

DISCUSSION AND FINDINGS
BY THE DIVISION OF REACTOR LICENSING
U.S. ATOMIC ENERGY COMMISSION
RELATING TO
CONSIDERATION OF SUSPENSION
PENDING NEPA ENVIRONMENTAL REVIEW
OF THE CONSTRUCTION PERMIT
FOR THE CRYSTAL RIVER UNIT 3 NUCLEAR PLANT

AEC DOCKET NO. 50-302

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1.0 INTRODUCTION

On September 9, 1971, the Atomic Energy Commission (AEC) published in the Federal Register a revised Appendix D to 10 CFR Part 50 setting forth AEC's implementation of a national Environmental Policy Act of 1969 (NEPA). Paragraph E(3) of revised Appendix D generally requires a holder of a construction permit issued prior to January 1, 1970, for which an operating license has not been issued to furnish to the AEC within 40 days of September 9, 1971, a written statement of any reasons, with supporting factual submission, why with reference to the criteria in Paragraph E(2) of revised Appendix D the permit should not be suspended, in whole or in part, pending completion of the NEPA environmental review specified in Appendix D.

On September 25, 1968, the AEC issued a construction permit to the Florida Power Corporation for the Crystal River Unit 3 Nuclear Plant. On October 15, 1971, Florida Power Corporation filed with the AEC the statement required by Paragraph E(3) of Appendix D. In response to subsequent AEC questions, the company also supplied additional supporting information on November 9, 1971 as Amendment No. 15 to their Application for Licenses for Crystal River Unit 3.

1.1 Determination

In accordance with the requirements of Section E of Appendix D, we have determined that the construction permit for the Crystal River

Unit 3 Nuclear Plant should not be suspended pending completion of the NEPA environmental review specified in Appendix D. A formal determination to this effect is being forwarded to the Federal Register for publication. In reaching this determination we have considered and balanced the criteria in Paragraph E(2) of Appendix D.

1.2 Background

On August 10, 1967, FPC filed an application for a construction permit for the Crystal River Unit 3 Nuclear Plant with the AEC. An extensive review of the application was made by the AEC's Regulatory Staff and by the Advisory Committee on Reactor Safeguards. A public hearing was held before a three-man Atomic Safety and Licensing Board at Crystal River, Florida, on July 16 and 17, 1968. On September 24, 1968, the Board issued its initial decision authorizing the Director of Regulation to issue a construction permit to the applicant. On September 25, 1968, Construction Permit No. CPPR-51 was issued.

The applicant submitted an environmental report on February 8, 1971. On October 15, 1971, the applicant notified the AEC that it intended to submit a new and complete environmental report which would replace in its entirety the report submitted on February 8, 1971.

2.0 COMPLETION OF NEPA REVIEW

The time necessary for the completion of NEPA review for the

Crystal River Unit 3 Nuclear Plant is estimated at ten months assuming receipt by the Commission of the replacement environmental report by the end of 1971. The criteria set forth in Section E of Appendix D to 10 CFR Part 50 have been evaluated with this approximate time period in mind. That is, the environmental impact of continuing construction at this site and the foreclosure of alternatives of the type that might occur during the NEPA review period have been considered.

The applicant states that a twelve-month construction stoppage would result in a delay in commercial operation of at least 15 and possibly as much as 18 months. Such an extended delay is attributed to recruiting a skilled labor force in an area which is removed from normal construction labor markets and to retraining specialized personnel such as Quality Control inspectors. The same remobilization problem would affect vendors and contractors. The cost of delay has been evaluated for an 18-month delay in commercial operation beyond the scheduled date of approximately September, 1973.

Should the actual NEPA review for this case exceed the ten month period, such a longer time period may add to the environmental impact arising from planned excavation of the canal extension (see Section 3.0). It would also substantially increase the cost of delay if the

construction were now suspended. A longer review period would also increase the total actual plant expenditures at completion of the NEPA review if the construction permit were not now suspended.

