLAN
Scale 1"=400'




ASSUMED TYPICAL SECTION B-B
Scales Hor 1"=100'
Vert 1"=10'




TYPICAL SECTION A-A
Scales: Hor 1"=40'
Vert 1"=10'

use 12" graded crushed stone under all riprap

Scales as noted

| REV NO. | DATE | MADE | CHKD | SUPV | INSP | SUBM | RECM |
|---|---|---|---|---|---|---|---|
| DSGN. REK | | | | SUPV. | | | |
| DRWN. R.E.F. | | | | INSP. | | | |
| CHKD. | | | | ENGINEER | | | |
| TRCD. | | | | | | | |
| COMP. | | | | | | | |

ESSENTIAL RAW COOLING WATER

ALTERNATE No. 6

COOLING POND

BELLEFONTE NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

| SUBMITTED | RECOMMENDED | APPROVED |
|---|---|---|
| | | |

KNOXVILLE | 88 C 4 10SNF43

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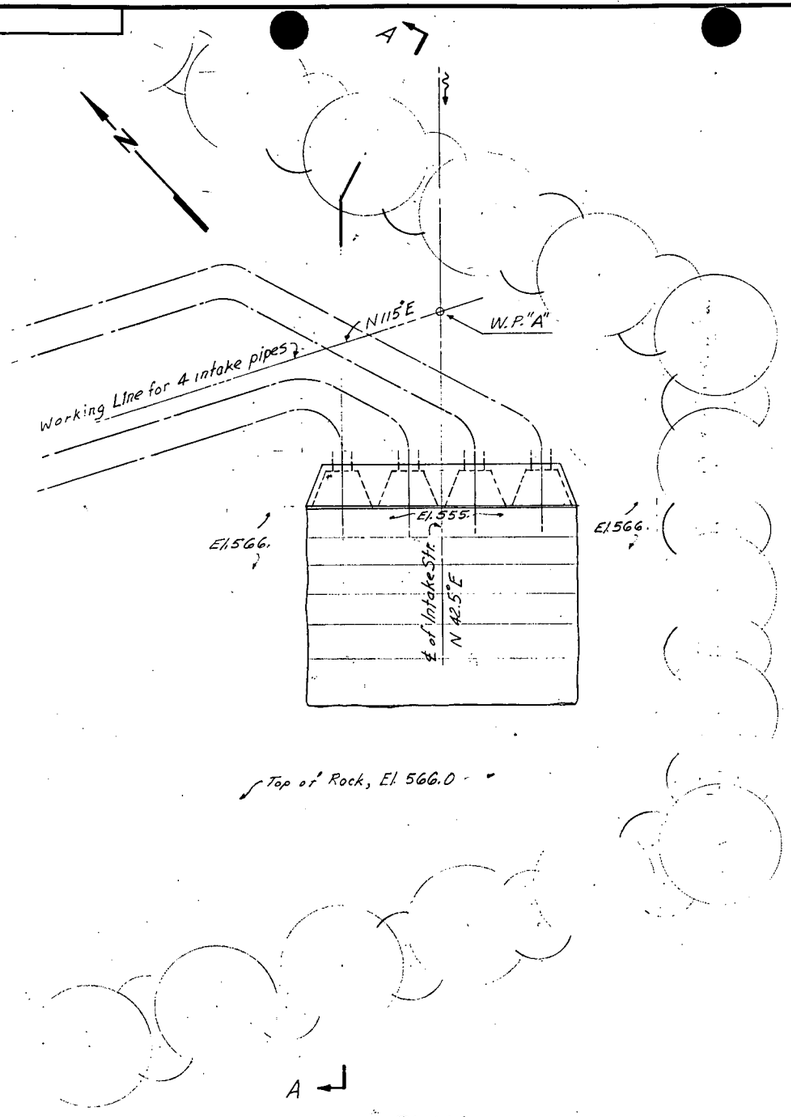
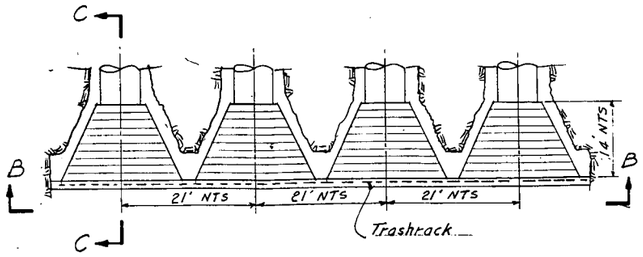
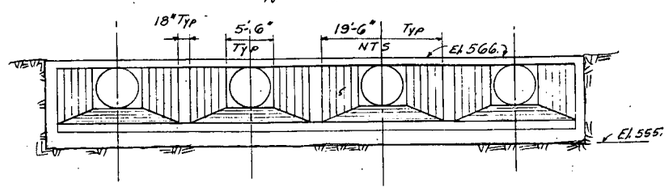



