January 31, 1983

Docket No. 50-206
LS05-83-01-048

Mr. R. Dietch, Vice President
Nuclear Engineering and Operations
Southern California Edison Company
2244 Walnut Grove Avenue
Post Office Box 800
Rosemead, California 91770

SEE REPTS. # 8209160331

Dear Mr. Dietch:

SUBJECT: SEP HYDROLOGY TOPICS II-3.A, II-3.B, II-3.B.1, AND II-3.C, SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 1

Enclosure 1 is a copy of our draft evaluation of SEP Hydrology Topics II-3.A, Hydrology Description; II-3.B, Flooding Potential and Protection Requirements; II-3.B.1, Capability of Operating Plants to Cope with Design Basis Flood Conditions; and II-3.C, Safety-Related Water Supply (Ultimate Heat Sink). These evaluations are based on the review of our contractor's Technical Evaluation Report which is provided as Enclosure 2. Also, enclosed to the evaluation is Appendix A, a generic discussion of the conservatisms involved in estimating a Probable Maximum Flood (PMF). Our conclusions regarding these topics are summarized as follows:

Topic II-3.A - The design basis for low water and rooftop ponding are not adequately described. There are insufficient measurements of groundwater at the San Onofre Unit 1 site to accurately identify a probable maximum groundwater level. On other subjects, the hydrologic environment is adequately described.

II-3.B - (1) In order to meet current criteria a groundwater elevation of +10.0 ft MLLW should be considered; (2) the tsunami gates in the intake and discharge lines must be closed to protect the plant from the probable maximum tsunami; the forces used by the licensee to analyze the tsunami wall are appropriate; however, the structural adequacy of the tsunami flood wall complex will be reviewed in SEP Topic III-3.A when the balance of that SAR is received; (3) San Onofre Unit 1 cannot be shown to meet current criteria for flooding from local PMP. Due to the lack of detailed topographic information necessary to accurately define runoff, conservative assumptions (including flow reduction through the storm drain systems due to silt and debris accumulation) were used in the calculation of the ponding depth in the confined plant area. This may have resulted in conservatively high levels; and (4) the roofs of all safety related buildings meet current criteria for local PMP except for the fuel storage and ventilation building roof-tops. The design basis loads for these roofs have not been provided and compliance with current criteria cannot be determined.

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Add: Gary Staley

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II-3.B.1 - The Operating Instructions provided by the licensee, Tsunami Warning (#S01-1.6-2) should be modified to incorporate the recommendations identified in the evaluation.

II-3.C - The ultimate heat sink (Pacific Ocean) meets the criteria of Regulatory Guide 1.27 with respect to quality (temperature) and quantity of water available.

You are requested to examine the facts upon which the staff has based its evaluation and respond either by confirming that the facts are correct, or by identifying errors and supplying corrected information. We encourage you to supply any other material that might affect the staff's evaluation of this topic or be significant in the integrated assessment of your facility. Your response is requested within 30 days of receipt of this letter. If no response is received within that time, we will assume that you have no comments or corrections.

Sincerely,

Original signed by:

Walt Paulson, Project Manager
Operating Reactors Branch #5
Division of Licensing

Enclosure:
As stated

cc w/enclosure:
See next page

OFFICE	SEPB:DL	SEPB:DL	SEPB:DL	SEPB:DL	SEPB:DL	ORB#5:PM	ORB#5:BC
SURNAME	AWang:dk	DPersinko	EMcKenna	CGrimes	WRussell	WPaulson	DCrutchfield
DATE	12/29/82	12/31/82	12/31/82	12/31/82	12/31/82	12/31/82	12/31/82

Mr. R. Dietch, Vice President
Nuclear Engineering and Operations
Southern California Edison Company
2244 Walnut Grove Avenue
Post Office Box 800
Rosemead, California 91770

Docket No. 50-206
San Onofre 1

cc
Charles R. Kocher, Assistant General Counsel
James Beoletto, Esquire
Southern California Edison Company
Post Office Box 800
Rosemead, California 91770

David R. Pigott
Orrick, Herrington & Sutcliffe
600 Montgomery Street
San Francisco, California 94111

Harry B. Stoehr
San Diego Gas & Electric Company
Post Office Box 1831
San Diego, California 92112

