Dominion Energy - Kewaunee Power Station
STS Project No. 200700302

Appendix A

Water Supply Well Records (7 pages)

WDNR Soil Boring Log Forms (14 pages)

WDNR Well Installation Forms (14 pages)

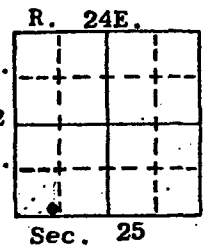
WDNR Well Development Forms (14 pages)

1215 University Avenue, Madison, Wisconsin 53706 Sample Nos. 285570-285631 KW-2

Well name Kewaunee Nuclear Plant, Well #1
Town of Carlton
Owner.... Wisconsin Public Service Corp.
Address..

Driller.. Joseph Reynen
Engineer.

County: Kewaunee
Completed... 3/27/68 & 7/15/68
Field check.
Altitude.... 612'
Use..... Power Plant
Static w. l. -- 34'
Spec. cap... -- 0.79



Location: SW¼,NE¼,SE¼,SE¼,SW¼,SW¼,Sec25,T22N,R24E Quad. Two Creeks 7½'

Drill Hole						Casing & Liner Pipe or Curbing							
Dia.	from	to	Dia.	from	to	Dia.	Wgt. & Kind	from	to	Dia.	Wgt. & Kind	from	to
16"	0	95'				10"	365 Wall 40 lb. Blk PE new pipe steel	0	95'	16"	3/8 Wall PE New steel pipe welded	0	81'
10"	95'	250'											

Grout: Kind	from	to
Cement	0	95'

Samples from 0 to 310' Date received: 7/16/68 Issued: 6/24/69
Examined by: M. Roshardt Date: 1/27/69

Formations: Drift, Silurian Undifferentiated

Remarks: Well tested for 12 hours at 204 gpm with 256 feet of drawdown.

LOG OF WELL:

	Depths	Graphic Section	Rock Type	Color	Grain Size Mode	Grain Size Range	Miscellaneous Characteristics - rounding, cementation, density, trace minerals, etc.
D	0-5		Gravel	Gry or	S peb	M peb/granule	Mostly dolomite pebs, few granite&gabbro. Much
	5-10		"	"	"	"	Same calcareous gray orange silt.
R	10-15		Clay	Dk rd bn	Clay	-	Very calcareous sty clay with few dol grans &
	15-20		"	"	"	-	Same trace quartz sand. Trace gabbro.
	20-25		"	"	"	-	Same
I	25-30		"	"	"	-	Same
	30-35		"	"	"	-	Same
	35-40		"	"	"	-	Same
F	40-45		"	"	"	-	Same
	45-50		"	"	"	-	Same
T	50-55		"	"	"	-	Same
	55-60		"	"	"	-	Same
	60-65		"	"	"	-	Same
	65-70		"	"	"	-	Same
	70-75		"	"	"	-	Same
80'	75-80		"	"	"	-	Same
S	80-85		Dolomite	Yl gry	M	-	Dense, little blue gray dolomite. Trace gabbro.
I	85-90		"	"	Fn	-	Dense, blocky dolomite.
	90-95		"	"	"	-	Same
L	95-100		"	"	"	-	Dense, blocky with slight gry mottling. Tr gabbro gra
U	100-105		"	"	"	-	Dense, blocky. Trace calcite.
R	105-110		"	"	"	-	Dense, blocky. Much dolomite silt.
I	110-115		"	"	"	-	Dense, blocky, slightly gry mot, mch dol silt&tr qtz s
	115-120		"	"	"	-	Same
A	120-125		"	"	"	-	Same
N	125-130		"	"	"	-	Dense, blocky dolomite. Much dolomitic silt.
	130-135		"	"	"	-	Dense, blocky, mch dol&calcitic silt&tr qtz sd&gra
	135-140		"	"	"	-	Dense, blocky, mch calcerous silt&clay. Tr quartz san
U	140-145		"	"	"	-	Same
N	145-150		"	"	"	-	Same
D	150-155		"	"	"	-	Dense, blocky, mch calcerous silt. Trace light gray mottling & limonite
I							
F							
F							

UNIVERSITY OF WISCONSIN GEOLOGICAL & NATURAL HISTORY SURVEY
1815 University Avenue, Madison, Wisconsin 53706

Sample Nos. 285570-285631 KW-20

Well Name: Kewaunee Nuclear Plant, Well #1
Town of Carlton, Wisconsin

	Depths	Graphic Section	Rock Type	Color	Grain Size Mode	Grain Size Range	Miscellaneous Characteristics - rounding, cementation, density, trace minerals, etc.
SILURIAN UNDIFFERENTIATED	155-160		Dolomite	Yl gry	Fn	-	Dense,blocky,much calcareous silt.Trace light gray mottling & limonite.
	160-165		"	"	M	-	Same
	165-170		"	"	"	-	Dense,blocky,mch calc silt.Tr qtz snd&lt gry mottling
	170-175		"	"	"	-	Dense,blocky,mch calc silt.Tr rd dolomite.
	175-180		"	"	"	-	Same plus trace light gray mottling.
	180-185		"	"	"	-	Dense,blocky,mch calc silt.Tr rd-pnk dol,light gry
	185-190		"	"	"	-	Same
	190-195		"	Pl rd	"	-	Dense-porous,mot blocky,some calcite,chert,fossil.
	195-200		"	Gry pnk	M	-	Same+crystalline pyr frag?Tr pyr.Mch calc silt&clay.
	200-205		"	"	"	-	Same
	205-210		"	"	"	-	Motiled,mch calcareous silt.Tr pyr,calcite & chert.
	210-215		"	"	Fn	-	Same plus trace crystalline quartz.
	215-220		"	"	"	-	Dense,blocky,white mot pnk,Trace drusy quartz.
	220-225		"	"	"	-	Same
	225-230		"	"	"	-	Same plus trace limonite.
	230-235		"	V lt gry	M	-	Dense,blocky dolomite with trace limonite.
	235-240		"	"	"	-	Same plus gray,red & pnk mottling.
	240-245		"	"	"	-	Dense,blocky dolomite with trace limonite.
	245-250		"	"	"	-	Dense,blocky,mot gry & pnk.Trace druzy quartz.
	250-255	Lim	"	Pl yl gry	"	-	Granular.Some limonite,tr yellow mottling&druzy qtz
	255-260		"	"	"	-	Dense-porous blocky dolomite,trace limonite.
	260-265		"	"	"	-	Dense blocky dolomite with trace limonite.
	265-270		"	"	"	-	Granular with tr yl mottling,druzy qtz.& limonite.
	270-275		"	"	"	-	Dense,blocky.Tr yl & pnk mot,limonite,pyr&crys calc
	275-280		"	"	Fn	-	Dense,platey-blocky.Tr pnk & yellow mottling.
	280-285		"	V pl or	M	-	Dense,blocky,mot pnk & bn.Tr lim,druzy qtz& some calc
	285-290		"	"	"	-	Same
	290-295		"	Lt gry	"	-	Dense-porous,blocky.Tr chert,limonite & pyrite.
	295-300		"	Gry or	Fn	-	Dense,blocky.Tr pnk mot&qtz,pyr&chert.Mch calc silt
	300-305		"	"	M	-	Sugary,ltl pnk & bn mot.Tr chert&druzy qtz.Mch calc s
230	305-310		"	Pl yl gry	"	-	Blocky,platey.Tr pyr,fossil frags,or pnk mot & chert

END OF LOG

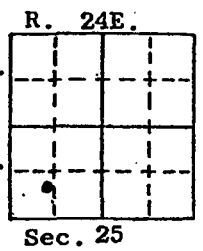
UNIVERSITY OF WISCONSIN GEOLOGICAL & NATURAL HISTORY SURVEY — LOG NO. KW-21
1815 University Avenue, Madison, Wisconsin 53706 — Sample Nos. 286041-286104

Well name Kewaunee Nuclear Plant Well #2
Town of Carlton
Owner.... Wisconsin Public Service Corp.
Address..

Driller.. Joseph Reyner
Engineer.

County: Kewaunee

Completed... 5/27/68
Field check.
Altitude.... 617' CI-20' TOPO
Use..... Power Plant
Static w. l. --34'
Spec. cap... 3.42 gpm/ft.



Location: C. of SE¼,NE¼,SW¼,SW¼,Sec25,T22N,R24E Quad. Two Creeks 7½'

Drill Hole						Casing & Liner Pipe or Curbing							
Dia.	from	to	Dia.	from	to	Dia.	Wgt. & Kind	from	to	Dia.	Wgt. & Kind	from	to
16"	0	95'				16"	Welded 3.75 Wall new steel pipe	+18"	81'	10"	Welded 3.75 Wall new steel pipe	+18"	95'
10"	95'	320'											

Grout: Kind	from	to
Cement	0	95'

Samples from 0 to 320' — Date received: 7/16/68 — Issued: 6/24/69
Examined by: M. Roshardt — Date: 2/7/69

Formations: Drift, Silurian Undifferentiated

Remarks: Well tested for 12 hours at 380 gpm with 111' of drawdown.

LOG OF WELL:

		Depths	Graphic Section	Rock Type	Color	Grain Size Mode	Grain Size Range	Miscellaneous Characteristics - rounding, cementation, density, trace minerals, etc.
DRIFT		0-5		Clay	Rd brn	Clay	-	V calcareous,mch quartz & dolomite sand,Mch silt.
		5-10		"	"	"	-	Same plus small pebbles of dolomite & igneous rock
		10-15		"	"	"	-	Same
		15-20		"	"	"	-	Same
		20-25		"	"	"	-	Same
		25-30		"	"	"	-	Same
		30-35		"	"	"	-	Same
		35-40		"	"	"	-	Same
		40-45		"	"	"	-	Same
		45-50		"	"	"	-	Same
		50-55		"	"	"	-	Same
		55-60		"	"	"	-	Same
		60-65		"	"	"	-	Same
		65-70		"	"	"	-	Same
		70-75		"	"	"	-	V calcareous silty clay,mch quartz & dolomite sand
	80'	75-80		"	"	"	-	Same plus igneous grains.
SILURIAN UNDIF		80-85		Dolomite	Pnk gry	M	-	Chunky dolomite,ltl silt,tr limonite,quartz&ig sand
		85-90		"	"	"	-	Same plus tr bl-gry mottling.
		90-95		"	"	"	-	Chunky dolomite,ltl silt,tr limonite,pyr,foss frag
		95-100		"	"	"	--	Chunky dolomite,mch dolomitic silt,tr limonite &
		100-105		"	"	"	--	Same \ bl-gry mottling
		105-110		"	"	"	-	Chunky dolomite,mch calcareous silt,Tr crystalline
		110-115		"	"	"	-	Blocky dolomite,mch calcareous silt,Tr crys pyrite
		115-120		"	"	"	-	Blocky dolomite,mch calcareous silt,Tr bl-gry mott
		120-125		"	"	"	-	Chunky dolomite,mch calcareous silt,Tr lim,gypsum
		125-130		"	"	"	-	Same \ & mottling
		130-135		"	"	"	-	Same
		135-140		"	"	"	-	Same
		140-145		"	"	"	-	Chunky dolomite,mch calcareous silt.Tr mottling.
		145-150		"	"	"	-	Same
		150-155		"	"	"	-	Chunky dolomite,mch calcareous silt,Ltl bl-gry mo
		155-160		"	"	"	-	Chunky dol,mch calc silt.Ltl bl-gry,rd pnk,gn mo
		160-165		"	"	"	-	Same

UNIVERSITY OF WISCONSIN GEOLOGICAL & NATURAL HISTORY SURVEY
1315 University Avenue, Madison, Wisconsin 53706

LOG NO. KW-21
Sample Nos. 286041-286104

Well Name: Kewaunee Nuclear Plant Well #2

	Depths	Graphic Section	Rock Type	Color	Grain Size Mode	Grain Size Range	Miscellaneous Characteristics - rounding, cementation, density, trace minerals, etc.
SILURIAN UNDIFFERENTIATED	165-170		Dolomite	Pnk gry	M	-	Chunky dol,mch calc silt,ltl bl-gry,rd pnk,gn mot.
	170-175		"	"	"	-	Same
	175-180		"	"	"	-	Blocky dolomite,ltl calcareous silt&bl-gry mot.
	180-185		"	"	"	-	Blocky dolomite,mch silt,ltl mottling.Tr gypsum.
	185-190		"	"	"	-	V blocky,mch bn yl mottled dolomite/mch chert.Few fossil fragments.
	190-195		"	"	"	-	Same
	195-200		"	"	"	-	Same
	200-205		"	"	"	-	Platey dolomite,mch yl bn mottling&chert.Tr silt & pyrite.
	205-210		"	"	"	-	Same
	210-215		"	"	"	-	Granular dolomite,ltl yl bn&bl gry mot.Tr cht,pyr.
	215-220		"	"	"	-	Granular dolomite,ltl yl bn mottling.Tr pyrite & limonite.
	220-225		"	"	"	-	Same
	225-230		"	"	"	-	Blocky dolomite,ltl dolomite silt.
	230-235	G	"	V lt gry	"	-	Blocky dolomite,ltl dolomite silt,tr glauconite&pyr
	235-240	G	"	"	"	-	Blocky,ltl dolomite silt,tr glauconite,pyrite,limonite & bl gry mottling.
	240-245	G	"	"	"	-	Same
	245-250		"	Pnk gry	"	-	Chunky,mch dolomite silt,ltl pnk rd mot & tr gypsum
	250-255		"	Lt gry	"	-	Mch bl gry mottling,ltl silt.
	255-260		"	"	"	-	Same
	260-265		"	Gry or pnk	"	-	Granular,mch lt bn mottling.Tr pyrite,quartz,gypsum,
	265-270		"	"	"	-	Same
	270-275		"	"	"	-	Same
	275-280		"	"	"	-	Chunky,mch lt bn mottling.Tr chert,pyrite,limonite.
	280-285		"	Lt gry	"	-	Platey,mch lt bn mottling.Tr pyrite,limonite.
	285-290		"	Gry or pnk	"	-	Granular,ltl lt bn mottling.Tr pyr,lim,calc,cht&gyp
	290-295		"	Gry or	"	-	Platey,ltl pnk rd mottling&silt.Tr calcite.
	295-300		"	Gry or pnk	"	-	Granular,mch lt bn mot.Tr pyr,lim,calc,cht,gyp,ool.
	300-305		"	"	"	-	Same but no oolites
	305-310		"	"	"	-	Granular,mch lt bn mot.Cht w/oolites.Tr qtz,calc,
	310-315		"	"	"	-	Same but no oolites lim,pyr,silt&gyp
240	315-320		"	"	"	-	Granular,mch lt bn mottling.Ltl chert.Tr quartz, pyrite & limonite.

END OF LOG

WELL CONSTRUCTOR'S REPORT — DEPARTMENT OF RESOURCE DEVELOPMENT — Wel 6

1. COUNTY: Kewaunee — CHECK ONE: ☒ Town ☐ Village ☐ City — NAME: Carlton — KW-21

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available): S W ¼ of S W ¼ Sec 25 T 22 N. R 24 E. GSE, NESW, SW Sec. 25

3. OWNER AT TIME OF DRILLING: Kewaunee, Nuclear Power Plant Well no 2

4. OWNER'S COMPLETE MAIL ADDRESS: Wis Consin Public Service Corporation Kewaunee Wis

5. Distance in feet from well to nearest: (Record answer in appropriate block)

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
—	—	—	—	—	—	—	—	—

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
—	—	—	—	—	—	—	—	—	—

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.): No Building in field

6. Well is intended to supply water for: Nuclear Power Plant

7. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
16	Surface	95	10	95	320

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
16'	Welded 3.75 Wall	Surface	
new	steel pipe	0	81
10"	Welded 3.75 Wall		
new	steel pipe	0	95

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Cement	Surface	95

10. FORMATIONS

Kind	From (ft.)	To (ft.)
clay	Surface	60
hard brown Limestone	60	81
	81	320
Kewaunee Co. Ind #2 Well #2 Perm Well No 50803 Standby Cooling Well Town of Carlton		

Well construction completed on: May 27 1968

11. MISCELLANEOUS DATA

Yield test: 12 Hrs. at 380 GPM

Depth from surface to normal water level: 34 ft.

Depth to water level when pumping: 145 ft.

Well is terminated 18 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

Water sample sent to Madison laboratory on: May 30 1968

Your op[illegible] wells, st[illegible] surface [illegible] KW 6 9 7 [illegible] ution hazards, information concerning difficulties encountered, and data relating to nearby g joints, method of finishing the well, amount of cement used in grouting, blasting, sub- should be given on reverse side.

SIGNATURE: Joseph Ruffner Registered Well Driller — COMPLETE MAIL ADDRESS: Green Bay Wis R. 1

Please do not write in space below

COLIFORM TEST RESULT	GAS — 24 HRS.	GAS — 48 HRS.	CONFIRMED	REMARKS
High Capacity Well Approved 12/26/67 & 1/26/68				cc: M.E. Ostrom 6-20-68

File: Tisch Mills

WELL CONSTRUCTOR'S REPORT — DEPARTMENT OF RESOURCE DEVELOPMENT — Wel 6

KW-20

1 COUNTY: Kewaunee — CHECK ONE: ☒ Town ☐ Village ☐ City — NAME: Carlton

2 LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.)
SW¼ of SW¼ Sec 25 T 22 N R 24 E | SW, NE, SE, SE, SW, SW, Sec. 25 T22N R24E

3 OWNER AT TIME OF DRILLING: Wisconsin Public Service corporation

4 OWNER'S COMPLETE MAIL ADDRESS: Kewaunee Nuclear Power Plant

5. Distance in feet from well to nearest: (Record answer in appropriate block)

BUILDING	SANITARY SEWER C.I.	SANITARY SEWER TILE	FLOOR DRAIN C.I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C.I.	WASTE WATER DRAIN TILE
none	—	—	—	—	—	—	—	—

CLEAR WATER DRAIN C.I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
—	—	—	—	—	—	—	—	—	—

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

6. Well is intended to supply water for: Power Plant

7. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
16	Surface	95	10	95	250

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
10	.365 wall S&R 40 lbs	Surface	
BLK PE new like steel		0	95
16" .3 wall PE new			
steel like Welded		0	81

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Cement	Surface	95

10. FORMATIONS

Kind	From (ft.)	To (ft.)
gravel & Clay	Surface	20
Clay	20	75
hardpan	75	81
Limestone	81	250
deepened to 310' 7-15-1968		
Kewaunee Co. Ind #2		
Well #1 Perm Well	50802	
COOLING	WELL	
Town of Carlton		

11. MISCELLANEOUS DATA

Yield test: 12 Hrs. at 193 GPM

Depth from surface to normal water level 30 ft.

Depth to water level when pumping 230 ft.

Well construction completed on March 27 1968

Well is terminated 24 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

Water sample sent to Madison laboratory on: April 2 1968

Your [illegible] wells, surface [illegible] KW6 9 8 pollution hazards, information concerning difficulties encountered, and data relating to nearby ing joints, method of finishing the well, amount of cement used in grouting, blasting, subtc., should be given on reverse side.

SIGNATURE: Joseph Peffner Registered Well Driller

COMPLETE MAIL ADDRESS: Green Bay Wis. R. 1

Please do not write in space below

COLIFORM TEST RESULT	GAS — 24 HRS.	GAS — 48 HRS.	CONFIRMED	REMARKS
High Capacity well approved For: Tests & Refills	1-26-68 & 12-26-67			Rec: M.E. Ostrom 4/12/68

WELL CONSTRUCTOR'S REPORT — DEPARTMENT OF RESOURCE DEVELOPMENT — Wel 6

1. COUNTY: Kewaunee — CHECK ONE: ☑ Town ☐ Village ☐ City — NAME: Carlton — KW-20

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot unit block numbers when available): SW¼ of SW¼ Sec 25 T 22 N R 24 E — SW, NE, SE, SE, SW, SW Sec 25 — T22N R24E

3. OWNER AT TIME OF DRILLING: Kewaunee Nuclear Power Plant

4. OWNER'S COMPLETE MAIL ADDRESS: Well No 1

5. Distance in feet from well to nearest: (Record answer in appropriate block)

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
–	–	–	–	–	–	–	/	/

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
–	–	–	/	–	–	/	–	/	/

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

6. Well is intended to supply water for: Power Plant

7. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	Surface 250	310			

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
		Surface	

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
	Surface	

10. FORMATIONS

Kind	From (ft.)	To (ft.)
Limestone	Surface 250	310
Original Work = 3-27-68	–	
We drilled no 1		
Well 60 ft deeper		
when got the report		
on this well		
Kewaunee Co. Ind. #2		
Well #1 Perm Well	No. 50802	
Coding Well		
Town of Carlton		

11. MISCELLANEOUS DATA

Yield test: 12 Hrs. at 204 GPM

Depth from surface to normal water level 34 ft.

Depth to water level when pumping 290 ft.

Well construction completed on 7-15 1968

Well is terminated 24 inches ☑ above ☐ below final grade

Well disinfected upon completion ☑ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

Water sample sent to Madison laboratory on: July 17 1968

Your o[illegible] wells, s[illegible] surface [illegible]lution hazards, information concerning difficulties encountered, and data relating to nearby [illegible]g joints, method of finishing the well, amount of cement used in grouting, blasting, sub-[illegible]., should be given on reverse side.

KW 899

SIGNATURE: Joseph Reifnen Registered Well Driller

COMPLETE MAIL ADDRESS: Green Bay Wis Rt. 1

Please do not write in space below

COLIFORM TEST RESULT	GAS — 24 HRS.	GAS — 48 HRS.	CONFIRMED	REMARKS
High Capacity Well Approved for Test Wells				Rec'd M.E. Co. from 9-27-68

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Dominion Energy - Kewaunee Power Station		MW-0701

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
STS - E. Schmidt - STS Project No. 200700302	5/23/2007	5/24/2007	hollow stem auger

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
VT620		MW-0701	597.11 Feet MSL	605.8 Feet MSL	8.0 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane 195,859 N, 2,644,681 E S/C/N
1/4 of SW 1/4 of Section 25, T 22 N, R 24 E
Lat ___ ° ___ ' ___ "
Long ___ ° ___ ' ___ "
Local Grid Location ☐ N Feet ☐ S ☐ E Feet ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
	Kewaunee	31	Kewaunee

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			2	Hydrovac - No samples collected										
			4											
			6											
1 SS	24 24	7	8	Brown clayey silt - with sand - wet at 11.0 feet										
2 SS	24 19	7	10											
3 SS	24 18	9	12		ML								70.2	
4 SS	24 18	22	14											
5 SS	24 13	15	16											
6 SS	24 14	14	18											
			20	No Samples collected										
				End of Boring Boring advanced to 20.8 feet with 4 1/4" ID HSA. Installed monitoring well at 20.0 feet.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm	Tel: 920-468-1978
Robert J. Mott	STS 1035 Kepler Dr. Green Bay, WI 54311	Fax: 920-468-3312

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

Route To: Watershed/Wastewater ☐ Waste Management ☐ Remediation/Redevelopment ☒ Other ☐

MONITORING WELL CONSTRUCTION

Form 4400-113A Rev. 7-98

Facility/Project Name: Dominion Energy - Kewaunee Power Station	Local Grid Location of Well: ____ ft. ☐N. ☐S. ____ ft. ☐E. ☐W.	Well Name: MW-0701
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☐ Lat. ° ' " Long. ° ' " or	Wis. Unique Well No.: VT620 / DNR Well Number:
Facility ID	St. Plane 195,859 ft. N, 2,644,681 ft. E. S/C/N	Date Well Installed: 05/24/2007
Type of Well: Well Code 11/mw	Section Location of Waste/Source: ____ 1/4 of SW 1/4 of Sec. 25, T. 22 N, R. 24 ☒E ☐W	Well Installed By: (Person's Name and Firm): Luke Cravillion / STS
Distance from Waste/Source ft. / Enf. Stds. Apply ☐	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known	Gov. Lot Number:

A. Protective pipe, top elevation 605.83 ft. MSL

B. Well casing, top elevation 605.62 ft. MSL

C. Land surface elevation 605.8 ft. MSL

D. Surface seal, bottom 605.3 ft. MSL or 0.5 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

14. Drilling method used: Rotary ☐ 50 / Hollow Stem Auger ☒ 41 / ____ Other ☐

15. Drilling fluid used: Water ☐ 02 Air ☐ 01 Drilling Mud ☐ 03 None ☒ 99

16. Drilling additives used? ☐ Yes ☒ No

Describe ____

17. Source of water (attach analysis, if required):

E. Bentonite seal, top 605.3 ft. MSL or 0.5 ft.

F. Fine sand, top 601.8 ft. MSL or 4.0 ft.

G. Filter pack, top 601.8 ft. MSL or 4.0 ft.

H. Screen joint, top 600.8 ft. MSL or 5.0 ft.

I. Well bottom 585.8 ft. MSL or 20.0 ft.

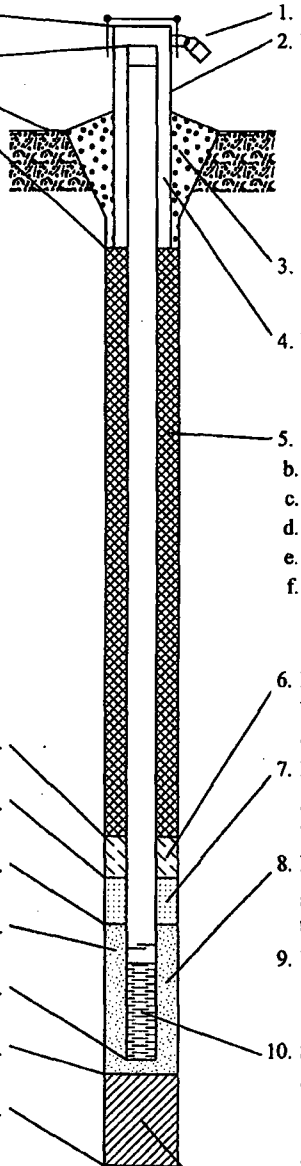
J. Filter pack, bottom 585.0 ft. MSL or 20.8 ft.

K. Borehole, bottom 585.0 ft. MSL or 20.8 ft.

L. Borehole, diameter 8.0 in.

M. O.D. well casing 2.25 in.

N. I.D. well casing 2.00 in.



1. Cap and lock? ☒ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 8.0 in.
b. Length: 1.0 ft.
c. Material: Steel ☒ 04 / ____ Other ☐
d. Additional protection? ☐ Yes ☒ No
If yes, describe: ____

3. Surface seal: Bentonite ☒ 30 / Concrete ☐ 01 / ____ Other ☐

4. Material between well casing and protective pipe:
Bentonite ☐ 30 / ____ Other ☒

5. Annular space seal: a. Granular/Chipped Bentonite ☒ 33
b. ____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. ____ Lbs/gal mud weight . . . Bentonite slurry ☐ 31
d. ____ % Bentonite . . . Bentonite-cement grout ☐ 50
e. 3.5 Ft³ volume added for any of the above
f. How installed: Tremie ☐ 01 / Tremie pumped ☐ 02 / Gravity ☒ 08

6. Bentonite seal: a. Bentonite granules ☐ 33
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒ 32
c. ____ Other ☐

7. Fine sand material: Manufacturer, product name & mesh size
a. 45/55 Badger
b. Volume added 1 ft³

8. Filter pack material: Manufacturer, product name & mesh size
a. 45/55 Badger
b. Volume added 5 ft³

9. Well casing: Flush threaded PVC schedule 40 ☒ 23 / Flush threaded PVC schedule 80 ☐ 24 / ____ Other ☐

10. Screen material: PVC
a. Screen Type: Factory cut ☒ 11 / Continuous slot ☐ 01 / ____ Other ☐
b. Manufacturer Buffalo
c. Slot size: 0.006 in.
d. Slotted length: 15.0 ft.

11. Backfill material (below filter pack): None ☒ 14 / ____ Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Robert J. Mottl | Firm: STS Consultants, Ltd. 1035 Kepler Dr. Green Bay, WI 54311 | Tel: 920-468-1978 Fax: 920-468-3312

Please complete both Forms 4400-113A and 4400-113B and return them to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐

Facility/Project Name	County	Well Name
Dominion Energy - Kewaunee Power Station	Kewaunee	MW-0701

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well Number
	31	VT620	

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method:

surged with bailer and bailed	☐	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed, and pumped	☐	70
compressed air	☐	20
bailed only	☒	10
pumped only	☐	51
pumped slowly	☐	50
other _____	☐	

3. Time spent developing well: 85 min.

4. Depth of well (from top of well casing): 19.7 ft.

5. Inside diameter of well: 2.00 in.

6. Volume of water in filter pack and well casing: 12.0 gal.

7. Volume of water removed from well: 20.0 gal.

8. Volume of water added (if any): gal.

9. Source of water added _____

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

		Before Development	After Development
11. Depth to Water (from top of well casing)	a.	6.30 ft.	18.40 ft.
Date	b.	5/31/2007	6/11/2007
Time	c.	01:50 ☒ p.m. ☐ a.m.	11:00 ☐ p.m. ☒ a.m.
12. Sediment in well bottom		inches	inches
13. Water clarity		Clear ☐ 10 Turbid ☒ 15 (Describe) brown - cloudy	Clear ☐ 20 Turbid ☒ 25 (Describe) light brown cloudy

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	mg/l	mg/l
15. COD	mg/l	mg/l

16. Well developed by: Person's Name and Firm
Matthew Bowman
STS

17. Additional comments on development:

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: Dominion Energy - Kewaunee Power Station

Street: N490 State Highway 41

City/State/Zip: Kewaunee, Wisconsin 54216

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: Matthew Bowman /BJM

Print Name: Matthew Bowman

Firm: STS Consultants, Ltd.

NOTE: See instructions for more information including a list of county codes and well type codes.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

For the

KEWAUNEE POWER STATION

N 490 State Highway 42
Kewaunee, Wisconsin 54216

Owned and Operated by:
Dominion Energy Kewaunee, Inc.

April 2009

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WISCONSIN RULE CROSS REFERENCE

SWPPP Permit Reference	Wisconsin Stormwater Pollution Prevention Plan (SWPPP) Elements	SWPPP Text Reference
(1)	**WI-S067857-2 PART III, SECTION B (2) (a). POLLUTION PREVENTION INDIVIDUAL.** The SWPPP shall identify by job title the specific individual responsible for all aspects of SWPPP development and implementation. The individual acting in that job title shall have the responsibility to coordinate the development, evaluation, maintenance, and amendment of the SWPPP. The specific individual shall also coordinate facility compliance with the specific management actions identified in the SWPPP, including management practices, conducting monitoring activities, preparing and submitting reports, and to serve as facility contact for the Department.	Section 2.1 and Section 5.2.1
(2)	**WI-S067857-2 PART III, SECTION B (2) (b). FACILITY SITE DESCRIPTION AND DRAINAGE BASE MAP.** The SWPPP shall contain a short description that summarizes the major activities conducted at various locations throughout the facility. The SWPPP shall also contain a facility drainage base map that depicts how storm water drains on, through, and from the facility to groundwater, surface water, or wetlands. The drainage base map shall show: that facility property boundaries; a depiction of the storm drainage collection and disposal system, including all known surface and subsurface conveyances, with the conveyances named; any secondary containment structures; the location of all outfalls, including outfalls recognized as permitted outfalls under another WPDES permit, numbered for reference, that discharge channelized flow to surface water, groundwater, or wetlands; the drainage area boundary for each storm water outfall; the surface area in acres draining to each outfall, including the percentage that is impervious such as paved, roofed, or highly compacted soil and the percentage that is pervious such as grassy areas and woods; existing structural storm water controls; and the name and location of receiving waters. The location of activities and materials that have the potential to contaminate storm water shall also be depicted on the drainage base map.	Section 1.1, Section 3.1, Section 4.0 and Appendix A, B, & C
(3)	**WI-S067857-2 PART III, SECTION B (2) (c). SUMMARY OF EXISTING SAMPLING DATA OR OBSERVATIONS.** The SWPPP shall summarize any results of available storm water sampling data or other observations that could be useful in characterizing the quality of storm water discharges or identifying sources of storm water contamination. Available data that characterizes the quality of storm drainage discharges under dry weather flow conditions shall also be included, except when such data has or will be reported to the Department under another WPDES permit.	Section 3.3, Section 7.2
(4)	**WI-S067857-2 PART III, SECTION B (2) (d). POTENTIAL SOURCES OF STORM WATER CONTAMINATION.** The SWPPP shall identify all potential source areas of storm water contamination, including but not limited to: outdoor manufacturing areas, areas of significant soil erosion; industrial plant yards; immediate access roads and rail lines; material handling sites (storage, loading, unloading, transportation, or conveyance of any raw material, finished product, intermediate product, by-product or waste); refuse sites; disposal or application of wastewater; vehicle maintenance and cleaning areas; and other areas capable of contaminating storm water runoff. Rooftops contaminated by industrial activities or a pollution control device; storage and maintenance areas for material handling equipment; shipping and receiving	Section 4.0 and Section 4.2

	areas; manufacturing buildings; residual treatment, storage, and disposal sites; storage areas (including tank farms) for raw materials, finished and intermediate products; areas containing residual pollutants from past industrial activity. The SWPPP shall identify any significant polluting materials or activities associated with the storm water pollution source areas identified in this permit. When possible, specific pollutants likely to be present in storm water as a result of contact with specific materials shall also be listed.	
(5)	**WI-S067857-2 PART III, SECTION B (2) (e). STATUS OF NON-STORM WATER DISCHARGES TO THE STORM SEWER.** The SWPPP shall identify all known contaminated and uncontaminated sources of non-storm water discharges to the storm sewer system and indicate which are covered by WPDES permits. The SWPPP shall contain the results of the non-storm water discharge monitoring required by s. NR 216.27, Wis. ADM. Code. If such monitoring is not feasible due to the lack of suitable access to an appropriate monitoring location, the SWPPP shall include a statement that the monitoring could not be conducted and reasons why.	Page vi, Section 3.2.2
(6)	**WI-S067857-2 PART III, SECTION B (2) (f). SOURCE AREA CONTROL BEST MANAGEMENT PRACTICES.** The SWPPP shall rely, to the maximum extent practicable, and to the extent it is cost effective, on the use of source area control best management practices designed to prevent storm water from becoming contaminated at the site. Source area control best management practices that are either proposed or in place at the facility shall be indicated on the facility drainage base map described in subsection (b). The SWPPP shall provide for the use of the following applicable source area control best management practices: (1) Practices to control significant soil erosion; (2) Good house-keeping measures, preventative maintenance measures, visual inspections, spill prevention and response measures, and employee training and awareness; (3) Covering or enclosing salt storage piles so that either precipitation nor storm water runoff can come into contact with the stored salt; or, for permittees that use brine and have salt storage piles on impervious curbed surfaces, a means of diverting contaminated storm water to a brine treatment system for process use; and (4) Use of a combination of storm water contact control or containment, drainage controls, or diversions to control SARA Title III Section 313 "Water Priority Chemicals" (42 U.S.C. 11023(c)) potentially discharged through the action of storm water runoff, leaching, or wind.	Section 5.0
(7)	**WI-S067857-2 PART III, SECTION B (2) (g). RESIDUAL POLLUTANTS.** The SWPPP shall identify pollutants that are likely to contaminate storm water discharges to waters of the state following implementation of source area control best management practices. Past sampling data collected at the facility or at sufficiently similar outfalls at other facilities may be used in making this determination. At a minimum, the following pollutants shall be considered for their potential to contaminate storm water; (1) Any pollutant for which an effluent limitation is contained in any discharge permit issued to the permittee, for this facility, by the Department; (2) Any pollutant contained in a categorical effluent limitation or pre-treatment standard to which the permittee is subject to the facility; (3) Any SARA Title III Section 313 "Water Priority Chemicals" (42 U.S.C. 11023(c)) for which the permittee, for this facility, has reporting requirements and which has the potential for contaminating storm water; (4) Any other toxic or hazardous pollutants from present or past activity at the site that	Section 4.0 and 4.5.2

	remain in contact with precipitation or storm water and which could be discharged to the waters of the state, and which are not regulated by another environmental program; and (5) Any of the following parameters which might be present in significant concentrations: oil and grease, pH, total suspended solids, 5-day biological oxygen demand, and chemical oxygen demand.	
(8)	**WI-S067857-2 PART III, SECTION B (2) (h). STORM WATER TREATMENT BEST MANAGEMENT PRACTICES.** When source area controls are not feasible, not cost effective, or when the Department determines source area control best management practices are inadequate to achieve a water quality standard, the SWPPP shall prescribe appropriate storm water treatment practices as needed to reduce the pollutants in contaminated storm water prior to discharge to waters of the state. Proposed or existing storm water treatment practices shall be shown on the facility drainage base map. The SWPPP shall provide for the following types of storm water treatment practices: (1) Storm water significantly contaminated with petroleum products shall be treated for oil and grease removal by an adequately sized, designed, and functioning wastewater treatment device. Coverage under a separate individual or general permit is required for discharges of storm water from oil/water treatment devices. Under s. 281.41, Wis. Stats., prior approval of plans for oil and grease removal devices may be required. (2) Point source discharges of storm water contaminated by significant amounts of sediment from eroding areas, including bare earth industrial lots and ongoing industrial processes, shall be treated by filtration or sedimentation reduction type practices designed in accordance with good engineering practices and the design criteria, standards and specifications outlined in the Wisconsin Construction Site Best Management Practices Handbook (WDNR Pub. WR-222 November 1993 Revision).	Section 5.0
(9)	**WI-S067857-2 PART III, SECTION B (2) (i). FACILITY MONITORING PLAN.** The SWPPP shall include provisions for complying with the monitoring requirements specified in s. NR 216.28, Wis. ADM. Code, and Part IV of this permit. The SWPPP shall include a checklist of inspections to be made during the annual facility site inspection. The SWPPP shall also identify for each outfall the type of monitoring that will be conducted, such as non-storm discharge monitoring and storm water discharge quality inspections.	Section 3.3 Section 3.4 Section 3.5 Section 5.2.4
(10)	**WI-S067857-2 PART III, SECTION B (2) (j). SWPPP IMPLEMNTATION SCHEDULE.** The SWPPP shall include an implementation schedule for the requirements of this permit that are consistent with the compliance schedule set forth in Part V. of this permit.	Section 5.5
(11)	**WI-S067857-2 PART III, SECTION B (2) (k). SIGNATURE.** The SWPPP and SWPPP summary shall be signed in accordance with Part VI.M. and contain the following statement: "I certify under penalty of law that this document and attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information contained in the plan. Based on my inquiry of the person, or persons, who manage the system, or those persons directly responsible for gathering the information, the information contained in this document is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for providing false information, including the possibility of fine and imprisonment. In addition, I certify under penalty of law that, based upon	Page vi

	inquiry of persons directly under my supervision, to the best of my knowledge and belief, the provisions of this document adhere to the provision of the storm water permit for the development and implementation of a Storm Water Pollution Prevention Plan and that the plan will be complied with."	
(12)	**WI-S067857-2 PART III, SECTION D (1 - 2). AMENDING A SWPPP.** A permittee shall amend a SWPPP under the following circumstances: (1) When expansion, production increases, process modifications, changes in material handling or storage, or other activities are planned which will result in significant increases in the exposure of pollutants to storm water discharged either to waters of the state or to storm water treatment devices. The amendment shall contain a description of the new activities that contribute to the increased pollutant loading, planned source control activities that will be used to control pollutant loads, an estimate of the new or increased discharge of pollutants following treatment, and when appropriate, a description of the effect of the new or increased discharge on existing storm water treatment facilities. (2) The comprehensive annual facility site compliance inspection, quarterly visual inspection of storm water quality, or other means reveals that the provisions of the SWPPP are ineffective in controlling storm water pollutants discharged to waters of the state. (3) Upon written notice that the department finds the SWPPP to be ineffective in achieving the conditions of this general permit.	Section 7.5 Section 7.6 Appendix F
(13)	**WI-S067857-2 PART IV (B). EVALUATION OF NON-STORMWATER DISCHARGES.** The SWPPP must certify that the storm water discharge has been tested or evaluated for the presence of non-stormwater discharges.	Section 3.2.1
(14)	**WI-S067857-2 PART IV(C) (1) ANNUAL FACILITY SITE COMPLINANCE INSPECTION.** Permittees shall perform and document the results of the Annual Facility Site Compliance Inspection (AFSCI). The inspection shall be adequate to verify that the site drainage conditions and potential pollution sources identified in the SWPPP remain accurate, and that the best management practices prescribed in the SWPPP are being implemented, properly maintained. Information reported shall include: the inspection date, inspection personnel, scope of the inspection, major observations, and revisions needed in the SWPPP.	Section 3.4, 3.5, 7.3, 7.4, & Appendix E
(15)	**WI-S067857-2 PART IV(C) (2), QUARTERLY VISUAL MONITORING.** Permittees shall perform and document quarterly visual inspections of stormwater discharge quality at each storm water outfall. Inspection shall be conducted within the first 30 minutes of discharge or as soon thereafter as practical, but not exceeding 60 minutes. The inspections shall include any observations of color, odor, turbidity, floating solids, foam, oil, sheen, or other obvious indicators of storm water pollution. Information reported shall include the inspection date, inspection personnel, visual quality of the storm water discharge, and probable sources of any observed storm water contamination.	Section 3.3 Appendix F

(16)	**WI-S067857-2 PART IV A-B MONITORING REQUIREMENTS.** A. Purpose. Monitoring includes site inspections and non-storm water discharge assessments. The purpose of monitoring is to: a) evaluate storm water outfalls for the presence of non-storm water discharges, and b) evaluate the effectiveness of the permittee's pollution prevention activities in controlling contamination of storm water discharges. B. Evaluation of Non-Storm Water Discharges. The permittee shall evaluate all storm water outfalls for non-storm water contributions to the storm drainage system for the duration of this permit. Any monitoring shall be representative of non-storm water discharges from the facility. (I) Evaluations shall take place during dry periods, and may include either end of pipe screening or detailed testing of the storm sewer collection system. (2) Either of the following monitoring procedures is acceptable: (a) A detailed testing of the storm sewer collection system may be performed. Acceptable testing methods include dye testing, smoke testing, or video camera observation. The Department shall require a re-test after 5 years or a lesser period as deemed necessary by the Department. (b) End of pipe screening shall consist of visual observations made at least twice per year at each outfall of the storm sewer collection system'. Instances of dry weather flow, stains, sludge, color, odor, or other indications of a non-storm water discharge shall be recorded; (3) Results of the non-storm water evaluations shall be included in the SWPPP summary required in Part V.A. and the AFSCI report required in Part V.B.(1). Information reported shall include: date of testing, test method, outfall location, testing results, and potential significant sources of non-storm water discovered through testing. Upon discovering non-storm water flows, which are not covered under another permit, the permittee shall either seek coverage under another permit or eliminate the non-storm water flow. (4) Any permittee unable to evaluate outfalls for non-storm water discharges shall sign a statement certifying an inability to comply with this requirement, and include a copy of the statement in the SWPPP. In this case, the SWPPP shall be submitted to the Department, water discharge, and probable sources of any observed storm water contamination.	Section 3.4 Appendix F

PLAN REVIEW AND CERTIFICATION

WI-S067857-2 PART III, SECTION B (2) (k). SIGNATURE. *(SWPPP Permit Reference #11).*

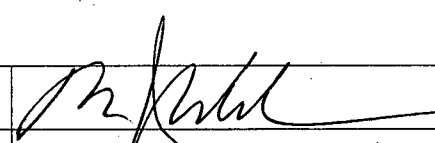
I certify under penalty of law that this document and attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information contained in the plan. Based on my inquiry of the person, or persons, who manage the system, or those persons directly responsible for gathering the information, the information contained in this document is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for providing false information, including the possibility of fine and imprisonment. In addition, I certify under penalty of law that, based upon inquiry of persons directly under my supervision, to the best of my knowledge and belief, the provisions of this document adhere to the provision of the storm water permit for the development and implementation of a Storm Water Pollution Prevention Plan and that the plan will be complied with. (SWPPP Permit Reference #11) *

Signature:		Date: 4/13/09
Printed Name:	Michael J. Wilson	
Title:	Director Safety & Licensing	

CERTIFICATION OF ELMINATION OF NON-STORMWATER DISCHARGES

***WI-S067857-2 PART III,* SECTION B (2) (e). STATUS OF NON-STORM WATER DISCHARGES TO THE STORM SEWER.** *(SWPPP Permit Reference #5).*

The stormwater outfalls at this Station have been evaluated for the presence of non-stormwater discharges that are not allowable under the Stations stormwater discharge permit. None were found during the site visit. Both oil and chemicals are in closed containers and the containers are within shelters and/or have canopies. Sources of potential stormwater contamination have been identified and stormwater contact management measures have been implemented.
(SWPPP Permit Reference #5) *

Signature:		Date: 4/13/09
Printed Name:	Michael J. Wilson	
Title:	Director Safety & Licensing	

1.0 FACILITY INFORMATION

1.1 Facility Description - General

WI-S067857-2 PART III, SECTION B (2) (b). FACILITY SITE DESCRIPTION AND DRAINAGE BASE MAP. *(SWPPP Permit Reference #2).*

The Kewaunee Power Station (the "Station") is a net 595 megawatt (MW) electric nuclear power station operated by Dominion Energy Kewaunee, Inc. that began operation on December 21, 1973 [one uranium pressurized water reactor (PWR)]. The Station is located adjacent to Lake Michigan nine miles south of the town of Kewaunee, Wisconsin and 27 miles southeast of Green Bay. The oil on site is primarily diesel generator and boiler fuel oil, which are stored in underground tanks plus turbine lube oil in tanks within the Station's turbine building. Only one small aboveground tank is located outdoors (550 gallons). The facility has not experienced a reportable oil spill.

