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Rhineland, Wisconsin: Exxon Mineral Company, May 1986

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ADDENDUM

CRANDON PROJECT

REVISED
WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTEWATER DISCHARGE PERMIT APPLICATION

(WPDES)

EXXON MINERAL COMPANY
RHINELANDER, WISCONSIN

MAY 1986

ADDENDUM

REVISED WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM (WPDES) WASTEWATER DISCHARGE PERMIT APPLICATION

1.0 INTRODUCTION

This addendum provides revised information for the December 1985 WPDES Permit Application Section II, Discharges 001, Swamp Creek Outfall, and 004 Contingency Mitigation for Surface Waters. The remaining information regarding Discharge 001 and Discharges 002 and 003, not included with this addendum, remains the same as submitted in the Application dated December 1985. Discharge 004 subsection of the December 1985 Application has been replaced by the new subsection prepared as part of this addendum.

ADDENDUM

CRANDON PROJECT

WPDES PERMIT APPLICATION

SECTION II

DISCHARGE 001

APRIL 1986

All Facility Discharges and other Losses; Number and Discharge (see Instructions) Volume Specify the number of discharge points and the volume of water discharged or lost from the facility according to the categories below. Estimate average volume per day in thousand gallons per day.

FOR DEPT. USE									

		Number of Discharge Points	Total Volume Used or Discharged, Thousand Gal/Day	
Surface Water	109a1	12	1,714	See additional information.
Sanitary wastewater transport system	109b1	N/A	N/A	
Storm water transport system	109c1	30	--	See additional information.
Combined sanitary and storm water transport system	109d1	N/A	N/A	
Surface impoundment with no effluent	109e1	--	--	See additional information.
Underground percolation	109f1	N/A	N/A	
Well Injection	109g1	N/A	N/A	
Waste acceptance firm	109h1	N/A	N/A	
Evaporation	109i1	3	218	See additional information.
Consumption	109j1	1	27	See additional information.
Other*	109k1	0	309	See additional information.
Facility discharges and volume Total Item 9.	109l1	41	1,959	See additional information.
	109m1	Retained in tailings and backfilled sands.		

*If there are discharges to 'other,' specify.

10. Permits, Licenses and Applications

List all existing, pending or denied permits, licenses and applications related to discharges from this facility (see instructions).

	Issuing Dept.	For Dept. Use	Type of Permit or License	ID Number	Date Filed YR/MO/DA	Date Issued YR/MO/DA	Date Denied YR/MO/DA	Expiration Date YR/MO/DA
0	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
1.	DNR		WPDES					
	DNR		Water Regulatory		Not Filed			
2.	COE		Sec. 404		Not Filed			
3.								

11. Maps and Drawings

Attach all required maps and drawings to the back of this application. (see instructions)

12. Additional Information

112	Item Number	Information
	108a	Non-contact cooling water:
		Use <u>10³ Gal/Day</u> <u>gpm</u>
		Compressor cooling <u>960</u> <u>665</u>
		NOTE: This water is not discharged; it is recycled through a cooling tower prior to reuse in the compressors.

ADDENDUM

Item 12. Additional Information (continued)

109a The twelve discharges to surface water include one discharge of 1,190 gpm of treated water to Swamp Creek (Discharge 001). This includes 350 gpm of treated intercepted ground water, 825 gpm of treated contaminated mine water, and 15 gpm of treated sanitary effluent. | *

The other eleven discharges are intermittent discharges to streams, springs, and lakes described in Section II - Discharge 004 (1-11). Since these discharges will not be routine, they are listed in 109a in number but not in volume discharged. |

109c Contaminated storm water runoff will be collected and sent to reclaim pond cell A and does not constitute a separate discharge from the facility. Uncontaminated storm water runoff will be collected and directed to sedimentation ponds. See Section II - Discharge number 002 and Section II - Discharge 003. Discharge 002 includes storm water runoff from the mine/mill site and the MWDF. Discharge 003 includes storm water runoff from access road and railroad. Also see Section 1, Figure 1.

109e Information on infiltration from tailings ponds is included in the NR 182.08 application. The application is supported by the Mine Waste Disposal Feasibility Report dated November, 1985.

*Vertical lines in the margin identify lines in which revisions have been made.

TABLE 2.

TOXIC POLLUTANT	HAZARDOUS SUBSTANCES	HAZARDOUS SUBSTANCES
Asbestos	Dichlorvos	Naled
	Diethyl amine	Napthenic acid
HAZARDOUS SUBSTANCES	Dimethyl amine	Nitrotoluene
Acetaldehyde	Dinitrobenzene	Parathion
Allyl alcohol	Diquat	Phenolsulfonate
Allyl chloride	Disulfoton	Phosgene
Amyl acetate	Diuron	Propargite
Aniline	Epichlorohydrin	Propylene oxide
Benzonitrile	Ethion	Pyrethrins
Benzyl chloride	Ethylene diamine	Quinoline
Butyl acetate	Ethylene dibromide	Resorcinol
Butylamine	X Formaldehyde ¹	X Strontium Intake ²
Captan	Furfural	Strychnine
Carbaryl	Guthion	Styrene
Carbofuran	Isoprene	2,4,5-T (2,4,5-Trichlorophenoxyacetic acid)
Carbon disulfide	Isopropanolamine	TDE (Tetrachlorodiphenyl ethane)
Chlorpyrifos	Keithane	2,4,5-TP (2-(2,4,5-Trichlorophenoxy)propionic acid)
Coumaphos	Kepone	Trichloroethene
Cresol	Malathion	Triethanolamine
Crotonaldehyde	Mercaptodimethur	Triethylamine
Cyclohexane	Methoxychlor	Trimethylamine
2,4-D (2,4-Dichlorophenoxyacetic acid)	Methyl mercaptan	Uranium
Diazinon	Methyl methacrylate	Vanadium
Dicamba	Methyl parathion	Vinyl acetate
Dichlobenil	Mevinphos	Xylene
Dichlorone	Mexacarbate	Xylenol
2,2-Dichloropropionic acid	Monoethylamine	Zirconium
	Monomethylamine	

NOTE: The previous tables were taken from the May 19, 1980 Federal Register.

If you have reason to believe that none of these pollutants will be present in the effluent as a result of your operations/manufacturing processes, place an "X" in the adjacent blank. _____

This Addendum must be signed by the official representative of the facility who is: the owner, the sole proprietor for a sole proprietorship, a general partner for a partnership, or an executive officer of at least the level of vice president for a corporation, having overall responsibility for the operation of the facility.

D. B. Achttien
Typed Name of Official Representative

D. B. Achttien
Signature of Official Representative

General Manager, Crandon Project
Title
Exxon Minerals Company,
Attorney-in-fact for Exxon Corp.

January 16, 1986
Date Signed

Chpt. 147.21(4), Wisc. Stats., provides that: Any person who knowingly makes any false statement, representation or certification in this Addendum shall upon conviction be punished by a fine of not more than \$10,000 or by imprisonment for not more than 6 months or both.

¹ Formaldehyde concentration is expected to be less than 7 ug/l in the discharge to Swamp Creek (Discharge 001).

² Strontium was not analyzed in the ground water. We expect that it would be present in low concentrations (less than 1 mg/l in ground water).

DDA
5/8/86

DDA
5/8/86

Item 26. Additional Information (continued)

Item 17 (continued)

TABLE 2

WATER QUALITY BASED EFFLUENT LIMITS FOR THE PROPOSED DISCHARGE TO SWAMP CREEK
(All values are in mg/L unless noted differently)

Parameters	Daily Maximum ⁽¹⁾	Monthly average limits ⁽²⁾ based on effluent flows (Q _e) of <1300 gpm	1301-200 gpm
<u>Toxic Pollutants</u>			
Arsenic	1.48 ⁽³⁾	0.626/0.663 ⁽³⁾	.508/.533 ⁽³⁾
Cadmium	0.073	0.0045/0.0048	0.0037/0.0039
Chromium+6	0.058	0.051/0.053	0.042/0.043
Chromium+3	11	0.27/0.28	0.22/0.23
Copper	0.025	0.025/0.025	0.021/0.022
Cyanide	0.093	0.010/0.011	0.010/0.011
Lead	0.6 ⁽⁴⁾	0.118/0.125	0.096/0.10
Mercury	0.0022	0.0002 ⁽⁵⁾	0.0002 ⁽⁵⁾
Selenium	1.0	0.165/0.174	0.134/0.140
Silver	0.007	no rec'd value	no rec'd value
Zinc	0.44	0.14/0.14	0.11/0.12
<u>Conventional Pollutants</u>			
BOD		20 (summer) ⁽⁶⁾ 40 (winter) ⁽⁶⁾	15 (summer) ⁽⁶⁾ 30 (winter) ⁽⁶⁾
Total Suspended Solids	30 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾
pH (S.U.)	6 - 9		
<u>Non-Conventional Pollutants</u>			
Barium		10.8/11.4	8.8/9.2
Fluoride		14.6/15.5	11.9/12.4
Iron		1.8/1.9	1.5/1.6
Total Dissolved Solids ⁽⁷⁾	1210/1000 ⁽⁸⁾		

(1) For most of the toxic pollutants (except lead), the maximum limits were derived from the available acute toxicity information for resident Wisconsin aquatic species.

(2) The monthly average limits were calculated based on the following mass balance equation: $C_e = \frac{Q_m C_m - Q_s C_s}{Q_e}$.

(3) The water quality criterion for arsenic to protect human health is being reviewed. The above limits are based on the acute and chronic toxicity effects to resident Wisconsin aquatic species.

(4) Categorical limits (New Source Performance Standards) apply because they are more stringent than the water quality numbers.

(5) The monthly average water quality criterion necessary to prevent exceedance of FDA action limits in fish and thus protect human health is 0.0002 mg/l. This criterion value is near the detection limit of most current analytical techniques.