Resident Inspector/ San Onofre NPS
c/o U.S. Nuclear Regulatory Commission
Post Office Box 4329
San Clemente, California 92672

Mayor
City of San Clemente
San Clemente, California 92672

Chairman
Board of Supervisors
County of San Diego
San Diego, California 92101

California Department of Health
ATTN: Chief, Environmental Radiation
Control Unit
Radiological Health Section
714 P Street, Room 498
Sacramento, California 95814

U.S. Environmental Protection Agency
Region IX Office
ATTN: Regional Radiation Representative
215 Freemont Street
San Francisco, California 94111

Robert H. Engelken, Regional Administrator
U.S. Nuclear Regulatory Commission, Region V
1450 Maria Lane
Walnut Creek, California 94596

SYSTEMATIC EVALUATION PROGRAM

Topic II-3.A,	Hydrologic Description
Topic II-3.B,	Flooding Potential and Protection Requirements
Topic II-3.B.1,	Capability of Operating Plants to Cope with Design Basis Flood Conditions
Topic II-3.C,	Safety-Related Water Supply (Ultimate Heat Sink)

Plant Name: San Onofre Nuclear Generating Station
Docket Number: 50-206

I. INTRODUCTION

The Systematic Evaluation Program (SEP) was established by the Nuclear Regulatory Commission (NRC) to evaluate the safety of ten older nuclear power plants. The program evaluates the plants against current licensing criteria with respect to 137 selected topics.

The hydrologic topics provide:

- A brief description of the hydrologic features of the site and surrounding area, plant facilities and the design bases used for construction. Additionally both surface and groundwater and their interfaces with plant safety-related buildings and systems are described.

- Design bases floods for the plant are developed, using current criteria, and compared to the design bases events used when the plant was built. Deviations and their safety significance are discussed. Acceptability of current features are noted where applicable.

- Where physical protection is used to prevent plant flooding, the design and design bases are reviewed and compared to current criteria. The variations, if any, and their safety significance with respect to structural and equipment distress are discussed.

- The design basis groundwater level for hydrostatic loading is determined in accordance with current criteria and compared to the value used for design.

- Existing emergency plans or procedures and technical specifications related to flooding or safety-related water supply are reviewed and compared to current criteria. Deficiencies are noted and, where possible, acceptable fixes are recommended. Where emergency plans or technical specifications do not exist but are potential solution to a problem, they are discussed and recommendations made, if appropriate.

- As reviewed here, the Ultimate Heat Sink (UHS) consists of water sources for the cooling water system, necessary retaining structures (e.g., a pond with its dam or a cooling tower supply basin), and the canals or conduits connecting the sources with (but not including) the cooling water system intake structures. The existing UHS is compared to current criteria with respect to available supply and maximum temperature, and if deficiencies exist, they are discussed and acceptable solutions recommended, if possible.

The information used to perform the reviews was gathered from the licensee's files, NRC files, other agencies, and the site visit. In some cases, detailed information was not available. In such cases, the staff and its consultants conservatively estimated these parameters required for analysis. For this evaluation, the staff consultant was the Franklin Research Center.

II. REVIEW CRITERIA

Current licensing criteria for nuclear power plants, related to the SEP topics addressed in this report, were developed from the Code of Federal Regulations: 10 CFR Part 50, "Licensing of Production and Utilization Facilities," and General Design Criterion 2, 4, 5 and 44 of Appendix A, "General Design Criteria"; 10 CFR Part 100, "Reactor Site Criteria" and Appendix A, "Seismic and Geologic Siting Criteria for Nuclear Power Plants".

The criteria which are applicable are (1) Standard Review Plan 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.4.5, 2.4.6, 2.4.7, 2.4.8, 2.4.9, 2.4.10, 2.4.11, 2.4.12 and 2.4.14; (2) Regulatory Guides 1.27, 1.59, 1.70, 1.102, 1.127 and 1.135 (Ref 2); and (3) American National Standards Institute (ANSI) Standard N170-1976 (Ref. 3).

III. RELATED SAFETY TOPICS AND INTERFACES

The effects of high surface water and ground water (pertaining to structural strength of building walls, loss of important equipment and its effect on the plants' ability to safely shutdown, etc) are outside the scope of the hydrologic evaluation. However, the levels of flood and ground water are determined in this evaluation and given to the structural and system reviewers for their use.