The Station also has some chemicals on site such as sodium hydroxide, sodium hypochlorite, and sulfuric acid for water treatment. Neither oil nor chemical tanks are subject to the direct exposure of stormwater and stationary transfer equipment such as pumps are located indoors. In addition, the majority of Station's oil and chemical equipment has secondary containment. However, small spills outdoors are possible such as associated with tank truck unloading areas. There is also the potential for larger spills if there was a catastrophic failure of equipment. Both Station stormwater and non-stormwater (e.g., industrial and domestic sludge) are regulated by land and water discharge permits.

A topographical map (Figure 1) of the Station is included in Appendix A of this Plan. Appendix B contains oil equipment locations (Figure 2) and chemical equipment locations (Figure 3). Appendix C contains a site drainage diagram (Figure 4). Appendix D contains photographs of equipment locations including oil and chemical transfer locations. There is no aboveground piping outside of the Station building. The closest navigable waterway is Lake Michigan; it receives the Station's stormwater runoff.

1.2 Facility Owner and Operator

The facility owner and operator (same) are given as follows:

Facility Operator:	**Dominion Energy Kewaunee, Inc.**	**Facility Owner:**	**Dominion Energy Kewaunee, Inc.**
Address:	N 490 State Highway 42 Kewaunee, Wisconsin 54216	**Address:**	N 490 State Highway 42 Kewaunee, Wisconsin 54216
Telephone:	920-388-8367	**Telephone:**	920-388-8367

2.0 CONTACTS AND TEAM MEMBERS

2.1 Pollution Prevention Team

WI-S067857-2 PART III, SECTION B (2) (a). POLLUTION PREVENTION INDIVIDUAL.
(SWPPP Permit Reference #1).

The specific individuals for all aspects of SWPPP development and implementation include:

Name	Title	Contact Number
Michael J. Wilson	Director Safety & Licensing (1)	(920) 388-8537
Michael Failey	Chemistry Supervisor (4)(6)	(920) 388-8370
Ted Maloney	Sr. Environmental Compliance Coordinator (2)(3)(4)	(920) 388-8863
Mike Bernsdorf	Chemist 3 (6)	(920) 388-8367
Steve Horn	Environmental Specialist III (Millstone) (6)	(860) 447-1791 ext.4359
Rick Woolard	Environmental Specialist III (Innsbrook) (3)(5)	(804) 273-2991

(1) RESPONSIBLE PERSON FOR OVERALL COORDINATION AND DEVELOPMENT.
(2) RESPONSIBLE PERSON FOR IMPLEMENTATION, TRAINING, AND REVISIONS TO PLAN.
(3) RESPONSIBLE PERSON FOR COORDINATION OF CORPORATE ENVIRONMENTAL AND STATION REQUIREMENTS.
(4) RESPONSIBLE PERSON FOR INSPECTION AND MONITORING EVENTS
(5) RESPOSIBLE PERSON FOR PERMIT INTERPRETATION.
(6) RESPONSIBLE PERSONS FOR COVERING STORM WATER JOB DUTIES WHEN Sr. ECC IS ABSENT

2.2 Spill Prevention and Response

In the event of a spill, station personnel would notify the Shift Manager of the spill location, then minimize the spill through valve closure, isolation, etc., use oil boom, absorbent material, diking, or other appropriate method to prevent the spill from reaching navigable waters. The Shift Manager is to oversee spill containment and is to notify the Site Vice President and Chemistry Supervisor. The Shift Manager is to initiate action to determine the quantity of the spill, the cause of the spill, and the corrective actions to prevent reoccurrence. Refer to Section 5.2.5 of this plan for specific spill response procedures and the SPCC Plan Figure 13 for Response Actions and Figure 14 for Spill Mitigation Procedures for petroleum spills.

2.3 POTW Requirement

(POTW – Industrial User Permit Requirement)

The facility does not discharge to a Publicly Owned Treatment Works (POTW) sewage treatment plant. The facility operates its own sewage treatment plant.

3.0 SAMPLING / MONITORING AND INSPECTION REQUIREMENTS

3.1 Summary of Outfalls

WI-S067857-2 PART III, SECTION B (2) (b). FACILITY SITE DESCRIPTION AND DRAINAGE BASE MAP. *(SWPPP Permit Reference #2)*

The Station's general stormwater "Tier 2" WPDES permit (#WI-S067857-2) requires visual (qualitative) stormwater monitoring on a quarterly basis. The 7 designated storm water outfalls serving both operational and non-operational areas receive storm water via grates or inlets, and ditches throughout the station. The station has two tributaries that run through the station. The tributary south of the station is nick named "Un-named Tributary", which discharges to the Station's waste water Outfall 010. The tributary north of the station is un-named and has a small pond adjacent to Lake Michigan's shore and discharges via conveyance pipe known as storm water outfall 005. Both of the tributaries collect storm water from various areas throughout the station and are monitored at the above discharge locations along Lake Michigan's shore.

The Station also has had an individual wastewater WPDES permit (#WI-0001571-07-0), which permits outfalls (#001, 002, 003, and 004), brief descriptions of each outfall is section 3.2.2.

A flow diagram of discharge outfall information is given in Appendix C and described follows:

Storm Water Outfalls (WPDES Permit (#WI-S067857-2):

Discharge Point 005: Is discharged via conveyance pipe from the pond north of the station, this outfall receives water consist largely of the un-named tributary that traverses the Station's property. As the tributary traverses the station it receives storm water from the approved land applied sludge fields and a storage/parking area. Approximately 90% of the drainage area is grass/covered field and 10% compacted crushed gravel.

Discharge Point 006: Is a ditch that is located north of the station and receives storm water from a narrow drainage area between the plants protected area and the Independent Spent Fuel Storage Installation (ISFSI). Approximately 75% of the drainage area consists of compacted crushed gravel and 25% concrete.

Discharge Point 007: This outfall is located north of the station and receives storm water from an area that is approximately 50% grass and 50% compacted crushed gravel. The gravel area is currently periodically used to store equipment (ie. scaffolding).

Discharge Point 008: This outfall is located north of the station and receives storm water from an area that is consist approximately of 50% compacted crushed gravel, 40% grass area, and 10% run-off from nearby rooftops.

Discharge Point 009: This outfall is located south of the station and receives 95% of the storm water from a paved parking lot and 5% from the nearby building roof top.

Discharge Point 010: This outfall receives influents from the sewage treatment facility and discharges to the unnamed tributary, which combines with storm water from the south side of the plant and substation

and discharges to Lake Michigan south of the facility. The effluent of the sewage treatment plant is monitored prior to combining with the southern unnamed tributary.

Discharge Point 011: This outfall is located north of the station and receives storm water from the Independent Spent Fuel Storage Installation (ISFSI) which is an area that is approximately 50% concrete and 50% compacted crushed gravel. The discharge travels from the ISFSI through a storm water collection system and discharges to a sediment diversion pond before being discharged to the shore of Lake Michigan.

3.2 Non-Stormwater Discharges

3.2.1 Certification of Non-Stormwater Discharges

WI-S067857-2 PART IV (B). EVALUATION OF NON-STORMWATER DISCHARGES. *(SWPPP Permit Reference #13)*

The non-stormwater discharge certification is included on Page vii. Non-storm water sources at this site include primarily those inputs that mix with stormwater reaching Outfall #001 and that are given in Section 3.2.2 below.

3.2.2 Non-Storm Water Discharges

WI-S067857-2 PART III, SECTION B (2) (e). STATUS OF NON-STORM WATER DISCHARGES TO THE STORM SEWER. *(SWPPP Permit Reference #5).*

Under the Tier 2 WPDES storm water permit provisions, the commingling of non-stormwater with stormwater is not allowed unless the non-stormwater component is regulated under another permit or unless it is composed of discharges that are not considered illicit by the State of Wisconsin Department of Natural Resources (WDNR). Such allowable discharges include water line flushing, landscape irrigation, diverted stream flows, uncontaminated groundwater infiltration or pumped groundwater, discharges from potable water sources, foundation drains, air conditioning condensation, flows from riparian habitats and wetlands, street wash water, fire fighting water, and minor discharges of fire header dead-leg discharge water. In particular, for purposes of this SWPPP, the non-water sources listed above for Discharge Point 001 are considered by the facility to be allowable non-stormwater discharges because they are included in the Station's wastewater permit.

Non-Storm Water Outfalls (WPDES Permit #WI-0001571-07-0):

Discharge Point 001: Historically, this outfall has received the following non-stormwater tributary flows:

101. Steam generator blowdown and condenser cooling water to Outfall #001
201. Turbine Building sump drainage (floor drains) to Outfall #001
301. Service water treatment lagoon effluent (overflow) to Outfall #001
401. Point 401 was not assigned under permit.
501. Reverse osmosis (RO) unit reject water to Outfall #001
601. Floodwater-pump water (turbine building basement water) to Outfall #001.

Discharge Point 002. Discharge from the Screen House suction point to the vicinity of the water intake to prevent icing over.

Discharge Point 003. This outfall receives effluents from the sewage treatment facility and discharges to the southern unnamed tributary, which combines with storm water and discharges to Lake Michigan south of the facility via Outfall 010.

Discharge Point 004. This outfall is the land application of domestic wastewater (sewage) sludge as noted in WPDES permit #WI-0001571-07-0. The application of sludge is a very rare occurrence and not expected to occur during the life of the permit.

3.3 Monitoring Requirements

WI-S067857-2 PART III, SECTION B (2) (C). SUMMARY OF EXISTING SAMPLING DATA OR OBSERVATIONS. *(SWPPP Permit Reference #3)*
WI-S067857-2 PART III, SECTION B (2) (I). FACILITY MONITORING PLAN. *(SWPPP Permit Reference #9)*
WI-S067857-2 PART IV(C) (2), QUARTERLY VISUAL MONITORING. *(SWPPP Permit Reference #15)*

The Station is required to visually inspect stormwater at each stormwater outfall on a quarterly basis utilizing Wisconsin Department of Natural Resources Form #3400-176A as given in Appendix F.

WET WEATHER QUALITATIVE MONITORING PARAMETERS

Stormwater Discharge Characteristics	Stormwater Visual Observation Frequency	Station Designated Wet Weather Monitoring Locations for WPDES Permit # WI-S067857-2
Color	Quarterly	Outfalls 005, 006, 007, 008, 009, 010, and 011
Odor	Quarterly	Outfalls 005, 006, 007, 008, 009, 010, and 011
Turbidity	Quarterly	Outfalls 005, 006, 007, 008, 009, 010, and 011
Floating Solids	Quarterly	Outfalls 005, 006, 007, 008, 009, 010, and 011
Foam	Quarterly	Outfalls 005, 006, 007, 008, 009, 010, and 011
Oil Sheen	Quarterly	Outfalls 005, 006, 007, 008, 009, 010, and 011
Other visual indicators	Quarterly	Outfalls 005, 006, 007, 008, 009, 010, and 011

Other visual indicators can be emulsions, sludges, stains, or other signs of pollution.

3.4 SWPPP Inspection Requirements

WI-S067857-2 PART III, SECTION B (2) (i). FACILITY MONITORING PLAN. *(SWPPP Permit Reference #9).*
WI-S067857-2 PART IV(C) (1) ANNUAL FACILITY SITE COMPLINANCE INSPECTION. *(SWPPP Permit Reference #14).*
WI-S067857-2 PART IV, SEC. A-B, FACILITY MONITORING *(SWPPP Permit Reference #16).*

The SWPPP shall be reviewed and updated on annual basis and visual monitoring of outfall discharges be completed quarterly. Refer to Section 3.3 and Section 3.5. The petroleum equipment will be inspected in accordance with the SPCC requirements and referenced in Figure 21 of the SPCC Plan.

Semiannual dry inspections shall be preformed per CHEM-73.001, "WPDES Storm Water Outfall Inspection" to comply with WI-S067857-2 Part IV, Sections A-B. *(SWPPP Permit Reference #16).* Dry inspections shall be documented on WDNR form #3400-176A and can be found in Appendix F.

3.5 Comprehensive Site Compliance Evaluation

WI-S067857-2 PART III, SECTION B (2) (i). FACILITY MONITORING PLAN *(SWPPP Permit Reference #9).*
WI-S067857-2 PART IV(C) (1) ANNUAL FACILITY SITE COMPLINANCE INSPECTION. *(SWPPP Permit Reference #14).*

The Station is required to inspect stormwater systems on an annual schedule utilizing Wisconsin Department of Natural Resources Form #3400-176 and given in Appendix E. The checklist of items to be inspected includes housekeeping, best management practices (BMP) maintenance reviews, SWPPP plan text updates, and other typical SWPPP parameters common to both state and federal rule guidance. It is also to include each quarterly visual inspection of stormwater.

4.0 POTENTIAL POLLUTANT SOURCES

WI-S067857-2 PART III, SECTION B (2) (b). FACILITY SITE DESCRIPTION AND DRAINAGE BASE MAP. *(SWPPP Permit Reference #2).*
WI-S067857-2 PART III, SECTION B (2) (d). POTENTIAL SOURCES OF STORM WATER CONTAMINATION. *(SWPPP Permit Reference #4).*
WI-S067857-2 PART III, SECTION B (2) (g). RESIDUAL POLLUTANTS. *(SWPPP Permit Reference #7).*

4.1 SUMMARY OF POTENTIAL POLLUTANT SOURCES

A summary of the type of activities or equipment areas that can impact stormwater is given as follows:

Kewaunee Power Station Area	Activity or Activities	Pollutant(s) or Pollutant Parameter(s)
VARIOUS TRUCK UNLOADING AREAS NEAR THE TURBINE, AUXILIARY, REACTOR, AND OFFICE/WAREHOUSE AREA	Truck unloading to UST tanks within or in general vicinity of primary station buildings	POLLUTANT: Diesel Oil, Turbine Lube Oil. DIRECT EXPOSURE: No POTENTIAL TO DISCHARGE: Yes
VEHICLE STORAGE BUILDING (9-STALL GARAGE):	Truck unloading to UST within or in general vicinity of the Vehicle Storage Building	POLLUTANT: Gasoline. DIRECT EXPOSURE: No POTENTIAL TO DISCHARGE: Yes
LAND SPREADING AREAS	Sludge disposal from Service Water Treatment Lagoons	POLLUTANTS: Soil Runoff/Erosion Turbidity from Plowing Operations. DIRECT EXPOSURE: No POTENTIAL TO DISCHARGE: Yes
SWITCHYARD TRANSFORMERS AND BREAKERS	Electrical voltage regulators and control equipment.	POLLUTANT: Transformer and Breaker Oils (PCB and Non-PCB Mineral Oils). DIRECT EXPOSURE: No POTENTIAL TO DISCHARGE: Yes
OTF/STF DIESEL FUEL AST (550 Gallons)	Vehicle fueling from small AST.	POLLUTANT: Diesel fuel. DIRECT EXPOSURE: No POTENTIAL TO DISCHARGE: Yes
Warehouse 1 Receiving Building	Semi-Truck Oil Drum Unloading.	POLLUTANT: Lube Oil. DIRECT EXPOSURE: No POTENTIAL TO DISCHARGE: Yes

4.2 Description of Potential Pollutant Sources

WI-S067857-2 PART III, SECTION B (2) (c). POTENTIAL SOURCES OF STORM WATER CONTAMINATION *(SWPPP Permit Reference #4).*

A SWPPP evaluation and associated SPCC Plan review has targeted equipment areas where stormwater could potentially be impacted as a result of spills or leaks. The following table gives equipment locations that are the most likely places where stormwater can be impacted. They are primarily associated with storm grate (drip inlet) vicinity to tank truck unloading activities. The likelihood of pollution is low as there is no direct exposure. Refer to Figure 4 in Appendix C for site drainage areas and flow directions. There are also land areas that could potentially yield pollution from stormwater runoff. These are industrial and domestic sludge spreading areas that may result in stormwater runoff to onsite ponds, woodlands, and wetlands, or stormwater flow directly to the shore of Lake Michigan via area tributaries.

POTENTIAL EQUIPMENT SPILLS OR LEAKS THAT CAN IMPACT STORMWATER AND DRAINAGE POINTS

Equipment Unloading or Transfer Area	Spill Likelihood and Predicted Quantity	Drainage Point
Truck Unloading to Diesel Generator Fuel Oil Storage USTs - 1A & 1B (35,000 gallons each)	Low. Infrequent activity. Likely incidental losses of up to 200 gallons. Limited to stormwater inlet grate drainage points. Truck berm can be used or drain barriers can be placed over inlets during truck transfers. Personnel monitor the transfers.	East into Lake Michigan via storm drain.
Truck Unloading to Turbine Oil Storage AST (14,000 gallons)	Same as above	East into Lake Michigan via wastewater treatment system.
Truck Unloading to Heating Boiler Fuel Oil UST (30,000 gallons)	Same as above	East into Lake Michigan via storm drain.
Unloading for TSC Diesel Generator Fuel Oil UST (10,000 gallons)	Same as above	East into Lake Michigan via storm drain.
Sodium Hypochlorite Tote Transfer to Screen House Basement Tank (800 gallons).	Low. 300-gallon totes are used to fill hypochlorite tank in screen house. Each totes is placed on a tote berm in case of leakage.	East into Lake Michigan via sheet flow.
Truck Unloading for Gasoline Dispensing UST (550 gallons)	Low. Stormwater inlet grates are not in the immediate vicinity of transfer area. Likely incidental losses of up to 200 gallons. Truck and facility personnel are in attendance during transfers.	Into Lake Michigan via ditch tributary
Truck Unloading to OTF/STF Diesel Fuel AST (550 gallons)	Same as above	South via drainage ditch and then east to Lake Michigan

POTENTIAL EQUIPMENT SPILLS OR LEAKS THAT CAN IMPACT STORMWATER AND DRAINAGE POINTS		
Switchyard Transformers (3) and Circuit Breakers (4) [Dominion Equipment]	Low. The transformers and breakers are in a switchyard area that is a large gravel base area. Oil leaks would likely be retained in the area. Predicted losses up to 100 gallons.	South into a drainage ditch adjacent to the Switchyard and then east to Lake Michigan

The spreading areas received industrial sludge wastes from the Service Water Treatment Lagoons, under a supplemental State industrial waste approval known as a "Conditional Land Spreading Plan" issued independently of the WPDES permits and in accordance with a Nuclear Regulatory Commission (NRC) one time safety evaluation that did not mandate a separate NRC approval. These were issued in 1992.

Sludge spreading on land is not currently an active option for the Station, but is planned for the future. Refer to Appendix C site drainage areas for the locations of these land spreading areas (Figure 5).

NON-EQUIPMENT POLLUTANT SOURCES THAT COULD POTENTIALLY IMPACT STORMWATER AND DRAINAGE POINTS		
Land Spread Area or Source of Waste	**Spill Likelihood and Predicted Quantity**	**Drainage Points (Direction from Reactor Containment Building)**
Service Water Treatment Lagoons (2)	Low. Unlined lagoons receive ferric hydroxide or flocculent wastewater from water treatment processes within buildings, and can also receive domestic sewage sludge.	Stormwater falling into lagoons would evaporate or percolate into lagoon bottom or drain via discharge line to Lake Michigan via Outfall #001.
Onsite Land Spread Areas (4) for Sludges from the Service Water Treatment Lagoons. Refer to past Wisconsin DNR and federal NRC approval letters given in Appendix G. Restrictions are placed on sludge quantities, ground slope, winter spreading, runoff control, tilling, and other parameters. (Future landspreading requires DNR approval before occurring)	Low. Sludges are plowed to 6 inches in depth. The amount spread is limited to 5 metric tons per hectare per year. The radioactive potential risk analysis is less than 0.001 mrem per year.	Area 1 – Northwest of Reactor with drainage east towards soil erosion North Retention Pond at Lake. front. Area 2 - Northwest of Reactor with drainage east towards soil erosion retention pond at Lake.. Area 3 - Southwest of Reactor with drainage southeast towards wooded area. Area 4 - South of Reactor with drainage southeast towards wooded area. or South Retention Pond.

NON-EQUIPMENT POLLUTANT SOURCES THAT COULD POTENTIALLY IMPACT STORMWATER AND DRAINAGE POINTS		
Onsite Land Spread Area (1) for Non-Radiological Contaminated Sludges from Service Water Treatment Lagoons (2)	Low. Sludges are plowed to 6 inches in depth. The amount spread is limited to 5 metric tons per hectare per year. The radioactive potential risk analysis is less than 0.001 mrem per year.	Area 5 - Northwest of Reactor with drainage east towards Lake via sheet flow.

4.3 Site Bulk Chemicals

CHEMICAL STORAGE CONTAINERS		
Storage Tank Type	**Storage Capacity (Gallons)**	**Structural BMPs Secondary Containment (Gallons)**
Sulfuric Acid Storage Tank Auxiliary Building Basement	5,000	Concrete containment area (7,131) serves the tank.
Sulfuric Acid Storage Tank Turbine Building 1st Floor	200	Concrete containment area (250) serves the tank.
Caustic Soda Storage Tank Auxiliary Building 3rd Floor	5,000	Concrete containment berm (1,500) serves the tank. Concrete containment berm (1,500) serves the tank. The feasibility of adding containment is being reviewed.
Sodium Hypochlorite Storage Tank Turbine Building Basement	5,000	Concrete containment area (7,131) serves the tank.
Sodium Hypochlorite Storage Tank Screen House Basement	800	Poly berm containment area (1,786) serves the tank.
Sodium Hypochlorite Tote Containers Outside Screen House ~3 totes at 300 gallons each	900	Totes are used to fill screenhouse tank and when used, are placed on individual tote berms.
Sulfuric Acid, Caustic Soda, Hydrazine and other non-hazardous chemical drums. Chemical Storage Room Office/Warehouse Annex 1st Floor~ 12 drums @ 55 gal each	55	Drums storage in room that has containment capacity for a drum (70)
Hydrazine and Poly Aluminum Chloride (PAC) Auxiliary Building and Augmented Water Building. PAC-2 drums. Hydrazine- 2 @ 55 gal and 2 @ 35 gal	55	Drum containment pad (70) each.
Secondary Injection Chemicals- Auxiliary Building. Dimethylamine (DMA) - 1 Tote 300 gallons. Morpholine, Hydrazine - 2 drums each @ 55 gal.	520	Building floor and wall containment. Drum containment pad (70).
Sulfuric Acid and Sodium Hydroxide. Waste Neutralization Tank Chemicals Turbine Building 2 tanks (300 gals each)	600	Building floor and wall containment (750)

CHEMICAL UNLOADING & TRANSFER FACILITIES		
Unloading/Transfer Facility Name, Number	**Container Capacity (Source)**	**Structural BMPs Secondary Containment (Gallons)**
Sulfuric Acid Unloading Bay Inside Auxiliary Building (5,000 Gallon Tank)	2,100 gals (Truck Compartment)	Building floor and wall containment with drain to sump (10,000)
Caustic Soda Unloading Bay Inside Auxiliary Building (5,000 Gallon Tank)	2,100 gals (Truck Compartment)	Building floor and wall containment with drain to sump (10,000)
Sulfuric Acid and Caustic Soda Unloading Pump and Truck Connection Manifold Pad (150 Gallon Pad)	150 Gals (150 gpm pump)	Concrete containment basin for pump and hose connection points (150)
Hypochlorite Tank Unloading Area For Turbine Building (5,000 Gallon Tank)	2,100 gallons (Truck Compartment)	A spill during hose transfer to tank would be uncontained. BMP (standard operating procedures) for unloading would be utilized. Refer to procedure CHEM-43.009.
Hypochlorite Tank Unloading Area at Screen House (800 Gallon Tank)	300 gals (Tote size)	Bermed totes are used to transfer hypochlorite to the 800 gal tank. A leak from a tote during transfer would be collected in the berm. A hose leak would be uncontained. BMP (standard operating procedures) for unloading would be utilized. Refer to procedure CHEM-43.009.

4.4 Site Bulk Oil

The oil tank and equipment tables are located in the Station's SPCC Plan in Figure 8 and the associated petroleum transfer / unloading is discussed in Figure 7, 40CFR 112.7 (h). The SPCC is maintained under separate cover and available upon request.

4.5 Sediment & Erosion

4.5.1 Site Specific Sediment and Erosion Control

Most of the Station operating areas are impervious and consist of buildings, concrete, pavement, and/or crushed stone or gravel. There is no evidence of significant erosion and/or loss of sediment in these areas. Drainage, including sheet flows from these areas, is directed to storm drains (grates or drop inlets). Stormwater is conveyed to either various land based outfalls, storm water outfalls, or to the station's waste water outfalls.

Also, there are two stormwater retention ponds serving the operating areas. The first is the Training Building, which directs the storm water flow from the rooftops and parking lots to the ditch system that

circles that area. This storm water drops its sediment in the retention pond as designed and is then routed to Outfall 005 by surface ditches. The second is found near the Independent Spent Fuel Storage Facility (ISFSI). This retention pond only serves the ISFSI and directs the storm water underground to the pond for sediment removal. The storm water then is directed to the shore of Lake Michigan via Outfall 011.

However, the facility can spread and till sludge as part of land spreading practices on unimproved areas of land to the north and south of the Station operating areas. These are discussed below relative to potential residual pollutant contamination.

To the south, southwest, and northwest of the primary operating areas is unimproved land where there has been land spreading. Service water lagoon sludges including clarifier sludge, ferric hydroxide sludge, Reverse Osmosis Microfiltration Backwash, as well as domestic sludge has been spread and tilled into the soil; these areas can be still be utilized for such activities. Figure 5 in Appendix C shows these areas including stormwater drainage direction, ponds of the area, and ditch tributaries to Lake Michigan that may receive stormwater drainage.

The Army Corps of Engineer placed a retention pond on the shore of Lake Michigan to catch runoff. This pond receives runoff from the largest land spreading area that is to the northwest of the Station. There is an additional pond upgrade and to the south of the Station but it is not believed to receive any runoff from the land spreading areas. Also, at least one drainage tributary receives some runoff from the land spreading areas to the northwest of the Station. For these areas and the areas to the south and southwest of the Station, the likelihood of substantial land runoff of soil resulting in turbidity in Lake water is nil and of no greater likelihood than runoff from neighboring dairy farms. Note that some land spreading area runoff is restricted by recently constructed impervious security wall right of ways.

4.5.2 Construction Erosion & Sediment Control

WI-S067857-2 PART III, SECTION B (2) (g). RESIDUAL POLLUTANTS. *(SWPPP Permit Reference #7)*

Appendix H is reserved for erosion and sediment control plan insertion in the event of construction at the station. Such a plan would address the potential construction impacts taking into consideration site topography, drainage patterns, soils, ground cover, and area runoff.

5.0 STORMWATER CONTROLS

WI-S067857-2 PART III, SECTION B (2) (f). SOURCE AREA CONTROL BEST MANAGEMENT PRACTICES. *(SWPPP Permit Reference #6)*
WI-S067857-2 PART III, SECTION B (2) (h). STORM WATER TREATMENT BEST MANAGEMENT PRACTICES. *(SWPPP Permit Reference #8)*

Stormwater management controls appropriate for the Station can be summarized as follows:

UNIT OR AREA NAME	APPROPRIATE STORMWATER MANAGEMENT CONTROLS
Storage Tank – One Outside AST	Dike Containment, Dike Drainage Procedure, Visual Inspection, and Unloading Procedures.
Storage Tanks - Outside USTs	Control Room Monitoring (CRM), Leak Detection Devices, Unloading Procedures.
Storage Tanks – Inside ASTs	Berm, Dike, or Sump Containment, Visual Inspection, CRM.
Mechanical Equipment	Berm and/or Sump Containment, Visual Inspection, Sorbents, CRM.
Electrical Equipment	Gravel Containment, Visual Inspection, Sorbents, CRM.
Material Transfer Areas	Transfer Procedures, Sorbents, Grate Barriers, Truck Berms, CRM.
Industrial and Domestic Sludge Land Spreading Areas	Tilling Wastes Under Ground Surface. Maintaining Setback from Water Well. Controlling Erosion.

As mentioned, the Station only has one small outdoor tank. Stormwater accumulation is periodically drained from its dike area after a visual check for oil sheen. Mechanical equipment greater than 55 gallons is limited to nine systems. Emergency Diesel Generators 1A & 1B, Main Feedwater Pumps, Turbine Oil Purification System, Pedestal Crane in Containment, Rad Waste Compactor, Reactor Coolant Pumps, Turbine EH Fluid Reservoir, Turbine oil Reservoir Tank and five elevator hydraulic systems located around the plant. Each oil filled electrical transformer near the turbine building has substantial concrete containment and a drainage sump.

The areas that do not have constructed secondary containment include the Switchyard transformers and breakers, and the tank truck unloading areas for both oil and chemicals. It has been determined that it is not economical and practical to provide containment for the entire substation at this time. Plans are in place to construct oil containment as the substation is being upgraded in the future. Procedures have been changed to require temporary berms for tank truck deliveries of oil. Changes for chemical deliveries procedures are in progress. Finally, the land spreading areas have little if any erosion runoff under industrial wastewater permit land spreading provisions.

5.1 Structural BMPs

Refer to Section 4.3 & 4.4 for structural BMPs in place at this Station for both oil and chemicals. Any stormwater that accumulates in secondary containment must be evaluated visually for color, foam, staining, visible sheens, and dry weather flow, prior to release.

5.1.1 Secondary Containment Schedule

This facility stores sulfuric acid in excess of threshold limits defined in Section 313 of SARA. Refer to Section 4.3 for secondary containment capacity and the SPCC Plan Figure 12 for the petroleum equipment.

5.2 Non-Structural BMPs

In addition to this SWPPP and the Station's SPCC Plan, the Station has operating procedures that are its BMPs including oil and chemical unloading procedures, spill prevention and response procedures, waste disposal procedures, and sludge land spreading procedures. They reduce the potential for stormwater contact due to equipment failure or operational losses. The procedures are listed in the table in section 5.2.1 below:

5.2.1 Employee Training

WI-S067857-2 PART III, SECTION B (2) (a). POLLUTION PREVENTION INDIVIDUAL *(SWPPP Permit Reference #1).*

SWPPP and SPCC Plan are the primary documents utilized for stormwater management training purposes. Training may also encompass new employee training relative to safety indoctrination, safety inspections, and hazard communication as needed.

The BMP procedures given in the following table include Station Chemistry Procedures (CHEM), General Nuclear Procedures (GNP), Normal Operating Procedures (NOP), or Preventative Maintenance Procedure (PMP) that are related to stormwater management to the extent of avoiding the potential contact of oil, chemical, industrial or domestic waste sludge with stormwater. The procedure titles are listed as follows. They may supplement stormwater management training as needed as part of personnel reviews of the SWPPP and SPCC Plan.

SWPPP Related Station BMP Procedures	
Procedure Number	**Candidate Procedure Name for Training**
CHEM-49.021	Landspreading of Approved NRC Sewage Sludge
CHEM-49.020	Landspreading of Pretreatment Sludge
OP-KW-NOP-DGM-002	Loading Diesel Generator Fuel Oil (truck unloading)
KW-PROC-TEC-CY-KW-42-007	Sulfuric Acid Day Tank Alternate Filling Method
GNP-01.27.09	Hazardous Chemical Spill/Release Emergency Contacts
CHEM-49.009	Response to Gasoline Storage Tank Leak Detection Alarms (UST)
CHEM-47.003	Response to House Heating Boiler Fuel Tank Leak Detection Alarms
CHEM-49.008	Testing Fuel Storage Tank Continuous Leak Detection Systems
GNP-01.27.01	Response to Sulfuric Acid Spill/Release
GNP-01.27.03	Response to Hydrazine Spill/Release
GNP-01.27.04	Response to Sodium Hydroxide Spill/Release
GNP-01-27.05	Response to Sodium Hypochlorite Spill/Response
PMP 32A-01	Liquid Waste Processing & Discharge (WD-L) Motor & Pump Maintenance QA-2
EV-KW-ENV-001	Collection and Disposal of Chemicals at the Kewaunee Power Station
GNP-01.19.24	Diesel Fuel Collection and Disposal
GNP-01.19.26	Lead-Acid Batteries Collection and Disposal
GNP-01.19.27	Acids and Bases Disposal
GNP-01.19.15	Used Oil – Collection and Disposal
GNP-02.09.01	Injury, Illness, and Accident Response
GNP-01.27.06	Personnel Protective Equipment (PPE)
CY-AA-CTL-510	Fleet Procedure – Chemical Control
GNP-01.27.07	Non-Radiological Decontamination for Hazardous Material Spill/Release

Material Safety Data Sheets (MSDS) are also utilized as part of training to ensure that employees understand the nature of chemical materials including hazards as well as properties that could cause equipment leaks. MSD Sheets involving hazardous chemicals are included as part of BMP procedures and maintained in the Station's files and available upon request.

5.2.2 Good Housekeeping

Refer to Section 5.2.4 and Section 6.0. The Station utilizes inspection forms that were made a part of the Station's SPCC Plan that encompass good housekeeping. Housekeeping goals are met as a result of adherence with Station's procedures.

5.2.3 Minimizing Exposure

The Station minimizes exposure by use of housekeeping, structural & non-structural BMPs. This includes maintaining the salt storage pile in a covered storage bay so that that neither precipitation nor storm water runoff can come into contact with the stored salt. Refer to Section 6.0 for discussion on the minimization of exposure of other miscellaneous Station operations and activities.

5.2.4 Routine Facility Inspections

WI-S067857-2 PART III, SECTION B (2) (i). FACILITY MONITORING PLAN. *(SWPPP Permit Reference #9).*

Monthly visual inspections are completed as a part of the facility's SPCC Plan program. During the course of each day site procedures cause the following equipment to be visually inspected at a minimum:

- Tanks, valves, piping, and piping joints and flanges.
- Secondary containment
- Turbine areas
- Transformer areas
- Pump and pumping equipment areas.

Forms utilized include a Monthly Visual Inspection (figure 21 of the SPCC Plan), a form for Fuel Storage Leak Detection System Checks (part of CHEM-49-008-1), and a Substation Inspection Report (no procedure number). In addition, there is Weekly Instrument Channel Checks (SP-87-151). Inspection forms help to ensure corrective actions are initiated before any deterioration or malfunction occurs to oil/chemical storage containment in particular.

Any defects are repaired through the sites Corrective Action System with appropriate priority. All records are retained for at least 3 years.