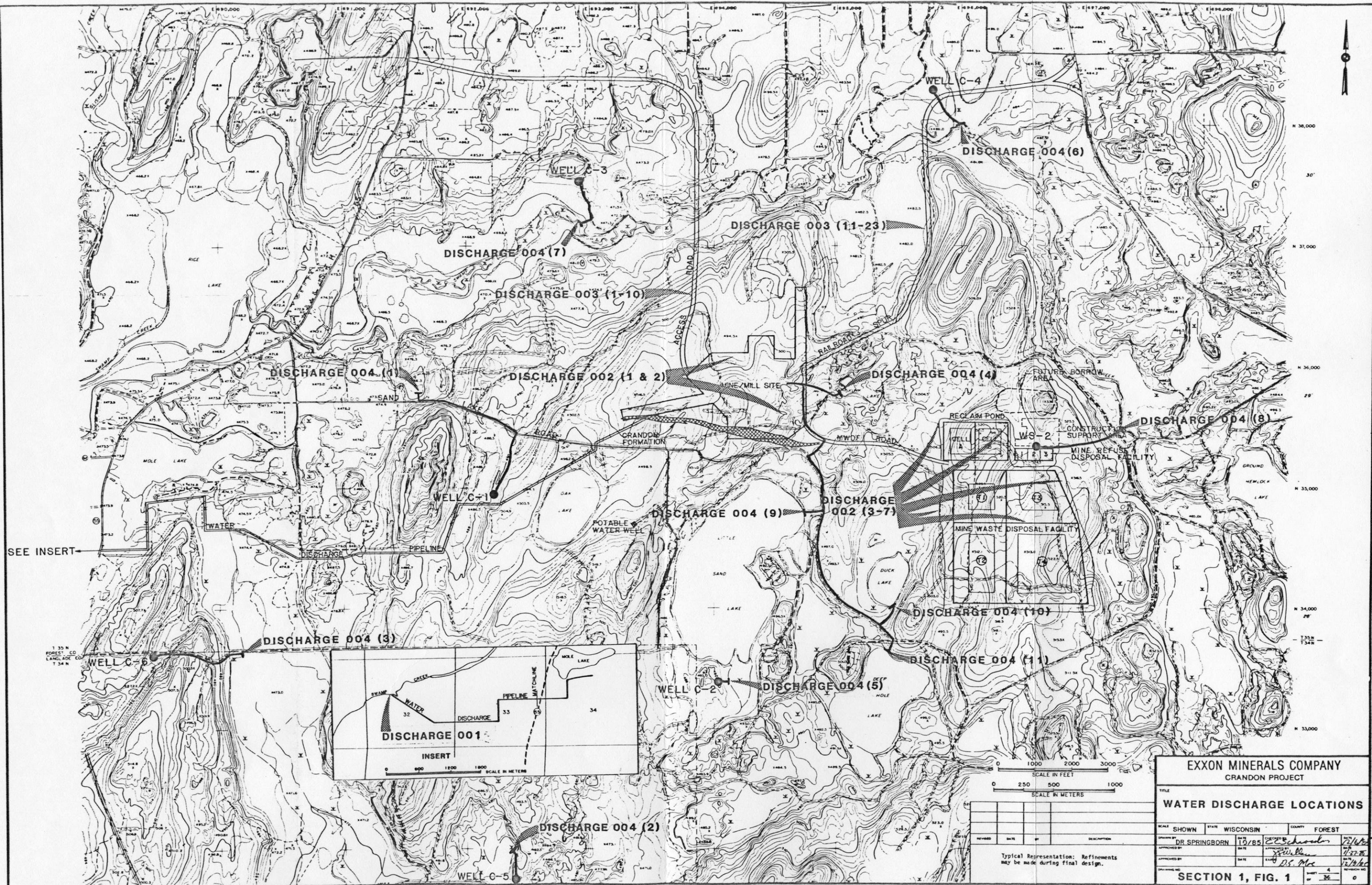
(6) BOD limits are applied as weekly rather than monthly averages.

(7) Limits for chlorides and sulfates are regulated as part of the TDS number.

(8) The maximum limit for TDS is 1210 mg/l when Q_e < 1300 gpm and 1000 mg/l when Q_e is between 1301 and 2000 gpm.

NOTE: Two scenarios were assumed in determining the monthly average effluent limits. The first set of numbers (before the slash) were calculated based on an upstream Q_{7,10} of 13.5 cfs (assuming no flow mitigation for Upper Swamp Creek). The second set of numbers were calculated based on an upstream Q_{7,10} of 15 cfs (assuming that there will be flow mitigation to Upper Swamp Creek).

SOURCE: Letter from B. Baker, Bureau of Water Resources Management to B. J. Hansen, Crandon Project Permitting Manager, dated February 19, 1986.



EXXON MINERALS COMPANY			
CRANDON PROJECT			
TITLE			
WATER DISCHARGE LOCATIONS			
SCALE	SHOWN	STATE	WISCONSIN
DATE	12/85	COUNTY	FOREST
APPROVED BY	DR. SPRINGBORN	DATE	1/27/86
APPROVED BY	DATE	DATE	1/27/86
SECTION 1, FIG. 1			

Typical Representation: Refinements may be made during final design.

ADDENDUM

CRANDON PROJECT

WPDES PERMIT APPLICATION

SECTION II

DISCHARGE 004

APRIL 1986

**STANDARD FORM C – MANUFACTURING AND COMMERCIAL
DISCHARGERS
SECTION II. BASIC DISCHARGE DESCRIPTION**

FOR DEPT. USE									

Complete this section for each discharge indicated in Section I, Item 9, that is to surface waters. This includes discharges to municipal sewerage systems in which the wastewater does not go through a treatment works prior to being discharged to surface waters. Discharges to wells must be described where there are also discharges to surface waters from this facility. **SEPARATE DESCRIPTIONS OF EACH DISCHARGE ARE REQUIRED EVEN IF SEVERAL DISCHARGES ORIGINATE IN THE SAME FACILITY.** All values for an existing discharge should be representative of the twelve previous months of operation. If this is a proposed discharge, values should reflect best engineering estimates.

ADDITIONAL INSTRUCTIONS FOR SELECTED ITEMS APPEAR IN SEPARATE INSTRUCTION BOOKLET AS INDICATED. REFER TO BOOKLET BEFORE FILLING OUT THESE ITEMS.

1. Discharge Serial No. and Name

a. Discharge Serial No.
(see instructions)

201a 004 (1-11)

b. Discharge Name
Give name of discharge, if any.
(see instructions)

201b Contingency Mitigation For Surface Waters

c. Previous Discharge Serial No.
If previous permit application
was made for this discharge (see
Item 4, Section I), provide previ-
ous discharge serial number.

201c N/A

2. Discharge Operating Dates

a. Discharge Began Date If the
discharge described below is in
operation, give the date (within
best estimate) the discharge
began.

202a N/A
YR MO

b. Discharge to Begin Date If the
discharge has never occurred but
is planned for some future date,
give the date (within best esti-
mate) the discharge will begin.

202b (See Additional Information)
YR MO

c. Discharge to End Date If dis-
charge is scheduled to be discon-
tinued within the next 5 years,
give the date (within best esti-
mate) the discharge will end.

202c N/A
YR MO

3. Engineering Report Available

Check if an engineering report is
available to reviewing agency upon
request. (see instructions)

203 ☒ (See Additional Information)

**4. Discharge Location Name the
political boundaries within which
the point of discharge is located.**

State

204a Wisconsin

County

204b Forest

(if applicable) City or Town

204c --

For Dept. Use

204d	
204e	
204f	

5. Discharge Point Description

Discharge is into (check one):
(see instructions)

Stream (includes ditches, arroyos,
and other intermittent watercourses)

205a ☒ STR (See Item 207a)

Lake

☒ LKE

Ocean

☐ OCE

Municipal Sanitary Wastewater
Transport System

☐ MTS

Municipal Combined Sanitary and
Storm Transport System

☐ MCS

FOR DEPT. USE

Municipal Storm Water Transport System

Well (Injection)

Other

If 'other' is checked, specify

6. Discharge Point — Lat/Long Give the precise location of the point of discharge to the nearest second.

Latitude

Longitude

7. Discharge Receiving Water Name Name the waterway at the point of discharge. (see instructions)

If the discharge is through an outfall that extends beyond the shore-line or is below the mean low water line, complete Item 8.

8. Offshore Discharge

a. Discharge Distance from Shore

b. Discharge Depth Below Water Surface

9. Discharge Type and Occurrence

a. Type of Discharge Check whether the discharge is continuous or intermittent. (see instructions)

b. Discharge Occurrence Days per Week Enter the average number of days per week (during periods of discharge) this discharge occurs.

c. Discharge Occurrence —Months If this discharge normally operates (either intermittently, or continuously) on less than a year-around basis (excluding shutdowns for routine maintenance), check the months during the year when the discharge is operating. (see instructions)

Complete Items 10 and 11 if "Intermittent" is checked in Item 9.a. Otherwise, proceed to Item 12.

10. Intermittent Discharge Quantity State the average volume per discharge occurrence in thousands of gallons.

11. Intermittent Discharge Duration and Frequency

a. Intermittent Discharge Duration Per Day State the average number of hours per day the discharge is operating.

b. Intermittent Discharge Frequency State the average number of discharge occurrences per day during days when discharging.

12. Maximum Flow Period Give the time period in which the maximum flow of this discharge occurs.

☐ STS☐ WEL☐ OTH

206a

206a

____ DEG ____ MIN ____ SEC

206b

____ DEG ____ MIN ____ SEC (See Additional Information)

207a Hoffman Spring/Creek, Martin Spring/Creek 11-4, Upper Pickerel Creek, Skunk Lake, Creek 12-9, Swamp Creek, Hemlock Creek, Little Sand Lake, Duck Lake, and Deep Hole Lake.

For Dept. Use

For Dept. Use

207b

Major	Minor	Sub

207c

303e

208a

N/A _____ feet

208b

N/A _____ feet

209a

☐ (con) Continuous☒ (int) Intermittent

209b

N/A _____ days per week

209c

☐ JAN ☐ FEB ☐ MAR ☐ APR☐ MAY ☐ JUN ☐ JUL ☐ AUG☐ SEP ☐ OCT ☐ NOV ☐ DEC

N/A

210

N/A _____ thousand gallons per discharge occurrence.

211a

N/A _____ hours per day

211b

N/A _____ discharge occurrences per day

212

From N/A to N/A
month month

004

FOR DEPT. USE

13. Activity Description Give a narrative description of activity producing this discharge. (see instructions)

213a

These eleven discharges are provided as a contingency for hydrological impacts that may occur to surface waters due to mine dewatering. These discharges would provide supplementary water to springs, creeks, and lakes to mitigate the effect that ground water drawdown may have on these surface waters.

Discharge points 004-1 through 004-3 and 004-5 through 004-11 will be discharging ground water from wells constructed in accordance with NR 115 or from the mine ground water intercept system. The discharge water lines will be constructed out of non-reactive piping. The discharge of the pumped ground water into the stream, spring or lake will be done in a manner so as to minimize any turbidity. Consequently, the schedules requested in Items 16 and 17 have not been completed because polluted water is not being discharged.

Discharge 004-4 is described under Item 15 below. For flow rates and specific water sources, see additional information.