SEP interface topics are:

II-4.D - Stability of Slopes

II.4.E - Dam Integrity

II-4.F - Settlement of Foundations and Buried Equipment

III-1 - Classification of Structures, Components and Systems

III-3.A - Effects of High Water Level on Structures

III-3.B - Structural and Other Consequences of Failure of Underdrain Systems

III-3.C - Inservice Inspection of Water Control Structures

III-6 - Seismic Design Considerations

VII-3 - Systems Required for Safe Shutdown

VIII-2 - On-Site Emergency Power Systems - Diesel Generator

IX-3 - Station Service and Cooling Water Systems

XVI - Technical Specifications

IV. REVIEW GUIDELINES

The hydrologic issues identified in the Introduction are developed from design information for the nuclear power plant and from many sources containing hydrologic information for the site. Design bases (elevation of floods, depths of precipitation flooding, elevation of ground water and amounts of available cooling water) are determined and their conformance with or degree of departure from the current criteria is assessed. The Standard Review Plans and Regulatory Guides identified in Section II direct a complete evaluation of all issues and suggest or reference appropriate technical evaluation methods.

Regulatory Guides 1.27, 1.59 and 1.102 have been specifically identified as needing consideration for backfit on operating reactors. These guides are used in determining whether the facility design complies with current criteria or has some equivalent alternatives acceptable to the staff. The acceptability or nonacceptability of any deviations identified in this evaluation and the need for further action will be judged during the integrated assessment for this facility.

V. TOPIC EVALUATION

The staff's consultant, Franklin Research Center (FRC), has reviewed available background information and made independent analyses necessary to prepare the report, "Technical Evaluation Report, Hydrological

Considerations, Southern California Edison Company-San Onofre Nuclear Generating Station Unit 1" dated September 14, 1982 (TER-C5257-423)." This work was performed under NRC Contract NO. 03-79-118 and provides the assessment for Systematic Evaluation Program (SEP) Topics: II-3.A Hydrologic Description; II-3.B, Flooding Potential and Protection Requirements; II-3.B.1, Capability of Operating Plants to Cope with Design Basis Flood Conditions and, II-3.C Safety Related Water Supply (Ultimate Heat Sink (UHS)).

The staff has reviewed the TER and generally concurs with the evaluations, conclusions and recommendations. The following summary evaluation describes significant features addressed, any staff differences of opinion with the TER and any independent staff judgements. The FRC TER is attached as Enclosure 2.

1. Topic II-3.A-Hydrologic Description

This topic provides a brief description of hydrologic features, related plant facilities and design bases used for plant construction. The San Onfore plant is on the Southern California Coast of the Pacific Ocean, near the city of San Clemente. The Unit 1 site is bordered on the north and east by Camp Pendleton, a U. S. Marine Corps base; on the south by Units 2 and 3; and on the west by San Onofre State Beach and the Pacific Ocean. Plant grade varies from 11 to 20 ft. MLLW. The two potential sources of flood flow are (1) precipitation (rainfall) runoff from the bluff areas north and east of the plant and the plant area itself, and

(2) tides, surges, and tsunamis; combinations thereof; and accompanying wind-generated waves from the Pacific Ocean. Existing flood protection at the site includes:

- gunited (sprayed concrete) steel sheetpile seawall on the west side of the plant for protection from the Pacific Ocean.
- reinforced concrete floodwall, concrete channel, and catch basin to collect flood runoff from the areas north and east of the plant.
- 30- and 42-in. diameter flap-gated openings in the sea-wall at the west end of the collector channel to convey collected flood runoff outside the confined plant area.
- two 48 in. diameter corregated metal pipes (CMPs) to convey flood runoff from the collector channel to the plant intake structure and then to the Pacific Ocean.
- yard sump for collection of rainfall from the confined plant area and conveyance to the plant discharge structure.
- tsunami gates on the plant intake and discharge conduits to preclude the ocean from flooding the confined plant area
- concrete curb between Units 2 and 3 and Unit 1 to preclude runoff from Units 2 and 3 from entering the Unit 1 area.

