



Consumers  
Power  
Company

James W Cook

Vice President - Projects, Engineering  
and Construction

General Offices: 1945 West Parnall Road, Jackson, MI 49201 • (517) 788-0453

July 2, 1982

RFG 0782-1

Harold R Denton, Director  
Office of Nuclear Reactor Regulation  
Division of Licensing  
US Nuclear Regulatory Commission  
Washington, DC 20555

MIDLAND PROJECT  
MIDLAND DOCKET NOS 50-329, 50-330  
ADDITIONAL RESPONSE TO DES-OL COMMENTS  
FILE: 0505.5 SERIAL: 17928

In response to the May 6 letter from Elinor G Adensam, Chief Licensing Branch Number 4 and other subsequent transmittals, attached are three signed originals and 40 additional copies of Consumers Power Company's responses on additional comments received by the NRC on the Draft Environmental Statement (DES-OL). These responses address the comments in the five comment letters transmitted to the Company by the NRC.

Thank you for the opportunity to respond to these comment letters.

R A Wells, Executive Manager

For: J W Cook

RAW/RFG/fms

CC RJCook, Midland Resident Inspector  
RHernan, US NRC  
DBMiller, Midland Construction (3)  
RWHuston, Washington

C002<sup>3</sup>  
3/40 on  
shelf

oc0782-1083a131

8207070214 820702  
PDR ADOCK 05000329  
D PDR

In the Matter of )  
CONSUMERS POWER COMPANY )  
Application for Reactor )  
Construction Permit and )  
Operating License )

Midland Plant Units 1 and 2  
Docket No 50-329  
Docket No 50-330

APPLICANT'S RESPONSE (JULY 2, 1982)

TO

5 DES-OL COMMENT LETTERS

## TABLE OF CONTENTS

	<u>Page</u>
21. MARY SINCLAIR LETTER (4/17/82)	
A. Cost-Benefit Analysis	
(1) Construction Costs . . . . .	1
(2) Economic Impact on State . . . . .	2
(3) Attorney General Study . . . . .	4
(4) Load Growth Projections . . . . .	6
(5) Operating Assumptions . . . . .	8
(6) Net Utility Plant . . . . .	9
B. Cost Trends . . . . .	10
C. Alternative Power Sources for Dow . . . . .	11
D. Property Values . . . . .	12
E. Health Care Costs . . . . .	13
F. Cogeneration . . . . .	14
G. Groundwater Quality . . . . .	16
H. Cooling Pond Fog/Ice . . . . .	17
I. Fog Interaction With Routine Rad Releases . . . . .	19
J. Rad Releases and Meterological Inversions	
(1) Accident Rad Releases . . . . .	20
(2) Routine Rad Releases . . . . .	22
K. Chemical/Radiological Synergerisms	
(1) Johns Hopkins University . . . . .	23
(2) Dr Irwin Oster/Dr C Heupner . . . . .	25
(3) West German Law Suit . . . . .	27
L. Radiation Health Effects	
(1) Susceptible Population . . . . .	28
(2) NRC Radiation Standards . . . . .	29
(3) BEIR III . . . . .	30
M. Effects of Tritium Discharge	
(1) Dr Theodore Rizki . . . . .	32
(2) Dr Charles Huver . . . . .	34
N. Effects of Plutonium Discharges . . . . .	37
O. Bioaccumulation of Radioactivity	
(1) Physicians for Social Responsibility . . . . .	39
(2) Saginaw County Medical Society . . . . .	41
P. Chemical/Rad Releases To/From Pond . . . . .	43
Q. Uranium Fuel Cycle/Radon 222 Health Consequences . . . . .	45
R. Radioactive Waste Disposal . . . . .	47
S. Onsite Waste Storage . . . . .	48
T. Radwaste Transportation . . . . .	49
22. BARBARA STAMIRIS LETTER (no date)	
A. Soils Related Safety Concerns . . . . .	51
B. Economic	
(1) Construction Cost . . . . .	52
(2) Capital Costs of Alternatives . . . . .	53
(3) Decommissioning Costs . . . . .	54
(4) Applicant's Risk/Sunk Costs . . . . .	55

	<u>Page</u>
C. Probable Maximum Flood	
(1) Dike Design/Construction . . . . .	57
(2) Upstream Dam Failure . . . . .	58
D. Groundwater . . . . .	59
E. Area Water Requirements . . . . .	60
F. Pipe Corrosion Near BWST . . . . .	64
G. Seepage From Dow Pond . . . . .	65
H. Design/Construction - Consideration of Existing Safety Features . . . . .	66
I. Reactor Vessel Embrittlement . . . . .	70
J. B&W System Sensitivity . . . . .	71
K. Plant Siting	
(1) Population Distance Requirements . . . . .	72
(2) Reactor Location/Compensatory Measures . . . . .	73
L. NEPA Considerations	
(1) Attorney General Study . . . . .	74
(2) MERB Comments . . . . .	75
23. DEBRA K STEMPEK (4/2/82)	
A. Radwaste Disposal	
(1) Generic Status . . . . .	77
(2) Heat Generation . . . . .	78
(3) Commercial/Military Wastes . . . . .	79
(4) State Bans . . . . .	80
(5) Uranium Fuel Cycle . . . . .	81
(6) Decommissioning . . . . .	82
(7) Amount . . . . .	83
24. ANDREA K WILSON (4/12/82)	
A. Chemical Plant Synergisms . . . . .	85
B. DES Dose Calculations . . . . .	86
C. Preoperational/Operational Rad Monitoring . . . . .	87
25. GOVERNOR, STATE OF MICHIGAN: MERB (5/11/82)	
A. Water Quality Impacts . . . . .	89
B. Waterfowl Impacts . . . . .	91
C. Fogging Impacts . . . . .	93
D. Elimination of Cooling Tower . . . . .	94
E. Temperatures in Thermal Plume . . . . .	96
F. Evacuation of Dow Employees . . . . .	97
G. Additional Thermal Plume Analyses . . . . .	98
H. Exclusion Area . . . . .	99
I. Accident Rad Exposure . . . . .	100



MARY SINCLAIR (4/17/82)

21.A(1) COMMENT: COST-BENEFIT ANALYSIS - CONSTRUCTION COSTS

- 1) Excluding construction costs of these plants in the cost-benefit analysis.  
(DEIS 2-2)

Cost-Benefit Analysis-Omission of Construction Costs

One example of the omission of an important factor in the cost-benefit analysis for these nuclear plants is its treatment of construction costs. The construction costs, exacerbated as they have been by a series of major quality control errors by Consumers Power Co. and Bechtel, have been eliminated from consideration in the cost-benefit analysis (DEIS 2-2) in order to provide a favorable and totally fictitious picture of benefits. Yet it is known, and the data exist, to show that the extraordinary construction costs of the Midland nuclear plant will have a dramatic adverse impact on industry in this state, as well as Consumers' Power Co. ratepayers. The nuclear plants can not be placed in the rate base until they are completed, and so their costs must be a part of future "real world" considerations.

Since that time the new cost estimate has increased to \$3.4 billion. The full cost of the extensive remedial work for the soils problem now underway is as yet not known and could make this figure much higher.

The soil settlement problem has become a significant additional cost which must be added to the calculations of the AG-MCL study to further skew the cost-benefit analysis against these nuclear plants. It has already been identified that the soil settlement problem is a major and recent quality control problem--one out of a long and alarming history of such problems--that is a part of the record of this plant's construction. (Memo to H.D. Thornburg, from James E. Keppler, Director, Region III. Midland Summary Report, February 15, 1979)

Failure to consider these costs in the cost-benefit analysis of the DEIS is gross negligence.

RESPONSE

This comment was basically responded to in the Consumers Power Company letter to the Nuclear Regulatory Commission (Serial 17231, May 21, 1982), D Hebert, comment 6.E. The operating license DES is not the proper forum for arguing the prudence of the Company's investment in the Midland facility. The NRC has, in the DES-OL, carried out its regulatory responsibility under NEPA by considering the environmental costs of operation against reasonable alternatives, including non-operation.

mi0582-1018a131

MARY SINCLAIR (4/17/82)

21.A(2) COMMENT: COST-BENEFIT ANALYSIS - ECONOMIC IMPACT ON STATE

- 2) Failure to evaluate the economic impact on the major industries of Michigan.

. . . .

When the cost increase of these plants to \$3.1 billion was announced early in 1980, a General Motors' spokesman said the potential consequences for industry in this state are "horrendous". It was estimated then that electric rates would increase by one-third. (Wall Street Journal, March 4, 1980)

. . . .

One major industry, the Goodyear Tire and Rubber Co. of Jackson, Michigan, has already threatened to leave the State of Michigan because the costs of electrical power here are 28% higher than in other neighboring states. (Letter, Attorney-General Frank Kelley, November, 13, 1981)

. . . .

The impact on rates of placing an increase of more than 100% in the rate base of net plant utility, if Midland goes into commercial operation, will be staggering.

RESPONSE

These comments were basically responded to in the Consumers Power Company letter to the Nuclear Regulatory Commission (Serial 17231, May 21, 1982), D Hebert, comments 6.G and 6.H. Rates will increase, of course, when the Midland Plant goes into commercial operation. This happens any time a new generating unit is added to the Company's system. The actual rate increase will be set by the MPSC after full public hearings and consideration of Plant costs. Although customers will pay for the added benefits of the Plant through rate increases, these increases will not be "staggering" as suggested by the comment. Additionally, the use of nuclear fuel as opposed to coal will offer a partial offset to the rate increase necessitated by adding the Midland capital costs to the Company's rate base.

The estimated rate increase information provided in response to comment 6.G was based on 1981 studies by the Company. Recent studies confirm that after adding both Midland Units to the Company's rate base, the increased cost to a residential customer using 500 kWh per month will range from \$6.50-\$7.50/month (1981 dollars). This estimate must be considered in the face of several uncertainties as to the ultimate rate treatment that will be exercised by the Michigan Public Service Commission (MPSC) as well as future escalation rates and fuel costs.

As far as the impact on industry, the previous response to comment 6.H indicates that in an analysis of a typical January 1982 bill, completed by the

## 21.A(2) (Continued)

Edison Electric Institute, the average industrial customer on our system of 1,000 kW and 400,000 kWh per month paid only 2-1/2% more than the national average. Another study completed by the Edison Electric Institute computes energy costs as a percentage of the value of the product. This study shows that energy costs only comprise 0.4 to 3.0% of the value of the product, depending upon the industry, and on average only represent 1.2%. Since these costs represent such a small proportion of the value of the product, it is not likely that they would be the determining factor in causing industry to move from the state when balanced against the value of a strong reliable energy supply. Additionally, that response indicates energy cost is only one of eight important parameters that an industry evaluates in the location of plant facilities. In fact, a study by Roger W Schmenner, Associate Professor, Graduate School of Business Administration, Duke University, dated October 1980 regarding The Location Decisions of Large Multi-Plant Companies does not identify utility services as a controlling concern of companies in identifying, regions, states and other metropolitan areas as potential acceptable plant sites.

MARY SINCLAIR (4/17/82)

21.A(3) COMMENT: COST-BENEFIT ANALYSIS - ATTORNEY GENERAL STUDY

In an effort to assess the effect of these runaway costs on Michigan's economy, the Michigan Attorney-General's office and the Michigan Citizens' Lobby (AG-MCL) developed an indepth analysis of the costs of the Midland nuclear plants as part of Case No. 6360 in 1981 before the Michigan Public Service Commission in which Consumers Power Co. was seeking approval of securities to continue construction at Midland, as well as the lifeline rate case U-6490. That study showed that Midland power would cost about 14¢/kwh in 1984 delivered to retail customers, or about 2 1/2 times the average delivered cost of Consumers Power Co. electricity at present.

This indepth study contained in the Brief of AG-MCL concludes that it would be less expensive to ratepayers by \$484 to \$1,135 million to stop Midland construction, build equivalent coal units, and even return the present sunk cost of Midland back to the Company once all addition projected costs to completion, including decommissioning are considered for this facility.\*

---

\*Consumers Power Co. Campbell #3 770MW coal-fired plant, built from 1974-1980, cost \$600 million. Cost for Midland is \$2,000 per kwh, --cost of Campbell #3, \$800 per kwh.

RESPONSE

The study referred to in this comment and contained in the Brief of the Attorney General - Michigan Citizens' Lobby was performed by Mr Jatinder Kumar and Dr William Belmont of Associated Regulatory Consultants, Inc, Rockville, Maryland and Dr Richard A Rosen of Energy Systems Research Group, Inc, Boston, Mass. This study was discredited by the Consumers Power Company during cross-examination at the Michigan Public Service Commission hearing and found to have little probative value by the presiding Administrative Law Judge (ALJ).

In the ALJ's Proposal for Decision (PFD),<sup>(1)</sup> he found that Mr Kumar's estimated capital cost for the Midland Units should be rejected. He stated that Mr Kumar lacked the necessary or required qualifications to conduct an independent estimate or calculation of Midland capital costs. Further, the ALJ found that the Intervenor's case, which compared the cost effectiveness of Midland to the alternative coal-fired unit, did not treat Midland sunk costs uniformly. The Intervenor's case included Midland sunk costs in the Midland alternative but excluded Midland sunk costs in whole or in part in the coal alternative. Such treatment when applied to a comparison of the discounted streams of required revenues, distorted the resulting differences and constituted an improper measure of cost effectiveness. The ALJ found that sunk costs should be treated consistently; either ignored in both the Midland and coal cases or included in both cases (PFD p 41-42). It was further stated

## 21.A(3) (Continued)

that in his study Dr Rosen terminated the analysis of cost effectiveness of Midland in 1995, and that the premature truncating of the analysis resulted in a substantial bias against the Midland Plant. The ALJ concluded that, "Intervenors' cost-effectiveness study, if only corrected for errors and treatment of sunk costs, load growth, and appropriate time period of study, would show an investment of \$3.5 billion in Midland would be more cost effective than constructing two equivalent coal-fired plants." (PFD, p 43)

## REFERENCE

1. Judge Robert L Shanklind, "Proposal for Decision", Case U-6360, 5/21/81.

MARY SINCLAIR (4/17/82)

21.A(4) COMMENT: COST-BENEFIT ANALYSIS - LOAD GROWTH PROJECTIONS

The study assumed that Consumers Power Co. was correct in predicting 3% annual growth. The savings to ratepayers shown in the AG-MCL study would be even larger if lower load growth rates are assumed. In a very recent study the consultants, the Energy System Research Group of Boston, projected Consumers Power Co. long-term growth at about 1-1 1/2% annually. The NRC has a legal obligation to consider these load forecasts by a state office.

The U.S. NRC Practice and Procedure Digest---Supplement 1 to Digest No. 2---NUREG 0386 (Feb., 1980) states that "considerable weight should be accorded the electrical demand forecast of the state's utilities commission that is responsible by law for providing current analysis of probable electrical demand growth and which has conducted public hearings on the subject."

"A party may have the opportunity to challenge the analysis of such commissions. Nevertheless, where the evidence does not show such analysis is seriously defective or rests on a fatally flawed foundation, no abdication of NRC responsibilities under NEPA results from according conclusive effect to such a forecast." Carolina Power and Light, (Shearon Harris Nuclear Power Plant, Units 1-4) ALAB-490, 8 NRC 234, 240-41 (1978).

RESPONSE

In making the aforementioned AG-MCL study, The Energy Research Group assumed annual growth rates of 0% and 1.5% as well as the 3% annual growth rate cited in the comment and stated that 1.5% was the probable case.

The commenter also implies that the testimony of the Attorney General and of other Intervenor before the MPSC should be given great weight by the NRC. It is readily apparent that the commenter has confused the discredited testimony of a party to the MPSC rate proceedings with the decision of the MPSC. Neither the Attorney General of the State of Michigan nor the Michigan Citizen's Lobby are either "the state's utility commission" or "responsible by law for providing current analysis of probable electrical demand growth," thus their results are not to be accorded preferential weight. The active advocacy of these parties in this matter reinforces this conclusion. In fact, the MPSC specifically rejected the study provided by the Attorney General's office and other Intervenor.

Carolina Power and Light, (Shearon Harris Nuclear Power Plant, Units 1-4), ALAB 490, held that the NRC, if it wishes, may accord great weight to a decision of a state public utility commission on issues properly before that commission, not that the NRC must give great weight to such decisions. In this instance, were the NRC to give weight to the decision of the MPSC, the NRC would reject the arguments presented in this comment.

In any event consideration of the need for power or alternative energy supplies at the Operating License State is precluded by recent Amendments to 10 CFR 51, as noted in response to the B Stamaris comment, 22.B(2). As a

21.A(4) (Continued)

matter of law, the Final Environmental Statement of the NRC need not and must not consider such issues. The comments on this subject are, therefore, not relevant to the matter at hand.



MARY SINCLAIR (4/17/82)

21.A(5) COMMENT: COST-BENEFIT ANALYSIS - OPERATING ASSUMPTIONS

Fairly optimistic operating conditions were assumed in the AG-MCL study. However, if the Midland nuclear plants (1) operated as poorly as Palisades (also built by Bechtel), or (2) should it shutdown as Three Mile Island has, or (3) should it not run 34 years as assumed in the analysis (no nuclear plant has), but only 15-20 years, or (4) should there be high interim retirement of the plants' components because of metal fatigue from radioactivity, these plants would be an unbearable disaster financially, according to the study.

RESPONSE

As noted in the Company's response to the M Sinclair comments, 21.A(3) and 21.A(4), the Administrative Law Judge noted many analytical errors in the AG-MCL study, and the Michigan Public Service Commission rejected the study. Reckless speculation by the commenter that improbable events will result in "an unbearable disaster financially" are unfounded. In addition, the typical nuclear unit ran at 66% capacity factor in 1981, better than assumed in the study, as noted in the Consumers response to the D Hebert comment, 6.D.

Finally, this comment has no relevance to the environmental decision facing the NRC -- whether or not to permit operation of the Midland Plant. If anything, the comment supports a decision to license Plant operation by implying that great economic waste would result from anything which keeps the Plant from operating.



MARY SINCLAIR (4/17/82)

21.A(6) COMMENT: COST-BENEFIT ANALYSIS - NET UTILITY PLANT

The Midland nuclear plant cost is larger than the whole existing net utility plant of Consumers Power Co. While these plants will increase net utility plant--which includes transmission and distribution--by over 100%, they will only increase net system generating capability by 19%.

