REGULATOR[illegible]INFORMATION DISTRIBUTION S[illegible]TEM (RIDS)

ACCESSION NBR:8208160011 DOC.DATE: 82/08/06 NOTARIZED: YES DOCKET #
FACIL:STN-50-528 Palo Verde Nuclear Station, Unit 1, Arizona Publi 05000528
STN-50-529 Palo Verde Nuclear Station, Unit 2, Arizona Publi 05000529
STN-50-530 Palo Verde Nuclear Station, Unit 3, Arizona Publi 05000530
AUTH.NAME AUTHOR AFFILIATION
VAN BRUNT,E.E. Arizona Public Service Co.
RECIP.NAME RECIPIENT AFFILIATION
NOVAK,T.H. Assistant Director for Licensing

SUBJECT: Forwards response to NRC 820510 hypothetical questions re postulated loss of essential spray pond spray nozzles due to tornado missiles.Util relies on probabilistic risk assessment as response to SER Section 9.2.5.

DISTRIBUTION CODE: B001S COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 11
TITLE: PSAR/FSAR AMDTS and Related Correspondence

NOTES:Standardized plant. 05000528
Standardized plant. 05000529
Standardized plant. 05000530

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	A/D LICENSNG	1	0	LIC BR #3 BC	1	0
	LIC BR #3 LA	1	0	LICITRA,E. 01	1	1
INTERNAL:	ELD/HDS3	1	0	IE FILE	1	1
	IE/DEP EPDS 35	1	1	IE/DEP/EPLB 36	3	3
	NRR/DE/CEB 11	1	1	NRR/DE/EQB 13	3	3
	NRR/DE/GB 28	2	2	NRR/DE/HGEB 30	2	2
	NRR/DE/MEB 18	1	1	NRR/DE/MTEB 17	1	1
	NRR/DE/QAB 21	1	1	NRR/DE/SAB 24	1	1
	NRR/DE/SEB 25	1	1	NRR/DHFS/HFEB40	1	1
	NRR/DHFS/LQB 32	1	1	NRR/DHFS/OLB 34	1	1
	NRR/DHFS/PTRB20	1	1	NRR/DSI/AEB 26	1	1
	NRR/DSI/ASB 27	1	1	NRR/DSI/CPB 10	1	1
	NRR/DSI/CSB 09	1	1	NRR/DSI/ETSB 12	1	1
	NRR/DSI/ICSB 16	1	1	NRR/DSI/PSB 19	1	1
	NRR/DSI/RAB 22	1	1	NRR/DSI/RSB 23	1	1
	NRR/DST/LGB 33	1	1	REG FILE 04	1	1
	RGN5	2	2	RM/DDAMI/MIB	1	0
EXTERNAL:	ACRS 41	10	10	BNL(AMDTS ONLY)	1	1
	DMB/DSS (AMDTS)	1	1	FEMA-REP DIV 39	1	1
	LPDR 03	1	1	NRC PDR 02	1	1
	NSIC 05	1	1	NTIS	1	1

TOTAL NUMBER OF COPIES REQUIRED: LTTR 58 ENCL 53

ARIZONA PUBLIC SERVICE COMPANY
P. O. BOX 21666 · PHOENIX, ARIZONA 85036

August 6, 1982
ANPP-21572 - WFQ/KEJ

Mr. T. H. Novak
Assistant Director of Licensing
Division of Licensing
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2 and 3
Docket Nos. STN-50/528/529/530
File: 82-056-026; G.1.01.10

References:
1. Letter from F. J. Miraglia, NRC to E. E. Van Brunt, Jr., APS, dated May 10, 1982
2. Letter from E. E. Van Brunt, Jr., APS, to R. L. Tedesco, NRC, dated May 24, 1982
3. Letter from E. E. Van Brunt, Jr., APS, to R. L. Tedesco, NRC, dated March 25, 1982
4. NUREG-0857 "Safety Evaluation Report" related to the operation of Palo Verde Nuclear Generating Station Units 1, 2 and 3 dated November, 1981.

Dear Mr. Novak:

Please find attached our responses to the hypothetical questions forwarded in Reference (1), concerning the NRC postulated loss of the essential spray pond spray nozzles due to tornado missiles.

These questions arose through the staffs review of APS' response (enclosure 2 of Reference (3)) entitled "Extended/Alternate Sources of Auxiliary Feedwater", in which APS was requested by the staff to indicate what capabilities PVNGS had if required to provide core cooling without the essential spray pond system. This response was intended as additional information to the Probabalistic Risk Assessment (PRA) which was provided to NRC as enclosure 1 of Reference (3). The PRA study concluded that tornado generated missiles were an insignificant concern for the PVNGS essential spray pond system. APS' relies on the conclusions and recommendations discussed in the PRA as our response to the concern in section 9.2.5 (page 9-15) of Reference (4). We therefore, request that any further review of these concerns be viewed in that manner.