5.2.5 Spill Prevention and Response Procedures

Written Station Procedures for prevention of and responding to spills/releases are given in section 5.2.1 of this SWPPP and maintained in Station's files, but available upon request. They include GNP-01.27.09 governing appropriate actions for hazardous chemical spill release emergency contacts, and GNP-01.27.01 through GNP-01.27.05 for response actions to sulfuric acid, hydrazine, sodium hydroxide, and sodium hypochlorite. In addition, a Spill Prevention Control and Countermeasure Plan (SPCC Plan) maintained under separate cover at the Station references the appropriate actions for oil spills/leaks and leak detection including GNP-01.30.01 spill contingency plan actions, CHEM-49.009 responses to boiler fuel oil tank leak detection alarm, and CHEM-49.008 testing fuel storage tank continuous leak detection systems.

5.3 BMP Maintenance

Best Management Practices employed for the SWPPP are to be implemented within 24 months of the effective date of the WPDES stormwater permit (7-15-05). This facility has implemented the BMP procedures given in section 5.2.1 of this SWPPP and it updates the BMPs as needed. Preventive Maintenance (PM) of all oil and chemical handling equipment is performed on a periodic basis. Schedules and written procedures for PM are developed based on manufacturer's recommendations, operator experience, and/or local, state, and federal regulations.

5.4 Existing BMPs

Based upon the facility SWPPP evaluation, Section 4.0 (Potential Pollutant Sources) identified those types and locations of equipment that can potential impact stormwater as a result of operational or equipment failure or human error. For the most part, the facility does have both structural and non-structural Best Management Practices (BMPs) that are currently utilized, and will continue to be utilized, until planned feasibility studies are completed for the possible future construction and/or implementation of additional secondary containment. As stated above, the primary concern for potential contamination was associated with fuel oil and chemical tank truck transfer areas subject only to written BMP procedures in areas without secondary containment. Refer also to Section 5.5.

Refer to the following table for equipment/equipment areas selected for continued BMP use/inspection.

Unit Name / Area	Type of Equipment	Continuing Structural or Non-Structural BMP Selected for Use
Various truck unloading areas near the turbine, auxiliary, reactor, and office/warehouse area	Truck unloading to AST and UST tanks within or in general vicinity of Station Primary Buildings	Adhere to Operating Procedures OP-KW-NOP-EDG-002, CHEM-42.006, and CHEM-42.005 for oil, caustic, and acid transfers in particular (refer to Section 5.2.1 above).
Vehicle storage building (9-stall garage area):	Truck unloading to tank within or in general vicinity of the Vehicle Storage Building	Adhere to Operating Procedure CHEM 49-008 and CHEM-49-009 in particular (refer to Section 5.2.1 above).
Land spreading areas and service water treatment lagoons (2). Low level radioactive sludge waste	Sludge disposal from Service Water Treatment Lagoons (Sewage Treatment Plant Lagoon Area Serving Water Treatment Operations)	Adhere to State "Conditional Land Spreading Plan" approval provisions). Refer Operating Procedures CHEM-49.020 and CHEM-49.021.
Switchyard transformers and breakers and nearby OTF/STF diesel fuel AST (550 gallons)	Electrical voltage regulation and control. Vehicle fueling from small AST.	Adhere to Operating Procedure OP-KW-NOP-EDG-002 and to the Substation Inspection Report (no procedure number)

5.5 BMPs Planned for Consideration

WI-S067857-2 PART III, SECTION B (2) (j). SWPPP IMPLEMNTATION SCHEDULE.
(SWPPP Permit Reference #10)

BMPs planned for consideration at this facility are limited to those identified during periodic evaluations. Stormwater detention or retention is included as one type of structural BMP under consideration and will be continually reviewed for both contained and uncontained equipment. Refer to Appendix E, Annual Compliance Evaluation for the most recent BMP recommendations.

New BMP Candidates Since the Last Site Evaluation:	Responsible Person	Status of BMP / Completion Date

5.5.1 Feasibility Study

Refer to Action Items Implementation Schedule in Section 5.5 above.

6.0 GOOD HOUSEKEEPING MEASURES

6.1 Fugitive Dust Emissions

This Station is a nuclear power plant. It does not burn coal or wood to power its turbines. No residue hauling vehicles are utilized during normal operational and maintenance activities as can be common at fossil fuel power stations. There is little dust that can impact stormwater.

6.2 Delivery Vehicles

There is no substantial delivery vehicle traffic.

6.3 Fuel Oil Unloading Areas

Oil transfers are primarily for diesel generator oil and turbine oil. Refer to OP-KW-NOP-DGM-002, CHEM-47.003, and CHEM-49.008 in section 5.2.1 above or the SPCC plan for oil transfers and leak detection.

6.4 Chemical Loading/Unloading Areas

Chemicals are primarily used for water and wastewater treatment. Refer to CHEM-42.005, CHEM-42.006, and CHEM-42.007 in section 5.2.1 above.

6.5 Miscellaneous Loading/Unloading Areas

None.

6.6 Small Liquid Storage Tanks

The Screen House area is also a transfer point for sodium hypochlorite transfer to a small tank (800 gallons) in the Screen House basement. The transfer of the substance should be completed in accordance with the facility's spill contingency plans.

6.7 Large Bulk Fuel Storage Tanks

The largest fuel tanks on site are USTs that are not subject to housekeeping measures. Refer to Section 4.4 and the facility's SPCC plan maintained under separate cover.

6.8 Spill Reduction Measures

Refer to Section 5.0 and the facility's SPCC plan maintained under separate cover.

6.9 Oil Bearing Equipment in Switchyards

Refer to Section 4.4 and the facility's SPCC plan maintained under separate cover.

6.10 Residue Hauling Vehicles

No residue hauling vehicles (such as are used for coal or wood) are utilized during normal operational and maintenance activities.

6.11 Ash Loading Areas

No residue hauling vehicles are utilized during normal operational and maintenance activities. The facility does not burn coal or wood.

6.12 Areas Adjacent to Disposal Ponds or Landfills

The Station is not adjacent to landfills or disposal ponds.

6.13 Landfills, Scrap Yards, Surface Impoundments, Open Dumps, General Refuse Sites

With the exception of two ponds on the north and south side of the site in the vicinity of land spreading operations, the Station does not have any of the above referenced facilities. Runoff from land spreading areas that may reach the ponds is governed by industrial and domestic waste permit provisions.

6.14 Maintenance Activities

6.14.1 Vehicle and Equipment Storage Areas

The site has a 9-stall garage but this is used for vehicle storage and not maintenance. Vehicle oil changes are not completed on site.

6.14.2 Fueling Areas

Refer to the facility's SPCC plan maintained under separate cover and to OP-KW-NOP-DGM-002 listed in section 5.2.1 above. The Station does have a gasoline dispensing UST subject to CHEM-49.009 procedures.

6.14.3 Universal Waste Storage Areas

This facility does not store any universal waste outside.

6.14.4 Vehicle and Equipment Cleaning Areas

Security vehicles are occasionally cleaned and rinsed when wet conditions cause mud buildup. This area is an asphalt roadway near the Sewage Treatment Plant which flows to a grassy area which collects any sediment.

6.14.5 Vehicle and Equipment Maintenance Areas

Both vehicle and equipment maintenance is limited and vehicles are sent offsite for maintenance. Small engine equipment is maintained in either the Vehicle Storage Garage or Wood Shed. Less than 55 gallons of oil is drained from vehicles during a month.

6.14.6 Material Storage Areas

The facility does have a wood chip, stone, sand, and dirt pile storage area but they are not of substantial size and do not contribute to significant runoff turbidity. This facility does not have a coal pile.

7.0 DOCUMENTATION

The Station documents monitoring, measurements, inspections, and maintenance activities and training. In particular, observations are made of Outfall 001 discharges in accordance with the WPDES permits, and land spreading operations are observed in accordance with the State DNR approval for the spreading of industrial wastes. Such documentation is kept on-site for a period of three years and is made available to state or federal agencies as needed upon request. (SWPPP Permit Reference #15)

The following subsection represents the various areas of documentation.

7.1 Spills and Leaks

There have been no significant spills or leaks of pollutants in the past three years. Significant spills and leaks are documented in the sites Corrective Action System.

7.2 Stormwater Monitoring Requirements

WI-S067857-2 PART III, SECTION B (2) (C). SUMMARY OF EXISTING SAMPLING DATA OR OBSERVATIONS. *(SWPPP Permit Reference #3)*

Monitoring records, including date and observations, are retained for three years and area maintained in the Station's files and are available upon request.

7.3 Site Inspections

WI-S067857-2 PART IV(C) (1) ANNUAL FACILITY SITE COMPLINANCE INSPECTION. *(SWPPP Permit Reference #14).*

Refer to Section 3.3. The facility is required to complete quarterly visual monitoring. Inspection records are maintained in Appendix F.

7.4 Annual Evaluation and Amendment

WI-S067857-2 PART IV(C) (1) ANNUAL FACILITY SITE COMPLINANCE INSPECTION. *(SWPPP Permit Reference #14).*

Refer to Appendix E for the evaluation summary report.

PERIODIC SIGNED INSPECTION REPORTS

Refer to Appendix E.

ANNUAL COMPLIANCE EVALUATION CERTIFICATION

Date of Site Visit	Purpose
8-31-05	Annual Evaluation
2006 N/A	Not Required (see note)
7-31-07	Annual Evaluation
7-14-08	Annual Evaluation

Note: Per WDNR permit compliance guidance document, no annual compliance evaluation was due in 2006.

7.5 Goals & Objectives

The stormwater pollution prevention plan (SWPPP) has been developed as required by the Station's stormwater discharge permit and to incorporate good engineering practices. This SWPPP describes this Station, its operations, identifies potential sources of stormwater pollution at the facility, recommends appropriate best management practices (BMPs) or pollution control measures to reduce the discharge of pollutants in stormwater runoff, and provides for periodic review of this SWPPP. It is the objective of this program to improve the quality of surface waters by reducing the amount of pollutants potentially contained in the stormwater runoff being discharged.

ACTION ITEMS

Action items are listed in the implementation schedule below. The items are identical to those given in the Station's SPCC Plan. The Station's Environmental Compliance Coordinator shall enter the actual date of completion of each item. Completed action items will be removed from the list at the next SWPPP revision.

ACTION ITEM IMPLEMENTATION SCHEDULE			
Action Item	**Responsible Person**	**Completion Deadline**	**Actual Date Completed**

7.6 Record of Reviews

WI-S067857-2 PART III, SECTION D (1 - 2). AMENDING A SWPPP. *(SWPPP Permit Reference #12).*

Record of Reviews (SWPPP Permit Reference #12)				
Date of Inspection [1]	**Date Minor SWPPP Revisions Completed** [2]	**Date of Substantial BMP Modification** [3,4]	**Date of Comprehensive Site Evaluation Summary Report** [5]	**Reason for Amendment**
8-31-05	10-31-05	Refer to Action Item Schedule	10-31-05	Annual site comprehensive evaluation
	7-14-06			Action Item Update along with Minor Revisions
7-31-07	2-20-08		7-31-07	Changes responding to Dominion Audit Items and other minor revisions
10-10-08	3-6-09 est		7-31-07	Changes responding to Dominion Audit Items and other minor revisions

[1] A Station inspection must be completed by qualified personnel familiar with Station operations in accordance with State and Federal SWPPP regulations.

[2] The SWPPP shall be modified as necessary to include minor changes in SWPPP text, Station controls or BMPs. Revision to the SWPPP must be completed following the inspection unless permission for a later date is granted in writing by the State WPDES authority.

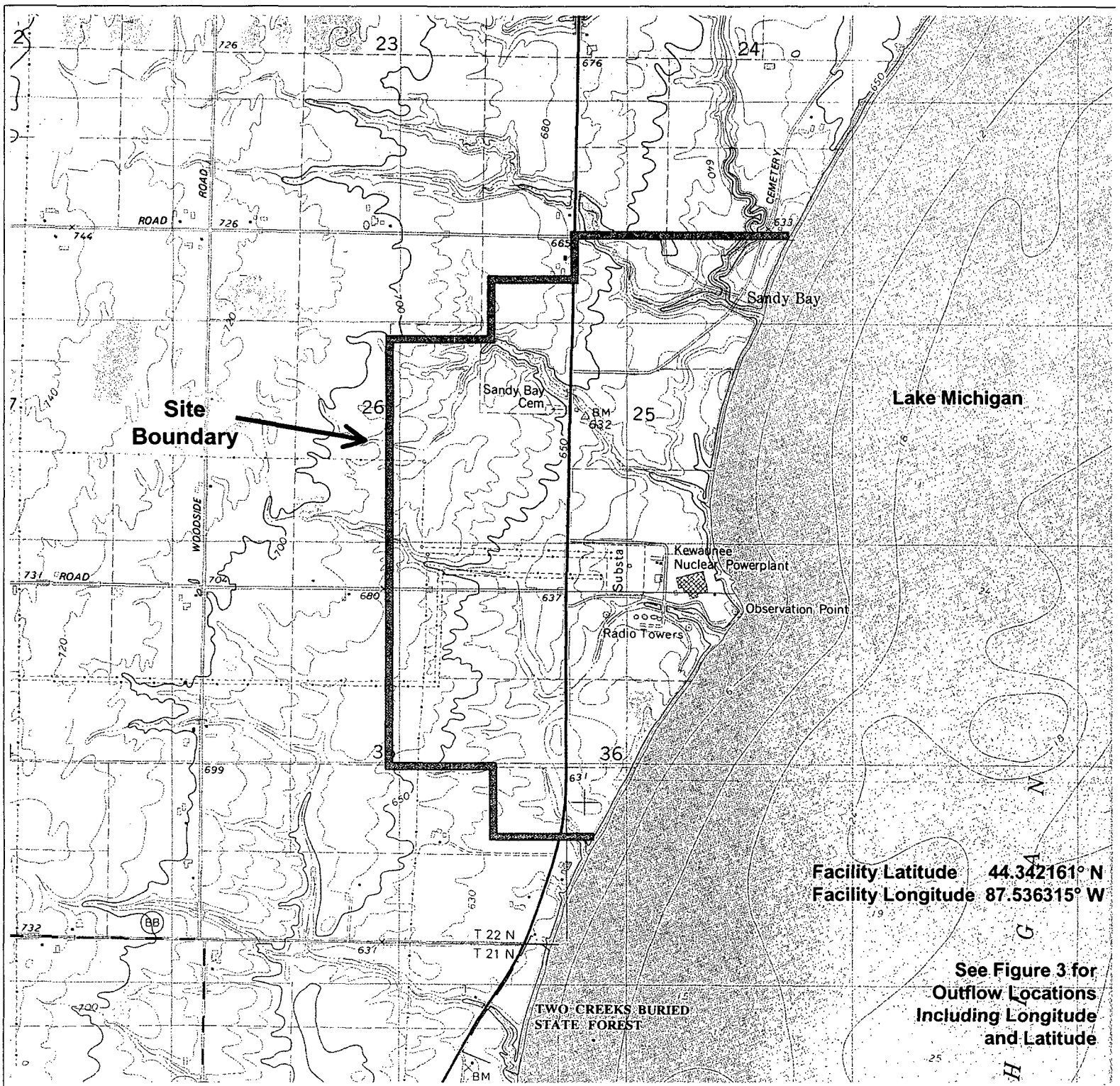
[3] If substantial SWPPP change is necessary including significant modification of existing BMPs or if the addition of new BMPs is necessary, implementation must be completed before the next anticipated storm event, if practicable, but not more than 12 weeks after completion of the comprehensive site evaluation, unless permission for a later date is granted in writing by the State WPDES authority. Refer to the Action Item Schedule on the next page.

[4] The permittee shall amend the SWPPP whenever: (1) there is a change in design, construction, operation, or maintenance at the facility that has a significant effect on the discharge, or the potential for the discharge, of pollutants from the facility; (2) during inspections, monitoring, or investigations by facility personnel or by local, state, or federal officials, it is determined that the SWPPP is ineffective in eliminating or significantly minimizing pollutants from sources identified.

[5] A report summarizing the scope of the inspection, name(s) of personnel making the inspection, date(s) of the inspection, and major observations relating to the implementation of the SWPPP, and actions taken in accordance with the WPDES permit shall be made and retained as part of the SWPPP for at least three years from the date of the inspections.

Appendix A

Topographic Site Map
(SWPPP Permit Reference #2)



SOURCE:
U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLE
Two Creeks, Wisconsin
1978

CONTOUR INTERVAL = 10 FEET

GRAPHIC SCALE (approx.)
2000 0 2000 4000
1" = 2000'

APPROXIMATE QUADRANGLE LOCATION

N

PROJECT:
SWPPP
Kewaunee Power Station
Kewaunee, Wisconsin

Dominion Energy Kewaunee, Inc
Kewaunee Power Station
Kewaunee, Wisconsin

FIGURE TITLE:
Site Location Map

PROJECT MANAGER:	PROJECT NO.:	DATE: 1/28/08	SCALE: AS SHOWN	FIGURE NO.: 1

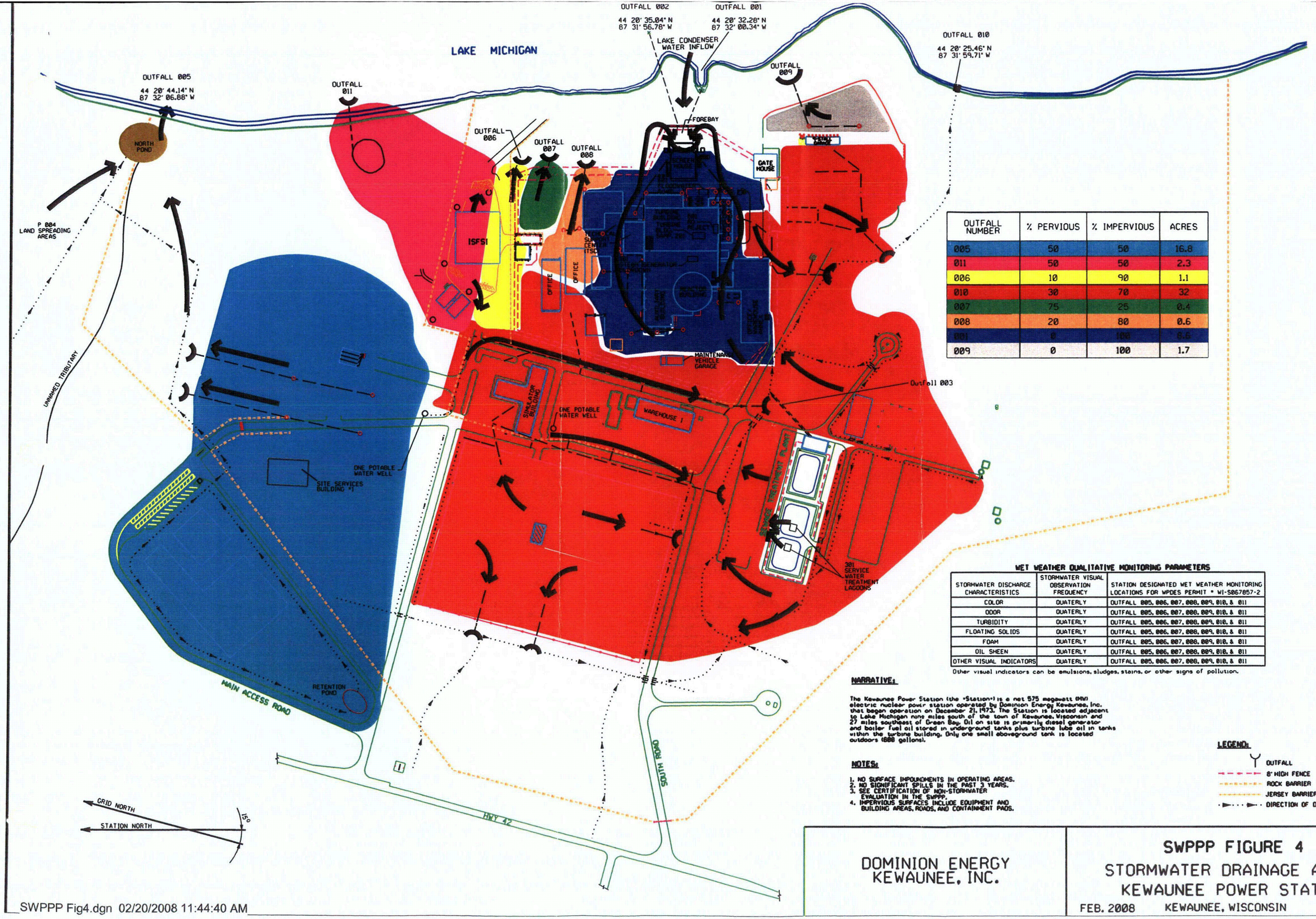
Appendix B

Site Plans -
Oil and Chemical Equipment Locations
(SWPPP Permit Reference #2)

Two Site Maps with Sensitive Information Redacted

Appendix C

Stormwater Drainage Areas, Industrial/Domestic Sludge Land Spreading Areas, and Water Flow Diagram. (SWPPP Permit Reference #2)



OUTFALL NUMBER	% PERVIOUS	% IMPERVIOUS	ACRES
005	50	50	16.8
011	50	50	2.3
006	10	90	1.1
010	30	70	32
007	75	25	0.4
008	20	80	0.6
001	0	100	6.6
009	0	100	1.7

WET WEATHER QUALITATIVE MONITORING PARAMETERS

STORMWATER DISCHARGE CHARACTERISTICS	STORMWATER VISUAL OBSERVATION FREQUENCY	STATION DESIGNATED WET WEATHER MONITORING LOCATIONS FOR WPDES PERMIT # WI-S067857-2
COLOR	QUATERLY	OUTFALL 005, 006, 007, 008, 009, 010, & 011
ODOR	QUATERLY	OUTFALL 005, 006, 007, 008, 009, 010, & 011
TURBIDITY	QUATERLY	OUTFALL 005, 006, 007, 008, 009, 010, & 011
FLOATING SOLIDS	QUATERLY	OUTFALL 005, 006, 007, 008, 009, 010, & 011
FOAM	QUATERLY	OUTFALL 005, 006, 007, 008, 009, 010, & 011
OIL SHEEN	QUATERLY	OUTFALL 005, 006, 007, 008, 009, 010, & 011
OTHER VISUAL INDICATORS	QUATERLY	OUTFALL 005, 006, 007, 008, 009, 010, & 011

Other visual indicators can be emulsions, sludges, stains, or other signs of pollution.

NARRATIVE:

The Kewaunee Power Station (the "Station") is a net 575 megawatt (MW) electric nuclear power station operated by Dominion Energy Kewaunee, Inc. that began operation on December 21, 1973. The Station is located adjacent to Lake Michigan nine miles south of the town of Kewaunee, Wisconsin and 27 miles southeast of Green Bay. Oil on site is primarily diesel generator and boiler fuel oil stored in underground tanks plus turbine lube oil in tanks within the turbine building. Only one small aboveground tank is located outdoors (888 gallons).

NOTES:

1. NO SURFACE IMPOUNDMENTS IN OPERATING AREAS.
2. NO SIGNIFICANT SPILLS IN THE PAST 3 YEARS.
3. SEE CERTIFICATION OF NON-STORMWATER EVALUATION IN THE SWPPP.
4. IMPERVIOUS SURFACES INCLUDE EQUIPMENT AND BUILDING AREAS, ROADS, AND CONTAINMENT PADS.

LEGEND:

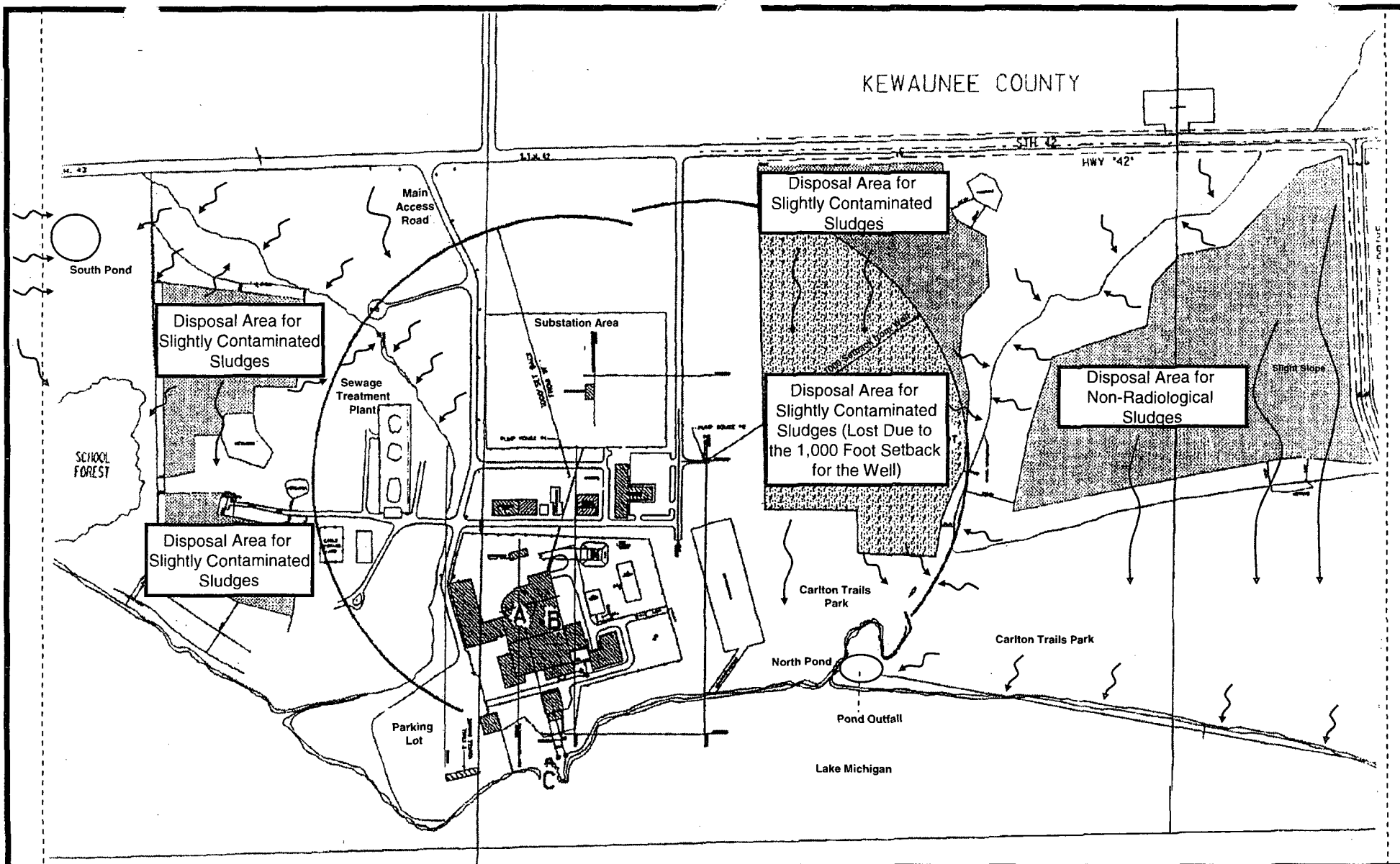
- OUTFALL
- 8' HIGH FENCE
- ROCK BARRIER
- JERSEY BARRIERS
- DIRECTION OF DRAINAGE

DOMINION ENERGY
KEWAUNEE, INC.

SWPPP FIGURE 4
STORMWATER DRAINAGE AREAS
KEWAUNEE POWER STATION

FEB. 2008 KEWAUNEE, WISCONSIN 87642.06

SWPPP Fig4.dgn 02/20/2008 11:44:40 AM



LEGEND

A = CONTAINMENT BUILDING VENT ELEVATION 775'

B = AUXILARY BUILDING VENT ELEVATION 665'

C = EFFLUENT LIQUID DISCHARGE ELEVATION 580'

= STORMWATER FLOW

N

PROJECT:

SWPPP

Kewaunee

Power Station

Kewaunee, Wisconsin

EarthTech

A tyco International Ltd. Company

FIGURE TITLE:

Industrial & Domestic Sludge Land Spreading Areas

PROJECT MANAGER:	PROJECT NO.:	DATE:	SCALE:	FIGURE NO.:
Robert Hare	87642.06	10/31/05	N/A	5

Appendix D

Site Photo Log

Photo 01: Storm grate in the truck unloading areas for the 10,000 gallon TSC Diesel Generator Fuel Oil UST.

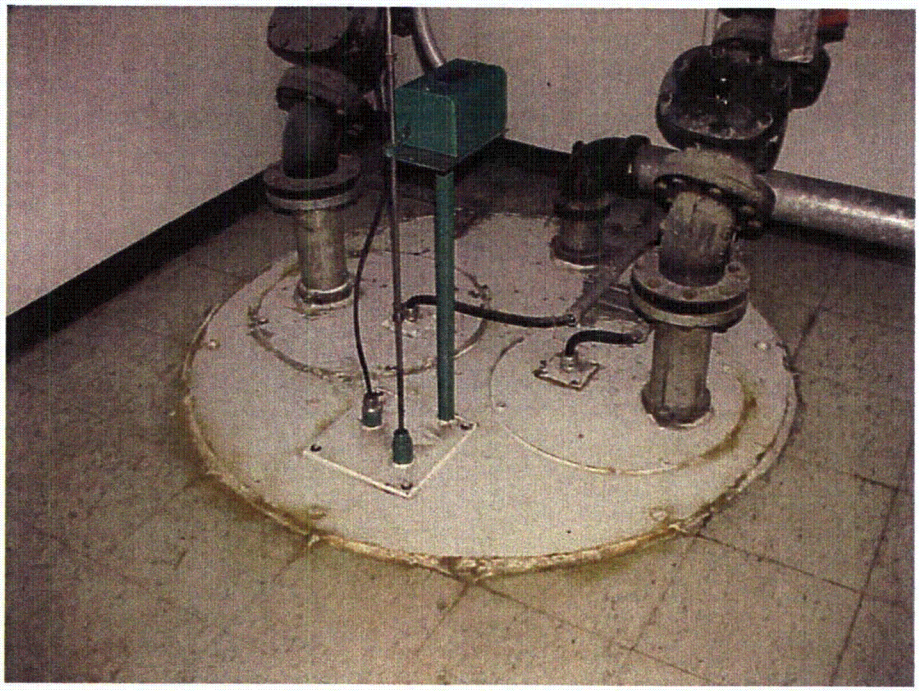


Photo 02: Technical Support Center (TSC) Fuel Oil Day Tank 1B2 containment drainage sump.

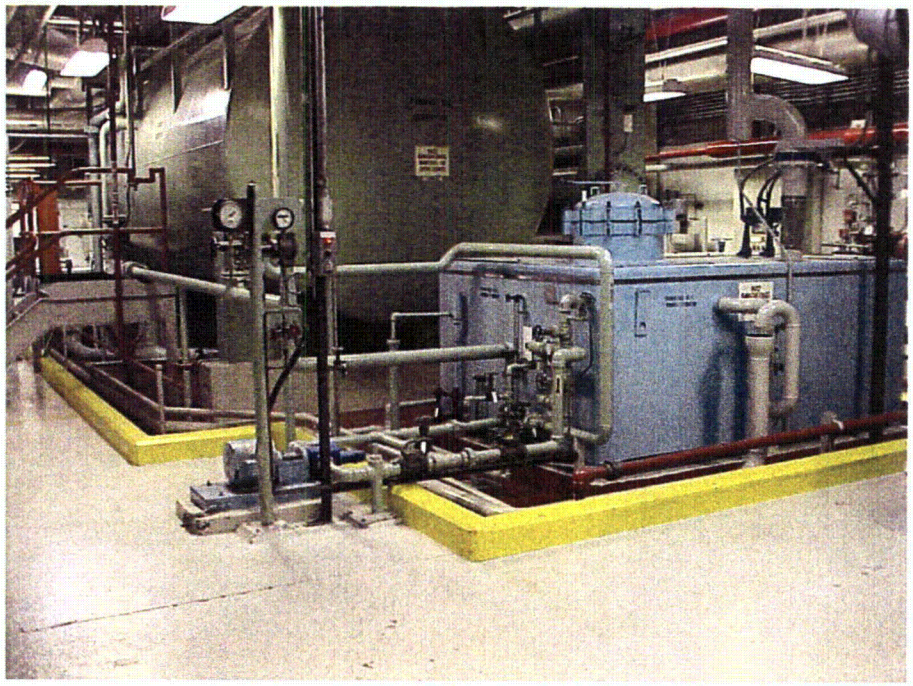


Photo 03: 14,000 Gallon Turbine Oil Reservoir Tank in Turbine Building.

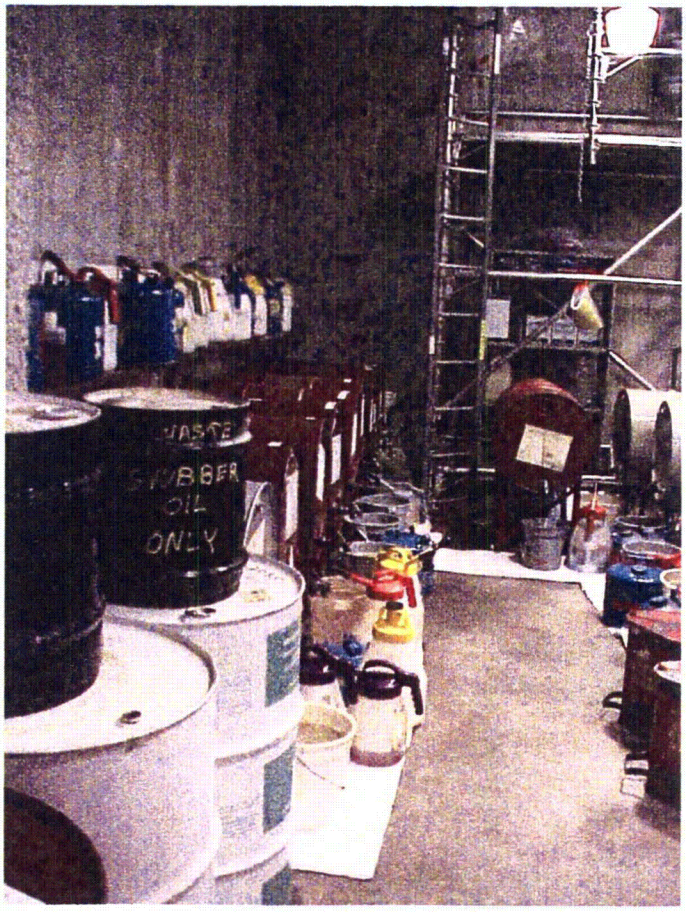


Photo 04: Turbine Oil Building Oil Storage Room for Used Oil.

Photo 05: 14,000 Turbine Oil Tank Tank.

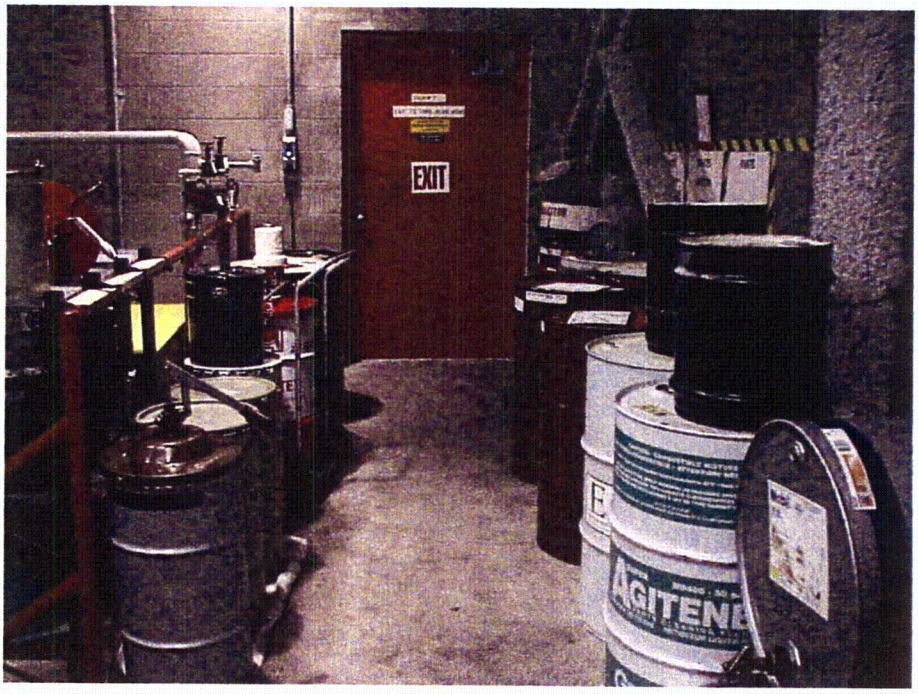


Photo 06: 14,000 Turbine Oil Tank room also has Drum Storage within room with curb at door.

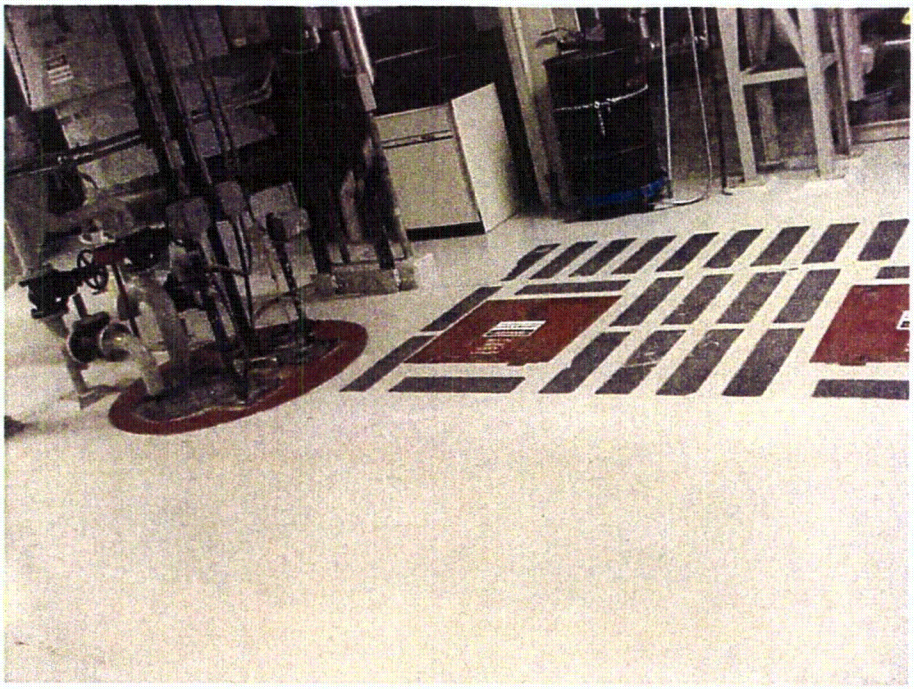


Photo 07: Turbine Building Floor Sump and Lift Station

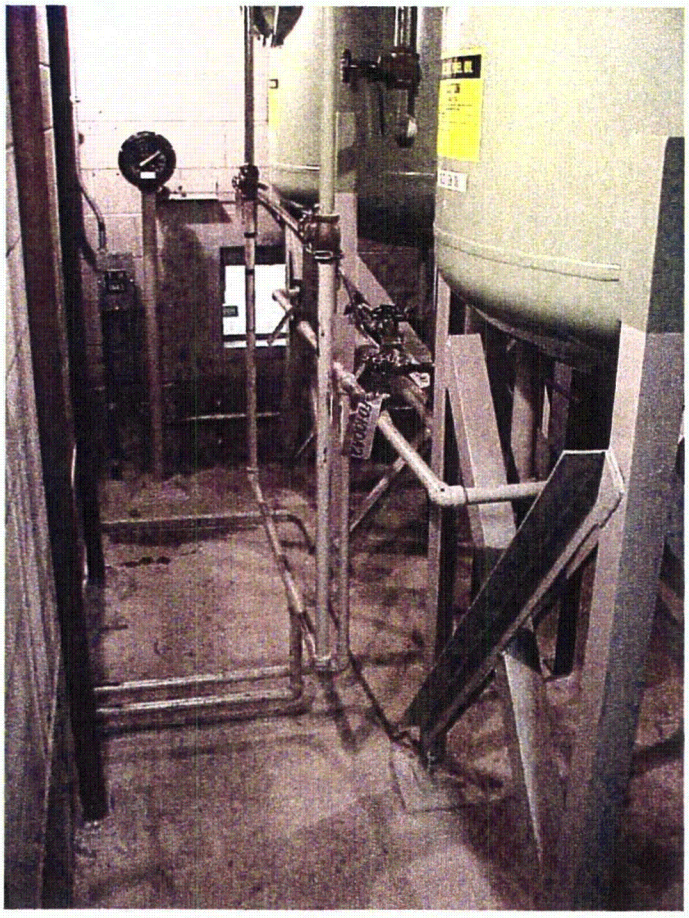


Photo 08: 850 Gallon Diesel Generator Fuel Oil Day Tanks within below grade room floor containment.

