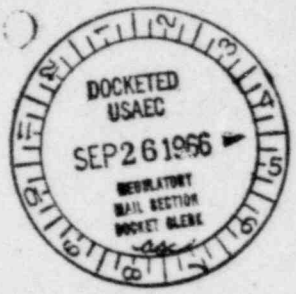

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CONSUMERS POWER COMPANY
PARNALL ROAD OFFICE TWX 517 787-1985
JACKSON MICHIGAN
9-23-66 4-55 PM

TO - DR. PETER A MORRIS' DIRECTOR
DIVISION OF REACTOR LICENSING
UNITED STATES ATOMIC ENERGY COMMISSION

ATTENTION - MR. JAMES SHEA

AS A RESULT OF OUR SEPTEMBER 9' 1966 MEETING WITH MEMBERS OF YOUR STAFF REGARDING OUR REQUEST FOR CHANGES TO THE BIG ROCK POINT TECHNICAL SPECIFICATIONS' DATED JULY 29' 1966' AND FURTHER SUPPORTING INFORMATION TRANSMITTED BY TWX ON AUGUST 16' 1966 AND SEPTEMBER 8' 1966' THE FOLLOWING ADDITIONAL INFORMATION IS SUBMITTED.

1. REACTOR KINETICS FOR GRAVITY ROD DROP AT HOT STANDBY 286 DEG C FROM 10 TO MINUS 6 TIMES RATED POWER -

DELTA ROD	PEAK ENTHALPY' CAL/GM
1.5	221
2.0	305
2.5	366
3.0	420
3.5	475
4.0	530
4.5	585

ROD WORTHS AT THE HIGHER END OF THIS RANGE ARE NOT CONSIDERED CREDIBLE.

2. VESSEL DAMAGE PARAMETERS CALCULATED USING 40 MILLISECOND TIME CONSTANT FOR 400 CAL/GM FUEL AND DECREASING FOR HIGHER ENTHALPIES.

PEAK ENTHALPY' CAL/GM	MAXIMUM VESSEL VERTICAL MOVEMENT' FT	MAXIMUM VESSEL STRAIN' PERCENT
490	0	0
540	0.17	0
590	0.50	1.1

THE POSSIBLE PRIMARY SYSTEM RUPTURE LIMITS ARE 0.5 FEET VESSEL MOVEMENT AND 13 PERCENT VESSEL STRAIN.

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3. WEIGHT FUEL AT OR ABOVE INDICATED ENTHALPY FOR VARIOUS PEAK ENTHALPIES IS AS FOLLOWS -

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PEAK ENTHALPY CAL/GM	ABOVE 425 CAL/GM /PROMPT RUPTURE/	ABOVE 280 CAL/GM /FULLY MOLTEN/	ABOVE 220 CAL/GM /START MELTING/
450	3 LB	460 LB	1080 LB
490	30	660	1450
540	100	750	1810
590	210	1130	2480

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4. ALL THE ABOVE RESULTS ARE FOR HOT STANDBY. ALTHOUGH THE COLD CONDITION ACCIDENT RESULTS IN A GREATER PEAK ENTHALPY' THE AVAILABILITY OF THE LARGE COLD WATER HEAT SINK REDUCES THE SEVERITY TO LESS THAN THAT OF THE HOT STANDBY CASE.

5. THE FLUX DEPRESSION IN THE CENTER OF A BWR FUEL ROD IS 5 TO 10 PERCENT MINIMUM/AVERAGE AS COMPARED TO ABOUT A FACTOR OF 4 FOR TREAT 15 PERCENT ENRICHED RODS' AS STATED BY ANL. IN A BWR TRANSIENT OF 425 CAL/GM' THE TEMPERATURE PROFILE ACROSS THE UO2 IS ESSENTIALLY UNIFORM UP TO THE TIME OF FAILURE. THEREFORE' ALL THE UO2 IS AT THE SAME CONDITION - MOLTEN AND PARTIALLY VAPORIZED. TECHNICAL JUDGMENT INDICATES THAT THE POWDER HAS AGGLOMERATED WHEN THE FUEL BECOMES FULLY MOLTEN AT ABOUT 280 CAL/GM.

6. THE TWO THIN CLAD FUEL BUNDLES HAVE A PROMPT RUPTURE THRESHOLD ABOUT 1 PERCENT LOWER THAN THE STANDARD BUNDLES. THIS IS NEGLIBLE IN ITS EFFECTS.

7. REGARDING THE TREAT POWDER FUEL TESTS -

A - PRESSURE TRACES DO NOT INDICATE PREMATURE UO2 EXPULSION FROM GAS-FILLED POWDER FUEL' AND

B - ANALYSIS SHOWN ABOVE IS BASED ON HEAT TRANSFER TIME CONSTANT CONSISTANT WITH OBSERVED PARTICLE SIZE AND CAPSULE PRESSURE RISE RATE FOR POWDER FUEL.

THE ABOVE CALCULATIONS ARE QUITE CONSERVATIVE SINCE NO CREDIT HAS BEEN TAKEN FOR THE ENERGY ABSORPTION WITHIN THE THERMAL SHIELD AND CORE STRUCTURE OR FOR THE REACTOR VESSEL SUPPORTS. IT IS OUR OPINION THAT A DROP OF THE ROD OF HIGHEST POSSIBLE WORTH WOULD NOT RESULT IN RUPTURE OF THE PRIMARY SYSTEM' EVEN ASSUMING THAT THE PRESENT TREAT EXPERIMENT DATA ON POWDER FUEL IS COMPLETELY VALID FOR A POWER REACTOR.

R. L. MAUETER
ASSISTANT ELECTRIC PRODUCTION SUPT - NUCLEAR

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END DH
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