Consumers
Power
Company

Stephen H. Howell
Senior Vice President

80E01.13 HOWE 67-79 RFG 0279-21

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

February 27, 1979

Director of Nuclear Reactor Regulation
Att Mr Roger Boyd, Director
Division of Project Management
US Nuclear Regulatory Commission

MIDLAND PROJECT -
DOCKETS 50-329, 50-330 -
AMENDMENT 60 -
FILE: 0485.11 SERIAL 6575

Enclosed herewith is Amendment 60 to Consumers Power Company's application for construction permits and operating licenses containing forty-one (41) copies including three (3) signed originals of Revision 6 to the Company's Environmental Report, Operating License Stage.

Revision 6 to the Environmental Report (OLS) contains updated material as detailed in the application page.

We are retaining an additional one hundred nine (109) copies of Revision 6 to the Environmental Report for direct distribution. Within ten (10) days after docketing, we will provide an affidavit that distribution in accordance with Enclosure 1 to your April 10, 1978 letter (as revised by April 28, 1978 letter) has been completed.

Stephen H Howell (Signed)

7903020355

CONSUMERS POWER COMPANY

APPLICATION FOR

REACTOR CONSTRUCTION PERMIT AND OPERATING LICENSE

DOCKET 50-329
DOCKET 50-330
AMENDMENT 60

Enclosed herewith, revising and supplementing the above-entitled application, are revised pages for incorporation in the Environmental Report (OLS). The Environmental Report was submitted with Amendment 43 to the above dockets on April 12, 1978. The enclosed material consists of the following:

1. Revised responses to Mr W H Regan, Jr letter of October 11, 1978 requesting additional information.

2. Responses to Mr W H Regan, Jr letter of January 31, 1979 requesting additional information.

3. Revised material on makeup water withdrawal and on decommissioning and dismantling.

4. Correction of minor errors and omissions.

5. Changes relating to the above (Tables of Contents, Text, Figures, Tables, etc).

These new and revised pages bear the notation "Revision 6 - February 1979" and are marked in the margin to indicate where changes have been made. Additional pages and figures have been added as reflected on the revised Midland Plant ER "List of Effective Pages."

CONSUMERS POWER COMPANY

By Stephen H Howell (Signed)
Stephen H Howell, Senior Vice President

Dated: February 27, 1979

Sworn and subscribed to before me this 27th day of February 1979.

Betty L Bishop (Signed) (SEAL)
Betty L Bishop, Notary Public
Jackson County, Michigan
My commission expires September 21, 1982.

INSTRUCTIONS FOR ADDING REVISION 6 TO THE MIDLAND PLANT ENVIRONMENTAL REPORT

This Revision 6 to the Environmental Report (ER) of the Midland Plant consists of pages that are to be inserted into your copy of the ER.

Vertical bars in the margin indicate the location of the revisions in text and tables. Pages without bars are either unchanged pages furnished for continuity or contain minor spelling or editorial corrections which do not change the text content. The pages to be removed and inserted are as follows:

REMOVE	INSERT
Volume 1	
After Tab, LOEP-1 thru LOEP-11	After Tab, LOEP-1 thru LOEP-11
Volume 2	
2.6-3 thru 2.6-5	2.6-3 thru 2.6-5
3-iii/3-iv	3-iii/3-iv
3.3-1b/3.3-2	3.3-1b/3.3-2
3.4-7b thru 3.4-12	3.4-7b thru 3.4-12
Tbl 3.4-5 thru Tbl 3.4-8	Tbl 3.4-5 thru Tbl 3.4-8
4.1-3/4.1-4	4.1-3/4.1-4
4.3-3/4.3-4	4.3-3/4.3-4
5.8-1/5.8-2	5.8-1/5.8-2
Tbl 5.8-1	Tbl 5.8-1
5.8R-1	5.8R-1
Volume 3	
6-i thru 6-v	6-i thru 6-v
8.2-1 thru 8.2-3	8.2-1 thru 8.2-3
Q&R-i thru Q&R-iv	Q&R-i thru Q&R-iv
ARC 3-1	ARC 3-1
ARC 9-1	ARC 9-1
ARC 10-1	ARC 10-1
-	FPM 1-1 thru FPM 3-1

LIST OF EFFECTIVE PAGES

	CP Co Transmittal Letter	NRC Receipt
Tendered ER	02/28/78	03/01/78
Docket	04/12/78	04/14/78
Revision 1 - April 1978	05/08/78	05/12/78
Revision 2 - June 1978	06/29/78	07/05/78
Revision 3 - November 1978	11/10/78	11/16/78
Revision 4 - December 1978	12/07/78	12/12/78
Revision 5 - January 1979	01/29/79	02/01/79
Revision 6 - February 1979	02/27/79	