14. Activity Causing Discharge For each SIC Code which describes the activity causing this discharge, supply the type and maximum amount of either the raw material consumed (Item 14a) or the product produced (Item 14b) in the units specified in Table I of the Instruction Booklet. For SIC Codes not listed in Table I, use raw material or production units normally used for measuring production. (see instructions)

a. Raw Materials

SIC Code	Name	Maximum Amount/Day	Unit (See Table I)	Shared Discharges (Serial Number)
(1)	(2)	(3)	(4)	(5)
1021	Copper Ores	8,200*	STPD**	None
1031	Lead and Zinc Ores	Design Capacity		

b. Products

SIC Code	Name	Maximum Amount/Day	Unit (See Table I)	Shared Discharges (Serial Number)
(1)	(2)	(3)	(4)	(5)
1021	Copper Concentrates	210	STPD**	None
1031	Lead and Zinc Concentrates	1,536	STPD**	
	(Product exists process as metal sulfide concentrates.)			

*8,200 STPD is the design production rate of the zinc, copper, and lead ore. Annual production expressed as a daily average is 7,400 STPD.

**Short tons per day.

004

FOR DEPT. USE

15. Waste Abatement

- a. Waste Abatement Practices**
Describe the waste abatement practices used on this discharge with a brief narrative. (see instructions)

213aNarrative: The water discharged to Hoffman Spring/Creek

), Swamp Creek (004-6 and 004-7), Hemlock
Creek (004-8), Little Sand Lake (004-9), Duck Lake
(004-10), and Deep Hole Lake (004-11) will be of
ambient ground water quality supplied from wells or
the mine ground water intercept system as described
in the additional information for Item 213a. No
treatment of this water would occur prior to discharge.
(continued below)

- b. Waste Abatement Codes**
Using the codes listed in Table II of the Instruction Booklet, describe the waste abatement processes for this discharge in the order in which they occur if possible.

213b

- | | | |
|-------------|-------------|-------------|
| (1) _____, | (2) _____, | (3) _____, |
| (4) _____, | (5) _____, | (6) _____, |
| (7) _____, | (8) _____, | (9) _____, |
| (10) _____, | (11) _____, | (12) _____, |
| (13) _____, | (14) _____, | (15) _____, |
| (16) _____, | (17) _____, | (18) _____, |
| (19) _____, | (20) _____, | (21) _____, |
| (22) _____, | (23) _____, | (24) _____, |
| (25) _____, | | |

The water discharged to Skunk Lake (004-4) will be a blend of treated mine water and ground water from the potable water tank or from the mine ground water intercept system. The treated mine water will be the same as that discharged to Swamp Creek (001). The mine water treatment methods have been described in detail in Section II, Discharge 001.

004

FOR DEPT. USE

16. Wastewater Characteristics (See Item 13)

Check the box beside each constituent which is present in the effluent (discharge water). This determination is to be based on actual analysis or best estimate. (see instructions)

Parameter 216	Present	Parameter 216	Present
Color 00080		Copper 01042	
Ammonia 00610		Iron 01045	
Organic nitrogen 00605		Lead 01051	
Nitrate 00620		Magnesium 00927	
Nitrite 00615		Manganese 01055	
Phosphorus 00665		Mercury 71900	
Sulfate 00945		Molybdenum 01062	
Sulfide 00745		Nickel 01067	
Sulfite 00740		Selenium 01147	
Bromide 71870		Silver 01077	
Chloride 00940		Potassium 00937	
Cyanide 00720		Sodium 00929	
Fluoride 00951		Thallium 01059	
Aluminum 01105		Titanium 01152	
Antimony 01097		Tin 01102	
Arsenic 01002		Zinc 01092	
Beryllium 01012		Algicides* 74051	
Barium 01007		Chlorinated organic compounds* 74052	
Boron 01022		Pesticides* 74053	
Cadmium 01027		Oil and grease 00550	
Calcium 00916		Phenols 32730	
Cobalt 01037		Surfactants 38260	
Chromium 01034		Chlorine 50060	
Fecal coliform bacteria 74055		Radioactivity* 74050	

*Specify substances, compounds and/or elements in Item 26.

004

FOR DEPT. USE

17. Description of Intake and Discharge (See Item 13)

For each of the parameters listed below, enter in the appropriate box the value or code letter answer called for. (see instructions)

In addition, enter the parameter name and code and all required values for any of the following parameters if they were checked in Item 16: ammonia, cyanide, aluminum, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, phenols, oil and grease, and chlorine (residual).

Parameter and Code 217a	Influent		Effluent					
	Untreated Intake Water (Daily Average) (1)	In-Plant Treated Intake Water (Daily Average) (2)	Daily Average (3)	Minimum Value Observed or Expected During Discharge Activity (4)	Maximum Value Observed or Expected During Discharge Activity (5)	Frequency of Analysis (6)	Number of Analyses (7)	Sample Type (8)
Flow* Gallons per day 00056								
pH Units 00400								
Temperature (winter) ° F 74028								
Temperature (summer) ° F 74027								
Biochemical Oxygen Demand (BOD 5-day) mg/l 00310								
Chemical Oxygen Demand (COD) mg/l 00340								
Total Suspended (nonfilterable) Solids mg/l 00530								
Specific Conductance micromhos/cm at 25° C 00095								
Settleable Matter (residue) ml/l 00545								

*Other discharges sharing intake flow (serial numbers). (see instructions)

004

FOR DEPT. USE							

Parameter and Code

247a

[illegible]

218

N/A

2124

2190

219c

N/A

004

FOR Q&PT. USE

d. Chemical composition of these additives (see instructions).

219d

N/A

Complete items 20-25 if there is a thermal discharge (e.g., associated with a steam and/or power generation plant, steel mill, petroleum refinery, or any other manufacturing process) and the total discharge flow is 10 million gallons per day or more. (see instructions)

20. Thermal Discharge Source Check the appropriate item(s) indicating the source of the discharge. (see instructions)

Boiler Blowdown

Boiler Chemical Cleaning

Ash Pond Overflow

Boiler Water Treatment — Evaporator Blowdown

Oil or Coal Fired Plants — Effluent from Air Pollution Control Devices

Condense Cooling Water

Cooling Tower Blowdown

Manufacturing Process

Other

220

N/A

☐ BLSD

☐ BCCL

☐ APOF

☐ EPBD

☐ OCFP

☐ COND

☐ CTBD

☐ MFPR

☐ OTHER

21. Discharge/Receiving Water Temperature Difference

Give the maximum temperature difference between the discharge and receiving waters for summer and winter operating conditions. (see instructions)

Summer

221a

°F.

Winter

221b

°F.

22. Discharge Temperature, Rate of Change Per Hour

Give the maximum possible rate of temperature change per hour of discharge under operating conditions. (see instructions)

222

N/A °F./hour

23. Water Temperature, Percentile Report (Frequency of Occurrence)

In the table below, enter the temperature which is exceeded 10% of the year, 5% of the year, 1% of the year and not at all (maximum yearly temperature). (see instructions)

Frequency of occurrence

N/A

a. Intake Water Temperature (Subject to natural changes)

223a

b. Discharge Water Temperature

223b

10%	5%	1%	Maximum
°F	°F	°F	°F
°F	°F	°F	°F

24. Water Intake Velocity (see instructions)

224

N/A feet/sec.

25. Retention Time Give the length of time, in minutes, from start of water temperature rise to discharge of cooling water. (see instructions)

225

N/A minutes

Item 26. Additional Information

Item 202b. The discharges described in this section are of two types:
mitigation actions and contingency actions.

Mitigation actions will be undertaken before EMC begins Crandon Project dewatering activities and are addressed to designated primary ground water flow systems. Contingency actions will be undertaken in the event that impacts are observed on other designated area water bodies as a result of Crandon Project dewatering activities.

Although the facilities for the mitigation actions will be constructed prior to the start of dewatering activities, the actual discharges will not begin until specified criteria indicate that supplementary water flow to the described surface waters is required. The discharge for the contingency actions are also controlled by a set of specified criteria. The criteria that control the eleven discharges (004-1 through 004-11) described in this section include lake or spring levels or stream flow rates as measured at designated sites. These criteria are described in detail in "High Capacity Well Approval Applications" (Exxon Minerals Company, April 1986) and are not restated in this permit application.

Item 26. Additional Information (continued)

Item 203. Detailed information on the contingency mitigation is described in "High Capacity Well Approval Applications" (Exxon Minerals Company, April 1986).

Item 206a. The locations of the eleven discharges covered by this permit section are shown in Section I, Figure 1 of this Addendum. They are also shown in more detail in Figure 004-1 and Figures 004-3 through 004-12.

Item 213a. MITIGATION ACTIONS

Described below are the mitigation actions involving water discharge to surface waters. The locations of all mitigation facilities are presented in Figure 004-1. Mitigation actions are summarized in Table 1. See Figure 004-2 for a representation of a typical discharge structure.

Hoffman Spring/Creek System

The discharge to Hoffman Spring/Creek [004(1)] will be from well C-1 initially capable of delivering 130 gpm of pumped ground water. The locations of the well, pipeline and discharge structure are shown in Figure 004-3. This discharge structure and the other structures for the mitigation and contingency actions will include mechanisms to aerate the ground water supplements prior to discharge.

ADDENDUM

Discharge Serial
No. 004

Item 26. Additional Information (continued)

Item 231a. (continued)

TABLE 1
MITIGATION ACTIONS

DISCHARGE 004	WATER BODY	MITIGATION WELL NUMBER	MITIGATION SUPPLEMENT (GPM)
1	Hoffman Spring/Creek	C-1	130
2	Martin Spring/Creek 11-4	C-5	30
3	Upper Pickerel Creek	C-6	110
4	Skunk Lake	NA ^a	2 to 115 ^b

^aNA = Not applicable.^bBased on EMC impact projections and DNR impact projections.

Item 26. Additional Information (continued)

Item 213a. Hoffman Spring/Creek System (continued)

(continued) The supplement to the Hoffman Spring/Creek system will range from 50 to 130 gpm depending on the systems flow rate. If the 130 gpm supplement does not maintain the systems designated flow, additional supplement capacity will be installed and up to 250 gpm will be pumped as necessary.

Martin Spring/Creek 11-4 System

The discharge to Martin Spring [004(2)] will be from well C-5 initially capable of delivering 130 gpm of pumped ground water. The locations of the well, pipeline, and discharge structure are shown in Figure 004-4.

