

# THERMAL REMEDIATION FOR SOLVENTS RECOVERY SERVICES OF NEW ENGLAND, INC. (SRSNE) SUPERFUND SITE SOUTHINGTON, CT



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DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE
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SITE LOCATION



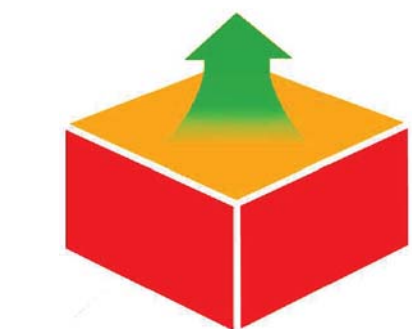
AERIAL VIEW – SRSNE SUPERFUND SITE

SITE LOCATION



STREET MAP – SOUTHTON, CT

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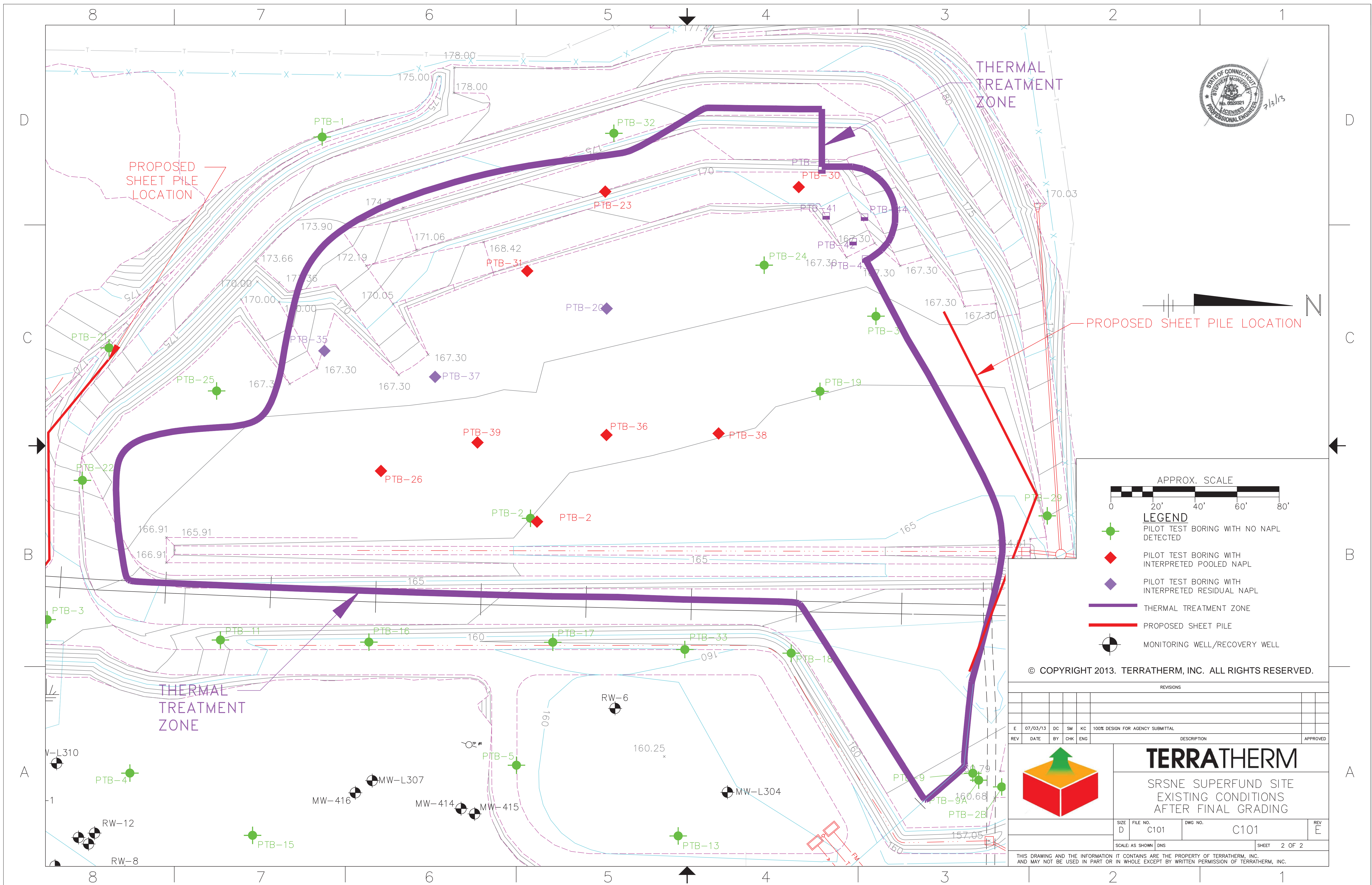


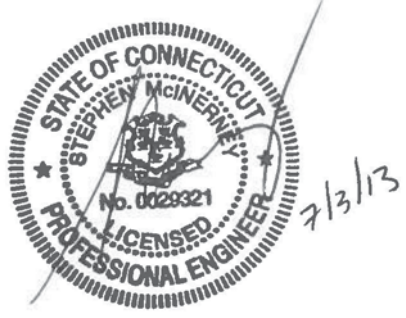
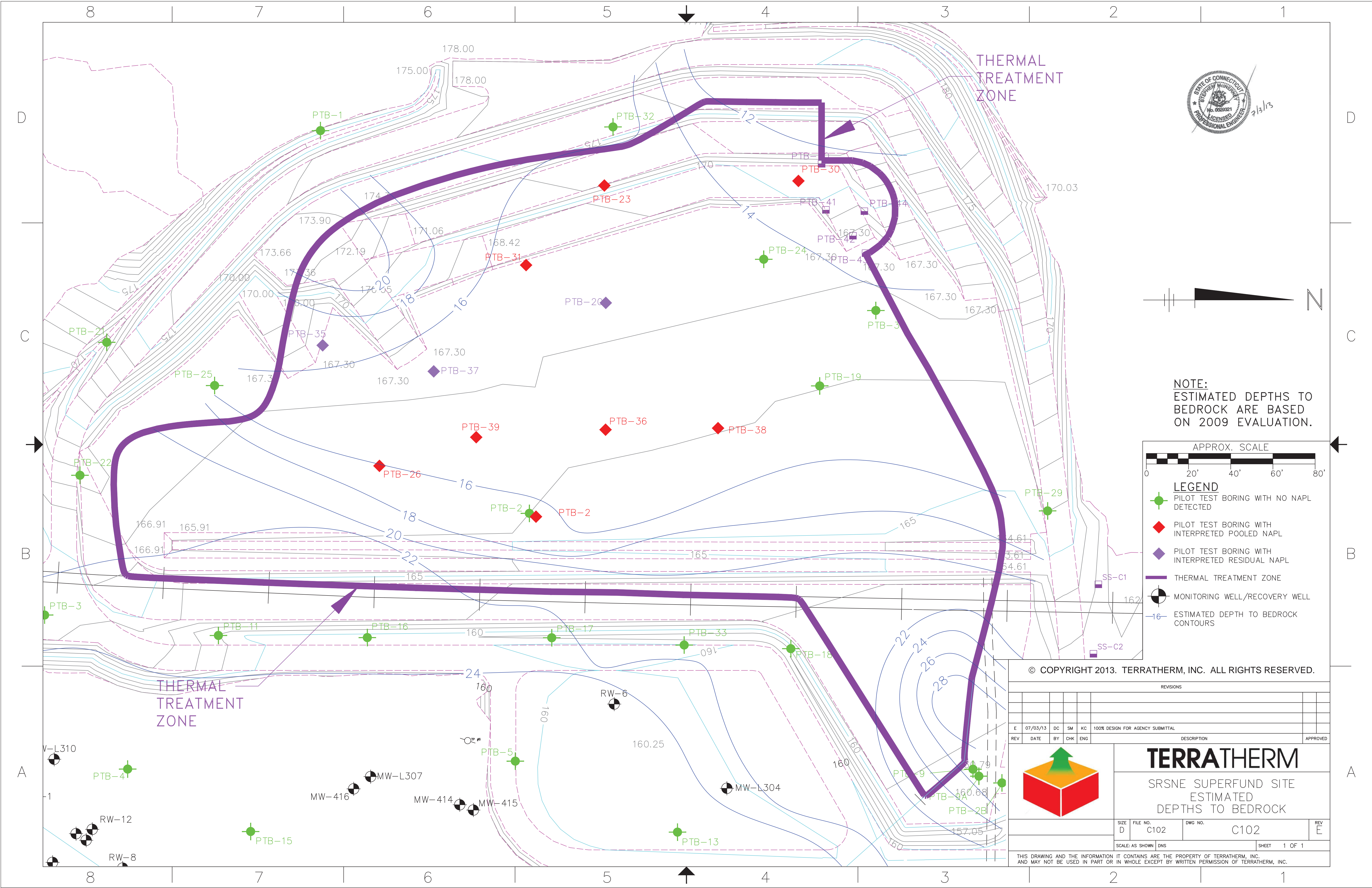
**TERRATHERM**

SRSNE SUPERFUND SITE  
DRAWING INDEX & LOCATION MAP

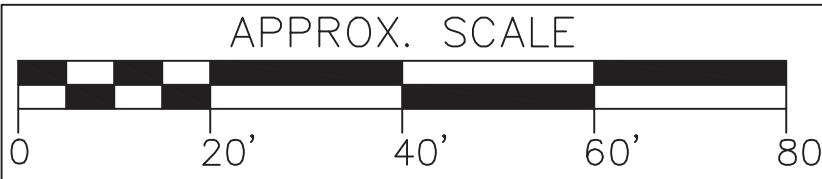
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SCALE: NTS	DNS	DSN	SHEET 1 OF 1
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NOTE:  
ESTIMATED DEPTHS TO  
BEDROCK ARE BASED  
ON 2009 EVALUATION.



LEGEND

- PILOT TEST BORING WITH NO NAPL DETECTED
- PILOT TEST BORING WITH INTERPRETED POOLED NAPL
- PILOT TEST BORING WITH INTERPRETED RESIDUAL NAPL
- THERMAL TREATMENT ZONE
- MONITORING WELL/RECOVERY WELL
- ESTIMATED DEPTH TO BEDROCK CONTOURS

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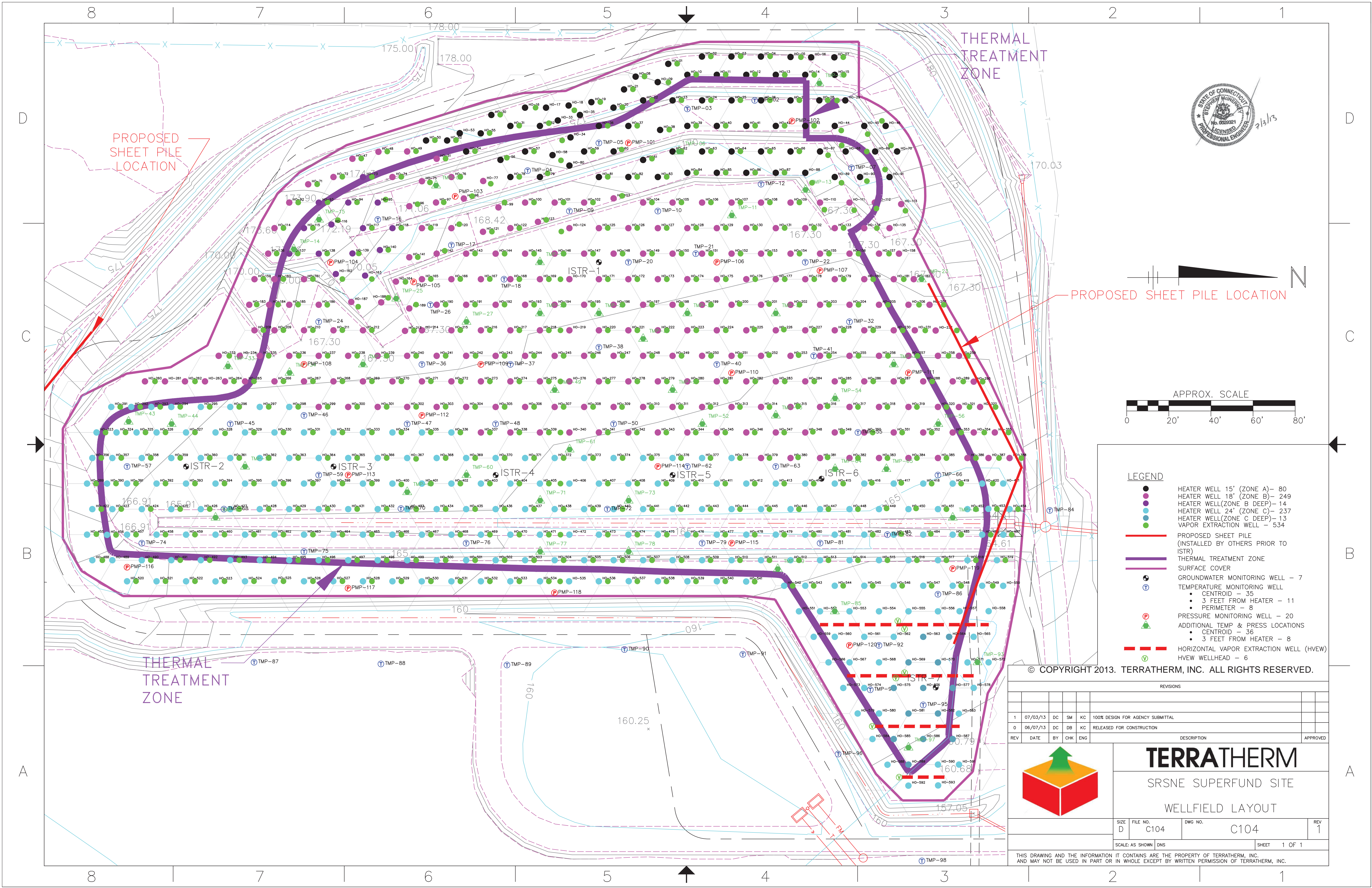
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REV	DATE	BY	CHK	ENG	DESCRIPTION				APPROVED