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iv	0	1.1-18	4	Tbl 1.1-13	4
v	0	1.1-19	4	Tbl 1.1-14	2
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LOEP-2	6	1.1-21	4	Fig 1.1-2	2
LOEP-3	6	1.1-22	2	Fig 1.1-3	2
LOEP-4	6	1.1-23	2	1.2-1	3
LOEP-5	6	1.1-24	4	1.3-1	4
LOEP-6	6	1.1-25	4	1.3-2	4
LOEP-7	6	1.1-26	4	Tbl 1.3-1	4
LOEP-8	6	1.1-27	4	Tbl 1.3-2	4
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LOEP-10	6	1.1-29	4	2-ii	0
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1.1-2	2	1.1-33	2	2-viii	0
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1.1-5	2	1.1-36	2	2.1-2	0
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1.1-11	2	Tbl 1.1-6	4	2.1-8	0
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1.1-14	2	Tbl 1.1-9	4	2.1-11	0
1.1-15	2	Tbl 1.1-10		2.1-12	0
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Tbl 2.1-6	0
Tbl 2.1-7	0
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Tbl 2.1-9	0
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Tbl 2.1-13	0
Tbl 2.1-14	0
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Fig 2.1-8	0
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Fig 2.1-20	0
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Fig 2.1-22	0
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Tbl 2.2-5	1
Tbl 2.2-6	1
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Fig 2.2-2	0
Fig 2.2-3	0
Fig 2.2-4	0
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App 2.2B	NA
App 2.2C	NA
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2.3-4	0
2.3-5	1
2.3-6	1
2.3-7	0
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2.3-9	0

NA = Not applicable. This appendix was not written by Consumers Power Company or its contractors.

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2.3-11	0	App 2.3A		Tbl 2.4-4	0
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2.3-13	0	2.3A-i	0	Tbl 2.4-6	0
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2.3-15	0	Tbl 2.3A-2	0	Tbl 2.4-8	
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2.3-20	0	Tbl 2.3A-7	0	Tbl 2.4-9	
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Tbl 2.3-8	0	2.4-6	0	Fig 2.4-2	0
Tbl 2.3-9	0	2.4-7	0	Fig 2.4-3	0
Tbl 2.3-10	0	2.4-8	0	Fig 2.4-4	0
Tbl 2.3-11	0	2.4-9	0	Fig 2.4-5	0
Tbl 2.3-12	0	2.4-10	1	Fig 2.4-6	0
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Tbl 2.3-17	0	2.4-15	2	Fig 2.4-11	0
Tbl 2.3-18	0	2.4-15a	2	Fig 2.4-12	2
Fig 2.3-1	0	2.4-15b	2	2.4R-1	1
Fig 2.3-2	0	2.4-16	0	2.4R-2	1
Fig 2.3-3	0	2.4-17	0	2.4R-3	0
Fig 2.3-4	0	2.4-18	2	2.5-1	0
Fig 2.3-5	0	2.4-19	2	2.5-2	2
Fig 2.3-6	0	2.4-20	1	2.5-3	0
Fig 2.3-7	0	2.4-21	0	2.5-4	2
Fig 2.3-8	0	2.4-22	0	2.5-5	1
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Fig 2.3-12	0	2.4-24	2	Fig 2.5-2	0
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2.3R-2	0	Tbl 2.4-2	0	Fig 2.5-5	0

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Fig 2.5-7	0
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2.6R-1	3
App 2.6A	NA
App 2.6B	NA
App 2.6C	NA
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Fig 2.7-1	0
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Fig 3.1-3/ Fig 3.1-4	0

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NA = Not applicable. This appendix was not written by Consumers Power Company or its contractors.

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4.1R-1	1	5.1-16	0	5.2-3	0
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arrangements and the topsoil was removed without notification to the amateur archaeologist.

Consumers Power forwarded a copy of Mr Pomranky's letter to the State Archaeologist on June 14, 1978 asking for a letter giving his evaluation for inclusion in the Midland Plant Environmental Report. Initially, the State Historic Preservation Officer, in a letter of June 23, 1978, declined approval of this request.

A subsequent meeting (on July 24, 1978) between Consumers Power representatives, the State Historic Preservation Officer and the State Archaeologist provided necessary background to these State personnel (refer to confirming letter of August 2, 1978 in Appendix 2.6A). The functions of State
3 Historic Preservation Office were transferred from the Michigan Department of Natural Resources Office to the Michigan History Division of the Department of State near the end of 1974. Apparently as a result of this transfer some key documents were never received by the Michigan History Division, particularly those of 1971 which established Consumers Power Company's initial contact with the State Historic Preservation Coordinator. Realizing what had occurred, at that earlier time, the State Historic Preservation Officer, on August 21, 1978, although noting the inadequacy of the archaeological appraisal, acknowledged that the facts stated and correspondence cited are accurate as far as they are able to determine and that Consumers Power adequately discharged its historic preservation responsibilities at the Midland Plant at the time in question (1971).