A supplement of 30 gpm will be added to Martin Spring as necessary to maintain the system's designated flow rate. If the 30 gpm supplement does not maintain the system's flow, additional supplement capacity will be installed and up to 180 gpm will be pumped as necessary.

Upper Pickerel Creek

The discharge to Upper Pickerel Creek [004(3)] will be from well C-6 initially capable of delivering 110 gpm of pumped ground water. The locations of the well, pipeline and discharge structure are shown in Figure 004-5.

Item 26. Additional Information (continued)

Item 213a. Upper Pickerel Creek (continued)

(continued) A supplement of 110 gpm will be added to Upper Pickerel Creek as necessary to maintain the system designated flow rate. If the 110 gpm supplement does not maintain the creek's designated flow rate, additional supplement capacity will be installed and up to 450 gpm will be pumped as necessary.

Skunk Lake

The discharge to Skunk Lake [004(4)] will be based on lake level. The supplement will range from 2 to 115 gpm depending on lake level. The locations of the pipeline and the discharge structure are shown in Figure 004-6. The supplement will consist of ground water from the mine ground water intercept system or ground water from the potable water tank (water from well WS-1) blended with treated mine water to meet the DNR effluent standards for Skunk Lake.

The treated mine water has been described in detail in Section II, Discharge 001 of the December 1985 Application. This section includes the treatment methods to be used and the range of discharge composition expected.

Item 26. Additional Information (continued)

Item 213a. Contingency Ground Water Supplementation Option

(continued) If the water supplement to Hoffman Spring/Creek, Upper Pickerel Creek and/or Skunk Lake provided by wells, C-1, C-6 and WS-1 create unacceptable secondary impacts, EMC may, at its option, pump ground water to these water bodies from the mine ground water intercept system in addition to or in substitution for ground water from these wells. Such optional supplementation may be provided by way of pipelines to Hoffman Spring/Creek and Upper Pickerel Creek from the mine/mill site area to existing discharge structures.

The mine ground water intercept system is described in the "High Capacity Well Approval Applications" (Exxon Minerals Company, April 1986). The water from this system will be of ambient ground water quality.

CONTINGENCY ACTIONS

The locations of all contingency wells and structures are presented in Figure 004-7. The contingency actions are summarized in Table 2.

The Plan for the streams (Creek 12-9, Swamp Creek, and Hemlock Creek) consists of installing and operating four wells located where the aquifer is large enough to provide sufficient water for supplementation. As described above in the Contingency Ground Water

ADDENDUM

Discharge Serial
No. 004

Item 26. Additional Information (continued)

Item 213a. (continued)

TABLE 2
CONTINGENCY ACTIONS

DISCHARGE 004-	WATER BODY	CONTINGENCY WELL NUMBER	CONTINGENCY SUPPLEMENT (GPM)
5	Creek 12-9	C-2	250
6	Swamp Creek Upstream from the Access Road	C-4 or mine ground water intercept system	140
7	Swamp Creek Downstream from the Access Road	C-3 or mine ground water intercept system	120
8	Hemlock Creek	WS-2 or mine ground water intercept system	290
9	Little Sand Lake	-a	305 to 740 ^b
10	Duck Lake	-a	6 to 12 ^b
11	Deep Hole Lake	-a	20 to 180 ^b

^aSupplement to be provided from mine ground water intercept system,
potable water tank (well WS-1) or well (WS-2).

^bBased on EMC impact projections and DNR impact projections.

Item 26. Additional Information (continued)

Item 213a. CONTINGENCY ACTIONS (continued)

(continued) Supplementation Option for the Mitigation Activities (the use of ground water from the mine ground water intercept system) may also be optionally used to supplement Swamp Creek and Hemlock Creek. This would be done to minimize secondary impacts caused by wells C-3, C-4 and WS-2 as described in the "High Capacity Well Approval Applications" (April 1986).

The Plan for the lakes consists of installing pipelines to provide ground water supplements from the potable water tank (well WS-1), well WS-2 and/or the mine ground water intercept system.

Creek 12-9

The discharge to Creek 12-9 [004(5)] will be from well C-2 which will be capable of delivering 250 gpm of pumped ground water. The locations of the well, pipeline, and discharge structure are shown in Figure 004-8. The flow rate of the supplement will be up to 250 gpm when operating and will be based on the creek flow rate.

Swamp Creek Upstream from Proposed Access Road

The discharge to Swamp Creek upstream from the proposed access road [004(6)] will be from well C-4, which will be capable of delivering 140 gpm of pumped ground water. The locations of the well, pipeline and discharge structure are shown in Figure 004-9. The flow rate

Item 26. Additional Information (continued)

Item 213a. Swamp Creek Upstream from Proposed Access Road (continued)

(continued) of the supplement will be 140 gpm when operating and will be activated or shut off based on the stream flow.

Swamp Creek Downstream from the Proposed Access Road

The discharge to Swamp Creek downstream from the proposed access road [004(7)] will be from well C-3, which will be capable of delivering 120 gpm of pumped ground water. The locations of the well, pipeline, and discharge structure are shown in Figure 004-10. The flow rate of the supplement will be 120 gpm when operating and will be activated or shut off based on the stream flow rate.

Hemlock Creek

The discharge to Hemlock Creek [004(8)] will be from well WS-2 which will be capable of delivering 290 gpm of pumped ground water. The locations of the well, pipeline and discharge structure are shown in Figure 004-11. The flow rate of the supplement will be 290 gpm when operating and will be activated or shut off based on the creek flow rate.

Little Sand Lake

The discharge to Little Sand Lake [004(9)] when operating will range from 305 to 740 gpm depending on the lake level. The locations of the pipeline and discharge structure are shown in Figure 004-12.

Item 26. Additional Information (continued)

Item 213a. Little Sand Lake (continued)

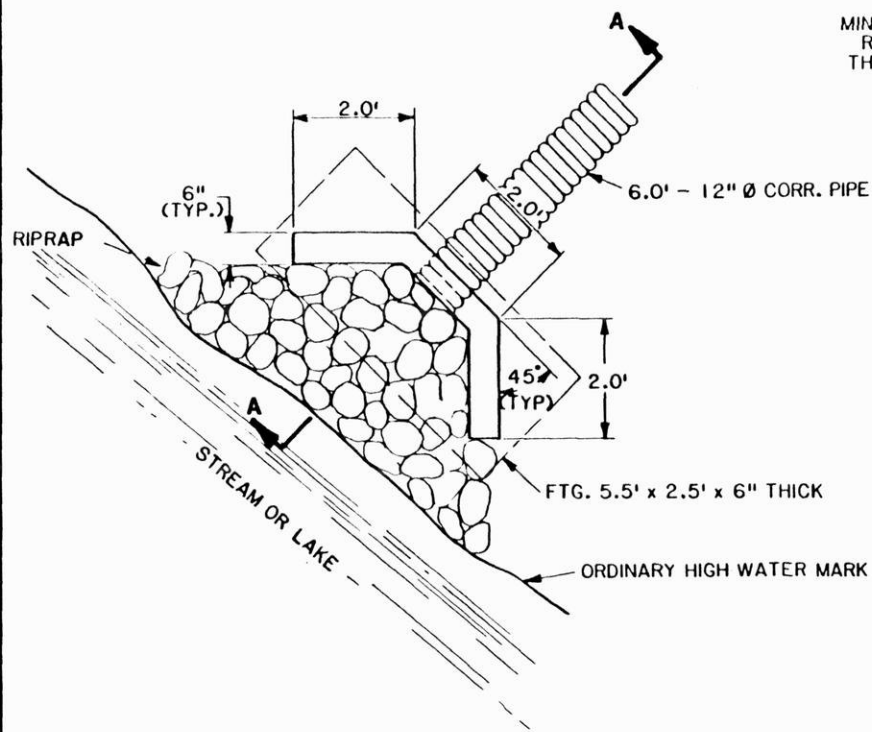
(continued) The buried pipeline will be constructed so as to enable ground water to be pumped from the potable water tank and/or the mine ground water intercept system to the discharge structure.

Duck Lake

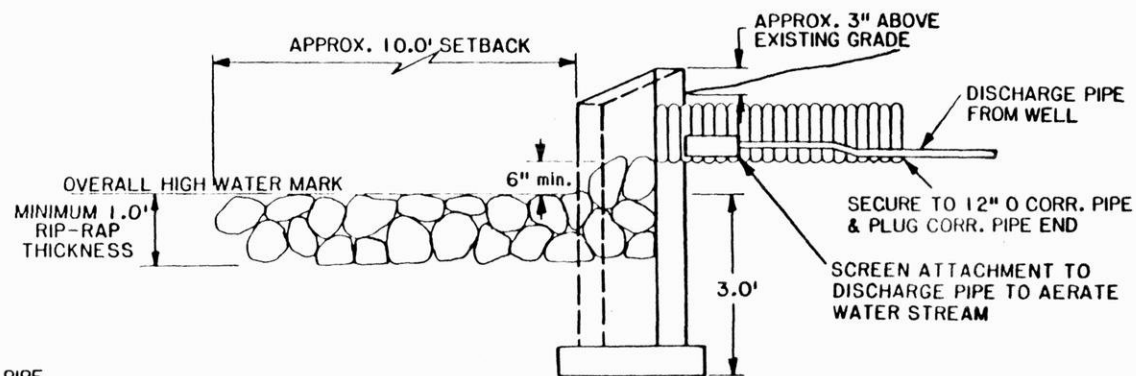
The discharge to Duck Lake [004(10)] when operating will range from 6 to 12 gpm depending on the lake level. The location of the pipeline and discharge structure are shown in Figure 004-12. The buried pipeline will be constructed so as to enable ground water to be pumped from the potable water tank and/or the mine ground water intercept system to the discharge structure.

Deep Hole Lake

The discharge to Deep Hole Lake [004-(11)] when operating will range from 20 to 180 gpm depending on the lake level. The location of the pipeline and discharge structure are shown in Figure 004-12. The buried pipeline will be constructed so as to enable ground water to be pumped from the potable water tank and/or the mine ground water intercept system to the discharge structure.