If you have any questions concerning these matters, please contact me.

Very truly yours,

E. E. Van Brunt

E. E. Van Brunt, Jr.
APS Vice President,
Nuclear Projects
ANPP Project Director

EEVBJr/KEJ/sp

B001

DISTRIBUTION

A. C. Gehr	(w/a)
L. Bernabei, Esq.	"
P. L. Hourihan	"
E. Licitra	"
J. Wermiel	"

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, Edwin E. Van Brunt, Jr., represent that I am Vice President Nuclear Projects of Arizona Public Service Company, that the foregoing document has been signed by me on behalf of Arizona Public Service Company with full authority so to do, that I have read such document and know its contents, and that to the best of my knowledge and belief, the statements made therein are true.

Edwin E. Van Brunt, Jr.

Edwin E. Van Brunt, Jr.

Sworn to before me this 6th day of August, 1982.

David L. Graham
Notary Public

My Commission expires:

My Commission Expires May 19, 1986

My Commission Expires May

REQUEST FOR ADDITIONAL INFORMATION

TORNADO MISSILE PROTECTION FOR THE ULTIMATE HEAT SINK

PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 AND 3

NRC QUESTION 1

It is not clear from the discussion provided that the assessment for achieving safe reactor shutdown with a total loss of the essential spray pond nozzles includes a postulated single failure concurrent with the tornado missile damage. The applicant should verify that the analysis assumes the above condition.

RESPONSE:

As shown in the probability analysis, it is extremely unlikely that a total loss of essential spray pond nozzles could occur. However, if it should occur, PVNGS could alter the alignment of heat rejection sources to dissipate reactor decay heat to the atmosphere through the atmospheric dump valves and use either (or both) of the redundant auxiliary feedwater (AFS) trains. As there are two redundant ESF AFS trains, safe shutdown could be achieved with a single active failure.

Support system heat loads (fuel pool, diesel generator, essential chillers) would continue to be rejected to the ponds; however, the bulk mixing discharge (lines SIA-066-18" and SIB-048-18" on the spray pond system PI&D (FSAR Figure 9.2-1) could be used in place of discharge through the spray nozzle header. Each pond would remove the heat of its related ESF train. Again, since there are two ESF spray pond trains, safe shutdown could be achieved with a single active failure. Accordingly, our assessment of safe shutdown capability with a total loss of the essential spray pond nozzles has included consideration of a single active failure concurrent with the tornado missile damage.

NRC QUESTION 2

As previously mentioned in discussions with the applicant, loss of off-site power is assumed concurrent with the tornado. Therefore, the applicant should describe the capability of the essential spray ponds to cool the station emergency diesel generators and essential reactor auxiliaries (essential HVAC

room coolers, reactor coolant pump seals. spent fuel pool, etc.) without the spray nozzles.

RESPONSE:

As mentioned in the response to question 1, the primary system sensible and decay heat could be rejected to the atmosphere by using the atmospheric dump valves and the auxiliary feedwater system with RCS flow established through natural circulation. For the assumed scenario of a tornado concurrent with a loss-of-power situation, the station essential heat loads would total 30.71 x 10^6 Btu/hr. with single train operation, and include a diesel generator, an essential HVAC chiller, the spent fuel pool heat exchanger and the essential cooling water system (ECWS) pump and ESPS pump heat loads. In the absence of any pond spraying, the ECWS temperature reaches the limiting value of 125°F specified for essential chiller cooling in a little over four days, summertime operation (101 hours). Operation of 5% of the spray nozzles on one pond at their design flow rate would limit the ECWS temperature to about 123°F and the pond to 120°F. Such partial spray operation would require that damaged risers or individual nozzle units be capped or repaired to maintain the design pressure and flow of seven psig and 53 gpm/nozzle, respectively, to intact or repaired nozzles. With partial spray operation, the pond flow not being sprayed would have to be bypassed directly to the pond through the existing pond return spray bypass valve (A-train HV49B or B-train HV50B).

NRC QUESTION 3

The alternative shutdown capability described by the applicant involves the use of the auxiliary feedwater (AFW) system and atmospheric dump valves for long term cooling. The discussion (and Table 1 of enclosure 2) involves an evaluation of a number of alternate water sources for extended use of the AFW system. We require the following additional information on the water sources.

a. Other than the condensate storage tank, none of the sources identified appears to be tornado missile protected. Justify the avialability of the alternative AFW sources (either by separation or inherent protection by location in suitable structures).

