UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JUN 19 1981

MEMORANDUM FOR: Harold R. Denton, Director
Office of Nuclear Reactor Regulation

THRU: Roger J. Mattson, Director
Division of Systems Integration, NRR

FROM: William E. Kreger, Assistant Director
for Radiation Protection, DSI

SUBJECT: UNUSUALLY HIGH OCCUPATIONAL DOSES REPORTED FOR POWER REACTORS OPERATING IN 1980

The purpose of this memorandum is to inform you further regarding some significant increases in total person-rem doses to reactor plant workers during calendar year 1980, relative to prior years.

RAB staff has completed a preliminary summary of the 1980 occupational radiation exposure data, submitted by licensees in accordance with 10 CFR Part 20.407 and R.G. 1.16. Enclosure "A", a C. Hinson to W. Kreger memo of May 28, 1981, summarizes the extent of the observed increases. You have received a copy of Enclosure "A".

Subsequent to our receipt of the data, the staff has had informal telephone conversations with plant radiation protection managers (RPM) at eight of the plants which experienced the largest observed increases (principally BWRs). In these conversations the RPM's have indicated that they feel that about 35% of total plant exposures during 1980 may have resulted from NRC-mandated activities, and that similar increases may be expected at a number of plants at which such NRC-mandated activities have not yet been completed. The activities they identified were seismic hanger inspections and changes, snubber corrections and masonry wall modifications that were directed by bulletins 79-02, 79-14 and 80-11. They also called out feedwater piping clad removal, and other torus and drywell changes.

In contrast to what we were told in the above conversations about how the work came about, James M. Smith, Jr. of General Electric Company, in a phone conversation with me characterized the major additional exposures at BWRs as being due to modification of the Mark I toruses, and replacing certain stainless steel components that showed intergranular stress corrosion cracking with 316 stainless steel. Although I&E bulletins have been issued regarding some of these matters, which would make them appear to be NRC mandated, Mr. Smith felt they were actually G.E. identified deficiencies and fixes. He believes that these special work efforts will result in significant future reduction of collective radiation exposure in those affected plants. He further indicated that the BWR 6's with Mark II containments will not have the problems indicated above, and should be able to operate at about 300 person-rems per year.

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As part of the conversation, the question of crud was discussed. Smith indicated that recirculating pipe dose rates seem to level off at 400 mrem/hr at 6 years or so, rather than continuing to rise indefinitely. He believes there is now enough information on how to control feedwater quality to control a potential continued buildup of crud levels. He stated that much of the dose-causing work discussed above was done at relatively low dose rates, but took many man hours (e.g., Millstone torus and suppression pool work took 42,000 man hours at about 9 mr/hr).

Smith projects that there will be about 2 years of these significant occupational radiation exposure increases at older BWRs but then doses will return to normal (i.e., at about 700 person-rems per year), or better.

Although our quantitative information on activities causing power plant exposures is limited, we have been concerned for some time about NRC-mandated activities that have contributed somewhat to the increased 1980 occupational doses. The process of backfitting safety requirements on operating plants has not necessarily considered competing risks, such as occupational radiation exposure, alongside the benefits associated with NRC-mandated actions. Even in establishing safety requirements at the CP and OL licensing stages, the staff has not had a uniformly effective mechanism for weighing increased safety (benefit) against possible increased exposure (cost) of such safety practices.

Enclosure "B" describes a staff developed risk comparison system which has been applied to requests by licensees for relief from requirements for inservice inspection and inservice testing. Such a system provides guidance for development of mechanisms to be more broadly applicable.

RAB plans to proceed, in conjunction with DL and DST, in considering further development of staff mechanisms to assure that risk-related considerations are taken into account when future NRC-mandated safety actions are contemplated. This staff activity will not take place at the expense of licensing commitments and schedules. However, we believe it to be an appropriate action related to operating reactors, since many of the new requirements were mandated as part of NUREGs 0600 and 0737.