RESPONSE

The commenter makes the error of comparing the cost of new plants, completed in 1984-85, with the cost of old plants, completed from the 1950's to 1980. Obviously the cost of the Midland Plant is higher today simply because of the increase due to inflation. If the older plants were built in the same time period and regulatory and financial climate as the Midland Plant, their costs would have been much higher and the net utility plant cost would be higher.

MARY SINCLAIR (4/17/82)

21.B COMMENT: COST TRENDS

Dr. Richard Rosen, expert witness and physicist, determined that the trend of cost over-runs is almost without comparison at Midland and that they relate quite specifically to the nature of Consumers Power Co.'s management of the project.

RESPONSE

At the Michigan Public Service Commission hearing, Dr Rosen did not address Consumers' management of the Midland Project. His area of expertise does not qualify him to be considered an expert on this subject. The Company's response to the M Sinclair comment, 21.A(3) points out one of the errors Dr Rosen made in a cost-effectiveness analysis.

MARY SINCLAIR (4/17/82)

21.C COMMENT: ALTERNATIVE POWER SOURCES FOR DOW

As for the need for steam and power for Dow, that Company has already stated that they plan to build a power plant using their newly developed coal gasification process if the Midland nuclear plants don't come on line according to their contract with Consumers Power Co.

This alternative power source for the needs of The Dow Chemical Company would meet the NEPA considerations which state that unless a "proposed nuclear unit has environmental disadvantages when compared to alternatives, differences in financial costs are of little concern." (Ibid, VI-Gen. Matters - NEPA 12.2.6) Public Service Co. of Oklahoma et al.) (Black Fox Station Units 1 and 2, LBP, 78-26 8 NRC 102, 161 1978) Coal gasification power plants have definite environmental advantages over nuclear plants, especially in a populated area.

RESPONSE

Dow has not discussed with Consumers, nor to Consumers knowledge do they have, any alternate plans other than their present plan for process steam from Consumers Midland Generating Plant and electricity from Consumers state-wide grid. The present Dow South Side Power Plant, burning low sulfur coal, will be used as backup. Dow has not shared any information about "their newly developed coal gasification process" with Consumers if they indeed have such a process.

The most promising coal gasification program in the United States at this time (June 1982) is currently under construction in California with test operation scheduled from 1985 through 1991 after which "commercialization" of coal gasification will probably be feasible.<sup>(1)</sup> Regarding the comment that "coal gasification power plants have definite environmental advantages over nuclear plants" it should be noted that a 250 MMcf/day coal gasification plant (about twice the equivalent steam design capacity for Dow's process steam) would contribute over 500,000 tons of solid waste per year to the environment in addition to significant amounts of SO<sub>2</sub>, NO<sub>x</sub> and particulates.<sup>(2)</sup>

REFERENCES

1. Henry S Jakuc, "Cool Water Cool Gasification Program, A Key Link to Commercialization," in Electric Forum, Volume 7, Number 2, 1981; pp 5-13.
2. "How to Use Coal: Gas Judged Superior All Round to Electricity," in The Energy Daily, Llewellyn King (ed), May 4, 1977; p 3.

MARY SINCLAIR (4/17/82)

21.D COMMENT: PROPERTY VALUES

- 3) Omitting the loss in property values of homes and farmland in the area in the cost-benefit analysis.

Cost-Benefit Analysis-Omission of Loss in Property Values

Distance and shielding have always been key factors in considering the safety of nuclear plants. The site of the Midland nuclear plants as part of the City of Midland, and in the middle of a populated area, has eliminated distance as a safety factor. The DEIS admits that there will be impacts on area farmlands from birds attracted to the pond and from fogging. These factors diminish the desirability of homes and agricultural land in the vicinity of the nuclear plant, with the result of a drop in their salable value. (Impact of the Nuclear Industry on Real Estate Values, James L. Terry, University of Michigan, Nov., 1976).

RESPONSE

Consumers Power Company contacted the University of Michigan Graduate Library in May 1982 in an effort to obtain the reference cited in the comment. The U of M Library does not have a copy of the document or any indication of its existence. This comment basically was addressed in a Consumers Power Company letter to the Nuclear Regulatory Commission (Serial 17231, May 21, 1982), V Castellanos, comment 8.F. Our response noted that an extensive 1978 study report for the NRC demonstrated that residential property values are not negatively impacted by nuclear power plants. The present commenter's identified impacts of fogging and occasional crop losses to waterfowl will probably have a negligible net impact on the value of agricultural land, and thus the NRC Staff was correct in not identifying this as a significant impact.

MARY SINCLAIR (4/17/82)

21.E COMMENT: HEALTH CARE COSTS

- 4) Omitting the health care costs now and for future generations in the cost-benefit analysis.

Cost-Benefit Analysis-Omission of Health Care Costs

Another significant omission from the cost-benefit analysis was that of health care costs, both somatic and genetic, that will be an inevitable result of the operation of these plants.

Dr. Joshua Lederberg, a Nobel Laureate geneticist, who testified before a Congressional Committee (July, 1970) on these costs, gave a special warning on the burden of genetic disease caused by radiation. He said that over a period of generations the health costs of the additional mutations caused by routine radiation releases from U.S. nuclear facilities would be about \$10 billion a year. (Report on Congressional Testimony, Washington Post, July 19, 1970)

Some of that cost must be anticipated by the people of this area and their future generations as a result of the operation of these plants and should have been included in the DEIS.

RESPONSE

Based on Table IV-2 of the BEIR III Report<sup>(1)</sup> and associated text, an average dose of less than 1 millirem per year to individuals residing within 50 miles of the Midland Plant would cause an increase in normal mutation rates of only 0.003% to 0.03%. Similar to the normal mutations, the changes typically may be for such traits as hair or eye color. The costs due to such an indeterminate, but extremely small number of detrimental effects are minor relative to the other costs documented in the DES-OL. For this reason, DES-OL Table 6.1 categorizes adverse radiological health effects to the general population as "small" and of such minor nature, that they do not warrant detailed investigations or considerations of mitigative actions.

REFERENCE

1. National Academy of Sciences, The Effects on Exposure to Low Levels of Ionizing Radiation, 1980.

MARY SINCLAIR (4/17/82)

21.F COMMENT: COGENERATION

Cogeneration-A Questionable Description

Characterizing these nuclear plants as cogenerating facilities because they produce steam and power is inaccurate. The term "cogeneration" refers to the use of waste heat by a facility producing steam and power, or both. There is only a marginal use for waste heat from these plants and that is for heating the cold water that Dow will supply for use in their process steam. The rest of the waste heat will go to the cooling pond, to the Tittabawassee River and to the air.

RESPONSE

Cogeneration facilities are not limited to those which use waste heat to accomplish their goal of generating electricity and industrial process steam more efficiently than by using two or more separate facilities. While it is true that the use of waste heat to generate process steam fits the definition of cogeneration, it is by no means the only method that does.

The Internal Revenue Service,<sup>(1)</sup> which allows tax credits to certain commercial and industrial taxpayers for cogeneration equipment, defines cogeneration in a manner which does not differentiate between waste heat and other heat from the same fuel.

Also, numerous books, articles and papers have been published on cogeneration which describe the use of extraction turbines to supply steam for industrial process use.<sup>(2,3,4,5,6)</sup>

Since Midland Unit 1 utilizes an extraction turbine to supply heating steam for generating process steam for the Dow Chemical Company, the DES-OL is correct and accurate in referring to the Midland Plant as a cogenerating facility.

REFERENCES

1. Internal Revenue Code of 1954, As Amended, Section 48(1)(14)(A).
2. Richard A Edelman and Sal Bongiorno, "Cogeneration - A Viable Alternative," Public Utilities Fortnightly, December 6, 1979; pp 1-8.
3. Resource Planning Associates, Inc, "Inclusion of Cogeneration in Electric Utility Models," Electric Power Research Institute, Report EPRI EA-1504, September 1980.
4. L Denesdi, "Fuel Savings with Turbines Modified for District Heating," Power Engineering, February 1980; pp 62-64.
5. F C Olds, "Power Plant Construction: State-of-the-art," Power Engineering, March 1981; pp 57-58.

## 21.F (Continued)

6. Robert E Albrecht, Robert M Gerzetic and Edward W Browning, "Early Planning for Cogeneration", International Conference on Alternative Energy Sources," December 15-17, 1980.

MARY SINCLAIR (4/17/82)

21.G COMMENT: GROUNDWATER QUALITY

Groundwater

While the DEIS states that no groundwater will be used for plant operations, (DEIS 4-2) the water that is seeping from the cooling pond will be contaminated and can affect the groundwater. Besides chemical wastes, the laundry wastes going into the pond can contain radioactive contaminants and through seepage from the pond reach the land area and the groundwater in the vicinity. This may violate Michigan groundwater protection regulations.

RESPONSE

In a letter to the NRC responding to other comments on the DES-OL (Serial 17231, May 21, 1982), the Company responded to a similar comment (T L Washington, 12.F) on the issue of groundwater quality. As noted there, reference in the DES-OL to cooling pond seepage reflects the fact that cooling pond water has migrated into the captive fill beneath the station and that the level of the perched water table beneath the station has risen accordingly. The station, captive fill and its perched water table are all within the same confines as is the pond, ie, the dike and impervious layer underlying the entire pond and station area.

Contrary to the implication of this comment, the DES-OL does not suggest that water will seep out of the cooling pond and contaminate groundwater in the vicinity. Rather, DES-OL Section 5.3.1 references Section V.B of the FES-CP as still being valid. That FES-CP Section substantiates that pond water seepage through the dike and impervious underlaying layer to groundwater will be minimal.

In a separate letter to the NRC (Serial 16594, April 2, 1982), Consumers Power provided comments on the DES-OL clarifying which wastewater streams are normally routed to the cooling pond. These wastewater streams are the iron removal sump effluents, Unit 1 and 2 clean waste sump effluents, spent circulating and service water treatment chemicals, and wastes from the sodium hypochlorite generation system. The laundry waste stream is not discharged to the cooling pond. The subsequent discharge of cooling pond water to the river is regulated by NPDES Permit limits. Water quality monitoring programs will document compliance with Michigan Standards and regulations.



MARY SINCLAIR (4/17/82)

21.H COMMENT: COOLING POND FOG/ICE

- 5) Use of an inappropriate model for an evaluation of the effects of the cooling pond.

Cooling Pond Effects

The data on the cooling pond in the DEIS (Table 4.1-4.2) is based on a model that does not represent the NRC's best available data on ponds in the Midwest, according to information supplied by James Carson, meteorologist from Argonne National Laboratory.

The original cooling pond data which was used for the construction license to calculate fog affects was supplied by Bechtel and again used in this DEIS (4-7, 4-8) was taken from a pond in Arizona and was not appropriate or comparable to fog effects from a pond in the Midwest, according to the NRC.

On September 14, 1978, Mr. James Carson met with Midland officials, Clifford Steff of the Midland Planning Commission and Gordon Solberg and William Fortier of the Road Commission. Mr. Ron Cook, NRC resident inspector of the Midland nuclear plants, was present at the meeting, as well as a representative of Consumers Power Co. and William Olmstead, NRC attorney.

Mr. James Carson pointed out that the NRC had more accurate data on cooling pond effects based on the Dresden cooling pond in Illinois which had been operating for several years.

James Carson stated that the people in the area of the cooling pond would be subjected to hundreds of hours of steam fog from the cooling pond every winter. They can expect icing on their homes, outlying buildings, equipment, trees and animals. He said much additional snow will be generated in the area. These effects will occur primarily from November through March. (These data are confirmed, but only in part, by the DEIS, 5-8)

Mr. Carson said that at the Dresden pond, the water is running 90 hotter than the outside temperature. For example, when the air temperature is -20F., the pond is measuring 70F. and producing huge quantities of dense fog. Fog plumes up to 5 miles have been observed at Dresden. The DEIS limits this to 1.6 to 3.2 km or (1 to 2 miles) (DEIS 5-7).

The DEIS admits that the Midland cooling pond will be hotter than the Dresden pond because it is smaller--880 acres at Midland as compared to 1,275 acres at Dresden according to Carson.

The severe fogging will often create zero visibility on area roads, and Mr. Carson recommended that roads be widened and flashing signals installed to warn motorists of these road conditions. He recommended closing of Gordonville Road during heavy fog. The DEIS merely recommended a study in the area to determine the highway safety effects of the fog. (DEIS 5-8)

## 21.H (Continued)

Since the inappropriate Bechtel model from 1973 was used for calculations of the effects of the heat load on the pond (DEIS 4-7, 4-8), instead of the Dresden pond, the calculations given are incorrect and not applicable.

A greater heat load from the pond would indicate a much greater rate of evaporation. The amount of water available for cooling in the pond will be lost at a greater rate than these data in the DEIS indicate and other resources of cooling water may need to be provided.

This is another glaring example of the erroneous assumptions in the data base of the DEIS that distorts the real environmental impacts.

## RESPONSE

This comment has been previously responded to in a Consumers Power Company letter to the Nuclear Regulatory Commission (Serial 17231, dated May 21, 1982). Responses in that submittal to comments 3.E, 8.B, 9.C and 14.E address the concerns raised by the present comment. While fogging will occur over the Midland pond, it is expected that it will remain very localized and have minimal effect on traffic. It is anticipated that the fogging and icing effects of the Midland Plant cooling pond will be comparable to those observed during a recent EPRI study of cooling ponds located at the Baldwin and Dresden plants. The report documenting the results of this study concludes:

"Steam fog was found to be the most frequently observed atmospheric effect of the cooling lakes, with a maximum occurring in fall and winter. Natural fog also occurs most often in these periods. In only rare instances did fog sufficiently thick to impair visibility extend more than a few hundred meters from the lake shore. Light icing of structures near the lake was observed immediately near the lake when air temperatures were below -7C (19F). No change in precipitation amount or intensity could be attributed to enhanced evaporation or convection from the cooling lake."<sup>(1)</sup>

Additionally, the data in DES-OL Tables 4.1 and 4.2 are not "based on a cooling pond in Arizona which is not applicable in the Midwest" as the commenter incorrectly states. The report<sup>(2)</sup> cited by the commenter presents the results of a study conducted to assess the thermal performance of the cooling pond not to assess fogging impacts from the pond. The DES-OL correctly refers to the results of the cooling pond thermal performance study in Section 4.2.6.2.

## REFERENCES

1. Atmospheric Effects of Cooling Lakes, EPRI EA-1762.
2. Bechtel Incorporated, Cooling Pond Thermal Performance Summary Report; Midland Plant Units 1 and 2, August 1973.

MARY SINCLAIR (4/17/82)

## 21.I COMMENT: FOG INTERACTION WITH ROUTINE RAD RELEASES

### The Effects of Multiple Radiological Impacts

The DEIS section on radiological impacts does not take into account the manner in which these impacts will be concentrated in this area that will be injurious to public health and safety. (DEIS 5-9)

For example, Dr. Edward Epstein, meteorologist from the University of Michigan, who testified at the construction permit hearings in July, 1971, pointed out that the gaseous effluents routinely released from the nuclear plants will be entrapped in the fog from the cooling pond and will cause a build-up of radioactivity in the area. The projections for radiological impacts in the DEIS do not take this into account. Besides the surface build-up of radioactivity, some of that entrapped radiation will reach the cooling pond and can ultimately seep out to the surrounding area. It can also reach the ground water since it will be iced out or rained out in the area.

On October 22, 1971, at a seminar at the University of Michigan nuclear engineering department, Dr. Epstein described the extent of the fogging problem and the radioactivity on the area and said, "I don't know how those people are going to live."

### RESPONSE

In a letter to the NRC responding to other comments on the DES-OL (Serial 17231, May 21, 1982), the Company addressed similar comments (3.D(3), 9.A, 12.G, and 14.F) on the issue of fog interaction with routine radioactive releases from the Plant. Comment 9.A specifically references the same testimony of Dr Edward Epstein. It is important to note that during cross-examination at the Construction Permit stage hearings, Dr Epstein specifically agreed that he had no experience in analysis of the interaction of airborne radioactive materials and mists. He further stated that he had performed no previous meteorological studies of the effects of large cooling ponds and that he had performed no diffusion calculations on the effect of the Midland cooling pond. (1)

As noted in these previous responses, based on the nature of the cooling pond fog, the elevation of routine radioactive airborne releases, and the lack of evidence of such effects at other nuclear power plants, no significant interaction between cooling pond fog and low-level radioactive releases are expected during Plant operation. For a more detailed discussion on the subject, refer to Attachment B of Consumers Power letter Serial 17231.

### REFERENCES

1. Midland Construction Permit Hearing Record, TR (3660-61).

MARY SINCLAIR (4/17/82)

21.J(1) COMMENT: RAD RELEASES AND METEOROLOGY - ACCIDENT RAD RELEASES

The Effects of Multiple Radiological Impacts

The DEIS section on radiological impacts does not take into account the manner in which these impacts will be concentrated in this area that will be injurious to public health and safety. (DEIS 5-9)

. . .

Other information on the manner in which radioactive releases can reach and concentrate in the environment comes from numerous other sources. The DEIS does not take these into account.

For example, Dr. Edward Teller in an article published in the Journal of Petroleum Technology, (May, 1965, p. 506) stated:

"In principle, nuclear reactors are dangerous. They are not dangerous because they may blow up . . . But a powerful nuclear reactor which has functioned for some time has radioactivity stored in it greatly in excess of that released from a powerful nuclear bomb. There is one difference, and this difference makes the nuclear bomb look like a relatively safe instrument. In the case of an atmospheric nuclear explosion, the radioactivity ascends into the stratosphere and is widely distributed and diluted . . . before returning to the ground."

"A gently seeping nuclear reactor can put its radioactive poison under a stable inversion layer and concentrate it into a few hundred square miles in a truly deadly fashion."

RESPONSE

In this quote Dr Teller is stating that nuclear reactors are potentially dangerous for accidents which have degraded beyond the design basis. Section 5.9.4.5 of the DES-OL specifically addresses the probabilities and consequences of such accidents for Midland. The article from which Dr Teller was quoted was published in 1965 and since then many safety features have been added to nuclear power plants. In contrast to this earlier remark, Dr Teller sardonically stated following the TMI-2 accident that he became the accidents only "casualty" when he suffered a heart attack while traveling about the country refuting claims as to the public health hazard of the event.<sup>(1)</sup> In subsequent discussions on the TMI-2 accident, Dr Teller stated that the TMI-2 accident proved that the existing reactor design technology is "remarkably safe."<sup>(2)</sup>

Implicit in this comment is the thought that the DES-OL does not adequately address meteorological conditions in its assessment of radiological impacts of severe accidents. Contrary to that contention, Section 5.9.4.5(2)

## 21.J(1) (Continued)

specifically addresses meteorological conditions in its assessment of Class 9 accidents. Consistent with the probabilistic nature of this assessment, site specific meteorological data representing a full year of consecutive hourly measurements is used in the calculation. Assuming adverse meteorology (ie, inversion) concurrent with the accident, the calculational assessment shows lower probabilities of occurrence with greater impacts. This conclusion is demonstrated by the results of Section 5.9.4.5(3) in Figures 5.4, 5.5, 5.6 and 5.7. In conclusion, the DES-OL has appropriately accounted for meteorology in the assessment of radiological impacts due to severe accidents.