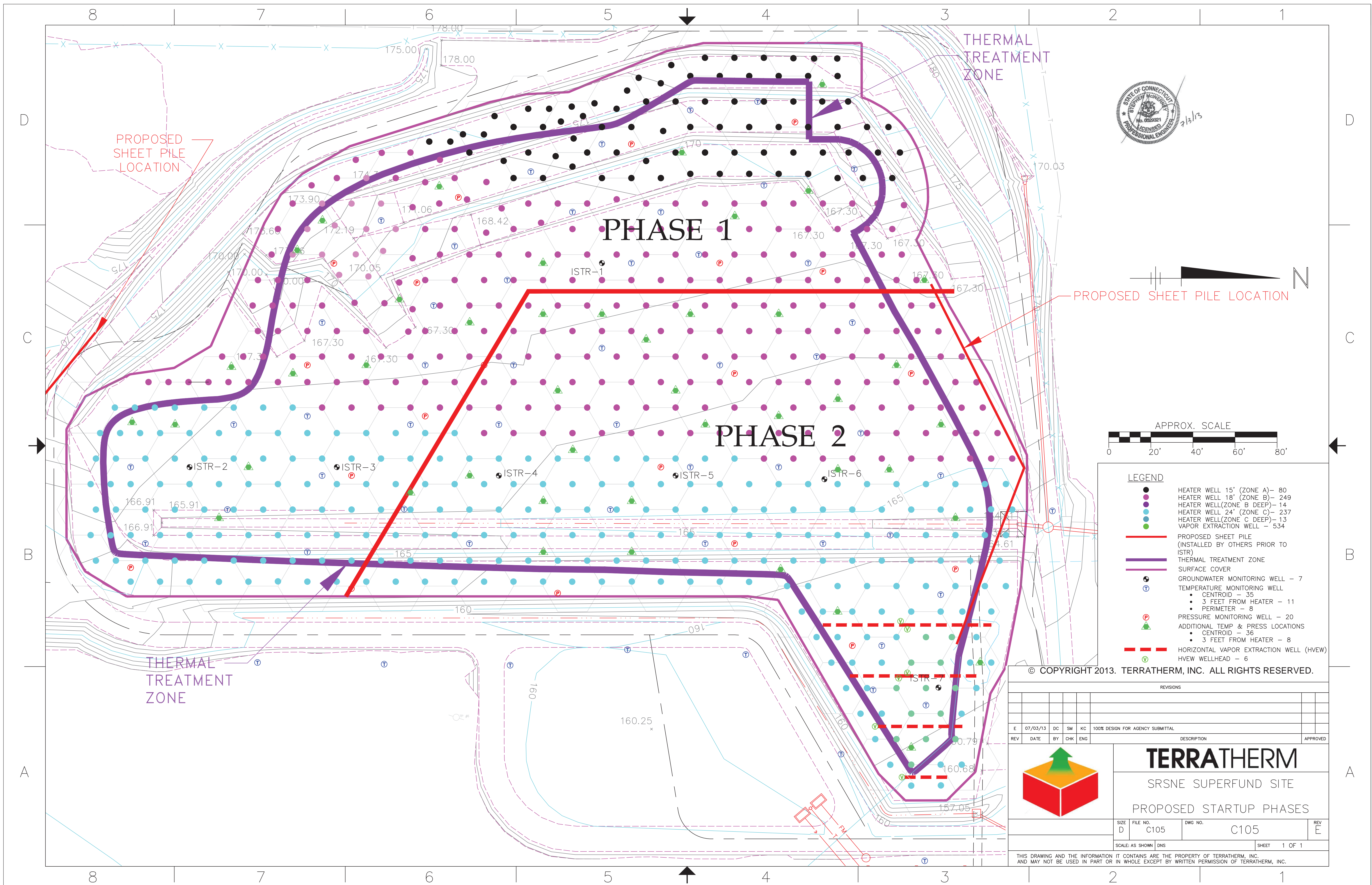
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SRSNE SUPERFUND SITE  
ESTIMATED  
DEPTHS TO BEDROCK

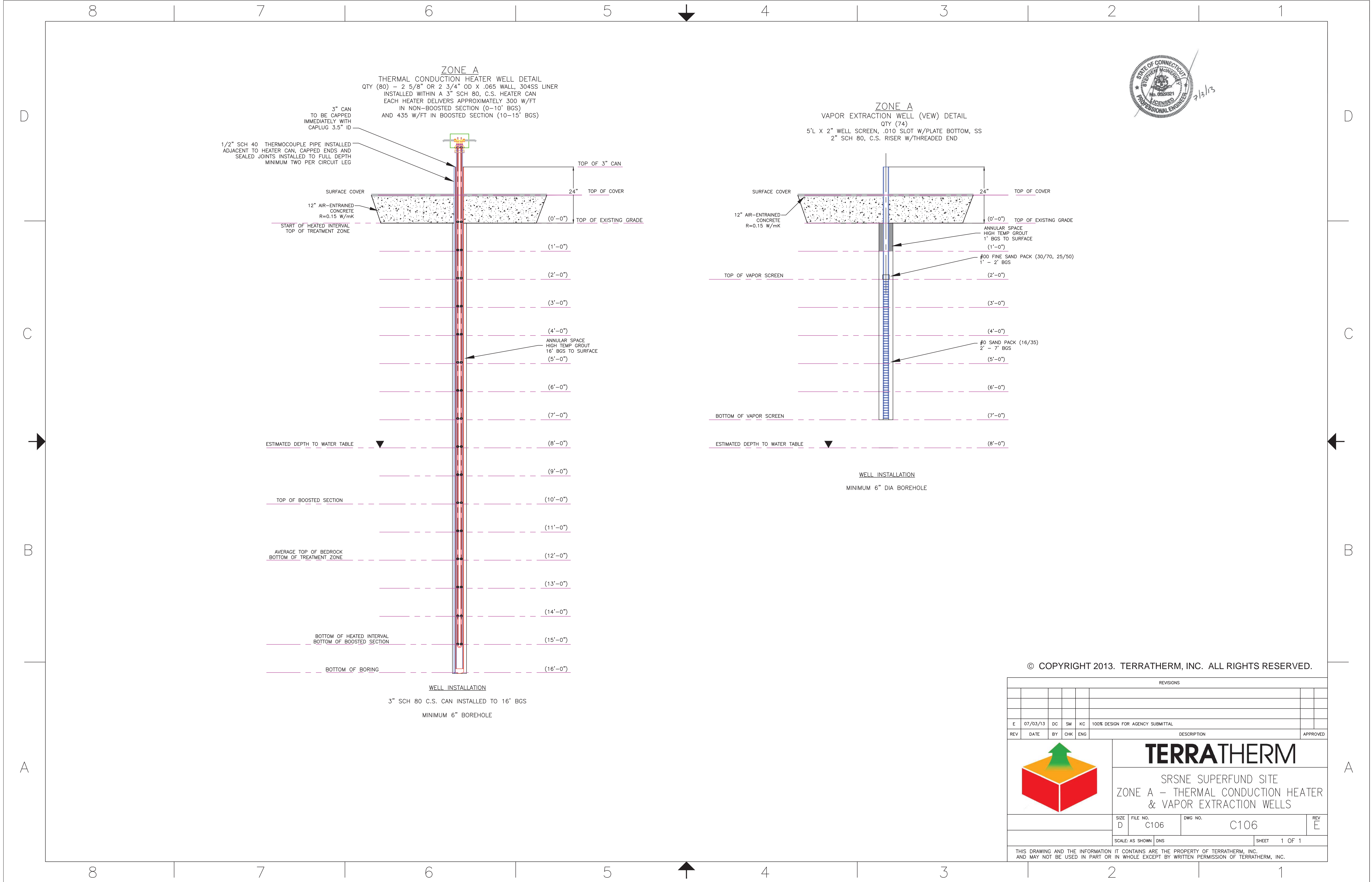
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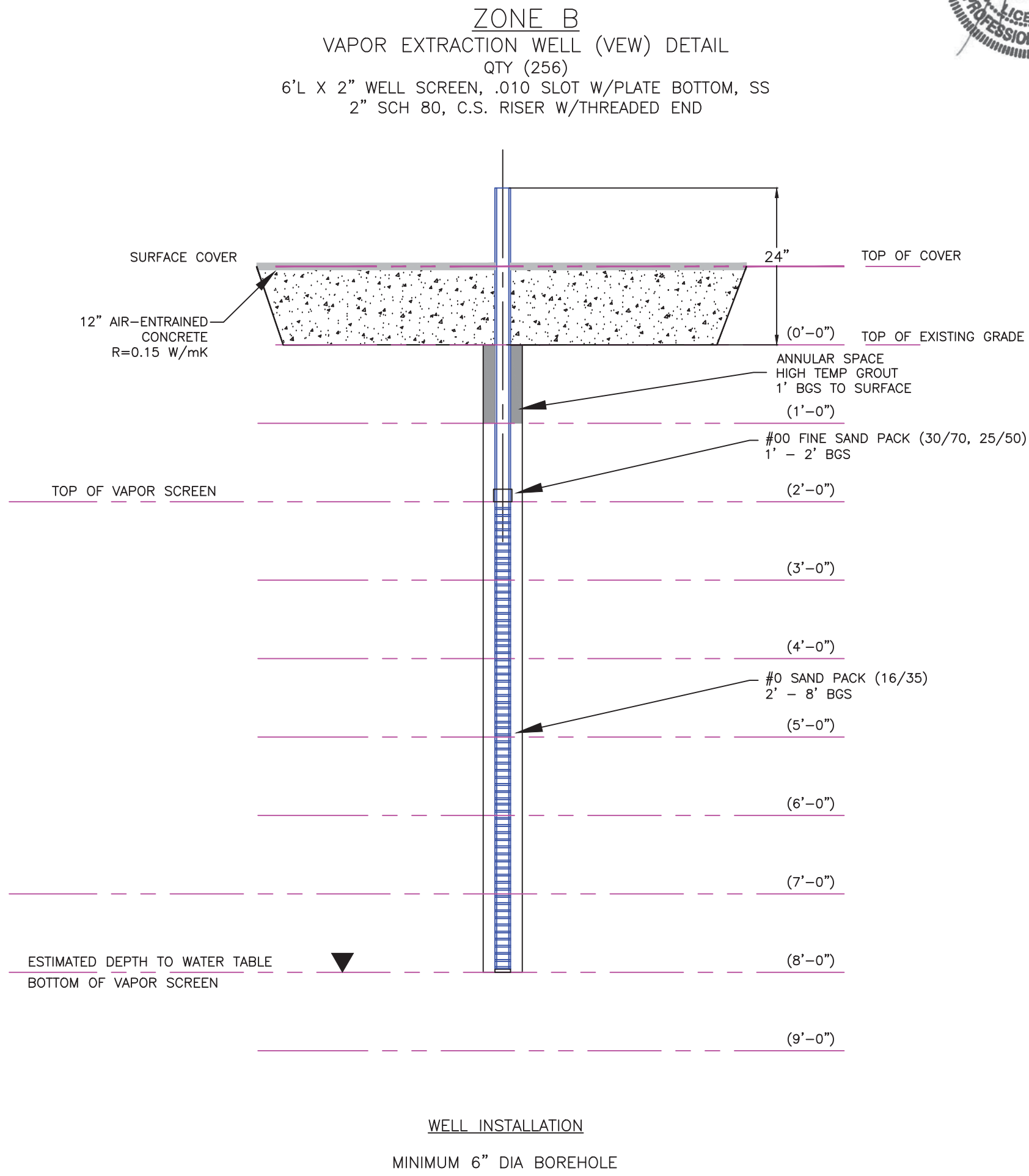
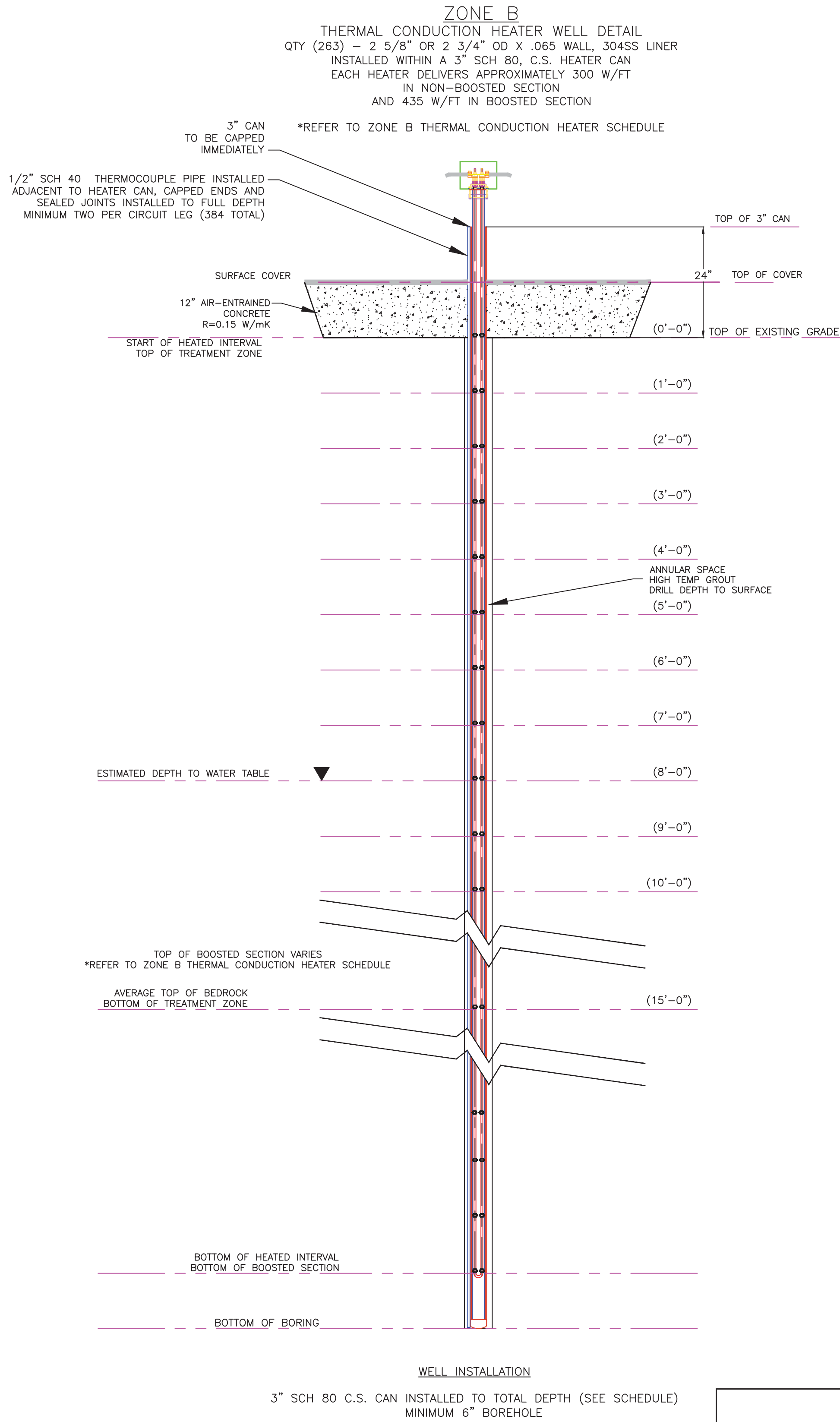
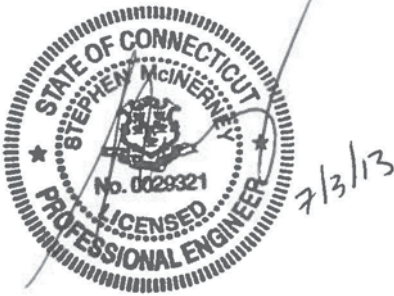