William E. Kreger

William E. Kreger, Assistant Director
for Radiation Protection
Division of Systems Integration

Enclosures:
As Stated

cc: See next page

cc: E. Case
R. Mattson
T. Murley
M. Ernst
D. Collins
R. Alexander
E. Conti
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R. Cunningham
R. Hartfield
B. Brooks
A. Roecklein
J. Joyner, Reg. I
A. Gibson, Reg. II
R. Gregor, Reg. III
G. Brown, Reg. IV
H. Book, Reg. V
C. Hinson
RPS Staff

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MAY 26 1981

MEMORANDUM FOR: William E. Kreger, Assistant Director
for Radiation Protection, DSI

THRU: Douglas M. Collins, Leader
Radiation Protection Section, DSI

FROM: Charles S. Hinson
Radiological Assessment Branch, DSI

SUBJECT: PRELIMINARY LWR EXPOSURE DATA FOR 1980

Attached is a preliminary compilation and analysis of occupational radiation exposures at operating light water cooled nuclear power reactors (LWR's) for the year 1980. This information was derived from reports submitted to the United States Nuclear Regulatory Commission in accordance with Part 20.407 of Title 10, Chapter 1, Code of Federal Regulations (10 CFR Part 20.407) and Regulatory Guide 1.16.

One additional LWR completed a full year of commercial operation for the first time in 1980 (only LWR's that had been in commercial operation for at least one full year as of December 31, 1980, are included in this compilation). This single new operating plant, Hatch II (BWR), increased the number of plants included in this year's compilation to 68. This new unit is indicated in the compilation table by a (N).

The number of operating BWR's increased from 25 to 26 in this year's compilation. The yearly average exposure per reactor for BWP's in 1980 was 1136 person-rems. This represents a 55 percent increase over the 1979 average of 733 person-rems/reactor.

The yearly average exposure per reactor for the 42 operating PWR's in 1980 was 578 person-rems. This represents a 13 percent increase over the 1979 average of 510 person-rems/reactor.

The overall average exposure per reactor for all LWR's increased 33 percent from 593 person-rems in 1979 to 791 person-rems in 1980. The attached exposure compilation table include a breakdown of the person-rems received at each of the LWR's included in the above compilation for 1980. This table lists the exposure figures which were submitted by the licensees in response to the requirements of 10 CFR Part 20.407 and Regulatory Guide 1.16 (R.G. 1.16 data shown in parenthesis). The data quoted above and used in the attached figures is from the 10 CFR Part 20.407 data.

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PLANT NAME	PLANT TYPE	AGE	EXPOSURE 2040? (1976)
Arkansas I	P	6	342 (263)
Beaver Valley I	P	4	552 (496)
Big Rock Point	B	12	354 (360)
Brown's Ferry I, II, III	B	6/5	1026 (1246)
Brunswick I, II	B	5/3	3370 (3164)
Calvert Cliffs I, II	P	5/3	677 (640)
Cook I, II	P	5/2	493 (450)
Cooper Station	B	6	859 (820)
Crystal River III	P	3	625 (598)
Davis Besse I	P	3	154 (279)
Dresden I, II, III	B	20/10/6	2105 (2028)
Duane Arnold	B	5	471 (444)
Farley I	P	3	435 (377)
Fitzpatrick	B	5	2040 (2135)
Ft. Calhoun	P	7	618 (657)
Ginna	P	10	708 (714)
Haddam Neck (Connecticut Yankee)	P	12	1353 (1292)
Hatch I+II (N)	B	5/1	449 (590)
Humboldt Bay	B	17	22 (15)
Indian Point I, II	P	18/7	97, (939)
Indian Point III	P	4	308 ( )
Kewaunee	P	6	165 (146)
La Crosse	B	1	218 (215)
Maine Yankee	P	8	462 (555)
Millstone I	B	9	2158 (2075)
Millstone II	P	5	636 (612)
Monticello	B	9	531 (469)
Nine Mile Point I	B	11	591 (472)
North Anna I	P	2	218 (322)
Oconee I, II, III	P	7/6	1055 (1119)
Oyster Creek	B	11	1722 (1602)
Palisades	P	9	424 (3[illegible]
Peach Bottom II, III	B	6/6	2302 (216[illegible]
Pilgrim	B	6	2176 (217[illegible]
Point Beach I, II	P	10/8	598 (56[illegible]
Prairie Island I, II	P	7/6	353 (32[illegible]
Quad Cities I, II	B	7/7	4838 (4660)
Rancho Seco	P	5	412 (243)
Robinson II	P	9	1852 (1762)
Salem I	P	3	449 (400)
San Onofre I	P	12	2397 (2241)
St. Lucie I	P	4	532 (495)
Surry I, II	P	8/7	3836 (3665)
Three Mile Island I, II	P	6/2	395 (510)
Trojan	P	4	421 (448)
Turkey Point III, IV	P	6/7	1651 (1819)
Vermont Yankee	B	8	1338 (1309)
Yankee Rowe	P	14	213 (179)
Zion I, II	P	7/6	920 (864)
Fort St. Vrain	HTGR	2	3 ( )