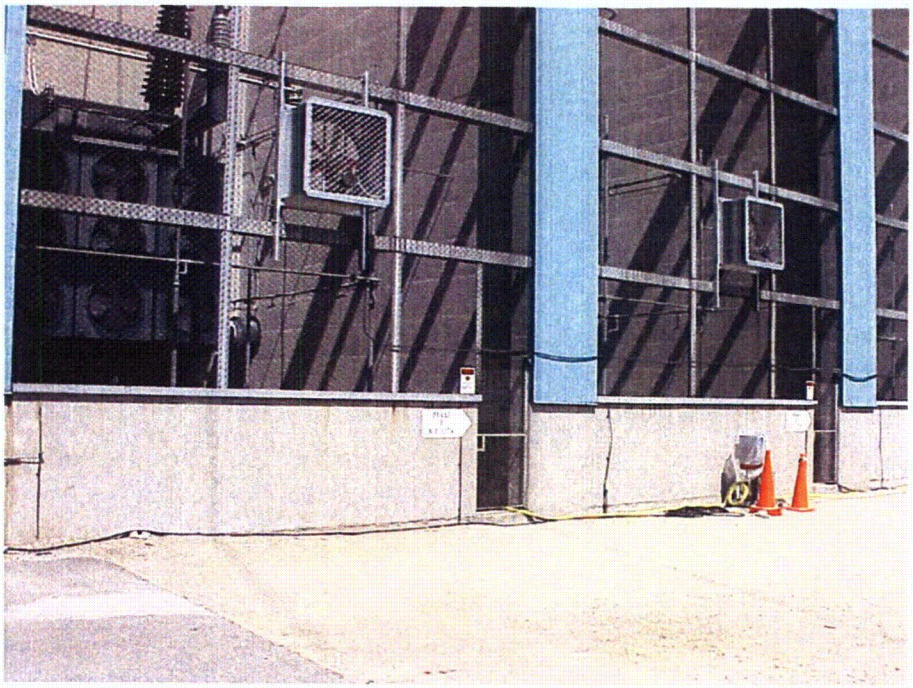


Photo 09: Station Transformers outside of Turbine Building within containment areas. Phase A & B units shown.

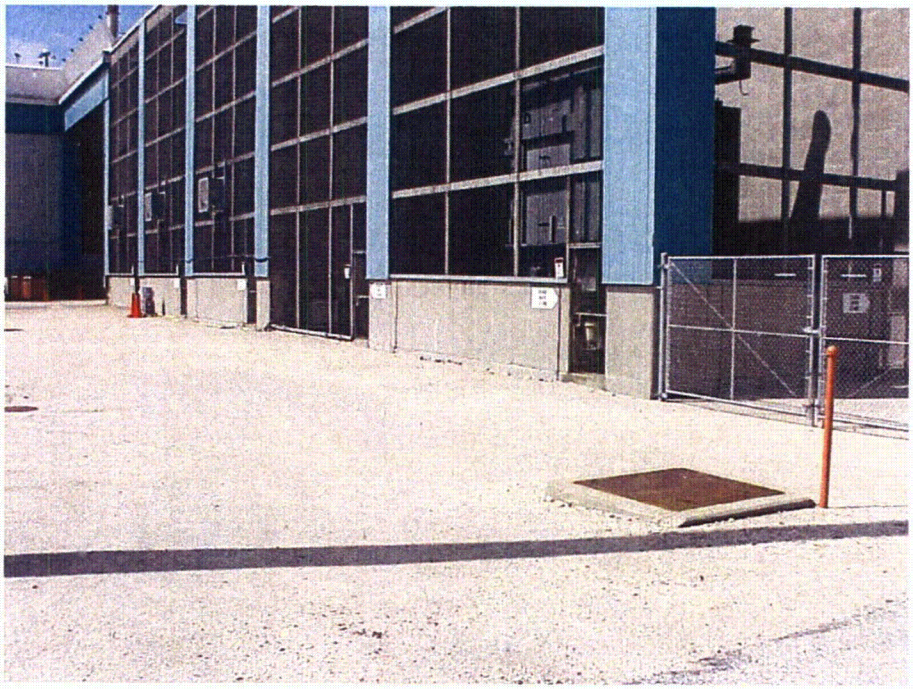


Photo 10: Station Transformers are within containment outside of Turbine Building. Large spills would drain to the sump in the right foreground; one 10,000 gal. sump.

Photo 11: Photo shows Station Transformer area where a Lake Michigan stormwater drain is outside of containment. Trucks are utilized to transfer oil to or from a transformer in this area. The left side of photo shows drainage sump #2.

Photo 12: Photo of the area where the 35,000 gallon USTs are located.

Photo 13: Photo of the truck unloading area for the 35,000 gallon Diesel Generator Fuel Oil USTs. Spill drainage from the area could reach Lake Michigan. Yellow line represents grade crest at truck unloading spot.

Photo 14: Photo of the truck unloading area for the 35,000 gallon USTs.

Photo 15: Photo of the truck unloading area for the 10,000 gallon TSC Diesel Fuel Oil tank. Drainage would reach Lake Michigan stormwater drains.

Photo 16: Photo of the truck unloading area for the 10,000 gallon TSC Diesel Fuel Oil Tank. Drainage would reach Lake Michigan stormwater drains.

Photo 17: Photo downgrade of the truck unloading area for the 10,000 gallon TSC Diesel Fuel Oil Tank shows additional Lake Michigan stormwater grate serving the area.

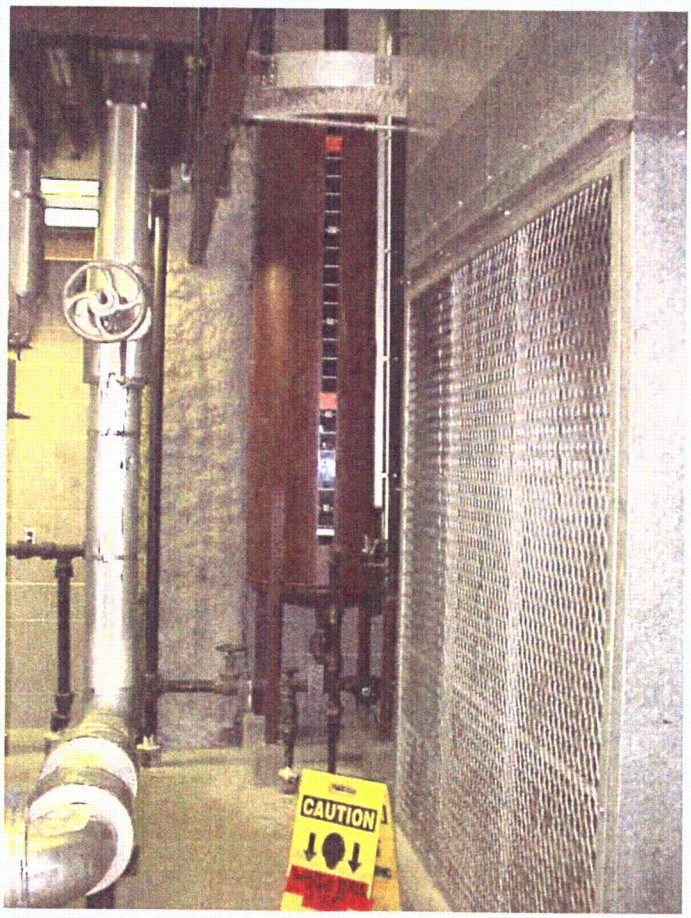


Photo 18: 475 Gallon TSC Fuel Oil Day Tank 1B2

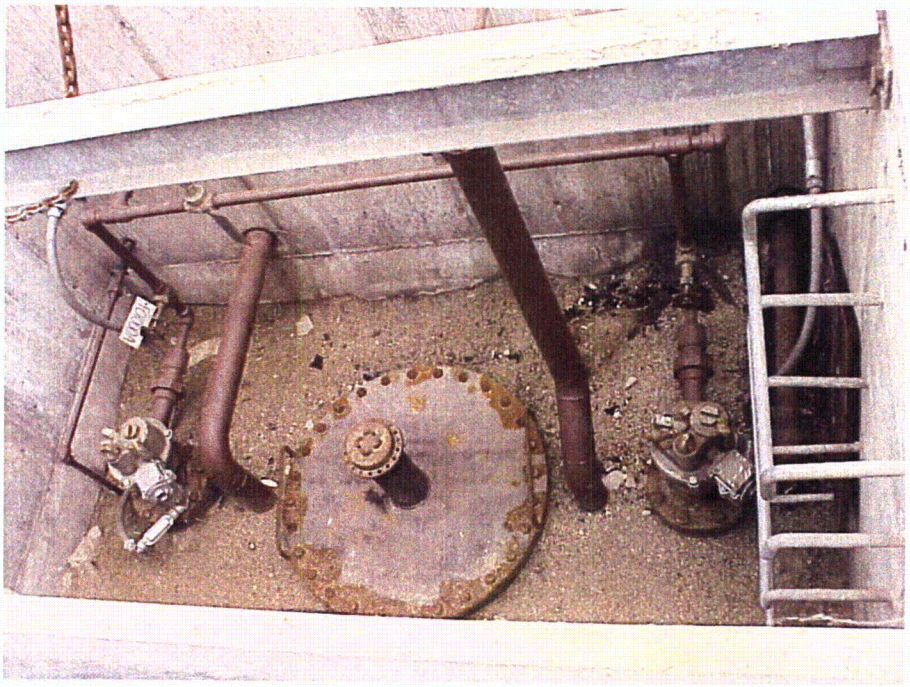


Photo 19: Manway entrance point to 10,000 Gallon TSC Diesel Fuel Oil UST.

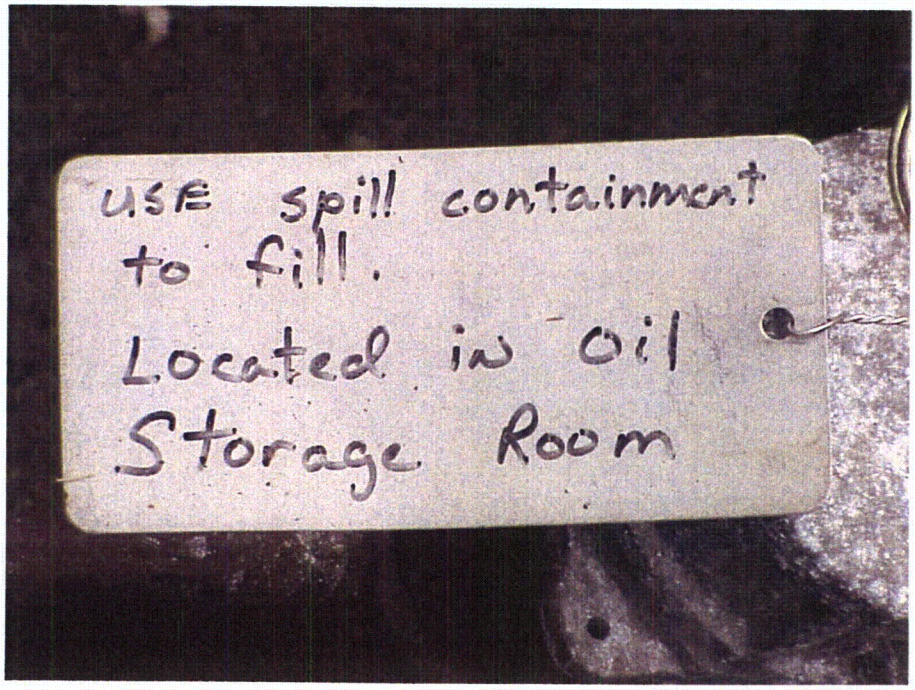


Photo 20: Tag in 10,000 gallon TSC Diesel Generator Fuel UST Area.

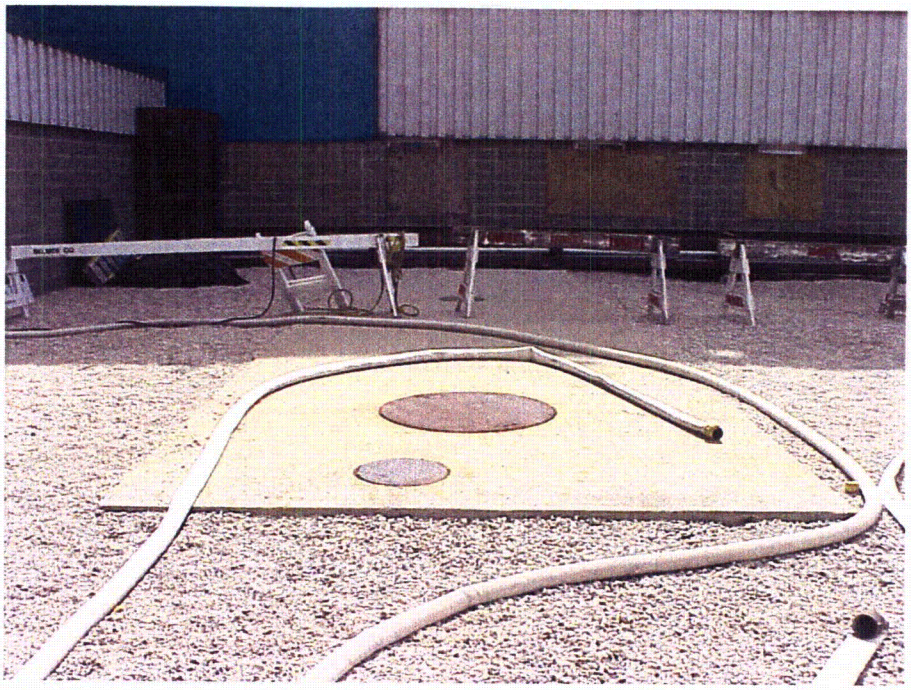


Photo 21: 30,000 Gallon Boiler Fuel Oil UST area.

Photo 22: 30,000 Gallon Boiler Fuel Oil Tank Truck Unloading Area is in Vicinity of Lake Michigan Stormwater Drainage Grate.

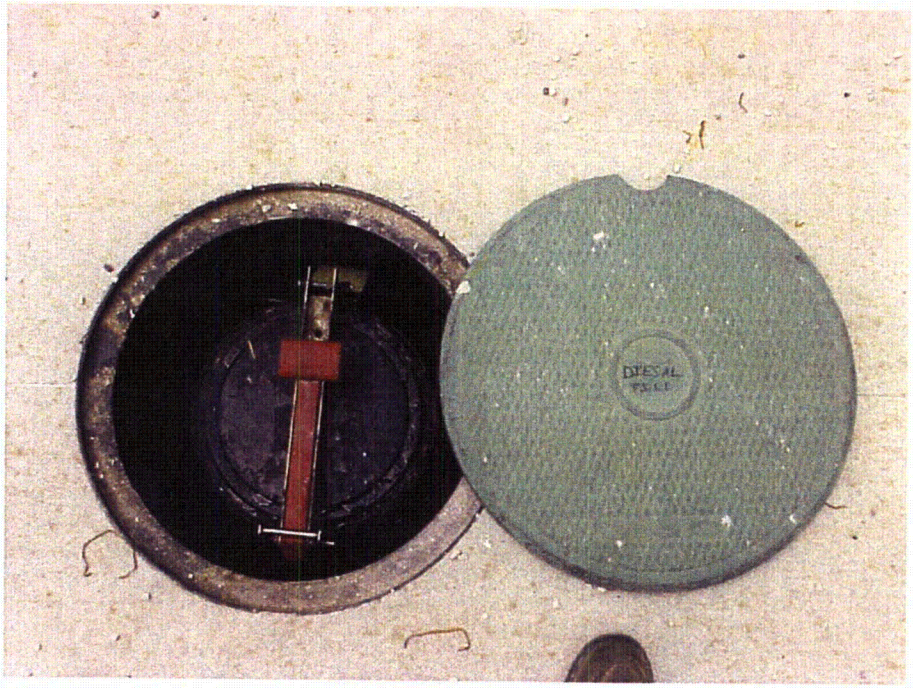


Photo 23: 30,000 Gallon Boiler Fuel Oil Tank.

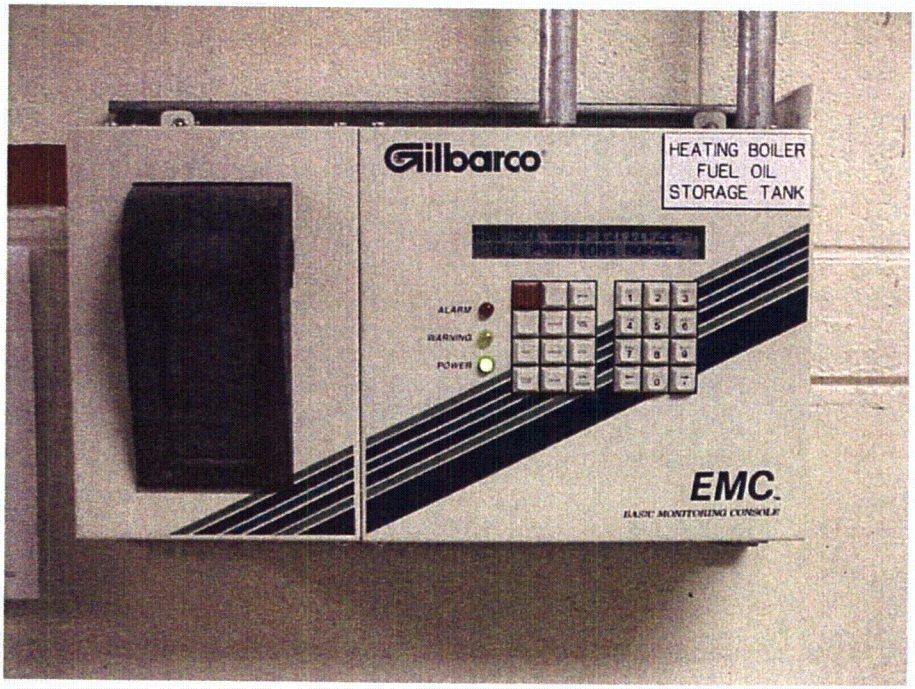


Photo 24: 30,000 Gallon Boiler Fuel Oil Tank leak detection alarm control.

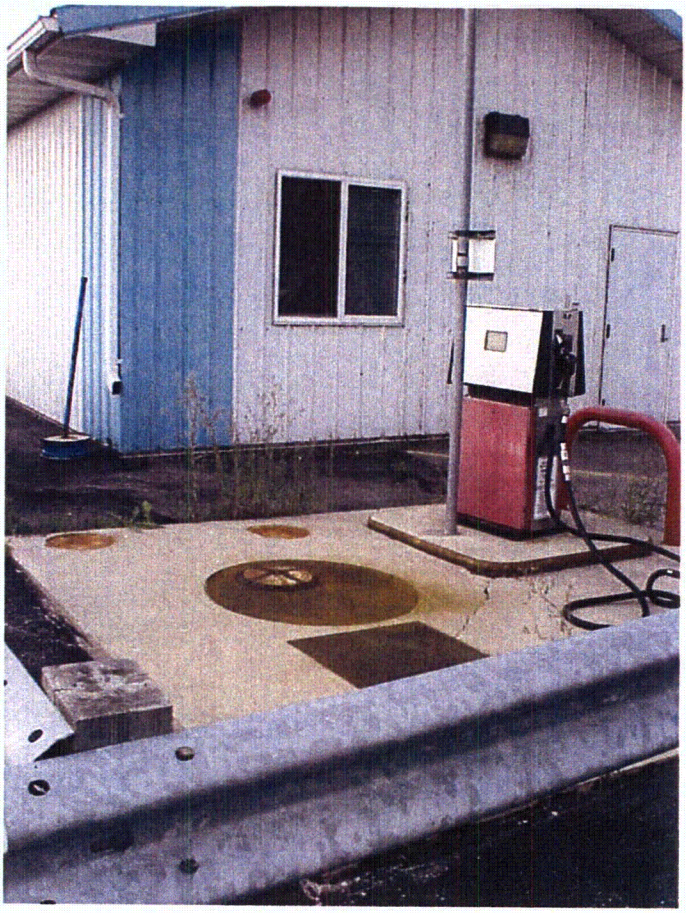


Photo 25: 550 Gallon Gasoline Dispensing UST Next to Vehicle Storage Building.

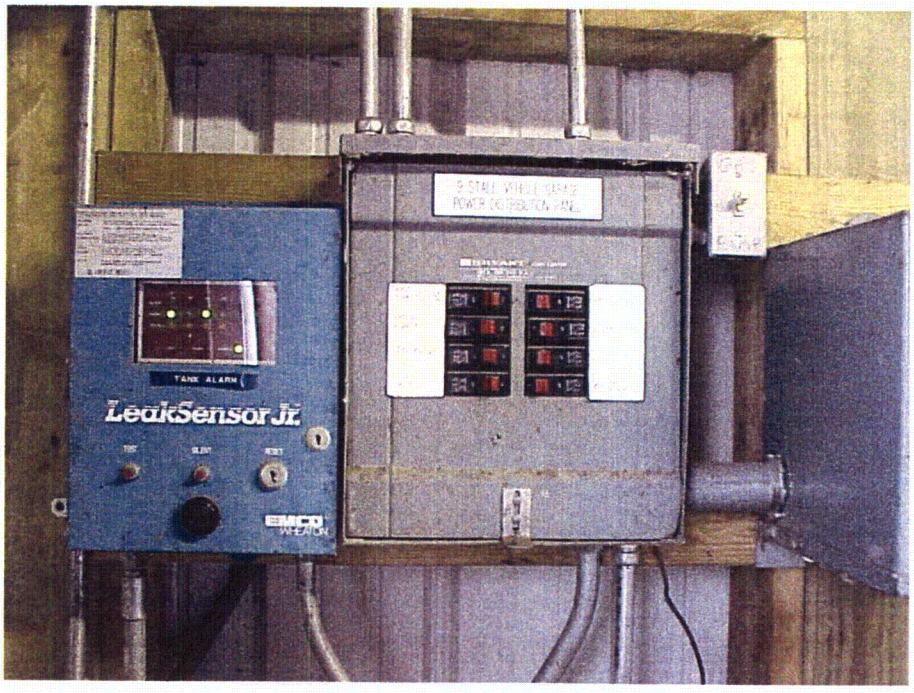


Photo 26: Leak detection system for 550 Gallon Gasoline Dispensing UST.

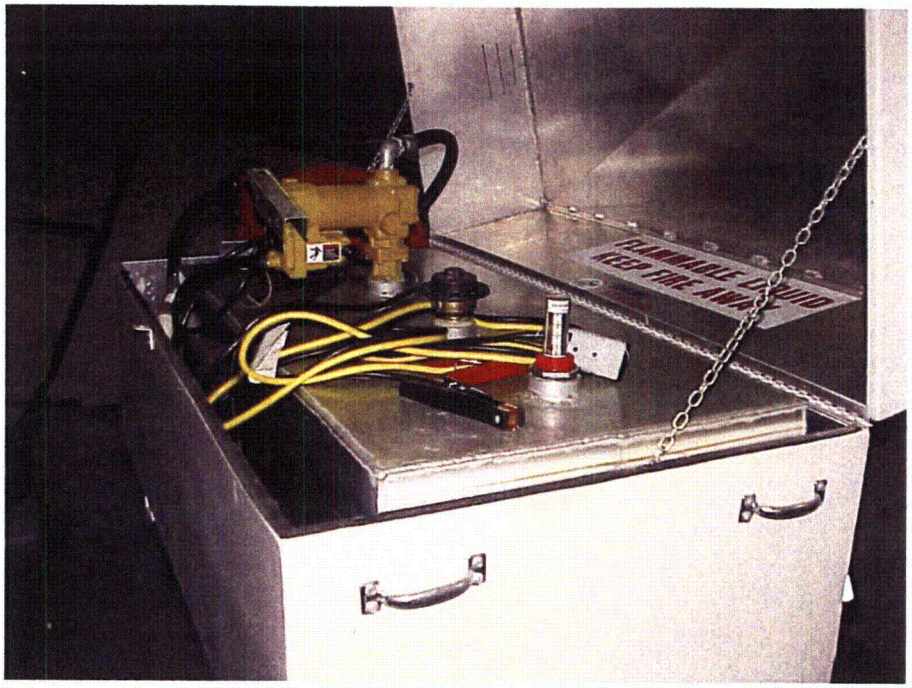


Photo 27: 90 Gallon Portable Diesel Fuel Wagon.

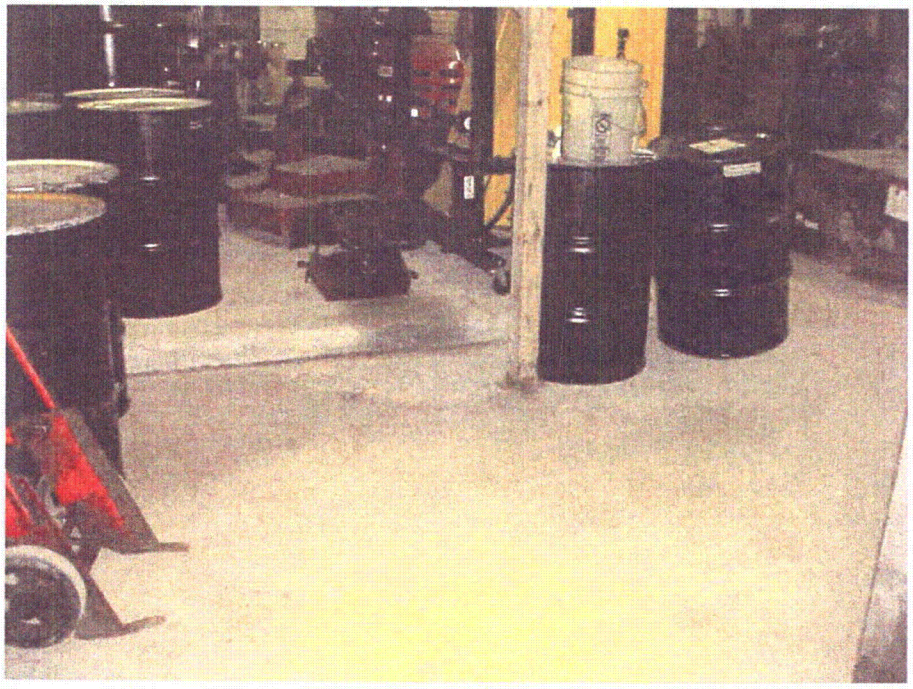


Photo 28: Maintenance Used Oil and Material Storage Building Drums.

Photo 29: 600 Gallon Diesel Fuel OTF/STF Tank at Pump House

Photo 30: 600 Gallon Diesel Fuel STF/OTF Tank in Containment Dike with drainage hose in foreground.

Photo 31: ATC/Dominion Switchyard area in the background.

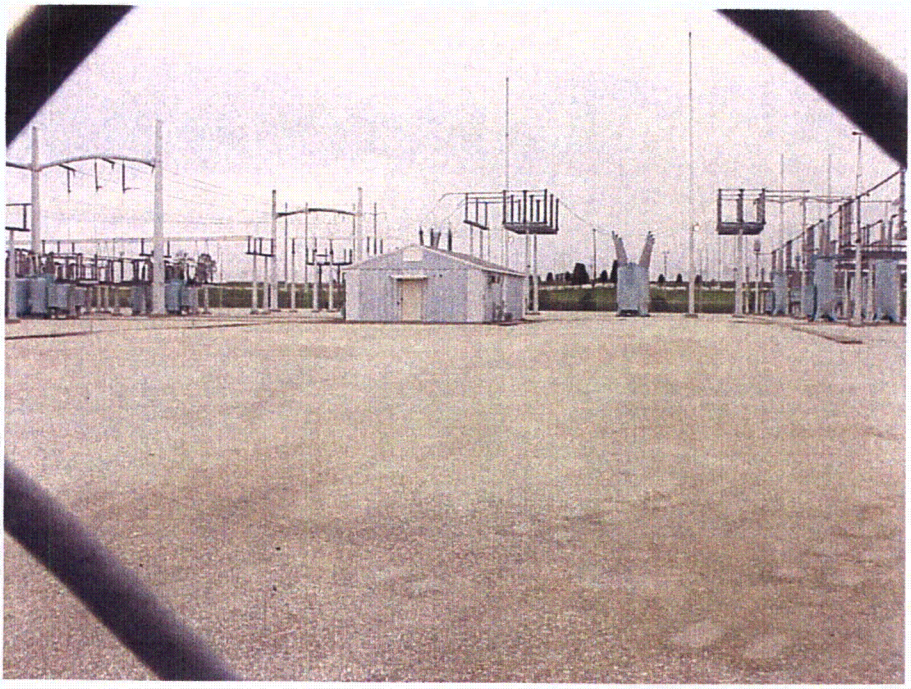


Photo 32: ATC/Dominion Switchyard Area.

Photo 33: Office/Warehouse Annex Drum Storage; Used Oil

Photo 34: Office/Warehouse Annex Drum Storage; Used Oil. Entrance door has ramp that acts as containment berm.

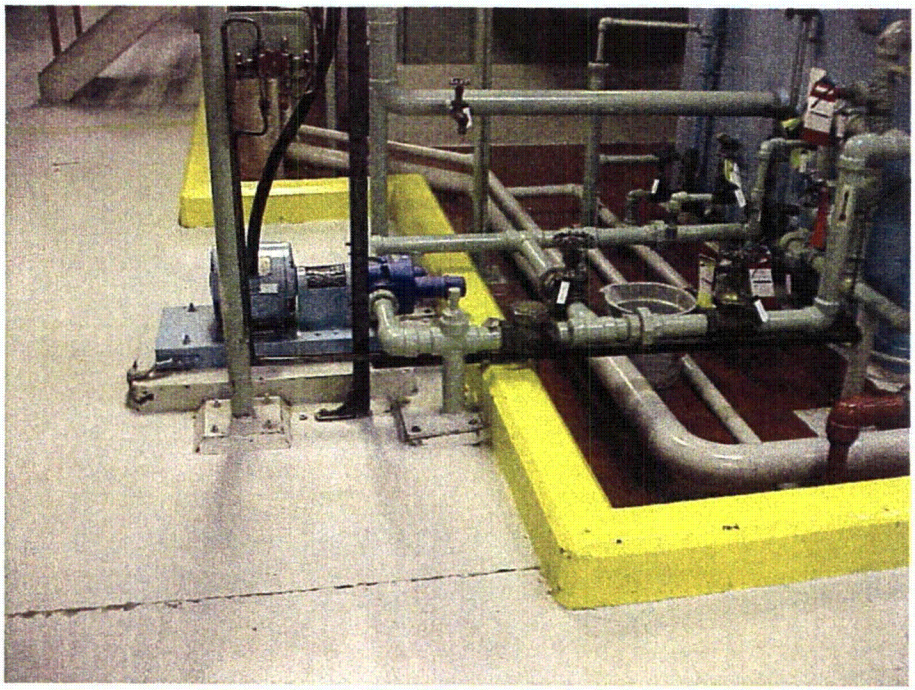


Photo 35: A leak from the turbine oil pump outside of berm would go to Turbine Building sump.

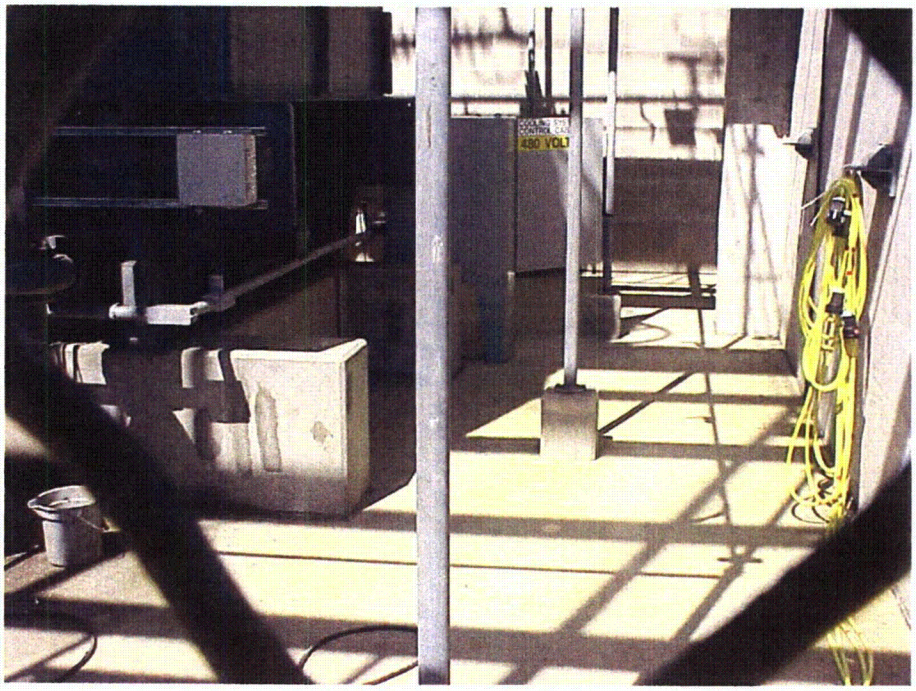


Photo 36: Contained Dominion Transformer Areas Outside Turbine Building

Photo 37: Uncontained Spare Dominion Main Transformer at Switchyard (Gravel Area Containment Only)

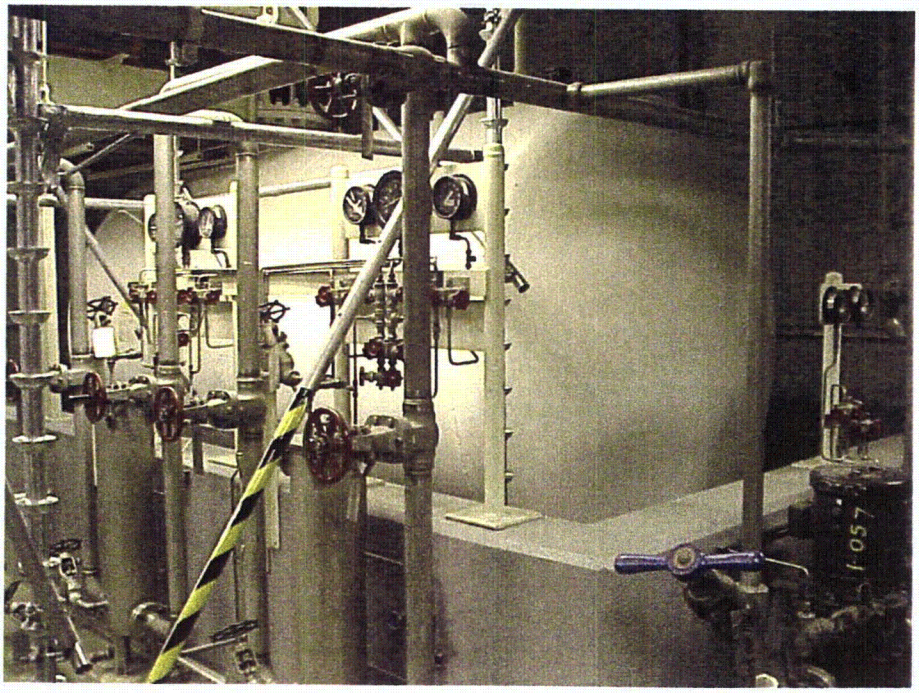


Photo 38: Contained Indoor Acid Tank

Photo 39: Turbine Building Secondary Chemical Injection Area – Drum Pad and Floor Sump Containment

Photo 40: Turbine Building Secondary pH Control Chemicals

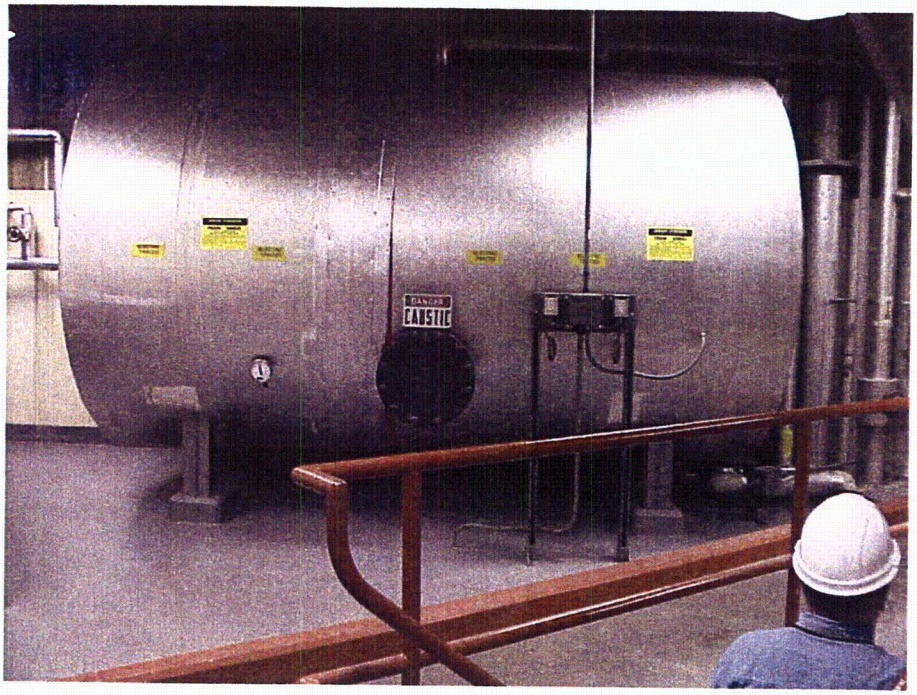


Photo 41: Caustic Soda Tank on 3rd Floor of Auxiliary Building

Photo 42: Chemical Storage Room

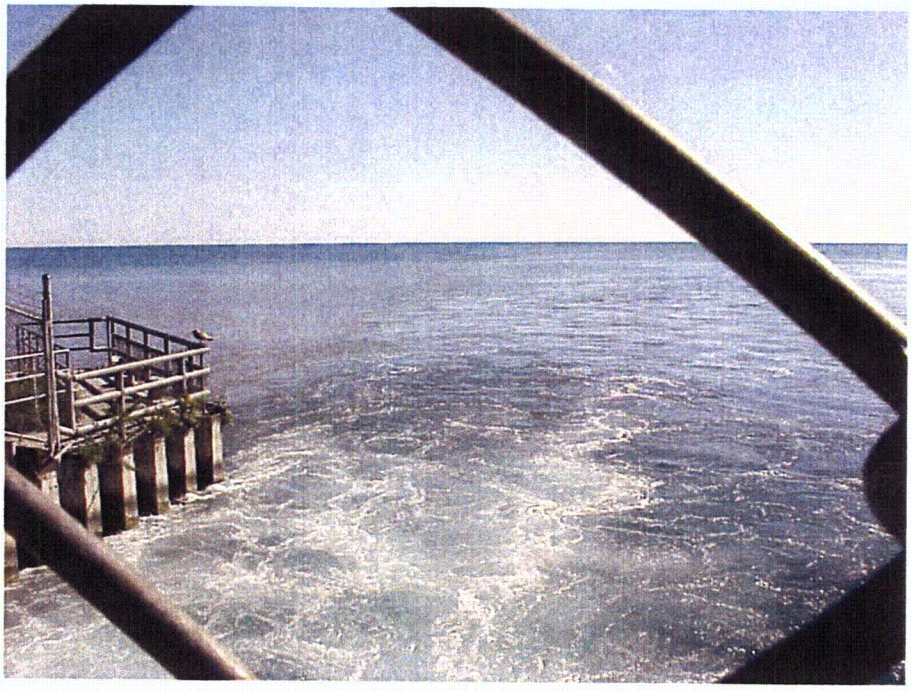


Photo 43: Discharge Structure Near and Outfall 001 Area

Photo 44: Main Parking Lot Above Storm water Pipe
Serving Parking Lot Only and Discharges via Outfall 009

Photo 45: Shoreline Near Where Outfall 003 Tributary Discharges

Photo 46: Tributary Ditch Serving Transformer Switchyard Runoff and Sewage Treatment Plant Treated Effluent

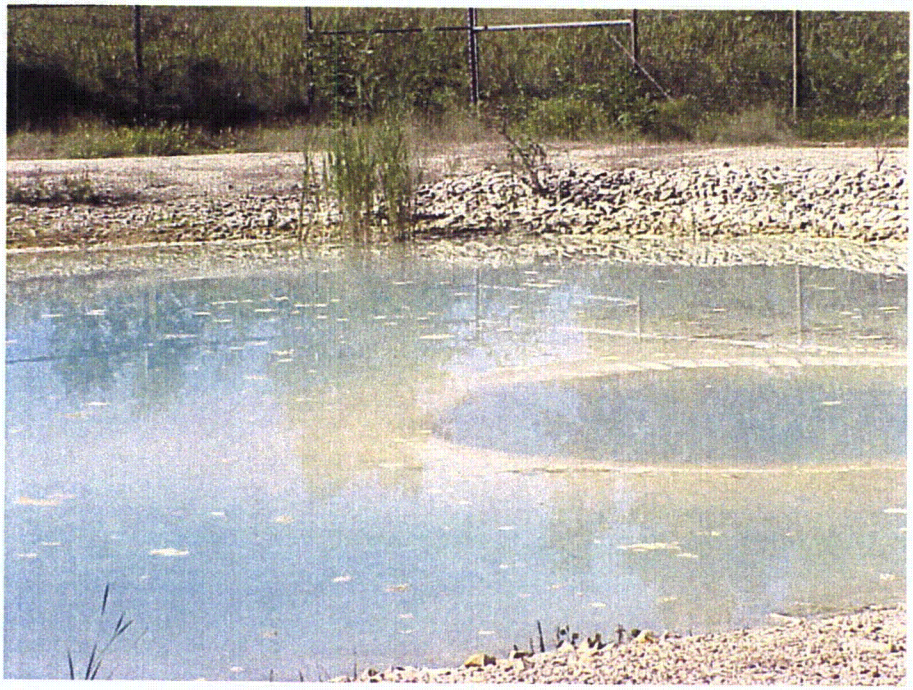


Photo 47: One of Two Services Water Lagoons with Flocculent Haze. Contains Ferric Hydroxide Sludge.