We have taken these considerations into account in balancing the factors specified in Paragraph E of Appendix D to 10 CFR Part 50 and have concluded that if a longer time period were required to complete the NEPA review, it would not affect our determination that the construction permit for the Crystal River Unit 3 Nuclear Plant should not be suspended at this time. However, suspension of the excavation of the intake and discharge canal extensions at a later date is not precluded by this finding.

3.0 ENVIRONMENTAL IMPACT DURING THE REVIEW PERIOD

Since construction of the plant will not be completed during the forecast NEPA review period, there will be no environmental impact from radioactive water or water vapor effluents which would be released as a result of operation of the plant.

Construction to be accomplished during the prospective review period falls basically into three categories: (1) continuation of site excavations, (2) continuation of construction work on containment, other buildings, and structures, and (3) continuation of transmission facility construction. The current construction status and anticipated activities for the next ten months are described below for each of these areas.

There are two fossil fueled electrical generating plants presently operating at the Crystal River site. All land clearing in connection with the construction of Unit 3 has been completed. Several small excavations exist in the construction area. These are being dewatered continuously and the effluent from the dewatering is being treated prior to discharge to the receiving marshlands. The reinforced concrete foundations of all buildings are complete. The turbine generator pedestal is in place. Erection of structural steel has commenced and is complete for the cylindrical portion of the reactor building. The concrete walls and intermediate floors of the control complex building are complete; they are in process for the auxiliary building. The reinforced concrete outer walls of the reactor building are approximately 15% complete. Components already installed in these buildings include condenser shell, waste evaporator packages, heat exchangers, various tanks and several pumps. The single transmission line for Unit 3 is being added to the existing transmission corridor which was cleared several years ago in conjunction with the fossil plant projects.

The company had indicated that during the coming ten month period excavation of the intake and discharge canal extensions was to be essentially completed. The purpose of this work is to extend inland, by 600 feet, the intake and discharge canals from the

existing fossil units to the Unit 3 location as indicated on Figure 1. These excavation operations would involve the movement and stockpiling of 75,000 cubic yards of material, as well as leaving two large unfilled entrenchments. Because of questions raised by the AEC staff about the environmental impact of these operations, and because a delay could be accepted with little cost or penalty, the Florida Power Corporation has volunteered to postpone commencement of the excavation for the intake and discharge canal extensions to October 1972 and February 1973 respectively. By October 1972 the environmental review of Crystal River Unit 3 is scheduled to be completed.

Also during the NEPA review period, it is anticipated that excavation of the intake and discharge structures will be started. This work is confined to two approximately 150 feet by 100 feet areas on-site involving the movement of 45,000 cubic yards of material which will be stockpiled in the general construction area (see Figure 1). The material is the same type as the surrounding fill. Effluent from these excavations will be discharged into an upland settling basin of a size and configuration such that the overflow will be within established water quality standards before release into the marshlands. Essentially all excavation will be accomplished behind an earthen plug, thereby eliminating any disturbance to the open water of the Gulf of Mexico. It is judged that during the NEPA review period the environmental impact of these structure

excavations is substantially less than for the canal extensions and that it will not be unduly adverse.

The erection of structural steel and the installation of reinforced concrete will continue on all buildings. Installation of some mechanical, structural, electrical, and architectural equipment and material will be done. Continuation of this phase of construction will have an incremental adverse environmental impact when compared with the present state of construction for Unit 3. This incremental adverse impact will be largely temporary in nature and of the type which usually accompanies activities at large scale construction projects. Impact factors will include heavy truck traffic as construction materials are brought to and moved on the site, operation of a concrete batch plant, and the noises associated with crane operation, steel erection work and miscellaneous mechanized tools and equipment. The construction noises are unlikely to disturb the surrounding population since this is a relatively remote site.

Further significant physical changes to the site are not anticipated during the prospective review period other than the continuation of the work mentioned above. It is expected that the appearance of the site as viewed from beyond the property boundary will become aesthetically more pleasing as the principal structures proceed toward their final planned outward shapes.