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					<div>TERRATHERM</div> <div>SRSNE SUPERFUND SITE ZONE A – THERMAL CONDUCTION HEATER &amp; VAPOR EXTRACTION WELLS</div>				
					SIZE D	FILE NO. C106	DWG NO. C106		REV E
					SCALE: AS SHOWN   DNS			SHEET   1   OF   1	
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ZONE B THERMAL CONDUCTION HEATER SCHEDULE								
WELL TYPE	HEATER TYPE	QUANTITY	BOTTOM OF HEATER BGS	NON-BOOSTED INTERVAL	BOOSTED INTERVAL	BOTTOM OF BORING BGS	HEATER CAN LENGTH	SS LINER LENGTH
ZONE B	18	249	18'-0"	0'-0" - 12'-0"	12'-0" -18'-0"	19'-0"	21'-0"	21'-8"
ZONE B - DEEP	20	6	20'-0"	0'-0" - 14'-0"	14'-0" -20'-0"	21'-0"	23'-0"	23'-8"
ZONE B - DEEP	21	5	21'-0"	0'-0" - 15'-0"	15'-0" -21'-0"	22'-0"	24'-0"	24'-8"
ZONE B - DEEP	22	3	22'-0"	0'-0" - 16'-0"	16'-0" -22'-0"	23'-0"	25'-0"	25'-8"

NOTE:  
CUSTOM WELL INSTALLATION FOR  
(14) ZONE B WELLS  
AS SHOWN ON DRAWING C104

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**TERRATHERM**  
SRSNE SUPERFUND SITE  
ZONE B – THERMAL CONDUCTION HEATER  
& VAPOR EXTRACTION WELLS

SIZE D	FILE NO. C107	DWG NO. C107	REV E
SCALE: AS SHOWN		DNS	SHEET 1 OF 1

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D

C

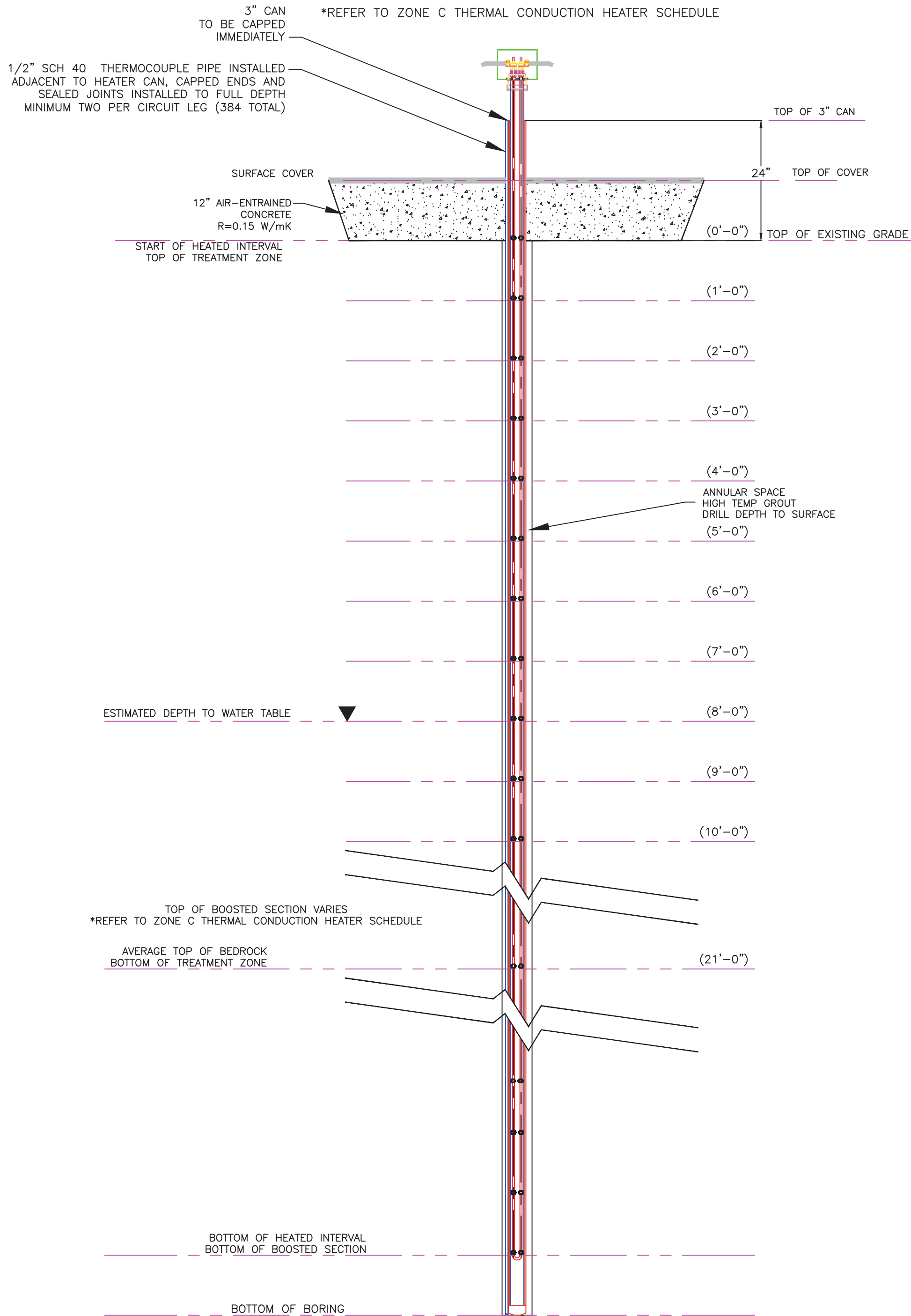
B

A

ZONE C

THERMAL CONDUCTION HEATER WELL DETAIL  
QTY (250) - 2 5/8" OR 2 3/4" OD X .065 WALL, 304SS LINER  
INSTALLED WITHIN A 3" SCH 80, C.S. HEATER CAN  
EACH HEATER DELIVERS APPROXIMATELY 300 W/FT  
IN NON-BOOSTED SECTION  
AND 435 W/FT IN BOOSTED SECTION

\*REFER TO ZONE C THERMAL CONDUCTION HEATER SCHEDULE



WELL INSTALLATION

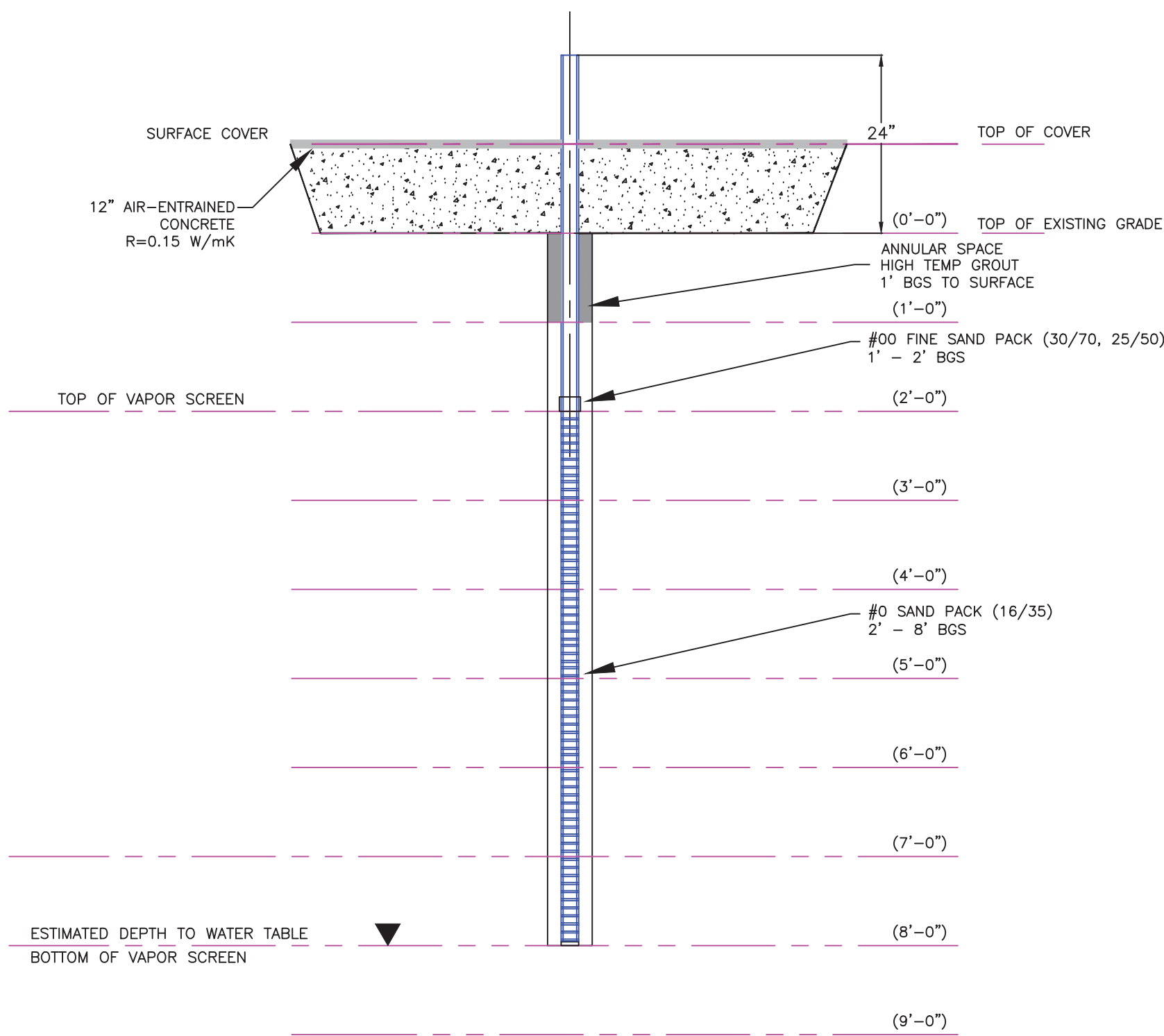
3" SCH 80 C.S. CAN INSTALLED TO TOTAL DEPTH (SEE SCHEDULE)  
MINIMUM 6" BOREHOLE

NOTE:  
CUSTOM WELL INSTALLATION FOR  
(13) ZONE C WELLS  
AS SHOWN ON DRAWING C104

ZONE C

VAPOR EXTRACTION WELL (VEW) DETAIL

QTY (204)  
6" L X 2" WELL SCREEN, .010 SLOT W/PLATE BOTTOM, SS  
2" SCH 80, C.S. RISER W/THREADED END



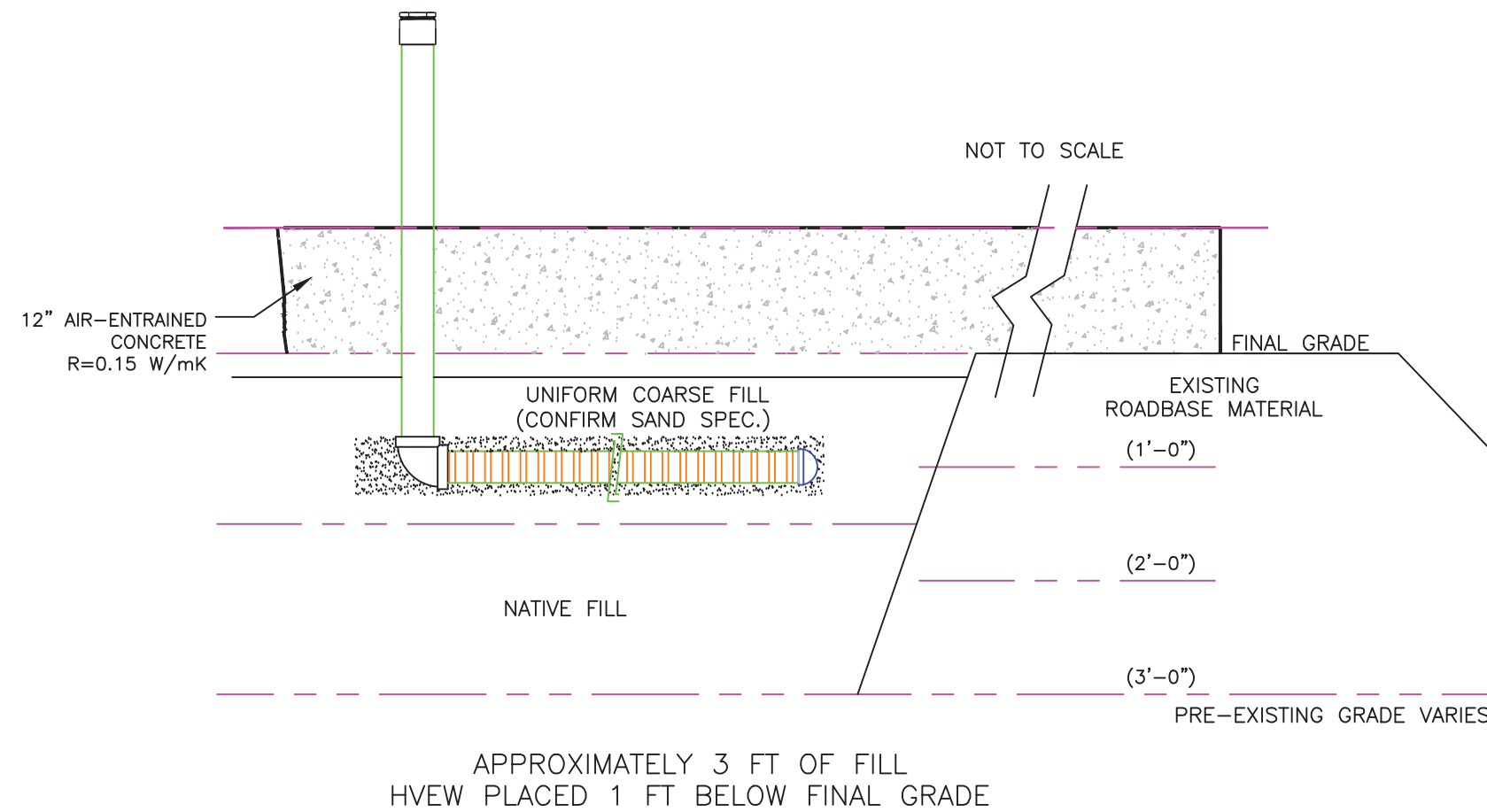
WELL INSTALLATION

MINIMUM 6" DIA BOREHOLE

ZONE C

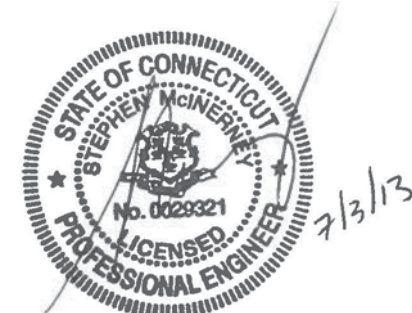
HORIZONTAL VAPOR  
EXTRACTION WELL (HVEW) DETAIL