## REFERENCES

1. Wall Street Journal, July 31, 1979.
2. Nucleonics Week, November 15, 1979; pages 4-5.

MARY SINCLAIR (4/17/82)

21.J(2) COMMENT: RAD RELEASES AND METEOROLOGY - ROUTINE RAD RELEASES

The Effects of Multiple Radiological Impacts

The DEIS section on radiological impacts does not take into account the manner in which these impacts will be concentrated in this area that will be injurious to public health and safety. (DEIS 5-9)

. . .

Since the site of the Midland reactors is in the flood plain area of the Saginaw Valley, inversions are not an infrequent occurrence. This is another source of radioactive build-up in this water shed which will effect the concentrations that will enter the Tittabawassee River and Bullock Creek as a result of the operation of the Midland nuclear plants.

RESPONSE

The commenter contends that meteorological inversions common to the area have not been accounted for in the DES-OL in the assessment of radiological impacts due to routine Plant operation. Contrary to this contention, Appendix C of the DES-OL does account for all meteorological conditions, in that the dose calculations were performed using an annual average relative concentration (X/Q). This annual average value was based on a two-year period of actual meteorological data collected at the site. Based on this site specific input, the DES-OL has appropriately factored meteorological conditions into its dose assessments for routine Plant operation at Midland.

With respect to the basic site meteorology and the frequency of adverse meteorological conditions such as inversions, it is interesting to note the testimony of the intervenor's witness on meteorology during the Construction Permit Stage hearings. As noted in the initial decision of the Atomic Safety and Licensing Board for Midland, the intervenor's witness characterized the site as "being rather good from the point of diffusion by and large."<sup>(1)</sup>

REFERENCE

1. Atomic Safety and Licensing Board, Initial Decision, December 14, 1972; Paragraph 22.

MARY SINCLAIR (4/17/82)

21.K(1) COMMENT: CHEMICAL/RADIOLOGICAL SYNERGISM - JOHNS HOPKINS UNIVERSITY

- 6) Failure to discuss the combination of the overlapping chemical, thermal and radioactive environments of The Dow Chemical Co. and the nuclear plants --and the synergistic effects this will produce -- a condition that is unique and requires special study at this site.

#### Synergistic Effects of Chemical and Radioactive Effluents

The unique association with, and proximity to, The Dow Chemical Co. of these plants also poses special problems in environmental impact. The extent to which the toxicity of radioactive releases will be increased due to synergistic effects from contacts with chemical pollutants and thermal pollution in this area has not been considered by this DEIS.

These facts are also well documented. In a paper called, "The Effects of Nuclear Power Plants" published by the School of Hygiene and Public Health of John Hopkins University, the following statement is made:

"It is an ecological truism that in natural environments stimuli do not act separately, but together. Such stimuli acting together to produce a response different in quantity or quality from that which is observed when they act separately is defined as "synergism". Heat may influence radioactivity in several ways, namely by altering community and current structure."

"What is clear is that thermal pollution alters both physiochemical properties of water and the metabolism of organisms. In so doing, it may significantly alter the distribution and abundance of organisms. With such alterations, the distribution and abundance of contained contaminants will also be expected to be altered. This environmental synergism between heat and the distribution of other pollutants makes predictions on the effect of the latter extremely difficult. Radionuclide distribution at present, then, is not necessarily an indication of its distribution in an altered community."

#### RESPONSE

In a letter to the NRC responding to other comments on the DES-OL (Serial 17231, May 21, 1982), the Company addressed similar comments (3.A, 12.C and 12.D) and provided related information (12.B) with respect to the issue of chemical, thermal and radiological synergisms. As noted before, the issue of synergism has been formally and extensively raised during Construction Permit Hearings before the Atomic Safety and Licensing Board (ASLB) and before the Michigan Department of Natural Resources (MDNR) which made no finding of adverse effects on humans or aquatic life from synergistic interactions.



## 21.K(1) (Continued)

The synergistic effects considered during the ASLB hearings included both physiological effect of combined dosage of chemical and radiological effluents on human tissue and the interaction of chemical and radiological effluents in the environment to produce a reactant which could have a different effect on humans. As noted in its Initial Decision, the ASLB repeatedly offered the intervenors opportunities to challenge the validity of Commission radiological regulations on any basis including the contention that synergistic effects would significantly alter the effects of otherwise insignificant releases of radioactive material. To this end, the ASLB ordered Dow to submit a list of effluents expected to be discharged during Plant operation for review in terms of potential synergistic interaction. Following extensive review, the ASLB concluded:

Viewed in the light most favorable to Intervenors, and without considering the countervailing evidence of Applicant and the Staff, the evidence fails to establish that, at the levels of concentration involved here, there will be any interaction which would tend to increase radiation effects from the Plant, or the chemical effects from Dow. And when one considers the testimony of Applicant and Staff witnesses, the evidence is overwhelming against a finding of "synergism."<sup>(1)</sup>

Likewise, the relationship between increased water temperature and increased chemical reactions due to other pollutants discharged by Consumers or by Dow Chemical Company has been formally reviewed by MDNR. On July 28, 1978, the MDNR Staff requested Consumers Power to analyze the possible interaction between materials discharged from the Dow Chemical Company and thermal effluent from the Midland Plant. A September 13, 1978 letter from the MDNR provided a list of materials to be included in the scope of the analysis. This list originated from Dow's annual wastewater report of materials discharged during 1977. The resulting analysis was provided in the Company's Amendment 1 to the State Discharge Permit Application dated October 20, 1978. Subsequently, the Company provided the MDNR a report entitled, "Effects of Selected Toxicants and Thermal Discharge Interactions on Aquatic Biota." The MDNR utilized these data and thermal discharge restrictions addressed in response to comment 12.B in preparation of a formal response and discussion to the Michigan Environmental Review Board on April 26, 1982. The MDNR concluded that the interaction of the Dow and Midland Plant discharges should not adversely affect the aquatic life in the river based on the current state of knowledge on synergistic effects under these conditions.

## REFERENCES

1. Atomic Safety and Licensing Board, Initial Decision, December 14, 1972; Paragraph 66.



MARY SINCLAIR (4/17/82)

21.K(2) COMMENT: CHEMICAL/RADIOLOGICAL SYNERGISM - DR IRWIN OSTER/  
DR C HEUPNER

- 6) Failure to discuss the combination of the overlapping chemical, thermal and radioactive environments of The Dow Chemical Co. and the nuclear plants --and the synergistic effects this will produce --a condition that is unique and requires special study at this site.

#### Synergistic Effects of Chemical and Radioactive Effluents

The unique association with, and proximity to, The Dow Chemical Co. of these plants also poses special problems in environmental impact. The extent to which the toxicity of radioactive releases will be increased due to synergistic effects from contacts with chemical pollutants and thermal pollution in this area has not been considered by this DEIS.

Dr. Irwin Oster, former director of Genetic Research at Bowling Green State University, Bowling Green, Ohio, wrote the following statement:

"It is of paramount importance to recognize that the additivity between chemical agents and radiation exists at the level of the actual damage produced, and this is the level at which interaction takes place--it is not merely the summation of the damage produced by one noxious agent and the damage produced by another toxic agent. By way of emphasizing this point, we can describe the effect as follows: Exposure to one dose of radiation plus one dose of chemical mutagen (and/or carcinogen) yields the same end-result in terms of over-all damage as being exposed to two doses of radiation. Furthermore, the same linear nonthreshold model, coupled with cumulative effects, holds true for such chemicals." (Letter, October, 1971)

In a statement before the US Public Health Symposium, September 8-9, 1960, on "Physiological Aspects of Water Quality," Dr C Heupner made the following statement: (Symposium Report, page 185).

"In addition to direct radioactive effect of such water pollutants on consumers, attention should also be paid to direct and indirect radiation effects by radioactive matter on other chemical constituents, especially those of industrial origin which may simultaneously contaminate the water. Such effects may be associated with chemical changes elicited by the production of peroxides or may be related to intramolecular rearrangements of atoms and groups of atoms, such as polymerization, depolymerization and crosslinkage formation occurring under the impact of ionizing radiation. An exploratory study into the chemical end products of such possible interactions between

## 21.K(2) (Continued)

radioactive and non-radioactive water pollutants seems to be indicated for assessing properly the entire scope of potential cancer hazards for consumers of drinking water containing radioactive pollutants."

## RESPONSE

The issue of chemical and radiological synergism was raised formally and extensively during the Construction Permit (CP) hearings. As noted in the previous comment, the ASLB concluded that the evidence was "overwhelming against" a finding of synergism in the case of the Midland Plant. For an additional discussion on this topic, refer to the response to comment 21.K(1).

With respect to both Dr Oster's and Dr Heupner's comments, it is relevant to note the testimony of Dr John H Rust and Dr Frigerio during the CP hearings. Dr Heupner's comment was made in 1960 and Dr Rust's testimony in 1972 appeared to address his concerns. At the time of the hearing, Dr Rust held doctorates in veterinary medicine and pharmacology and was on the World Health Organization's Expert Committee on Radiation, on the National Academy of Science's Committees on Food Protection and Radioactive Waste Disposal, and on the US Public Health Service's Long-Term Radiation Effects Advisory Committee. Dr Rust's expertise in the combined effects of radiation and chemicals was based on his own studies and personal testing on the combined effects of radiation and chemicals. Dr Rust testified that, based on his own personal testing of several thousand agents, the most probable interaction to be expected between radiation and chemical agents is one in which the radiation effect is reduced. He noted that there had been extensive searches for chemicals that would enhance the effects of radiation and that a few such chemicals had been found, but none had been shown to have enhancing effects at low levels of radiation. Dr Rust concluded by stating that there was no direct or indirect evidence that would lead one to conclude that the effluents of either Dow or the Midland Nuclear Plant would interact in any way to make the very minimal ionizing radiation or the chemical effluents expected harmful to man or the biosphere.<sup>(1)</sup> Dr Frigerio, the Staff witness from Argonne National Laboratory, also reviewed the intervenor contention of an interaction between effluents from Dow and the Midland Plant. Dr Frigerio concluded that there would be no synergistic effect.<sup>(2)</sup> Dr Rust and Dr Frigerio both indicated that they would expect no effects from interaction of Dow effluents and radioactive effluents from the Plant in excess of mere addition regardless of chemical or radiation level. And, in regards to expected operational discharges, Dr Frigerio stated, "with the radiation levels I expect from Midland, I don't expect ever to be able to see this kind of summation with Dow effluents."<sup>(3)</sup>

## REFERENCES

1. Midland Construction Permit Hearing Record, Tr (8796-8814 and 8873-8900).
2. Midland Construction Permit Hearing Record, Tr (7564).
3. Midland Construction Permit Hearing Record, Tr (8929-37).

MARY SINCLAIR (4/17/82)

21.K(3) COMMENT: CHEMICAL/RADIOLOGICAL SYNERGISM - WEST GERMAN LAW SUIT

- 6) Failure to discuss the combination of the overlapping chemical, thermal and radioactive environments of The Dow Chemical Co. and the nuclear plants --and the synergistic effects this will produce -- a condition that is unique and requires special study at this site.

Synergistic Effects of Chemical and Radioactive Effluents

The unique association with, and proximity to, The Dow Chemical Co. of these plants also poses special problems in environmental impact. The extent to which the toxicity of radioactive releases will be increased due to synergistic effects from contacts with chemical pollutants and thermal pollution in this area has not been considered by this DEIS.

As an example of the importance of this concern, two West German pharmaceutical companies sued to halt construction of a nuclear plant in Grohnde a mile away from their operation in June, 1977. They charged that the nuclear plant's radioactive effluents would contaminate their products and effect their quality. (Nucleonics Week, September 1, 1977).

RESPONSE

The issue of chemical and radiological synergism was raised formally and extensively during the Construction Permit hearings. As noted in the previous two comments (21.K(1) and 21.K(2)), the ASLB concluded that the evidence was "overwhelming against" a finding of synergism. The comment on the West German lawsuit does not appear to be applicable to this issue or relevant to the Midland Plant review process. Nonetheless, in a telephone conversation with Nucleonics Week, it was confirmed that the final resolution of the suit is still pending before the court. We were advised that in the initial ruling on the case, there was insufficient ground to halt construction of the nuclear plant. The plant is scheduled for completion in 1985. (1)

REFERENCE

1. Consumers Power Company telephone conversation with Nucleonics Week, July 1, 1982.

MARY SINCLAIR (4/17/82)

21.L(1) COMMENT: RADIATION HEALTH EFFECTS - SUSCEPTIBLE POPULATION

Adverse Health Effects to Susceptible Groups

There is a substantial amount of research that indicates that there are groups in the general population who are more susceptible than others to adverse effects from radiation. Since these plants are in the middle of a populated center, these effects should be considered. Infants and children are known to be at least 50 times more susceptible than the average male adult. (Saginaw Doctors' Report, 1971, p. 47) The elderly are also known to be more susceptible. Dr. John W. Baum states human beings "constitute a heterogeneous population with mixed predisposition to cancer due to genetic differences and sensitivity which varies with age, sex, environmental factors, cell type, stage of cell cycle, etc." (Health Physics, August, 1973)

. . .

There is no discussion in the DEIS of consideration for susceptible groups in the nearby general population.

RESPONSE

The comment that the DES-OL does not consider groups in the general population of Midland who are more susceptible to radiation than others is false. The DES-OL conservatively calculates the dose to a hypothetical maximally exposed individual of the public for adults, teenagers, children and infants. These calculations are performed based on site specific locations about the Midland area and utilize site specific meteorological information. These dose calculations consider different dose factors, consumption parameters, usage parameters, breathing rates, etc for each of the aforementioned age groups. Table C.6 of Appendix C of the DES-OL specifically identifies the age group and limiting organ with the highest cumulative dose for a given site location. As clearly demonstrated in Appendix C of the DES-OL, all susceptible age groups have been considered in the dose assessment calculations for the Plant.

Additionally, the use of the Saginaw County Medical Society environmental committee report (apparently cited in the comment) by a group opposed to the Plant was denounced by the Society's President in 1972, as discussed in the Company's response to comment 21.0(2).

MARY SINCLAIR (4/17/82)

21.L(2) COMMENT: RADIATION HEALTH EFFECTS - NRC RADIATION STANDARDS

Adverse Health Effects to Susceptible Groups

. . .  
In NRC's own announcement of improving radiation standards issues on March 21, 1980, they indicate that standards for individual occupational exposure, and the need for special provisions to limit collective population doses and exposures of children, fertile women and other susceptible groups are not adequate and must be improved.

New Information on Radiation Standards-Dose Estimates

The announcement mentioned above and posted in the Federal Register by the Nuclear Regulatory Commission in March, 1980, is among the recent events indicating that new significant knowledge on radioactive protection standards has been developing.

RESPONSE

The commenter portrays the referenced NRC document on radiation protection standards as being based on "new significant knowledge" previously unscrutinized and constituting an invalidation of existing regulation. This contention represents a misunderstanding of both the NRC proposal and the process. While it is true that the NRC is considering changes to 10 CFR 20, the referenced NRC document is a proposed rulemaking which has not been acted on. In the Federal Register notice of this proposal, it was stated that the items identified in this proposal for possible revision were the results of a "preliminary review."<sup>(1)</sup> Furthermore, the items identified were referred to as "areas in which Part 20 might be improved"<sup>(1)</sup> rather than areas of inadequacy requiring immediate action. These proposals are based on an accumulation of radiation protection information over a long period of time in lieu of the inferred "new significant knowledge." Furthermore, such updating of regulations with improvements is not without precedent. Appendix I to 10 CFR 50 on Design Objectives to meet As Low As is Reasonably Achievable (ALARA) criterion for radioactive material in plant effluents was added to the Code of Federal Regulations effective in 1975. As in the case with Appendix I, Midland complies with all existing regulation on radiation protection and will comply in the future with any additional regulations which are federally mandated as conditions for operation.

REFERENCE

1. Federal Register, Vol 45, No 56, Thursday, March 20, 1980, Proposed Rules; 10 CFR Part 20, "Standards for Protection Against Radiation; Advance Notice of Proposed Rulemaking."

MARY SINCLAIR (4/17/82)

21.L(3) COMMENT: RADIATION HEALTH EFFECTS - BEIR III

- 10) No recognition of new developments in radiation protection standards in calculating exposure for the public and workers.

New Information on Radiation Standards-Dose Estimates

Important new studies from the Lawrence Livermore Laboratory can alter the dose estimates in the DEIS by several orders of magnitude. Recently, the 1980 National Academy of Sciences' BEIR (Biological Effects of Ionizing Radiation) Report has been suspended because of new data disclosed this past year by two physicists, William Loewe and E. Mendelsohn of the Lawrence Livermore Laboratory, a weapons research facility of the Defense Department. These researchers found that serious errors were made in the radiation dose estimates of the Hiroshima and Nagasaki atomic blasts. These data had been the basis for much of the current radiation dose estimates, including those in the 1980 National Academy of Science Report. The Livermore studies were first reported in Science, May 22, 1981.

By September, a task force of about 120 scientists was brought together to review these new data. (Science, October 2, 1981) This task force agreed that the dose estimates which have been in use since 1965 can no longer be considered accurate and should be revised in the light of research done at Livermore, two other national laboratories and two private consulting firms.

These findings can substantially alter the dose estimates and calculation of the effects that can be anticipated from the radioactive effluent from these plants and render dose estimate charts in the DEIS obsolete.

RESPONSE

In a letter to the NRC responding to other comments on the DES-OL (Serial 17231, May 21, 1982), the Company addressed this contention in responses to comments 5.A, 10.B, 11.B, 17.A and 18.B on the BEIR III report and the research of Loewe and Mendelsohn. As noted in the previous responses, the BEIR report, which is one of sixty-seven references contained in Section 5 of the DES-OL, is not seriously being considered for suspension. Furthermore, the implications of the Loewe and Mendelsohn studies, if any, are far from resolved. There has even been some suggestion that this new data may support a lower risk estimate for low doses of gamma radiation, as would be present during routine power plant operation.