TYPICAL DISCHARGE HEADWALL

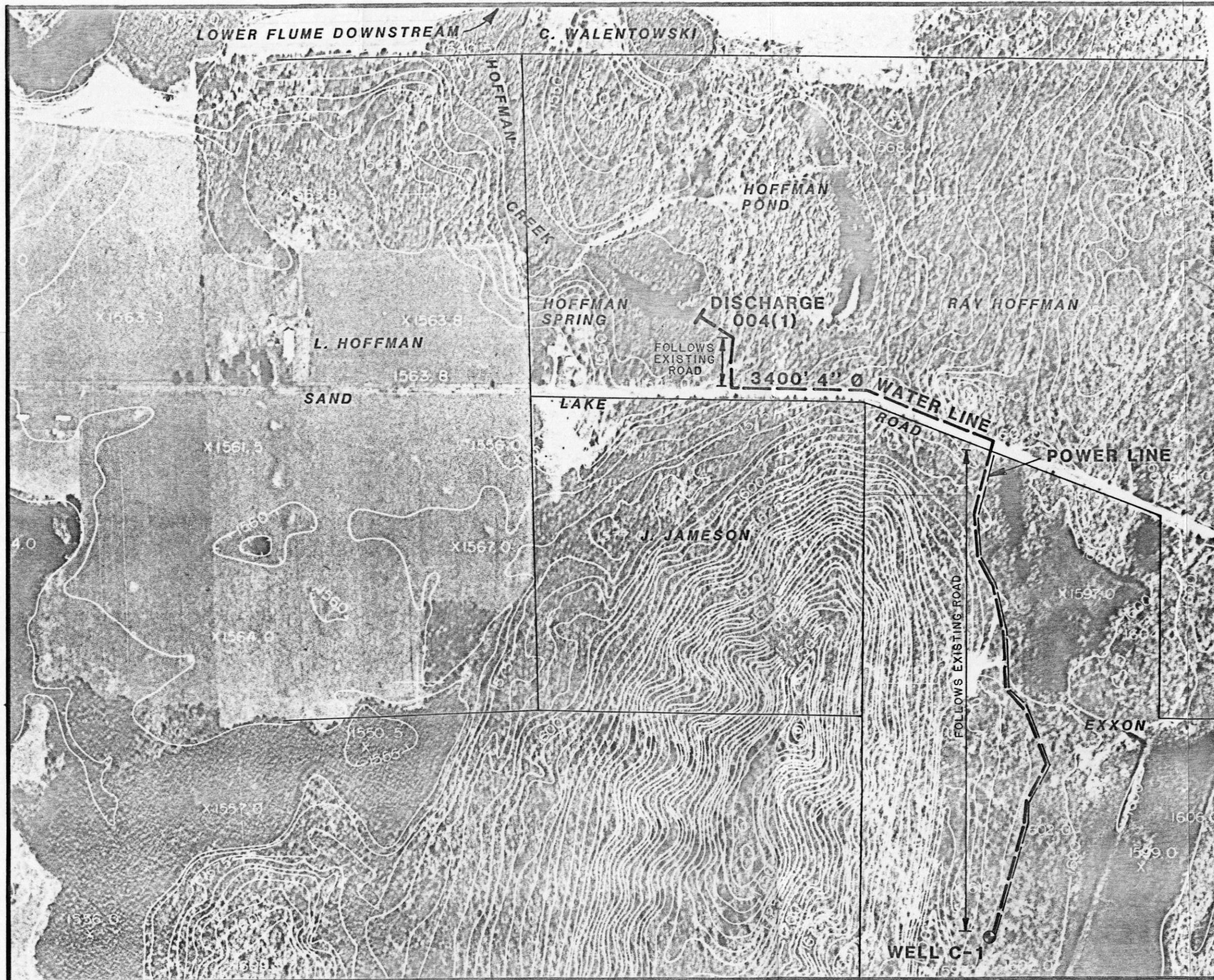


SECTION A-A
TYPICAL DISCHARGE HEADWALL



REVISED	DATE	BY	DESCRIPTION
Typical Representations: Refinements May Be Made During Final Engineering			

EXXON MINERALS COMPANY			
CRANDON PROJECT			
TITLE			
TYPICAL DISCHARGE STRUCTURE FOR STREAMS, SPRINGS & LAKES			
SCALE	SHOWN	STATE	WISCONSIN
COUNTY	FOREST		
DRAWN BY	DR SPRINGBORN	DATE	11/85
APPROVED BY		DATE	
APPROVED BY		DATE	
DRAWING NO.	FIGURE 004-2		SHEET
			OF
CHECKED BY		DATE	
APPROVED BY	C.C. Schroeder	DATE	11/13/85
APPROVED BY	D.F. Moore	DATE	11/11/85
REVISION NO.			



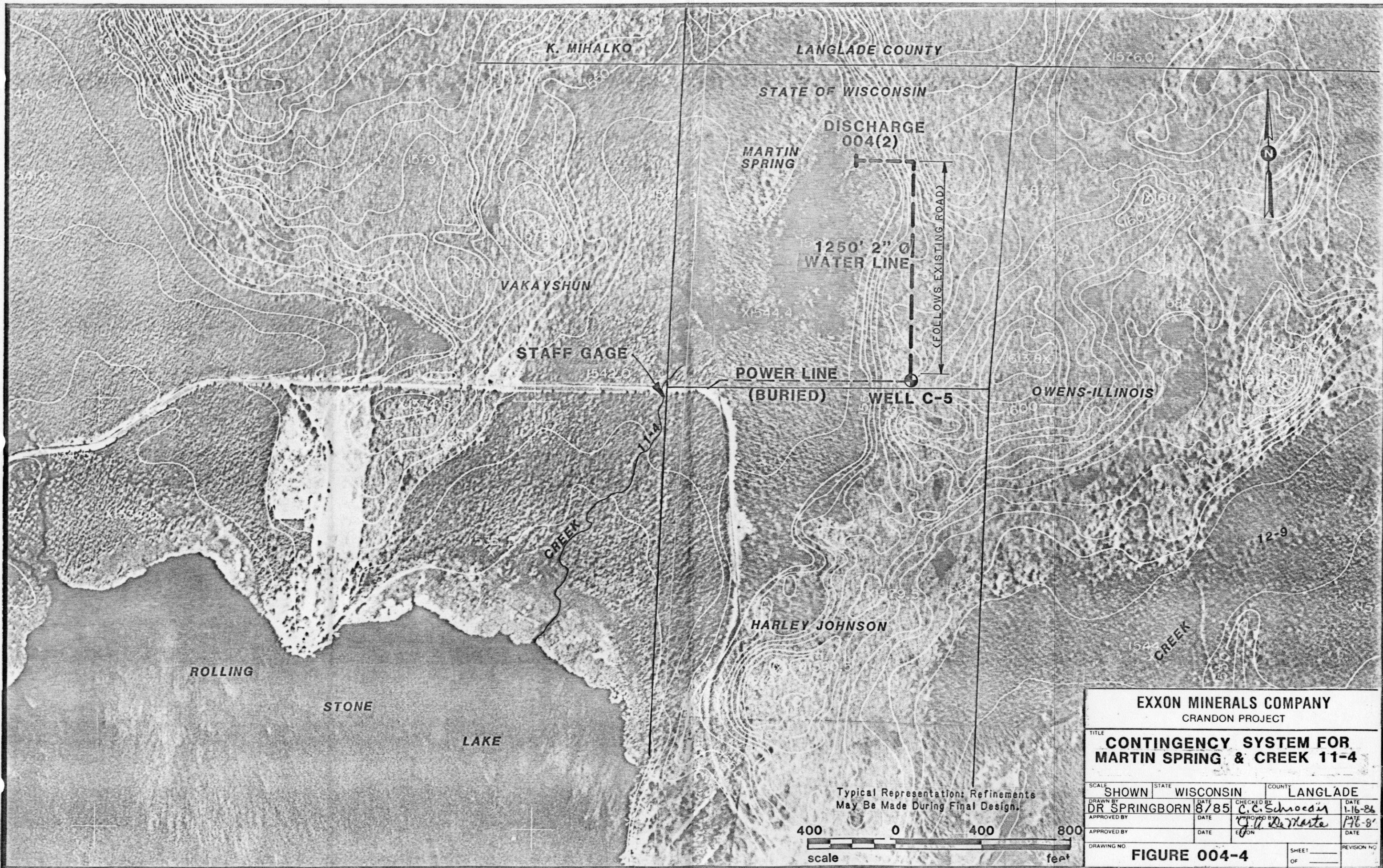
Typical Representation: Refinements
May Be Made During Final Design.