TOTAL: 200 LINEAR FEET  
3" SS WELL SCREEN, 0.010 SLOT  
SEE SHEET M101 FOR HVEW LAYOUT



APPROXIMATELY 3 FT. OF FILL  
HVEW PLACED 1 FT BELOW FINAL GRADE

NOTE:  
NATURAL FILL, COURSE FILL, AND ROAD BASE MATERIAL INSTALLED  
AS PART OF PRE-ISTR SITE PREPARATION ACTIVITY. HVEW  
COMPONENTS AND 12" CONCRETE COVER TO BE INSTALLED  
AS PART OF THIS WORK.



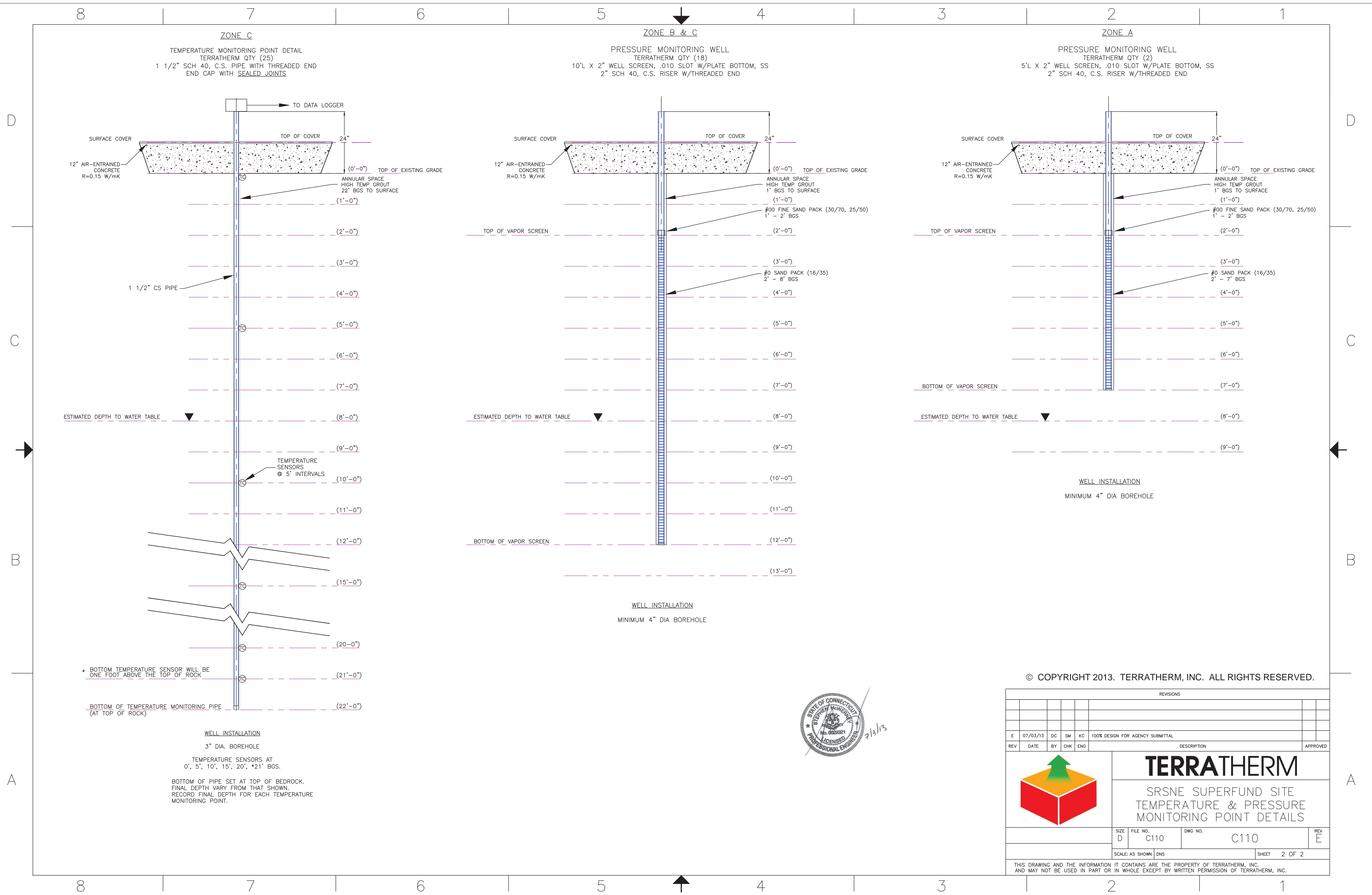
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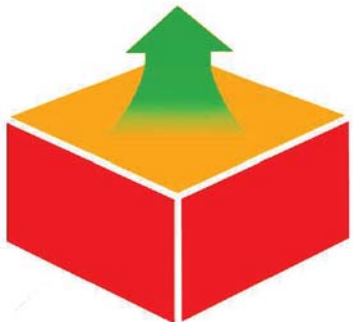
ZONE C THERMAL CONDUCTION HEATER SCHEDULE								
WELL TYPE	HEATER TYPE	QUANTITY	BOTTOM OF HEATER BGS	NON-BOOSTED INTERVAL	BOOSTED INTERVAL	BOTTOM OF BORING BGS	HEATER CAN LENGTH	SS LINER LENGTH
ZONE C	24	237	24'-0"	0'-0" - 18'-0"	18'-0" - 24'-0"	25'-0"	27'-0"	27'-8"
ZONE C - DEEP	26	7	26'-0"	0'-0" - 20'-0"	20'-0" - 26'-0"	27'-0"	29'-0"	29'-8"
ZONE C - DEEP	28	2	28'-0"	0'-0" - 22'-0"	22'-0" - 28'-0"	29'-0"	31'-0"	31'-8"
ZONE C - DEEP	32	4	32'-0"	0'-0" - 26'-0"	26'-0" - 32'-0"	33'-0"	35'-0"	38'-8"

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REV	DATE	BY	CHK	ENG	DESCRIPTION				
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REV	DATE	BY	CHK	ENG	DESCRIPTION						APPROVED
					<h1>TERRATHERM</h1> <h2>SRSNE SUPERFUND SITE GROUNDWATER MONITORING WELL DETAILS</h2>						
					SIZE D	FILE NO. C111	DWG NO. C111				REV E
					SCALE: AS SHOWN    DNS						SHEET    1 OF 1
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## GENERAL NOTES

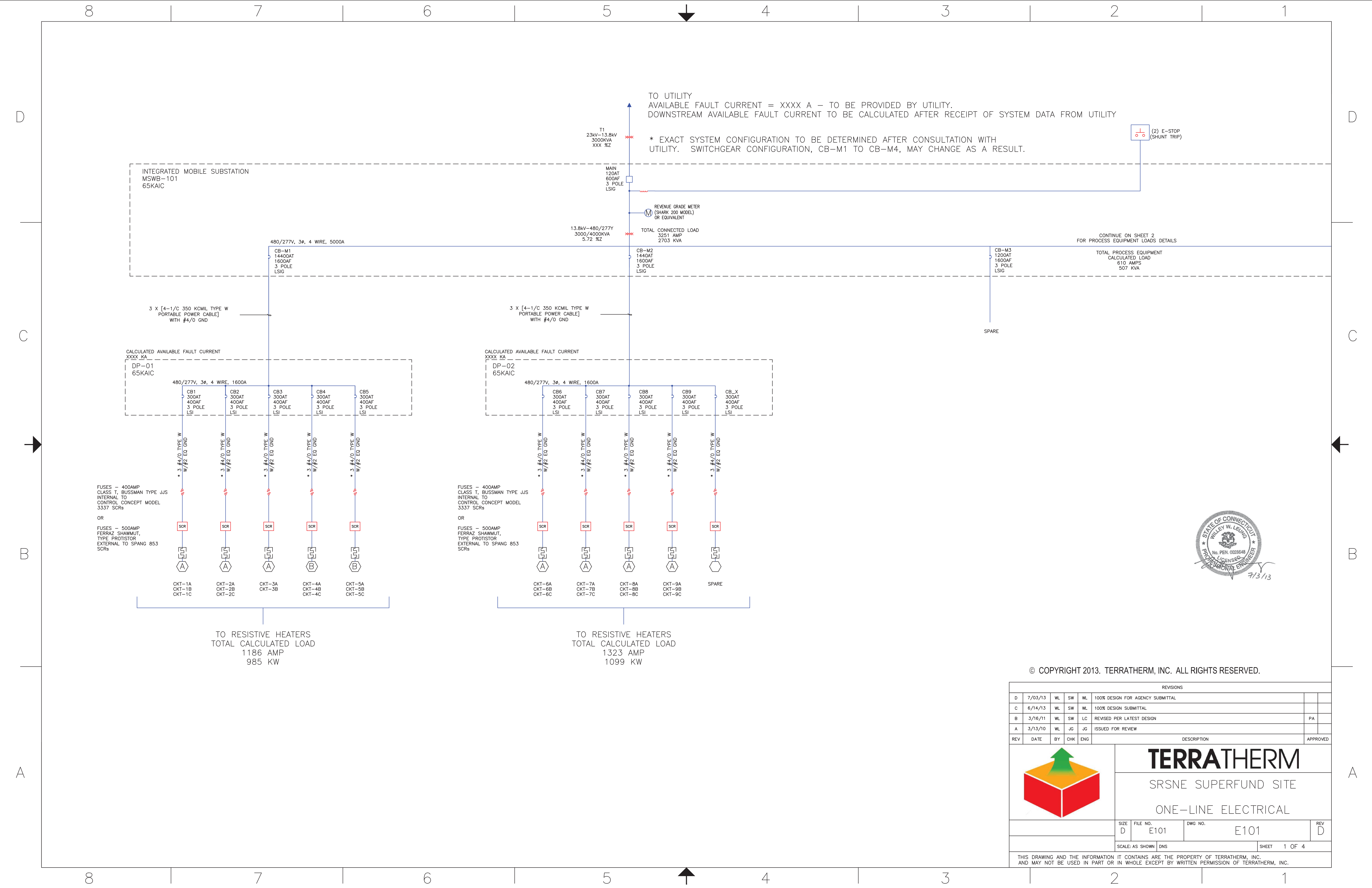
TO ALL ELECTRICAL DRAWINGS, OR E-SERIES, UNLESS

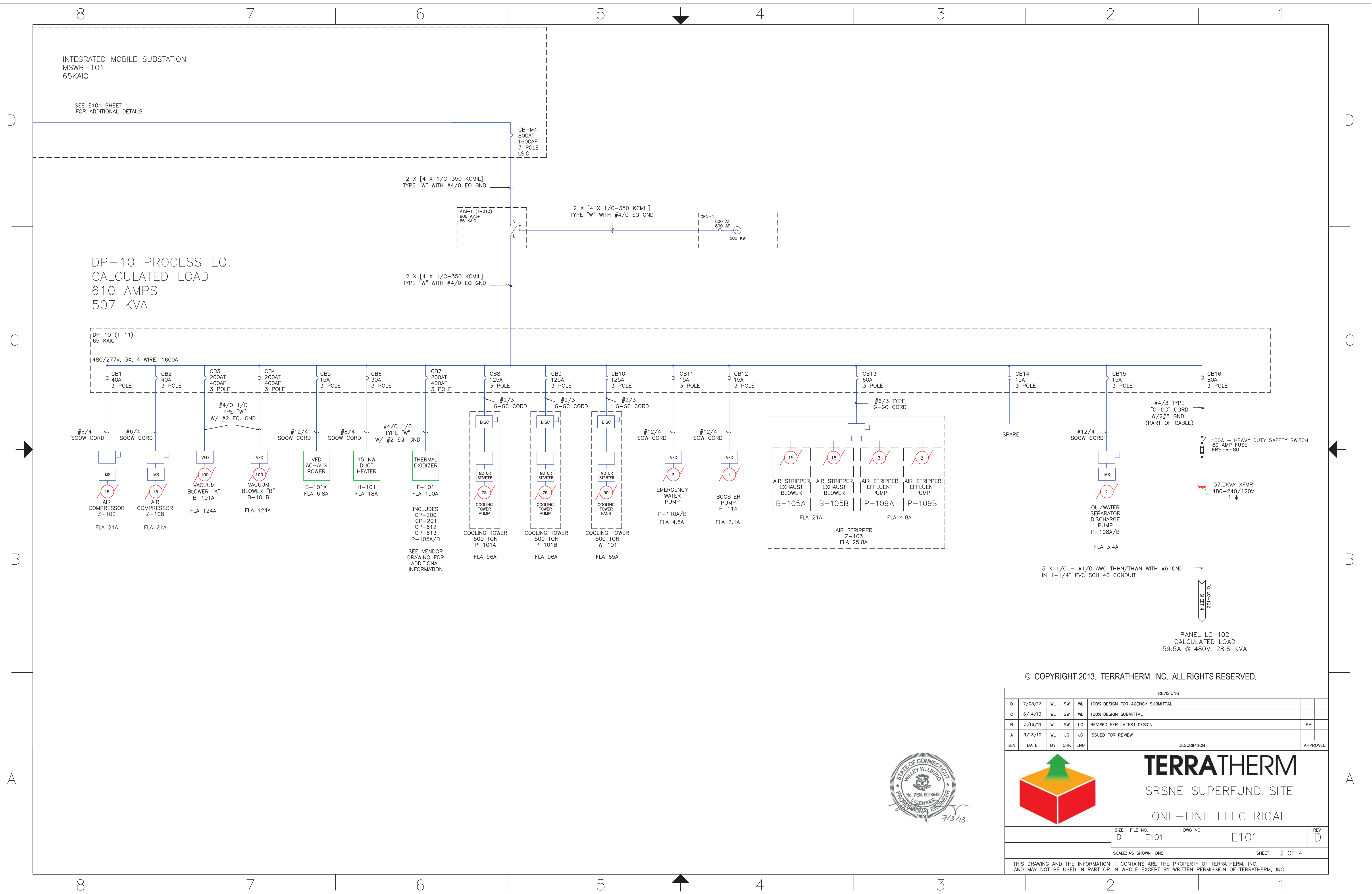
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STATE OF CONNECTICUT  
WILLEY W. LEUNG  
No. PEN. 0028648  
LICENSED PROFESSIONAL ENGINEER  
7/3/13