Completion of tower footings, erection of remaining towers and installation of insulators and conductors remain for the new 500 kV transmission system. Some foundation work and the installation of equipment and conductors must be accomplished for the associated substations. Since these facilities are located in an existing transmission corridor, the incremental environmental impact consists only of the construction of the additional towers, lines, and substations. No displacement of residents will occur. The area ecology will not be disrupted since flora and fauna in areas adjacent to right-of-way should remain substantially unaffected by construction activities. Redress of the impact of tower and substation construction could be affected by removal.

4.0 FORECLOSURE OF ALTERNATIVES DURING THE PROSPECTIVE REVIEW PERIOD

The incremental environmental impact of continued construction of the facility, as discussed above, could be largely redressed by removal of structures and reconstitution of the landscape in the event that the full NEPA review so required. There are two fossil fueled plants currently operating at the site. Therefore, the ongoing construction activities themselves will not result in a substantial increase in the existing environmental impact. Except for the impact of continuing construction and subsequent operation of Unit 3, the major adverse environmental impact has already been made.

Alternatives that potentially could be foreclosed by continued construction are those related to effluent control measures. These include the environmental impact of heated water and chemical releases and routine and accidental radiological releases. We have examined each of these areas to determine the alternatives that might be foreclosed as a result of construction during the NEPA review period.

Appendix D to 10 CFR Part 50 requires that a cost-benefit analysis of radiological, thermal and other environmental effects be performed by the AEC during the NEPA review and that a conclusion be reached on whether modification or termination of the license is warranted. The radiological effects involve both anticipated low-level releases associated with operation of the plant and with potential releases of radioactivity at somewhat higher levels that could result from an accident.

4.1 Foreclosure of Heated Water Alternatives

We are concerned about the environmental effects that might result from high temperature water discharging into the Gulf of Mexico from the proposed cooling system for Crystal River Unit 3. The cooling system design for this unit presently consists of a once-through system drawing sea water from the open Gulf of Mexico through an intake canal and discharging water back into the Gulf through a discharge canal.

The discharge canal provides a single common pathway for heated water from each of the three units to the Gulf of Mexico. The design cooling water flow through the condenser results in an approximately 17°F rise in the temperature of the cooling water at the end of the plant discharge canal. Florida Power Corporation states that the cooling water condenser and piping for Unit 3 are being installed presently and that the installation of these components within the plant proper will preclude redesign of the condenser system to affect a reduced temperature rise. While effecting a lower temperature rise through the condenser is not feasible, if a reduction in the temperature rise is required, additional means of cooling the condenser discharge flow will be incorporated through the use of external or add-on components to the main cooling system facility. The company has identified four saltwater cooling design alternatives that might be used to reduce the temperature rise. These alternatives include: (1) spray module cooling, (2) combination spray module-dilution cooling, (3) cooling ponds, and (4) cooling towers.

It is our present understanding that for the most part excavation of the intake and outfall canal extensions and construction of the intake and discharge structures for the once-through cooling system has not yet started. Since we are concerned with the adequacy of the

Unit 3 cooling system, the possibility of foreclosing each of the above alternatives following excavation for and construction of the system has been evaluated.

The open spray module cooling concept would utilize 132 spray modules located in the existing discharge canal. Such a system would result in a maximum temperature rise of 11°F. This system is entirely separate from the generating units drawing input effluent from the present discharge canal. Continuation of excavation and construction of the Unit 3 intake and discharge structures will not affect the subsequent installation of this alternative.

The second alternative which the company proposes is a combination spray module-dilution cooling concept. This system is expected to utilize 172 spray modules located in the present discharge canal in combination with ambient water introduced into the discharge canal near the last of the spray modules. This dilution aspect of the concept will require the excavation of a new canal between the present intake and discharge canals in near proximity to the Gulf of Mexico as well as widening the existing discharge canal from 100 to 160 feet. Additional pumps would be required to move the dilutant water from the intake to the discharge canal. The combination of these methods is stated by the applicant to result in a 5°F maximum temperature rise. Since neither the spray modules nor the

added dilution canal are directly connected to the individual unit cooling systems, continued construction of Unit 3 will not foreclose the subsequent adoption of this alternative.