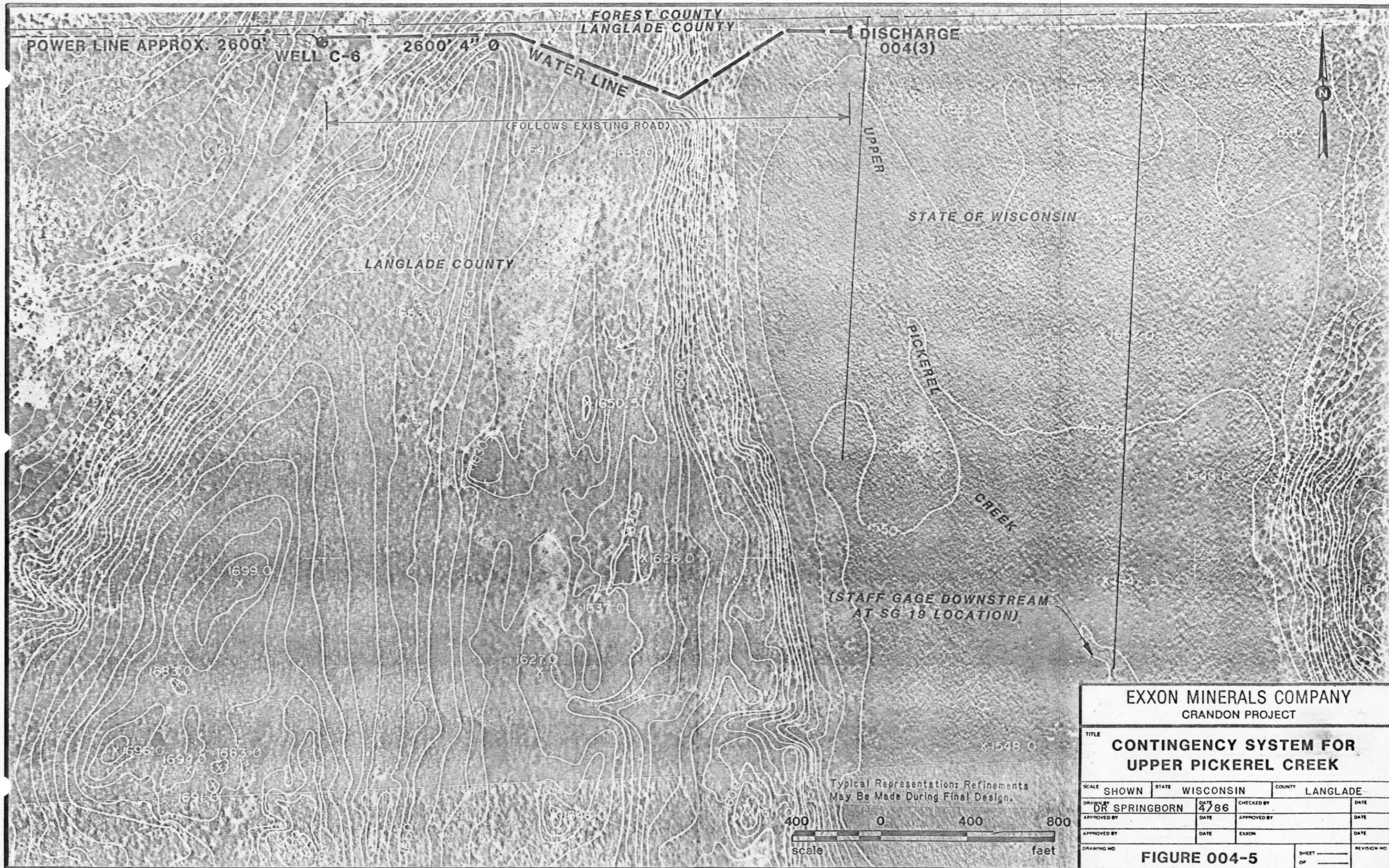
EXXON MINERALS COMPANY
CRANDON PROJECT

TITLE
**CONTINGENCY SYSTEM FOR
HOFFMAN SPRING &
HOFFMAN CREEK**

SCALE	SHOWN	STATE	WISCONSIN	COUNTY	FOREST
DRAWN BY	DR. SPRINGBORN	DATE	8/85	CHECKED BY	C. C. Schaefer
APPROVED BY		DATE		APPROVED BY	G. G. L. L. L.
APPROVED BY		DATE		APPROVED BY	

DRAWING NO. **FIGURE 004-3** SHEET OF REVISION NO.

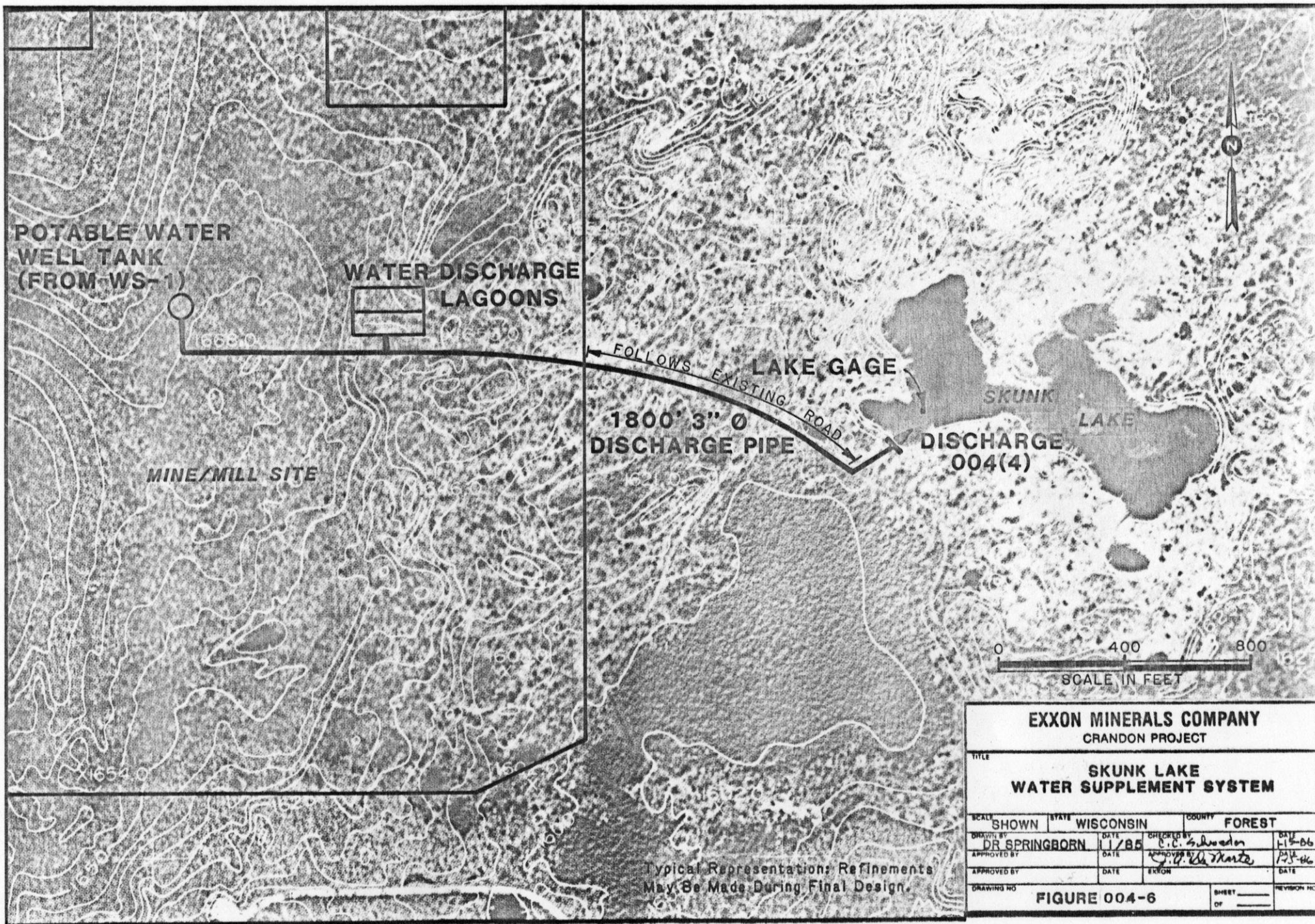




EXXON MINERALS COMPANY
GRANDON PROJECT

TITLE
**CONTINGENCY SYSTEM FOR
UPPER PICKEREL CREEK**

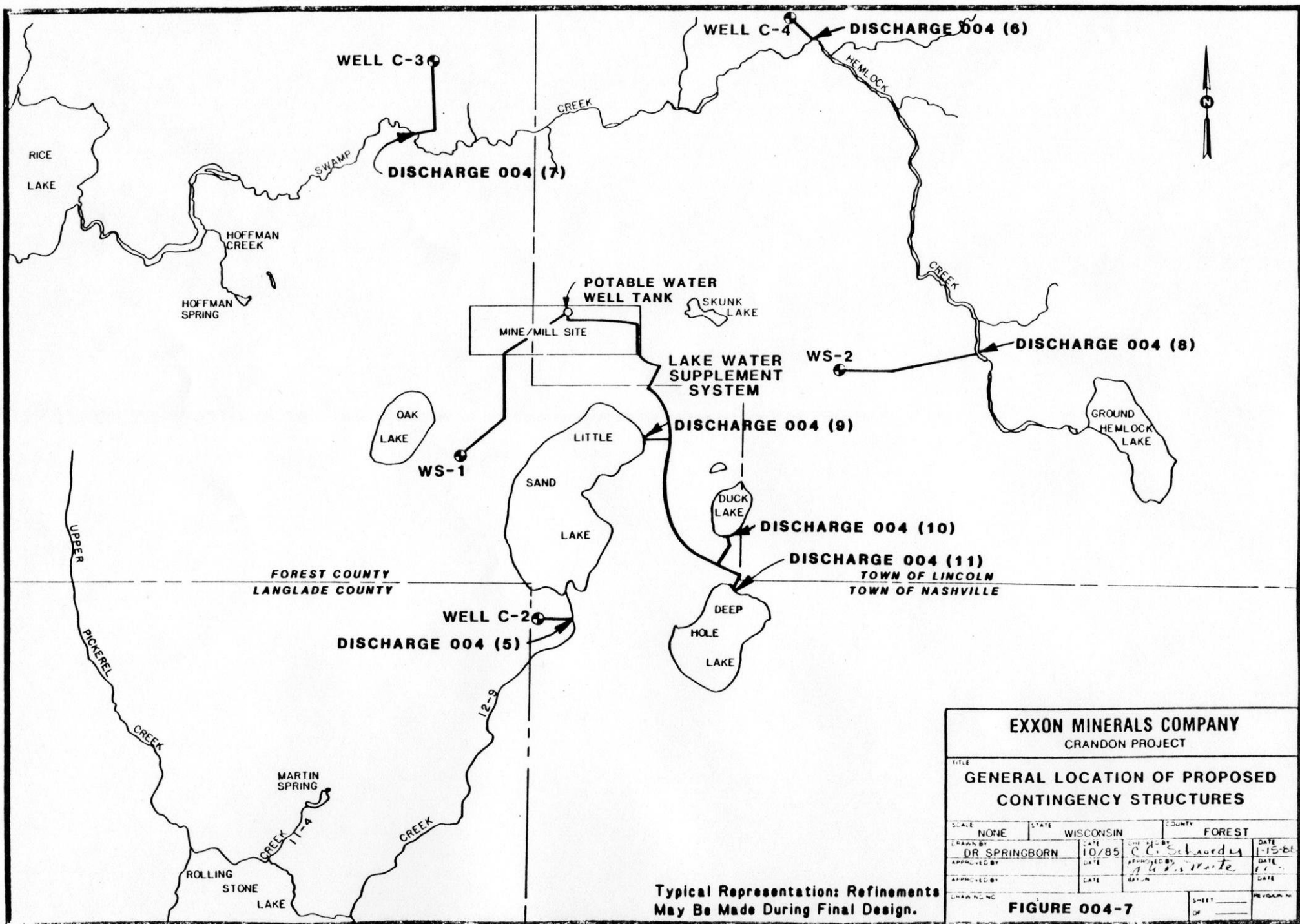
SCALE	SHOWN	STATE	WISCONSIN	COUNTY	LANGLADE
DRAWN BY	DR SPRINGBORN		DATE	CHECKED BY	DATE
APPROVED BY			DATE	APPROVED BY	DATE
APPROVED BY			DATE	EXXON	DATE
DRAWING NO				SHEET _____ OF _____	REVISION NO
FIGURE 004-5					