**CONFIDENTIAL**

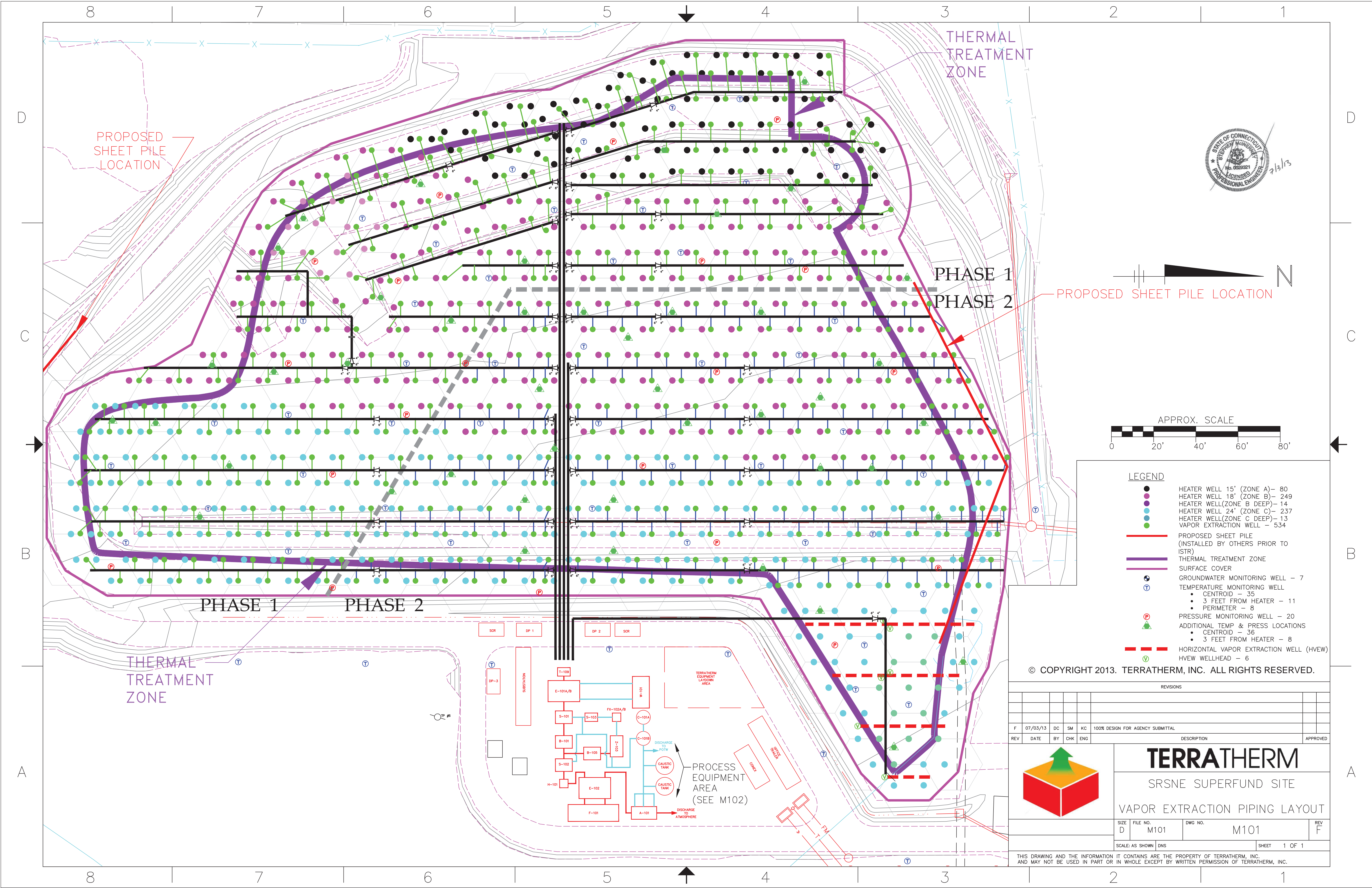
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C	6/14/13	WL	SW	WL	100% DESIGN SUBMITTAL								
REV	DATE	BY	CHK	ENG	DESCRIPTION						APPROVED		
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					SIZE D	FILE NO. E100	DWG NO. E100				REV D		
					SCALE: NTS DNS				SHEET 1 OF 1				
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- LEGEND**
- HEATER WELL 15' (ZONE A) - 80
  - HEATER WELL 18' (ZONE B) - 249
  - HEATER WELL (ZONE B DEEP) - 14
  - HEATER WELL 24' (ZONE C) - 237
  - HEATER WELL (ZONE C DEEP) - 13
  - VAPOR EXTRACTION WELL - 534
  - PROPOSED SHEET PILE (INSTALLED BY OTHERS PRIOR TO ISTR)
  - THERMAL TREATMENT ZONE
  - SURFACE COVER
  - GROUNDWATER MONITORING WELL - 7
  - TEMPERATURE MONITORING WELL
    - CENTROID - 35
    - 3 FEET FROM HEATER - 11
    - PERIMETER - 8
  - PRESSURE MONITORING WELL - 20
  - ADDITIONAL TEMP & PRESS LOCATIONS
    - CENTROID - 36
    - 3 FEET FROM HEATER - 8
  - HORIZONTAL VAPOR EXTRACTION WELL (HVEW)
  - HVEW WELLHEAD - 6

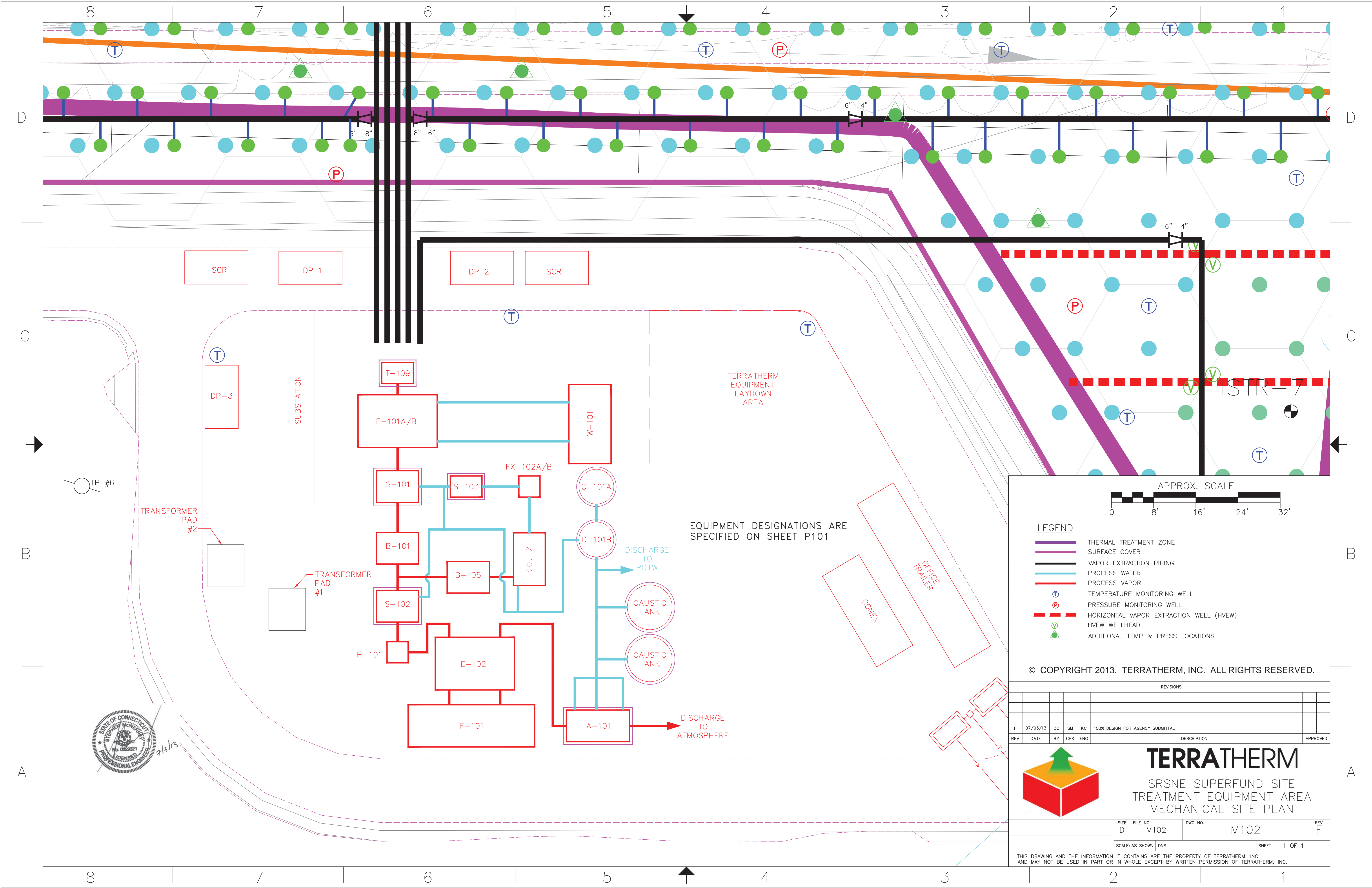
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**TERRATHERM**  
SRSNE SUPERFUND SITE  
VAPOR EXTRACTION PIPING LAYOUT

SIZE D	FILE NO. M101	DWG NO. M101	REV F
SCALE: AS SHOWN DNS		SHEET 1 OF 1	

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APPROX. SCALE

0 8' 16' 24' 32'

**LEGEND**

- THERMAL TREATMENT ZONE
- SURFACE COVER
- VAPOR EXTRACTION PIPING
- PROCESS WATER
- PROCESS VAPOR
- TEMPERATURE MONITORING WELL
- PRESSURE MONITORING WELL
- HORIZONTAL VAPOR EXTRACTION WELL (HVEW)
- HVEW WELLHEAD
- ADDITIONAL TEMP & PRESS LOCATIONS

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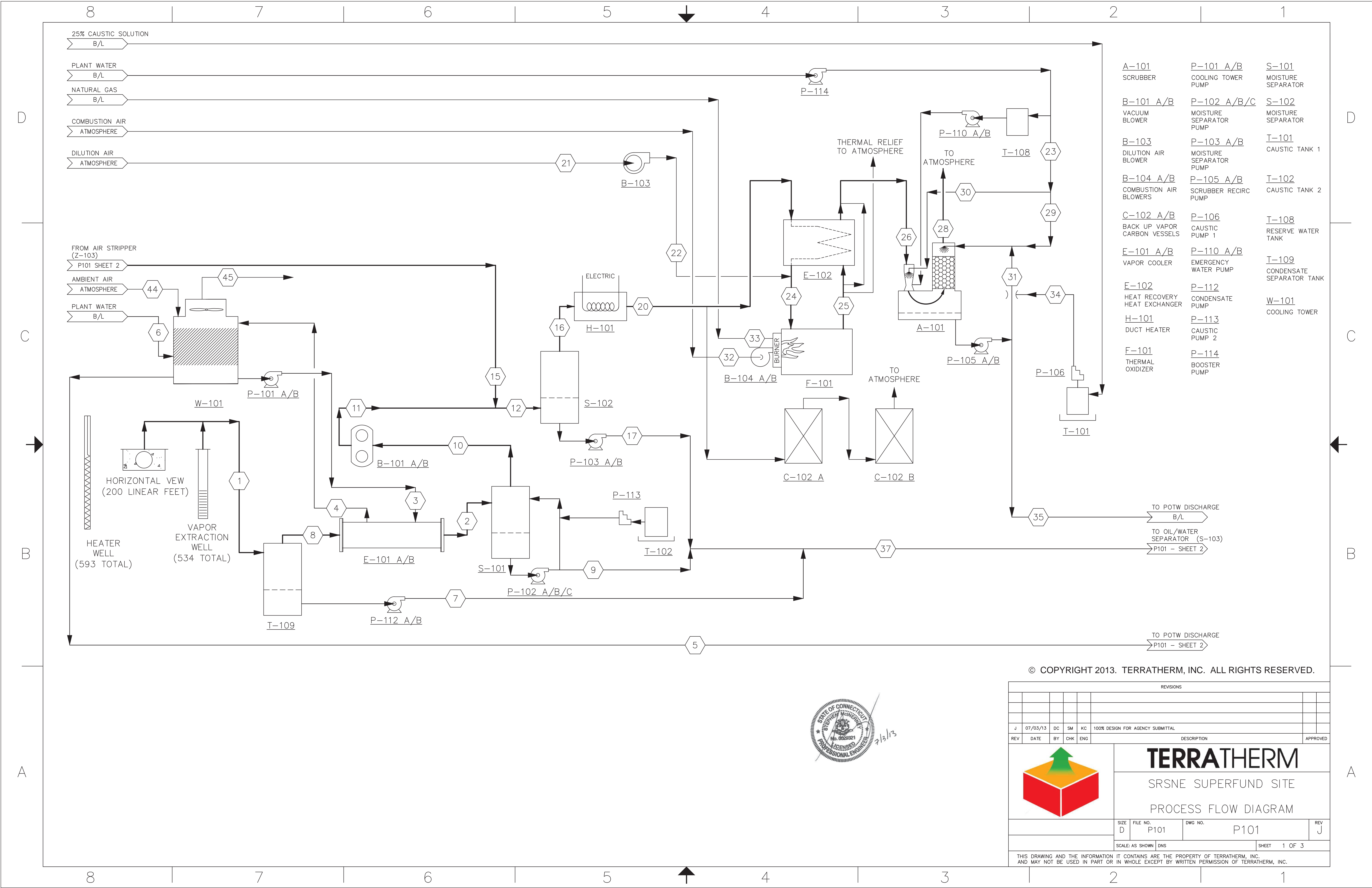
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**TERRATHERM**