Subsequent to the meeting with the State, Consumers Power received Ms Wang's letter providing more details on the investigation conducted by the amateur archeologists at the Midland Plant site in 1971. The Michigan History Division was informed of this additional information by letter of August 2, 1978.

At a meeting on September 7, 1978 with members of the Nuclear Regulatory Commission staff, Ms Wang of the Michigan Archeological Society and Mr Brunett
3 of the Saginaw Archeological Commission (formerly with the Chippewa Nature Center) it was indicated that other archeological materials had been collected from the Midland Plant site at various times prior to Plant construction.

The results of the evaluation of these other cultural materials collected on site and available from members of the Michigan Archeological Society and at the Chippewa Nature Center and of prehistoric cultural materials found on the
6 site in 1971 by amateur archeologists are presented in a report on the floodplain archeological survey of the Midland Plant site (refer to Section 2.6.2).

2.6.2 Operating License Stage

3 Consumers Power presented specific information to the Michigan History Division regarding the proposed pond blowdown discharge line in an August 9, 1978 letter. Subsequently the Michigan History Division requested that an archeological survey of the pond blowdown discharge line be performed by a professional archeologist prior to the construction of that discharge line.

On August 29, 1978 Consumers Power Company representatives and the State
3 Archeologist toured the Midland Plant site. A survey of the Tittabawassee
River floodplain (including the route of the proposed blowdown discharge line)
was initiated in October 1978. Two previously identified archeological
significant sites which contain historic and prehistoric artifacts were
6 identified during the survey and are discussed in the report, <u>Archeological and Historical Investigations of the Floodplain Area, Midland Plant Site, Midland, Michigan</u>. This report describing the results was submitted to the Nuclear Regulatory Commission on February 8, 1979.

2.6.3 Transmission Line Right-of-Way Archeological Features

Appendix 2.6C is a copy of the archeological survey of the transmission line
3 right-of-way associated with the Midland Plant. A detailed plan for the
mitigation or avoidance of the identified archeological sites that could be
disturbed by the construction and operation of the Plant's associated
4 transmission facilities is presented in Section 4.2.2.

CHAPTER 3

LIST OF TABLES

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6| Tittabawassee River at a maximum rate of 270 cfs subject to the restrictions listed in Table 3.4-6 and a 1 ft/s approach velocity. Table 3.4-6 provides restrictions on makeup water withdrawn during periods of low river flow.

The 880-acre (356 ha) recirculating cooling pond is designed to provide dissipation of heat removed by Plant cooling and condensing systems and provides water for the Plant fire protection system. Cooling pond makeup and blowdown discharge is discussed in Sections 3.4.3, 3.4.4, 3.4.5, and 3.6.4. The effects of pond level fluctuations on pond biota are discussed in Section 5.6.2.

3.3.3 Domestic Water

Water for use as domestic water is taken from the Midland Municipal Water District, which draws its supply from Lake Huron. Domestic water is supplied to sanitary fixtures, laboratory fixtures, and laundry facilities.

Treatment and discharge of domestic wastewater is discussed in Section 3.7.

3.3.4 Precipitation

Precipitation falling on the Plant site is transported via roof drains and site storm drains to Bullock Creek, the Tittabawassee River, and the 880-acre (356 ha) recirculating cooling pond. Precipitation falling on areas where oil contamination may occur such as transformer areas, oil storage areas, and oil transfer areas is routed to the oily waste collection system for treatment (refer to Section 3.6). Precipitation falling on the 880-acre (356 ha) recirculating cooling pond contributes slightly to the pond makeup water requirements.

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3.4.4 Cooling Pond Makeup System Structures

Cooling pond makeup water is taken from the Tittabawassee River through the river intake structure illustrated in Figure 3.4-7. River water is supplied from the river intake structure to the makeup pump structure shown in Figure 3.4-8 through a single 96-inch (244-cm) diameter pipe. Three cooling pond makeup pumps, each having a nameplate rating of 31,500 gpm (70 cfs) capacity
6 and 40,400 gpm (90 cfs) maximum capacity at river levels exceeding 595 feet msl, take suction from the common suction chamber of the makeup pump structure and discharge the river water into the cooling pond through a 72-inch (183-cm) diameter concrete pipe. A dilution line (shown as Laundry Waste Dilution line on Figure 3.3-1) is provided from the cooling pond makeup pumps to the cooling pond discharge structure to provide minimum dilution flows for discharge of
6 low level radioactive effluents as described in Section 5.2.2.1.1.