RESPONSE:

The analysis of extended sources of auxiliary feedwater has considered the potential for tornado missile damage of these sources. It was concluded that due to spatial separation, intervening barriers, and inherent design resistance to missiles, it was not credible to postulate loss of all alternate feedwater source capability.

Figure 1 depicts the site and the locations of alternate feedwater sources. As can be seen, the sources are spread out over about 1¼ square miles. Thus, due to spatial separation alone it is unlikely that tornado damage would occur at all locations during the course of the postulated scenario.

The spray ponds and reactor makeup water tanks are isolated from the onsite wells and domestic/demineralized water systems by the concrete buildings of the power block. These buildings act as barriers providing additional assurance that tornado missiles will not disable both areas. CVCS and LRS components are located inside reinforced concrete structures.

Lastly, the circulating water system basins and the spray ponds are excavated structures. Even with substantial structural damage, a large quantity of impounded water would remain.

Thus, while none of the individual sources is fully missile protected, the system of sources if missle protected due to the separation of sources.

b. Describe the time available to accomplish each of the temporary makeup water alignments for extended AFW supply. This discussion should include an evaluation of manpower availability, and availability of necessary equipment.

RESPONSE:

Time estimates and equipment required to accomplish each temporary makeup water alignment for the postulated extended Auxiliary Feed Water Supply are estimated as follows:

METHOD	ESTIMATED TIME REQUIRED
I. Normal Mode All operations done from Control Room	2 minutes
II. AFP Suction from RWMT 2 manual valves are closed per pump 1 manual valve is open per pump all valves located wn respective AFP rooms	15 minutes
III. Demin Water Tank Makeup to CST or RMWT	
1. With non IE power available	15 minutes
2. Without non IE power, Jumpers must be installed to run DW pump for IE power supply.	2 hours
Assumption: Bulk cable is available on site	
3. Demin water system (WRF) makeup to CST or RMWT	1 hour
Assumption: Non IE power is available to WRF and WRF is operating.	
IV. LRS makeup to CST or RMWT	
1. With non IE power available	
a. Valve lineups made using demin cleanup.	1 hour
b. Valve lineups made and starting up for evaporator cleanup.	3 hours
Assumption: Water available in LRS Holdup Tanks.	
2. Without non IE power, jumpers would have to be installed to run LRS Holdup and Recycle Monitor Pumps.	
a. using demin cleanup	3 hours
b. using evaporator cleanup	not practical
V. CVCS makeup to RMWT Required valve lineups and startup of Boric Acid concentrator	
a. With no IE power available	3 hours
b. Without non IE power available	not practical

METHOD	ESTIMATED TIME REQUIRED
VI. Fire header makeup to SCT or RMWT Requires removal of manway and hookup of firehoses	2 hours
VII. Portable Pump Makeup to CST or RMWT From Cooling Tower Basin, Hotwell or Spray Ponds	4 hours

The estimated times required assume a normal shift complement, including assigned shift maintenance personnel are available.

c. Verify that extended reactor cooling using alternate AFW sources does not result in degradation of the steam generators due to improper secondary side water chemistry.

RESPONSE:

The discussion of use of extended reactor cooling capability was provided to discuss an improbable situation - loss of all spray nozzles in both spray ponds. APS prepared a comprehensive probalistic risk assessment (PRA) which demonstrated that such an event is incredible. However, per NRC request, APS evaluated methods that rely on the auxiliary feedwater system as a possible alternate means of decay heat removal even though PVNGS is not designed to operate in that manner. These methods are postulated to be used only if all spray nozzles in both spray ponds were destroyed. The PRA demonstrates that these methods are not required and are outside the design basis of Palo Verde as the current arrangement of the spray ponds meets Regulatory Guide 1.117 and General Design Criteria 4, 34, and 44.

Water meeting CE specifications for feedwater will be available onsite in the condensate storage tanks, reactor makeup water tanks, condenser hotwells, and demineralized water system. It is possible that these sources could be utilized without steam generator degradation if design basis methods were not available. Use of this water should allow sufficient time to repair the postulated damage spray nozzles. However, if repairs were not effected, there may be other sources of water that could be used to further extend the auxiliary feedwater mode of decay heat removal. These water sources do not

meet the chemistry specifications of the steam generators and tube damage would be expected. APS cannot verify that such improper secondary side water chemistry would not degrade the steam generators. APS does not expect degradation of the steam generators since it is unlikely that improper quality water would ever be introduced. The PRA demonstrates that the likelyhood of loosing the UHS due to tornado missiles and thus requiring alternate sources of Auxiliary Feedwater is improbable.