SRSNE SUPERFUND SITE  
TREATMENT EQUIPMENT AREA  
MECHANICAL SITE PLAN

SIZE D	FILE NO. M102	DWG NO. M102	REV F
SCALE: AS SHOWN DNS		SHEET 1 OF 1	

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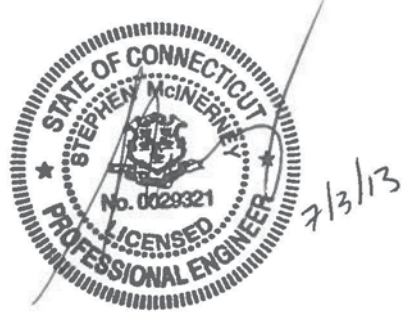


STATE OF CONNECTICUT  
STEPHEN McINERNEY  
No. 0029321  
LICENSED  
PROFESSIONAL ENGINEER  
7/3/13

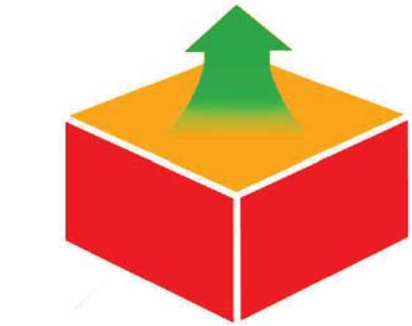
Project: SRSNE  
Case 1: High COC & No Heat Recovery  
Date: 6/14/2013

STREAM NUMBER:	HEAT EXCHANGER 1 AND COOLING TOWER													AIR STRIPPER										
	1	7	8	2	9	10	11	4	3	44	45	5	6	14	14A	13	43	15	12	16	17	18	19	
	VAPOR FROM EXTRACTION WELLS	CONDENSATE FROM SEPARATOR TANK T-109	VAPOR TO EXCHANGER E-101	EXCHANGER E-101 OUTLET VAPOR	EXCHANGER E-101 CONDENS.	SEPARATOR S-101 OUTLET VAPOR	BLOWER B-101 OUTLET VAPOR	COOLING WATER RETURN FROM E-101	COOLING WATER SUPPLY TO E-101	COOLING TOWER W-101 INLET AIR	COOLING TOWER W-101 OUTLET AIR	COOLING TOWER W-101 BLOWDOWN	COOLING TOWER MAKEUP WATER	AIR STRIPPER Z-103 INLET AIR	AIR STRIPPER Z-103 OUTLET AIR	SEPARATOR S-104 OUTLET VAPOR	SEPARATOR S-104 LIQUID CONDENS.	BLOWER B-105 OUTLET VAPOR	SEPARATOR S-102 INLET VAPOR	SEPARATOR S-102 OUTLET VAPOR	SEPARATOR S-102 LIQUID CONDENS.	AIR STRIPPER Z-103 INLET WATER	AIR STRIPPER Z-103 OUTLET WATER	
Temp, °F	209	175	175	120	120	120	140	92	82	82	92	92	82	60	118	118	118	128	139	139	139	120	120	
Pressure, in H <sub>2</sub> O ga.	-20	-20	-20	-22		-24	19.0			0	0			0	-20.0	-22.0		19.0	19.0	17.0				
relative humidity	0.00		1.00	1.00		0.99	0.60			1.00	1.00			0.40	0.95	0.95		0.78	0.61	0.61				
Moisture, lb/hr	5386		5386	799	4587	799	799	480303	480303	8903	12409	386	3857	10	174	174	0	174	973	973	0	4587	4422	
Moisture, Entrained #/hr		0																						
Natural Gas, lb/hr																								
Hydrogen, lb/hr																								
Nitrogen, lb/hr	6935		6935	6935		6935	6935			288005	288005			1665	1665	1665		1665	8600	8600				
Oxygen, lb/hr	2095		2095	2095		2095	2095			87002	87002			503	503	503		503	2598	2598				
CO <sub>2</sub> , lb/hr	0		0	0															0					
HCl, lb/hr	0		0	0															0					
COC, lb/hr	350		350	245	105	245	245								103.95	103.95		103.95	349	349		105.00	1.05	
Dissolved Solids, lb/hr																								
NaOH, lb/hr																								
Total (lb/hr)	14766	0	14766	10074	4692	10074	10074	480303	480303	383909	387416	386	3857	2177	2446	2446	0	2446	12520	12520	0	4692	4424	
Enthalpy, MMBtu/hr	6.66		6.50	1.15	0.55	1.15	1.20	44.2	39.4	17.17	21.97	0.0	0.3	0.04	0.26	0.26	0.00	0.26	1.47	1.47	0.00	5.10	4.92	
Change Enthalpy, MMBtu/hr				4.803					4.803	4.803	0.000				0.21				0.00				0.18	
ACFM	5272		5001	2683		2697	2508			89048	92000			479	634	637		586	3099	3113				
SCFM (@ 68 F)	3954		3954	2310		2310	2310			86748	88000			486	551	551		551	2861	2861				
Water, GPM		0.0			9.2			960	960			0.8	7.7				0.00				0.00	9.17	8.84	
H <sub>2</sub> O (% vol, wet)	48.6			12.3		12.3	12.3							0.7	11.3	11.3		11.3	12.1	12.1				
O <sub>2</sub> (%vol, wet)	10.6			18.2		18.2	18.2							20.8	18.3	18.3		18.3	18.2	18.2				
COC (%vol, wet)	0.5			0.6		0.6	0.6							0.0	1.0	1.0		1.0	0.6	0.6				

STREAM NUMBER:	THERMAL OXIDIZER								SCRUBBER								WATER TREATMENT							
	20	21	22	24	32	33	25	26	29	30	23	34	35	31	28	37	38	39	40	41	27	42		
	HEAT EX E-102 INLET VAPOR	BLOWER B-103 INLET AIR	BLOWER B-103 OUTLET AIR	OXIDIZER F-101 INLET STREAM	COMBUSTION AIR FROM BLOWER B-104	OXIDIZER BURNER AUXILIARY FUEL	OXIDIZER F-101 EXHAUST GAS	HEAT EX E-102 OUTLET VAPOR	SCRUBBER A-101 MAKE-UP WATER	QUENCH INLET WATER	WATER TO QUENCH & SCRUBBER	SCRUBBER A-101 CAUSTIC ADDITION	SCRUBBER A-101 BLOWDOWN	SCRUBBER A-101 RECIRC PUMPS	SCRUBBER A-101 OUTLET GAS	CONDENS. TO OWS S-103	OWS S-103 DISCHARGE TO T-105	LNAPL DISCHARGE TO T-106	DNAPL DISCHARGE TO T-104	CARBON BEDS C-101W/B DISCHARGE	COOLING TOWER & SCRUBBER BLOWDOWN	COMBINED WATER TREATMENT EFFLUENT		
Temp, °F	145	60	60	145	60	60	1,600	1,600	82	82	82	70	174.62	174.62	174.62	120.0	120.0	120.0	120.0	120.0	167.4	143.6		
Pressure, in H <sub>2</sub> O ga.	16.0	0	16.0	16.0	16.0	16.0	16.0	15.0							1.5									
relative humidity	0.50			0.50	0.50	X									1.00									
Moisture, lb/hr	973	0	0	973	5.3	0	1256	1256	3406	4529	7935	413	3818.5	100080	5785	4587	4587			4422	4204	8627		
Moisture, Entrained #/hr																0	0							
Natural Gas, lb/hr						49																		
Hydrogen, lb/hr																								
Nitrogen, lb/hr	8600	0	0	8600	772.1		9372	9372							9372									
Oxygen, lb/hr	2598	0	0	2598	234.6		1947	1947							1947									
CO <sub>2</sub> , lb/hr							879	879							879									
HCl, lb/hr							125	125							1.25									
COC, lb/hr	349			349			3.49	3.49							3.49	105	105			0.01		0.0105		
Dissolved Solids, lb/hr													200.97	7533							200.97	200.97		
NaOH, lb/hr												138												
Total (lb/hr)	12520	0	0	12520	1012.0	49	13582	13582	3406	4529	7935	550	4019	107613	17987	4692	4692			4423	4405	8828		
Enthalpy, MMBtu/hr	1.48	0.00	0.00	5.98	0.02	1.46	7.46	7.05	3.73	4.96	8.69	0.45	4.34	113.70	7.05	5.10	5.10			4.92		9.68		
Change Enthalpy, MMBtu/hr	0.02			4.49			0.0								0.00									
ACFM	3153	0	0	3153	214	19	11225	11252							5517									
SCFM (@ 68 F)	2861	0	0	2861	226	20	2990	2990							4607									
Water, GPM									6.81	9.05	15.86	0.82	7.63	200		9.17	9.17			8.84	8.40	17.24		
H <sub>2</sub> O (% vol, wet)	12.1			12.1	0.0		15.0	15.0							44.8									
O <sub>2</sub> (%vol, wet)	18.2			18.2	0.0		13.1	13.1							8.5									
COC (%vol, wet)	0.6			0.6439	0.0		0.0	0.0							0.0									

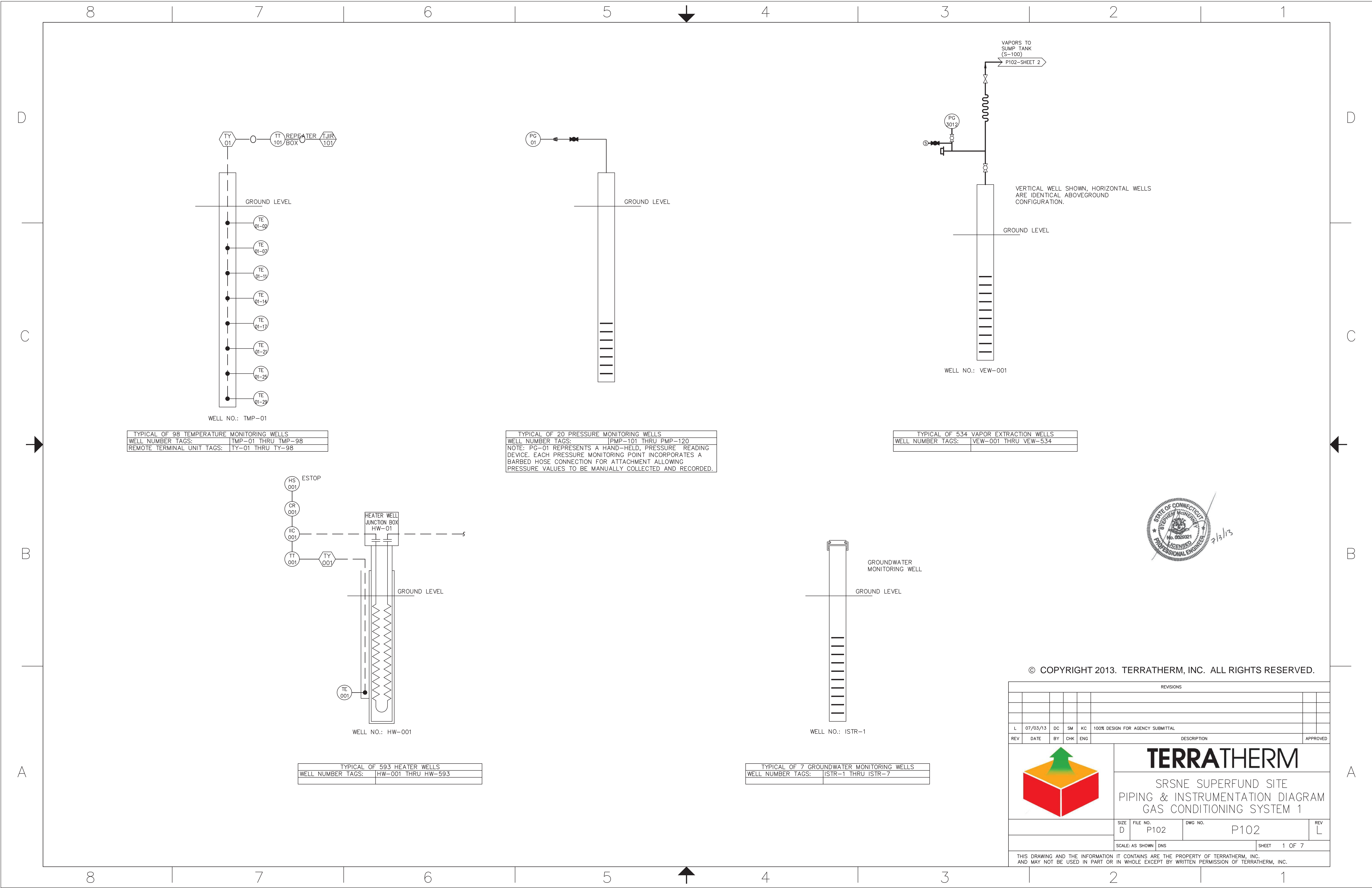


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**TERRATHERM**  
SRSNE SUPERFUND SITE  
MASS & ENERGY BALANCE

SIZE D	FILE NO. P101	DWG NO. P101	REV J
SCALE: AS SHOWN		DNS	SHEET 3 OF 3
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TYPICAL OF 98 TEMPERATURE MONITORING WELLS  
WELL NUMBER TAGS: TMP-01 THRU TMP-98  
REMOTE TERMINAL UNIT TAGS: TY-01 THRU TY-98

TYPICAL OF 20 PRESSURE MONITORING WELLS  
WELL NUMBER TAGS: PMP-101 THRU PMP-120  
NOTE: PG-01 REPRESENTS A HAND-HELD, PRESSURE READING DEVICE. EACH PRESSURE MONITORING POINT INCORPORATES A BARBED HOSE CONNECTION FOR ATTACHMENT ALLOWING PRESSURE VALUES TO BE MANUALLY COLLECTED AND RECORDED.