In addition, the commenter has failed to mention a subsequent article in Science containing a letter by Loewe and Mendelsohn in response to the initial Science article. In that letter, Loewe and Mendelsohn took exception to



21.L(3) (Continued)

conclusions made in Science based on their Hiroshima and Nagasaki dosimetry studies and concluded that, "We fail to see how our work can be a basis for assigning a greater hazard to gamma radiation. <sup>(1)</sup> For a more detailed discussion of this topic, refer to Attachment C to our Serial 17231 letter.

REFERENCE

1. "Radiation Estimates," Letters, Science, Vol 213, July 3, 1981.

MARY SINCLAIR (4/17/82)

21.M(1) COMMENT: EFFECTS OF TRITIUM DISCHARGE - DR THEODORE RIZKI

Tritium--Produced In Quantity--Misrepresented In Its Effects

Tritium is generated in large quantities by pressurized water reactors. The NRC and this DEIS does not recognize its adverse health effects.

Several experts have commented on the public health significance of tritium, which will be produced and released in quantities from these reactors. Dr Theodore Rizki in a hearing statement for the Michigan legislature (dated, October 16, 1974) stated:

"As a biologist and geneticist, I would like to point out that there has been a tendency to underestimate the damaging effects of tritium. In considering radioactive materials in terms of energy levels, we are often misled by assuming that tritium is a weak beta-emitter. Our thinking must be altered; we must underline the fact that once tritium is incorporated in a biological molecule such as DNA, the degree of concentrated ionization within a hundred-thousandth of an inch is so high that to achieve the same effect from background radiation would require enormous amounts of deep penetrating radiation."

RESPONSE

Despite making this statement in support of an issue concerning tritium releases from nuclear power plants, Dr Rizki's comments pertain to tritium in organic forms and not to tritium in the inorganic forms released from nuclear power plants. Specifically, Dr Rizki's comments appear to pertain to genetic research and the effects of tritium tagging of DNA molecules through use of such chemicals as thymidine and uracil. The significantly greater cellular effects of tritium in such chemical forms and applications has long been known and recognized by the scientific community. (1,2,3) Specifically, Wimber (2) states that the cellular growth retardation effects of 5 millicurie/cc tritiated water is the same as that for 5 microcurie/cc  $H^3$ -thymidine (a thousandfold difference).

This essential difference in chemical form has been recognized since 1959 by the International Commission on Radiological Protection. The ICRP Publication 2 (3) states explicitly that their permissible dose standards apply to HTO (water with one tritium atom),  $T_2O$  (water with two atoms of tritium), and  $T_2$  (hydrogen gas molecule having two tritium atoms) and to interactions of tritium released in these forms with biological materials. Tritiated water from nuclear power plants has a radiological effect similar to x-rays with the exception that a factor of 1.7 is applied for all beta emitters with energy less than 0.03 MeV to account for the localized ionization of its weak beta emission. In accordance with ICRP Publication 2 calculations in the DES-OL have utilized this factor of 1.7 for tritium beta emissions.



## 21.M(1) (Continued)

In summary, the DES-OL has appropriately factored tritium from plant releases into its radiological consequence calculations consistent with the ICRP. Furthermore, the application of tritium effects associated with genetic research and the use of specifically formulated chemical compounds is not relevant to the assessment of nuclear power plant effluent discharges.

## REFERENCES

1. H A Johnson, "Dose to the Cell Nucleus from Tritiated Thymidine", Medical Radionuclides Radiation Dose and Effects, CONF 69.212, June, 1970.
2. D E Wimber, "Effects of Intracellular Irradiation with Tritium", Advances in Radiation Biology I, 1964; p 85.
3. International Commission on Radiation Protection (ICRP), ICRP-2, "Report of ICRP Committee II on Permissible Dose for Internal Radiation," 1959.

MARY SINCLAIR (4/17/82)

21.M(2) COMMENT: EFFECTS OF TRITIUM DISCHARGE - DR CHARLES HUVER

Tritium--Produced In Quantity--Misrepresented In Its Effects

Tritium is generated in large quantities by pressurized water reactors. The NRC and this DEIS does not recognize its adverse health effects.

...

Dr Charles Huver, radio-ecologist of the James Ford Bell Fisheries Laboratory of the University of Minnesota, made the following statement on the biological effects of tritium at a hearing on February 19, 1969:

"In cognizance of the dominant position of this radio-isotope (tritium) in the effluents of nuclear reactors, it would be irresponsible for persons charged with the protection of public health or with providing consultation on the safety aspects of nuclear discharges to ignore the biological effects of tritium in the intracellular environment.

There has been a tendency, especially among those concerned with the promotion of the nuclear industry, to ignore or to minimize the biological significance of tritium. However, there is now such a large body of evidence available in the literature of radiation biology that to continue to ignore tritium would be an admission of a serious lack of knowledge of nuclear safety.

Tritium generally enters the body in the form of tritiated water (THO) and is transported through a variety of metabolic pathways to become widely distributed and incorporated into a wide array of biological molecules.

Because tritium becomes incorporated in the DNA molecule (among others) the problem of genetic mutation and chromosome damage has to be faced. For instance, Gray (1959) has reported the remarkable result that B-rays of the energy of tritium are about 2.5 times as effective in producing chromosome breaks as are X-rays. Assuming the oftenheld view that chromosome breakage is one of the main causes of cell lethality, one would expect that tritium B-rays would be about 2.5 times as lethal per dose as X-rays."

RESPONSE

Contrary to the implication of this comment, the biological effects of tritium have been responsibly addressed in the DES-OL consistent with the guidelines of the International Commission on Radiological Protection (ICRP). The present limits on exposure of individuals to concentrations of radioactive materials in 10 CFR 20<sup>(1)</sup> and Regulatory Guide 1.109<sup>(2)</sup> are based on models, equations, and assumptions adopted by the ICRP and published in ICRP-2.<sup>(3)</sup> As

## 21.M(2) (Continued)

stated in the previous comment (21.M(1)), the ICRP-2 standards explicitly address HTO (water with one tritium atom),  $T_2O$  (water with two atoms of tritium), and  $T_2$  (hydrogen gas molecule having two tritium atoms) and the interactions of tritium released in these forms with biological materials. These forms of tritium are typical of those which are routinely released from nuclear power plants. Beta emissions from tritiated plant discharges have a radiological effect on cells similar to that of x-rays with the exception that a quality factor of 1.7 is applied to account for the localized ionization of tritium's weak beta emission. This "effectiveness" factor is routinely applied to all beta emitters of energy less than 0.03 MeV consistent with ICRP-2.

In regards to the contention that tritium is generated in large quantities by nuclear power plants, it is useful to compare plant-generated tritium production with that which occurs naturally. Naturally occurring tritium is produced by cosmic ray neutrons colliding with nitrogen in the atmosphere, according to the nuclear reaction,  $^{14}N(n,t)^{12}C$ . The natural tritium production rate is estimated to be from 4 to 8 Megacuries per year. (4) This is compared to the 0.00101 Megacuries of tritium per year estimated for both units of Midland in Appendix C of the DES-OL. As can readily be seen, the Midland Plant contribution to the production of tritium in the environment is very small and represents a quantity several orders of magnitude less than background production due to naturally-occurring processes.

It is relevant to note that the referenced quote by Dr Huver was submitted verbatim as part of his testimony during the Construction Permit Stage hearings. Since Plant releases were projected to be within the limits permitted, by regulation, it was noted then that Dr Huver's testimony appeared to challenge the validity of the Commission's radiation protection standards rather than address releases related to those projected for the Midland Plant. In the Initial Decision of the Atomic Safety and Licensing Board, the Board determined that none of the intervenor's contentions with respect to releases of radioactivity established sufficient invalidity of existing radiation protection standards to warrant referral to the Commission for disposition. (5)

## REFERENCES

1. Title 10 Code of Federal Regulations, Part 20, (10 CFR 20) "Standards for Protection Against Radiation."
2. Regulatory Guide 1.109, Revision 1, "Calculation of Annual Doses to Man From Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," October, 1977.
3. International Commission on Radiation Protection (ICRP), ICRP-2, "Report of ICRP Committee II on Permissible Dose for Internal Radiation," 1959.
4. "Sources of Tritium Production and Its Releases," Hearings before the Joint Committee on Atomic Energy, Congress of the United States, Ninety-First Congress, page 528.

## 21.M(2) (Continued)

5. Atomic Safety and Licensing Board, Initial Decision, December 14, 1972, Paragraph 55.

MARY SINCLAIR (4/17/82)

## 21.N COMMENT: EFFECTS OF PLUTONIUM DISCHARGES

This DEIS does not take into account plutonium that will be released to the environment from these plants. A study of mussels made at Plymouth, Massachusetts, where a nuclear plant is located, had indicated that plutonium is a part of the radioactive effluent from a nuclear power plant. (Newsweek, December 11, 1978)

## RESPONSE

The DES-OL takes into account all radioactive materials that will be released to the environment in significant amounts as a result of routine operation of the Midland Plant. The plutonium radioisotope is generated within the fuel in a sealed fuel rod and thereby remains isolated from the environment. As a result, plutonium does not constitute a significant radioisotope in Plant effluents.

Upon examining the referenced article, we find no definite statement that the nuclear plant near Plymouth is the source of the plutonium. Possibly, the two relevant sentences in the article are:

"The telltale mussels also give important clues to the source of pollutants. The plutonium-rich mussels off Plymouth alerted scientists that a nearby atomic-power plant was discharging nuclear wastes into the water."

The reason for the ambiguity could be that the reporter knew then or learned later that most probable source of plutonium was from nuclear weapons testing performed throughout the world more than a decade earlier. Studies indicate<sup>(1)</sup> that as much as 5 tons of plutonium-239 and half a ton of plutonium-238 have been released into the atmosphere during weapons testing. As a result, the terrestrial surface concentration of plutonium is of the order of one millicurie per square kilometer. If this is the concentration over Michigan, then the amount of plutonium in Michigan alone is about 5 pounds, or about two and a half billion micrograms. This phenomena has been substantiated by the observation of measurable amounts of plutonium in Lake Michigan sediment.<sup>(2,3)</sup> The source of this plutonium is from nuclear bomb tests. It is expected that Lake Huron sediments could have comparable concentrations of plutonium due to weapons testing fallout.

## REFERENCES

1. M Taube, Plutonium--A General Survey, 1974; p 100.
2. D N Edgington, J J Alberts, M A Wahlgren, J O Marttunen, C A Reeve, Plutonium and Americium in Lake Michigan Sediments in Transuranium Nuclides in the Environment, Proc of a Symp San Francisco, 17-21, November 1975, International Atomic Energy Agency, Vienna, 1976.

## 21.N (Continued)

3. D N Edgington and J A Robbins, "The Behavior of Plutonium and Other Long-Lived Radionuclides in Lake Michigan: II. Patterns of Deposition in the Sediments," Proc Int Symp Radiol Impacts of Releases from Nuclear Facilities into Aquatic Environ, Otaniemi, Finland, 1976.

MARY SINCLAIR (4/17/82)

21.0(1) COMMENT: BIOACCUMULATION OF RADIOACTIVITY -  
PHYSICIANS FOR SOCIAL RESPONSIBILITY

Bioaccumulation of Radioactivity

The fact of bioaccumulation of radioactivity in plant, water and animal life is not adequately addressed in the DEIS. Besides side stepping the issue in the report, it does not take into effect of the overlapping environments of the chemical and radioactive pollutants from The Dow Chemical Company in this area.

Many references to bioaccumulation of radioactivity appear in the literature. Only a sampling can be provided here.

In a statement to the New York Times, a number of medical doctors associated with the Physicians for Social Responsibility have warned about what they call dangerous myths about nuclear power.

Myth 1 of the statement--"Nuclear plants in normal operation are not a radiation hazard," has the most significant bearing on the adequacy of this permit. Their statement includes the following comments:

"Nuclear plants and their supporting facilities routinely release radioactive effluents into the air and water. These may contain elements that concentrate in the bones, muscles, thyroid and other organs. The magnitude of the health risk is inestimable since it may take time for the material to circulate through the food chain before human exposure reaches significant levels. Leukemias would not then appear for at least five more years; other cancers, 15 to 30 years, and latent genetic damage might only become manifest generations hence."

This statement underlines the fact that the effluents that will be routinely or accidentally released to the air and water can ultimately be incorporated in the food chain of man.

The DEIS does not take into consideration the somatic and genetic effects of not only the accumulation but the bioconcentration of the effluents that will be released to the water here through routine and the inevitable accidental releases during the expected lifetime of the plant.

RESPONSE

In a letter to the NRC responding to other comments on the DES-01 (Serial 17231, May 21, 1982), the Company addressed similar comments (3.C, 9.B and 12.D) on the issue of bioaccumulation. Comment 9.B specifically references the same New York Times article. The issue of "overlapping environments of



## 21.0(1) (Continued)

chemical and radioactive pollutants' was previously addressed in responses to comments 21.K(1) and 21.K(2) of this letter.

As noted in our previous response, the effects of bioaccumulation on man and biota have been adequately accounted for in the assessment of the environmental impact of the Plant. In regards to the comment from the Physician's for Social Responsibility that "the magnitude of the health risk is inestimable", the DES-OL identifies the personal risk of potential premature death from cancer to an individual from exposure to routine releases of Plant effluents. In DES-OL Section 5.9.3.2, this risk is identified as less than one chance in one million from one year of reactor operations. This calculation accounts for the effects of bioaccumulation in determining the radiation exposure to man due to Plant operation. Likewise, in contrast to the commenter's contention, the DES-OL does provide an estimate of genetic disorders attributable to routine Plant operation which considers bioaccumulation in the calculation. Section 5.9.3.2 estimates that "0.01 genetic disorders may occur in all future generations of the exposed population." The value of 0.01 genetic disorders means that the probability of one genetic disorder in all future generations of entire exposed general population due to one year of operations for both units of the Midland Plant is about one chance in one hundred.

MARY SINCLAIR (4/17/82)

21.0(2) COMMENT: BIOACCUMULATION OF RADIOACTIVITY -  
SAGINAW COUNTY MEDICAL SOCIETY

Bioaccumulation Of Radioactivity

The fact of bioaccumulation of radioactivity in plant, water and animal life is not adequately addressed in the DEIS. Besides side stepping the issue in the report, it does not take into effect of the overlapping environments of the chemical and radioactive pollutants from The Dow Chemical Company in this area.

Many references to bioaccumulation of radioactivity appear in the literature. Only a sampling can be provided here.

. . .

Report of the Committee on Environment of the Saginaw County Medical Society, Dec..(sic)

Early in the construction phase of these plants, a group of medical doctors from the Saginaw County Medical Society prepared a study on nuclear energy. In that study, they discussed among other things, the environmental concentration of radioactivity:

"Every time radioactive waste is dumped into a stream, buried, dropped into the ocean, discharged into the air or otherwise released from human control, it passes into the complex world of living things. It will pass from living things to living things, sometimes being concentrated, at other times being dispersed, with an efficiency and ingenuity which man has not yet come to understand. At unpredictable times and places, this radioactive waste will reappear in man's food, air, and water. It will not go away for decades, or centuries, or even millennia."(p.41)

It is important to note that as a consequence of their extensive study, the Saginaw Doctor's Committee concluded the Midland nuclear plants were not sited in the best interest of public health and safety.

RESPONSE

The President of the Saginaw County Medical Society has rebuked the use of this committee report by a "group against atomic power." Dr Stander further states:

"This group has utilized a report to the environment committee of our Saginaw County Medical Society to their advantage. This report only accepted for information, was sent without authority or consent to them. The way this report was utilized by this group and some news media has in effect placed the county medical society as being

## 21.0(2) (Continued)

against atomic energy for power production in the Tri-County area. A poll of all members of the environment committee, reveals that the author of the report and other members of the committee are certainly not in agreement. . . . In answer to several queries from a variety of sources directed to me regarding our county medical society's position, I have stated that the report sent to the Environment Committee has been received for information only. I have also stated that in my opinion we are not well enough informed to give a valued judgment at this time. In a society, where electric power is such an important and necessary commodity, the use of atomic energy conversion to electric power, instead of dependence on the fossil fuels such as coal and oil, may be an important factor in future international relations, and a possible deterrent to future wars.

. . . In my opinion the dangers of atomic power is a much lower item on the priorities in safeguarding the public health." (1)

In a letter to the NRC responding to other intervenor comments on the DES-OL (Serial 17231, May 21, 1982), the Company addressed similar comments (3.C, 9.B and 12.D) on the issue of bioaccumulation. As noted in the previous responses, the effects of bioaccumulation are accounted for in determining the radiation exposure to man due to Plant operation. Specifically, Regulatory Guide 1.109 bioaccumulation factors are used. Appendix C of the DES-OL, Section C.1 describes the calculation approach and refers the reader to Regulatory Guide 1.109 for a detailed discussion of the dose calculations. Regulatory Guide 1.109 discusses bioaccumulation factors in depth, and tabulates values used for various elements which range up to a factor of 100,000 times greater than the observed water concentration. Thus, bioaccumulation effects have been considered fully in DES-OL calculations of offsite radiological consequences due to routine Plant operation.

In addition to these calculational considerations, radiological monitoring will be performed by Consumers Power to check fish, aquatic plants, zoo-plankton, phytoplankton, benthos and other constituents of the food chain for abnormal concentrations of radioactivity. Observations at other operating nuclear power plants have confirmed that bioaccumulation factors used in these calculations are conservative.

## REFERENCE

1. Dr A C Stander, "The President's Message; Power, Priorities, Pollution," The Bulletin, Saginaw County Medical Society, April, 1972; pp 3-4.

MARY SINCLAIR (4/17/82)

21.P COMMENT: CHEMICAL/RAD RELEASES TO/FROM POND

Balancing Operational And Environmental Requirements

The DEIS indicates that the cooling pond will become the first waste disposal system for chemical wastes and laundry wastes which could contain radioactive materials from the nuclear plants. These wastes will be a part of the seepage to the nuclear plant site. The dewatering system will return them along with other contaminants from the reactor area back to the cooling pond according to the DEIS.

The DEIS also states that the water in the cooling pond will have to be maintained at a carefully controlled chemical content in order to use this water for cooling the reactors. It is not clear from the DEIS how the rigid requirements for the cooling pond water can be maintained as well as maintaining the limits of what goes into the Tittabawassee River as defined by the requested water permit.