When the Pacific Ocean is at normal levels (stillwater level below elevation 12 ft. MLLW), runoff water from the confined plant area can flow (by gravity) intothe cold water intake bay and to the Pacific ocean. The intake and discharge conduits on the plant side of the seawall are provided with hydraulic stop gates to prevent ocean water from entering the plant during extreme high ocean water levels.

Therefore when these gates are closed there is no outlet for plant area runoff water, and this water would pond in the plant area until these gates could be reopened.

The groundwater aquifer beneath the site is the San Mateo Formation which underlies the site to a depth of about 900 ft. The groundwater recharge takes place in upstream parts of stream channels and alluvia. Groundwater recharge within the influence of the plant area would flow to the ocean, and spills at the plant site would not affect any offsite wells.

The groundwater gradient across the main plant area is influenced by tidal fluctations. The design basis for the subsurface hydrostatic loading for Unit 1 is elevation +5 ft Mean Lower Low Water Datum (MLLW), which is the average groundwater level at the site. Table 1 summarizes the Hydrologic engineering design bases.

Table 1. Design Bases

	Design Bases		
Event	Original (1965)	Present (1982)	NRC (1982)
Surge			
Tsunami	11 ft mllw [9]	15.6 ft mllw [16]	15.6 ft mllw [11]
Runup	13 ft mllw [9]	26.6 ft mllw [17]	27.5 ft mllw [11]
Low Water			
Stillwater Level	Unknown	Unknown	-2.63 ft mllw [11]
Tsunami	Unknown	Unknown	-12.3 ft mllw [11]
Local Precipitation	100-yr rainfall [9]	Unknown	PMP 7.0 in 1 hr [19] 12.0 in 6 hr [19]
Rooftop Ponding	Unknown	Unknown [16]	PMP 7.0 in 1 hr [19] 12.0 in 6 hr [19]
Groundwater			
Normal High	Unknown	5.0 ft mllw [22]	10.0 ft mllw
Extreme High	Unknown	5.0 ft mllw [22]	Plant grade

2. Topic II-3.B - Evaluation of Flooding Potential and Protection Requirements

The purpose of this topic is to identify the plant and site design basis flood level resulting from all potential flood sources external to the plant and site, using current NRC licensing criteria.

A. Groundwater

According to the applicant's FSAR, the average groundwater elevation at the site is 5 feet MLLW and the water table is influenced by tidal fluctuations. These tidal fluctations are reflected in the range of 0.1 to 0.3 of their height in the water table elevations, depending on the proximity of the measurement point to the shoreline with a lag of about 1 hour after high or low tide. Groundwater readings have been made at irregular intervals from 1967 to 1977 and show that under some conditions groundwater levels exceeded 5 feet. Thus, 5 feet MLLW is not considered a conservative design basis for groundwater loading. It is recommended that 10 ft MLLW be used as a conservative design bases groundwater level.

B. Probable Maximum Tsunami

The design basis flood for the Unit 1 seawall is the same flood that has been accepted by the staff for the Units 2 and 3 operating license application. The design basis flood includes a combination of tide, storm surge, a sea level anomaly, tsunami, and coincident wind-generated waves.

The spring high tide at San Onofre that has a 10 percent probability of being exceeded annually is +7.0 ft MLLW. The estimated sea level anomaly at the site (the persistent difference between predicted high and low tides and observed values) is + 0.3 ft. The probable maximum tsunami (PMT) for this area of the coast is locally generated (Ref. 8), and the runup is estimated to be 6.3 ft. Because the PMT has a relatively long wave period (about 12 min), it is considered as part of the stillwater level. The estimated annual storm surge associated with the combined tsunami and tide is 2.0 ft. The combined stillwater level then includes the 7.0 ft tide, 0.3 ft sea level anomaly, 2.0 ft storm surge, and the 6.3 ft PMT, for a combined stillwater level of 15.6 ft MLLW.

Storm waves approaching the seawall coincident with the stillwater elevation of 15.6 ft MLLW are depth limited. The existing beach at Unit 1 is artificial because of the construction of Units 2 and 3. However, using beach profiles developed before the construction of Units 2 and 3, an approximate lower limit of erosion to 7.0 ft MLLW at the walkway fronting the seawall was established. Considering the eroded beach and a range of wave periods, maximum breaker heights and runup elevations were determined.