Reactor Type	# of Reactors	Total Person-Rems	Avg. Person-Rems Per Reactor
BWR	26	29531	1136
PWR	42	24266	578
LWR	68	53797	791

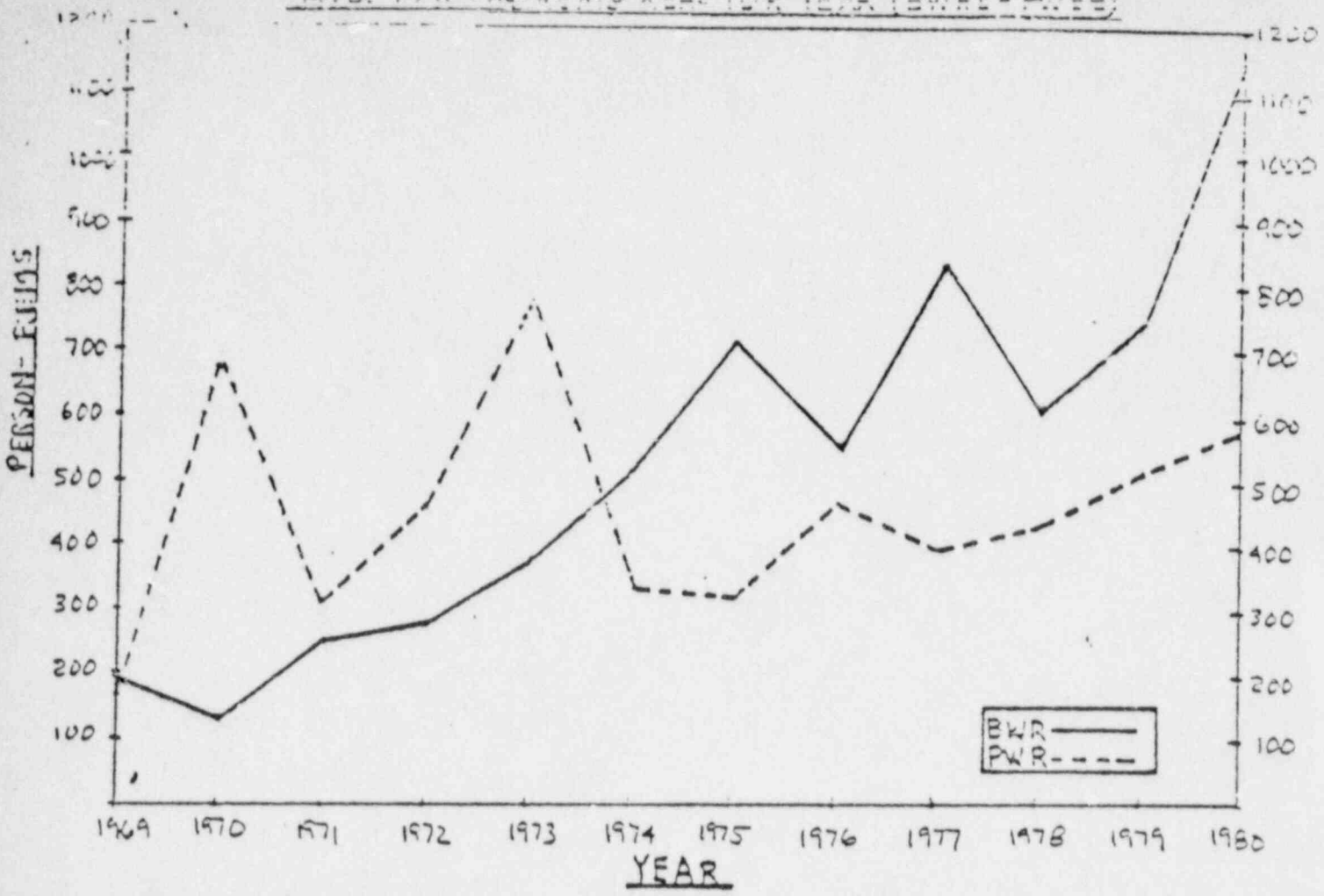
AVG. PERSON-REMS/REACTOR YEAR (BWR's - PWR's)
PERSON-REMS
1200
1100
1000
900
800
700
600
500
400
300
200
100
BWR
PWR
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
YEAR