RESPONSE

In a separate letter to the NRC (Serial 16594, April 2, 1982), Consumers Power provided comments on the DES clarifying which wastewater streams are normally routed to the cooling pond. These wastewater streams are the iron removal sump effluents, Unit 1 and 2 clean waste sump effluents, spent circulating and service water treatment chemicals, and wastes from the sodium hypochlorite generation system. The laundry waste stream is not discharged to the cooling pond. The subsequent discharge of cooling pond water to the river is regulated by NPDES Permit limits. Water quality monitoring programs will document compliance with Michigan Standards and regulations.

We have been unable to find where the DES-OL states "...the cooling pond will have to be maintained at a carefully controlled chemical content in order to use this water for cooling the reactors." In addition, reference to the chemistry and the use of the pond water to cool the reactor is very misleading and implies that the cooling pond water may come in contact with the reactor. During normal operation, cooling pond water is used to condense steam in the secondary cycle via the condenser and the steam is actually the media used to cool the primary system (reactor) by way of the steam generators. Neither the secondary steam nor cooling pond water comes in direct contact with the reactor. In the unlikely event of a loss of all other sources of feedwater, the cooling pond can serve as a source of auxiliary feedwater. During this upset period, cooling pond water would be used to cool the steam generators but would not come in contact with the reactor. Furthermore, the cooling pond water chemistry is not controlled for this abnormal operational mode.

The only pond water parameters to be controlled for operational purposes are pH in the water entering the condensers, free chlorine content in the water leaving the condensers and total dissolved solids (TDS). These parameters are controlled for the purpose of minimizing scaling and biological fouling of the

## 21.P (Continued)

condensers and service water system heat exchanger surfaces. Again, the reactor has no bearing on pond chemistry control.

While pond chemistry control requires frequent attention, the Company neither considers it to be a difficult task nor the requirements to be rigid. All parameters have fairly wide ranges within which they can vary and still maintain river water quality when discharged. In addition, the purpose of the DES-OL is not to explain detailed design features or administrative procedures to be used by the Midland Plant in maintaining cooling pond chemistry or the limits of discharges into the Tittabawassee River. The NPDES Permit defines the discharge parameters which must be met, and by its issuance the Company is committed to operating the Plant in compliance with these limits. The DES-OL recognizes this fact and reflects it repeatedly in Section 4.2.6.1 by indicating that the chemicals in the cooling pond blowdown will be regulated to meet the discharge limitations of the NPDES Permit.

## REFERENCES

1. Consumers Power Company letter to the Nuclear Regulatory Commission, Serial 16594, April 2, 1982; pp 6-7.

MARY SINCLAIR (4/17/82)

21.Q COMMENT: URANIUM FUEL CYCLE/RADON 222 HEALTH CONSEQUENCES

- 9) No discussion made of the long term health effects of the entire nuclear fuel cycle from routine operation of these plants which reaches into thousands of years.

Long Term Health Consequences

The health consequences of the radon-222 that will be released from mining and mill tailings of the uranium that will be needed for the Midland nuclear plants were evaluated. However, they were evaluated only for 1,000 years. However, these radon emissions are, in fact, governed by the 80,000 year half-life of the thorium and the 4.5 billion year half-life of the U-238 in the mill tailings and the amount of the material covering the tailings.

The NRC estimate of 2 deaths in the draft is more than 100,000 too low, according to the analysis of Dr William Lochstet. (Comments, Midland DEIS, April, 1982) This is due largely to the arbitrary, immoral, incorrect procedure of stopping the calculations at the end of the first 1,000 years.

RESPONSE

In a letter to the NRC responding to other comments on the DES-OL (Serial 17231, May 21, 1982), the Company addressed similar comments (14.H and 15.A) on the issue of the uranium fuel cycle. As noted in the previous response, the contention that the NRC is improperly evaluating the long-term health consequence of radon-222 emissions from the uranium fuel cycle is presently being addressed as a generic issue. However, in contrast with the conclusions of this comment, other sources suggest that the long-term consequences of uranium used for reactor operation may actually be less than those of the uranium had it been left undisturbed in the ground. In a recent article in Health Physics,<sup>(1)</sup> Dr Cohen analyzed the health consequences of and means to comply with the recent regulation on radon emissions in 10 CFR 40, Appendix A. This regulation requires that emissions from tailings piles be reduced to 2pCi/m<sup>2</sup>-sec. Dr Cohen points out that between 3 to 5 meters of soil covering the tailings piles will accomplish a reduction in emissions to below the specified 2pCi/m<sup>2</sup>-sec limit. At this emission rate, Dr Cohen calculates approximately 1.5 fatalities/GWe-yr spread over a time period of "hundreds of thousands of years." In contrast to the recent requirement of 10 CFR 40, Appendix A, Dr Cohen analyzed radon emissions from unmined uranium and concluded that unmined emissions would be approximately five times higher than for covered tailings. Thus, he concluded, "that if mill tailings are covered, the radon problem is an important positive factor in analyses of health effects of nuclear power; far more lives are saved by removing uranium from the ground to produce fuel for nuclear power plants than are lost from all radioactive emissions from the nuclear industry combined."

21.Q (Continued)

REFERENCE

1. B L Cohen, "Health Effects of Radon Emissions From Uranium Mill Tailings," Health Physics, Vol 42, No 5, May 1982.



MARY SINCLAIR (4/17/82)

21.R COMMENT: RADIOACTIVE WASTE DISPOSAL

Radioactive Waste

The flat statement that there will be no releases to the environment from low level radioactive waste buried in land-fills is belied by actual experience. The low level radioactive waste buried at Maxey Flats, Kentucky, and Sheffield, Illinois, was found migrating off site less than a decade after the AEC had assured state officials that they would remain in place for centuries.

The arbitrary statement that all the high level and transuranic wastes from these plants will be buried with no radiological environmental impact, is an illusion and not supportable by any facts or past experience.

RESPONSE

The issue of nuclear waste disposal is a generic item being resolved on the Federal level for the entire industry. With respect to the comment on low-level wastes, slight migration of very low concentrations of radioactivity have been reported just beyond the site fences at these low-level waste burial sites. However, no significant migrations have occurred and no subsequent environmental impacts to the public have been measured or observed. Thus, the DES-OL statement of "No significant effluent to the environment." in Table 5.9 is an accurate representation of current conditions with respect to low-level waste disposal. In regards to high-level waste disposal, it is relevant to note the recent Congressional activity on this topic. The Senate and House are presently working on a national nuclear waste policy bill (S.1662). That bill presently notes "the that technology exists and is under development" to provide reasonable assurance that spent fuel and high-level wastes can be disposed of safely and that disposal facilities can be "available when needed."<sup>(1)</sup>

REFERENCE

1. National Nuclear Waste Policy Act of 1981, Senate Bill S 1662.

MARY SINCLAIR (4/17/82)

21.S COMMENT: ONSITE WASTE STORAGE

- 7) No analysis made of the impact of storing hundreds of tons of high level nuclear wastes on site for any extended period of time near an industrial complex and a population center, since no method for the storage of high level wastes exists at the present time or for the foreseeable near future.

RESPONSE

The comment that no analysis has been made in regards to the impact of storing high-level wastes (ie, spent fuel) on site is false. Specifically, the consequences of an accident while handling spent fuel is addressed in Section 5.9.4.5 of the DES-OL. With respect to routine environmental effects of onsite storage, DES-OL Table 5.9 references WASH-1248<sup>(1)</sup> for waste management effluents. This document and its supplements (specifically NUREG-0116) address the environmental impacts of onsite storage on a generic basis. NUREG-0116 summarizes the environmental impacts of onsite storage of transuranic contaminated wastes as "quite small."<sup>(2)</sup>

The comment that no method of high-level waste storage will be in existence "for the foreseeable near future" does not reflect recent Congressional action. Our response to comment 21.R indicates that Congressional action on a waste storage bill is now pending. As noted in the Senate version of the bill, the technology exists or is under development to resolve this issue.

REFERENCES

1. WASH-1248, Environmental Survey of the Uranium Fuel Cycle, April 1974.
2. NUREG-0116, Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle, October 1976; Section 2.3

MARY SINCLAIR (4/17/82)

21.T COMMENT: RADWASTE TRANSPORTATION

- 8) No evaluation made of the unique problems of transportation of high level wastes through a heavy industrialized, highly populated area.

RESPONSE

Contrary to the commenter's contention of no evaluation, Section 5.9.3.1.2 of the DES-OL addresses the issue of transportation of radioactive materials including high-level wastes. The DES-OL specifically refers to a generic consideration of the issue as set forth in Summary Table S-4 of 10 CFR Part 50.20, which is reproduced as DES-OL Table 5.2.

BARBARA STAMARIS (no date)

22.A COMMENT: SOILS RELATED SAFETY CONCERNS

GENERAL

The unresolved safety issues regarding soil settlement problems and their remediation at this plant are, according to NRC statements in 1981, serious, extensive, and unprecedented. These soils issues set forth in the NRC Dec. 6, 1979 Order, have yet to be resolved by the ASLB hearing the case, yet the DES notes the absence of compelling safety concerns arising since the construction permit review and goes on to say "in the absence of any significant environmental or safety objection, the decision is an economic one."

RESPONSE

Most of the safety issues relating to soils raised by the NRC Staff have now been resolved. The NRC Staff has carefully reviewed and accepted the concept of all remedial proposals, and has permitted construction to proceed on many aspects of remedial activities following detailed Staff review. Final Staff resolution on remaining issues and approval of remaining remedial construction...is expected in the near future. In short, soils does not constitute a "significant safety objection."

BARBARA STAMARIS (no date)

22.B(1) COMMENT: ECONOMIC - CONSTRUCTION COST

GENERAL

The NRC then sets forth an economic analysis which considers the \$3.4 billion construction costs to be not "relevant for consideration now" despite the fact that these costs will become a part of the energy ratebase to the public as soon as the plant operates according to MPSC policy. Only production and operation costs are considered, resulting in a cost savings conclusion.

RESPONSE

The response to M Sinclair comment 22.A(1) indicates that consideration of construction monies is inappropriate for NRC operating license decision making.

BARBARA STAMARIS (no date)

22.B(2) COMMENT: ECONOMIC - CAPITAL COST OF ALTERNATIVES

GENERAL

Although the NRC ignores the capital investment of the Midland plant, it does not consider those factors for non nuclear alternatives. Saying "these alternatives would require significant environmental and capital commitments in addition to their cost of operation", it rules them out by using a double standard.

RESPONSE

The environmental and capital commitments for construction of the Midland Plant have been made already. Building other alternatives now to replace Midland would not change this fact, but would involve making new commitments for the alternatives. Additionally, the Nuclear Regulatory Commission has amended its regulations to eliminate considerations of alternative energy source issues from its review of applications to operate nuclear power plants. (1)

Previously, the Commission's regulations implementing the National Environmental Policy Act required that alternative energy sources, including no additional generating capacity, be considered in its review of both applications for permits to construct and licenses to operate nuclear power facilities.

In amending its regulations, the Commission has concluded that consideration of this matter continues to be important in its review of applications for permits to construct nuclear power plants.

However, past experience has shown that by the time an application for an operating license is reviewed, no viable alternatives to a completed nuclear plant are likely to exist which would tip the cost-benefit balance, required by the National Environmental Policy Act, against issuance of an operating license.

In addition, the Commission believes this conclusion would be unlikely to change -- even if an alternative were shown to be marginally superior from an environmental standpoint -- because of the economic advantage which operation of nuclear power plants has over available fossil generating plants.

REFERENCE

1. Nuclear Regulatory Commission, "Need for Power and Alternative Energy Issues in Operating License Proceedings," Final Rule, 10 CFR Part 51, Federal Register, Vol 47, No 59, March 26, 1982; pp 12940-12943.

BARBARA STAMARIS (no date)

22.B(3) COMMENT: ECONOMIC - DECOMMISSIONING COSTS

GENERAL

Unrealistic data base assumptions are apparant in the acceptance of a decommissioning estimate for Midland which represents less than 1% of its construction costs, in the face of Consumer's 1980 decommissioning request to the MPSC for Big Rock and Palisades which represented 100% of their original costs. Although inflation accounts for a portion of this difference, the discrepancy remains significant.

RESPONSE

The Consumers Power response to the W A Thibodeau comment, 4.A (Serial 17231, May 21, 1982), addressed this comment. The Company estimates the decommissioning cost of Midland, Units 1 & 2 to be \$235 million in 1984 dollars. In other words, if the Midland units are decommissioned in 1984, it will cost the Company \$235 million, which is approximately 7% of the total estimated construction cost of \$3,390 million and not 1% as alleged by the commenter. The Company's estimate of \$235 million (in 1984 dollars) for Midland decommissioning is based on the immediate dismantling/prompt removal method and also includes the cost of removal of non-nuclear structures and safe disposal of contaminated material from the site. The assumptions made for this estimate are very similar to the assumptions used for developing the decommissioning cost estimates for the Palisades and Big Rock Plants presented to the Michigan Public Service Commission in 1980. The commenter compares present-day decommissioning costs of Big Rock and Palisades to the construction costs in the early 1960's and early 1970's respectively - the construction completion dates for the Plants. Obviously, at a later date, the decommissioning cost of Midland Plant will be much higher simply because of the increased cost due to inflation.



BARBARA STAMARIS (no date)

22.B(4) COMMENT: ECONOMIC - APPLICANT'S RISK/SUNK COSTS

GENERAL

These are among the most flagrant examples of the extent to which the NRC feels compelled to go to justify the operation of a nearly complete facility. Consumers chose to proceed without predetermined acceptance criteria or NRC approval in their soil settlement remediation. Yet these and other construction practices undertaken supposedly at the Applicant's own risk, carry no risk at all when "sunk costs" are used in the manner the NRC has here elected to justify the need for this plant. The denial of the existence of significant safety concerns at this plant is a virtual abdication of NRC regulatory responsibility to the public.

RESPONSE

The commenter attempts to draw specific issues regarding soil settlement into the environmental analysis by stating that Consumers' proposals to remedy soil settlement problems are being conducted at the Company's own risk. The commenter goes on to say that the NRC uses sunk costs, representing construction work conducted at one's own risk, to justify the need for a completed plant. This argument has no support either in logic or in the actual practice of the NRC. The reference to construction being undertaken at Consumers' own risk, regarding soils settlement issues, was derived from minutes of a meeting between Consumers and the NRC. During that meeting, the NRC pointed out to Consumers that any construction work to remedy soil settlement problems was being undertaken at the Company's own risk; that the NRC had not determined at that time that the Midland remedial measures, in fact, resolved all safety concerns. That risk, ie, the risk that a utility design or construction will not meet safety requirements, is inherent in all activities undertaken pursuant to a construction permit. The Commission has always taken the position that the mere construction of the plant will not justify its operation unless all applicable safety requirements are met.

The commenter also states that Consumers "chose to proceed" with soils remedial work without predetermined acceptance criteria. While there has been some disagreement with the NRC Staff on this issue, the Company believes that adequate acceptance criteria were developed prior to any soils remedial work being undertaken. In any event, the issue is being litigated in the ASLB soils hearing and is not appropriate for consideration in the NRC's environmental review.

None of the examples cited in this comment represent the use of "sunk costs" to environmentally justify the Midland facility. The NRC's present practice is to ignore sunk costs in its Operating License environmental review, recognizing that such costs have already been incurred and that such costs are more appropriately considered at the Construction Permit stage. Since the NRC

## 22.B(4) (Continued)

does not take sunk costs into account at the time of its Operating License environmental review, the commenter is incorrect in stating that such sunk costs are used to justify the operation of the facility.

BARBARA STAMARIS (no date)

22.C(1) COMMENT: PROBABLE MAXIMUM FLOOD - DIKE DESIGN/CONSTRUCTION

GEOLOGICAL CONSIDERATIONS

- 1) The effect of the probable maximum flood (PMF) has not been adequately accounted for in that the cooling pond dike embankment was not designed and constructed as a Category I structure resulting in questionable freeboard allowance, according to NRC testimony in the OM-OL hearing.

RESPONSE

The effect of the PMF on the cooling pond dike has been considered and is discussed in the Final Safety Analysis Report<sup>(1)</sup> and a recent letter to the NRC<sup>(2)</sup> which addresses this issue. The Consumers Power response to the A B Savage comment (14.C) briefly discussed that information. The following conclusions summarize the referenced documents.

- 1) The effects of overtopping of dikes due to wind generated waves during PMF are not considered to be detrimental to the required safety function of the ultimate heat sink (ie, emergency cooling pond).
- 2) The emergency cooling pond is below the bottom of the dikes and will retain water independent of dike integrity.
- 3) The results of the slope stability analyses of the cooling pond dikes are presented in SER Section 2.5.6.7. The potential effects for erosion of the cooling pond dikes due to overtopping during a PMF and measures taken for the dikes to withstand the expected velocities is given in SER Section 2.4.4.4.

REFERENCES

1. FSAR, Revision 39, 11/81; Section 2.4.3; pp 2.4-4 - 2.4-12.
2. Consumers Power Company Letter (Serial 16642) to NRC, April 21, 1982.

BARBARA STAMARIS (no date)

22.C(2) COMMENT: PROBABLE MAXIMUM FLOOD - UPSTREAM DAM FAILURE

GEOLOGICAL CONSIDERATIONS

The following 4/3/82 newspaper article raises further questions about the adequacy of PMF calculations for this plant. ("Dam at Sanford on Hazard Potential List," Midland Daily News, April 3, 1982)

RESPONSE

As noted in the Consumers Power response (May 21, 1982, Serial 17231) to the A B Savage comment, 14.C, the Michigan Department of Natural Resources (MDNR) Water Management Division conducted a four year inventory and inspection program of Michigan Dams. The dams at Sanford and Beaverton have been classified as "High Hazard Potential" based only on their location with respect to downstream riparians. This indicates only that should the dams fail there would be a high hazard potential to downstream landowners with river front property. The dams have not been rated as structurally unsafe, in fact the supervisor of the MDNR's Dam Inventory and Inspection Program indicates both facilities should withstand a 200 year flood with a low probability (0.5% chance) of failure.<sup>(1)</sup>

Saginaw Intervenors at the Construction Permit stage (1972), asked a question about consideration of flooding and design of the Plant. The Applicant's response described<sup>(2)</sup> the hydrologic analysis and plant design aspects relative to major flooding.