The 7.0 ft breaking waves will runup the seawall to elevation 27.5 ft MLLW. This will not exceed the top of the seawall at Elevation 28.2 ft MLLW.

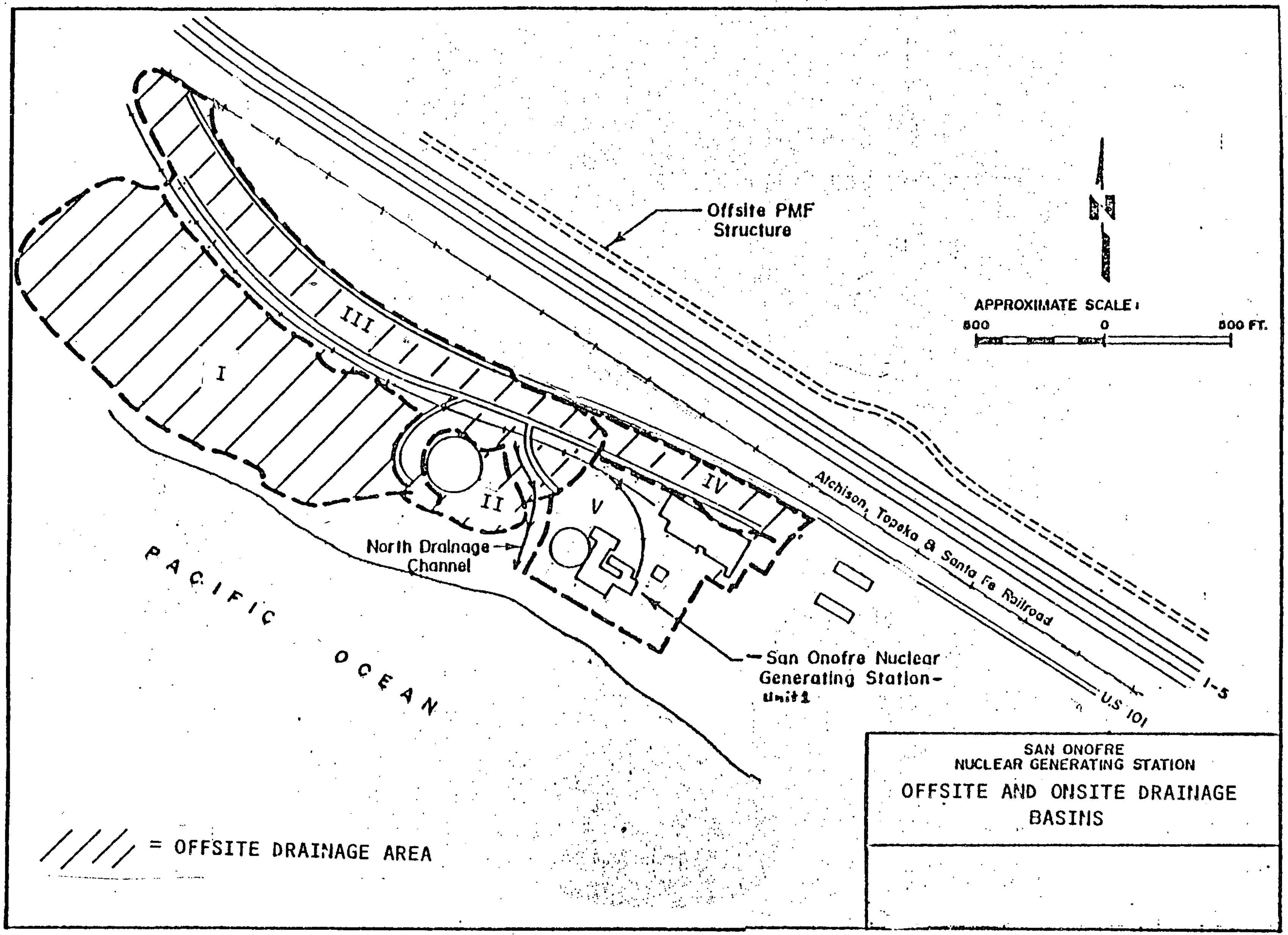

Figure 1 Offsite and Onsite Drainage Basins

It has previously been demonstrated that the PMT will cause failure of the steel sheetpile seawall if the beach walkway, the walkway retaining wall, and the riprap berm do not exist. An analysis of the tsunami wall complex consisting of the seawall, the riprap berm and the walkway retaining wall has been performed to verify results presented by the licensee. The analysis concluded adequacy of the riprap berm and verified the applied forces used by the licensee. Subsequent to the issuance of our contractor's report, the licensee has provided calculations to support their results and include a stability analysis of the sheet-piling. This information will be reviewed in SEP Topic III-3.A, "Effects of High Water Level on Structures" along with the balance of this topic when it is received from the licensee.