Another alternative proposed by the company is a closed loop system which would use a large, artificial, cooling pond as the heat sink. A preliminary estimate of the size of such a pond indicates a minimum area of about 3 square miles. In this concept, the intake and discharge structures of Unit 3 would be used just as for the present system. The Unit 3 intake canal extension may not be required, although the company envisions the possibility of using the extension as a source of makeup water for the closed portion of the system. The heated water from Unit 3 will be discharged into the cooling pond instead of through the discharge canal into the Gulf of Mexico. In such a case there is some doubt as to the necessity of the presently proposed discharge canal extension. The temperature rise associated with this alternative was not estimated because of the preliminary nature of the investigation. Completion of the proposed intake and discharge structures for Unit 3 will not foreclose this closed loop alternative method. Furthermore, according to the applicant's revised construction schedule, excavation for the Unit 3 intake or discharge canals will not start before October 1972 at which time it is anticipated that the Environmental Review will have been completed.

The last alternative suggested by the company consists of a saltwater cooling tower complex. This system would utilize mechanical draft

cooling towers consisting of 26 cells. The towers would be located immediately adjacent to the existing discharge canal taking input directly from the canal. Therefore, they would be separated from the individual generating units. This arrangement would result in a maximum temperature rise of 11°F. Since this concept is completely separate and removed from the presently planned intake and discharge structures, subsequent adoption is not foreclosed by continued construction.

4.2 Foreclosure of Chemical Effluent Alternatives

Chemical wastes will be generated from such processes as cleaning of steam and condensate lines, regeneration of demineralizers and lime softener blowdown. It is the design intent of the company to collect the chemical waste of all three Crystal River units in an imperviously lined basin. The wastes could then be treated by a number of different methods such as settlement and precipitation, evaporation, distillation or offsite disposal. The detail design of this collection and treatment system has not been completed. It appears that continuance of construction will not affect the ability to install the necessary treatment facilities at a later date.

4.3 Foreclosure of Radiological Effluent Alternatives

Routine gaseous and liquid effluent releases will be governed by the limits set forth in 10 CFR Part 20 and the technical specifications

to be included in the operating license and Florida Power Corporation will be further required to keep radioactive effluents as far below these limits as practicable. This will include meeting numerical guidelines for routine releases comparable to those contained in Proposed Appendix I to 10 CFR Part 50.

The liquid radwaste treatment system for the plant is designed to be capable of recycling liquid radioactive wastes generated during operation. The wastes will be released from the plant on a batch basis. Prior to release, each batch will be sampled to determine the activity content.

The gaseous radwaste treatment system provides for the safe collection and storage of gases evolved from primary coolant. It is presently designed to allow a 90 day holdup. The gas passes through charcoal and HEPA filters and it is monitored twice prior to discharge.

Although the total radwaste system has been fully designed and all equipment procured, we conclude that modifications to the radwaste system would not be foreclosed by continued construction. There is reasonable assurance that a completed system could be modified to incorporate any radwaste treatment systems found necessary to restrict environmental release of radioactive waste to levels on the order of those specified in Proposed Appendix I, including the addition of building space if required.

The probability of occurrence of accidents and the spectrum of their consequences to be considered from an environmental effects standpoint will be analyzed using best estimates of probabilities and realistic fission product release and transport assumptions. For site evaluation in our safety review extremely conservative assumptions were used for the purpose of comparing calculated doses resulting from a hypothetical release of fission products from the fuel, against the 10 CFR Part 100 siting guidelines. The computed doses that would be received by the population and environment from actual accidents would be significantly less than those presented in our Crystal River Unit 3 Safety Evaluation.^{1/}

Although the environmental effects of radiological accidents are anticipated to be small, if further reduction in postulated accidental releases is required as a result of the full NEPA review, additional engineered safety systems could be added. For example, space is available for the inclusion of supplemental containment air cleanup systems.