The Probable Maximum Flood (PMF) combined peak flow is 262,000 cfs which includes the effects of Probable Maximum Precipitation with failure of Secord, Smallwood, Edenville and Sanford dams. The associated peak still water level at the Plant would be about 631 feet msl. Plant dikes are at elevation 632 and the power block is at elevation 634 feet msl.<sup>(3)</sup>

This safety related item is fully discussed in the Final Safety Analysis Report.<sup>(4)</sup>

REFERENCES

1. Discussion with the Michigan Department of Natural Resources, Water Management Division Supervisor of the Dam Inventory and Inspection Program (Mr Gary F Croskey) May 4, 1982.
2. Applicant's Reply to Saginaw Intervenors February 6, 1972 Statement of Environmental Contentions, Item 114; pp 124-125.
3. ER-OL, Revision 12, June 1981; Section 2.4.4; pp 2.4-5 - 2.4-10.
4. FSAR, Revision 39, 11/81; Section 2.4.3; pp 2.4-4 - 2.4-12.

BARBARA STAMARIS (no date)

22.D COMMENT: GROUNDWATER

GEOLOGICAL CONSIDERATIONS

. . .

2) Artesian water pressure, and its relationship to the underlying aquifers discussed in Appendix D to the 1970 SER, has not been addressed and resolved as a possible source of groundwater problems. (8/12/81 transcript p 4293, OM-OL proceeding)

RESPONSE

Section 5.3.1 of the DES-OL states, "Section V.B of the FES-CP is still valid..." The referenced Section of the FES-CP states, "The impervious layer prevents downward percolation from the cooling pond into the deep artesian aquifer."

Approximately 130 to 150 feet of very low permeability silty clays separate the cooling pond and the power block area from the deeper underlaying aquifers that are under artesian pressure. This thick silty clay strata acts as a very effective barrier between the near surface unconfined aquifer and the underlying deeper confined aquifers.

Even though the lower glacial aquifer is defined as artesian, the water pressure is not high enough to have any impact with respect to the power block area or the cooling pond. The thick clay layer that overlies and confines the lower aquifers minimizes the potential for vertical migration of groundwater in either an upward or downward direction.

With respect to the 8/12/81 OM-OL proceeding transcript, p 4293, hydrostatic pressures within the Plant fill have been accounted for in design and do not present a problem.

BARBARA STAMARIS (no date)

22.E COMMENT: AREA WATER REQUIREMENTS

GEOLOGICAL CONSIDERATIONS

3) "The Water Resources Commission, State of Michigan (1960) has stated that the water requirements in the Midland area for cooling, processing, and waste assimilation have already exceeded the supply", according to Appendix D of the 1970 SER, yet the DES fails to consider this finding and in fact accepts the elimination of the additional cooling capacity offered by the original cooling tower design.

RESPONSE

The 1960 Water Resources Commission Report<sup>(1)</sup> (WRC) was included, also as Appendix D to the Applicant's Supplemental Environmental Report<sup>(2)</sup> (ASER). The WRC report started with the assumption that upstream reservoirs were necessary for the Tittabawassee River, "Because the solution of downstream water resource needs involves regulated increases in river flows, a large part of the report is devoted to analyses of stream flow records and valley reservoir storage possibilities."<sup>(1)</sup> The report later states, "One of the main purposes of this report is to identify and appraise sites where the construction of dams would impound water in sufficient quantity to aid materially in increasing the low flow of the Tittabawassee River."<sup>(1)</sup> In regard to storage requirements the report states,

"Low flow rates of most larger streams in the Tittabawassee River system are small in comparison with their respective yearly averages. Thus, the present usefulness of these streams is only a fraction of their theoretical potentials. Those potentials can be realized in part by constructing storage reservoirs to hold seasonal excess flows for releases during low flow periods.

However, there are several undeveloped reservoir sites in the valleys of headwater and tributary streams which offer substantial possibilities for low flow augmentation.

Through the 46 years that stream flow records have been collected for the Tittabawassee River at Midland and Freeland, undeveloped sites on the Chippewa, Salt and Middle Branch of the Tittabawassee would have been adequate to maintain 800 cfs at Midland at all times."<sup>(1)</sup>

The report concludes:

## 22.E (Continued)

"In the Midland area the requirements for cooling, processing and waste assimilation have already exceeded the supply.

An assured minimum flow at Midland of between 600 and 800 cfs would meet the present requirements and provide for some future expansion.

The only means of obtaining these minimum flows is by use of reservoirs."<sup>(1)</sup>; and also that

"Direct diversions from streams for consumptive purposes during low flow periods may become a problem if the practice continues to expand. On the other hand, seasonal high flows constitute an enormous potential for storage and subsequent use."<sup>(1)</sup>

The above report conclusion on Midland area water requirements is supported only by the following statements:

"Today with few exceptions the pollution loads discharged into the surface waters of the basin have been reduced to the point where they are being assimilated without damage to other legitimate water uses. This improvement has been accomplished by elimination of certain seasonally heavy organic pollution loads, substitution of underground disposal for surface water disposal of wastes, and installation of conventional sewage and industrial waste treatment facilities.

From the standpoint of waste disposal, perhaps the most significant problem in the basin today exists in the Tittabawassee at Midland where the river's capacity for assimilating organic wastes has been reached under drought flow conditions expected once in ten years.

Assuming existing stream characteristics and uses remain unchanged, no further additions of organic waste can be permitted in the Midland area if reasonably acceptable conditions are to be maintained downstream."<sup>(1)</sup>

Since the WRC report was issued in 1960, several important changes have occurred. The Dow Chemical Company and the City of Midland have installed new and/or expanded sewage treatment facilities which reduce the organic waste load to the river. Dow Chemical and the City also obtain some of their water supply from Lake Huron. Additionally, the Water Resources Commission has promulgated Water Quality Standards (1973) which have resulted in improvements in the water quality of the Tittabawassee River by limiting discharges to levels which protect the River for various uses.

An earlier quote from the WRC report indicated the most significant problem occurred under drought flow conditions expected once in ten years. The Michigan Department of Natural Resources estimates that once in 10 years the



## 22.E (Continued)

seven day low river flow is expected to be less than about 260 cfs. The Midland Plant will use a reservoir (cooling pond) for closed cycle condenser cooling, but with sufficient storage capacity so that river water is only withdrawn for makeup during periods of high river flow (greater than 350 cfs). By using the cooling pond for storage the deficiency of water in the Tittabawassee River and the Midland area will not be intensified as a result of the Midland Plant. The NRC (AEC at that time) also recognized this in the 1972 FES-CP.<sup>(3)</sup> The WRC, who prepared the 1960 report and reached the conclusion contained therein, has reviewed Applicant's plan for use of the river water, including its staged withdrawal plan, issued an Order of Determination (October 15, 1970) and certified (March 12, 1971) that Applicant's discharges will comply with applicable State Water Quality Standards (ASER, Appendix N).<sup>(2)</sup> The WRC's filed comments on DES-CP indicated no concern over depletion of flow by Applicant.

Finally the ASLB concluded at the Construction Permit stage that

"Assuming that the proposed plant will be built at the proposed site, a final question is whether there is a preferable alternative cooling system for condenser water. An important consideration in this respect is that in order to supply coolant water in periods of low river flow, there will have to be a pond built at the location. The use of this pond for cooling thus has a natural cost advantage over cooling towers, all the cost of which would be supplemental to the cost of the pond . . . The Applicant discussed and the Staff considered the use of both dry and wet cooling towers. Neither form of wet tower (mechanical draft or natural draft) would offer any significant environmental advantages. . . We find that in the circumstances of this plant, the proposed cooling system is preferable to available alternatives."<sup>(4)</sup>

In addition the supplemental cooling tower originally discussed for cooling pond blowdown is not necessary. As correctly summarized in DES-OL, "...based on the comparison of the applicant's blowdown temperature studies in the river with the limitations specified in the draft NPDES permit and the water quality standards of the MWRC, the staff expects that the applicant will be able to operate Midland Plant within thermal discharge limitations."<sup>(5)</sup>

In summary several factors have resulted in improved water quality during low flow periods over the past twenty-two years since the referenced WRC report was published. Consumers Power Company's Midland Plant cooling pond assures the facility of an adequate cooling water supply and allows for the use of a closely regulated effluent which assures that cooling pond discharges will not exceed Water Quality Standards.

## REFERENCES

1. Water Resources Commission, State of Michigan, Water Resource Conditions and Uses in the Tittabawassee River Basin, 1960; pp IV, 93, 88, 112, 113, 69-70.

## 22.E (Continued)

2. Consumers Power Company, Applicant's Supplemental Environmental Report, October 19, 1971 (as amended); Appendix D; Appendix N.
3. ~~Applicant's~~ Energy Commission, Final Environmental Statement Related to Construction of Midland Plant, Units 1 & 2, March 1972; Section V.B, p V-10.
4. Atomic Safety and Licensing Board, Initial Decision, December 14, 1972; paragraph 77, pp 58-59.
5. Nuclear Regulatory Commission, Draft Environmental Statement Related to Operation of Midland Plant, Units 1 & 2, NUREG-0537, February 1982; Section 5.3.2.2, p 5-5.

BARBARA STAMARIS (no date)

22.F COMMENT: PIPE CORROSION NEAR BWST

#### GEOLOGICAL CONSIDERATIONS

. . .

4) The cause and effects of the unusual corrosion of stainless steel safety piping identified in 1979 near the BWST has not been resolved.

#### RESPONSE

The comment is irrelevant to the NRC's environmental review and is inaccurate in stating that stainless steel "safety" piping was identified in 1979 as being corroded. We assume that the piping referred to is the buried stainless steel line used to fill the Unit 1 condensate storage tank.<sup>(1,2)</sup> This piping is not safety grade. The probable cause of the corrosion of the condensate storage tank fill line has been determined to be localized stray currents from welding activities. Corrective action has been taken to prevent such practices from recurring.<sup>(4)</sup>

#### REFERENCES

1. "Stamiris Exhibit 35" from the ASLB Soils Hearings held on February 18 and 19, 1982 in Midland, Michigan, which is NRC "Summary of July 18, 1979 Meeting on Soil Deficiencies at the Midland Plant Site," October 16, 1979; Page 1, Paragraph 4.
2. Bechtel National, Inc, "Condensate Tank Fill Pipe Corrosion Study," Log Number 567177, transmitted by BLC-8608, December 19, 1979.

BARBARA STAMARIS (no date)

22.G COMMENT: SEEPAGE FROM DOW POND

GEOLOGICAL CONSIDERATIONS

5) The effect of possible contaminants from seepage from the Dow pond have not been adequately analyzed in relation to corrosion or other synergistic effects with radioactive emissions from the nuclear plant.

RESPONSE

Bullock Creek lies between the Dow pond and the Plant site area. Any seepage from the Dow pond toward the Plant area would be intercepted by Bullock Creek. An extensive groundwater study at the Plant site has shown that there is no groundwater recharge from Bullock Creek into the Plant fill. Therefore, seepage from the Dow pond will not affect groundwater quality in the Plant fill and is not a concern in evaluating corrosion or other affects in the Plant site area.

The Company's response to Question 52 from the NRC in regard to the 10 CFR 50.54(f) soils issue stated "The Dow pond is not considered a source of groundwater because of its topographic position with regard to the plant area and relocated Bullock Creek."<sup>(1)</sup> The response contained supporting information and sketches regarding distances and elevations of the Dow pond.

The NRC Staff stated that "Any seepage from this (the Dow) pond in an easterly direction toward the plant would be interrupted by the relocated Bullock Creek and would be carried to the Tittabawassee River." The Staff concluded "that the Dow pond will not be a source of recharge to the plant fill."<sup>(2)</sup>

REFERENCES

1. Consumers Power Company letter to Nuclear Regulatory Commission, Serial 10112, November 21, 1980, Response to Question 52.
2. Nuclear Regulatory Commission, Safety Evaluation Report Related to the Operation of Midland Plant Units 1 and 2, May 1982; Section 2.4.6.2, p 2-26.

BARBARA STAMARIS (no date)

22.H COMMENT: DESIGN/CONSTRUCTION - CONSIDERATION OF EXISTING SAFETY FEATURES  
MITIGATION OF ACCIDENT CONSEQUENCES

Section 5.9.4.4 of the DES credits Midland with possessing standard Engineered Safety Features designed to mitigate accident consequences, however these specific safety features are not analyzed as they exist at Midland.

The discussion of design features notes the passive mitigating capacity of the "steel lined, pre-stressed post-tensioned" concrete containment structure.

There is a bulge in the steel liner plate of Unit II (55e 74-01, 77-01). Structural reinforcing bars and Shear reinforcement were found lacking in the containment in 1975 and 1981 respectively (55e 81-05). Tendon sheath omissions occurred in 1977 and in 1979, containment post-tensioning errors occurred (I&E 79-19).

The component cooling water system, the next safety feature discussed, was found defective in 1980 (55e 80-06) as was the reactor cavity cooling system in 1981 (55e 81-06),

Lastly the DES states, "all the mechanical systems mentioned above are supplied with emergency power from onsite diesel generators". The integrity of the diesel generator system itself is a major unresolved safety question of the ongoing soil settlement proceeding.

In addition to these deficiencies, the reactor pressure vessel anchor bolts have cracked and failed requiring extensive permanent design modifications (55e 79-10). During the investigation of this problem, B&W requested confirmation of the Bechtel design input and discovered that the Bechtel NSSS Seismic-LOCA Analysis was defective (55e 80-07 #4). Errors were also found in Bechtels design input for the reactor building internal wall models which remain unresolved final 55e report (80-07 #5).

RESPONSE

The commenter contends that items reported by the Company under 10 CFR 50.55(e) which affect safety systems are not, but should be, factored "as-built" into the DES-OL discussion in Section 5.9.4.4 on systems designed to mitigate accident consequences. Although specific mention of the referenced issues is not made in the DES-OL, those which remain significant to safety and/or involve significant remedial actions are addressed in the Safety Evaluation Report (SER). This approach of providing an overview of safety features in the DES-OL while leaving detailed design information to the SER is specifically stated in Section 5.9.4.4 The SER should be consulted for a safety evaluation of the relevant referenced issues.

Beyond the issue of appropriateness of discussing SER items in the DES-OL, the commenter has implied within the context of the comment that no corrective

## 22.H (Continued)

measures have been taken to restore the reported items or to verify that the as-built conditions were within acceptance criteria. This implication is false as a summary of the status of the referenced examples shows:

1. With respect to the "bulge" in the steel liner plate of Unit 2, the cause of the "bulge" has been identified and corrected. All bulged areas of the liner plate were removed, replaced and reanchored to the containment wall. Cores were drilled and an analysis was made to verify that the structural integrity of the wall was not impaired by this incident. A test program was conducted to confirm the functionability of the replacement anchor system. Based on the information from the above tests and analyses, the replacement liner was found to be adequate and capable of meeting the original design criteria.
2. With respect to spacing of structural reinforcing bars in Unit 2 in excess of specification, detailed structural analyses were performed for the "as-built" conditions. The computed stresses in the steel and concrete were shown to be lower than the allowable stresses stated in the PSAR. Therefore, the structural integrity of the containment wall was not affected by local variations in rebar spacing and the rebar in its "as-built" location will properly perform its design function.
3. With respect to the adequacy of radial shear tie reinforcement around several containment penetrations, reanalysis of the suspect penetrations is ongoing to determine acceptability of the "as-built" condition. For penetrations in which the reanalysis has been completed, the shear stresses associated with penetration have been shown to satisfy acceptance criteria.
4. With respect to the misplacement of post-tensioning tendon sheathings, review of the "as-built" conditions indicated that the original design criteria could be met by rerouting the four misplaced sheathings. This new configuration was evaluated by the vendor for the post-tensioning system design. His evaluation established that relocation of the sheathings would provide a system equivalent to the original design.
5. With respect to "containment post-tensioning errors" in 1979, we assume the commenter is addressing the item on prestressing tendons in the referenced I&E Inspection Report.<sup>(1)</sup> This item concerns tendons fabricated with wire lengths in excess of specification. To correct this situation, some of the tendons were rechecked and tendons which could be salvaged were modified to the correct length. Based on this corrective action, original design criteria was maintained.
6. With respect to the component cooling water (CCW) system, corrective actions were taken to ensure that the system would function as designed under accident conditions. These actions, which include increasing CCW surge tank capacity, the size of the piping connecting the surge tank to the CCW pump, and providing faster motor operators on several isolation valves, are enumerated in the final 50.55(e) report.<sup>(2)</sup> Based on these

## 22.H (Continued)

actions, the CCW system design capability has been maintained to its original design criteria.

7. With respect to the reactor cavity cooling system, subsequent review of this item determined that the Plant could withstand one or more cycles of a loss of reactor cavity cooling without any detrimental effects on safety. Additionally, the Company committed to modify operating procedures for the system to require at least one fan in service during normal operations. In light of these findings, this issue is not relevant as a safety system concern.
8. With respect to the question of diesel generator integrity, the remedial measures being taken to resolve the soils settlement issue will ensure that diesel generator integrity is maintained. The design and construction details of the remedial measures are well developed and are receiving appropriate review prior to full implementation of the associated construction. In Sections 2.5.4 and 3.8.4 of the SER, the NRC discusses this issue. Additionally, an ad hoc subcommittee of the Advisory Committee on Reactor Safeguards (ACRS) has reviewed the foundation problems and remedial actions associated with the diesel generator building. In a memorandum to the NRC Staff, the ACRS noted that, with respect to the entire soils issue and proposed remedial actions, "the ACRS has found the Staff's approach to be acceptable..."<sup>(3)</sup> In contrast to the comment, based on the remedial measures being taken to resolve the soils settlement issue, diesel generator integrity will be maintained.
9. With respect to the reactor vessel anchor bolt failures, analysis of the problem has resulted in a redesign of the reactor vessel support system. This redesign includes detensioning the remaining studs to reduce service stresses and modifying the existing shield plug support brackets to provide additional upper lateral support. Based on a review of these changes, the NRC has concluded in SER Sections 3.8.2 and 3.9.3.3 that the redesign was an "acceptable approach" to satisfying the applicable requirements.<sup>(4)</sup>
10. With respect to errors in the input to the reactor building internal wall models, these input errors have been identified and corrected. Subsequent to these corrective measures, applicable portions of the Bechtel seismic analyses were being rerun in order to determine the impact, if any, of these model errors. This reanalysis has not yet been completed.

As noted above, all of the referenced items have had or are in the process of having corrective measures and/or reanalysis to establish that the item meets acceptance criteria. Corrective measures being taken to resolve 10 CFR 50.55(e) reports are reported to the NRC for their review.