Floating logs in front of the river intake structure prevent admission of
6 large floating debris. Vertical trash racks with 3-inch (7.6-cm) openings and three traveling screens with 3/8-inch (9.5-mm) mesh size are provided for further removal of smaller debris which would otherwise enter the river intake
6 structure. Disposal of debris is addressed in Section 3.7.

The design of the river intake structure features a natural bypass channel which creates a sweep flow in front of the traveling screens. The bypass channel provides an escape route for fish and helps to reduce accumulation of debris and silt in front of the traveling screens.

6 The makeup water withdrawal regime as a function of river flow is listed in Table 3.4-6. Furthermore, the average velocity of the withdrawn river water

approaching the screens, normal to the screens, should not exceed 1 ft/s (30cm/s). This is accomplished by operating the appropriate number of makeup pumps as illustrated in Table 3.4-7. Due to operational limitations of the makeup pumps, excess water withdrawn above that permitted for makeup according
6 to Table 3.4-6 is recirculated back to the makeup pump structure.

During initial filling of the pond, river water in excess of 350 cfs is
6 withdrawn until the pond is full. Two makeup pumps normally provide a minimum withdrawal rate of 140 cfs.

3.4.5 Cooling Pond Blowdown Discharge Structure

The cooling pond blowdown discharge structure shown in Figure 3.4-9 consists of three parallel 30-inch (76-cm) diameter concrete pipes which have an invert elevation of 587 feet msl (179 m) at their outfall. The pipes are positioned at the river bank normal to the river flow, and connect to the 66-inch (168-cm) diameter blowdown line at the edge of the Plant fill as shown in Figure 3.4- The blowdown discharge is regulated by three valves located on each of the 30-inch (76-cm) diameter pipes. This scheme provides control of blowdown discharge velocities up to 15 ft/s (4.6 m/s) by allowing shutoff of one or two of the three pipes depending on the Plant discharge. Thus, by maintaining high discharge momentum when possible, more effective mixing of the blowdown with the river flow is achieved. A riprap blanket in front of the pipe outfalls protects the riverbed from potential erosion due to the jet action.

Physical model testing of the blowdown system at a scale of 1:15 was carried out to assess its thermal performance as discussed in Section 5.1.2. Thermal plumes, as defined by the T = 5°F (2.8°C) isotherm, contain not more than 25%

of the cross-sectional area or volume of river flow at any transect of the Tittabawassee River. Chemical characteristics of pond blowdown are discussed in Section 3.6.

The cooling pond blowdown operation is designed to control the pond total dissolved solids (TDS) concentrations which originate from the use of Tittabawassee River water. TDS contribution from the Plant operation, sulfuric acid and hypochlorite addition to the circulating water and the possible discharge of condensate demineralizer regeneration waste are not significant. As evaporation losses of pond water resulting from the heat dissipation process will result in TDS accumulation, the cooling pond blowdown and makeup process will allow for TDS control within the pond operating requirements.

The principal parameters influencing the occurrence of cooling pond blowdown and its flowrate are: TDS levels in the pond, pond temperature, TDS levels in
3 the river, river flowrate and ambient temperature, and the ability to make up to the pond. Because the blowdown criteria are dynamic, the Company plans to utilize an automatic control system on the pond blowdown which is responsive to appropriate parameters to assure applicable discharge limitations are met.

An automatic control system is provided to minimize the TDS concentration in the cooling pond by maximizing blowdown and makeup flowrates. The frequent changes in the variables, particularly river flow, dictate the need for an automatic rather than a manual system.

The combined effects of the cooling pond blowdown and The Dow Chemical Company discharge shall comply with Michigan Water Quality Standards regarding

temperatures, TDS, mixing zone length, and width. The cooling pond is generally kept full when possible and therefore blowdown is usually voluntarily restricted when makeup canot keep up with pond losses.

Blowdown flowrate is determined by calculating the flowrate that satisfies the river TDS limitations and separately calculating the flowrate that satisfies the river thermal limitations. The lower of the two flowrates is selected and then checked to verify that it is within the physical range of the blowdown system. Pond level and makeup rate are also checked to make certain that blowdown discharge will not unacceptably decrease the pond level. The calculated blowdown rate is then set by an automatic adjustment of the three blowdown control valves. Flow measurement is provided in each blowdown line.
3 Periodically the flowrate is recalculated and reset as required.

The blowdown flowrate to satisfy river thermal limitations is calculated from the Alden Research Laboratory model testing program results. Calculations can be done for all river flowrates up to the maximum rate tested by interpolation. For higher river flowrates, extrapolation of the test data and proportioning are used to calculate blowdown flowrates. The measured parameters required for this calculation of blowdown are river flowrate, the cooling pond blowdown temperature and the natural river temperature. If the natural river temperature exceeds the monthly maximums stated in the Water Quality Standards, no blowdown is planned.