This analysis has not shown consideration for a postulated flood hazard resulting from seismic failure of the seawall. Should the seawall fail due to the forces resulting from the near source earthquake which generates the tsunami, a flood hazard may exist. To date SEP Topic III-6 Seismic Design Considerations, has not rendered an analysis of seismic stability of the tsunami wall. Should completion of SEP Topic III-6 demonstrate the seawall is unstable under seismic loading, further evaluations of flooding would be warranted under SEP Topic II-3.B.

C. Local Flooding

The most severe hydrometeorological condition with respect to Unit 1 site drainage is the probable maximum flood (PMF) resulting from rainfall equivalent to the probable maximum precipitation (PMP). The PMP is generally defined as the theroetically greatest depth of precipitation for a given duration that is physically possible over a drainage basin at a particular time of year (19).

The attached TER (TER Fig. 4) shows eight drainage subbasins that were evaluated for potential effects at the site. Three of the subbasins do not contribute flow to the Unit 1 plant area. Our summary evaluation addresses the remaining five subbasins, shown as areas I thru V on Figure 1.

Subbasin V represents the confined main plant area and PMP on this area would produce a PMF with a peak discharge of about 168 cfs. The yard sump has a capacity to discharge about 190 cfs before safety equipment is affected and thus can safely handle the peak discharge from the confined plant area if there is no other contributing flow from offsite.

Subbasins I, II, III & IV represent site drainage that is outside the confined plant area. This flow is routed to the North Drainage Channel where it discharges through the sea wall and/or through two 48 inch diameter corregated metal pipes (CMP) to the intake structure and to the Pacific Ocean. PMP on this area would produce a PMF with a peak discharge of 385 cfs. The staff recognizes that a portion of the flow from subbasins I and II will probably flow over the bluff and directly to the Pacific Ocean. However, since we did not have sufficiently detailed topographic information to evaluate the actual division in flow, it was conservatively assumed that all runoff would be through the North Drainage Channel.

The staff has some reservation with respect to discharge capability of the 30 inch and 42 inch gated outlets through the seawell and the two 48 inch CMP that divert flow to the intake structures. Basically our concerns are for possible flow reduction due to silt and debris accummulation and blockage of the flap gate on the 42 inch outlet.

Our contractor (FRC) tested two scenarios involving the degree to which the storm drain systems were clogged by debris. The lower 42 inch-diameter Reinforced Concrete Pipe (RCP) flapgate (invert elevation 10.0 ft. MLLW) at the mouth of the north drainage channel was assumed blocked by beach sand for both scenarios tested.

The first scenario assumed that all other drain systems were operating with the twin 48 inch CMP at 90% capacity and the 30 inch CMP at 40% capacity. The results of the contractor's evaluation show that the North Drainage Channel can handle a peak discharge of 336 cfs with 49 cfs overflowing the flood wall and combining with the 168 cfs from subbasin V for discharge through the yard sump and yard drainage system. The resulting water surface elevation in the confined plant area would be elevation 15.5 ft. MLLW. Hence, the contractor stated that safety related equipment would be flooded. However, our contractor did not consider available yard storage. With consideration for this storage, the flood level would be below safety related equipment.

The second scenario assumed that both the seawall culverts (30 and 42 inch) were 100% blocked and the twin 48 inch CMP's were operating at 90%

capacity; the yard drainage system is completely blocked and the yard sump operates at 100% capacity. The results of this contractor evaluation show that the North Drainage Channel can handle a peak discharge of 310 cfs and the remaining 75 cfs will overtop the wall and combine with the 168 cfs from Subbasin V to be discharged through the yard sump. This water would pond in the confined area to about elevation 23 feet MLLW. Safety related equipment would be flooded. As in the previous scenario the contractor did not take into consideration the effects of yard storage capacity on predicted flood levels. The staff has made independent evaluations in this area and we conclude that the worst case flood stage in the confined plant area would be about elevation 15.5 ft MLLW. Hence, the staff concludes that safety related equipment would be flooded for this scenario. The elevations of various safety related equipment can be found in reference 16.