In any event, operation of the plant will be required to be such that the environmental impact of postulated accidental releases will

^{1/} Safety Evaluation by the Division of Reactor Licensing, U.S. Atomic Energy Commission in the matter of Florida Power Corporation, Crystal River Unit 3 Nuclear Plant, Docket No. 50-302, June 6, 1968, pages 51-54.

be within Commission guidelines. We conclude that alternatives related to mitigation of accident consequences would not be precluded by the continuation of construction during the prospective review period.

In summary no alternatives would be foreclosed by continued construction from the standpoint of technical feasibility.

5.0 POWER NEEDS FOR CRYSTAL RIVER UNIT 3

Florida is supplied by seven major electrical utilities, one of which is Florida Power Corporation, and a number of smaller municipal generating systems. These utilities operate as an interconnected network so that a capacity problem for one utility will affect the total State power supply. These State utilities operate on the concept of helping neighbors whenever possible; however, each utility is responsible for protecting its own system before that of his neighbors.

Florida Power Corporation states that delay of Crystal River Unit 3 would result in a negative reserve of -8.4% to its system for the 1973-74 winter season. Reserve margin would increase to +7% during the summer of 1974 but it would again be slightly negative for the 1974-75 winter season. A negative reserve infers the possibility of curtailing customer loads during peak periods.

The company feels that a margin of 20 to 25% for the State is required by the Federal Power Commission to maintain reliability.

Reserves below this level tend to result in a high degree of probability of power curtailment during emergencies. If Crystal River Unit 3 is delayed beyond its scheduled service date of September 1973, Florida Power Corporation estimates the State reserve at 16.4% for the 1973-74 winter season. Beyond that time adequate margin appears available assuming that all other planned generators are brought into service on time.

5.1 Availability of Alternative Sources

Because of the low level of State power reserves, the possibility of contracting additional power from neighboring utilities is considered nonexistent by the company. Furthermore, there is insufficient time for any company within the State to install any type of large generating unit with an acceptable environmental impact. The most likely alternative for Florida Power Corporation seems to be the installation of peaking units since they are reported to be available on a relatively short lead time. However, the company identifies three distinct disadvantages to this approach: (1) an over-expansion of this type of capacity would result in significantly higher operating costs, (2) the environmental impact of operating these units is calculated to be more detrimental than a nuclear fueled unit, and (3) the cost of this additional generating equipment in relation to the applicant's current construction program would seriously jeopardize the company's financial conditions.

It appears that there is a bonafide need for the generating capacity of the Crystal River Unit 3 both to the Florida Power Corporation service area and to the State of Florida. At least one alternative has been identified but, as with any unit, it would superimpose large capital equipment and construction costs upon an already expansive construction program. It is likely that any alternative source would be fossil-fueled and that such a unit would have a more adverse impact upon the environment than a nuclear unit.

6.0 COSTS OF DELAYS

We have examined the Florida Power Corporation's estimate of costs that might be incurred through suspension of the Crystal River 3 construction permit in whole or in part. The company has judged that if a twelve month construction stoppage occurred as a result of suspension of the permit in its entirety pending completion of the NEPA review, a delay of at least fifteen and possibly as much as eighteen months for commercial plant operation would result. They have estimated the cost of complete construction suspension based upon the eighteen month time interval. Florida Power Corporation has stated under oath that an increase in costs as a result of such delay would be in excess of \$30,000,000 to them alone. The AEC's Division of Construction has independently reviewed these delay costs and has concluded that the estimate by the applicant of the overall increase

in costs associated with such a delay in Crystal River Unit 3 falls within the general range of what could be expected. These costs include suspension of physical site activities including the layoff and rehiring of the construction workers, field construction standby charges, engineering and home office work, contingencies and escalations on future work except hardware procurement. They also include taxes, insurance, owners staffing, administration, training and overhead, and interest. An increased incremental cost of replacement power associated with alternative sources whose capital cost is \$51,000,000 would also be incurred.