The blowdown flowrate to satisfy river TDS limitations is based on a calculation of a fully mixed mass balance using measured values of river flow and TDS concentration, The Dow Chemical Company discharge flow and TDS

concentration, and the blowdown TDS concentration. River TDS is measured downstream at Freeland to verify compliance.

During the months of March, April and May, the pond blowdown discharge will most likely be continuous. For the remaining months, the discharge may be intermittent. At any given instant, the blowdown flow may be between 5 and 200 cfs or there may be no pond blowdown discharge flow dependent upon the parameters previously outlined.

Pond blowdown is used for radwaste dilution when the blowdown flow is
3 adequate. When the pond blowdown flow is not adequate, the makeup pumps
provide the necessary dilution flow and pond blowdown flow is temporarily
suspended.

Results of the recent cooling pond operational study indicate that the 5°F isotherm criterion of the State Water Quality Standards could be met within 1,700 feet (515 m) downstream of the pond blowdown discharge structure. The 25% river cross-sectional or flow criteria of the Water Quality Standards can also be met on an average temperature basis.

TABLE 3.4-5

MONTHLY COOLING POND PERFORMANCE FOR BOTH UNITS OPERATING[(a)]

Month	MAXIMUM GUARANTEED LOAD IMPOSED HEAT LOAD: 7.69×10^9 Btu/hr CIRCULATING WATER FLOW RATE: 653,900 GPM				UNIT 1 BACK END LIMITED AND UNIT 2 VALVES WIDE OPEN IMPOSED HEAT LOAD: 9.05×10^9 Btu/hr CIRCULATING WATER FLOW RATE: 653,900 GPM			
	Condenser Inlet Temperature (°F)	Average Pond Surface Temp (°F)	Total Evaporation (acre-ft/day)	Percent Imposed Heat Load Lost by Evap (%)	Condenser Inlet Temperature (°F)	Average Pond Surface Temp (°F)	Total Evaporation (acre-ft/day)	Percent Imposed Heat Load Lost by Evap (%)
January	59.0	64.1	29.0	44	63.5	69.4	35.9	46
February	60.5	65.8	31.6	46	64.5	70.0	37.2	46
March	65.0	69.9	36.5	50	69.0	74.6	44.0	52
April	73.5	78.3	44.4	57	76.5	82.3	52.5	59
May	83.0	87.9	55.4	64	86.0	91.6	63.8	66
June	89.5	94.2	61.1	68	92.0	97.5	70.2	69
July	92.0	96.8	60.8	69	94.5	100.1	69.8	70
August	92.0	96.5	57.4	68	94.5	100.0	66.5	70
September	85.5	90.4	53.0	67	88.0	93.9	61.6	69
October	78.0	82.9	45.2	61	81.0	87.0	53.6	63
November	68.0	73.0	36.5	53	71.5	77.6	44.2	55
December	60.5	65.8	30.5	46	65.0	71.0	37.7	44

°C = 5 (°F-32)/9.

(a) Bechtel, 1973[(2)].

TABLE 3.4-6

6 MAKEUP WATER WITHDRAWAL REGIME

River Flow	Withdrawal
Less than 350 cfs	No withdrawal for pond (for dilucion only)
350-390 cfs	Withdraw flow in excess of 350 cfs
390-650 cfs	Withdraw 40 cfs for Plant evaporation and seepage losses
650 cfs or more	6 Withdraw 40 cfs plus that flow above 650 cfs up to the total pump capacity equal to 270 cfs

TABLE 3.4-7

MAKEUP WATER APPROACH VELOCITIES FOR VARIOUS WITHDRAWAL RATES

	River Flow (cfs)	Withdrawal for Makeup (cfs)	Recirculation (cfs)	Total Pumping (cfs)	No of Pumps Operating	Water Surface Elevation at Intake (ft (msl))	Average Approach Velocity (ft/s)
	350	0	67 (b)	67	1	588.8	0.42
	390	40	40 (c)	80	1	589.0	0.24
	700	90	69 (c)	159	2	589.4	0.50
	744	134	15 (c)	159	2	589.5	0.73
	1000	200	33 (c)	233	3	590.0	1.00
	2150	238	0	238	3	591.5	<1.00
6	5000	270	0	270 (a)	3	595.2	<1.00

a) Maximum pump output is 270 cfs at river flow exceeding 5,000 cfs.

b) Recirculation to the river for laundry waste dilution only. Dilution flows may also occur at higher river flow, but will usually be provided by cooling pond blowdown.

c) Recirculation to makeup pump inlet.