TYPICAL OF 534 VAPOR EXTRACTION WELLS  
WELL NUMBER TAGS: VEW-001 THRU VEW-534

TYPICAL OF 593 HEATER WELLS  
WELL NUMBER TAGS: HW-001 THRU HW-593

TYPICAL OF 7 GROUNDWATER MONITORING WELLS  
WELL NUMBER TAGS: ISTR-1 THRU ISTR-7



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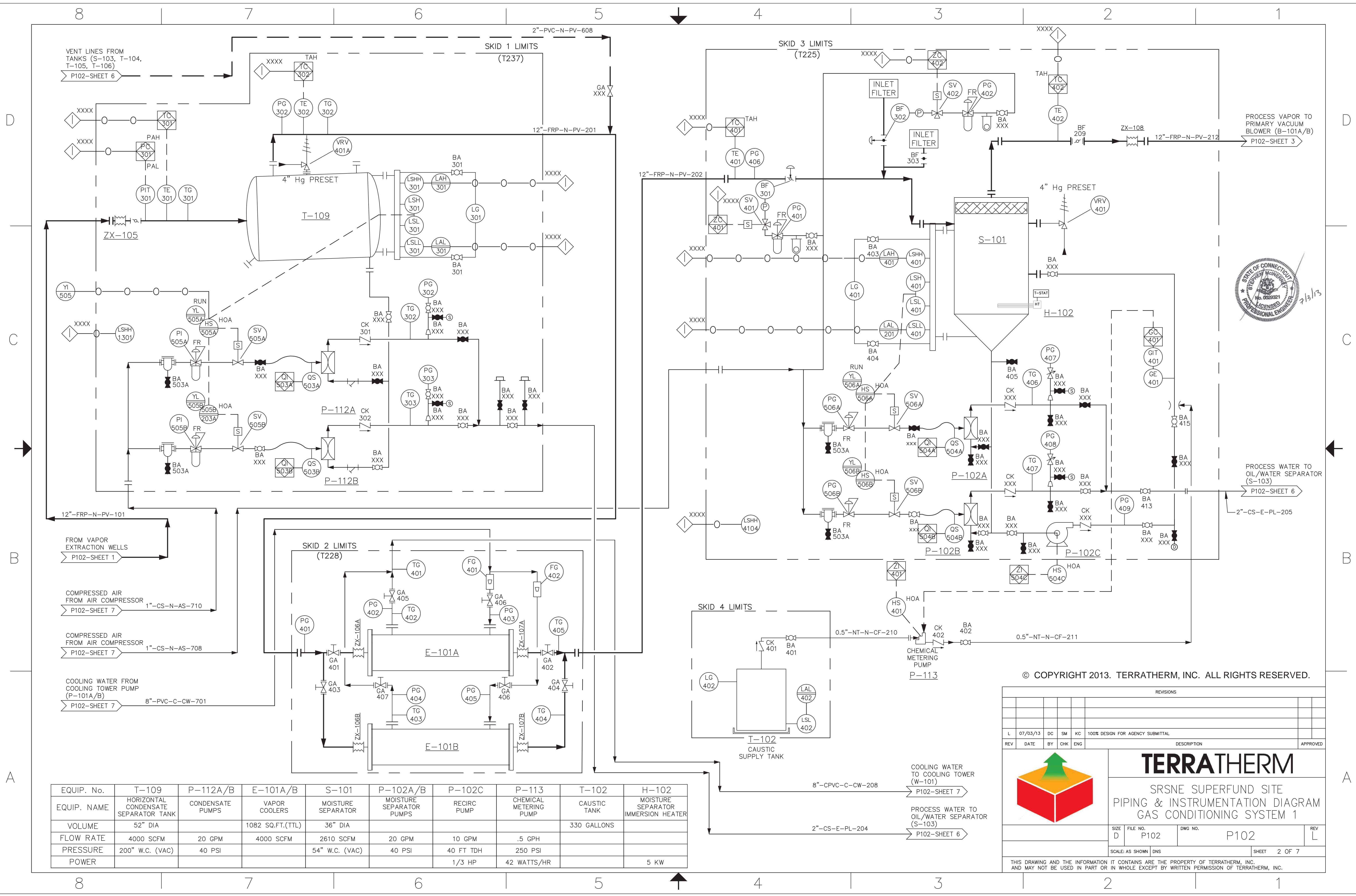
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REV	DATE	BY	CHK	ENG	DESCRIPTION	APPROVED	

**TERRATHERM**

SRSNE SUPERFUND SITE  
PIPING & INSTRUMENTATION DIAGRAM  
GAS CONDITIONING SYSTEM 1

SIZE D	FILE NO. P102	DWG NO. P102	REV L
SCALE: AS SHOWN DNS			
SHEET 1 OF 7			

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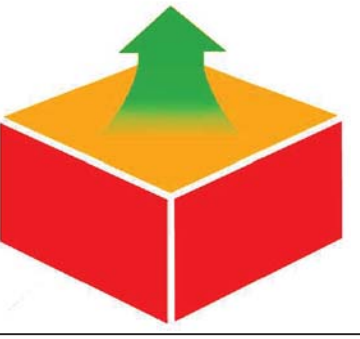


EQUIP. No.	T-109	P-112A/B	E-101A/B	S-101	P-102A/B	P-102C	P-113	T-102	H-102
EQUIP. NAME	HORIZONTAL CONDENSATE SEPARATOR TANK	CONDENSATE PUMPS	VAPOR COOLERS	MOISTURE SEPARATOR	MOISTURE SEPARATOR PUMPS	RECIRC PUMP	CHEMICAL METERING PUMP	CAUSTIC TANK	MOISTURE SEPARATOR IMMERSION HEATER
VOLUME	52" DIA		1082 SQ.FT.(TTL)	36" DIA				330 GALLONS	
FLOW RATE	4000 SCFM	20 GPM	4000 SCFM	2610 SCFM	20 GPM	10 GPM	.5 GPH		
PRESSURE	200" W.C. (VAC)	40 PSI		54" W.C. (VAC)	40 PSI	40 FT TDH	250 PSI		
POWER						1/3 HP	42 WATTS/HR		5 KW

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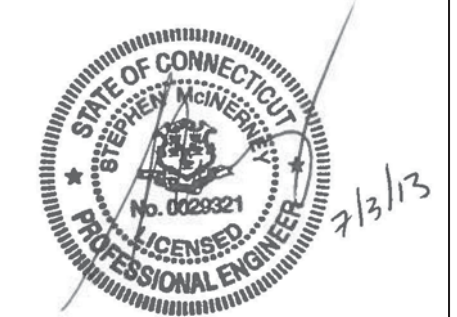
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SRsNE SUPERFUND SITE  
PIPING & INSTRUMENTATION DIAGRAM  
GAS CONDITIONING SYSTEM 1

SIZE	FILE NO.	DWG NO.	REV
D	P102	P102	L

SCALE: AS SHOWN DNS SHEET 2 OF 7

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VAPOR FROM  
AIR STRIPPER  
(Z-103)  
P102-SHEET 6

VAPOR FROM  
MOISTURE SEPARATOR  
(S-101)  
P102-SHEET 2

COMPRESSED AIR  
FROM AIR COMPRESSOR  
P102-SHEET 7

SKID 5 LIMITS  
(T061)

SKID 6 LIMITS  
(T178)

SKID 7 LIMITS  
(T183)

PROCESS CONDENSATE  
TO OIL/WATER SEPARATOR  
(S-103)  
P102-SHEET 6

EQUIP. No.	FX-101A/B	B-101A/B	Y-101A/B	Y-102A/B	S-102	P-103A/B	H-101	H-103
EQUIP. NAME	FILTERS	VACUUM BLOWERS	VACUUM BLOWER INLET SILENCERS	VACUUM BLOWER DISCHARGE SILENCERS	MOISTURE SEPARATOR	MOISTURE SEPARATOR PUMPS	DUCT HEATER	MOISTURE SEPARATOR IMMERSION HEATER
VOLUME					36" DIA			
FLOW RATE	4675 CFM	2400 SCFM	2400 SCFM	2400 SCFM	3000 SCFM	20 GPM		
PRESSURE		48" W.C. (VAC)			54" W.C. (VAC)	40 PSI		
POWER		200 H.P.					15 KW	5 KW

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SRSNE SUPERFUND SITE  
PIPING & INSTRUMENTATION DIAGRAM  
GAS CONDITIONING SYSTEM 2

SIZE D	FILE NO. P102	DWG NO. P102	REV L
SCALE: AS SHOWN DNS		SHEET 3 OF 7	

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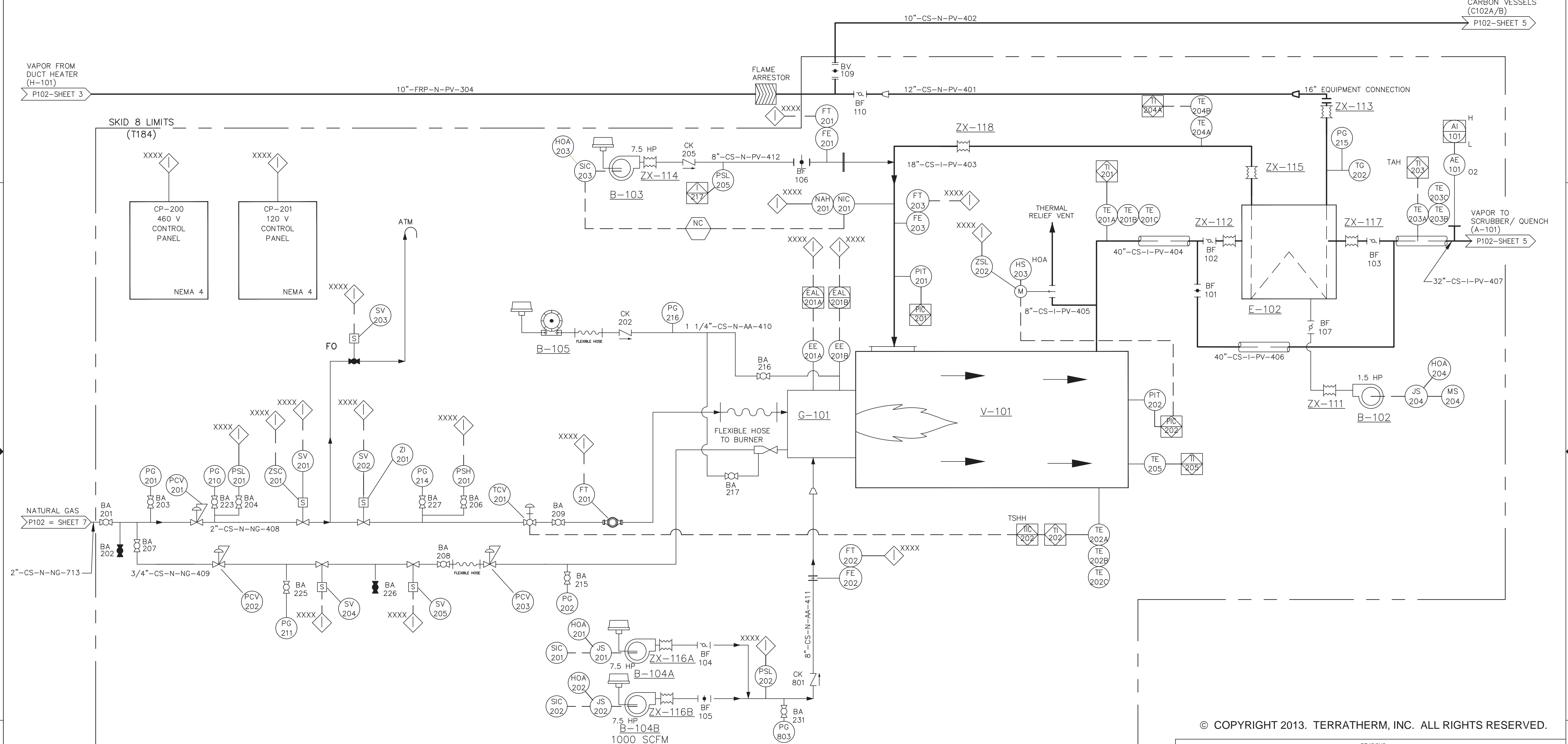
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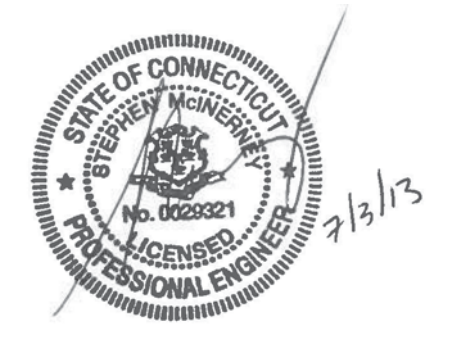
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EQUIP. No.	B-103	B-104A/B	G-101	V-101	E-102	B-102
EQUIP. NAME	DILUTION AIR BLOWER	COMBUSTION AIR BLOWERS	OXIDIZER BURNER	THERMAL OXIDIZER	HEAT EXCHANGER	AIR SEAL BLOWER
VOLUME			4 MMBTU			
FLOW RATE	750 SCFM	1000 SCFM		3000 SCFM	3000 SCFM	
PRESSURE						
POWER	7.5 HP	7.5 HP				1.5 HP