FIGURE 1

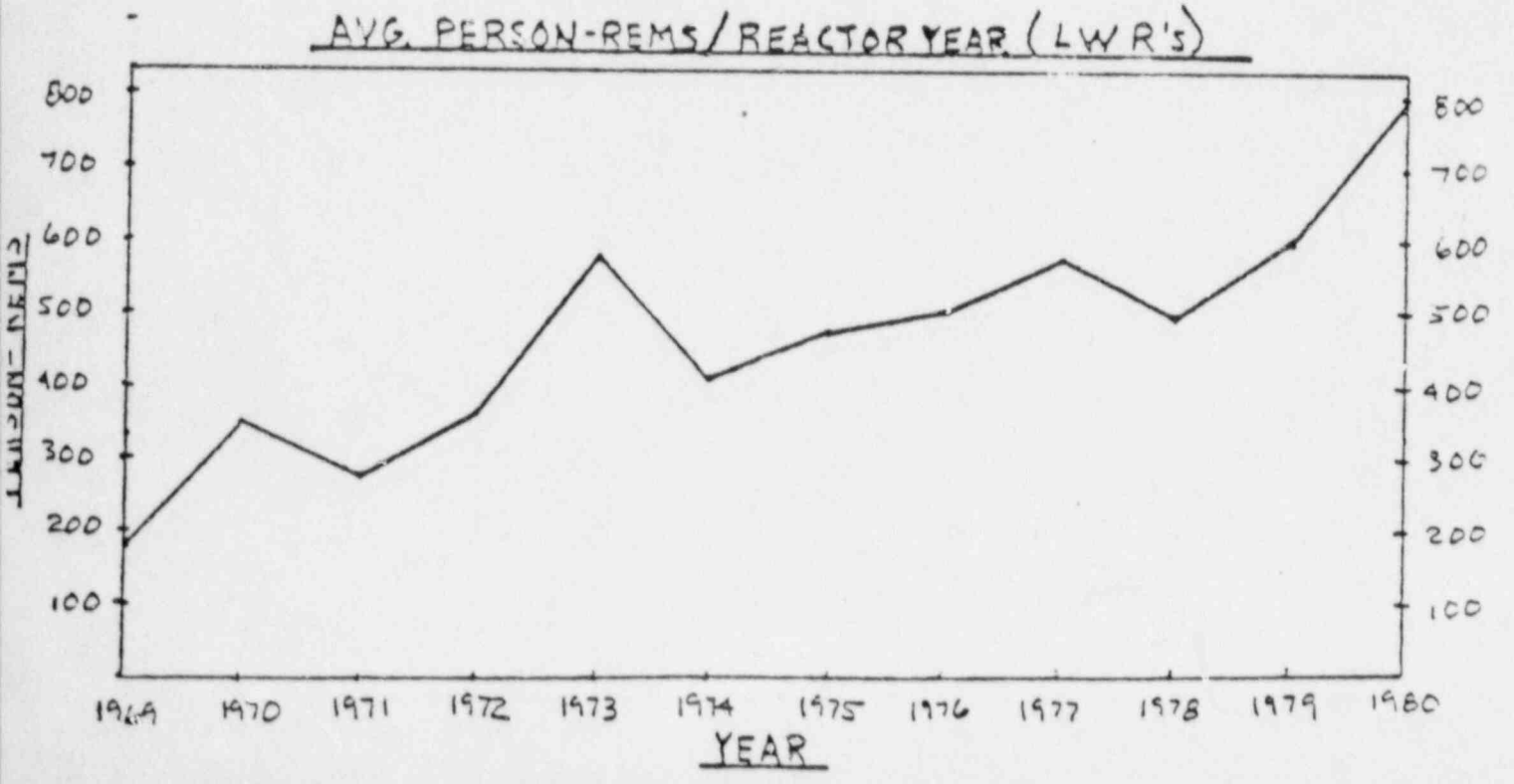
AVG. PERSON-REMS/REACTOR YEAR (LWR's)
PERSON-REMS
800
700
600
500
400
300
200
100
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
YEAR