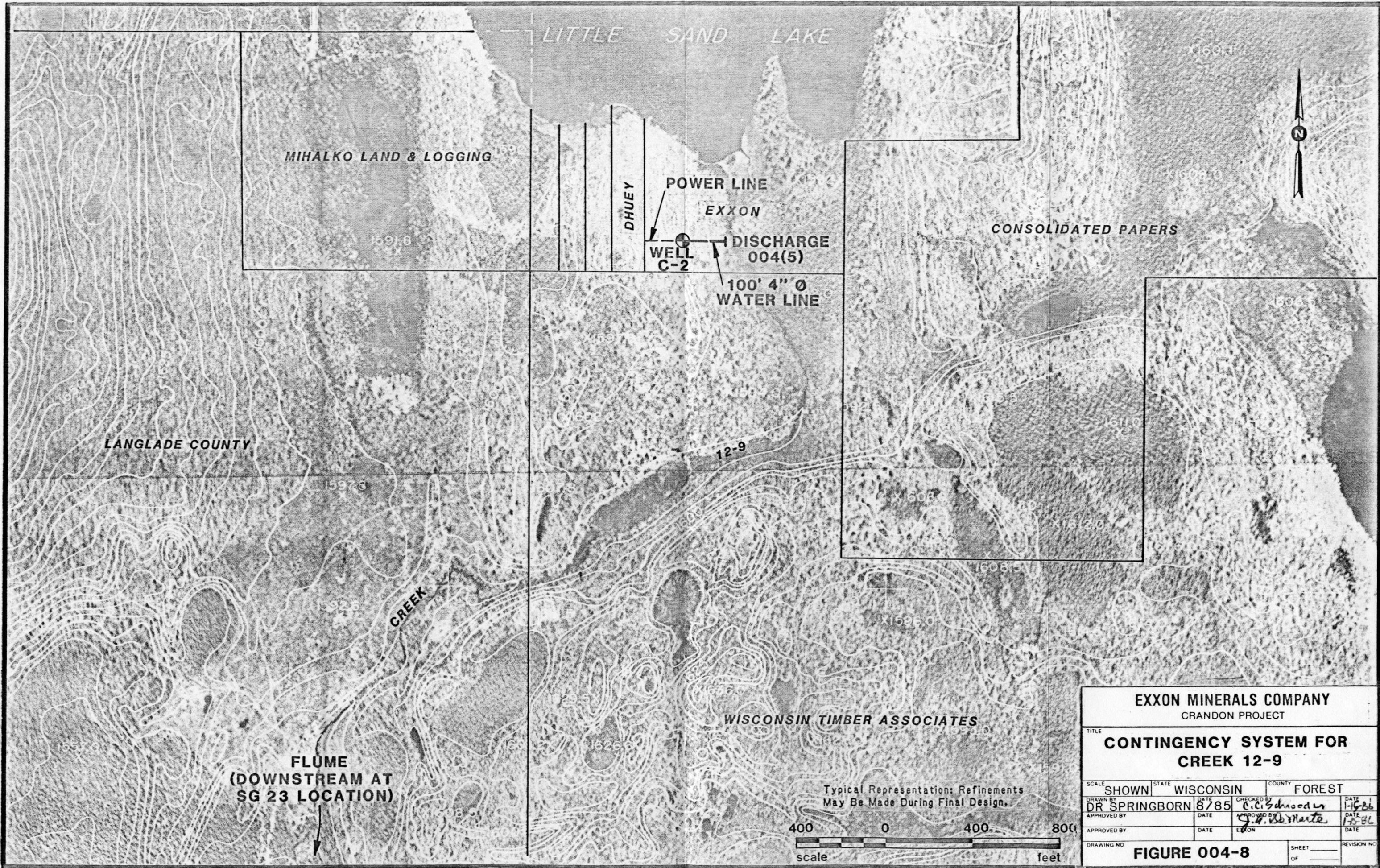


EXXON MINERALS COMPANY
CRANDON PROJECT

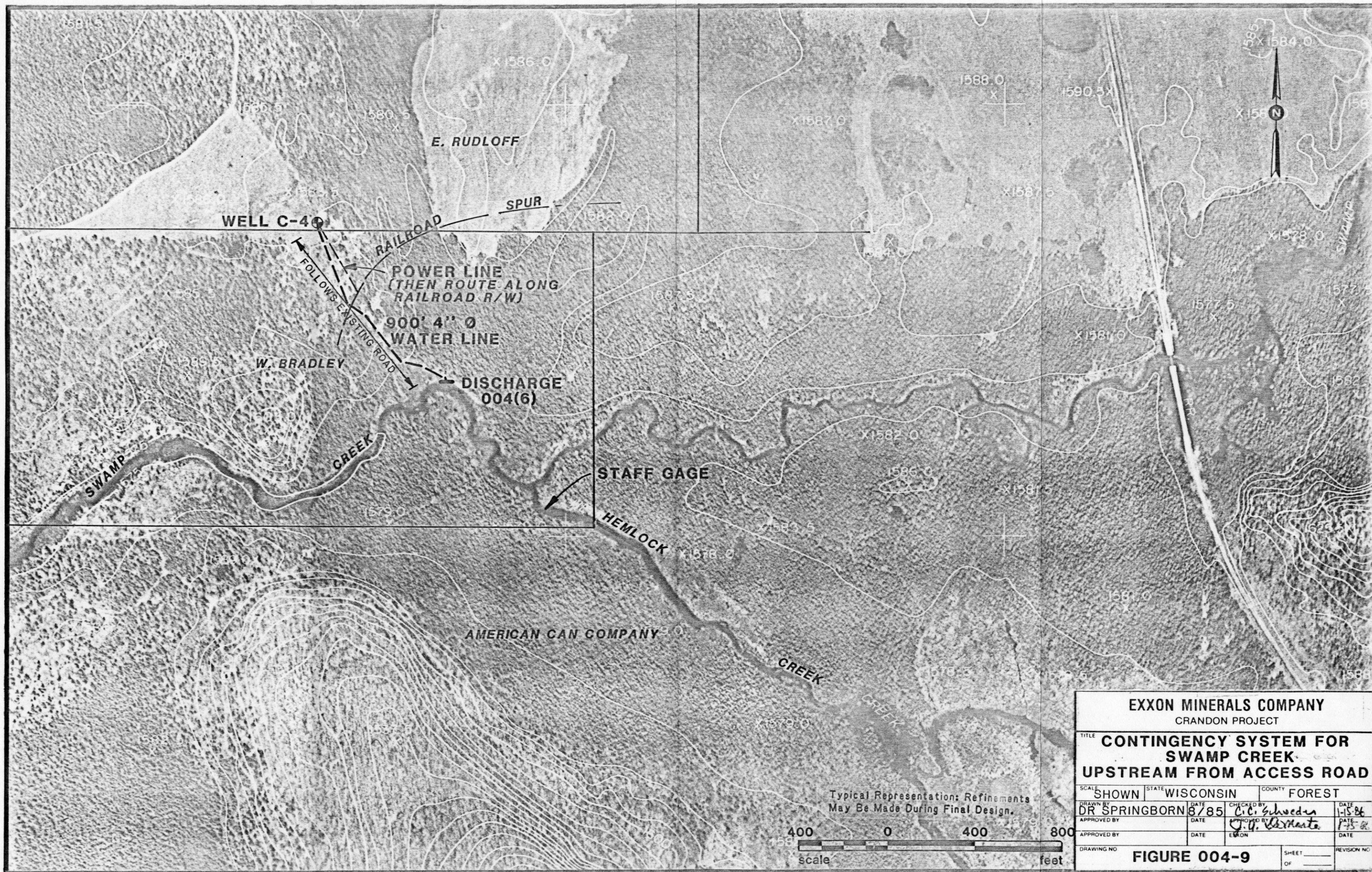
**SKUNK LAKE
WATER SUPPLEMENT SYSTEM**

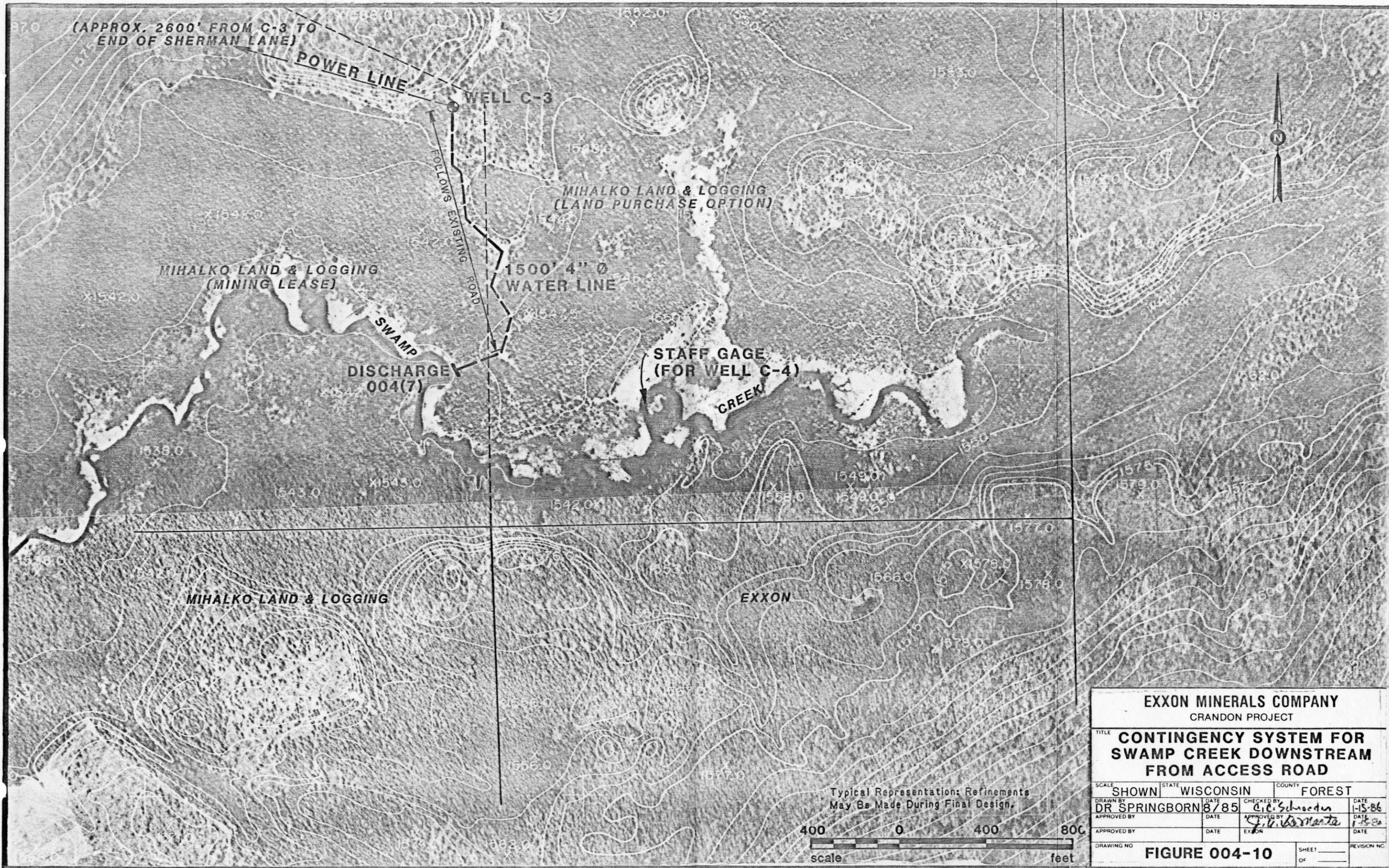
SCALE	SHOWN	STATE	WISCONSIN	COUNTY	FOREST
DRAWN BY	DR SPRINGBORN	DATE	11/85	CHECKED BY	J.C. Silvestri
APPROVED BY		DATE		APPROVED BY	J.P. Silvestri
APPROVED BY		DATE		SKN	
DRAWING NO	FIGURE 004-6				REVISION NO
	SHEET				
	OF				