1 ft = 0.3048 m
1 ft/s = 30.5 cm/s

TABLE 3.4-8

MAXIMUM AND MINIMUM TEMPERATURES DURING HOURLY SIMULATIONS FOR 40-DAY PERIOD (°F)

	Equilibrium Temperature[(a)]		Condenser Inlet Temperature[(b)]	
	Max	Min	Max	Min
Hourly	113.2	35.9	97.7	87.6
Daily Average	80.2	59.9	97.0	88.3
2 6-Day Average	75.1	65.7	95.1	90.4
Period Average (40 days)	71.0		89.9	
Average - last 30 days	72.5		92.0	

(a) Equilibrium temperature is the temperature of a water body at which there is no net heat transfer across the water surface. Equilibrium temperature is determined solely by meteorological conditions.

(b) Figures represent last 30 days of simulation period to allow for adjustment to assumed initial conditions. The heat load in Btu/hr was 7.61×10^9.

above mean sea level (msl). To minimize the effects of dredging, the following measures were taken:

a. Construction of a cofferdam to prevent runoff and erosion during the construction of the intake structure and retaining walls.

b. Dumping of dredge spoils onshore.

c. The placement of riprap along the banks for minimizing erosion and siltation.

   All riprap was sound, durable rocks, free of cracks, and coverage size of 8 to 12 inches (20 to 30 cm) with specified maximum and minimum sizes of 18 and 6 inches (43 and 15 cm), respectively.

d. Finished surfaces around the intake structure were smoothed to conform to the general contour of the floodplain. Finished surfaces and embankments were seeded, fertilized and mulched to prevent soil erosion.

Benthic macroinvertebrates inhabiting this area were found in concentrations ranging from 54 to 1,595 per m^2, both prior to and following dredging, indicating complete recovery. Much of the variation was due to the constant shifting of bottom substrates in the river(4). Benthic organisms inhabitating the area were removed with the spoils, but the modification has not affected the assimilative capacity or the water quality and biological productivity potential of the river. The downstream effects of increased suspended solids, fine particulates, and siltation are expected to be minimal since most macroinvertebrates inhabiting this type of stream are adapted to the silty

conditions that normally occur in lotic waters such as the Tittabawassee River.

Although not specifically monitored, the effects of dredging on fish populations of that area are also expected to be minimal, resulting in only temporary displacement of some local individuals.

The net result of this dredging, from a fisheries standpoint, is an improvement of the stream due to deepening, bank stabilization and cover, and an increase in the area available for spawning, feeding and cover provided by the riprap.

4.1.4 Other Impacts of Site Preparation and Station Construction

Socioeconomic impacts are discussed in Chapter 8.

Impacts associated with transmission facilities have been addressed in Section 3.9.

Two previously identified archeologically significant sites which contain
6 historic and prehistoric artifacts were identified in a 1978 survey on the Tittabawassee River floodplain (refer to Section 2.6.2). Archeological sites along transmission corridors have been addressed in Section 3.9 and described in Appendix 2.6C.

345 kV towers and installation of four wood poles. It is assumed that the above land can be reclaimed for previous uses following decommissioning.

As stated in Section 3.9.4, towers will be located within an existing corridor between Tittabawassee Substation and the point of connection with the Kenowa-Thetford 345 kV Line. Towers will be located to avoid disturbance of archaeological sites identified by University of Michigan archaeologists (refer to Appendix 2.6C). A total of 8.3 acres (3.4 ha) will be disturbed for construction of towers within the corridor. These 8.3 acres will be lost to existing uses for the duration of line operation. However, this commitment of land is not irretrievable.

Less than 0.4 acre (0.2 ha) will be disturbed by the towers required for the Midland start-up circuits. One tower each will be located on public land (City of Midland, Saginaw Road-Waldo Road interchange) and Dow Chemical Company river frontage. The remaining towers and poles will be located on site or on Consumers Power Company land associated with the Tittabawassee Substation site.

Part of the Midland Plant 345 kV Line right-of-way will cross Dow Chemical Company lands. A major part of this right-of-way was formerly reserved for railroad sidings. Less than 1.0 acre (0.4 ha) of newly disturbed land will be added for tower construction since many towers will be located on fill established for Dow pond containment dikes.

The accumulative impact of construction activities for transmission facilities will be minor and temporary. For all transmission facilities associated with

the Midland Plant, less than 12 acres (4.9 ha) of land will be lost to present uses by construction of 190 towers and 16 wood poles.