The staff has also reviewed the flood runoff from Units 2 and 3 as a potential source of flooding and finds that the curb separating Unit 1 from Units 2 and 3 is adequate to prevent flooding from this source during local PMP.

D. <u>Roof Drainage</u>

The roofs of the control building, the reactor auxiliary building, the sphere enclosure building, the post-accident sampling building, the turbine building, the east and west heater platforms, and the diesel generator building all meet current NRC criteria. The roofs of these structures are designed to withstand ponding from local PMP.

The fuel storage building and the ventilation building roofs are not designed to withstand ponding to the top of the parapets. Instead, they are equipped with 2 inch by 8 inch scuppers above the drains. If the drains are clogged during local PMP, the scuppers will be adequate to ensure the ponding does not rise to the top of the parapets. On the fuel storage building roof, ponding will not exceed 9 in. above the low point of the roof, exerting 46.6 psf. On the roof of the ventilation building, ponding will not exceed 7-1/2 in. above the low point of the roof, exerting a live loading of 38.9 psf. If these roofs have design basis live loading less than 46.6 psf for the fuel storage building and 38.9 psf for the ventilation building, they do not fulfill NRC criteria for local PMP. Since the Licensee has failed to provide design bases for these two buildings, compliance with NRC requirements cannot be determined.

3. Topic II-3.B-1. Capability of Operating Plant to Cope with Design Basis Flood Condition

The purpose of this topic is to identify and review technical specifications and emergency procedures which are intended to protect San Onofre Unit 1 from flood conditions, and to identify and review the effectiveness of these procedures in protecting the plant.

There are no technical specifications at San Onofre Unit 1 to protect the plant against flooding from any hydrologic event.

The Licensee has indicated two emergency procedures for flood protection (16). They are Operating Instruction #S01-1.5-4, "Condenser Bay Flooding", and Operating Instruction #S01-1.6-2, "Tsunami Warning."

Operating Instruction #S01-1.5-4 describes flooding caused by a failure of circulating water system piping. It is not applicable to flooding from hydrological events, and, therefore, does not fall within the scope of this review.

Operating Instruction #S01-1.6-2 is designed in two parts, addressing protection against both predicted and unpredicted tsunamis. Both versions include closing of the inlet and outlet hydraulic stop gate valves, the most important action necessary to complete the protection provided by the tsunami wall. The greater part of both versions addresses bringing the plant to hot standby and cold shutdown conditions.

Part A of Operating Instruction #S01-1.6.2, "Predicted Tsunami Warning", is initiated by information from the Energy Control Center or other sources, and confirmed by the System Operations Supervisor, who periodically reconfirms the prediction throughout the procedure. One hour prior to the predicted time of the tsunami, the operator is instructed to watch for tsunami wave action by monitoring the screenwall level, the storm drains, and the area intake structure for potential seawater in-leakage. However, no actions are prescribed if in-leakage is observed. Such a contingency should be addressed.

"Unpredicted Tsunami Warning" is Section B of Operating Instruction #S01-1.6-2. It is initiated by earth tremors followed by "intake structure high level" alarm or by off- or on-site seismic trigger alarms. Item 4.5 under 4.0, Subsequent Operator Actions, is an instruction to close the intake and outlet hydraulic stop gates. It is suggested that the instruction to close the intake and outlet hydraulic stop gates should be under 3.0, Immediate Operating Action, as item 3.3, to prevent flooding of the plant yard. Moreover, the staff has not had an opportunity to review with the licensee: (1) the time required to close the stop gates (tsunami gates) versus the time available based on a locally generated tsunami and, (2) the disposition of plant cooling and waste water during the period of time when the tsunami gates are closed and an estimate of how long gates would be closed. These items should be reviewed and acceptability determined during the Integrated Assessment.

Emergency procedures for flooding from heavy local precipitation at San Onfore Unit 1 could not fulfill current NRC criteria for flood protection, since the time available between receipt of a warning and accumulation of runoff is inadequate to implement protective actions.