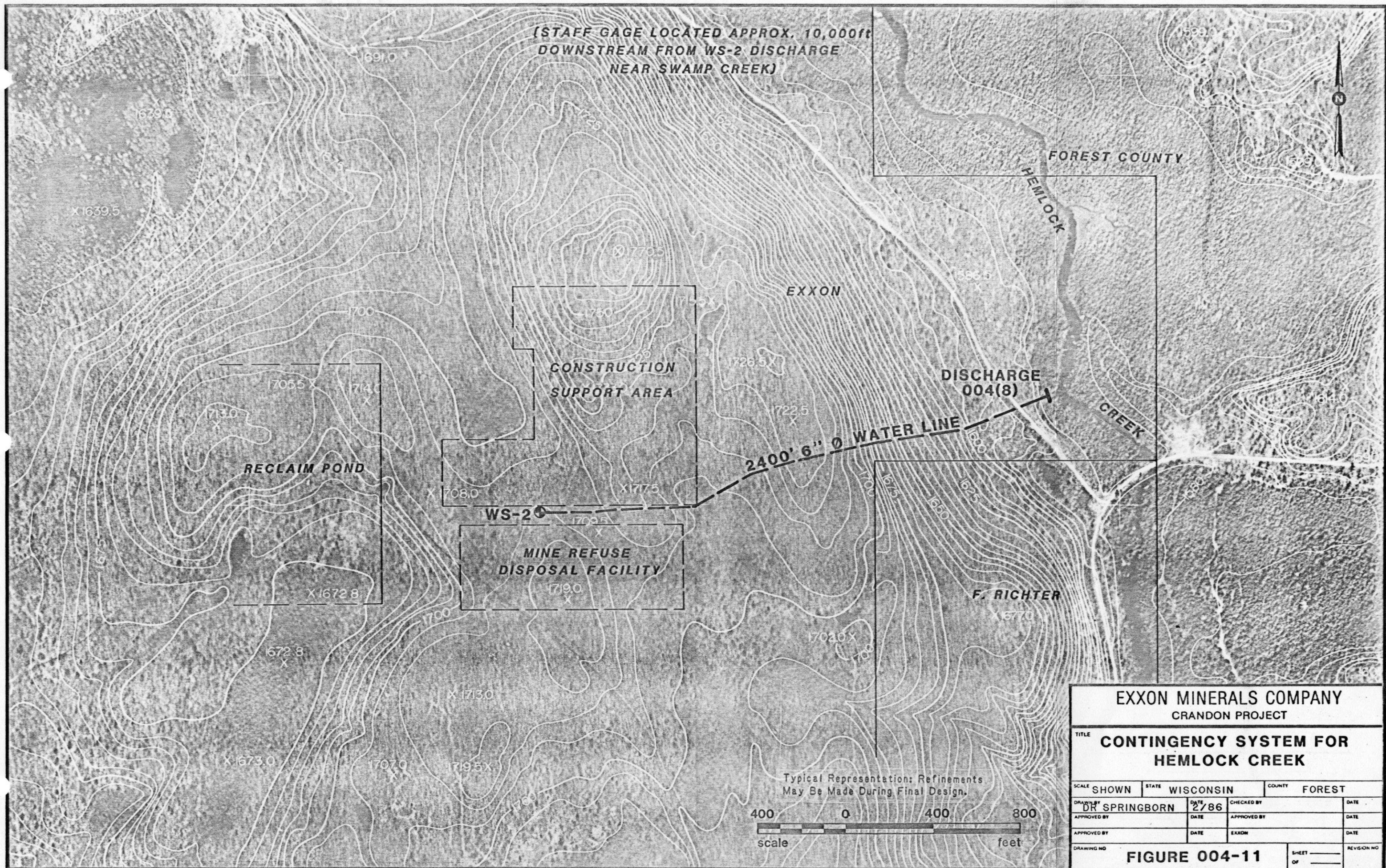


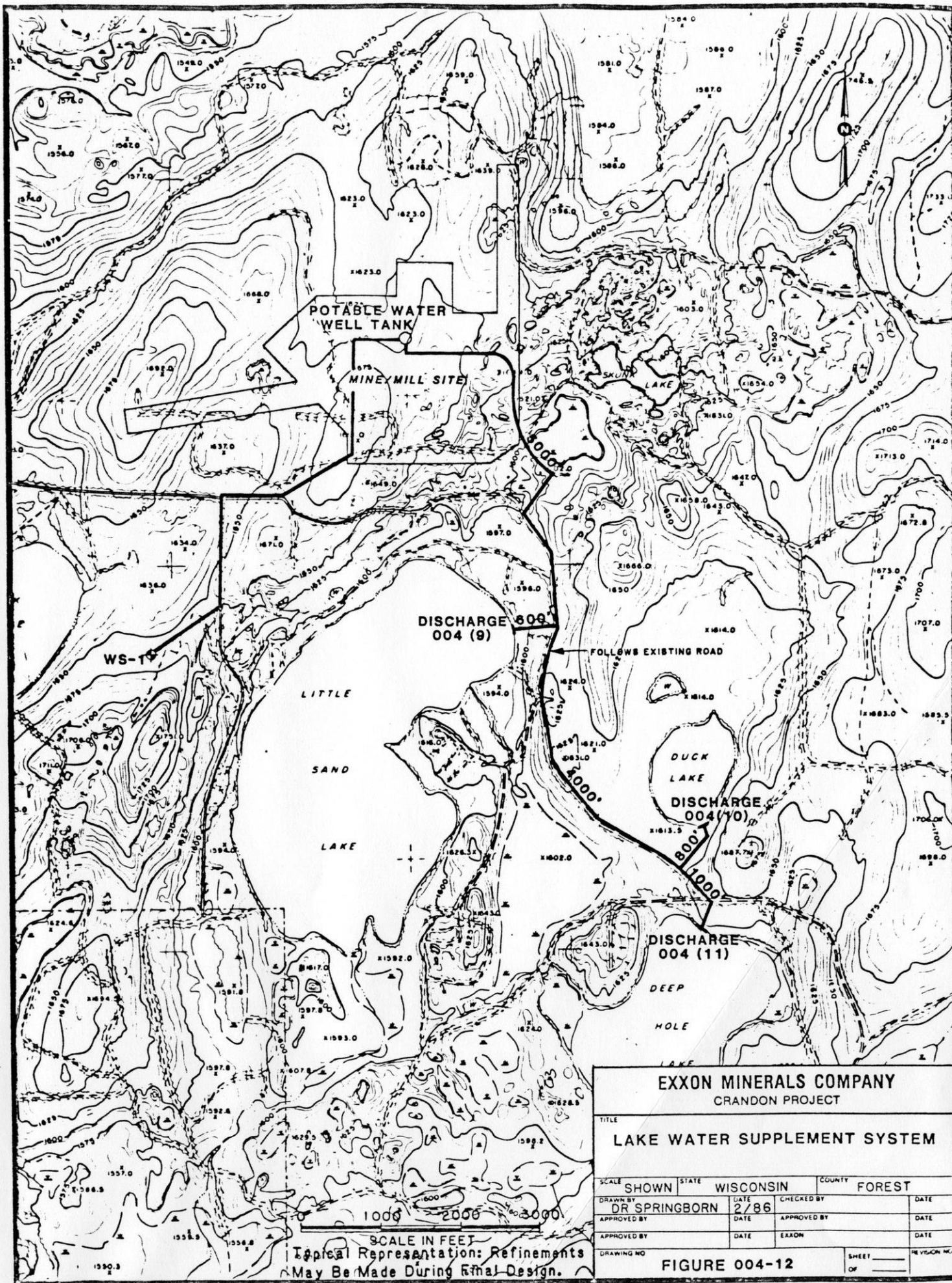
EXXON MINERALS COMPANY			
CRANDON PROJECT			
TITLE			
CONTINGENCY SYSTEM FOR CREEK 12-9			
SCALE	STATE	COUNTY	
SHOWN	WISCONSIN	FOREST	
DRAWN BY	DATE	CHECKED BY	DATE
DR SPRINGBORN	8/85	C. C. Schroeder	1-15-86
APPROVED BY	DATE	APPROVED BY	DATE
		J. H. Bernante	1-15-86
APPROVED BY	DATE	EXXON	DATE
DRAWING NO	FIGURE 004-8		SHEET
			OF
			REVISION NO





EXXON MINERALS COMPANY			
CRANDON PROJECT			
TITLE			
CONTINGENCY SYSTEM FOR SWAMP CREEK DOWNSTREAM FROM ACCESS ROAD			
SCALE	STATE	COUNTY	
SHOWN	WISCONSIN	FOREST	
DRAWN BY	DATE	CHECKED BY	DATE
DR SPRINGBORN	8/85	C. Schreder	1-15-86
APPROVED BY	DATE	APPROVED BY	DATE
		J. L. B. Monte	1-15-86
APPROVED BY	DATE	EXXON	DATE
DRAWING NO	FIGURE 004-10		SHEET
			OF
			REVISION NO.





EXXON MINERALS COMPANY
CRANDON PROJECT

TITLE
LAKE WATER SUPPLEMENT SYSTEM

SCALE SHOWN STATE WISCONSIN COUNTY FOREST

DRAWN BY DR SPRINGBORN DATE 2/86 CHECKED BY DATE

APPROVED BY DATE APPROVED BY DATE

APPROVED BY DATE EXXON DATE

DRAWING NO. SHEET OF

FIGURE 004-12

REVISION NO.