4.3.2 Water Resources

Some commitment of water has been, and is, required during construction of the Plant but losses are negligible and result only in a redistribution of water resources. In addition to using the City of Midland water supply, water needed for construction purposes has been obtained from wells that were drilled on site. Water for initial filling of the cooling pond is obtained from the Tittabawassee River in accordance with limits set forth in Table
6| 3.4-6. The Tittabawassee River was dredged and widened by 100 feet (30.5 m) for approximately 2 miles (3.2 km) adjacent to the Plant to compensate for the floodplain that was lost due to the construction of the Plant and cooling pond (see Section 4.1.3).

4.3.3 Biotic Resources

Irretrievable loss of aquatic biota during construction has been addressed in Section 4.1.3. The irretrievable losses are limited to benthic organisms removed during dredging. Some temporary displacement of fishes probably occurred during construction, but the net result of channelization and bank stabilization will increase available habitat.

Irretrievable loss of terrestrial biota during construction has been addressed in Section 4.1.1, and in the ASER[2] and ERS[3]. It is assumed that the majority of wildlife and vegetation have been displaced and/or destroyed in the construction area of 1,235 acres (500 ha).

5.8 DECOMMISSIONING AND DISMANTLING

Consumers Power Company will comply with all Federal, State and local laws and regulations properly in existence at the time of decommissioning the Midland Plant Units 1 and 2. At the time of decommissioning which is not expected to occur prior to 2012, and probably much later, a dismantlement plan will be submitted to the NRC as currently required by 10 CFR 50.82 and Regulatory Guide 1.86[1]. This plan will take advantage of then existing technology and result in a mutually agreeable restoration of the land.

At the present time, for planning purposes, Consumers Power Company endorses
6 the Battelle Pacific Northwest Laboratory study[1a] which covers the subject of decommissioning alternatives.

Of the major methods of decommissioning outlined in this study, mothballing and prompt removal/dismantling, Consumers Power Company has chosen to tentatively select prompt removal/dismantling for Midland Units 1 and 2.

6 The methodology of the Battelle study was followed in deriving Table 5.8-1 for the prompt removal/dismantling of the Midland Plant Units 1 and 2. Reduction factors for two-unit-on-a-site decommissioning were taken from the Atomic Industrial Forum study.[2] In addition to those costs involved in removal of the power block, associated costs are shown for restoration of the cooling pond area to its approximate condition prior to site preparation and process steam evaporators which are unique to the Midland Plant.

Restoration of the cooling pond is predicated on an existing condition of a local permit that states "If the company abandons the use of the property as approved by this order, then the dike and pond area shall be leveled and left

approved by this order, then the dike and pond area shall be leveled and left with a cover of soil in such a manner as to be harmonious with the then-existent drainage and suitable for uses permitted by the Township Zoning Ordinance for the use district in which the dike and pond area is located[3]."

TABLE 5.8-1

ESTIMATED DECOMMISSIONING[a] AND RESTORATION COSTS
(Millions of 1981 Dollars)

Activity	Estimate
Mobilization, Demobilization and Temporary Facilities	$ 3.7
Supplies, Power, Contractor Services, Nuclear Insurance	18.1
Equipment	4.1
Staff Labor	25.4
6 Demolition Services	40.2
Disposal (Radioactive Waste)	35.7
Overheads	12.5
Subtotal Decommissioning	$139.7
Reboiler, Diesel-Generator, Administration, Service Water and Circulating Water Structures Demolition	6.4
Site Specific Restoration	34.3
Total Decommissioning, Demolition and Site Restoration	$180.4

(a) Prompt removal/dismantling based on Battelle Pacific Northwest Study[1a] and Atomic Industrial Forum Study[2].

5.8R REFERENCES

1. Directorate of Regulatory Standards, Termination of Operating Licenses for Nuclear Reactors, Regulatory Guide 1.86 (June 1974), US Nuclear Regulatory Commission.

1a. R I Smith, G J Konzek and W E Kennedy, Jr, Technology, Safety and Costs
6 of Decommissioning a Reference Pressurized Water Reactor Power Station,
NUREG/CR-0130 (June 1978), Battelle Pacific Northwest Laboratory,
Prepared for US Nuclear Regulatory Commission.

2. W J Manion and T S LaGuardia, An Engineering Evaluation of Nuclear Power Reactor Decommissioning Alternatives (November 1976), National Environmental Studies Project, Atomic Industrial Forum, Inc.

3. Division of Radiological and Environmental Protection (compiler), Final Environmental Statement Related to the Construction of Midland Plant Units 1 & 2, Consumers Power Company, Section VIII (March 1972), US Atomic Energy Commission.

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8.2 COSTS ASSOCIATED WITH THE FACILITY

Estimated levelized annual costs of electric energy production from the Midland Plant are shown in the ERS[1].

8.2.1 Capital Costs of Facility Construction

The ERS[2] presents the capital costs of constructing Midland Units 1 and 2.