## 22.H (Continued)

## REFERENCES

1. IE Inspection Report No 50-329/79-19; 50-330/79-19, September 25, 1979.
2. CP Co Letter, Serial 11529, March 31, 1981: Final 50.55(e) Report No 80-06 3.
3. Memorandum to William J Dircks (NRC) from R F Fraley (ACRS), May 14, 1982.
4. NUREG-0793, Midland Safety Evaluation Report, May 1982, Subsection 3.9.3.3.

BARBARA STAMARIS (no date)

22.I COMMENT: REACTOR VESSEL EMBRITTLEMENT

MITIGATION OF ACCIDENT CONSEQUENCES

Section 5.9.4.4 of the DES credits Midland with possessing standard Engineered Safety Features designed to mitigate accident consequences, however these specific safety features are not analyzed as they exist at Midland.

. . .

On top of these site specific problems with the reactor containment, the Unit 1 B&W reactor has been identified as one of 12 manufactured with a defectively high copper content in the welding making it sensitive to overcooling and embrittlement problems.

RESPONSE

In a letter to the NRC responding to other comments on the DES-OL (Serial 17231, May 21, 1982), the Company addressed a similar comment (13.A) on the issue of reactor vessel embrittlement. As noted in that previous response, although specific mention of this safety-related issue is not made in the DES-OL, it is extensively discussed in the Safety Evaluation Report.<sup>(1)</sup> Furthermore, the issue of reactor vessel embrittlement is a generic safety issue which currently is in various stages of review and resolution by the NRC. Given the generic nature of this issue and the extensive SER review, specific omission of this issue from the DES-OL is not significant.

REFERENCES

1. NUREG-0793, Midland Safety Evaluation Report, May 1982; Subsection 5.3.

BARBARA STAMARIS (no date)

## 22.J COMMENT: B&W SYSTEM SENSITIVITY

### MITIGATION OF ACCIDENT CONSEQUENCES

Section 5.9.4.4 of the DES credits Midland with possessing standard Engineered Safety Features designed to mitigate accident consequences, however these specific safety features are not analyzed as they exist at Midland.

Add to that the generic B&W system sensitivity and TMI problems, and the combined effect is overwhelming. Yet the NRC does not systematically address the combined and interrelated effect of these weaknesses.

### RESPONSE

Although specific mention of the B&W sensitivity issue is not made in the DES-OL, Section 5.9.4.4 of the DES-OL does refer the reader to the Safety Evaluation Report (SER) for "more extensive discussions of safety features and characteristics of the Midland Plant." In Section 5.5 of the SER, the NRC extensively reviews the issue of B&W sensitivity. The NRC concludes that "the core will be protected in the event of postulated overcooling events"<sup>(1)</sup> and that "plant modifications being implemented by the applicant will reduce the occurrence rate of overcooling events."<sup>(1)</sup> Given the DES-OL reference to the SER and the extensive discussion of the issue in the SER, specific omission of B&W sensitivity in the DES-OL is an insignificant concern.

With respect to the issue of "TMI problems," the comment is so vague that the concern is obscured. Regardless, Section 5.9.4.4(1) of the DES-OL specifically addresses the implementation of lessons learned from the TMI-2 accident. The DES-OL states that the Applicant will be required to meet the TMI related requirements specified in NUREG-0737.<sup>(2)</sup> The DES-OL further states that no credit has been taken for these improvements in discussing the radiological risk of accidents in the DES-OL. Furthermore, the SER extensively discusses the application and implementation of TMI related requirements throughout the document. Based on the extensive coverage provided TMI related issues in the SER, the commenter's vague contention also appears to be inaccurate.

### REFERENCES

1. NUREG-0793, Midland Safety Evaluation Report, May 1982; Subsection 5.5.9.
2. NUREG-0737, Clarification of TMI Action Plan Requirements, November 1980.

BARBARA STAMARIS (no date)

22.K(1) COMMENT: PLANT SITING - POPULATION DISTANCE REQUIREMENTS

MITIGATION OF ACCIDENT CONSEQUENCES

. . .

The second section on Accident Mitigation in the DES concerns Midland site characteristics. This site was considered marginal even by 1969 standards according to the ACRS on 2/6/69 because of the Dow population within the exclusion zone and part of the city of Midland within the low population zone. According to this report "the site received a -34 index rating when compared to the hypothetical reference site". The DES states that "although a portion of the city is within the 1-1/3 mile (limit), it consists almost entirely of the Dow Chemical Property." The NRC interprets CFR100 population distance requirements to be based on the "population center distance" thereby justifying the location.

RESPONSE

In a letter to the NRC responding to other comments on the DES-OL (Serial 17231, May 21, 1982), the Company addressed a similar comment (3.B) on plant siting. As noted in our previous response, this is a Construction Permit stage issue which has been fully addressed before the Atomic Safety and Licensing Board (ASLB). As a result of the Construction Permit hearings, the ASLB concluded the following: "The residential population within the zone is well within acceptable limits. ...the Board finds the population zone satisfactory."<sup>(1)</sup>

REFERENCE

1. Atomic Safety and Licensing Board, Initial Decision, December 14, 1972; Paragraph 16.

BARBARA STAMARIS (no date)

22.K(2) COMMENT: PLANT SITING - REACTOR LOCATION/COMPENSATORY MEASURES  
MITIGATION OF ACCIDENT CONSEQUENCES

. . .

The 1969 Foundation Investigation Report by the Applicant notes that the reactor site had to be relocated twice "because of subsurface conditions encountered" before returning to the original location. Located on a floodplain which had to be built up with up to 35 feet of fill soils, it is apparant that the controlling factor in the location of the Midland plant was the need to be near the Dow complex to provide it with process steam. Despite the Applicant's failure to meet the compensatory design requirements regarding removal of loose surface sands, fill soil procedures, and groundwater analysis for this site which have resulted in the sitewide soil settlement problems facing us today, the NRC continues to defend and justify the construction of this plant.

RESPONSE

The comment is incorrect, the reactor site did not have to be relocated.

An important feature of the Plant is its cogenerative nature. In addition to supplying electricity for the Consumers Power system, the Plant will produce process steam for use by the Dow Chemical complex. Given the cogenerative nature of the Plant, the ASLB, at the Construction Permit stage, stated the following: "We conclude then that there is no preferable alternative" (site).<sup>(1)</sup>

Fill related problems at the Plant have been the topic of extensive public hearings. These hearings were the appropriate forum for all the issues raised in the comment. The design and construction details of the remedial measures at the Plant are well developed and are receiving appropriate NRC review prior to full implementation of the associated construction.

REFERENCE

1. Atomic Safety and Licensing Board, Initial Decision, December 14, 1972; Paragraph 76.

BARBARA STAMARIS (no date)

22.L(1) COMMENT: NEPA CONSIDERATIONS - ATTORNEY GENERAL STUDY

NEPA CONSIDERATIONS

NEPA requires that a federal agency make a "good faith" effort to predict reasonably foreseeable environmental impacts after taking a hard look at potential impacts. (PSC of Oklahoma, LBP78-26, 8NRC 102, 141) It also requires that the NRC give "considerable weight to action taken by another competent and responsible governmental authority in enforcing an environmental statute". (Ibid p281, 282) The DES does not represent a good faith effort to take a hard look at environmental impacts likely from this plant. Hopefully before it final (sic) Environmental Impact Statement the NRC will take a hard look at the studies by the Michigan Attorney General indicating that the Midland plant is neither necessary or cost effective compared to environmentally safer alternatives...

RESPONSE

The Consumers Power response to M Sinclair comments, 21.A(3) and 21.A(4), forcefully indicate that the Administrative Law Judge found that the AG-MCL study is flawed and that the Michigan Public Service Commission rather than the AG is the responsible agency for deciding issues of necessity and cost.

BARBARA STAMARIS (no date)

22.L(2) COMMENT: NEPA CONSIDERATIONS - MERB COMMENTS

NEPA CONSIDERATIONS

...  
Hopefully before its final (sic) Environmental Impact Statement the NRC will take a hard look at...and at the recent criticisms of the Michigan Environmental Review Board to the DES.

RESPONSE

Per the May 11, 1982 letter from the Governor of Michigan transmitting the Michigan Environmental Review Board (MERB) comments to NRC, MERB found the DES-OL to be unacceptable because of omissions and some apparent misstatements. Of the specific comments listed, all but one have been addressed in one or more of the following:

- a) Consumers Power Company letter to the Nuclear Regulatory Commission, DES-OL Comments, Serial 16594, April 2, 1982.
- b) Consumers Power Company letter to the Nuclear Regulatory Commission, Applicant's Response to 20 DES-OL Comment Letters, Serial 17231, May 21, 1982.
- c) Discussions at the February 22, March 22, and April 26, 1982 Michigan Environmental Review Board Meetings on the NPDES Permit.
- d) Consumers Power Company letters to Michigan Environmental Review Board in response to NPDES Permit comments:
  - i) Hitt 32-82, March 5, 1982
  - ii) Hitt 38-82, March 10, 1982
  - iii) Hitt 50-82, April 8, 1982

The remaining comment on the comparison of radiological dose commitments from design-basis accidents with those from normal Plant operation is answered in another DES-OL section (Appendix C) which gives the doses expected from normal operation.

Refer to responses 25.A-25.I in this response letter.

It is our understanding that NRC Staff will attend the July 26, 1982, MERB meeting to address MERB questions.



DEBRA K STEMPEK (4/2/82)

23.A(1) COMMENT: RADWASTE DISPOSAL - GENERIC STATUS

It has been estimated by the Environmental Protection Agency that, by the year 2000, America will have more than one billion cubic feet of toxic waste to deal with. The question of how to store nuclear waste has been studied since the mid 1940's and no workable solution has yet to be found.

Not one permanent safe method of storage has been found after many years and numerous means have been tested. It is totally irresponsible to license another nuclear plant when there is no safe way to dispose and store the waste materials they produce.

RESPONSE

The issue of nuclear waste disposal is being handled as a generic item. Currently, the United States Senate and House are working on a national nuclear waste policy bill.<sup>(1)</sup> The bill notes that the "technology exists and is under development" to provide reasonable assurance that spent fuel and high level wastes can be disposed of safely and "that disposal facilities for spent fuel and high-level wastes can be made available when needed."

REFERENCE

1. National Nuclear Waste Policy Act of 1981, Senate Bill S 1662.

DEBRA K STEMPEK (4/2/82)

23.A(2) COMMENT: RADWASTE DISPOSAL - HEAT GENERATION

Geological formations of many types have been studied and not one has been found that would be capable of storing high level radioactive waste giving off temperatures exceeding 900F for millions of years.

RESPONSE

Geologic disposal of radioactive waste has been under development for the last 25 years. Bedded salt, salt domes, clays, shales, granites, and basalts are all being considered for permanent disposal of nuclear waste. These stable geologic formations have existed in a relatively undisturbed state for hundreds of millions of years. As noted in Senate Bill S 1662, "the technology exists and is currently under development" to provide reasonable assurances that high level wastes can be stored safely. (1)

With respect to heat generation of high level radwaste, the maximum temperature rise of the radwaste is dependent on the configuration of the waste container, time after irradiation in which the waste is buried, and fission product concentration. Lengthening the time after irradiation or lowering the fission product concentration both tend to lower the maximum temperature rise. In an article in Scientific American, (2) Dr. B L Cohen estimated that the maximum temperature rise at the surface of a waste container could be limited to 250C (482F) by burying the waste ten years after irradiation. In rock of average thermal conductivity Dr Cohen calculated that the maximum average increase in temperature in the rock just above and below the burial depth would not exceed 140C (284F).

After reaching a peak temperature, both the waste container surface temperature and burial rock temperature drop significantly. In Dr Cohen's example, the peak surface temperature of the waste container occurs at approximately one year after burial. The peak temperature of the rock occurs approximately forth years after burial. Based on these observations, the comment that high level radioactive waste generates heat exceeding 900F for millions of years is erroneous.

REFERENCES

1. National Nuclear Waste Policy Act of 1981, Senate Bill S 1662.
2. B L Cohen, "The Disposal of Radioactive Wastes From Fission Reactors," Scientific American, June 1977.

DEBRA K STEMPEK (4/2/82)

23.A(3) COMMENT: RADWASTE DISPOSAL - COMMERICAL/MILITARY WASTES

With commerical plants producing wastes at a much faster rate than the military, it is absurd to produce such highly toxic wastes with absolutely no safe method of storage.

RESPONSE

The issue of whether the military or commercial radioactive wastes are being generated at a faster rate is not really germane to the issue of waste disposal. Regardless of the rate of production of high level wastes, the technology exists to safely dispose of the waste. As noted in the findings of Senate Bill S 1662, "disposal facilities for spent fuel and high level wastes can be available when needed."<sup>(1)</sup> Finally, in contrast to the comment, over 90% by volume of all waste and about 97% by volume of the high-level waste accumulated through 1980 has resulted from defense activities.<sup>(2,3)</sup>

REFERENCES

1. National Nuclear Waste Policy Act, Senate Bill S 1662.
2. Dr G Oertel, "The DOE Program in High Level Waste Immobilization," NUREG/CP-0005, December 1978.
3. "Fact Sheet on the President's Program on Radioactive Waste Management," February 12, 1980.

DEBRA K STEMPEK (4/2/82)

23.A(4) COMMENT: RADWASTE DISPOSAL - STATE BANS

California and New York are the only two states that have banned further nuclear power development pending a demonstrated permanent waste disposal system at the Federal level.

RESPONSE

This comment is irrelevant with respect to the Midland Plant. Furthermore, judgment as to the constitutionality of these bans is pending before the U.S. Supreme Court.

DEBRA K STEMPEK (4/2/82)

23.A(5) COMMENT: RADWASTE DISPOSAL - URANIUM FUEL CYCLE

Besides the high level radioactive wastes there is also the remains to be considered from the mining and milling of uranium. To produce the 30 tons of enriched uranium fuel that is needed to operate a 1000-megawatt pressurized water reactor for a year, about 272 tons of natural uranium is required. This ore contains only 0.15% uranium, therefore 180,000 tons of uranium ore must be mined and processed.

RESPONSE

In a letter to the NRC responding to other comments on the DES-OL (Serial 17231, May 21, 1982), the Company addressed similar comments (14.H and 15.A) on the issue of the uranium fuel cycle. The response to comment 21.Q in this letter also addresses the issue. As noted in our previous response, this issue is presently being addressed on a generic basis. It is relevant to note, that in terms of the health consequence of mill tailings, some authorities on the subject suggest that the long-term consequences of radioactive emissions from mill tailings may actually be less than those of the uranium had it been left in the ground. (1)

REFERENCES

1. "Health Effects of Radon Emissions From Uranium Mill Tailings, Berward L Cohen. Health Physics, Vol 42, No 5, May 1982.

DEBRA K STEMPEK (4/2/82)

23.A(6) COMMENT: RADWASTE DISPOSAL - DECOMMISSIONING

Low level wastes must also be disposed of not to mention the nuclear installation itself.

RESPONSE

Low level waste disposal does not represent a major problem and technology exists for the disposal of these wastes as well as high level wastes. Decommissioning was addressed properly in the Draft Environmental Statement for the Midland Plant. It was concluded in the DES-OL that the "technology for decommissioning nuclear facilities is well in hand and, although technical improvements in decommissioning techniques are to be expected, at the present time decommissioning can be performed safely at a reasonable cost."<sup>(1)</sup>

REFERENCES

1. "Draft Environmental Statement related to the operation of Midland Plant, Units 1 and 2," US Nuclear Regulatory Commission, NUREG-0537, February 1982; Section 5.11, p 5-70.

DEBRA K STEMPEK (4/2/82)

23.A(7) COMMENT: RADWASTE DISPOSAL - AMOUNT

If nuclear power plants are allowed to proliferate, by 1990 the US would have to build a new permanent repository every 2 to 3 years.

RESPONSE

Approximately 25 tons of fuel per year are utilized by a 1000 megawatt nuclear power plant. The resultant volume of high level waste requiring disposal is controlled by a number of variables such as disposal technique, percent of fission product concentration, and whether spent fuel is reprocessed. Dependent on the assumptions used, the projected volume of waste can vary greatly. Likewise, assumptions on the projected number of operational power plants and the size of repositories can affect the conclusions of the commenter. Given recent projections for the number of commercial nuclear power plants and a careful search of the literature, it does not appear that the volume of waste is a major concern in resolving the radwaste disposal problem nor that a "new permanent repository" will have to be built every two to three years by 1990. Regardless of the number and rate of repositories required, Senate Bill S 1662 notes that "the technology exists and is under development which would provide reasonable assurance that spent fuel and high-level radioactive waste can be safely disposed of and that disposal facilities for spent fuel and high-level wastes can be available when needed."<sup>(1)</sup>

REFERENCE

1. National Nuclear Waste Policy Act of 1981, Senate Bill S 1662.



ANDREA K WILSON (4/2/82)

24.A COMMENT: CHEMICAL/RADIOLOGICAL SYNERGISM

Midland area is unique in that there is no other place in the country that has a nuclear plant being constructed in such close proximity to such an expansive chemical site. Midland has been, unknown to the DNR, exposed to radiation as well as to carcinogenic and toxic chemicals. What is the synergistic effect between Dow Chemical and the Midland Plant Nuclear Plant effluents?

RESPONSE

In a letter to the NRC responding to other comments on the DES-OL (Serial 17231, May 21, 1982), the Company addressed a similar comment (3.A) on chemical/radiological synergisms. The responses to comments 21.K(1) and 21.K(2) of this letter also address this issue. As noted before, the issue of synergism has been formally raised during the Construction Permit Hearings before the Atomic Safety and Licensing Board. Following extensive review, the Board concluded that the evidence was "overwhelming against" a finding of synergism.

The response to comment 24.B, following, addresses the minimal existing radiological releases from The Dow Chemical Company.

ANDREA K WILSON (4/12/82)

24.B COMMENT: DES DOSE CALCULATIONS

Why did the DES calculations fail to consider the unusual circumstances surrounding this particular area and the high exposure residents are already subjected to?

When drafting an environmental impact statement it is imperative that the statement take into account the total community, industry, projected growth and long-term development plans.