Photo 49: Wood Chip Area from Trees Felled for Security Visibility.

Photo 50: Storage Location Outside Equipment Area.

Photo 51: BMP Flow Restriction Measure from Runoff near Transformer Switchyard.

Photo 52: Flow Route of Runoff from Transformer Switchyard.

Photo 53: Small Tributary Pond Downgrade of Land Spreading Area and Parking Area. Overflow Tube Drains to Lake Michigan via Outfall 005

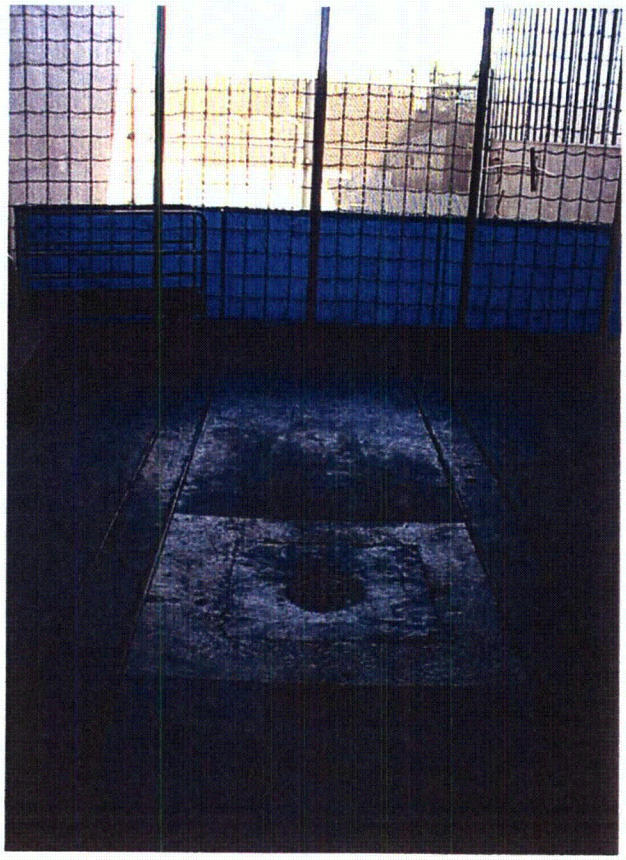


Photo 54: Contained Caustic and Acid Unloading Bay Inside Auxiliary Building.

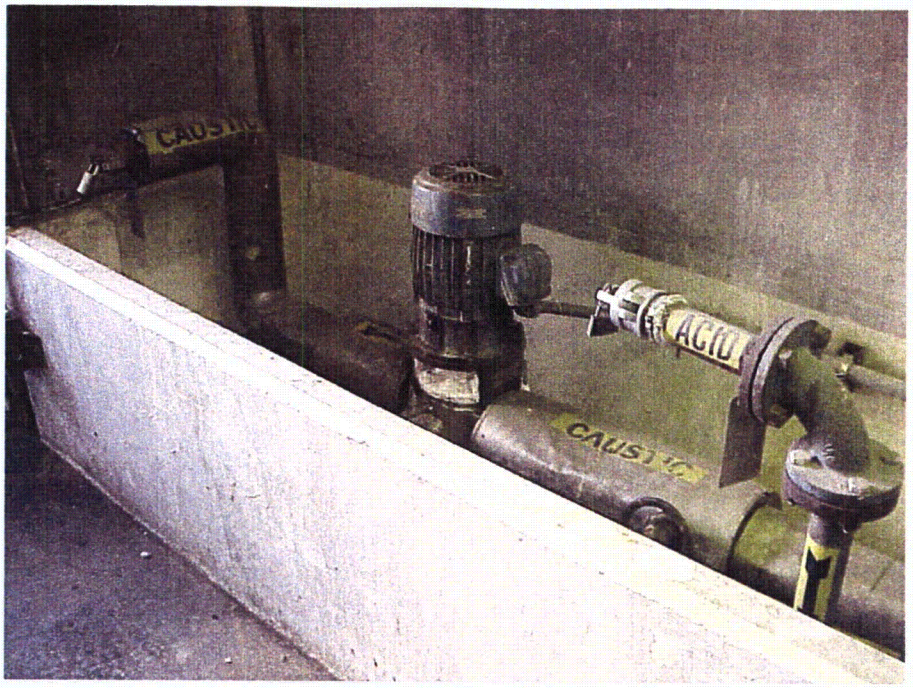


Photo 55: Acid and Caustic Pump and Truck Connection Containment.

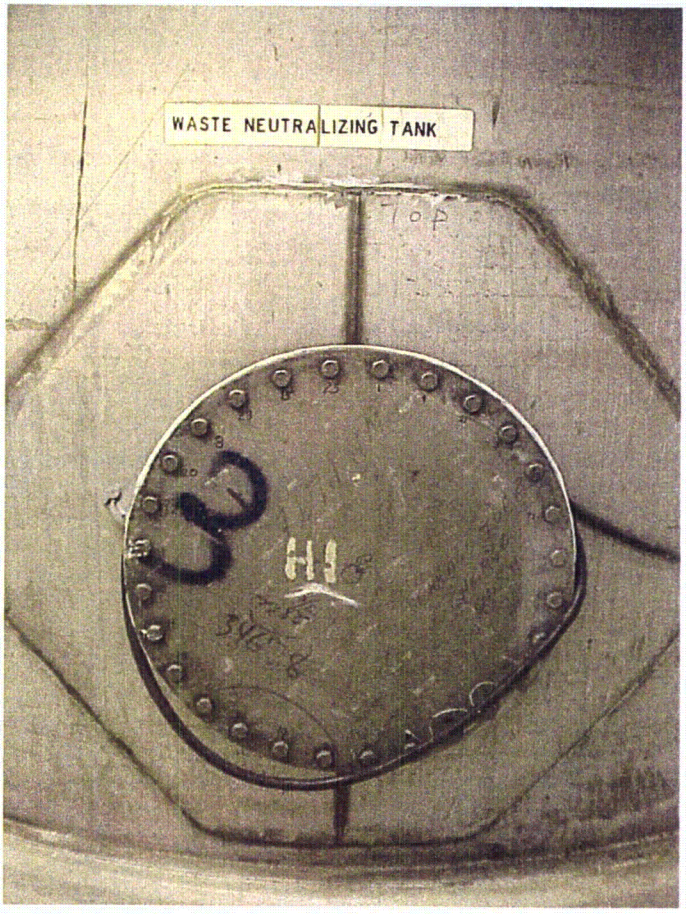


Photo 56: Water Treatment tank

Dominion Energy Kewaunee, Inc.
N490 Highway 42, Kewaunee, WI 54216-9511

Dominion®

MISC-2009-0019

APR 13 2009

WI Department of Natural Resources
Mr. Gary Kincaid
2984 Shawano Ave.
Green Bay, WI 54313

Dear Mr. Kincaid,

Attached is the Kewaunee Power Station original signed Electronic Discharge Monitoring Report Certification for the month of March 2009 and a copy.

If you have any questions, please contact Mr. Ted Maloney at (920) 388-8863.

Sincerely,

Michael J. Wilson
Director Safety and Licensing
Kewaunee Power Station

Attachment

Electronic Discharge Monitoring Report Certification

Facility Name:	DOMINION ENERGY KEWAUNEE, INC.	For DNR Use Only Date Received:	
Contact Address:	N490 Highway 42 Kewaunee WI 54216	DOC:	226983
Facility Contact:	Theodore Maloney — Env Compliance Coordinator	FIN:	5644
Phone number:	(920) 388-8863	FID:	431022790
Permit Number:	0001571	Region:	Northeast Region
Reporting Period:	03/01/2009 to 03/31/2009	Permit Drafter:	Paul W. Luebke
Due Date:	04/15/2009	Reviewer:	Gary W. Kincaid
		Office:	Green Bay

Submittal of your discharge monitoring data, including this certification document, is required by section 283.55, Wis. Stats., and chapters NR 205 and NR 214, Wis. Admin. Code.

Personally identifiable information collected on this document or submitted in your electronic discharge monitoring data may be used for purposes other than for which it was originally collected. This does not include passwords or User IDs. DNR is required to provide all non-confidential information to any person who requests it under the Open Records law. Such information may be provided to the public in its original form or in an electronic report. Information reported may be made available to the public via a DNR web page.

I certify under penalty of law that the discharge monitoring data submitted to DNR on 4/13/2009 9:13:15 AM for the period 03/01/2009 to 03/31/2009 and identified by the DOC number listed above, and authenticated by the document key number listed below, and all attachments were prepared under my direction or supervision. I certify that this was done in accordance with a system designed to assure that qualified personnel properly gathered, evaluated and converted the information to electronic form. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions, please call Gary Kincaid at (920) 662-5136.

Return Certification to:	Authorized Representative Signature	Date
WI Department of Natural Resources Gary Kincaid 2984 Shawano Av Green Bay, WI 54313	[signature]	4/13/09
	Operator Signature	Date
	Darryl Holschbach	4/13/09

Darryl Holschbach electronically submitted this data on 4/13/2009 9:13:15 AM.

For DNR Use Only:

DOC Key:

B1FB4B70D7A93120655799E61C460614

Date Received:		Action Taken:	
Date Certified:			
Date Rejected:			

Electronic Discharge Monitoring Report Certification

Facility Name:	DOMINION ENERGY KEWAUNEE, INC.	For DNR Use Only Date Received:	
Contact Address:	N490 Highway 42 Kewaunee WI 54216	DOC:	226983
Facility Contact:	Theodore Maloney — Env Compliance Coordinator	FIN:	5644
Phone number:	(920) 388-8863	FID:	431022790
Permit Number:	0001571	Region:	Northeast Region
Reporting Period:	03/01/2009 to 03/31/2009	Permit Drafter:	Paul W. Luebke
Due Date:	04/15/2009	Reviewer:	Gary W. Kincaid
		Office:	Green Bay

Submittal of your discharge monitoring data, including this certification document, is required by section 283.55, Wis. Stats., and chapters NR 205 and NR 214, Wis. Admin. Code.

Personally identifiable information collected on this document or submitted in your electronic discharge monitoring data may be used for purposes other than for which it was originally collected. This does not include passwords or User IDs. DNR is required to provide all non-confidential information to any person who requests it under the Open Records law. Such information may be provided to the public in its original form or in an electronic report. Information reported may be made available to the public via a DNR web page.

I certify under penalty of law that the discharge monitoring data submitted to DNR on 4/13/2009 9:13:15 AM for the period 03/01/2009 to 03/31/2009 and identified by the DOC number listed above, and authenticated by the document key number listed below, and all attachments were prepared under my direction or supervision. I certify that this was done in accordance with a system designed to assure that qualified personnel properly gathered, evaluated and converted the information to electronic form. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions, please call Gary Kincaid at (920) 662-5136.

Return Certification to:	Authorized Representative Signature	Date
WI Department of Natural Resources Gary Kincaid 2984 Shawano Av Green Bay, WI 54313	[signature]	4/13/09
	Operator Signature	Date
	Darryl Holschbach	4/13/09

Darryl Holschbach electronically submitted this data on 4/13/2009 9:13:15 AM.

For DNR Use Only:

DOC Key:

B1FB4B70D7A93120655799E61C460614

Date Received:		Action Taken:
Date Certified:		
Date Rejected:		

The attached pages contains the data transmitted electronically to the WI Department of Natural Resources that generates the Electronic Discharge Monitoring Report Certification

Wastewater Discharge Monitoring Long Report

For DNR Use Only

Facility Name:	DOMINION ENERGY KEWAUNEE, INC.
Contact Address:	N490 Highway 42
	Kewaunee,WI 54216
Facility Contact:	Theodore Maloney, Env Compliance Coordinator
Phone Number:	(920)388-8863
Reporting Period:	03/01/2009 - 03/31/2009
Form Due Date:	04/15/2009
Permit Number:	**0001571**

Date Received:	
DOC:	226983
FIN:	5644
FID:	431022790
Region:	Northeast Region
Permit Drafter:	Paul W. Luebke
Reviewer:	Gary W. Kincaid
Office:	Green Bay

	Sample Point	801	001	001	001	001	001
	Description	Mercury Field Blank	Condenser Cooling Water	Condenser Cooling Water	Condenser Cooling Water	Condenser Cooling Water	Condenser Cooling Water
	Parameter	280	211	481	480	486	377
	Description	Mercury, Total Recoverable	Flow Rate	Temperature Minimum	Temperature Maximum	Temperature Average	pH Field
	Units	ng/L	MGD	deg F	deg F	deg F	su
	Sample Type	GRAB	CONTINUOUS	CONTINUOUS	CONTINUOUS	CONTINUOUS	GRAB
	Frequency	MONTHLY	DAILY	DAILY	DAILY	DAILY	WEEKLY
Sample Results	Day 1		403.9	55	63	58	
	2		403.9	55	62	58	8.1
	3		403.9	56	72	62	
	4		403.9	56	73	64	
	5		403.9	57	67	61	
	6	0.287	403.9	58	69	62	
	7		403.9	57	71	64	
	8		403.9	56	64	60	
	9		408.0	54	73	64	8.1
	10		412.0	60	75	67	
	11		412.0	62	78	69	
	12		412.0	58	71	63	
	13		412.0	61	74	67	
	14		412.0	63	74	69	
	15		412.0	66	75	71	
	16		412.0	67	75	71	8.1
	17		412.0	67	76	71	
	18		412.0	69	76	72	
	19		412.0	64	74	69	
	20		412.0	61	76	69	
	21		412.0	69	78	74	
	22		407.8	68	76	73	
	23		412.7	64	77	70	8.3
	24		416.1	66	76	72	
	25		416.1	64	75	70	
	26		413.6	68	77	73	
	27		445.1	51	72	65	
	28		610.5	51	60	55	
	29		611.9	52	58	55	
	30		610.5	51	62	55	8.2
	31		478.2	51	78	65	

	Sample Point	801	001	001	001	001	001
	Description	Mercury Field Blank	Condenser Cooling Water	Condenser Cooling Water	Condenser Cooling Water	Condenser Cooling Water	Condenser Cooling Water
	Parameter	280	211	481	480	486	377
	Description	Mercury, Total Recoverable	Flow Rate	Temperature Minimum	Temperature Maximum	Temperature Average	pH Field
	Units	ng/L	MGD	deg F	deg F	deg F	su
Summary Values	Monthly Avg	0.287	432.441935484	59.903225806	71.838709677	65.741935484	8.15
	Daily Max	0.287	611.9	69	78	74	8.3
	Daily Min	0.287	403.9	51	58	55	8.1
	Daily Max - Variable						
	Week 1 Avg						
	Week 2 Avg						
	Week 3 Avg						
	Week 4 Avg						
Limit(s) in Effect	Monthly Avg						
	Daily Max						9 0
	Daily Min						6 0
	Daily Max - Variable						
	Weekly Avg						
QA/QC Information	LOD	0.12					
	LOQ	0.50					
	QC Exceedance						
	Lab Certification No.	405132750					

	Sample Point	001	001	001	001	002	003
	Description	Condenser Cooling Water	Condenser Cooling Water	Condenser Cooling Water	Condenser Cooling Water	Intake De-Ice	Sewage Treatment Plant
	Parameter	112	110	108	112	211	211
	Description	Chlorine, Total Residual	Chlorine, Total Resdl Discharge Time	Chlorine, Variable Limit	Chlorine, Total Residual	Flow Rate	Flow Rate
	Units	ug/L	min/day	ug/L	lbs/day	MGD	MGD
	Sample Type	GRAB	REC OF ADDN	CALCULATED	CALCULATED	ESTIMATED	CONTINUOUS
	Frequency	DAILY	DAILY	DAILY	SEE PERMIT	MONTHLY	CONTINUOUS
Sample Results	Day 1						0.0049
	2						0.0121
	3						0.0126
	4						0.0121
	5	40	108	200	9.39		0.0130
	6						0.0149
	7						0.0093
	8						0.0064
	9						0.0206
	10	<37	108	200	0		0.0109
	11						0.0154
	12						0.0127
	13						0.0134
	14						0.0067
	15						0.0072
	16						0.0159
	17						0.0166
	18	<37	108	200	0		0.0181
	19	40	108	200	9.39		0.0155
	20						0.0103
	21						0.0059
	22						0.0076
	23						0.0185
	24	<37	108	200	0		0.0113
	25						0.0133
	26						0.0176
	27	<37	108	200	0		0.0130
	28						0.0105
	29						0.0076
	30	<37	108	200	0		0.0147
	31					0.897	0.0161

	Sample Point	001	001	001	001	002	003
	Description	Condenser Cooling Water	Condenser Cooling Water	Condenser Cooling Water	Condenser Cooling Water	Intake De-Ice	Sewage Treatment Plant
	Parameter	112	110	108	112	211	211
	Description	Chlorine, Total Residual	Chlorine, Total Resdl Discharge Time	Chlorine, Variable Limit	Chlorine, Total Residual	Flow Rate	Flow Rate
	Units	ug/L	min/day	ug/L	lbs/day	MGD	MGD
Summary Values	Monthly Avg	13.333333333	108	200	3.13	0.897	0.012409677
	Daily Max	40	108	200	9.39	0.897	0.0206
	Daily Min	<37	108	200	0	0.897	0.0049
	Daily Max - Variable	40					
	Week 1 Avg						
	Week 2 Avg						
	Week 3 Avg						
	Week 4 Avg						
Limit(s) in Effect	Monthly Avg						
	Daily Max				180		
	Daily Min						
	Daily Max - Variable	0					
	Weekly Avg						
QA/QC Information	LOD	37					
	LOQ	122					
	QC Exceedance						
	Lab Certification No.	431022790					

	Sample Point	003	003	003	003	003	101
	Description	Sewage Treatment Plant	Sewage Treatment Plant	Sewage Treatment Plant	Sewage Treatment Plant	Sewage Treatment Plant	Steam Generator Blowdown
	Parameter	66	457	789	377	280	211
	Description	BOD5, Total	Suspended Solids, Total	Nitrogen, Ammonia (NH3-N) Total	pH Field	Mercury, Total Recoverable	Flow Rate
	Units	mg/L	mg/L	mg/L	su	ng/L	MGD
	Sample Type	24 HR FLOW PROP	24 HR FLOW PROP	24 HR FLOW PROP	GRAB	GRAB	TOT DAILY
	Frequency	3/WEEK	3/WEEK	MONTHLY	3/WEEK	MONTHLY	WEEKLY
Sample Results	Day 1				7.2		
	2				7.1		
	3				6.9		0.0006
	4	4	3		6.8		
	5	12	2		6.8		
	6	5	1	2.1	7.0	2.34	
	7				7.0		
	8				7.1		
	9				7.3		
	10				6.7		
	11	9	5		7.4		
	12	5	1		7.2		
	13	7	3		7.1		
	14				7.2		
	15				7.3		
	16				7.4		0.0479
	17				7.1		
	18	7	5		7.2		
	19	10	4		7.3		
	20	8	4		7.3		
	21				7.4		
	22				7.4		
	23				7.5		0.0474
	24				7.0		
	25	4	2		7.1		
	26	5	1		7.1		
	27	7	5		7.0		
	28				7.2		
	29				7.3		
	30				7.4		0.0053
	31				7.4		

	Sample Point	003		003		003		003		003		101	
	Description	Sewage Treatment Plant		Sewage Treatment Plant		Sewage Treatment Plant		Sewage Treatment Plant		Sewage Treatment Plant		Steam Generator Blowdown	
	Parameter	66		457		789		377		280		211	
	Description	BOD5, Total		Suspended Solids, Total		Nitrogen, Ammonia (NH3-N) Total		pH Field		Mercury, Total Recoverable		Flow Rate	
	Units	mg/L		mg/L		mg/L		su		ng/L		MGD	
Summary Values	Monthly Avg	6.916666667		3		2.1		7.167741935		2.34		0.031966667	
	Daily Max	12		5		2.1		7.5		2.34		0.0479	
	Daily Min	4		1		2.1		6.7		2.34		0.0006	
	Daily Max - Variable												
	Week 1 Avg	7		2									
	Week 2 Avg	7		3									
	Week 3 Avg	8.333333333		4.333333333									
	Week 4 Avg	5.333333333		2.666666667									
Limit(s) in Effect	Monthly Avg	30	0	30	0								
	Daily Max							9	0				
	Daily Min							6	0				
	Daily Max - Variable												
	Weekly Avg	45	0	45	0								
QA/QC Information	LOD					0.50				0.12			
	LOQ					1.0				0.50			
	QC Exceedance	Y											
	Lab Certification No.	431022790		431022790		405132750				405132750			

	Sample Point	101	201	201	201	301	301
	Description	Steam Generator Blowdown	Floor Drains to Outfall 001	Floor Drains to Outfall 001	Floor Drains to Outfall 001	Service Water Lagoon Overflow	Service Water Lagoon Overflow
	Parameter	457	211	457	651	211	457
	Description	Suspended Solids, Total	Flow Rate	Suspended Solids, Total	Oil & Grease (Hexane)	Flow Rate	Suspended Solids, Total
	Units	mg/L	MGD	mg/L	mg/L	MGD	mg/L
	Sample Type	GRAB	TOT DAILY	GRAB	GRAB	TOT DAILY	GRAB
	Frequency	MONTHLY	WEEKLY	WEEKLY	MONTHLY	WEEKLY	WEEKLY
Sample Results	Day 1						
	2		0.0550	3.9	3.3	0.0053	9.9
	3	<1.0					
	4						
	5						
	6						
	7						
	8						
	9		0.0583	2.3		0.0044	2.5
	10						
	11						
	12						
	13						
	14						
	15						
	16		0.0597	<1.0		0.0046	1.5
	17						
	18						
	19						
	20						
	21						
	22						
	23		0.0586	1.1		0.0126	10.7
	24						
	25						
	26						
	27						
	28						
	29						
	30		0.0536	2.9		0.0023	27.6
	31						

	Sample Point	101		201		201		201		301		301	
	Description	Steam Generator Blowdown		Floor Drains to Outfall 001		Floor Drains to Outfall 001		Floor Drains to Outfall 001		Service Water Lagoon Overflow		Service Water Lagoon Overflow	
	Parameter	457		211		457		651		211		457	
	Description	Suspended Solids, Total		Flow Rate		Suspended Solids, Total		Oil & Grease (Hexane)		Flow Rate		Suspended Solids, Total	
	Units	mg/L		MGD		mg/L		mg/L		MGD		mg/L	
Summary Values	Monthly Avg	0		0.0579		1.825		3.3		0.006725		6.15	
	Daily Max	<1		0.0597		3.9		3.3		0.0126		10.7	
	Daily Min	<1		0.055		<1		3.3		0.0044		1.5	
	Daily Max - Variable												
	Week 1 Avg												
	Week 2 Avg												
	Week 3 Avg												
	Week 4 Avg												
Limit(s) in Effect	Monthly Avg	30	0			30	0	15	0			30	0
	Daily Max	100	0			100	0	20	0			100	0
	Daily Min												
	Daily Max - Variable												
	Weekly Avg												
QA/QC Information	LOD							1.5					
	LOQ							5.1					
	QC Exceedance												
	Lab Certification No.	431022790				431022790		999407970				431022790	

	Sample Point	501	501	601	701		
	Description	RO Reject	RO Reject	Turbine Bldg Basement Water	Intake Water		
	Parameter	211	457	211	486		
	Description	Flow Rate	Suspended Solids, Total	Flow Rate	Temperature Average		
	Units	gpd	mg/L	MGD	deg F		
	Sample Type	TOT DAILY	GRAB	ESTIMATED	CONTINUOUS		
	Frequency	DAILY	WEEKLY	AT DISCHARGE	DAILY		
Sample Results	Day 1	15433			34		
	2	19014	<1.0		33		
	3	21455			37		
	4	22133			38		
	5	15298			36		
	6	18222			37		
	7	12932			38		
	8	17371			34		
	9	12881	1.7		38		
	10	17320			40		
	11	16977			42		
	12	16814			37		
	13	15187			40		
	14	14024			42		
	15	13081			43		
	16	18927	2.5		43		
	17	14814			44		
	18	13816			44		
	19	32592			41		
	20	50877			41		
	21	50611			45		
	22	28357			45		
	23	38898	<1.0		42		
	24	38536			43		
	25	33513			43		
	26	37735			45		
	27	34592			40		
	28	24372			40		
	29	10735			40		
	30	48502	3.1		41		
	31	23713			42		

	Sample Point	501	501	601	701		
	Description	RO Reject	RO Reject	Turbine Bldg Basement Water	Intake Water		
	Parameter	211	457	211	486		
	Description	Flow Rate	Suspended Solids, Total	Flow Rate	Temperature Average		
	Units	gpd	mg/L	MGD	deg F		
Summary Values	Monthly Avg	24167.3	1.05		40.258064516		
	Daily Max	50877	2.5		45		
	Daily Min	10735	<1		33		
	Daily Max - Variable						
	Week 1 Avg						
	Week 2 Avg						
	Week 3 Avg						
	Week 4 Avg						
Limit(s) In Effect	Monthly Avg		30 0				
	Daily Max		100 0				
	Daily Min						
	Daily Max - Variable						
	Weekly Avg						
QA/QC Information	LOD						
	LOQ						
	QC Exceedance						
	Lab Certification No.		431022790				

General Remarks

Laboratory Quality Control Comments

The BOD blanks set on 3/13/09, 3/26/09 and 3/27/09 were not within the 0-0.2 range.

KPS Correspondence Review & Approval Record

SUBJECT: Discharge Monitoring Report for March 09.

DUE TO State: 4/13/08

DUE TO: Director Safety and Licensing

Licensing contact: Ted Maloney
Phone Extension: 8863

Reviewer	Signature	Date	No Comments	Comments Resolved
			☐	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐
Corporate Environmental Review	Steve Horn email	4/13/09	☒	☐
Env. Comp. Coordinator Ted Maloney	Ted Maloney	4/6/09	☒	☐
Chemistry Review Darryl Holschbach	Darryl Holschbach	4/7/09	☒	☐
RPREPSHAS FOR **Licensing Manager Tom Breene**	RPV for	4/13/09	☒	☐

Please review and sign this form and check the appropriate box above. Document any required changes on the document itself and return it to the Licensing contact.

KPS System Description	System No. 04	Rev. 5
Title Circulating Water System (CW)	Date MAR 20 2008	Page 1 of 23
Author Lisa Blazer (Lisa Blazer)	OPs Review	
Tech Review (Dwight Vorpahl)	Approved (Doug Lawrence - Manager of Engineering)	

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1.0 Summary

1.1 Overview

The Circulating Water (CW) System (See Figure KNP-CW01) is designed to deliver sufficient screened Lake Michigan water for condenser cooling. The CW System intake is designed to provide a reliable supply of Lake Michigan water regardless of weather or lake conditions. The CW System Forebay also serves as the source for Service Water (SW) System pumps and the Fire Protection (FP) System pumps.

A 10 foot diameter pipe carries the water from the intake to the Screenhouse Forebay. At normal lake level (577 feet), the Forebay water level with two CW pumps in operation is 571 feet, and with one CW pump, 574 feet.

The intake structure, Forebay, discharge structure, and Screenhouse are **Safety Class 1** structures.

Water is pumped from the Forebay by two vertical CW pumps through individual check valves and discharge pipes. (See Figure KNP-CW01.) The discharge pipes combine and proceed through a main conduit until it splits into four individual conduits. Each conduit supplies a water box on Condensers A and B. Water flows through the condensers to individual discharge water boxes and out four individual conduits. These conduits join into a common CW discharge tunnel. The common CW discharge receives SW return water and miscellaneous drains. The common CW discharge pipe also supplies water to the recirculating water pump for de-icing operations, supplies a chlorine monitor, and an auxiliary intake line.

The water box priming jet takes a suction on the condenser water boxes to ensure they are full of water and do not become air bound.

As depicted in Figures KNP-CW01 and CW04, two Turbine Building (Turb. Bldg.) standpipes, one Auxiliary Building (Aux. Bldg.) standpipe and a 6" line from the Demineralizer area drain into the common CW discharge piping. These CW standpipes provide a means of returning all SW cooling and various system drains/blow-downs to the CW discharge piping.

Various support equipment is provided to assure continuous operation of the CW System. A recirculating water pump allows pumping of warm discharge water to a grid of perforated pipes above the inlets to prevent the formation of ice on the screen. Sodium Hypo chlorite injection points are provided for periodic chlorination into the individual water boxes and the Forebay. This prevents the buildup of bacterial slime in the water boxes and on condenser tubes and prevents zebra mussel accumulation in the CW system.

1.2 System Operation versus Plant Modes

Plant Mode	System Support
Startup	The CW System is required to be placed in operation prior to admitting steam to the condensers.
Normal Power	Normal full power operation requires one or two CW pumps and all four condenser water boxes in operation. Also, the water box priming ejector should be operating. Low lake water temperature requires recirculating water pump operation to de-ice the inlet crib.
Shutdown	The CW pumps can be individually shutdown. The discharge check valve allows continued operation of the other CW pump. If both CW pumps are to be shutdown, the turbine and the Reactor can no longer be operated at full power. An extended shutdown requires turning off the water box priming ejector control.
Refueling	The CW System may be operated for dilution of plant liquid discharges during refueling. However, the CW System is not specifically required during refueling operations.
Casualty Events	During plant emergency operation, only the intake to the Forebay and the discharge piping from the stop gates to the lake are required for safe shutdown. Other component failures could cause reduced load operation or a unit trip but do not endanger the safety of the plant.
Infrequent Operation	Operation without the water box priming ejector is acceptable, although the top tubes will not be flooded and a slight increase in turbine exhaust pressure will result.
Maintenance	A water box may be removed from service at less than 40 percent load for maintenance activities such as inspecting, cleaning, or tube plugging. Water boxes are always removed in pairs (1A1 and 1B2) or (1A2 and 1B1). Once isolated, the section of condenser tubes and water boxes are drained. When ready to reflood the tubes and water boxes, the inlet motor operated butterfly valve is throttled open to slowly fill the drained section.

1.3 Normal (See OP's # N-CW-04, N-CW-04-CL)

The Circulating Water (CW) System is started in accordance with N-CW-04 and N-CW-04-CL. If the system is not already operating, the CW System is placed in operation in accordance with N-0-02 prior to bringing the reactor power to the point of adding heat.

Prior to starting the CW pumps, ensure the traveling screens are operating and Checklist N-CW-04-CL is complete. Verify that cooling water is available to the CW pump seals and thrust bearing cooling. Check that all associated annunciators are clear and that sufficient water level exists in the Forebay. Verify open or throttle open the condenser inlet valves. Start one CW pump and then open the condenser inlet valves wide open. Start the second CW pump, if required and establish automatic operation of the waterbox priming ejector.

During normal power operations, two CW pumps are inservice for summer operation and one CW pump for winter, as required to maintain condenser ΔT or vacuum. Normally, all four condenser inlet valves are open. If inlet temperature is low, commence de-icing the intake crib by starting the recirculating water pump.

Section 4.0 of N-CW-04 contains the specific procedure steps for taking a specific pair of waterboxes out of service while operating at reduced power and for restoring the waterboxes back to service.

When shutting down the CW pumps or CW System, observe the Precautions of N-CW-04. Stop the waterbox priming and recirculating water pump. Stop the CW pumps and close the condenser inlet valves. Close the SW supply to the CW pumps seals and thrust bearing oil coolers.

1.4 **Abnormal** (See OP # A-CW-04)

Operating Procedure A-CW-04 describes automatic and operator actions for abnormal conditions in the CW System. The symptoms of an abnormal condition are the annunciators associated with the CW System as listed previously in Section 3.0. The immediate actions for an alarm are to silence the alarm, verify the problem by checking the SER, and taking the necessary action to clear the problem. The abnormal conditions in this procedure should not cause a plant trip.

1.5 **Emergency** (See OP # E-CW-04)

Operating Procedure E-CW-04 describes the automatic actions, immediate operator actions, and the subsequent actions necessary to recover from a Loss of Circulating Water. A sustained loss of circulating water will result in a turbine trip due to low condenser vacuum (10" Hg Abs.). In the event of a Turbine trip/Reactor trip, the Operator is directed to perform E-0, entitled "Reactor Trip or Safety Injection".

2.0 Functions

The purpose of the Circulating Water (CW) System is to deliver screened Lake Michigan water to Condensers 1A and 1B and return this water to the lake. The CW System also provides screened Lake Michigan water to two FP pumps and four SW pumps. SW return and various drains are directed into the CW discharge piping.

Three important functions of the CW System include the following:

- A reliable source of water to CW, SW, and FP pumps is provided.
- Four traveling screens filter the water with 3/8 inch mesh to prevent debris from entering the pump suctions. (See System Description 02, entitled "Service Water System", for details).
- All plant liquid discharges are sent through the CW discharge for dilution.

Some additional design functions of the CW System include the following:

- Each CW pump is designed to supply 210,000 gpm at a total differential head of 27.5 feet.
- Hypochlorite injection and sample taps are provided to intermittently inject sodium hypochlorite into the individual water boxes and Forebay to prevent the buildup of bacterial slime in the water boxes and on the Condenser tubes. It also prevents buildup of zebra mussels in the CW system.
- A recirculating pump provides warm recirculating water for de-icing the inlet grilles. Recirculated water is also directed from the CW discharge to the Forebay to prevent ice formation.
- Connections on Condenser 1A inlet water boxes supply CW to the Turbine Basement Cooling System. (Refer to System Description 16, entitled, "Turbine Basement Cooling System", for details.)

3.0 Design Descriptions

3.1 System Arrangement and Flowpaths

The CW System (See Figure KNP-CW01) takes a suction from Lake Michigan through a submerged intake structure consisting of three inlet cones and two auxiliary intakes. A 10 foot diameter steel pipe directs the intake water into the Forebay. The intake water then passes through four traveling screens to the pump bay in the Screenhouse. The screened water is supplied to the suctions of two CW pumps, four SW pumps, and two FP pumps.

The CW supply is taken from Lake Michigan through a submerged intake structure located approximately 1600 feet from the shore line. The intake structure has three inlet cones and two auxiliary intakes that are spaced such that the largest lake barge cannot directly cover all inlets and block water flow. During winter operation, the inlet crib and auxiliary inlets are below the ice blanket and are at least 450 feet beyond the maximum offshore distance for ice development.

Water is pumped from the Pump Bay by two vertical dry-pit CW pumps through individual Check Valves CW-1A and CW-1B and discharge pipes. The discharge pipes combine and proceed through a main conduit until it splits into four individual conduits to supply the water boxes on Condensers A and B. Four motor driven butterfly Valves CW-2A1/MV-32003, CW-2A2/MV-32004, CW-2B1/MV-32005, and CW-2B2/MV-32006, have an expansion joint incorporated into their valve body to allow for thermal expansion. The valves enable water box isolation while at power and are throttled during CW System startup to limit CW pump starting current. CW flows through condenser tubes to individual discharge water boxes and out four individual conduits which join into a common CW discharge tunnel.

The four condenser water box inlets and outlets have connections to the Water Box Priming Jet (See Figure KNP-CW3, CW9). A pipe from each water box vent connection carries a saturated air-water mixture into the discharge pipe. If the vent piping should lose its prime, the Water Box Priming Jet is set to automatically evacuate any air and reestablish CW flow. A single stage steam jet air ejector provides the required vacuum in the priming lines. Heating steam is used for the motive force. Control Valves HS-521 and CW-101 are used for priming. The water box priming is used for initial priming of the entire CW System.

Each Condenser water box discharges straight down through a 72 inch pipe and expansion joint to an elbow into the lower portion of the 120 inch square discharge tunnel. Flow balancing orifices are bolted at the water box outlets of Condenser B to provide equal flow through each section of the condenser. The common CW discharge receives SW return water and miscellaneous drains (See Figure KNP-CW04).

The common CW discharge pipe also supplies water to the Recirculating (recirc) Water Pump for de-icing operations (See Figure KNP-CW03). CW flows from the discharge pipe, to a recirculation water deaeration tank, through a recirculation pump, and to the Intake Crib.

An auxiliary intake 30 inch pipe connects to the CW Discharge Header. This pipe directs warm water back to the Forebay through locked open butterfly Valve CW-500.

The Fish Screen Air System (See Figure KNP-CW05) provides air flow to an air bubble screen at the Intake Structure. (DCR 2791 abandoned compressor.) Air supply is provided from the Station Air piping via manual Valve SA-219, if desired.

3.2 Intake Structure and Pipe

The CW inlet structure starts with three 22 foot diameter vertical inlet cones which discharge through 6 foot diameter outlet pipes to the 120 inch diameter intake conduit. The cones are located with their tops one foot above the lake bottom with approximately 15 feet of normal water depth and approximately 1600 feet from shore. The inlets have epoxy coated concrete lips to provide for a smooth inlet flow. A steel grid with 2 ft by 2 ft openings and a hinged manway serves as a trash screen or grille. Plastic covers are attached to trash screen grid bars to inhibit frazil ice attaching to the trash screen and blocking circulating water flow. The three cones are reduced to 6 foot diameter pipes which join at the 10 foot diameter steel pipe. The 120 inch diameter intake conduit is buried a minimum of 3 feet below the lake floor to ensure the necessary depth to provide the minimum "net positive suction head" (NPSH) for the CW pumps. The 120 inch diameter intake conduit is coated inside and outside with asphaltum and protected by the Cathodic protection system to minimize corrosion. The velocity at the surface of the intakes at full plant load is less than one foot per second (1 fps).

Two 30 inch auxiliary inlets in the top of the 120 inch intake pipe provide auxiliary supplies for Service Water. The two auxiliary inlets are located 50 ft and 100 ft shoreward from the intake cones. Each auxiliary inlet tee rises vertically to one foot above the lake bottom. Special screened cover plates are suspended 12 inches above the intake openings to prevent the entrance of debris. Each auxiliary water intake can supply in excess of 24,000 gpm. Spacing of the three inlet cones and the auxiliary inlets is such that the largest lake barge cannot directly cover all water inlets.