NRC QUESTION 4

Provide an assessment of the time and equipment required to repair the spray nozzles/risers and thus restore portions of the spray pond following tornado missile damage.

RESPONSE:

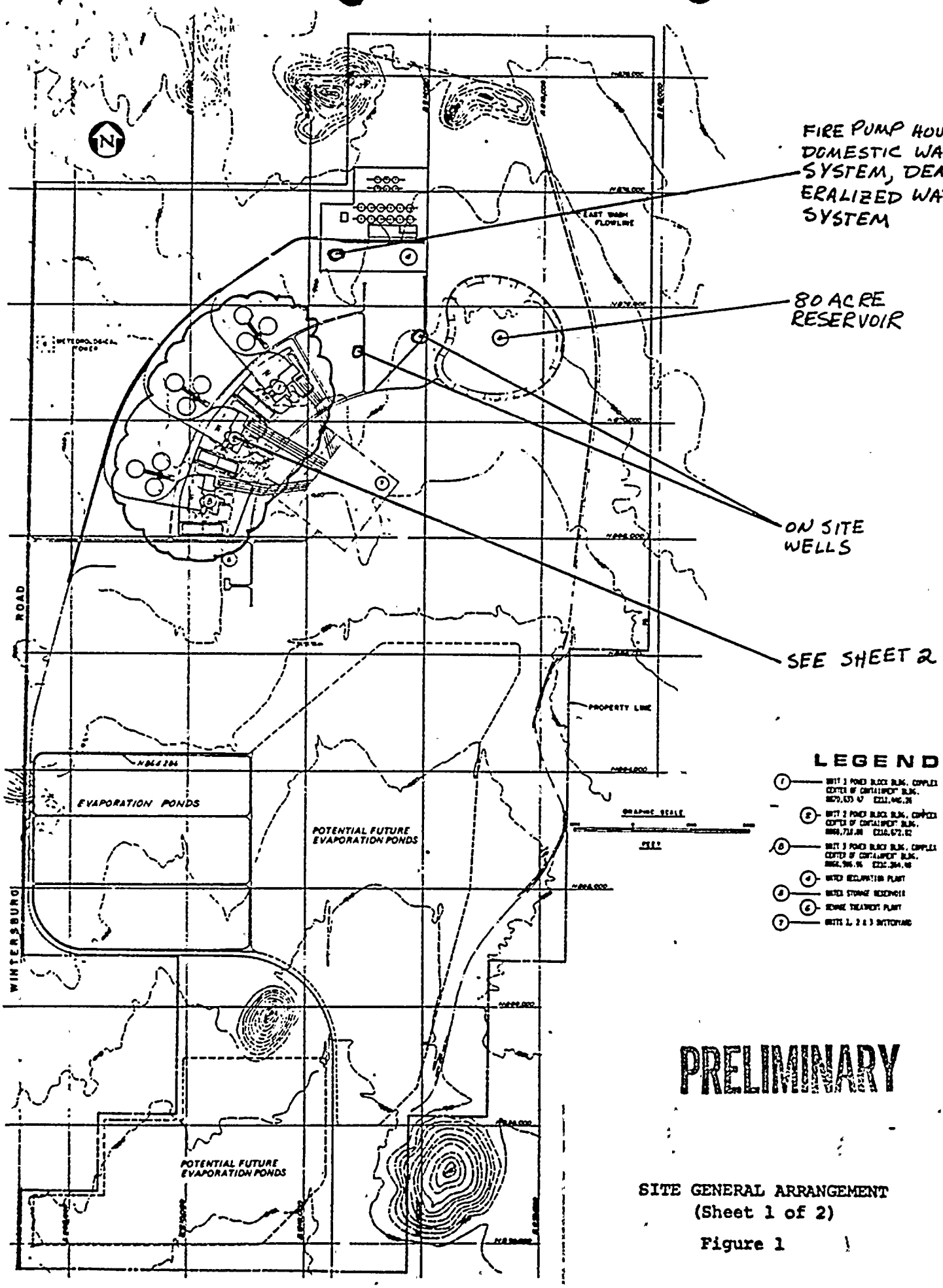
Tornado Missile damage is credible only to the riser and nozzle portion of the spray pond header system. Repairs would consist of cutting and capping sufficient damaged risers and restoring at least 5% of the installed spray nozzles in one pond to operation at 7psig and 53 gpm/nozzle. Cutting, dressing, and installing mechanical plugs in damaged risers is estimated to require a maximum of 2 hours per riser. Cutting, dressing, and installing, including fabrications of a nozzle set (4 nozzles), is estimated to require about 4 hours per riser. Up to five risers could be worked simultaneously without having to augment currently planned manning levels and tools inventories.