RESPONSE

Since the response to the previous comment, 24.A, addresses chemical/radiological synergism, it is assumed that the commenter is referring to radiological releases from The Dow Chemical Company as the "unusual circumstances" based on statements made earlier in the letter. In conversations with Dow Chemical, we have been advised that the projected dose from radiological releases at Dow have been recalculated since the referenced news article<sup>(2)</sup> to factor in Midland specific meteorology<sup>5</sup>. Based on these calculations, the projected dose is on the order of  $1 \times 10^{-5}$  mrem/year under the worst circumstances.<sup>(1)</sup> This value is negligibly small compared to the calculated dose commitments to the maximally exposed individual and to the population from operation of the Midland Plant as given in Table C.7 of the DES-OL. Inclusion of this dose would have no effect at all in DES-OL calculations of radiological impacts. As noted by the Michigan Department of Natural Resources (MDNR) in the news article attached to the commentator's letter, preliminary indications from MDNR studies of Dow incinerator emissions conclude that the risk of contracting a fatal cancer from these effluents is "so low it's absurd."<sup>(2)</sup>

REFERENCE

1. Telephone conversation, Consumers Power Company to Tracy Parsons/Dow Chemical Company, June 25, 1982.
2. Midland Daily News, "Dow Seeks Permit to Burn Radioactive Wastes," April 9, 1982; p3.

ANDREA K WILSON (4/12/82)

24.C COMMENT: PREOPERATIONAL/OPERATIONAL RAD MONITORING

This poor handling of what should be an important public report prompts me to recommend that public health data be collected before, during, and after the Midland Plant begins operation to establish a basis for comparison.

RESPONSE

As noted in Section 5.9.3.4 of the Midland DES-OL there is a preoperational and an operational phase of the offsite radiological monitoring program. This program will provide the necessary data to determine if the Midland Plant has any adverse radiological health effects on the public.

## GOVERNOR, STATE OF MICHIGAN: MERB (5/11/82)

## 25.A COMMENT: WATER QUALITY IMPACTS

General: The EIS includes several statements that are in contrast to those made earlier in the construction EIS. Impacts on water quality, . . . are predicted.

. . .

Vi: 4d. "small to moderate impacts" - How can this be true if the water quality standards are met?

. . .

5-1 statements given in Vi . . . above are repeated here.

## RESPONSE

Consumers Power Company has responded several times to the DES-OL statements and subsequent comments on downstream water quality effects:

- a) Consumers Power Company letter to Nuclear Regulatory Commission, DES-OL Comments, Serial 16594, April 2, 1982.
- b) Consumers Power Company letter to Nuclear Regulatory Commission, Applicant's Response to 20 DES-OL Comment Letters, Serial 17231, May 21, 1982.
- c) Discussions at the February 22, March 22 and April 26, 1982 Michigan Environmental Review Board Meetings on the NPDES Permit.

The Consumers Power response to the T L Washington Comment, 12.J(5), notes that the DES-OL concludes that Plant total dissolved solids (TDS) discharges may produce a small to moderate impact on existing and potential new water users. It is the Consumers Power Company position that since Michigan Water Quality Standards for TDS will not be exceeded due to Plant discharges (ie, cooling pond blowdown), Midland Plant TDS discharges will have little effect on present or potential new water users downstream.

The Plant cooling pond blowdown discharge is controlled by an on-line, real-time computer control system designed to match pond blowdown discharges with ambient river conditions to meet Water Quality Standards.

There are no present downstream water users that will be affected by Plant TDS discharges (ER-OL, Rev 12, Section 2.1.3.4.1). The TDS concentration in the river is controlled by regulatory limits to protect water quality for all uses. Dissolved solids will be a factor in regulating Midland Plant discharges. Plant cooling pond blowdown is controlled continuously to protect against Plant discharges which would cause the river TDS to exceed regulatory limits.

## 25.A (Continued)

The Consumers Power response to the T Hearron comment, 10.C, states that the concern of TDS impact on river water quality and downstream users was thoroughly addressed by Steve Casey (Michigan Department of Natural Resources (MDNR), Comprehensive Studies Section) at the April 26, 1982 meeting of the Michigan Environmental Review Board. MDNR Staff's presentation can be summarized as follows:

- a. Midland Plant cooling pond blowdown is expected to average 880 mg/l TDS with a maximum concentration of 2,200 mg/l.
- b. Plant TDS mass loading represents about 2% of total river load.
- c. River concentration of TDS as measured at Freeland Bridge will not exceed Water Quality Standards of 500 mg/l average and 750 mg/l maximum as a result of TDS input from the cooling pond discharge at the Midland plant.
- d. The "designated use" for the Tittabawassee River per R323.1100(1) of Part 5 of the Water Resources Commission (WRC) General Rules is "As a minimum, all waters of the State shall be protected for agricultural uses, navigation, industrial water supply, public water supply at the point of water intake, warm-water fish and partial body contact recreation" (emphasis added).
- e. The water quality standards of 500 mg/l average and 750 mg/l maximum for TDS were designed to protect for the most restrictive designated uses which are public and industrial water supply.
- f. Per EPA's Quality Criteria for water (Red Book), freshwater fish can tolerate TDS concentrations from 5,000 to 10,000 mg/l.

As indicated above, State Water Quality Standards of 500 mg/l average and 750 mg/l maximum for TDS will not be exceeded at Freeland Bridge as a result of plant discharges. Moreover, Steve Casey (MDNR Staff) advises that there are many public water intakes with TDS concentrations near 1,000 mg/l. He also advised that in this range of concentration, intake water would not require treatment for TDS reduction.

In summary, Midland Plant discharges of TDS will not impair the designated uses of the river. Therefore, future downstream users will be able to locate intakes in the river.

## GOVERNOR, STATE OF MICHIGAN: MERB (5/11/82)

## 25.B COMMENT: WATERFOWL IMPACTS

General: The EIS includes several statements that are in contrast to those made earlier in the construction EIS. Impacts on ... waterfowl ... are predicted.

...

Vii: 4h. "may pose hazards to waterfowl" - Ongoing studies do not make this an obvious conclusion.

4m. "attraction of waterfowl" - Again, this is not an obvious conclusion from ongoing studies.

...

5-1 statements given in . . . Vii above are repeated here.

## RESPONSE

Consumers Power Company has responded twice to the DES-OL statements and subsequent comments on waterfowl impact:

- a) Consumers Power Company letter to Nuclear Regulatory Commission, DES-OL Comments, Serial 16594, April 2, 1982.
- b) Consumers Power Company letter to Nuclear Regulatory Commission, Applicant's Response to 20 DES-OL Comment Letters, Serial 17231, May 21, 1982.

The Consumers Power response to the T Hearron comment, 10.D, indicates that since 1979, Michigan State University has been under contract to study waterfowl (and other waterbird) use of the Midland Plant cooling pond and vicinity. Two Michigan State University annual reports are cited as References 24 and 25 of Chapter 5 of the DES-OL. While the results of these preoperational studies do not allow the prediction of future impacts with complete certainty, they do provide a context for impact assessment. On-going preoperational monitoring and anticipated operational monitoring will enable Consumers Power Company to more fully assess potential impacts to waterfowl and to take measures to prevent such impacts.

In the Consumers Power response to the US Department of Interior comment, 20.C, we indicate that the Midland Plant cooling pond supports fish, aquatic plants, and other organisms which attract waterfowl, as indicated in our Avifauna Monitoring Program reports. Nearby grain fields supply an offsite food source for dabbling ducks and geese. However, when the cumulative impacts of regional open water sources and the amenities of the cooling pond are taken together, the numbers of waterfowl which will use the pond are difficult to predict.

## 25.B (Continued)

Disease potentially could pose a problem to wintering waterfowl. In fact, as a contingency measure we have contacted a Michigan Department of Natural Resources wildlife veterinarian to discuss the roles of State, Federal and Company representatives should a disease incident require the implementation of the Federal Waterfowl Disease Contingency Plan.

For several reasons we do not believe that waterfowl starvation will be a major impact.

1. Field feeding ducks and geese in the State readily move south as field food sources become unavailable. Wintering populations move north and south along the critical snowline with the availability of food and open water. Starvation should not be a problem with these birds.
2. Food resources are insufficient for a significant diving duck (Aythyinae) buildup in the winter. Thus diving duck starvation, a problem in wintering situations where ice cover renders food unavailable, is not anticipated.
3. It is likely that some fish will survive in the pond during operation and provide an appropriately sized forage base for mergansers (Merginae). Winter use of the pond by mergansers seems likely; indeed, mergansers are the most abundant diving ducks found in the Karn-Weadock discharge in Bay City. Mergansers commonly winter in the region in other warm water discharges, the faster flowing rivers, and stretches of rivers below dams. The diversity of potential wintering habitats lessens the likelihood of starvation for the Merginae.

In summary we do not believe that waterfowl starvation is a potential problem.



GOVERNOR, STATE OF MICHIGAN: MERB (5/11/82)

25.C COMMENT: FOGGING IMPACTS

General: The EIS includes several statements that are in contrast to those made earlier in the construction EIS. Impacts on ... downwind fogging are predicted.

. . .

5-8 Paragraph 5: "If traffic hazards" - What about closing or rerouting the road?

RESPONSE

Consumers Power Company has responded several times to the DES-OL statements and subsequent comments on cooling pond fog impacts:

- a) Consumers Power Company letter to the Nuclear Regulatory Commission, DES-OL Comments, Serial 16594, April 2, 1982.
- b) Consumers Power Company letter to Nuclear Regulatory Commission, Applicant's Response to 20 DES-OL Comment Letters, Serial 17231, May 21, 1982.
- c) Discussions at the February 22, March 22 and April 26, 1982 Michigan Environmental Review Board Meetings on the NPDES Permit.

Consumers Power responses to previous comments 3.E, 8.B, 9.C and 14.E address the concerns raised by the present comment. While fogging will occur over the Midland pond, it is expected that it will remain very localized and have minimal effect on traffic. It is anticipated that the fogging and icing effects of the Midland Plant cooling pond will be comparable to those observed during a study of cooling ponds located at the Baldwin and Dresden plants as reported by EPRI.

The Dresden study indicated that on those infrequent occasions when fogging did extend a significant distance from the plant, the fog tended to rise as the distance from the pond increased. Thus, while the fog may have extended some distance from the plant, the effects on traffic were minimal since the fog was elevated above the roadway.

The proposed monitoring program and a commitment to take those actions which may be necessary to mitigate fogging effects are contained in the Consumers Power Environmental Report. Company officials have had discussions (May 1982) on these topics with the Midland County Road Commission.

GOVERNOR, STATE OF MICHIGAN: MERB (5/11/82)

25.D COMMENT: ELIMINATION OF COOLING TOWER

General: The EIS includes several statements that are in contrast to those made earlier in the construction EIS. . . . The elimination of the cooling tower . . . are deficiencies that need justification.

RESPONSE

Consumers Power Company has responded several times to the comments on elimination of the cooling pond blowdown cooling tower:

- a) Consumers Power Company letter to Nuclear Regulatory Commission, Applicant's Response to 20 DES-OL Comment Letters, Serial 17231. May 21, 1982.
- b) Discussions at the February 22, March 22 and April 26, 1982 Michigan Environmental Review Board Meetings on the NPDES Permit.
- c) Consumers Power letter to Michigan Environmental Review Board, Hitt 38-82, March 10, 1982.

The Company concurs with the NRC Staff conclusions presented in DES-OL Section 3.2. There has been a change in the design of the Plant's cooling water system which included the elimination of the blowdown cooling tower.

Applicant's Environmental Report Supplement (ERS) was distributed to appropriate State and Federal agencies in 1976 per the NRC required distribution list and has been a matter of public record since then. ERS Section 3.4 discussed the Plant's heat dissipation system after the elimination of blowdown cooling towers. Earlier in 1976 the Company had reviewed with the Michigan Department of Natural Resources (MDNR) the elimination of the blowdown cooling tower. The Company was advised by letter from the MDNR that the requirements applicable to the cooling pond discharge would be those specified in the State Water Quality Standards. These standards can be met without a cooling tower on the pond discharge. Operating a cooling tower on the pond discharge would have negative effects. These would have included reduced reliability of operations and emissions of water vapor and drift which could contribute to icing of power lines and to fogging in the vicinity of the towers. The blowdown cooling towers also would have increased levelized annual cost by approximately two million dollars.

In summary, the cooling tower on the cooling pond discharge was eliminated, with MDNR knowledge, because it was not needed to meet State Water Quality Standards, it had potential negative operating effects during cold weather and it was costly.

Since Michigan Water Quality Standards will be met with the as constructed heat dissipation system, there is no compelling environmental or safety

## 25.D (Continued)

concern which merits a complete review of alternative cooling water systems or subsystems.

The Consumers Power response to the T L Washington comment 12.I(1), and the Company's response to the MERB NPDES Permit comment 9, presented the above information.

GOVERNOR, STATE OF MICHIGAN: MERB (5/11/82)

25.E COMMENT: TEMPERATURES IN THERMAL PLUME

General: The EIS includes several statements that are in contrast to those made earlier in the construction EIS. . . . the lack of any limitation on the  $\Delta$  temperature within the mixing zone . . . are deficiencies that need justification.

. . .

5-4 Last Paragraph: you need to give the temperature isopleths within the mixing zone to determine the possibility of lethal conditions.

. . .

5-12 Paragraph 2 - "Appendix B" - there is nothing in Apperdx B that limits the temperature within the plume to be below lethal limits. This must be corrected.

RESPONSE

Consumers Power Company has responded several times to the comments on temperature limitations:

- a) Consumers Power Company letter to Nuclear Regulatory Commission, Applicant's Response to 20 DES-OL Comment Letters, Serial 17231, May 21, 1982.
- b) Discussions at the February 22, March 22 and April 26, 1982 Michigan Enviornmental Review Board Meetings on the NPDES Permit.
- c) Consumers Power Company letter to Michigan Environmental Review Board, Hitt 50-82, April 8, 1982.

Per the Consumers Power response to the T L Washington comment, 12.B, and per the responses to MERB NPDES comments 14 and 15, even though the Company believes that the original discharge limits would not have created fish kills, we proceeded to further limit our discharge temperatures. Since the March 22, 1982 Michigan Environmental Review Board meeting, additional thermal discharge restrictions, maximum temperatures ranging from 75° in winter to 95°F in summer, have been accepted by the Company for inclusion in the NPDES Permit. These restrictions will be included in the final NPDES permit (DES-OL Appendix B) as part of the special conditions regulating cooling pond discharges.

MDNR fisheries biologists have stated that operation of the Plant within these restrictions and other operational constraints to meet TDS and thermal mixing zone requirements will preclude lethal effects to fish in the Tittabawassee River.

GOVERNOR, STATE OF MICHIGAN: MERB (5/11/82)

25.F COMMENT: EVACUATION OF DOW EMPLOYEES

General: The EIS includes several statements that are in contrast to those made earlier in the construction EIS. . . . the lack of any specific evacuation plan involving Dow Company employees are deficiencies that need justification.

5-49 Paragraph 3 - "probability distribution of consequences" - This all depends on the evacuation plan. You should include the plan and explain what triggers various modes of evacuation. Of particular interest is the evacuation of Dow Company employees for an extended period of time. How do you stabilize the chemical reactions that are ongoing?

RESPONSE

Consumers Power Company has responded several times to the comments on evacuation planning:

- a) Consumers Power Company letter to the Nuclear Regulatory Commission, Applicant's Response to 20 DES-OL comment letters, Serial 17231, May 21, 1982.
- b) Discussions at the February 22, March 22 and April 26, 1982 Michigan Environmental Review Board Meetings on the NPDES Permit.

The Consumers Power response to the Michigan Department of Public Health comment, 18.C(1), discusses protective actions regarding Dow Chemical facilities. Dow recently added an annex to its overall emergency plans which addresses nuclear incidents at the Consumers Power Company Midland Plant. The annex provides a plan for maintaining emergency preparedness to prevent any injury to personnel and to minimize extensive loss or damage of products and equipment.

GOVERNOR, STATE OF MICHIGAN: MERB (5/11/82)

25.G COMMENT: ADDITIONAL THERMAL PLUME ANALYSES

4-9 "920 to 3650 cfs" - these analyses should be done at lower flows (300-400) to determine the ambient temperature within the mixing zone.

RESPONSE

This section of the DES-OL discusses the parameters of the hydraulic model study conducted by Alden Research Laboratory for Consumers Power Company as reported in April 1979. As stated in the DES-OL, "River flows modeled range(d) from ... 920 to 3650 cfs." The 1:15 undistorted scale model simulated a river section of about 2100 feet. This model has been dismantled. As shown in DES-OL Figure 4.1, pond blowdown at net river flows less than 21.8 m<sup>3</sup>/s (770 cfs) will be restricted to small excess temperatures and low discharge rates. This point has been discussed with MERB and is indirectly illustrated in the Company's response to MERB NPDES Permit comments 14 and 15.

GOVERNOR, STATE OF MICHIGAN: MERB (5/11/82)

25.H COMMENT: EXCLUSION AREA

5-41 Paragraph 1 - "within the exclusion area" - Does this exclusion area include any portion of the river itself? If so, how can you legally limit river use?

RESPONSE

Consumers Power Company has responded to comments on the exclusion zone in the Consumers Power Company letter to the Nuclear Regulatory Commission, Applicant's Response to 20 DES-OL comment letters, Serial 17231, May 21, 1982.

As described in Section 5.9.4.4(2) of the DES-OL, portions of the Tittabawassee River and Bullock Creek lie within the exclusion area. Per the Consumers Power response to the T L Washington comment, 12.H, the DES-OL also states that local and State agencies will evacuate and limit access to the exclusion area should the need arise. The authority for such action is delegated by the Michigan Emergency Preparedness Act. There will be no routine exclusion of the public from the surface waters of the Tittabawassee River or Bullock Creek. Consumers Power, with aid of the police/sheriff, will only evacuate the area during an emergency that necessitates such an evacuation.

GOVERNOR, STATE OF MICHIGAN: MERB (5/11/82)

25.I COMMENT: ACCIDENT RAD EXPOSURE

5-43 Paragraph 3 - "roughly comparable to the exposures" - This statement is not at all clear. This should be proven, not declared.

RESPONSE

The referenced DES-OL paragraph states that population exposures have been calculated for design basis accidents in the "range from a small fraction of a person-rem to about 750 person-rem for the population within 80 km of the Midland Plant." The radiological impacts for normal operations referenced in this paragraph are detailed in Appendix C of the DES-OL. Table C.7 provides the calculated annual dose commitment to the population based on both 10 CFR 50 Appendix I design objective values and site specific calculations. The calculated annual dose commitment for both units is 6.32 person-rems. The annual dose commitment based on Appendix I design objectives is 10 person-rem. By considering these annual dose commitments over the entire life of the Plant, it can be readily concluded that population exposure due to normal operations is "roughly comparable" to "the small fraction of a person-rem to about 750 person-rem" for design basis accidents.