8.2.2 Capital Costs of Transmission Facilities

Construction costs for the associated transmission lines and substation facilities are reported in the ERS(3).

8.2.3 Fuel Costs

Fuel costs associated with the production of energy at the Midland Plant are discussed in the ERS[4].

8.2.4 Operating and Maintenance Costs

The uniform annual equivalent operating and maintenance costs are given in the ERS[5].

8.2.5 Costs of Decommissioning and Dismantling

3 Costs of decommissioning and dismantling the main power structure are estimated in 1981 dollars to be $146.1 million. Local requirements include removal of the pond and intake structures. The 1981 estimate for removal of
6 the pond and intake structure and relandscaping of the Plant site is $34.3 million.

3 Section 5.8 is a discussion and cost breakdown for decommissioning and dismantling the Midland Plant.

8.2. Cost of Income and Property Taxes

The present worth of income and property tax payments of the Midland Plant is indicated in the ERS(7).

8.2.7 Socioeconomic Costs

Additional municipal services would be required to support the Plant operating personnel who live in the area; however, the property taxes incurred by the Midland Plant will more than offset the increase in service costs.

Public service impacts attributable to immigration due to operation of the Plant are expected to be minimal. For example, the 240 school children would represent approximately 2.5% of the total projected Midland school 1980-81
2 enrollment of 9,679 if all were to be enrolled in Midland schools. Regarding traffic services, the vehicles introduced by Midland Plant staff personnel would represent less than 1% of all registered vehicles in the Midland area. This figure is based on an average of 1.7 vehicles per staff member (530 vehicles) and the 1976-77 registration of 59,000 vehicles total.

8.2.8 Environmental Costs

Only minor environmental costs are associated with the operation of the Midland Plant:

a. Preemption of 1,235 (500 ha) acres of land from other uses during the life of the Plant;

b. An increase in local fogging and icing;

c. Entrainment of planktonic organisms (phytoplankton, zooplankton, ichthyoplankton, and invertebrates) from approximately 5% of the river flow during the initial filling of the cooling pond and intermittent makeup pumping;

d. Possible impingement losses of some resident and migrant fish species during intermittent makeup pumping;

e. Temperatures elevated above normal river temperature fluctuations during blowdown.

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ARCHAEOLOGY

QUESTION 3

Provide an inventory of all cultural resources remaining on the Midland Plant property including the methods used for site location and evaluation. In addition, provide information on the structure and function of any individual historic and/or archaeological sites that have been located.

RESPONSE

3 A survey to locate and describe cultural resources in the floodplain (between the cooling pond dike and the bank of the Tittabawassee River) was initiated in October 1978. Six copies of Commonwealth Associates, Inc, Archeological
5 and Historical Investigations of the Floodplain Area, Midland Plant Site,
Midland, Michigan (January 1979), Consumers Power Company, were provided to
6 the NRC via separate cover on February 8, 1979.

ARCHAEOLOGY

QUESTION 9

Please provide the results of the evaluation of the prehistoric cultural materials found on the site in 1971.

RESPONSE

The results of the evaluation of the prehistoric cultural materials found by members of the Michigan Archaeological Society on the Midland Plant site in
6 1971 are contained in the report describing the floodplain archaeological survey. Refer to the response to Archaeology Question 3.

ARCHAEOLOGY

QUESTION 10

Provide an evaluation of other cultural materials known to have been collected from the Midland site including the photographs of collections that are currently available from members of the Saginaw Archaeological Commission and Chippewa Nature Preserve. Include information on chronology, site function, and cultural affiliation. This evaluation is to be made by a professional archaeologist meeting SOPA (Society of Professional Archaeologists) requirements.

RESPONSE

3 The evaluation of other cultural materials known to have been collected
6 previously from the Midland Plant site are described in a report describing
3 the floodplain archaeological survey (refer to the response to Archaeology
Question 3).

FLOODPLAIN MANAGEMENT

QUESTION 1

Provide verification of compliance with the State of Michigan Water Resources Commission Order and Permit No FP-55, issued on June 25, 1969, regarding construction of structures, in the floodplain of the Tittabawassee River, and mitigating actions, therefore, to compensate for loss of floodplain cross-sectional area due to the construction.

RESPONSE

Response will be provided in March 1979.

FLOODPLAIN MANAGEMENT

QUESTION 2

Provide verification of compliance with any amendments to the Order and Permit indicated in Question 1, above.

RESPONSE

Response will be provided in March 1979.

FLOODPLAIN MANAGEMENT

QUESTION 3

Provide a map indicating the floodplain of the Tittabawassee River in the area of the plant both before and after the construction indicated in Questions 1 and 2, above.

RESPONSE

Response will be provided in March 1979.