At the inlet to the Screenhouse Forebay, the 10 foot diameter intake conduit splits into two 100 inch x 120 inch inlets. A 24 inch line is provided from the Forebay to a 10 foot diameter well, intended for a future fish rearing pond. This pipe is capped and not presently used.

Intake Structure	
Data on Water Levels	**Elevation ft IGLD***
High lake level	581.9
Normal lake level	577.0
Low lake level	575.4
Minimum pump bay level	
Two pumps	568.4
One pump	572.0
Bottom of screenhouse	551.5
Elevation of Forebay weir	582.5
CW pumps trip	566.0

*IGLD (International Great Lakes Datum), which is sea level plus 1.3 feet. (See Figures KNP-CW06 and CW07)

3.3 Screenhouse and Forebay

The CW intake pipe supplies water to a 56.5 ft x 25 ft Forebay with an overflow weir of which the crest is at the 582.5 ft IGLD* elevation. The weir has a bottom length of 38.5 ft and side slopes of 45 degrees. The Forebay is open and the weir allows overflow back into the lake when the CW pumps trip. Structural considerations are included in the Forebay construction for supporting pumps which might be required by the addition of future cooling towers.

Data on Water Levels	Elevation ft IGLD*
High lake level	581.9
Normal lake level	577.0
Low lake level	575.4
Minimum pump bay level (two pumps)	568.4
Minimum pump bay level (one pump)	572.0
Bottom of screenhouse	551.5
Elevation of Forebay weir	582.5

*IGLD is sea level plus 1.3 feet. (See Figures KNP-CW06 and CW07)

3.4 Traveling Water Screens

Traveling water screens remove debris from water in the Forebay upstream of all pump suctions. Depending on lake temperature, one or two CW pumps and two to four SW pumps will normally be operating.

The traveling screens are motor driven with slow and fast speed operation. The screens are provided with automatic backwashing from the SW System. Automatic flushing controls are set on a four hour timer. A high differential pressure of 6 inches of water starts the traveling screen in fast speed and initiates flushing. This flushing continues for nine minutes after the condition clears. See System Description 02, entitled "Service Water System", for more details on the traveling screens.

From the Forebay, water passes through four 10 foot wide by 36 foot long traveling water screens with a mesh size of 3/8 inch. Each traveling water screen is capable of passing 110,000 gpm.

Traveling Water Screen	Power Supply
1A1	MCC 1-52D
1A2	MCC 1-35C
1B1	MCC 1-45C
1B2	MCC 1-62D

3.5 Forebay Level Control System (See Figure KNP-CW09)

Forebay level Indication (LI-41551) is provided on Mechanical Vertical Panel "A" in the Control Room. The level control system receives inputs from four level control switches. If Forebay level decreases to 567.5 ft (approximately 47%), a **Forebay Level Low** alarm (47051N) is actuated. The Sequence of Events Recorder (SER) prints out the Forebay Level Low message.

- If one level switch (1/4) reaches a level of 566 ft (approximately 42%), the same alarm (47051N) is actuated, however, the SER will print the message **Forebay Level Low-Low**.
- When 2/4 level switches reach the 566 ft level, a trip signal is sent to both CW Pumps and a **CW Pumps Low-Low Level Trip** alarm (47051M) and SER are actuated.

This protection is provided to ensure an adequate supply of water is available for the Service Water System.

3.6 Turbine Building Basement Flooding Trip

Turbine Building Basement Flooding Trip (See Figure KNP-CW13)

The Turbine Building Basement Flooding Trip circuit was installed to detect evidence of significant flooding in the Turbine Building basement that could potentially impact the operation of Class 1 equipment at or below the 586' elevation.

The CW pumps receive a trip signal from the turbine building basement flooding circuitry. The circuitry is designed with two independent trains of detection, and actuation and logic circuitry that will detect flooding on the turbine building basement (586' elevation) in the vicinity of the north wall, once the water level equals or exceeds 3-1/2" ± 1". The circuitry will provide a 2 out of 3 logic matrix outputs to trip both CW pump circuit breakers. Additionally, any single switch actuation or logic matrix trip actuation will be alarmed in the Control Room to alert the operators of the abnormal conditions. As an early detection of flooding in the basement an additional detector [located 24" (± 1") above condensate pump trench floor] and associated circuitry was installed to provide alarms in the Control Room.

The Turbine Building Basement Flooding circuitry will actuate three separate alarm windows and their associated SERs. The **TURB. BLDG. FLOOD LEVEL ALERT** alarm Annunciator window (47052N) and SER will be actuated when anyone of the six turbine building basement switches are activated. In addition, each basement switch has a separate SER that can be used to identify what level switch was activated.

Next, the **CIRCULATING WTR PUMPS FLOOD LEVEL TRIP** alarm Annunciator window (47051N) and SER will be actuated when anyone of the CW pump breakers receive a Turbine Building Basement Flooding Trip signal. Each CW pump trip signal is designed to generate a SER signal that is unique to the tripped CW pump.

Finally, the **COND. TRENCH WTR. LEVEL HIGH** alarm Annunciator window (47053N) and SER will be actuated when the detector, located in the condensate pump trench, is actuated.

3.7 Circulating Water Pumps

Two CW pumps are installed. The weight load and thrust of the CW pump is carried by a motor mounted Kingsbury thrust bearing. Pump and motor bearings are oil lubricated and bearing thermocouples are installed.

CW Pumps A & B	
Pump Manufacturer	Foster Wheeler Corp.
Technical Manual	XK-112-7
Model	MFVC-2.5
Stages	One – mixed flow volute
Impeller	End suction –single volute
Type	Vertical dry pit single stage, single suction
Discharge	108 inches
Speed	195 rpm
Design Capacity	210,000 gpm @ total differential head of 27.5 feet
Combined Capacity (Both pumps)	401,200 gpm to the condensers
Design Head	27.5 ft TDH
Design Efficiency	86 percent
Design Power Required	1695 BHP
Service Factor	1.15

CW Pump Motors A & B		
	Motor A	**Motor B**
Power Source: 4160VAC from	Switchgear Bus 1-3	Switchgear Bus 1-4
Motor Size	1750 hp	
Space Heaters	120 VAC, 1.5 kw	
Heaters Powered by	RPA-5, Circuit #7 and #9	

(See Figure KNP-CW08.) Plant Equipment Water provides CW pump shaft sealing, bushing lubrication, and thrust bearing oil cooling. SWPT from the cartridge filters can be manually aligned if necessary. SW provides an automatic backup. The three gpm minimum seal water flow is measured and alarmed by a rotometer for each CW pump. A continuous supply of seal water maintains the CW pump packing and throttle bushing free of dirt.

The CW pumps have "Duo-Check" Discharge Valves CW-1A and CW-1B to prevent water hammer and provide isolation for a nonoperating pump. Each CW pump has an 8 inch balancing line to equalize impeller back pressure with suction pressure to reduce thrust.

The CW motors space heaters keep the pump ready for starting at all times and to minimize condensation in the motor windings.
CW Pumps A and B are controlled by Switches ES-46507 and ES-46508, respectively, and are located in the Control Room on Mechanical Vertical Panel "A". Each control switch has four positions (**PULLOUT/STOP/BLANK/START**), and spring returns from **STOP** and **START** to the blank position. (See Figure KNP-CW11.) The **PULLOUT** and **BLANK** positions are maintained.

To start a CW pump, the control switch is placed in the **START** position. Forebay water level **must be** greater than 566 ft., and thrust bearing cooler flow (>4 gpm) must pre-exist to start the pump. Seal water flow should be stable at a positive flow rate or continuous leak-off evident at packing gland or packing gland is submerged in water. (Seal water permissive removed by DCR 2838.)

- Flow switch FS-16802 closes when minimum seal water flow is present.
- Flow Switch FS-16806 closes when a minimum thrust bearing cooler flow is present.

Loss of either cooling flow after a CW pump start does **not** stop the pump. An alarm is actuated, however, if either flow is lost.

Placing the CW Pump Control Switch ES-46507 or ES-46508 in the **STOP** position trips the respective pump motor control breaker which stops the pump. An automatic CW pump trip occurs on a current overload or a 2/4 Forebay lo-lo level (See Figure KNP-CW09). After a current overload trip, the Control Room Operator places the control switch in the **STOP** position to reset the circuit prior to restarting a CW pump.

Indicator lights are mounted directly above the CW Pump Control Switch. Red **(RUNNING)**, green **(OFF)**, and white **(OVERLOAD)** indicating lights are provided. An ammeter is also provided for each CW pump.

Each 108 inch CW pump discharge is reduced to 96 inches and, after Check Valves CW-1A and CW-1B, joins into a common 120 inch pipe which is encased in the basement floor slab. Another 120 inch pipe joins the CW common discharge to provide for a possible future cooling tower connection. This pipe runs to the south end of the screenhouse and is capped. The 120 inch CW pump common discharge line is reduced to two 96 inch lines and then split into four 72 inch vertical water box inlets to the condensers.

3.8 Condensers

Each of the four 72 inch water box inlets contains a combination motor operated butterfly valve/expansion joint. These MVs control which water boxes are in service/operation. MVs CW-2A1, 2A2, 2B1, and 2B2 are normally open and fail as is. The MVs are operated by 1.6 hp motors. The valves are suitable for throttling service when priming the system using the CW pumps. Each inlet water box is vented to the discharge water box for air removal. Condenser Inlet Water Boxes 1A1 and 1A2 also supply water to the Turbine Building Basement Cooling System, (See System Description 16).

Condenser Inlet Valves	
Manufacturer	Henry Pratt Co.
Purchase Order	XK-155
Type	Comb. butterfly/expansion joint
Size	72 inch

Valve Specifics	Condenser Inlet Valves			
	CW-2A1	CW-2A2	CW-2B1	CW-2B2
Motor Operator	MV-32003	MV-32004	MV-32005	MV-32006
Motor Number	1-345	1-346	1-347	1-348
Power Source MCC	1-32B	1-42B	1-32B	1-42B
Pushbutton Control	PB-19462	PB-19463	PB-19464	PB-19465
Condenser	1A North	1A South	1B North	1B South

These valves are controlled from locally mounted pushbutton stations (**CLOSE/OPEN**). (See Figure KNP-CW10.) Valve movement is controlled by holding the appropriate pushbutton until the valve has stroked open or closed to the desired position. The pushbutton controls can be used as a means of modulating the 72 inch butterfly valves.

The condenser inlet valves can be opened against CW pump discharge pressure. No automatic features are associated with these valves. Each valve has red (**OPEN**) and green (**CLOSED**) indicating lights on Mechanical Vertical Panel "A".

Both Condenser A and B are rectangular twin shell, single pass, surface condensers. The condenser has 300,000 ft^2 of type 439 stainless steel (SST) tube surface area for condensing-exhaust steam. Total CW flow to the condensers with two CW pumps operating is 401,200 gpm. The design load for the condensers is 3,864.5 million Btu/hr at an exhaust pressure of 1.5 inches Hg and a CW inlet temperature of 56° F. The design CW delta-T is 19.25° F. CW velocity through the condenser tubes is 6.38 fps. Condenser Waterboxes 1A2 and 1B1 inlet and outlet tubesheets are epoxy coated to prevent tube-to-tubesheet leakage. (Ref. Plant Modification 3463)

Each condenser outlet water box discharges straight down through a 72 inch pipe and expansion joint to an elbow into the lower portion of the 120 inch square discharge tunnel. Flow balancing orifices are bolted at the water box outlets of Condenser B to provide equal flow to each section of the condenser. Each water box outlet is equipped with a sample connection to be used to sample the total residual chlorine following chlorination of the individual water box.

Condensers			
Manufacturer		Foster Wheeler Corp.	
Technical Manual		XK-104-32	
Type		Rectangular twin shell	
Surface Area		300,000 square feet	
Number of Passes		One	
Design Load		3,864,500,000 Btu/hr	
Exhaust Pressure		1.5 inches Hg Abs.	
Condensate Temperature		91.72° F	
Inlet Water Temperature		56° F	
Tube Cleanliness Factor		90 percent	
CW Flow		401,200 gpm	
Velocity in tubes		6.38 fps	
CW delta T		19.25° F	
Overall Heat Transfer Rate		517 Btu/hr-ft-F	
Free Oxygen in Condensate		0.003 cc/liter	
Friction loss in water circuit		11.32 ft of water at 56° F	
Areas	**Condensing**	**Periphery**	**Air Cooler**
Tube Material	439 SS	439 SS	439 SS
Size	1 inch	1 inch	1 inch
Gauge	22 BWG	20 BWG	20 BWG
Eff. Length	--------	39'- 9½"	-------
Overall Length	--------	40'- 0¼"	-------
Number of Tubes	26,232	664	1,904

3.9 Chlorine Injection

Sodium Hypochlorite injection taps are provided to periodically inject sodium hypochlorite into the individual water boxes and the Forebay. The addition of Sodium Hypochlorite prevents buildup of bacterial slime on condenser tubes and prevents zebra mussel buildup in the CW System. The system is normally only used during the summer months, when lake temperature is elevated. See System Description 28, entitled, "Chemical Injection", for a full explanation of this subsystem.

3.10 Condenser Water Box Priming (See Figure KNP-CW03)

A 3 inch pipe from each outlet water box vent connection carries a saturated air/water mixture into a pipe downstream of the discharge elbow. If the vent piping should lose its prime, water box priming equipment is provided to evacuate the air and reestablish flow. A steam jet air ejector provides the required vacuum using heating steam as the working fluid. Control Valves HS-521 and CW-101 are used for water box priming. This equipment can also prime the entire CW System.

Condenser Waterbox Priming Ejector	
Manufacturer	Schutte & Koerting
Technical Manual	XK-266-2
Ejector Model	S-3 Type 555
Size: Suction	6 inch
Discharge	5 inch
Capacity at 7.0 inch Hg Abs.	500 lb/hr
Steam Consumption (50 psig Heat Steam)	3200 lb/hr
Material: Body	Steel
Steam jet	316 SS

The condenser water boxes are kept full of water by a pair of differential pressure (DP) switches that automatically cycle the water box priming system. DP switches are provided on Condenser Water Boxes 1A1 and 1A2 outlet shells. Heating Steam Supply Valve HS-521/CV-31306 and Condenser Water Box Priming Control Valve CW-101/CV-31304 both cycle to start and stop the priming action.

The controls for this system provide for cycle starting and stopping by either manual or automatic action. (See Figure KNP-CW09.) Local Control Switch ES-19407 is mounted near the water boxes and works in conjunction with the mode Selector Switch ES-19408. Switch ES-19407 has four positions (**PULLOUT/STOP PRIME/AUTO/START PRIME**) and spring returns to **AUTO** from **START PRIME** or **STOP PRIME**. When in automatic operation, the priming cycle begins when water level in the water boxes has fallen to the top of the water box. Priming continues until the water level has reached two feet (2') above the top of the water box in the line from the suction header to the water box.

Local Switch ES-19408 has three maintained positions (**1A NORTH/EITHER/1A SOUTH**). This switch is used to select which water box level starts the cycle. The normal operating mode is the **EITHER** position. The **1A NORTH** position is used when the south condenser half is out of service and vice versa.

Automatic operation is initiated by DP Switch 1641301, or by 1641401, or by either if selected by ES-19408. The initiation sequence is as follows:

- Low water level develops a **START** signal
- Steam Control Valve HS-521/CV-31306 opens
- Water Box Vent Control Valve CW-101/CV-31304 opens after the steam valve is fully open.

Manual initiation of the cycle causes the same action. The manual cycle, however, is inhibited by either DP switch indicating maximum allowable water box level. Shutdown is normally initiated by either DP switch indicating water box level has reached the allowable maximum level. When this happens, Water Box Priming Valve CW-101 is closed first. When Valve CW-101 is fully closed, the heating steam valve is closed. Shutdown can also be initiated manually. Local indicating lights are provided for both control valves.

3.11 Discharge (See Figure KNP-CW01)

The four 72 inch condenser outlets dump into the 120 inch square discharge tunnel, which also receives drainage and SW returns from the 24 inch Auxiliary Building standpipe and an 18 inch Turbine Building standpipe. Figure KNP-CW04 shows the various drains/inputs to the CW standpipes. The tunnel transitions into a 120 inch diameter discharge line. This line accepts drains and SW returns from the Auxiliary Building demineralizer area drains and another Turbine Building standpipe. The discharge line provides water to the recirculating water pump in the Screenhouse. A 120 inch pipe connection is provided for CW discharge to be routed to a future cooling tower.

At the 120 inch diameter discharge line outlet, the discharge line enters the concrete discharge structure below lake level. A concrete baffle in the discharge structure converts the exit velocity energy to potential energy. The baffle also spreads the discharge into the divergent excavated basin. The near-shore portion of the basin is paved with dumped rip-rap stones and is formed by steel sheet pilings along both sides. The floor of the offshore portion of the basin slopes up to reach the natural lake bottom. The excavation extends to 575 ft IGLD elevation. The warmed discharge spreads radially from the excavated basin into a mixing zone forming a semicircle in the lake.

Stop gate slots are provided at the discharge structure and on either side of the traveling screens. An isolation gate can be used to isolate an individual traveling screen, or all screens, or the CW discharge tunnel. These stop gates provide the means for isolating portions of the CW intake and/or discharge for inspection or maintenance.

A 30 inch recirculating line/ auxiliary intake line connects to the CW discharge in the discharge basin (on the lake side of the stop gate slots). This line is provided to recirculate warm water directly to the traveling screen inlet to prevent ice formation. A 30 inch locked open butterfly Valve CW-500 is in the line to the Traveling Screen inlet. Valve CW-500 can be shut to prevent warm water recirculation to the inlet of the traveling screens. This 30-inch re-circulation line will provide enough CW to the forebay to support operation of both SW trains if all other intakes are blocked with frazil ice. A two inch vent line has been installed to maintain the 30 inch recirculating line full of water. Sufficient heat is added to CW from SW, for all plant operating modes above cold shutdown, to maintain the temperature of the water in the CW discharge structure above freezing during frazil ice conditions. (Ref. DCR 3488)

3.12 Recirculating Water Pump (See Figure KNP-CW03)

The Recirculating Water Pump supplies warmed discharge water for de-icing the trash screens at the intake crib during winter operations. The pump draws water through a 12 inch recirculating water line and the Recirculating Water De-Aerating Tank.

Recirculating Water Pump	
Manufacturer	Gould
Technical Manual	XK-160-3
Model, Size	3755, 8 x 8-11
Stages	Single, centrifugal
Impeller	End suction volute
Type	Horizontal
Speed	1750 rpm
Design Capacity	2750 gpm
Design Head / Efficiency	84 ft TDH / 83 percent
Design Power	70.4 BHP

Recirculating Water Pump Motor	
Space Heater	120 watts, 120 VAC
Motor Size	75 hp
Power Source	MCC-1-35C

The pump discharges through a 10 inch pipe and 6 inch headers to a grid of 4 inch de-icing piping at each of the three inlets. The pump is started with a local switch in the Screenhouse when lake water temperatures require de-icing. When the lake water warms, the pump is shutdown locally.

The Recirculating Pump is controlled by Local Switch ES-19443 located near the pump. (See Figure KNP-CW12.) The control switch is two position **(OFF/ON)** maintained. To start the pump the switch is placed in **ON**. To stop the pump the switch is placed in **OFF**. There are no automatic features that prevent or stop operation. On loss of power the pump stops and on regaining power the pump starts (if the control switch is in **ON**).

Red **(ON)** and green **(OFF)** indicating lights are located with the recirculating pump control switch.

(Radiation Monitor Pump used for sample per DCR 2172)
(Fish Screen Air System deleted per DCR 2791)

3.13 Indications - Control Room

Mechanical Vertical Panel "A"			
Indication	**Range**	**Normal**	**Indicator**
Forebay Level	0-100 %	60-75%	LI-41551
Forebay Temperature	25-75° F	32-65° F	TR-42520
CW Pump A Amps	0-300 amps	190-230 amps	AI-44553
CW Pump B Amps	0-300 amps	190-230 amps	AI-44556

- Red (**OPEN**) and green (**CLOSED**) indication is provided for Condenser Inlet Valves CW-2A1, CW-2A2, CW-2B1, and CW-2B2.
- Red (**ON**) and green (**OFF**) indication is provided for Traveling Water Screens 1A1/1A2 and 1B1/1B2.
- Red (**OPEN**) and green (**CLOSED**) indication is provided for CW Pump Discharge Check Valves CW-1A and CW-1B.

Comp Pt.	Indication	Normal
T2513A	Cndsr Inlet Temp	32-65° F
T2515A	Cndsr 1A1 Outlet Temp	50-90° F
T2516A	Cndsr 1A2 Outlet Temp	
T2517A	Cndsr 1B1 Outlet Temp	
T2518A	Cndsr 1B2 Outlet Temp	

Table revised per DCR 2928

Safeguards Status Panel 44908	
44908-1205	Forebay Low-Low Level
44908-1206	Forebay Low-Low Level
44908-1207	Forebay Low-Low Level
44908-1208	Forebay Low-Low Level

3.14 Indications - Local

Indicator	Indication	Range
PI-11271	Waterbox Priming Ejector	30 in Hg Vacuum to 0 to 30 psig
PI-11012	Condenser A Inlet Pressure	30 in Hg Vacuum to 0 to 60 psig
PI-11013	Condenser B Inlet Pressure	
PI-11094	Condenser A Outlet Pressure	
PI-11095	Condenser B Outlet Pressure	
PI-16413	North Waterbox 1A Level DP	0-50 in WC
PI-16414	South Waterbox 1A Level DP	
TI-12125	Cdsr 1A1 CW Inlet Temperature	0-200° F
TI-12126	Cdsr 1A2 CW Inlet Temperature	
TI-12127	Cdsr 1B1 CW Inlet Temperature	
TI-12128	Cdsr 1B2 CW Inlet Temperature	
TI-12003	Cdsr 1A1 CW Outlet Temperature	20-160° F
TI-12004	Cdsr 1A2 CW Outlet Temperature	
TI-12005	Cdsr 1B1 CW Outlet Temperature	
TI-12006	Cdsr 1B2 CW Outlet Temperature	
PI-11185	Cdsr A Wtrbox Inlet DP	25 to 0 to 25 in Hg
PI-11190	Cdsr B Wtrbox Inlet DP	

Indicator	Indication	Range
PI-11102	CW Seal Water Header Pressure	0-200 psig
PI-11351	CW Pump A Seal Water Pressure	0-30 psig
PI-11352	CW Pump B Seal Water Pressure	
FS-16802	CW Pump A Clg Flow Rotometer	0-10 gpm
FS-16803	CW Pump B Clg Flow Rotometer	
FS-16806	CW Pump Thrust Brg Flow Rotometer	
Sightglass	Upper/Lower Mtr Brg Oil Levels	--
PI-11004	CW Pump A Discharge Pressure	30 in Hg Vacuum to 0 to 60 psig
PI-11005	CW Pump B Discharge Pressure	
TI-12001	CW Pump A Discharge Temperature	20-160° F
TI-12002	CW Pump B Discharge Temperature	
LI-18456	Recirc Tank Level	0-30 ft W.C.
PI-11006	Recirc Pump Suction Pressure	30 in Hg Vacuum to 0 to 60 psig
PI-11092	Recirc Pump Discharge Pressure	0-100 psig
DPI-11654	Recirc/Rad Monitor Pump Discharge	0-50 in W.C.
PI-11433	Circ Water Chlorine Monitoring Water Pump Suction Pressure	0-15 psi
PI-11434	Circ Water Chlorine Monitoring Water Pump Discharge Pressure	0-60 psig
FS-16818	Circ Water Chlorine Monitoring Water Pump Flow Indicator	0- 0 gpm
LS-26829	Forebay Level A1	0-100%
LS-26830	Forebay Level A2	
LS-26831	Forebay Level B1	
LS-26832	Forebay Level B2	

3.15 Controls - Control Room

The only operation that can be performed from the Control Room is to start and stop the CW pumps on Mechanical Vertical Panel "A". In order to start a CW pump, the pump permissive must be met.

- Thrust bearing cooling water flow must be >4 gpm.
- Forebay water level must be >566 ft. (42%).

Seal water flow > 1gpm is required for operation, but is **not** a permissive to start.

The following controls are available:

Control Switch	Switch #	Switch Position
CW Pump A	ES-46507	**PULLOUT/STOP/AUTO/START** Spring return to **AUTO** from **STOP** or **START**
CW Pump B	ES-46508	

In addition, red (**RUNNING**), green (**STOPPED**), and white (**OVERLOAD**) indicating lights are associated with the above control switches.

3.16 Controls - Local

The following controls are located near the associated equipment:

Switch Name	Switch #	Switch Position
Recirculating Pump Control Switch	ES-19433	**OFF/ON** Two Position
Fish Screen Air Compressor Control Switch	ES-19442	**STOP/BLANK/START,** Spring return to **BLANK**
Circ Water Chlorine Monitoring Water Pump Control Switch	ES-19610	**OFF/ON** Two Position
Condenser Water Box Priming Mode Selector Switch	ES-19408	**1A North/EITHER/1A South,** Three Positions Maintained
Condenser Water Box Priming Control Switch	ES-19407,	**PULLOUT/STOP/AUTO/START** Four Position spring return to **AUTO** from **START** or **STOP**
Condenser CW Inlet Valve Pushbuttons	PB-19462 PB-19463 PB-19464 PB-19465	**CLOSE/OPEN** Valves can be throttled open

3.17 Interlocks

At least one Circulating Water Pump must be operating (breaker **CLOSED**) to satisfy the Condenser steam dump interlock. If no CW pumps are operating, Condenser steam dump operation will be inhibited.

3.18 Alarms - Control Room

Note: See Alarm Response Sheets in Control Room for setpoint specifics.

Annunciator	Window Label	Actuation-SER Pt/Description
47051M	CW PUMPS LOW-LOW LEVEL TRIP	277 Circ Water Pump Forebay Level Low Low
47051N	CW PUMPS FLOOD LEVEL TRIP	392 Turb Bldg Flood Level Train "A" CW Pumps TRIP 528 Turb Bldg Flood Level Train "B" CW Pumps TRIP
47051O	CW PUMPS SEAL FLOW LOW	030 Circ Water Pump A Seal Water Flow Low 031 Circ Water Pump B Seal Water Flow Low
47051S	TURBINE TRIP	382 Condenser Low Vacuum Turbine Trip (See SD #54 for additional SER points.)
47051W	CONDENSER VACUUM LOW	441 Condenser Vacuum Low
47052M	FORBAY LEVEL LOW	278 Forbay Level Low 279 Forbay Level Low Low
47052N	TURBINE BLDG. FLOOD LEVEL ALERT	456 Turb Bldg Flood Level NW Train "A" High 409 Turb Bldg Flood Level N Train "A" High 398 Turb Bldg Flood Level NE Train "A" High 680 Turb Bldg Flood Level NW Train "B" High 658 Turb Bldg Flood Level N Train "B" High 604 Turb Bldg Flood Level NE Train "B" High
47052O	CW PUMPS BRG CLG FLOW LOW	032 Circ Water Pumps Bearing Cooling Water Flow Low
47053O	CW PUMPS TWIN STRNR DP HIGH	099 CW Pumps Twin Strainer Differential Pressure High
47054Q	TRAVELING WTR SCREEN DP HIGH	087 Traveling Water Screen B Differential Pressure High 086 Traveling Water Screen A Differential Pressure High
47082C	BUS 3 FEEDER BKR TRIP	695 Circ Water Pump A Brkr 1-306 Overcurrent Trip (See SD #39 for additional SER Pts.)
47082D	BUS 4 FEEDER BKR TRIP	698 Circ Water Pump B Brkr 1-403 Overcurrent Trip (See SD #39 for additional SER Pts.)
47083C	BUS 3 FEEDER BKR OVERLOAD	1211 Bus 3 Feeder Breaker Overload
47083D	BUS 4 FEEDER BKR OVERLOAD	1199 Bus 4 Feeder Breaker Overload

3.19 Sequence of Events Recorder (SER)

Note: See Alarm Response Sheets in Control Room for setpoint specifics.

SER No.	Printout
49001030	Circ Water Pump A Seal Water Flow Low Low
49001031	Circ Water Pump B Seal Water Flow Low Low
49001032	CW Pumps Motor Bearing Cooling Water Flow Low
49001086	Traveling Water Screen A Differential Pressure High
49001087	Traveling Water Screen B Differential Pressure High
49001099	CW Pumps Twin Strainer Differential Pressure High
49001199	Bus 4 Feeder Breaker Overload
49001211	Bus 3 Feeder Breaker Overload
49001277	Circ Water Pump Forebay Level Low Low
49001278	Forebay Level Low
49001279	Forebay Level Low Low
49001382	Condenser Low Vacuum Turbine Trip
49001441	Condenser Vacuum Low
49001695	Circ Water Pump A Bkr 1-306 Overcurrent Trip
49001698	Circ Water Pump B Bkr 1-403 Overcurrent Trip
49001392	TB FLOOD LVL 'A' CW PMP TRIP
49001398	TB FLOOD LVL NE 'A' HIGH
49001409	TB FLOOD LVL N 'A' HIGH
49001456	TB FLOOD LVL NW 'A' HIGH
49001458	COND PMP TRENCH WATER LVL HIGH
49001528	TB FLOOD LVL 'B' CW PMP TRIP
49001604	TB FLOOD LVL NE 'B' HIGH
49001658	TB FLOOD LVL N 'B' HIGH
49001680	TB FLOOD LVL NW 'B' HIGH

3.20 System Interrelationships

The Circ Water System **provides support** to the following systems:

System 02 The SW pumps share the screen intake facility and take a suction from the Forebay for suction head. See SW System Description 02, for further details on the traveling water screens.

System 03 CW delivers sufficient screened Lake Michigan water to Condensers A and B and returns the water to the lake for condenser cooling.

System 06 The CW system (CW Pumps A and B motor auxiliary contacts) provides an input to the Steam Dump Control System permissive.

System 08 The fire protection pumps share the screened intake facility and takes a suction from the Forebay for suction head.

System 16 The CW System supplies cooling water to the Turbine Building basement cooling system.

System 32A All plant discharges are sent through the CW discharge for dilution.

The Circ Water System **receives support** from the following systems:

System 01 Station Air serves as a source of air for Fish Screen Ring operation, if required for use.

System 02 The SW System provides backup seal water to the CW pumps and cooling water to the thrust bearing oil cooler. SW provides flushwater to the traveling screens for back-flushing debris from the screens. The SW system shares the intake facility and the discharge piping.

System 22 Heating steam provides the working fluid for the waterbox ejector to ensure the condenser waterboxes are completely vented during normal operation.

System 27B Plant equipment water/SWPT provides cooling and flushing water to the SW pump seals and thrust bearing coolers.

System 28 Sodium Hypochlorite is injected into the individual water boxes and Forebay to prevent the buildup of bacterial slime in the water boxes and on the condenser tubes. It also prevents zebra mussel accumulation in the CW system.

System 39 The Electrical System provides 4160V power to the CW pump motors.

System 40 The Electrical System also provides 480 VAC power to small pump motors and motor operated valves.

System 52 Various annunciators and SERs provide indication of abnormal plant conditions.

System 66 The Cathodic Protection System provides corrosion control for plant intake and discharge piping. The system uses sacrificial anodes and impressed current to limit galvanic corrosion in underground structures.

4.0 Precautions and Limitations

Frequent Starting CW Pumps - Frequent starting of the CW pumps may damage the motor windings due to overheating. The recommended starting restrictions include:

- Do **not** attempt more than three consecutive starts with the CW pump motor cold. Allow the motor to coast to "rest" between starts.
- Do **not** attempt more than two consecutive starts with the CW pump motor hot. An interval of 20 minutes with the motor running or 40 minutes with the motor not running must elapse before attempting another CW pump start.

Normal Design Delta-T - The normal design delta-T at 100 percent power is 19.25° F with two CW pumps operating.

Before Stopping CW Pump - Before stopping a CW Pump, stop condenser chlorination and any liquid discharge in progress or verify dilution requirements are satisfied to prevent exceeding the discharge permit.

Ensure RM RE-18 Setpoint Changed - Ensure Radiation Monitor RE-18 setpoint is changed if a liquid discharge is made with both CW pumps shutdown to prevent exceeding the discharge permit.

Only One Waterbox - Do **not** operate a CW pump with only one waterbox available. When venting the condenser waterboxes during startup, the waterbox inlet valves should be throttled in accordance with the startup procedure.

CW Pump/Motor oil levels - Ensure CW pump and motor oil levels are proper before starting a CW pump to prevent bearing damage. Verify the CW pump start permissive is met before starting a pump to allow pump operation.

CW inlet Temp - If CW inlet temperature is low, verify the recirculating water pump is operating for de-icing the intake crib.

5.0 References

1.0 Summary	N-CW-04 E-CW-04 N-CW-04-CL N-0-02 A-CW-04,		
2.0 Function	Functional Description M720 System Description 16 I & C Logic Description #4	OPERM-215 OPERM-213 USAR 10.2	E-1614 A-213
3.0 Design Description	System Description 02, System Description 16 System Description 28	XK-104-32 XK-112-7 XK-155	Tech Manual XK-266-2 Tech Manual XK-160-3
	For associated DCR's see: **Start\Apps\Modifications\Modifications Database\DCR Search\Sys 04**		
4.0 Precautions & Limitations			
5.0 References	KPS Technical Specifications		
6.0 Procedures	For procedures associated with System 04, see controlled copy of KPS procedures.		
7.0 Appendices	See attached Figures		

5.1 Technical Specifications

No specific KPS Technical Specifications are associated with the CW System. There is a TS section associated with the Forebay Level Control System.

TS 3.3.e.1.B	The Forebay water level trip system must be operable in accordance with this TS reference.
TS Table 3.5-1 #7.	Refer to this TS Table for specifics.
TRM 3.5.2	Flooding Protection – Circulating Water Pump Trip

6.0 Procedures

Note: For procedures associated with System 04, see controlled copy of KPS procedures.

7.0 Appendices

7.1 Attached Figures

Figures	Title	KPS DWG
KNP-CW01	Circulating Water System Overview	OPERM-215
KNP-CW02	Turbine Building Basement Cooling System	
KNP-CW03	CW Priming/Recirculating Water System	M-215
KNP-CW04	CW Stand Pipes	OPERM-202-2 OPERM-202-3 OPERM-209
KNP-CW06	Forebay Water Level With One CW Pump	SD Specific
KNP-CW07	Forebay Water Level With Two CW Pumps	
KNP-CW08	CW Pump Seals & Thrust Bearing Coolers	OPERM-?
KNP-CW09	Condenser Water Box Priming & Forebay Level Control	E-1614
KNP-CW10	Condenser Circulating Water Inlet Valves & Misc. Indicators	
KNP-CW11	Circulating Water Pumps Logics	
KNP-CW12	Circulating Water Recirculating Water Pump	
KNP-CW13	Turbine Building Basement Flooding Trip	

Note: The "Figures" (drawings) previously associated with the System Descriptions are not being revised and updated at this time. Instead (obsolete) copies of these Figures have been watermarked **HISTORICAL** and temporarily attached. These Figures will be revised and replaced when resources become available.

KPS System Description	System No. 02	Rev. 4
Title Service Water System (SW)	Date OCT 0 4 2007	Page 1 of 29
Author Lisa Blazer	OPs Review Kristopher Schaedler	
Tech Review Dwight Vorpahl	Approved Stew Yuen / Manager of Engineering	

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1.0 Summary

1.1 Overview

The Service Water (SW) System supplies water from Lake Michigan for cooling equipment in the steam plant, Containment fan coil units, and Reactor auxiliary systems. The purpose of the SW System is to provide redundant cooling water supplies for the engineered safeguards equipment required during post-accident conditions and for single non-redundant supplies to other systems, including balance of plant equipment. The SW System utilizes:

- Four pumps with two redundant headers,
- Strainers,
- Isolation valves, and
- Four Traveling Water Screens.

These components are powered from emergency buses, with the exception of Traveling Water Screenss 1A2 and 1B1 which are powered from non-emergency buses.

The SW System is designed with two redundant headers, each capable of providing for all anticipated post-accident heat removal requirements, including leakage allowances, at the highest expected lake water temperature. Each header is capable of supplying cooling water to balance of plant (BOP) equipment requirements. The SW System is also designed to automatically start the necessary number of pumps to maintain adequate system pressure.

Various redundant safeguard equipment and coolers are supplied with SW from each Aux Bldg header. Examples of major equipment include: four Containment fan coil units, the Auxiliary Feedwater (AFW) Pumps, and the Component Cooling (CC) water heat exchangers. Some non-safety Class 1 and non-redundant coolers and equipment are supplied from SW headers. Some examples include the CW Pump seals and bearing coolers, Traveling Water Screen wash nozzles, Fire Protection Jockey Pump, and Spent Fuel Pool Emergency Makeup Valve. The Diesel Generator Cooler Heat Exchanger is supplied by the Main Service Water Header.

1.2 System Operation vs. Plant Mode

Plant Mode	System Support
Startup:	The SW System is in operation at all times during plant operation and plant shutdown. The SW System cannot be shutdown while irradiated Reactor fuel is on site. The Control Room Operators must refer to KPS TS 3.3e for limiting conditions for operation (LCO's).
Normal Power:	
Shutdown:	
Refueling:	
Casualty Events And Recovery:	Portions of the SW System are Class 1. Those portions are required to be operating for safe shutdown of the Reactor during an accident condition.

1.3 **Startup** (See OP # N-SW-02 & N-SW-02-CL)

The SW System must be operating at all times regardless of plant load. The SW System is operated in accordance with Operations Procedure N-SW-02 under all modes of plant operations. Before Turbine or Reactor startup begins, one SW pump will be running based upon the preferred pump selector switch. For initial startup, a SW pump automatic startup sequence is selected by turning the Service Water Pump Preferred Selector Switch to either SW Pump 1A or 1B. The discharge valve of the first SW pump to be started is throttled until discharge pressure has reached approximately 90 psig, then slowly opened.

An additional SW pump is started by holding the control switch to **START** and the associated red breaker position light goes on. The associated SW strainer is verified operating. The **SW PUMP BRG SEAL WTR FLOW LOW** annunciator should be verified reset. Prior to starting a SW pump, seal water local pressure indicators should indicate about 10 psig (only this low when on SW backup) as regulated by the pressure reducing valves. The remaining SW Pump control switches are placed in **AUTO**. During the plant startup, SW Header pressure should be observed to assure that standby pumps start as required to maintain adequate pressure. With Station and Instrument Air System in service and air pressure at least 70 psig, SW System startup can continue.

The bubbler system in the Screenhouse for Traveling Water Screens DP signals is started. Before a Traveling Water Screens is placed in service, Spray Water Isolating Valves SW-201A1, SW-201A2, SW-201B1 and SW-201B2 and Root Valves SW-200A and SW-200B must be checked to determine if they are open. The cleaning cycle is manually started, and screen operation is observed. After the screens have cycled several times at the high speed, the mode select switches are reset to **AUTO**. All doors and housing must be firmly in place and latched.

The SW System valves are normally aligned as follows:

- Both Header Isolation Control Valves SW-3A and SW-3B are open.
- Both Aux Bldg Header Control Valves SW-10A and SW-10B are open.
- Both Aux Bldg Header Manual Isolation Valves SW-11A and SW-11B are closed.
- Turb Bldg Header Control Valve SW-4A or 4B is open.
- SW Supply and Return Valves to each component in the plant are open as required (Prestart Checklist N-SW-02-CL).

During plant startup, SW usage is regulated by the needs of plant systems. Pump minimum flow requirements of 1800 gpm is maintained by placing the associated strainer backwash in operation in accordance with Operations Procedure N-SW-02, if necessary.

1.4 **Normal** (See OP # N-SW-02)

SW System capability to provide plant required SW flow is automatically controlled. SW pumps start automatically to maintain pressure. Traveling Water Screens and SW strainers remove debris from the SW and automatically clean themselves. Control Room indication provides verification. Normally, SW pressure is maintained between 90 to 100 psig by manually starting/stopping SW pumps.