NRC QUESTION 5

Commit to provide the necessary procedures for establishing alternate AFW supply in the event of tornado missile damage to the UHS. Also, commit to provide procedures for repairing UHS tornado missile damage.

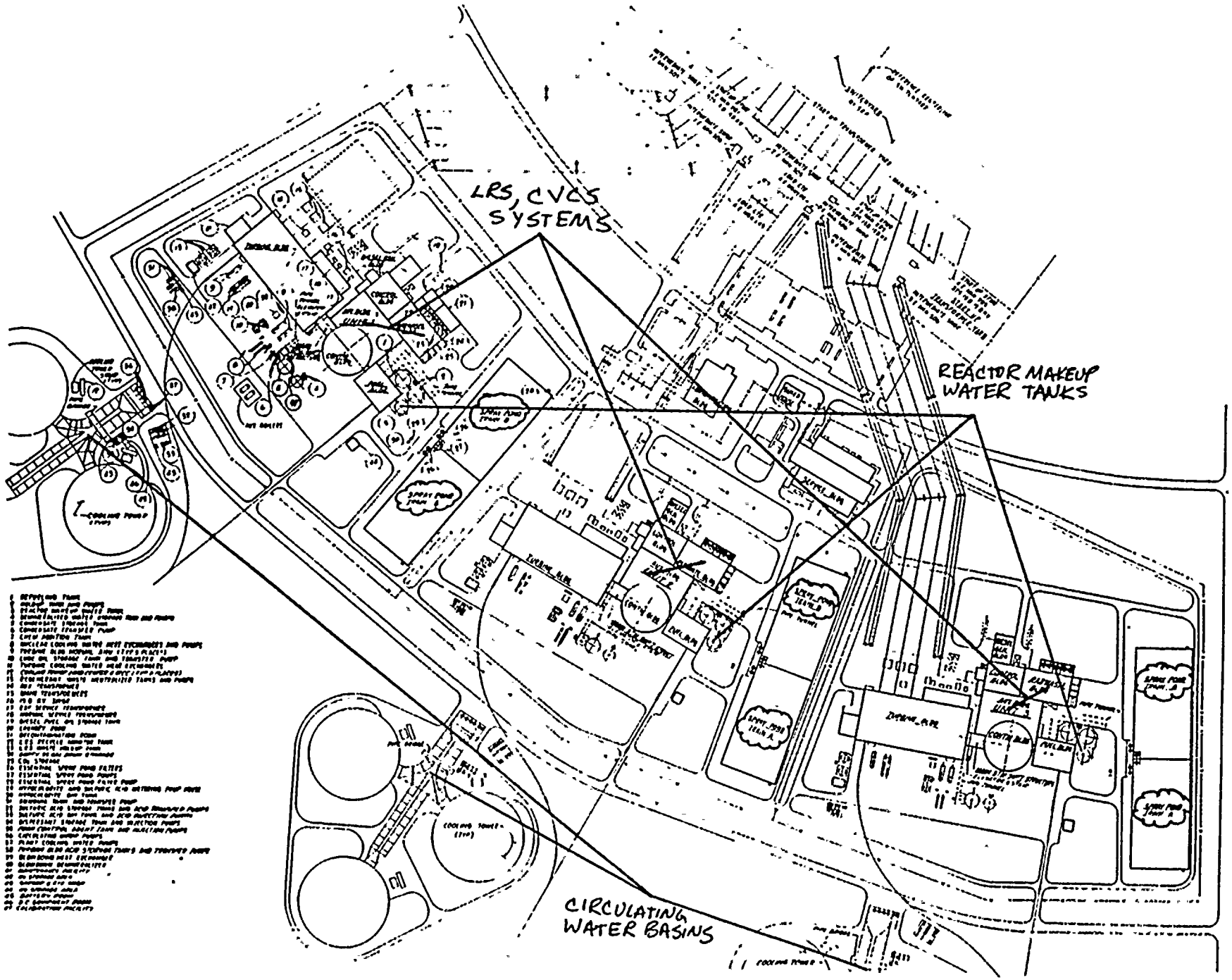
RESPONSE:

APS has provided a discussion of activities based on postulated events having a very low probability of occurance. Because of the conclusions in the evaluation and because NRC has not concluded their review, we believe such a request to be premature.



SITE GENERAL ARRANGEMENT
(Sheet 1 of 2)

Figure 1



PRELIMINARY

(Sheet 2 of 2)
Figure 1

CHANGE