4. <u>Topic II-3.C Safety Related Water Supply (Ultimate Heat Sink (UHS))</u>

This topic reviews the acceptability of the ultimate heat sink (UHS) of the cooling water system. The review is based on current criteria contained in Regulatory Guide 1.27, Rev. 2, which is an interpretation of General Design Criterion (GDC) 44, "Cooling Water" and GDC 2, "Design Bases for Protection Against Natural Phenomena" of 10 CFR50, Appendix A.

The ultimate heat sink (UHS) for San Onofre Unit 1 is the Pacific Ocean. The intake crib is about 3000 ft offshore in about 30 ft of water. The distance from shore and depth of water should be great enough to preclude the loss of supply during the extreme drawdown which would result from tide, storm surge or a probable maximum tsunami.

Water is conveyed from the intake crib to the plant area in a large-diameter conduit. The safety-related salt water cooling pumps are located in pumpwells just inside the seawall (plant side). The pumpwells can be flooded by failure of the north collector channel wall. The acceptability of the seismic design of the safety-related structures and equipment is reviewed under Topic III-6, "Seismic Design Considerations."

The intake crib and buried conduit must be able to meet the seismic Category I classification because they constitute the only safety-related water supply. The structural adequacy of this system will be evaluated during the Integrated Assessment.

VI CONCLUSIONS

TOPIC II-3.A HYDROLOGIC DESCRIPTION

The design bases for low water and rooftop ponding are not adequately described. Measurements of groundwater elevation at the San Onofre Unit 1 site are not sufficient to allow an accurate identification of probable maximum groundwater level. On other subjects, the hydrologic environment is adequately described.

TOPIC II-3.B FLOOD POTENTIAL AND PROTECTION REQUIREMENTS

The following conclusions pertaining to specific aspects of flood potential at the San Onofre Unit 1 site are presented.

A. Groundwater - The design basis groundwater level as stated by the licensee is 5.0 ft MLLW. In order to meet current criteria a groundwater elevation of +10.0 ft MLLW should be considered.

B. Probable Maximum Tsunami - The tsunami gates in the intake and discharge lines must be closed to protect the plant from the probable maximum tsunami. The forces used by the licensee to analyze the tsunami wall are appropriate; however, the structural adequacy of the tsunami flood wall complex will be reviewed in SEP Topic III-3.A when the balance of that SAR is received from the licensee.

C. Local Flooding - San Onofre Unit 1 does not meet current criteria for flooding from local PMP. Under conditions which can be reasonably foreseen to occur, ponding will rise to elevation 15.5 ft MLLW in the plant yard during PMP. Safety-related equipment would be flooded.

D. Roof Drainage - The roofs of the control building, the reactor auxiliary building, the sphere enclosure building, the post-accident sampling building, the turbine building, the east and west heater platforms, and the diesel generator building all meet current criteria for local PMP.

During the PMP event, the fuel storage building and the ventilation building rooftop will be subject to 46.6 psf and 38.9 psf respectively over the low points of the roofs. Since the Licensee has failed to provide the design basis, compliance with criteria cannot be determined. This issue will be evaluated under SEP Topic III-7.B, Design Codes, Design Criteria, Load Combinations and Reactor Cavity Design Criteria.

TOPIC II-3.B.1 - CAPABILITY TO COPE WITH DESIGN BASIS FLOODING CONDITIONS

The Operating Instructions provided by the Licensee, Tsunami Warning (#S01-1.6-2) will be adequate with the following changes:

- The procedure for predicted tsunami warning should include instructions for dealing with seawater in-leakage at the screenwell, the storm drains, and the intake structure.
- The procedure for predicted tsunami should be modified so that the instruction to close the intake and outlet hydraulic stop gates is an immediate operating action, rather than a subsequent one.
- The timing considerations for closing Tsunami gates and method of disposing of cooling water while gates are closed, need to be reviewed and approved.

4. TOPIC II-3.C. - SAFETY-RELATED WATER SUPPLY

The Pacific Ocean UHS meets the criteria of Regulatory Guide 1.27 with respect to quality (temperature) and quantity of water available and is acceptable. Related plant systems and electrical supply are reviewed under related topics, as noted in the introduction to this topic.