Normal SW pump operation includes semimonthly switching of running equipment to even pump wear and to assure availability of pumps at all times. Pump shifting is accomplished as follows:

1. Position Service Water Pump Preferred Selector to new position
2. **START** the second pump in the header matching the Service Water Pump Preferred Selector position.
3. Position Turbine Building SW Header Selector to the header matching the Service Water Pump Preferred Selector position
   NOTE: Allow A and B Service Water Header pressures to stabilize prior to stopping pumps.
4. **STOP** the required pump(s).

Normal SW system operation includes changing the Turb Bldg SW Header Control Valve position bimonthly. This switching is accomplished manually by turning Control Switch ES-46516 to either Turbine Building SW Header Isolation Valve SW-4A or B position. The Operator checks that, **except** during switching, only one valve shows a red (**OPEN**) position indicating light. Isolation Valves SW-11A and SW-11B are normally **OPEN** during refueling (Cold Shutdown).

When changing the equipment lineups semimonthly, the seal water supply from the Plant Equipment Water/SWPT System to each pump is valved out for approximately five (5) minutes. This action verifies that the self contained seal water (Cuno) filters maintain seal flow. The filters are replaced if necessary.

1.5 **Abnormal** (See OP# A-SW-02)

An abnormal condition in the SW System is indicated by alarms in the Control Room and SER printouts. The Operator needs to identify the specific problem from the symptoms/indications and to take appropriate corrective action in accordance with Operations Procedure A-SW-02. Some automatic actions which occur include:

- Upon receiving a High Traveling Water Screens DP, the screens start screen washing and running in fast speed until the high DP signal is cleared for 9 minutes.
- Upon receiving a SW Discharge Strainer high DP alarm, the affected strainer starts backwashing and continues for 3 minutes after the alarm has cleared.

In the event of a Traveling Water Screens High DP, the Operators observe the screen lights on the Mechanical Vertical Panel "A" and dispatch an Equipment Operator (EO) to the Screenhouse to check Traveling Water Screens and the Trash Basket for debris. The EO turns the local mode selector switch to **HAND** for the affected screens if the automatic running and washing has not occurred.

If a leak is suspected in the Containment Cooling SW Header, the Operator should attempt to diagnose the leak location. If circumstances permit, a Containment entry should be made. If the CRDM Shroud Cooling Coil is suspect, the Operator should switch the CRDM Shroud Cooling Coil Headers.

- If the leak continues the CRDM Shroud Cooling Coil selection switch should be placed in **PULLOUT**.
- If the leak continues, SW Inlet Valves SW-900A, SW-900B, SW-900C or SW-900D should be closed sequentially to locate the leak.

The SW Return Valves SW-903A, SW-903B, SW-903C or SW-903D should be closed to isolate the affected header. (TS 3.3.C.1 would be referred to for the required number of operable Containment Fan Coil Units for the existing plant mode of operation.)

In the event of Turb Bldg Header SW Isolation Valve closing, the Operators observe valve indication, attempt to open at least one valve and check that Instrument Air is being supplied to the Turb Bldg Header Supply Valves. If neither Turb Bldg Supply Valve can be opened, trip the turbine and follow E-0. Equipment supplied by the header should be secured.

For SW Pump Seal Water Flow Low, Operators observe the SER printout to determine which pump is affected and start a standby pump if necessary. For SW Pump Strainer High DP an EO is sent to the Screenhouse to investigate. The EO must locally start backwashing if the system has failed to start in **AUTO**.

In subsequent action steps, the Operator ensures that the plant conditions have stabilized and restores SW equipment to operating status. In all cases, the Operators ensure that equipment alignment and operation are in accordance with TS 3.3.e.

1.6 **Emergency** (See OP # E-SW-02)

During plant emergency operation, SW is supplied to at least one train of safeguards equipment. The SW System responds to a SI actuation, sequential DG loading, and low SW Header pressure by closing Isolation Valves SW-3A and SW-3B to form two redundant headers. SW Pumps are started in a pre-selected sequence. Since adequate SW is available with two pumps supplying one header to provide all Class I and balance of plant requirements, the Turb Bldg Header is **not** automatically isolated, unless a low SW header pressure condition exists in conjunction with a Safety Injection (SI) signal.

During normal operation, failure of a pipe or valve results in automatic Turb. Bldg. Header isolation. Operator action may be required to maintain Turb Bldg Header supply in the event of failure on the header supplying the Turb Bldg at that time. Emergency Procedure E-SW-02 outlines the steps necessary to ensure SW is supplied to at least one train of safeguards when low pressure exists. **Both** "SI" **and** "Low SW Header Pressure" conditions must exist before Valves SW-4A and/or SW-4B automatically goes **CLOSED.**

Automatic actions that occur on a dropping pressure indication automatically start pumps in a pre-selected sequence. If either header pressure drops to 72 psig, these additional actions occur:

- If Header 1A pressure is less than 72 psig, both pumps, (1A1 and 1A2) receive **START** signals and the Header Isolation Valve SW-3A closes.
- If Header 1B pressure is less than 72 psig, both pumps, (1B1 and 1B2) receive **START** signals and the Header Isolation Valve SW-3B closes.

The Turb Bldg supply should always be shifted to the header with the higher pressure. If the pressure starts to drop in the Turb Bldg Header and the leak cannot be isolated locally, the Operators trip the turbine and perform E-0, "Reactor Trip or Safety Injection". The remaining steps require isolation and securing of equipment to isolate the leak. Alternate cooling may be required for certain equipment.

Note: Throughout the subsequent actions, the Emergency Plan Implementing Procedures (EPIP) should be reviewed to evaluate if the emergency response organization should be activated.

2.0 Functions

The purpose of the SW System is to provide redundant cooling water supplies for the engineered safeguards equipment required during post-accident conditions and for single non-redundant supplies to other systems, including balance of plant (BOP) equipment.

The SW System is designed with two redundant headers. Each header is capable of providing all anticipated post-accident heat removal requirements, including leakage allowances, at the highest expected lake water temperature. The SW System is adequate for supplying cooling loads of the BOP equipment as well as for meeting the maximum operating and post-accident Safety Class 1 equipment requirements.

The Safety Class 1 SW supply is designed to function following one active (operational) failure within the system. The large SW return lines within Safety Class 1 areas are designed as Safety Class 1 since breaks in these lines could cause flooding of Engineered Safety Equipment (ESF).

Various equipment in the SW System is powered from the emergency buses. This equipment includes the SW pumps, isolation valves, and two Traveling Water Screens.

The SW System functions as an emergency makeup supply to the following equipment:

- AFW pumps if the Condensate Storage Tank fails for any reason.
- Spent Fuel Pool (SPF)
- CC Surge Tank

The SW System is designed to automatically operate the necessary number of SW pumps to maintain adequate system pressure. The SW System is designed to supply the designed flow rates to the various equipment. The SW System was originally designed to provide a pressure greater than the peak pressure expected during a LOCA at the Containment Fan Coil inlet penetration to prevent leakage from Containment to SW System in case of fan coil piping breaks. However, the pressure at certain points has been analyzed to be below the Containment design pressure of 46 psig. Since the fan coils and service water lines form a closed system inside the Containment, no contaminated leakage is expected into these units. Should such an unlikely situation occur, the unit could be remotely isolated to prevent outleakage.

3.0 Design Descriptions

3.1 System Arrangement and Flowpaths

SW And CW Intake System The SW System takes a suction from Lake Michigan through a submerged multiple intake structure from Lake Michigan consisting of three inlet cones.

Note: Two auxiliary inlets are provided on the intake conduit downstream of the multiple inlet. This alternate source of lake water is capable of providing all SW requirements if the normal intake structure becomes damaged or blocked.

Note: In addition, another alternate source of SW is provided by an interconnecting pipe between the CW discharge structure and the Screenhouse Forebay. This interconnection provides a redundant source of SW in the unlikely event the main intake line becomes blocked

A 10 foot diameter steel pipe directs the intake water into the Forebay of the enclosed Screenhouse structure. The water passes through four Traveling Water Screens to the pump bay in the Screenhouse. The screened water is supplied to the suctions of the four SW pumps and the two CW pumps. (Two fire pumps also take a suction from the pump bay.)

The SW and CW intake system is designed to Safety Class 1 requirements.

The SW System supply to the suction of the AFW pumps is Safety Class 1.

SW Pumps - SW is pumped from the pump bay by four centrifugal SW pumps through alternate individual check valves, rotating strainers and manual butterfly isolation valves. Each SW pump is capable of supplying 6400 gpm and is powered from one of two 4160 Volt emergency buses. Each pump discharges through a check valve to a rotating strainer and manual butterfly isolation valve. Two SW pumps (1A1 and 1A2) discharge to SW Header A and two SW pumps (1B1 and 1B2) discharge to SW Header B.

SW Headers - The two SW headers are connected at the pumps by two normally open, remotely operated butterfly valves (SW-3A and SW-3B). These valves separate the headers when necessary. Each SW header supplies water to an Auxiliary Building (Aux. Bldg.) through motor operated butterfly isolation valves (SW-10A and SW-10B) respectively. These two Aux. Bldg. headers can be connected together in the Aux. Bldg. through two normally closed manual butterfly valves (SW-11A and SW-11B). To ensure train separation, this is normally done when the plant is in cold shutdown. Various redundant safeguard equipment and coolers are supplied with SW from each of these headers.

Turbine Building - The Turbine Building (Turb. Bldg.) SW line is supplied through two remotely operated butterfly valves (SW-4A and SW-4B). Only one valve is open at a time to supply SW to the Turb. Bldg. Valves SW-4A and SW-4B have air accumulators to allow closing the valves on loss of normal air. Examples of loads on the Turb Bldg Header include the Main Feedwater Pump (FW) oil coolers, Turbine Lube Oil Coolers, Seal Oil Unit Oil Coolers, generator hydrogen coolers, and the Condensate Pump bearing coolers.

During an SI or low SW header pressure condition, SW headers A and B are automatically isolated by closing the separation valves (SW-3A and SW-3B). At the same time, all four SW pumps and rotating strainers start.

A Safety Injection , coincident with Low SW Header Pressure, will isolate the Turb. Bldg. SW Headers by automatically closing Valves SW-4A and SW-4B. (DCR 3338)

All SW Return headers dump into the CW System discharge. The discharge consists of three standpipes:

- Aux Bldg Standpipe – 24",
- Turb Bldg Standpipe – 24",
- Turb Bldg Standpipe – 18".

The SW Return paths are separated to minimize the possibility of flooding problems if a return line fails. SW Returns are directed to the CW System discharge.

Isolation valves are provided to isolate sections of the SW System in the event of a system malfunction. The Operator can isolate portions of the Aux. Bldg and the entire Turb Bldg SW supply by closing remotely actuated isolation valves.

Aux. Bldg. (portions of)	SW-10A & B
Turb. Bldg. (entire)	SW-4A & B

Rad Monitoring - The Aux Bldg Standpipe is monitored by Radiation Monitors R16 and R-20.

- Radiation Monitor R20 monitors the "SW Returns from the Spent Fuel Pool [SFP] Heat Exchanger" and "CC Heat Exchanger".
- Radiation monitor R-16 monitors the "SW Return from the Containment fan coil units".

3.2 Service Water Pumps

3.2.1 Service Water Pump Design

Four Worthington Corporation vertical, wet pit, single-stage, double suction, water lubricated, 1750 rpm, centrifugal pumps are installed in the pump bay for supplying SW to the Plant. The small weight load of the balanced thrust, dual volute impeller and shaft is supported by the vertical solid shaft Allis-Chalmers motor. Both motor upper thrust and lower line ball bearings are provided with oil thermocouples for computer inputs. The pump bearings are leaded bronze and the shaft is stainless steel.

Both the SW pump casing and the pump impeller have wear rings installed to ensure the pump maintains capacity for a longer period of time. The pump impellers each have 13% chrome wear rings and the pump casing have 17% chrome wear rings (per DCR1106). The original bronze casing and impeller hubs had shown severe sand erosion. The chrome wear rings will withstand the erosion for a longer time and maintain pump capacity.

Bearing water flow must be provided to keep the bearings free of dirt, and to lubricate the shaft tube bearings. The normal seal water supply is provided by the Plant Equipment Water Pumps. SW Pretreatment can be manually aligned in the event Plant Equipment Water is removed from service. 10 microns, dual element Cuno filters have been added to each of the normal seal water supply lines (one for each SW pump) to provide a final filtering of this water supply. (DCR3695)

Automatic backup seal water is taken from the SW Strainer outlet and filtered to 10 microns in a Cuno dual element filter. Backup seal flow is regulated by a pressure regulator with flow metered and alarmed at 0.5 gpm minimum by a Rotometer. Minimum flow in a non-running pump is 0.5 gpm. Expected flow to a running pump is about 1.25 gpm.

Each SW pump has a discharge check valve (SW-1A1, SW-1A2, SW-1B1 and SW-1B2). The check valve allows starting with an open discharge valve and prevents reverse rotation when the pump is not operating. Reverse pump rotation could loosen shaft couplings and cause improper impeller alignments. The SW pump discharge "column pipe" upper section is provided with eight stiffening ribs for strength required by seismic design. Each pump discharge is provided with a pressure gauge. Each SW pump motor has a space heater to keep the standby pump ready for immediate start.

Service Water Pump	
Manufacturer	Worthington Corporation
Technical Manual	XK-148-4
Model/Stages	140-18/One Stage-Centrifugal
Impeller	Double Suction –Dual Volute
Type	Vertical – Wet Pit
Speed	1750 rpm
Design Capacity	6400 gpm
Design Disch Press	90 – 100 psig
Design Head	204 ft TDH
Efficiency	85%
Power Required at Design	388 DHP
Motor Size	400 hp
Space Heater	600 Watts – 120 volts

Power supplies for the SW pumps and motor space heaters are listed below:

Power Supplies (4160 VAC)		Heaters (120 VAC)
SW Pump 1A1	Bus 1-5	Space Heater BRA105 ckt 27
SW Pump 1A2		
SW Pump 1B1	Bus 1-6	Space Heater BRB105 ckt 27
SW Pump 1B2		

Ckt 27 per DCR 2861

3.2.2 SW Pump Sequence Control (See Figure KNP-SW04)

The SW requirements during any operational condition are normally met by two to four SW pumps. Under normal conditions, a pressure sequencing system adds additional SW pumps to the running complement as the flow requirements increase. Two different pump sequences are available. The desired sequence is selected by the operation of the Control Room Selector Switch ES-46523. This switch is a two position maintained device (1A/1B) located on the Mechanical Vertical Panel "A".

PUMP SEQUENCE 1A			PUMP SEQUENCE 1B		
Pump	**Press Switch**	**Setpoint**	**Pump**	**Press Switch**	**Setpoint**
1A1	none	Continuous	1B2	None	continuous
1A2	PS-16005	86 psig	1B1	PS-16005	86 psig
1B1	PS-16003	82 psig	1A2	PS-16003	82 psig
1B2	PS-16004	78 psig	1A1	PS-16004	78 psig

The second pump of the selected sequence starts if pressure in the SW Header B is less than 86 psig. The third pump starts if SW Header A pressure is less than 82 psig. The fourth SW pump automatically starts if pressure in Header B is less than 78 psig. Normal SW pump discharge pressure is 90-100 psig.

3.2.3 Normal SW Pump Control (See Figure KNP-SW04)

The control logic for each SW pump is almost identical. The following description is applicable to any SW pump. Each pump has a Control Room switch located on Mechanical Vertical Panel "A". The Control Room switch has four positions (**PULLOUT/STOP/AUTO/START**). The switch spring returns to **AUTO** from **START** or **STOP** positions.

SW PUMP ELECTRICAL COMPONENTS				
Pump No.	**1A1**	**1A2**	**1B1**	**1B2**
SW Header	A	A	B	B
Control Rm Switches	ES-46524	ES-46525	ES-46526	ES-46527
DSP Local/Remote	ES-87151	ES-87147	-----	-----
DSP Start/Stop	ES-87172	ES-87149	-----	-----
Seal Water Flow Sw.	FS-16807	FS-16808	FS-16809	FS-16810
SI Train	A	A	B	B
Blackout Train	None	A	None	B
Ammeter	4455707	4455702	4455801	4455802

When one of the Control Room switches are placed in the **PULLOUT** or **STOP** positions, the associated 4160 V breaker trips, thus interrupting electrical power to the motor. These two positions are dominant and prevent the operation of the SW pump regardless of the presence of <u>any</u> automatic start signals.

Note: The Operator **<u>must</u>** hold the switch in the **STOP** position to prevent operation.

In addition, these positions provide a reset signal to the breaker lock-out circuit. This lock-out feature prevents an automatic restart of the SW pump after a breaker overcurrent condition. After the overcurrent condition, the appropriate SW pump switch must be rotated to the **STOP** position prior to restarting.

When one of the Control Room switches are in the **AUTO** position, the associated SW pump starts in a response to a pressure control sequence signal, if the following conditions are satisfied:

- Seal water flow is adequate (greater than 0.25 gpm on associated flow switch).
- Automatic operation is not inhibited (no SI or Blackout sequence).
- Pump has not tripped due to an overcurrent condition.

Once the SW pump has started, it continues to run until the Operator turns the pump off with the control switch or until a load shed signal is received. A load shed signal exists for a short period just prior to the start of a SI or Blackout sequence.

When the control switch is placed in the start position, the SW pump immediately starts if the seal water flow is adequate. If the seal water flow is too low and the Operator holds the switch in the **START** position, for 5 seconds, the seal flow interlock is bypassed and the pump will start. Once the pump has started, it continues to run until one of the previously mentioned trips stops the pump.

The SW pumps each have red (**RUNNING**) and green (**OFF**) indicating lights located with the Control Room switches. White status lights are also provided for each SW pump in the Safety Injection Active Status Light Panel on Mechanical Vertical Panel "C". SW Pumps 1A1 and 1A2 also have control switches with red (**RUNNING**) and green (**OFF**) indicating lights on the Dedicated Shutdown Panel (DSP).

3.2.4 Abnormal SW Pump Operation

Abnormal SW pump operation is discussed for three different conditions:

- Low SW Header pressure
- SI sequence
- Blackout sequence

If the SW pump control switch is in the **AUTO** position, the SW pump on the affected header starts upon receipt of a very low SW Header pressure signal (less than 72 psig), provided an automatic operation inhibit signal is not present. The very low header pressure signal overrides the seal water flow interlock. The SW pump starts and runs even if there is low or no seal water flow. The SW pump continues to run until stopped by the Control Switch (i.e., Load Shed Signal).

If the control switch is in the **AUTO** position when a SI or Blackout sequence signal is received, the SW Pump starts and runs. The seal flow interlock is again overridden, for these starts.

Note: A Blackout sequence only starts SW Pump 1A2 and 1B2.

In any of the above abnormal conditions, the **PULLOUT** and **STOP** positions are dominant. These positions prevent or stop pump operation. These switch positions also provide a signal for reset from a current overload trip condition. The current overload is also dominant over any automatic signal. During abnormal or emergency conditions, the Operator is able to manually start the SW pump at any time, if power is available.

3.3 Traveling Water Screens

Four Traveling Water Screens are divided into two pairs (1A1 and 1A2) (1B1 and 1B2). From the forebay, water passes through four 10 foot wide by 36 foot long Traveling Water Screens with a mesh size of 3/8 inch. Each Traveling Water Screen is capable of passing 110,000 gpm. A single local control panel for both pairs of screens provides both manual and automatic control. Auto control consists of high differential pressure (DP) operation at high speed and long time duration operation at low speed.

Traveling Water Screens (1A1 and 1A2) (1B1 and 1B2)	
Manufacturer	Link Belt Company/FMC Corp.
Technical Manual	134-13-1
Model	45A
Size	10'- 0" wide x 36'-0" long
Capacity	110,000 gpm each
Trays Material	Carbon Steel
Velocity at Low Water Level	2.54 fps at 568.4
Screen	#14 W&M Gauge 304 SS Wire Cloth with 3/8" Square Openings (mesh)
Chain	Carbon Steel Links Case Hardened Pins/Bushings
Speed / Drive	10 and 2.5 fpm, 2-speed
Motor Rating	3.0 / 0.75 hp
Motor Speed	1800 / 450 rpm
Spray Water Flow/Screen	300 gmp @ 75 psig

A bubbler system supplied by the Instrument Air System provides a DP signal used for automatic flushing controls. The flushing controls provide automatic backwashing set on a four hour timer. A high DP of 6 inches of water starts the Traveling Water Screens in fast speed and flushes for nine minutes after the high signal (alarm) clears. If no high DP occurs within four hours, the screen sprays and motor drives are operated for 45 minutes at low Traveling Water Screens speed. This operation lubricates the gear box components and articulates the drive chains to prevent seizure during long periods when no debris is present in the intake structure. Traveling Water Screens pressure switches are provided to determine screen SW Supply pressure. Greater than 60 psig interlock, as measured by the Traveling Water Screens pressure switches, is required for starting the screen motor.

The Traveling Water Screen housings have been reinforced to protect the Screenhouse from flooding during a maximum seiche (lake water level build-up resulting from meteorological conditions). The inspection doors should remain latched except during inspections.

TRAVELING WATER SCREENS & AUTOMATIC WASH COMPONENTS				
SW Screen	**1A1**	**1A2**	**1B1**	**1B2**
Power Source	1-52D	1-35C	1-45C	1-62D
Traveling Water Screens Press Switch (60 psig)	PS-16065	PS-16066	PS-16067	PS-16068
Test Pushbutton	PB-19421	PB-19422	PB-19423	PB-19424
Autowash Solenoid	SV-33010	SV-33011	SV-33012	SV-33013
Local Control Sw. **(HAND/OFF/AUTO)**	ES-19418	ES -19418	ES -19475	ES -19475
Local Maint. Sw. **(OFF/ON)**	ES -19419	ES -19420	ES -19476	ES -19477
DP Switch (6")	1642501	1642501	1642601	1642601

The control logic for the Traveling Water Screens is separated into two identical circuits (1A1/1A2 and 1B1/1B2). (Refer to Figure KNP-SW05 for the following discussion.)

A local screen wash panel contains three switches for each of the two control circuits. One of the switches is a three position maintained device **(HAND/OFF/AUTO)**. The other two switches are two positioned **(OFF/ON)** maintained devices, located in back of the panel. The **OFF/ON** switches are used to electrically isolate a particular Traveling Water Screens solenoid valve to prevent operation while the remainder of the control circuit remains operable. In addition, test pushbuttons are provided to test the screen drive motors. The pushbuttons are located next to the Traveling Water Screens.

With the three position switch in the **OFF** position, the automatic wash solenoid valves remain closed, thus preventing backwash. With the three position switch in this position the screen motors do not operate unless the local pushbutton is pressed and held. In this mode of operation the screens run at low speed.

When the local three position control switch is placed in the **HAND** position, both solenoid water valves open. As SW pressure in the spray nozzle header increases above the respective Traveling Water Screens pressure switch setpoint (60 psig), the associated Traveling Water Screens starts and runs at high speed.

When the control switch is placed in **AUTO**, a high DP across the screens automatically opens the backwash solenoid valves. If SW pressure in the spray nozzle header is above 60 psig, the Traveling Water Screens start and run at high speed. The screen is run at high speed for 9 minutes, after the DP switch has been reduced below the high setpoint (6 inches DP).

A special circuit is provided to operate the screen wash valves, which results in operation of the Traveling Water Screens for 45 minutes on a 4 hour cycle. During this exercise period, both screens on one control circuit operate at low speed. In addition, both solenoid valves open allowing screen wash to occur. A single 4 hour cycle timer controls the exercise cycles for both control circuits. The timer is adjusted so that only one set of screens are operated in the exercise mode at any time.

If a high DP develops during an exercise cycle, the automatic backwash cycle immediately starts. As described above, the screens operate at high speed and the screen wash valves open. During the auto cycle, the four hour timer continues to run.

If any exercise time is left at the end of the auto cycle, the Traveling Water Screens automatically return to the exercise cycle mode of operation.

Screen red (**RUN**) lights are provided on the local panel. In addition, the local panel contains a power on light for each control circuit. On the Control Room Mechanical Vertical Panel "A", one set of screen red (**RUN**) and green (**OFF**) lights is provided for each control circuit. The red (**RUN**) light is on if either screen motor is running. The green (**OFF**) light is lit if both screen motors are stopped. The backwash solenoid valves fail closed on a loss of electrical power supply.

3.4 **Service Water Strainers** (See Figures KNP-SW04 and KNP-SW07)

Four Kinney rotating, single drum, multiple basket media, automatic backwash strainers are installed on the discharges of the SW pumps. Each strainer has a motor drive unit to rotate the strainer constantly whenever the associated SW pump is operating. A packing and gland assembly seals the drive shaft against leakage. The strainer has dual backwash slots to balance thrust during backwashing. Backwash valves are operated by pneumatic cylinders. A DP of 5 psid across the strainer causes the individual backwash valve to open and discharge to the trash trough **NOTE:** D/P alarms at 8 psid. Full system pressure is applied across each strainer element for 3 minutes as it passes the backwash slots on opposite sides of the strainer. Backwash water is strained in a basket assembly at the trash trough outlet and then the water drains to the CW discharge through an 18 inch line.

Service Water Strainers	
Manufacturer	S.P. Kinney Engineers
Technical Manual	XK-162-13, 14
Model/Size	"A" / 16 inch
Body	Cast Iron
Drum	2% Nickel Cast Iron
Media	1/8" Perforated Cones of 316 Stainless Steel
Design Flow	6400 gpm
Clean Pressure Loss	2 psi
Motor/Speed	1 1/2 hp/860rpm

The backwash control valves are (SW-30A1, A2, B1, or B2), air operated ball valves actuated by solenoid valve The valve fails "as is" on loss of air. Manual operation is provided for by an exposed valve shaft extension. Field adjustment of valve rotation is required to limit backwash flow rate to an acceptable amount. Additionally, provisions are made for manual drum rotation. The individual media baskets are replaceable.

Each rotating strainer drive motor has a local control switch. The switch has two maintained positions **HAND/AUTO**. In the **AUTO** position, the strainer rotation is controlled by an auxiliary contact on the associated SW pump motor electrical breaker. Thus with the switch in the **AUTO** position, the strainer rotates while the associated SW pump is running and the strainer stops when the pump stops. With the local switch in the **HAND** position, the strainer rotates continuously.

SERVICE WATER STRAINER & AUTOMATIC BACKWASH COMPONENTS				
SW Pump	**1A1**	**1A2**	**1B1**	**1B2**
Strainer **HAND/AUTO**	ES-19478	ES-19479	ES-19480	ES-19481
Backwash **AUTO/OFF/HAND**	ES-19411	ES-19413	ES-19415	ES-19417
Backwash **CLOSE/OPEN**	ES-19410	ES-19412	ES-19414	ES-19416
Backwash Solenoid	SV-33018	SV-33019	SV-33020	SV-33021
Backwash Control Vlv	SW-30A1	SW-30A2	SW-30B1	SW-30B2
Air Operator	CV-31153	CV-31154	CV-31155	CV-31156
Backwash DP Switch	DPS-16419	DPS-16420	DPS-16421	DPS-16422
Power Source (MCC)	1-52D	1-52D	1-62D	1-62D

Strainer cleaning is accomplished by backwashing the strainers. (See Figure KNP-SW07). A local control panel is provided. The panel contains the indicating lights and two control switches for the control of each strainer backwash. The indicating lamps show red (**OPEN**) and green (**CLOSED**) position of the strainer backwash control valves.

One of the two switches is a three position maintained device (**AUTO/OFF/HAND**). The second switch is a two position maintained device (**CLOSE/OPEN**). In addition, each strainer is provided with a DP switch. As indicated in the following paragraphs, the DP switch provides the automatic input signal for the strainer backwash.

When the local panel three position switch is in the **AUTO** position, strainer backwash is automatically initiated when the DP across the strainer reaches 5 psig. The backwash is continued for 3 minutes after the DP falls below the setpoint. The extended backwash time ensures effective cleaning of the strainer. This extended period is controlled by adjustment of a time delay located in the local panel. One time delay is provided for each strainer.

When the local panel three position switch is placed in the **HAND** position, the local two position switch is used to manually control backwash. Backwash takes place when the two position switch is in the **OPEN** position. Backwash is stopped when the switch is turned to the **CLOSE** position. With the three position switch in the **HAND** position, automatic backwash is inoperable. With local three position switch in **OFF** position, the backwash valve remains closed, thus preventing backwashing. The logic and components for the strainer backwash are selected so the backwash fails "as is" on an electrical and/or air supply failure.

3.5 Service Water Loads

Auxillary Building Headers
Auxiliary Building Basement Fan Coils (4)
Auxiliary Building Fan Floor Fan Coils (2)
Auxiliary Building Mezzanine Fan Coils (2)
Auxiliary Feedwater Pumps (3)
Battery Room Fan Coil Units (2)
Charging Pump 1C Fan Coil (1)
Component Cooling Heat Exchangers (2)
Component Cooling Pump Fan Coil (1)
Containment Fan Coil Units (4)
Containment Purge Filters Deluge (1)
Control Room AC Coil Units (2)
Control Room PAR Filter Deluge (2)
CRDM Room Fan Coils (2)
CRDM Shroud Cooling Coil Units (2)
Instrument Air Compressors B and C
RHR Pump Pit Fan Coils (2)
Safety Injection Pumps Stuffing Box Jacket and Lube Oil Coolers (2)
SFP Exhaust Filters Deluge (2)
Shield Building Ventilation Filters Deluge (2)
Spent Fuel Pool Heat Exchanger
Turbine Building Basement Fan Coils 1A, 1B
Zone SV Filters Deluge (2)

Screenhouse Headers
CW Pumps Seals and bearing Coolers Backup Supply
Diesel Generator Cooling Water Heat Exchangers (2)
Fire Protection System Jockey Pump
Instrument Air Compressors A and C
SW Pump Strainer Backwash
SW Pumps Bearing lubrication (4)
Traveling Water Screens wash

Turbine Building Headers
Administration Building AC Units
Auxiliary Building AC Unit
Blowdown Tank Cooling Water Spray
Condensate Pump Coolers
Feedwater Pump Oil Coolers
Generator Exciter Air Cooler
Generator Hydrogen Cooler
Generator Hydrogen Seal Oil Coolers
Heater Drain Pump Coolers
Isolated Phase Heat Exchanger
Steam Generator Blowdown Treatment Heat Exchanger
Turbine EHC Oil Coolers
Turbine Oil Cooler
Vacuum Degasifier Vacuum Pumps

3.6 Major Service Water Loads Valves (See Figure KNP-SW06)

3.6.1 Service Water Loads Header Isolation Control Valves

The SW pumps discharge to a common 24 inch SW header. The common header provides redundant SW headers with two butterfly isolation control valves (SW-3A, SW-3B). The butterfly valves are air operated and fail closed on loss of air or electric power. The valves automatically close on an SI signal or a low SW header pressure (72 psig). These valves are located in the Screenhouse basement.

SW Header Isolation Control Valves		
SW Header	**1A**	**1B**
Control Switch	ES-46528	ES-46832
Solenoid Valve	SV-33040	SV-33041
Control Valve	SW-3A/CV-31038	SW-3B/CV-31040
DSP Local/Remote	ES-87120	-----
DSP Control Open/Close	ES-87100	-----

The header isolation control valves are actually cross-tie valves. Each valve is controlled by a three position switch (**CLOSE/AUTO/OPEN**). The switches spring return to **AUTO**. The switches are located on the Control Room Mechanical Vertical Panel "A". A set of position indicating lights, red (**OPEN**) and green (**CLOSE**), are provided with the control switch.

SW Header Isolation Valve SW-3A can also be operated from the Dedicated Shutdown Panel (DSP). If the **LOCAL/REMOTE** switch is placed in **LOCAL**, the Control Room switch and indicating lights are disabled. The local control switch at the DSP is now operable and the associated lights indicate the position of Valve SW-3A.

3.6.2 Aux Bldg SW Header Isolation Valves

One motor operated butterfly valve (SW-10A, B) is provided for each Aux Bldg SW header. These two 16 inch valves provide for remote isolation if flooding occurs or in the event of a failure in the Containment fan coil SW piping. Valve SW-10A is powered from MCC 1-52A and Valve SW-10B from MCC 1-62A. There is no auto closure provision. Valve SW-10A is located in DG Room A. Valve SW-10B is located outside DG Room B.

In case of malfunction of one of these valves or loss of a 24 inch SW header, the other Aux Bldg SW header supplies all Safety Class I systems necessary for safe plant operation. Two manual gate valves (SW-11A and SW-11B) are provided to connect the Aux Bldg SW headers. These valves allow all Safety Class I equipment to be supplied from one SW header if necessary.

Aux Bldg SW Header Isolation Valves		
SW Header	**1A**	**1B**
Control Switch	ES-46554	ES-46559
Butterfly Valve	SW-10A	SW-10B
Motor Operator	MV-32011	MV-32012
DSP Local/Remote	ES-87112	-----
DSP Control Open/Close	ES-87121	-----
Motor Power Source	MCC 1-52A	MCC 1-62A

The flow of SW to the Aux Bldg headers is manually controlled. This control is implemented by isolation valves with control switches on the Control Room Mechanical Vertical Panel "A". A set of position indicating lights, red (**OPEN**) and green (**CLOSE**), are provided with control switch. Control Switch ES-46559 for SW-10B is a two position maintained switch (**CLOSE/OPEN**). The Train A Header Supply Valve SW-10A can be controlled from the DSP or Control Room. DSP Control Switch ES-87122 has a **LOCAL** and **REMOTE** position. In the **LOCAL** position the valve is controlled from the DSP. In the **REMOTE** position the valve is controlled form the Control Room. DSP Control Switch ES-87121 is a two position maintained switch (**CLOSE/OPEN**). Control Room Switch ES-46554 for Valve SW-10A is a 3 position spring return from left or right to center switch (**CLOSE/BLANK/OPEN**).

3.6.3 Turbine Building SW Header Control Valves

One SW header supplies the Turb Bldg equipment. In order to supply this header from either SW train, two 20 inch air operated butterfly valves (SW-4A and SW-4B) are provided. Normal operation requires that only one valve be open at a time. Automatic sequencing allows transfer of supply from one header to the other. Upon SW header isolation, each Turb Bldg SW header control valve remains as is. Operator action is required to close the open valve.

However, upon **both** "SI Sequence – Step 9" and "Low SW Header Pressure" (82.5 psig) conditions, the open Turbine Bldg SW Header Control Valve will automatically close, and both Valves SW-4A and SW-4B will be blocked from manually re-opening, until the SW Header pressure is restored and the Turbine Bldg Service Water Isolation signal is reset. Per DCR 3338

- Valve SW-4A is located next to Air Compressor A.
- Valve SW-4B is inside DG Room B.

TURB BLDG SW SUPPLY ISOLATION VALVES		
SW Header	**1A**	**1B**
Control Valve	SW-4A	SW-4B
Air Operator	CV-31084	CV-31085
Solenoid Valve	SV-33043	SV-33044
DSP **LOCAL/REMOTE** Switch	ES-87120	-----
DSP **OPEN/CLOSE** Switch	ES-87119	-----

Either SW Header 1A or 1B can supply water to the Turb Bldg Header. The header supply valves are controlled by a single three position (**ISOL/1A/1B**) maintained switch. The switch is located in the Control Room on Mechanical Vertical Panel "A". A set of red (**OPEN**) and green (**CLOSE**) indicating lights is provided for each valve with the control switch.

When the control switch is in the **ISOLATE** position, both control valves remain in the closed position. When the switch is turned to the SW Header 1A position, the valve between SW Header 1A and the Turb Bldg opens. If the valve between SW Header 1B and the Turb Bldg is open, it automatically closes after the Control Valve 1A is fully open. In a similar manner, when the control switch is turned to the SW Header 1B position, Valve SW-4B between SW Header 1B and

the Turb Bldg Header opens. Valve SW-4A automatically closes after Valve SW-4B is open.

Isolation Valves SW-4A and SW-4B fail "as is" upon loss of electrical power. The valves also fail "as is" upon loss of Instrument Air supply. Sufficient compressed air is stored in a Class I air accumulator for each valve to permit valve closure by Operator action.

3.6.4 **Containment Fan Coil Units SW Return Valves** (See Figures KNP-SW09 & KNP-RBV3)

The Containment fan coil unit SW return valves control the flow of SW through the fan coil coolers. These valves provide cooling during normal operation, and if closed, they are automatically opened during abnormal conditions. Due to the redundancy requirements imposed for abnormal conditions, the valve logic is divided into two trains according to the SW header to which the valves are connected. Each train logic contains three valves.

CONTAINMENT FAN COIL SW VALVES						
Valves	**SW-903A**	**SW-903B**	**SW-904B**	**SW-903C**	**SW-903D**	**SW-904D**
Valve Operator	MV-32060	MV-32061	CV-31120	MV-32058	MV-32059	CV-31119
Solenoid	None	None	SV-33036	None	None	SV-33035
Control Switch	ES-46509	ES-46510	None	ES-46511	ES-46512	None
SI Train	A	A	None	B	B	None
Parallel Valve	None	SW-904B	SW-903B	None	SW-904D	SW-903D
Power Source MCC	1-52E	1-52E	-----	1-62E	1-62E	-----
DSP **Local/Remote**	ES-87124	ES-87109	-----	-----	-----	-----
DSP **Open/Close**	ES-87123	ES-87125	-----	-----	-----	-----

Each motor operated valve (MOV) has a three position (**CLOSE/AUTO/OPEN**) spring return to **AUTO** switch. The control switches are located adjacent to the associated Containment fan coil motor control switches on Mechanical Vertical Panel "A". Limit switch actuated valve position lights are provided directly above each switch. The air operated valves are modulated from a control station which is found in the same location.

The MOV's fail "as is " on loss of electrical supply. The air operated control valves fail closed on loss of electrical and/or air supplies.

Under normal operating conditions, MOV's are used as a coarse Containment temperature control. A closed loop analog control is used to provide position and hence flow control for both of the normally **CLOSED** air operated control valves. Each air operated control valve is also controlled by a three way solenoid valve. This solenoid valve maintains the control valve in a closed position if either of the following conditions exists:

- The MOV in parallel with the control valve is not fully closed.
- The associated Containment fan coil cooler fan motor is not running.

During abnormal conditions, a SI sequence signal is used to automatically drive all MOV's fully open. The air operated valve in parallel with the MOV closes automatically when the MOV leaves the fully closed position.

The Containment Fan Coil SW Return Valves (SW-903A and SW-903B) can also be operated from the DSP, similar to Valves SW-3A, SW-4A and SW-10A. When the associated **LOCAL/REMOTE** switch is in the **LOCAL** position, the indication and valve control is switched to the DSP.

3.6.5 SW to Component Cooling (CC) Heat Exchangers 1A and 1B

(See Figures KNP-SW03 and KNP-SW06)

The control of SW flow to each CC Water Heat Exchanger is similar. The following description is applicable to both heat exchangers. The numbers in the text are specifically for Heat Exchanger 1A, but refer to the Table for valve and switch numbers for CC Heat Exchanger 1B.

CC HEAT EXCHANGER SW COMPONENTS		
Valve	**1A**	**1B**
SW to CC HX Control Valve	SW-1306A	SW-1306B
Air Operator	**CV-31406**	**CV-31047**
CC Water Temp Element	TE-13057	TE-13058
SW to CC HX Controller	TC-26309	TC-26310
Valve	**1A**	**1B**
SW to CC HX Motor Valve	SW-1300A	SW-1300B
Motor Operator	**MV-32009**	**MV-32010**
Motor Control Switch	ES-46553	ES-46552
Motor Valve Power Source	MCC 1-52B	MCC 1-62E

SW flow to CC Heat Exchanger 1A is normally controlled by an air operated control valve (SW-1306A/CV-31046). This fail open valve is controlled by a temperature controller (TC-26309). When the temperature of CC water leaving the heat exchanger increases above the setpoint (90-100° F), Valve SW-1306A opens. When the temperature decreases below the setpoint, Valve SW-1306A closes. This valve also is provided with valve position indicating lights in the Control Room.

During abnormal operation, Valve SW-1300A/MV-32009 is opened to allow more SW flow through CC Heat Exchanger 1A. The abnormal operation is during periods of high heat load such as RHR or Containment Sump Recirc operation. SW-1300A may be throttled **OPEN** during periods of high heat load to allow SW-1306A to control temperature of the Component Cooling water system within its control band.