We also examined the costs of a delay in commencing excavation of the intake and discharge canal extensions for Unit 3 pending completion of the NEPA review, about October 1972. The company has stated that no cost penalty would accompany such a delay nor would it affect the availability of Unit 3 for commercial service in September 1973.

7.0 DETERMINATION AND BALANCING OF FACTORS

Pursuant to Section E of Appendix D to 10 CFR Part 50, we have taken into consideration and balanced the following factors in making a determination whether to suspend, in whole or in part, the construction permit for the Crystal River Unit 3 Nuclear Plant pending completion of the NEPA environmental reviews.

- 7.1 It is not likely that the onsite construction activities to be conducted during the period that the NEPA review is being completed will give rise to an incremental impact on the environment that is substantial and unduly adverse. As discussed in Section 3.0 above, two fossil fueled units are currently in operation at the site and the transmission lines are being added to an existing corridor. The environmental effects are those associated only with the construction and transmission associated with Unit 3. The adverse environmental impact associated with the change of the site from its former undeveloped state already have been incurred. Redress of such environmental impact as might result from further construction of Unit 3 could be achieved by removal of above-grade structures and reconstitution of the landscape at substantial costs. However, the two fossil units would remain. In the case of transmission line construction, the existing cleared right-of-way and transmission facilities would remain.
- 7.2 Continued construction during the prospective NEPA review period would not foreclose subsequent adoption of alternatives to currently proposed design features from the standpoint of technical feasibility with the exception noted below, although substantial additional dollar costs might be incurred as a result of ongoing construction activities if modifications were required at the end of the NEPA review. As discussed in Section 4.0 above, flexibility in system performance

specifications has been preserved in the area of treatment of radioactive wastes and installation of additional accident mitigating features should improvements in these areas prove necessary as a result of the NEPA review. The exception is that a change in the condenser itself would be difficult. Add-on cooling facilities would involve substantial costs but would not be foreclosed by continued construction. We regard the eventuality of installing add-on cooling facilities to reduce the temperature of the cooling water as likely. The continuing investments during the review period will not affect the decision to add equipment later.

- 7.3 The effects of complete suspension of the construction permit would be substantial. If a fifteen to eighteen month delay in commercial operation of the plant occurred, it would give rise to a serious shortage of electrical power to the Florida Power Corporation service area during the period 1973-75. Such a suspension would also reduce the state reserve slightly. An alternative source of power, fossil fueled peaking units, is probably available on a schedule to provide relief during the 1973-75 period. However, adoption of such a remedial measure on short notice would result in higher costs for generation equipment that may have a more severe impact on the environment than the nuclear unit.

7.4 The effects of suspension of the construction permit would be substantial. Increased construction and interest cost would result from stoppage and later resumption of construction. As discussed in Section 6.0 above, the cost of construction stoppage alone for 12 months has been estimated in excess of \$30,000,000.

An additional significant cash outlay will be made in the next 10 months in the normal course of construction. Part of this expenditure conceivably could influence a later decision whether to require major modifications to the plant. Although we anticipate the eventual installation of an add-on cooling water system, the company has stated that they do not wish to recommend foreclosure of any of the alternatives discussed in Section 4.1 on an economic basis at this time. They intend to reserve decision pending completion of the cost-benefit analysis which will be included in the Environmental Report. Therefore, we conclude that the large certain cost of delay outweighs the unlikely possibility that expenditures during the period of continued construction will affect substantially a subsequent decision regarding modification of the facility to reduce environmental impact.

7.5 After balancing the factors described above as to environmental impact of continued construction and the potential for foreclosure of alternatives as a result of further construction against the effects of delay, we conclude that the construction permit for the Crystal River Unit 3

Nuclear Plant should not be suspended, in whole or in part, pending completion of the ongoing NEPA review.

Pending completion of the full NEPA review, the holders of Construction Permit No. CPPR-51 proceed with construction at their own risk. The discussion and findings herein do not preclude the AEC as a result of its ongoing NEPA environmental review from continuing, modifying, or terminating the construction permit or its appropriate conditioning to protect environmental values.