PLAN



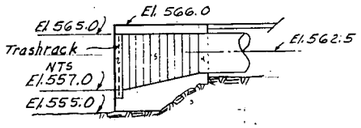

SECTIONAL PLAN EL. 562.5

1/8" = 1'-0"



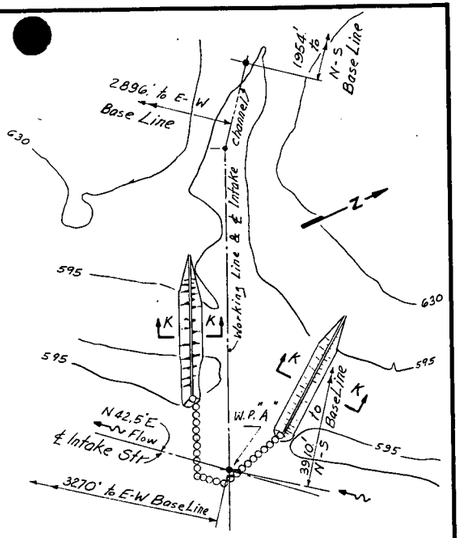

B-B

1/8" = 1'-0"



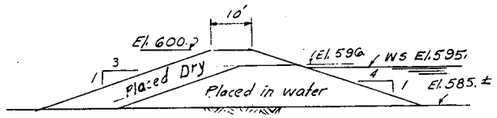

C-C

1/8" = 1'-0"

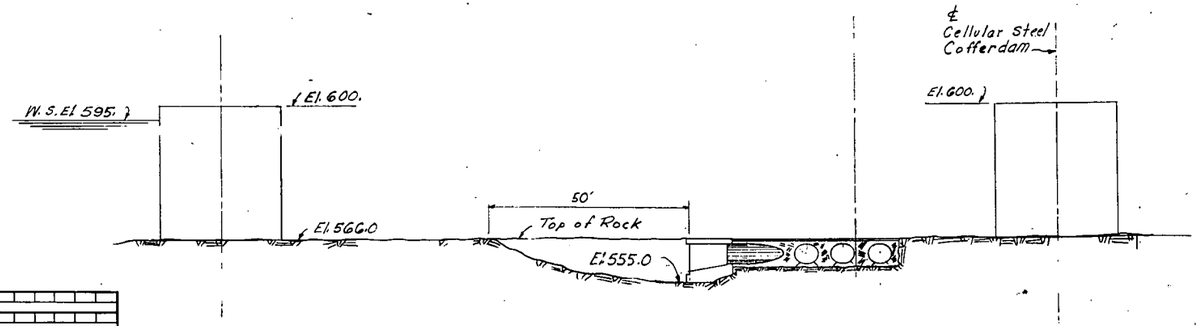



KEY PLAN

Scale 1" = 300'




K-K




A-A

scale 1/16" except as noted

| REV NO. | DATE | MADE | CHKD | SUPV | INSP | SUBM | RECM |
|---|---|---|---|---|---|---|---|
| DSGN | | | | SUPV. | | | |
| DRWN | KEH | | | INSP. | | | |
| CHKD | | | | ENGINEER | | | |
| TRCD | | | | | | | |
| COMP | | | | | | | |

ESSENTIAL RAW COOLING WATER

# ALTERNATE No. 4-A DEEP WATER INTAKE STRUCTURE

BELLEFONTE NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

| SUBMITTED | RECOMMENDED | APPROVED |
|---|---|---|
| | | |

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