FIGURE 2

TOTAL NUMBER OF OPERATING COMMERCIAL NUCLEAR PLANTS AND TOTAL RADIATION EXPOSURE RECEIVED AT THESE PLANTS - 1969-1980

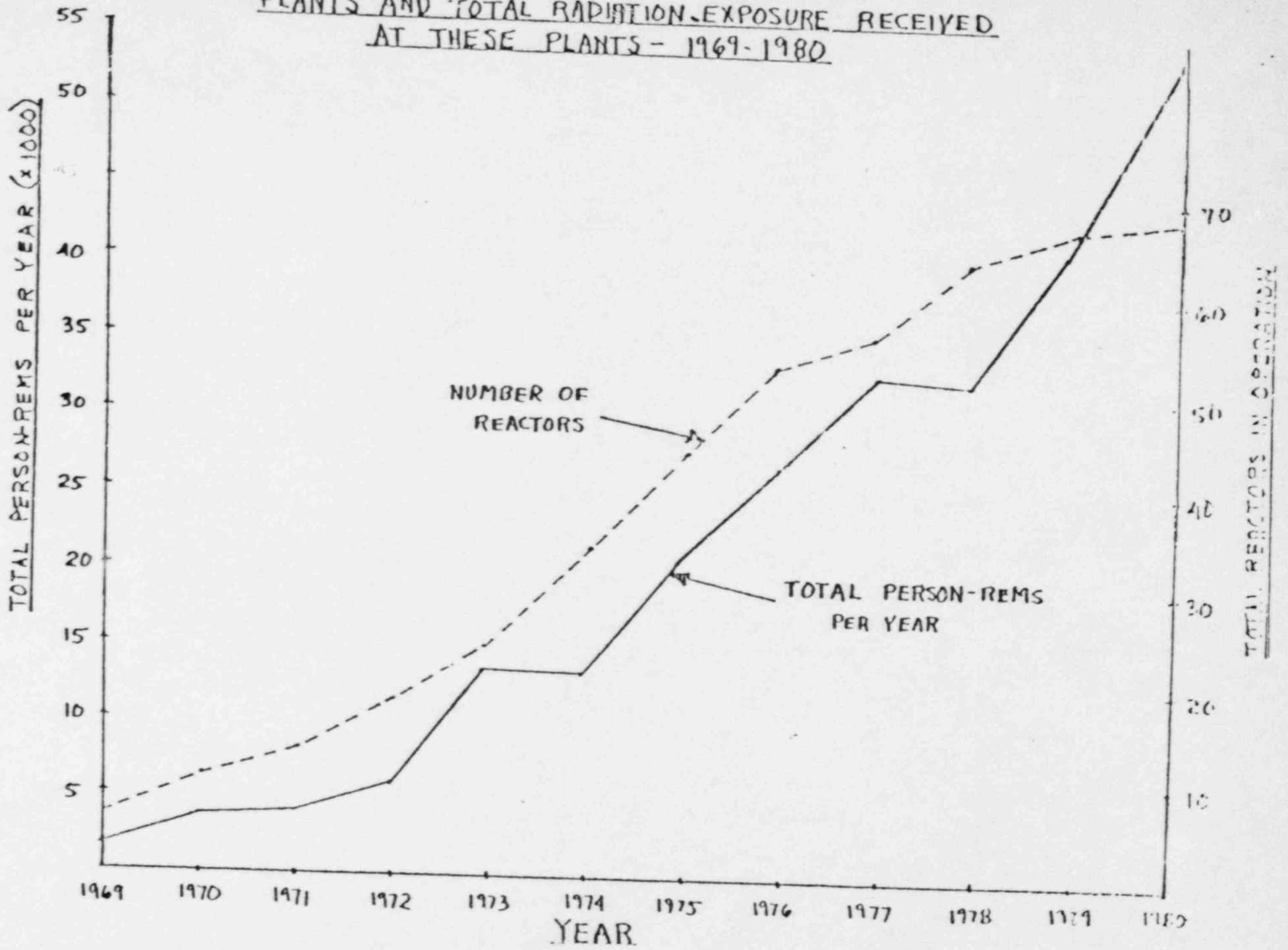