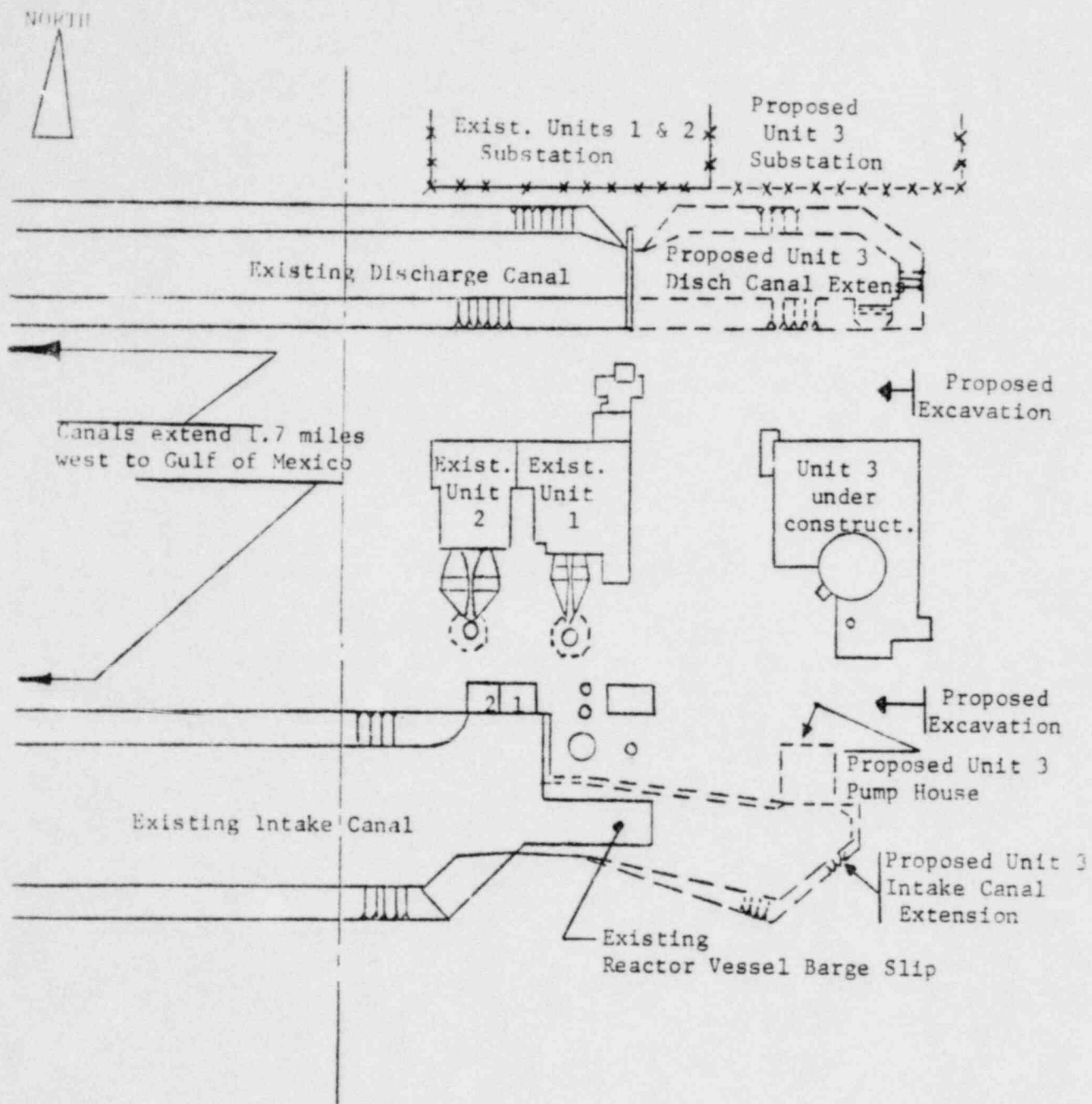


FIGURE 1