SW-1300A is operated from the Control Room by Control Switch ES-46553. This switch is a two position (**CLOSE/OPEN**) spring return to **CENTER** switch. The valve has red (**OPEN**) and green (**CLOSE**) indicating lights located with the control switch.

In the event of an SI at sequence step 0 the SW-1306A/B will go to full **OPEN**. After SI is reset and automatic control of CC water temperature is desired the SW-1306A/B valves must be reset locally using the local push button.

3.6.6 SW Emergency Makeup to CC Surge Tank

A 2 inch MOV (SW-1400/MV-32083), is provided for emergency makeup to the CC Surge Tank if the normal makeup from demineralized water fails. The valve is powered from MCC-52B. Valve SW-1400 is operated from the Control Room on Mechanical Console "C". Control Switch ES-43640 is a three position (**CLOSE/BLANK/OPEN**) switch. The switch spring returns to the center (**BLANK**) position. Red (**OPEN**) and green (**CLOSE**) indicating lights are located with the control switch.

3.6.7 SW to Auxiliary Feedwater (AFW) Pumps (See Figure KNP-SW03)

Three, 3 inch MOV's (SW-601A, SW-601B and SW-502), one suction valve for each AFW pump, are provided as an emergency source of water if the Condensate Storage Tanks become unavailable as a supply.

SW EMERGENCY SUPPLY TO AFW PUMPS			
Component	**AFW 1A**	**AFW 1B**	**Turb Driven AFW**
Emerg. Supply Valve	SW-601A	SW-602A	SW-502
Motor Operator	MV-32029	MV-32030	MV-32031
Control Switch	ES-46061	ES-46062	ES-46065
MV Power Source	MCC 1-52C	MCC 1-62C	CAB BRA-104

All three SW to AFW Pump valves are manually controlled from the Control Room. Each valve has a control switch in the Control Room on Mechanical Console "A". The switches are two position (**CLOSE/OPEN**) maintained switches.

Valve limit switches provide inputs for valve position indicating lights red (**OPEN**) and green (**CLOSE**) which are located with the associated control switches. The MOV's are equipped with a mechanical override for manual emergency operation.

3.6.8 SW to Spent Fuel Pool (SFP) Emergency Makeup (See Figure KNP-SW03)

One manually operated valve (SW-1497) is provided as emergency makeup to the SFP if normal Reactor Makeup Water is insufficient or is not available.

3.6.9 Spent Fuel Pool Heat Exchanger SW Valves

Service Water flow through the SFP Heat Exchanger is modulated to maintain a controlled temperature in the SFP. SW flow for this purpose is provided from Aux. Bldg. SW Header 1A. The temperature control is performed by a local temperature controller. The pneumatic controller has a temperature sensing bulb located in the SFP coolant outlet of the heat exchanger. This temperature controller modulates the SFP Heat Exchanger Outlet Valve (SW-1601/CV-31086) to maintain a constant temperature. The control valve fails open on loss of air supply.

3.6.10 Diesel Generator Heat Exchanger SW Valves

The flow of SW to the DG heat exchangers is controlled by the DG Heat Exchangers SW or control valves. A control valve is provided for each DG. The control valves are 4 inch ball valves.

DG HEAT EXCHANGER SW VALVES		
DG Heat Exchanger	**1A**	**1B**
HX Outlet Valve	SW-301A	SW-301B
Air Operator	CV-31088	CV-31089
Solenoid Valve	SV-33033	SV-33034

The control valves remain in a closed position until the associated DG is started. When the DG is started, the associated control valve goes to the fully open position. When the DG stops, the heat exchanger outlet valve closes. The valve fails open on loss of solenoid power or loss of DG startup air.

3.6.11 Blowdown Tank Spray SW Control Valve (See Figure KNP-SW02)

SW flow is used to maintain a controlled temperature in the Steam Generator Blowdown Tank or drain line. This control is implemented by modulation of the Blowdown Cooling Water (SW) Spray Control Valve SW-2303/CV-31053. This SW spray valve is an air operated, 1 inch valve. A local pneumatic controller is used to sense the temperature in the Blowdown Tank drain line. The output of the temperature controller (TC-26312), is used to modulate the cooling water spray Valve SS-2303. This valve fails open on loss of air supply.

3.6.12 Generator Hydrogen Cooler SW Valves

SW is used to cool and control the temperature of the hydrogen which is used as the generator coolant. A closed loop analog control is provided for this purpose. Controller CS-43001 is located on Mechanical Console "A". To implement the control loop, the hydrogen temperature is measured and compared to the selected setpoint (approximately 29° C) in the analog controller. The output pneumatic signal is used to adjust the position of Valve SW-2602/CV-31068. By adjusting Valve SW-2602, the hydrogen cooling rate is controlled. This valve fails open on loss of electrical power or loss of air supply.

3.7 Indications - Control Room

Mechanical Vertical Panel "A"			
Indication	**Range**	**Normal**	**Indicator**
SW Header 1A Pressure	0-150 psig	90-100 psig	PI-41503
SW Header 1B Pressure	0-150 psig	90-100 psig	PI-41506
SW Pump 1A1 Amps	0-75 amps	30-35 amps	4455701
SW Pump 1A2 Amps	0-75 amps	30-35 amps	4455702
SW Pump 1B1 Amps	0-75 amps	30-35 amps	4455801
SW Pump 1B2 Amps	0-75 amps	30-35 amps	4455802

SI Active Status Panel 44910
Each SW Pump breaker= **CLOSED** (pump running).
SW Header Isolation Valves SW-3A and SW-3B= **CLOSED**.
SW-1306A= **OPEN**, SW-1306B= **OPEN**, and CC-6A, CC-6B= **OPEN**.

SI Active Status Panel 44909
Aux Bldg & Reactor SW Supply Valves SW-10A and SW-10B **not** fully **OPEN**

3.8 Indications - Local

Indication	Range	Indicator
SW Strainer 1A1 DP	0-30 psid	DPI-11021
SW Strainer 1A2 DP	0-30 psid	DPI-11022
SW Strainer 1B1 DP	0-30 psid	DPI-11085
SW Strainer 1B2 DP	0-30 psid	DPI-11086
SW Header 1A Pressure	0-200 psig	PI-11331
SW Header 1B Pressure	0-200 psig	PI-11332
SW Header 1A Temperature	20-220° F	TI-12008
SW Header 1B Temperature	20-220° F	TI-12009
SW Pump 1A1 Brg Lube Pressure	0-30 psig	PI-11355
SW Pump 1A2 Brg Lube Pressure	0-30 psig	PI-11356
SW Pump 1B1 Brg Lube Pressure	0-30 psig	PI-11357
SW Pump 1B2 Brg Lube Pressure	0-30 psig	PI-11358
SW Pump 1A1 PEW Brg Lube Water DP	0-60 psid	DPI-11155J
SW Pump 1A2 PEW Brg Lube Water DP	0-60 psid	DPI-11156J
SW Pump 1B1 PEW Brg Lube Water DP	0-60 psid	DPI-11157J
SW Pump 1B2 PEW Brg Lube Water DP	0-60 psid	DPI-11158J
SW Pressure to SFP Heat Exch	0-200 psig	PI-11154
SW Pressure to CC Heat Exch	0-200 psig	PI-11155

Note: Other specific local instrumentation is for particular equipment that is discussed in the System Description applicable to that equipment.

3.9 Indications - DSP

Indication	Range	Indicator
SW Header 1A Pressure	0-150 psig	P-21005P

3.10 Controls - Control Room

Mechanical Vertical Panel "A"		
Switch Name	**Switch #**	**Switch Function**
SW Pump Preferred Selector switch	ES-46523	Two positions maintained 1A or 1B.
SW Pump 1A1 control switch	ES-46524	**PULLOUT/STOP AUTO START** Spring return to **AUTO** from **START** or **STOP**
SW Pump 1A2 control switch	ES46525	
SW Pump 1B1 control switch	ES-46526	
SW Pump 1B2 control switch	ES-46527	
SW Header 1A Isolation Valve SW-3A	ES-46528	**CLOSE/AUTO/OPEN** Spring return to **AUTO**
SW Header 1B Isolation Valve SW-3B	ES-46832	
Turb Bldg SW Supply & Isolation Valves SW-4A and SW-4B	ES-46516	**ISOL/1A/1B** Three positions maintained
Aux Bldg SW Header A Isolation Valve SW-10A	ES-46554	**CLOSE/BLANK/OPEN,** Spring return to center (**BLANK**)
Aux Bldg SW Header B Isolation Valve SW-10B	ES-46559	**CLOSE/OPEN** Two positions maintained

Mechanical Vertical Panel "A" (Continued)

Switch Name	Switch #	Switch Function
Containment Fan Coil SW Return Valve SW-903A	ES-46509	**CLOSE/AUTO/OPEN** Spring return to **AUTO**
Containment Fan Coil SW Return Valve SW-903B	ES-46510	
Containment Fan Coil SW Return Valve SW-903C	ES-46511	
Containment Fan Coil SW Return Valve SW-903D	ES-46512	
CC Heat Exchanger 1A Supply Valve SW-1300A	ES-46553	**CLOSE/OPEN** Spring return to **CENTER**
CC Heat Exchanger 1B SW Supply Valve SW-1300B	ES-46522	
Turbine Bldg SW ESF Isolation Reset Per DCR 3338	ES-40050	**RESET** Pushbutton

Mechanical Control Console "A"		
Switch Name	**Device**	**Switch Position**
Generator Hydrogen Coolers SW outlet Control Valve SW-2602	Hand Station CS-43001	Controlled by Control Station (No switch)
SW Emergency Supply to AFW Pump 1A, SW-601A	ES-46061	**CLOSE/OPEN** Two position maintained
SW Emergency Supply to AFW Pump 1B, SW-601B	ES-46062	**CLOSE/OPEN** Two position maintained
SW Emergency Supply to Turb Driven AFW Pump, SW-502	ES-46065	**CLOSE/OPEN** Two position maintained

Mechanical Control Console "C"		
Switch Name	**Switch #**	**Switch Function**
Emergency Makeup to CC Surge Tank, SW-1400	ES-46340	**CLOSE/BLANK/OPEN,** Spring return to center (**BLANK**)

All Control Room switches have red (**OPEN**) and green (**CLOSE**) position or pump **ON/OFF** indication lights with the associated control switches.

3.11 Controls – Local

Switch Name	Switch #	Switch Function
SW Strainer 1A1	ES-19478	**HAND/AUTO** Two position
SW Strainer 1A2	ES-19479	
SW Strainer 1B1	ES-19480	
SW Strainer 1B2	ES-19481	
SW Strainer 1A1 Backwash Valve SW-30A1	ES-19410	**CLOSE/OPEN** Switch
	ES-19411	**HAND/OFF/AUTO** Three position
SW Strainer 1A2 Backwash Valve SW-30A2	ES-19412	**CLOSE/OPEN** switch
	ES-19413	**HAND/OFF/AUTO** Three position

Controls – Local (Continued)

Switch Name	Switch #	Switch Function
SW Strainer 1B1 Backwash Valve SW-30B1	ES-19414	**CLOSE/OPEN** switch
	ES-19415	**HAND/OFF/AUTO** Three position
SW Strainer 1B2 Backwash Valve SW-30B2	ES-19416	**CLOSE/OPEN** switch
	ES-19417	**HAND/OFF/AUTO** Three position
Traveling Water Screens 1A1 Test ON Pushbutton PB-19421	ES 19419	Maintenance **ON/OFF** switch
	ES-19418	**HAND/OFF/AUTO** Three Maintained positions
Traveling Water Screens 1A2 Test **ON** Pushbutton PB-19422	ES 19420	Maintenance **ON/OFF** switch
	ES-19418	**HAND/OFF/AUTO** Three Maintained positions
Traveling Water Screens 1B1 Test **ON** Pushbutton PB-19423	ES 19476	Maintenance **ON/OFF** switch
	ES-19475	**HAND/OFF/AUTO** Three Maintained positions
Traveling Water Screens 1B2 Test **ON** Pushbutton PB-19424	ES 19477	Maintenance **ON/OFF** switch
	ES-19475	**HAND/OFF/AUTO** Three Maintained positions
Spent Fuel Pool Heat Exchanger SW Control Valve SW-1601	No Switches	Controlled by Local Temperature Controller TC-26311 (100° F)
Blowdown Tank Spray SW Control Valve SW-2303		Controlled by Local Temperature Controller TC-26306
DG A Heat Exchanger SW Outlet Control Valve SW-301A		Controlled by Solenoid Valve SV-33033 and DG Startup Air, **OPEN** when DG run
DG B Heat Exchanger SW Outlet Control Valve SW-301B		Controlled by Solenoid Valve SV-33034 and DG Startup Air, **OPEN** when DG run

3.12 Control - Dedicated Shutdown Panel (DSP)

Switch Name	Switch #	Switch Function
SW Pump 1A1	ES-87151	**LOCAL/REMOTE** Switch
	ES-87172	**STOP/BLANK/START** Spring return to **BLANK** DSP Control Switch
SW Pump 1A2	ES-87147	**LOCAL REMOTE** Switch
	ES-87149	**STOP/BLANK/START** Spring return to **BLANK** DSP Control Switch
SW Header 1A Isolation Valve SW-3A	ES-87120	**LOCAL/REMOTE** Switch
	ES-87190	**OPEN/CLOSE** Two Position, DSP Control Switch
Turb. Bldg. SW Supply & Isolation Valve SW-4A	ES-87120	**LOCAL/REMOTE** Switch
	ES-87119	**OPEN/CLOSE** Two Position, DSP Control Switch
Aux. Bldg. & Reactor Bldg. SW Supply Valve SW-10A	ES-87122	**LOCAL/REMOTE** Switch
	ES-87121	**OPEN/CLOSE** Two Position, DSP Control Switch

Control - Dedicated Shutdown Panel (DSP) (Continued)

Switch Name	Switch #	Switch Function
Containment Fan Coil SW Return Valve SW-903A	ES-87124	**LOCAL/REMOTE** Switch
	ES-87123	**OPEN/CLOSE** Two Position, DSP Control Switch
Containment Fan Coil SW Return Valve SW-903B	ES-87109	**LOCAL/REMOTE** Switch
	ES-87125	**OPEN/CLOSE** Two Position, DSP Control Switch

All DSP control switches have red (**OPEN**) and green (**CLOSE**) position or pump **ON/OFF** indication lights with the associated control switches.

3.13 Interlocks

Automatic start of the SW pumps on low SW header pressure of 78, 82 and 86 psig, is contingent on the pumps having adequate seal water flow (greater than 0.25 gpm). The Operator may override this interlock by holding the pump control switch to the **ON** position for five (5) seconds

3.14 Alarms - Control Room

Note: See Alarm Response Sheets in Control Room for "setpoint" specifics.

Annun. No	Window Label
47051P	**SW HEADER PRESSSURE LOW**
47052P	**TURBINE BLDG SW HEADER ABNORMAL**
47053P	**SW PUMP BRG SEAL WTR FLOW LOW**
47054P	**SW STRAINER DIFF PRESS HIGH**
47054Q	**TRAVELING WTR SCREEN DP HIGH**
47092I	**BUS 5 FEEDER BKR TRIP**
47092L	**BUS 6 FEEDER BKR TRIP**
47093I	**BUS 5 FEEDER BKR OVERLOAD**
47093L	**BUS 6 FEEDER BKR OVERLOAD**
47051Q	**TURBINE BLDG SERVICE WATER ISOLATION**
47052Q	**TURBINE BLDG SW ISOLATION ALERT**

3.15 Sequence of Events Recorder (SER)

Note: See Alarm Response Sheets in Control Room for "setpoint" specifics.

SER No.	SER Printout
086	TRAVELING WATER SCREENS A DP HIGH
087	TRAVELING WATER SCREENS B DP HIGH
088	CNTMT FAN COIL UNIT A HIGH SW LEAKAGE
089	CNTMT FAN COIL UNIT B HIGH SW LEAKAGE
090	CNTMT FAN COIL UNIT C HIGH SW LEAKAGE
091	CNTMT FAN COIL UNIT D HIGH SW LEAKAGE
092	TURB BLDG SW HDR CONTROL VALVES CLOSED
093	SW HEADER A, LESS THAN 82 PSIG
095	SW PUMP A1 BRG SEAL WTR FLOW LOW
096	SW PUMP A2 BRG SEAL WTR FLOW LOW
097	SW PUMP B1 BRG SEAL WTR FLOW LOW
098	SW PUMP B2 BRG SEAL WTR FLOW LOW

Sequence of Events Recorder (SER) (Continued)

SER No.	SER Printout
099	CW PUMPS TWIN STRAINER DP HIGH
100	SW, STRAINER A1 DIFFERENTIAL PRESS HIGH
101	SW, STRAINER A2 DIFFERENTIAL PRESS HIGH
102	SW STRAINER B1 DIFFERENTIAL PRESS HIGH
103	SW STRAINER B2 DIFFERENTIAL PRESS HIGH
122	SW HDR B LESS THAN 78 PSIG
123	TURB BLDG SW HDR LESS THAN 60 PSIG
124	SW HDR A LESS THAN 72 PSIG
125	SW HDR B LESS THAN 72 PSIG
240	TURB BLDG SW HDR A AIR ACMTR PR LOW
241	TURB BLDG SW HDR B AIR ACMTR PR LOW
283	SW PUMP A1 CONTROL ROOM SWITCH IN PULLOUT
284	SW PUMP A2 CONTROL ROOM SWITCH IN PULLOUT
293	SW PUMP B1 CONTROL ROOM SWITCH IN PULLOUT
294	SW PUMP B2 CONTROL ROOM SWITCH IN PULLOUT
687	SW PUMP A1 BKR 1-506 OVERCURRENT TRIP
688	SW PUMP A2 BKR 1-507 OVERCURRENT TRIP
689	SW PUMP B1 BKR 1-608 OVERCURRENT TRIP
690	SW PUMP B2 BKR 1-609 OVERCURRENT TRIP
691	SW PUMP A1 BKR 1-506 OPEN
692	SW PUMP A2 BKR 1-507 OPEN
693	SW PUMP B1 BKR 1-608 OPEN
694	SW PUMP B2 BKR 1-609 OPEN
839	TURB. BLDG. SWI-A SEAL-IN ACTUATION Per DCR 3338
840	TURB. BLDG. SWI-B SEAL-IN ACTUATION Per DCR 3338
841	SERVICE WATER HEADER A PRESSURE LOW (SWI)
842	SERVICE WATER HEADER B PRESSURE LOW (SWI)

3.16 System Interrelationships

SW System supplies - an emergency source of water to the AFW pumps for controlling Steam Generator water level.

SW System supplies - general cooling water for numerous loads in the following areas:

- Screenhouse and DG Rooms
- Turb Bldg., Aux Bldg.
- Admin Bldg
- Containment Bldg.

SW System supplies – "backup" cooling water to:

- Station and Instrument Air Compressors,
- Various pump seals
- Fire Protection Jockey Pump.

The normal supply to these components is Plant Equipment Water.

Instrument Air System - The Instrument Air System provides the motive force for air operated valves and pneumatic control features.

SI or low SW header pressure - During an SI or low SW header pressure condition, SW headers A and B are automatically isolated by closing the separation valves (SW-3A and SW-3B). At the same time, all four SW pumps and rotating strainers start.

SI & Low Header Pressure – During an SI (only) sequence (Step 9) and Low SW Header Pressure (82.5 psig) condition, the open Turb. Bldg. SW Header Control Valves SW-4A or SW-4B will automatically close, and both Valves SW-4A and SW-4B are blocked from re-opening until SW header pressure is restored and the Turb. Bldg. SW Isolation signal is reset. Per DCR 3338

CW System - SW returns are directed to the CW System discharge.

AFW Pumps - Should the supply of water from the Condensate Storage Tanks fail for any reason, the AFW pumps receive water from the SW header when normally closed motor operated valves (MOVs) are opened from the Control Room.

4.0 Precautions and Limitations

Irradiated Fuel on Site - The SW System shall be in operation whenever irradiated fuel is on plant site.

SW pump OOS - When one SW pump is taken out of service, its respective train shall be considered inoperable and TS 3.3.e.2 applied. No other components serviced by the affected train of SW need to be declared inoperable, however, all opposite train components shall be maintained operable.

R-16 or R-20 OOS - If Radiation Detector R-16 or R-20 is out of service, effluent releases via these pathways may continue provided that grab samples are collected and analyzed for gross radioactivity at least once every 12 hours per Offsite Dose Calculation Manual (ODCM) Table 3.1.

Fire Protection - Service Water provides the required fire protection for various ventilation system charcoal filters and fire hose stations. Refer to the Fire Plan prior to removing the SW System from service.

Minimum Flow Rates - Ensure that each SW pump is operated at flow rates of greater than 1800 gpm.

5.0 References

1.0 Summary	USAR 9.6.2 T.S. 3.3.e	TS 3.3.C.1 EPIP's	A-SW-02 E-SW-02	N-SW-02 N-SW-02-CL
2.0 Function	USAR 9.6.2			
3.0 Design Description	USAR 9.6.2, USAR 9.6.9 T.S. 3.3.e, ODCM Table 3.1,		OPERM-202, M-547, M-588, M-606 E-160 through E-1633, 3-3174	
	For DCR's associated with System 02, see: **Start\Apps\Modifications\Modifications Database\DCR Search\Sys 02s**			

4.0 Precautions & Limitiations	TS 3.3.e, N-SW-02 TS 3.3.e.2 ODCM Table 3.1.
5.0 References	TS 3.3, TS 3.3.e, and Table 7.1
6.0 Procedures	See a controlled copy of KPS procedures
7.0 Appendices	See attached Figures

5.2 Technical Specifications (TS)

Note: Refer to a controlled copy of the Technical Specification for specifics.

TS 3.3 The SW System is part of the Engineered Safety Features and Auxiliary Systems. This TS Section defines those limiting conditions for operation.

TS 3.3.e The Reactor shall **not** be made critical unless identified SW system conditions are satisfied.

TS Table 7.1 Deleted, See ODCM Table 3.1, entitled: "RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION"

6.0 Procedures

See a controled copy of KPS procedures

7.0 Appendices

7.1 Attached Figures

Figure No.	Title	KNP DWG's
KNP-SW01	Service Water 1	OperM-202-1
KNP-SW02	Service Water 2	OperM-202-3
KNP-SW03	Service Water 3	OperM-202-2
KNP-SW04	SW Logic – SW Pump Control / SW Pump 1A1	E-1630
KNP-SW05	SW Logic – Traveling Water Screenss 1A1 & 1A2	E-1631
KNP-SW06	Major Valves Control Logic	E-1630, 1632, 1633
KNP-SW07	Strainer Backwash Control Logic	E-1631, 1632, 1633
KNP-SW08	CRDM Shroud Cooling Valve Logic	E-3174
KNP-SW09	Containment Fan Coil Service Water Valves	E-1632

Note: The "Figures" (drawings) previously associated with the System Descriptions are **not** being revised and updated at this time. Instead (obsolete) copies of these Figures have been watermarked **HISTORICAL** and temporarily attached. These Figures will be revised and replaced when resources become available.

REVISION TRACKING AND PROCESSING RECORD FOR SYSTEM DESCRIPTIONS

Initiated By: Gerald I Zwarich Date: 8/8/07 Dept: S&L Ext.: 8317

System No: 02 System Title: Service Water System (SW)

Current Revision No. 03 New Revision No.: 04 9-20-07

No.	DESCRIPTION OF CHANGE	REASON FOR CHANGE
1.	Sub-Section 3.2.1 - Added statement that Cuno duplex filters are added to the normal bearing water supply going to the SW Pump bearings	These are added by DCR 3695
2.	Sub-Section 3.8, Table of Local Indications - Added the Differential Pressure Indicators for each of the SW Pump normal bearing water supply Cuno filters.	These are added by DCR 3695
3.	Changed template format to make it more readable for scanning purposes	The dark descriptions in the heading made it difficult to scan readable documents. These changes will be made to all the system descriptions as they come through revision. – LB
4.	Changed KNPP to KPS	New title for station resulting from Dominion purchase of plant. – LB
5.		
6.		
7.		

OCT 04 2007

Review and Approval Required Signatures:

	Print	Sign	Date
☒ Technical Review	DWIGHT VORPAHL	/	9/13/07
☒ Operations Review	Kristopher Lohmuller	/	9/28/07
☒ Engineering Manager Approval	Stewart Yuen	/	10/1/07

Kewaunee Power Station
Potable Water Usage Documentation

End of Month Reading

Month	Well 1A	Well 1B	Monthly Usage Well 1A	Monthly Usage Well 1B	Reading Date	Total Usage (gals)	# of days	Average usage per day	Average usage per hr	Average usage per min
Aug-07	82,724,530	236,372	N/A	N/A	8/30/07 0:00					
Sep-07	84,833,995	236,656	2,109,465	284	9/28/07 0:00	2,109,749	29.0	72,750	3031	50.5
Oct-07	87,225,258	253,995	2,391,263	17,339	10/31/07 0:00	2,408,602	33.0	72,988	3041	50.7
Nov-07	89,364,537	253,995	2,139,279	0	11/30/07 0:00	2,139,279	30.0	71,309	2971	49.5
Dec-07	91,222,924	254,430	1,858,387	435	12/31/07 14:30	1,858,822	31.6	58,816	2451	40.8
Jan-08	93,470,721	254,430	2,247,797	0	1/31/08 14:00	2,247,797	31.0	72,558	3023	50.4
Feb-08	95,664,340	254,430	2,193,619	0	2/29/08 13:30	2,193,619	29.0	75,696	3154	52.6
Mar-08		114,874	-95,664,340	-139,556		-95,803,896	-39507.6	2,425	101	1.7
Apr-08		114,874	0	0		0	0.0	#DIV/0!	#DIV/0!	#DIV/0!
May-08	95,981,950	114,874			5/29/08 14:20					
Jun-08	95,981,950	114,874	0	0	6/4/08 9:30	0	5.8	0	0	0.0
Jun-08	95,981,950	114,874	0	0	6/27/08 9:30	0	23.0	0	0	0.0
Jul-08	95,981,951	114,873	1	-1	8/5/08 11:30	0	39.1	0	0	0.0
Aug-08	95,981,951	114,873	0	0	8/26/08 12:30	0	21.0	0	0	0.0
Sep-08	96,018,928	605,695	36,977	490,822	9/30/08 11:45	527,799	35.0	15,093	629	10.5
Oct-08	96,048,916	605,695	29,988	0	10/31/08 11:00	29,988	31.0	968	40	0.7
Nov-08	96,048,918	605,695	2	0	11/26/08 11:00	2	26.0	0	0	0.0
Dec-08	96,121,917	666,110	72,999	60,415	12/31/08 10:30	133,414	35.0	3,814	159	2.6
Jan-09	96,121,917	666,725	0	615	1/30/09 11:00	615	30.0	20	1	0.0
Feb-09	96,121,928	666,725	11	0	2/27/09 0:30	11	27.6	0	0	0.0

New totalizers installed on both pumps in March 2009. "A" totalizer installed on 3/2/09 and "B" installed 3/3/09.

Mar-09	60,484	23	60,484	23	3/3/09 14:20	Startup documentation.				
Mar-09	1,688,654	23	1,628,170	0	3/31/09 15:15	1,628,170	28.0	58,070	2420	40.3
Apr-09	2,313,528	1,135,989	624,874	1,135,966	4/30/09 14:15	1,760,840	30.0	58,776	2449	40.8
May-09										
Jun-09										
Jul-09										
Aug-09										
Sep-09										
Oct-09										
Nov-09										
Dec-09										
Jan-10										
Feb-10										

NOTES

From Aug-07 to Jun-08, well 1B was not being used due to leakage.
The readings for March and April of 2008 were not readable due to fogging of the meter glass.
On June 4, 2008, the wells were repaired and both are being used for plant potable water.
Both well meters have failed after their last repair on June 4, 2008.
New totalizers installed on both pumps in March 2009. "A" totalizer installed on 3/2/09 and "B" installed 3/3/09.

Dominion®

Memorandum

January 11, 2008

To: Richard Gallagher
Company: Dominion
Department: Nuclear Projects—Kewaunee License Renewal
Location: Millstone Power Station

From: Thomas Hooker
Company: Dominion
Department: Nuclear Projects
Location: Kewaunee Power Station

Groundwater Usage at KPS

At your request, I have taken Deep Well Pump Readings on five occasions between October, 2006 and September 2007. The purpose of these readings has been to derive average groundwater usage, for use in the Kewaunee License Renewal Environmental Report. It is my understanding that these readings are being used as an independent backup to monthly totalizer readings to verify usage.

To perform these calculations, I derived pump rates using manufacturer flow curves, referenced against measured pump pressure. During each sampling event, I determined the amount of time the pump was actually on, based on Control Room instrumentation, average pump pressure based on local discharge pressure gauges, and calculated gallon per minute (gpm) usage, based on total elapsed time. During these five sampling periods, average flow ranged from 25.4 gpm to 60.8 gpm, as shown in the table below.

Date	Total Flow (Gallons)	Total Elapsed Time (Minutes)	Average Usage (Gallons/Minute)
10/03/06	1669.2	65.58	25.4
11/06/06	2062.3	61	33.8
1/18/07	3154.8	66	47.8
2/08/07	3146	59.5	52.8
2/09/07	3133	60.75	52
9/19/07	3998	65.75	60.8

DNR Drinking Water System: High Capacity Wells

DNR Approval Number	WI Unique Well No	DNR Region	County	Basin	Owner	Owner Phone	Operator	Well Name	Operator Phone	Approved Date (mm/dd/yyyy)	Driller License No
50802	BE601	Northeast Region	Kewaunee	Twin-Kewaunee River	DOMINION ENERTY KEWAUNEE, INC	920-388-2560	DOMINION ENERTY KEWAUNEE, INC	SOUTH WELL-1B	920-388-2560	01/26/1968	358
50803	BE602	Northeast Region	Kewaunee	Twin-Kewaunee River	DOMINION ENERTY KEWAUNEE, INC	920-388-2560	DOMINION ENERTY KEWAUNEE, INC	NORTH WELL - 1A	920-388-2560	01/26/1968	358

Records 1 to 2 of 2

Last Revised: 11/29/2007

dnr.wi.gov

Help | Reports

DNR Drinking Water System: High Capacity Wells

Enter query criteria for DNR Drinking Water System: High Capacity Wells

DNR Approval Number:

WI Unique Well No:

DNR Region:

County:
Adams
Ashland
Barron
Bayfield
Brown
Buffalo

Water Basin:
011 - Rock River (upper)
012 - Rock River (lower)
020 - Fox River

W.G. & N.H. Log #:

Owner: Dominion

Owner City:

Operator:

Operator City:

Township:
1
2
3
N

Range:
1
2
3

Range direction:

Section:
1
2
3

Quarter Section:
Northeast
Southeast
Southwest

Classification:

	Industrial Irrigation Miscellaneous
Status:	
Chief Aquifer:	Sand and/or Gravel Limestone or Dolomite Granite
Approved Date:	*CAL* to *CAL* mm/dd/yyyy
Completed Date:	*CAL* to *CAL* mm/dd/yyyy
Normal pumpage:	gpd
Pump Capacity:	to gpm
Well Depth:	to feet
Drilling Method:	Caisson Cable Tool Rotary Hammer and Air
Yield Test Pump Rate:	to gpm
Static Water Level:	to feet
Pumping Water Level:	to feet
Specific Capacity:	to gpm/foot

Find Clear

Last Revised: 11/29/2007

DNR Drinking Water System: High Capacity Wells

DNR Approval Number:	50802	**WI Unique Well No:**	BE601
DNR Region:	Northeast	**County:**	Kewaunee
Water Basin:	080 - Twin-Kewaunee River	**DNR Facility ID:**	
Operator's Well ID:	001	**Owner's Well Id:**	001
W.G. & N.H. Log #:		**Grid address:**	
Owner:	DOMINION ENERTY KEWAUNEE, INC	**Owner Address:**	N490 STH 42
Owner City:	KWAUNEE	**Owner State:**	WI
Owner Phone:	920-388-2560	**Operator:**	DOMINION ENERTY KEWAUNEE, INC
Operator Address:	N490 STH 42	**Operator City:**	KWAUNEE
Operator State:	WI	**Well Name:**	SOUTH WELL-1B
Operator Phone:	920-388-2560	**Well Town:**	CARLTON
Well address:		**Well Mailing City:**	
County Approval No:	0002	**File Ref. #:**	31-3-0002
Township:	22 **N**	**Range:**	24 E
Section:	25	**Quarter Section:**	Southwest
Quarter-Quarter:	Southwest	**Government Lot No:**	
Classification:	Industrial	**Status:**	APPROVED existing well
Chief Aquifer:	Limestone or Dolomite	**Approved Date:**	01/26/1968 **mm/dd/yyyy**
Completed Date:	03/27/1968 **mm/dd/yyyy**	**Driller:**	REYNEN JOSEPH
Driller License No:	358	**Normal pumpage:**	65000 **gpd**

Maximum Pumpage:	180000 **gpd**	**Pump Capacity:**	**gpm**
Gravel Pack:		**Well Depth:**	310 **feet**
Depth to Rock:	80 **feet**	**Type of Rock:**	
Multiple Aquifers:	N	**Drilling Method:**	
Enlarged Drillhole Depth:	95 **feet**	**Enlarged Drillhole Diameter:**	16 **inches**
Lower Drillhole Diameter:	10 **inches**	**Lower Drillhole Length:**	155 **feet**
More than 2 drillholes:	N	**Primary Casing Diameter:**	16 **inches**
Primary Casing Depth:	81 **feet**	**Liner Casing Diameter:**	10 **inches**
Liner Casing Length:	95 **feet**	**Liner Casing Depth:**	**feet**
Screen Diameter:	**inches**	**Screen Length:**	**feet**
Screen Type:		**Sealing Material Type:**	Cement Grout
Sealing Material Depth:	95 **feet**	**Yield Test Time:**	12 **Hours**
Yield Test Pump Rate:	204 **gpm**	**Static Water Level:**	34 **feet**
Pumping Water Level:	290 **feet**	**Specific Capacity:**	.8 **gpm/foot**

Geologic Formations

No Records returned

Annual Well Pumpage (gallons)

Pumpage Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1989	3,313,233	68,366	138,283	572,905	184,775	83,025	136,761	161,524	147,231	55,644	125,450	122,125
1988	133,246	54	113,692	684,644	185,274	0	249,082	113,155	122,828	715,412	109,355	85,888
1987	99	66,899	104,373	0	213,949	96,404	104,336	27,504	124,505	38,407	147,843	85,325
1986	103,819	103,838	66,156	30,788	1	0	0	0	100	0	199,966	128,577
1985	109,076	125,384	467,730	193,061	88,192	231,242	0	165,171	94,683	181,436	83,971	57,338
1984	27,122	9,632	98,767	99	25,782	302,665	29,381	264,736	128,850	169,840	109,270	32,496
1983	111,088	87,910	88,237	11,099	494,254	258,696	169,024	194,471	208,573	0	23,425	342,047
1982	178,977	1	73,035	149,378	417,486	224,492	87,146	0	112,625	77,904	75,920	81,339

1981	106,411	118,616	170,623	88,341	154,493	154,493	295,664	609,237	192,532	349,984	171,274	417,310
1980	23,200	117,000	97,000	125,500	0	412,100	178,200	183,000	0	156,000	254,717	63,307
1979	71,766	204,000	118,100	112,000	164,800	600	95,700	600	238,200	116,200	148,300	55,900
1978	90,000	387,200	108,400	191,100	322,800	1,500	1,200	147,200	38,850	38,850	71,767	71,766
1977	0	0	0	0	0	0	0	0	179,400	90,000	90,000	90,000

Download

- **Other DNR information on this Well**
  - Groundwater Retrieval Network Data

Last Revised: 11/29/2007

DNR Drinking Water System: High Capacity Wells

DNR Approval Number:	50803	**WI Unique Well No:**	BE602
DNR Region:	Northeast	**County:**	Kewaunee
Water Basin:	080 - Twin-Kewaunee River	**DNR Facility ID:**	
Operator's Well ID:	002	**Owner's Well Id:**	002
W.G. & N.H. Log #:		**Grid address:**	
Owner:	DOMINION ENERTY KEWAUNEE, INC	**Owner Address:**	N490 STH 42
Owner City:	KWAUNEE	**Owner State:**	WI
Owner Phone:	920-388-2560	**Operator:**	DOMINION ENERTY KEWAUNEE, INC
Operator Address:	N490 STH 42	**Operator City:**	KWAUNEE
Operator State:	WI	**Well Name:**	NORTH WELL - 1A
Operator Phone:	920-388-2560	**Well Town:**	CARLTON
Well address:		**Well Mailing City:**	
County Approval No:	0002	**File Ref. #:**	31-3-0002
Township:	22 **N**	**Range:**	24 E
Section:	25	**Quarter Section:**	Southwest
Quarter-Quarter:	Southwest	**Government Lot No:**	
Classification:	Industrial	**Status:**	APPROVED existing well
Chief Aquifer:	Limestone or Dolomite	**Approved Date:**	01/26/1968 **mm/dd/yyyy**
Completed Date:	05/27/1968 **mm/dd/yyyy**	**Driller:**	REYNEN JOSEPH
Driller License No:	358	**Normal pumpage:**	65000 **gpd**

Maximum Pumpage:	180000 **gpd**	**Pump Capacity:**	**gpm**
Gravel Pack:		**Well Depth:**	320 **feet**
Depth to Rock:	80 **feet**	**Type of Rock:**	Limestone or Dolomite
Multiple Aquifers:	N	**Drilling Method:**	
Enlarged Drillhole Depth:	95 **feet**	**Enlarged Drillhole Diameter:**	16 **inches**
Lower Drillhole Diameter:	10 **inches**	**Lower Drillhole Length:**	225 **feet**
More than 2 drillholes:	N	**Primary Casing Diameter:**	16 **inches**
Primary Casing Depth:	81 **feet**	**Liner Casing Diameter:**	10 **inches**
Liner Casing Length:	113 **feet**	**Liner Casing Depth:**	95 **feet**
Screen Diameter:	**inches**	**Screen Length:**	**feet**
Screen Type:		**Sealing Material Type:**	Cement Grout
Sealing Material Depth:	95 **feet**	**Yield Test Time:**	12 **Hours**
Yield Test Pump Rate:	380 **gpm**	**Static Water Level:**	34 **feet**
Pumping Water Level:	145 **feet**	**Specific Capacity:**	3.4 **gpm/foot**

Geologic Formations

No Records returned

Annual Well Pumpage (gallons)

Pumpage Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1989	229,503	101,303	258,797	131,035	123,870	130,260	113,821	86,149	128,740	251,460	134,275	138,330
1988	266,628	161,272	171,782	44,221	105,561	0	186,406	100	155,052	84,812	103,960	94,012
1987	144,265	132,954	220,556	680,486	261,959	166,901	107,352	276,904	59,448	263,363	134,437	170,352
1986	130,515	146,817	181,378	227,649	219,586	128,752	29,857	185,407	116,036	0	35,408	98,120
1985	17,819	86,697	726	415,386	193,935	419,966	103,338	259,401	102,555	113,596	152,004	140,949
1984	125,230	178,481	144,623	420,045	359,938	0	254,981	3,011	197,309	117,376	130,904	258,548
1983	73,148	127,439	122,484	375,871	76	60,793	54,368	0	149,225	101,391	213,942	65,660
1982	344,129	136,514	129,474	100,937	0	9,559	119,960	167,353	40,338	75,736	121,394	66,722

1981	69,989	108,062	128,744	219,831	200,766	200,766	141,859	24,946	141,278	147,739	367,485	18,250
1980	186,296	164,400	167,400	112,800	0	322,600	65,500	118,500	0	135,700	196,486	29,011
1979	45,433	600	43,400	211,100	6,900	310,300	107,800	127,600	73,900	0	30,700	127,200
1978	*70,000*	*301,500*	*95,600*	*55,900*	*62,700*	*124,700*	*158,300*	*37,500*	*107,750*	*107,750*	*45,433*	*45,433*
1977	0	0	0	0	0	0	0	0	47,100	70,000	70,000	70,000

Download

- **Other DNR information on this Well**
  - Groundwater Retrieval Network Data

Last Revised: 11/29/2007