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FIGURE 3a

BWR's PERSON-REM/UNIT 1979-1980

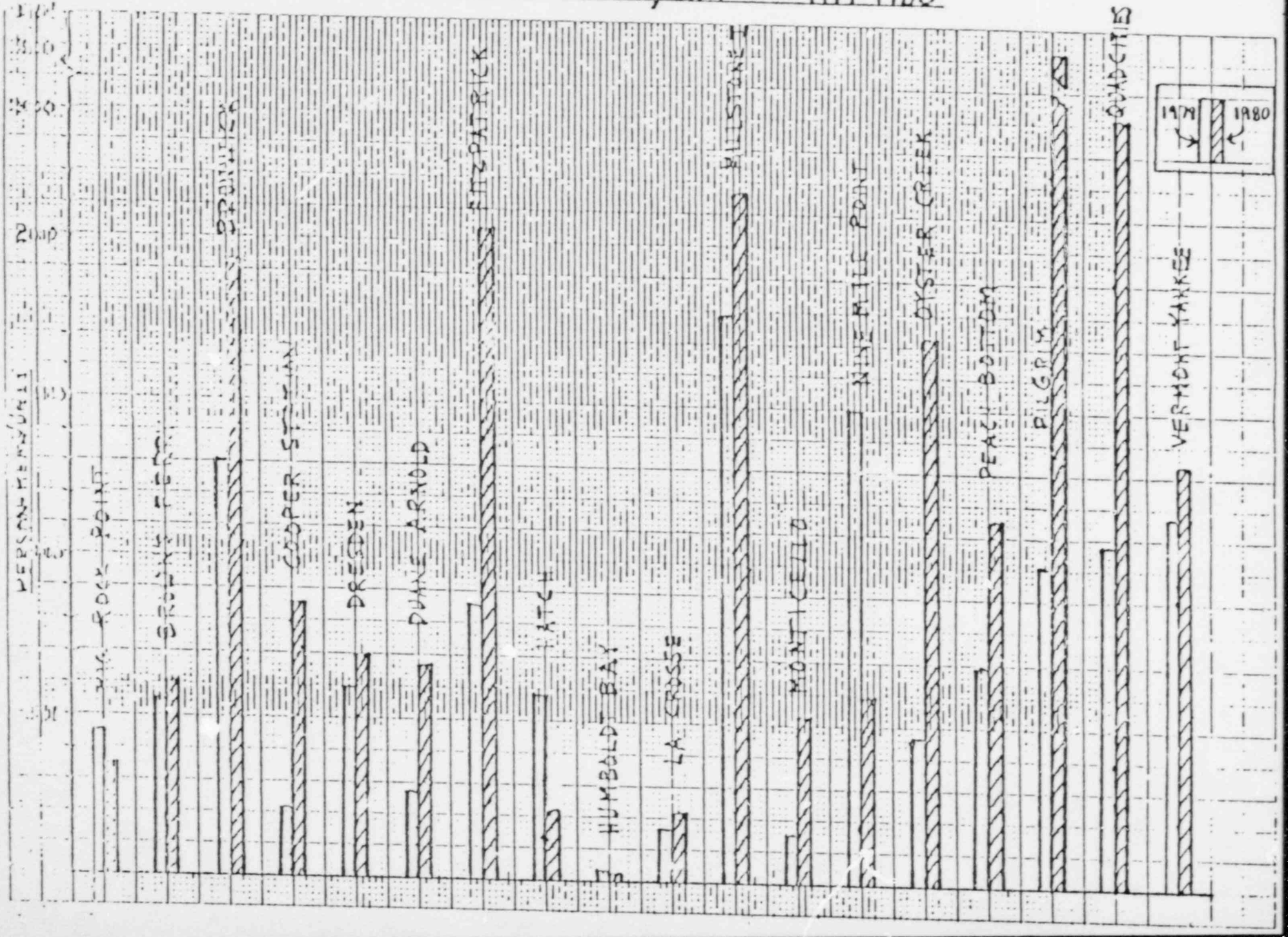

FIGURE 3b

PWR's - PERSON-REMS/UNIT 1979-1980