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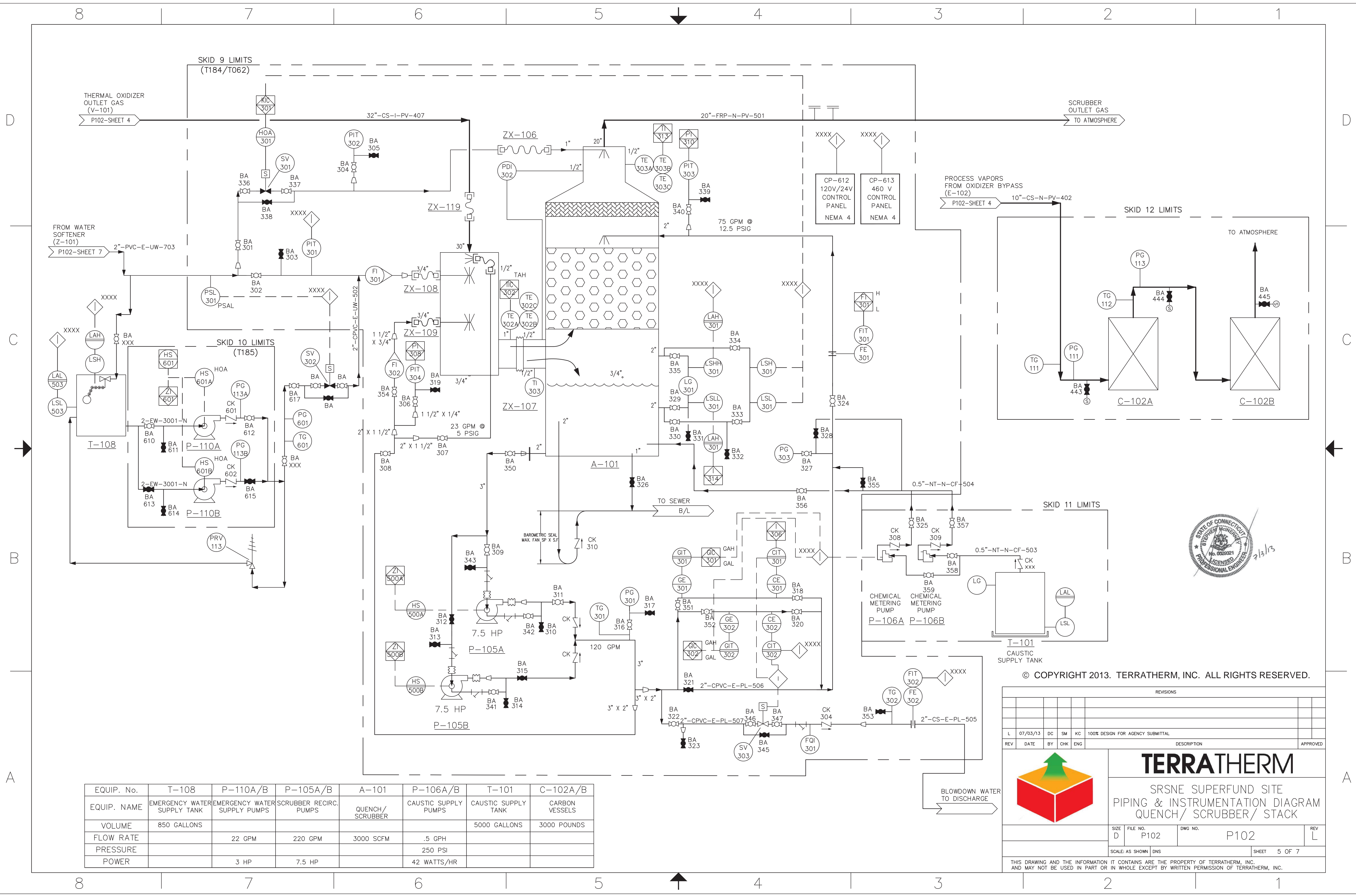
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SRSNE SUPERFUND SITE  
PIPING & INSTRUMENTATION DIAGRAM  
THERMAL OXIDIZER

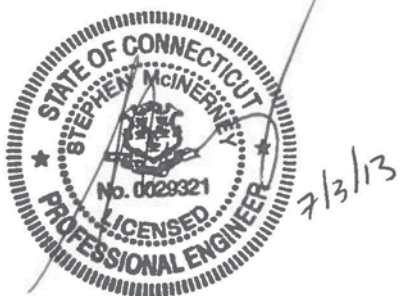
SIZE	FILE NO.	DWG NO.	REV
D	P102	P102	L

SCALE: AS SHOWN DNS SHEET 4 OF 7

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EQUIP. No.	T-108	P-110A/B	P-105A/B	A-101	P-106A/B	T-101	C-102A/B
EQUIP. NAME	EMERGENCY WATER SUPPLY TANK	EMERGENCY WATER SUPPLY PUMPS	SCRUBBER RECIRC. PUMPS	QUENCH/ SCRUBBER	CAUSTIC SUPPLY PUMPS	CAUSTIC SUPPLY TANK	CARBON VESSELS
VOLUME	850 GALLONS					5000 GALLONS	3000 POUNDS
FLOW RATE		22 GPM	220 GPM	3000 SCFM	.5 GPH		
PRESSURE					250 PSI		
POWER		3 HP	7.5 HP		42 WATTS/HR		



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SRSNE SUPERFUND SITE  
PIPING & INSTRUMENTATION DIAGRAM  
QUENCH/ SCRUBBER/ STACK

SIZE  
D

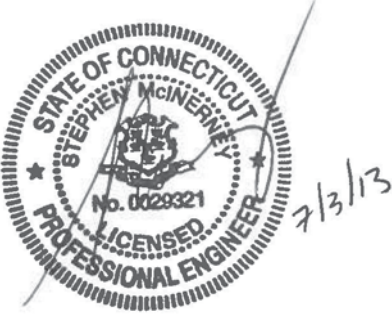
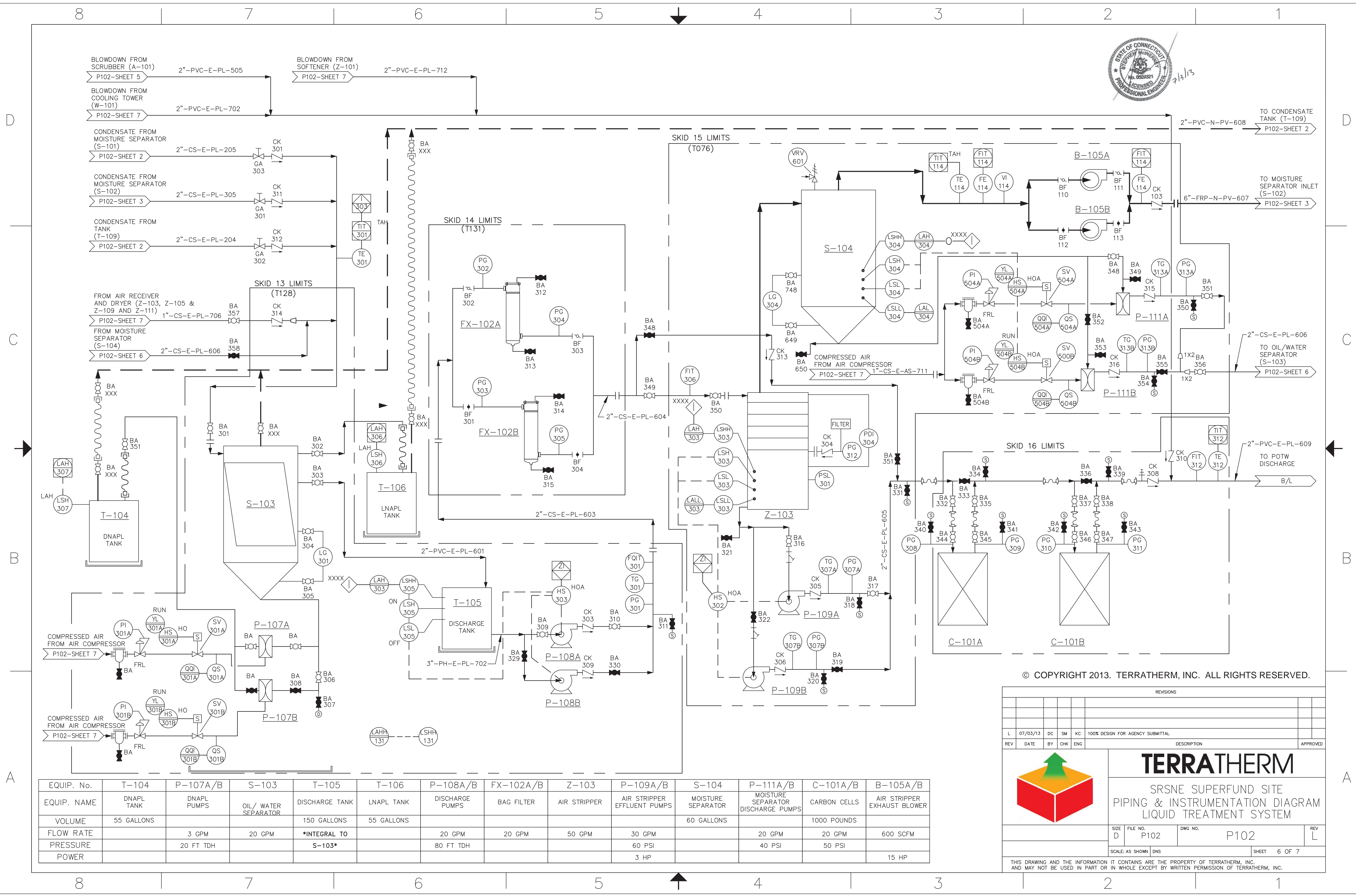
FILE NO.  
P102

DWG NO.  
P102

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SCALE: AS SHOWN DNS SHEET 5 OF 7

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SRSNE SUPERFUND SITE  
PIPING & INSTRUMENTATION DIAGRAM  
LIQUID TREATMENT SYSTEM

SIZE D	FILE NO. P102	DWG NO. P102	REV L
SCALE: AS SHOWN DNS		SHEET 6 OF 7	

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EQUIP. No.	T-104	P-107A/B	S-103	T-105	T-106	P-108A/B	FX-102A/B	Z-103	P-109A/B	S-104	P-111A/B	C-101A/B	B-105A/B
EQUIP. NAME	DNAPL TANK	DNAPL PUMPS	OIL/ WATER SEPARATOR	DISCHARGE TANK	LNAPL TANK	DISCHARGE PUMPS	BAG FILTER	AIR STRIPPER	AIR STRIPPER EFFLUENT PUMPS	MOISTURE SEPARATOR	MOISTURE SEPARATOR DISCHARGE PUMPS	CARBON CELLS	AIR STRIPPER EXHAUST BLOWER
VOLUME	55 GALLONS			150 GALLONS	55 GALLONS					60 GALLONS		1000 POUNDS	
FLOW RATE		3 GPM	20 GPM	*INTEGRAL TO		20 GPM	20 GPM	50 GPM	30 GPM		20 GPM	20 GPM	600 SCFM
PRESSURE		20 FT TDH		S-103*		80 FT TDH			60 PSI		40 PSI	50 PSI	
POWER									3 HP				15 HP

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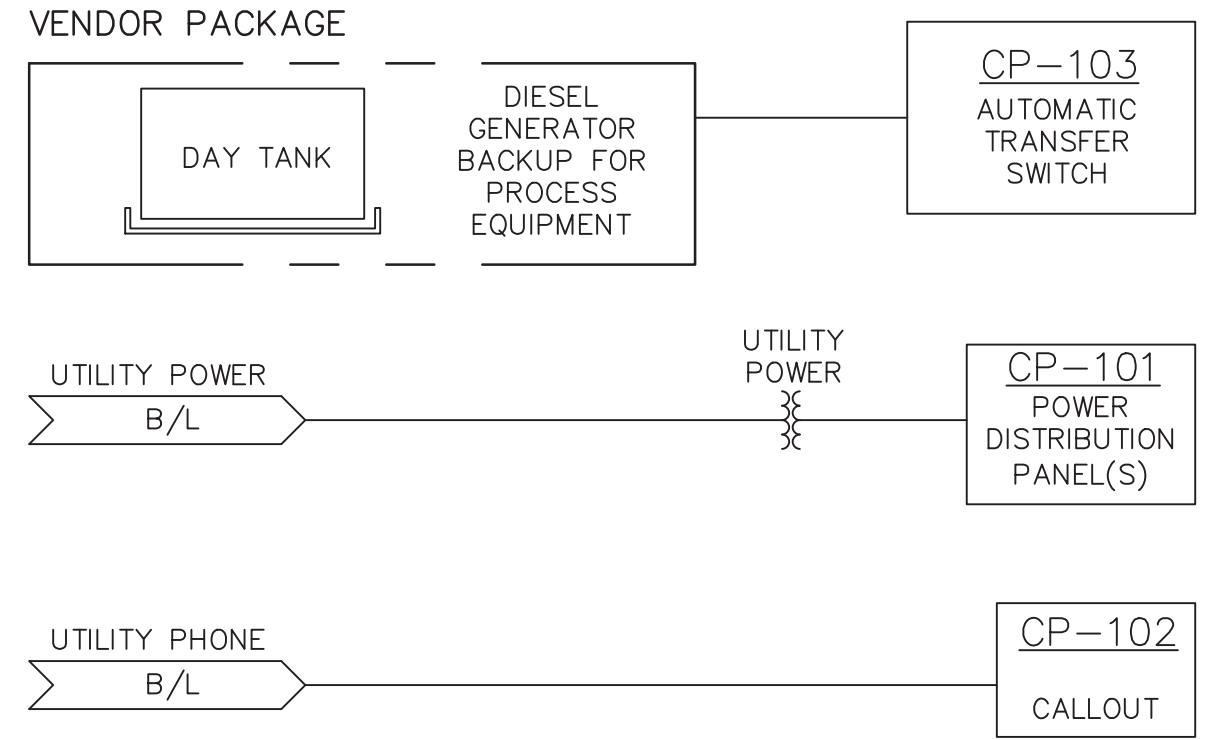
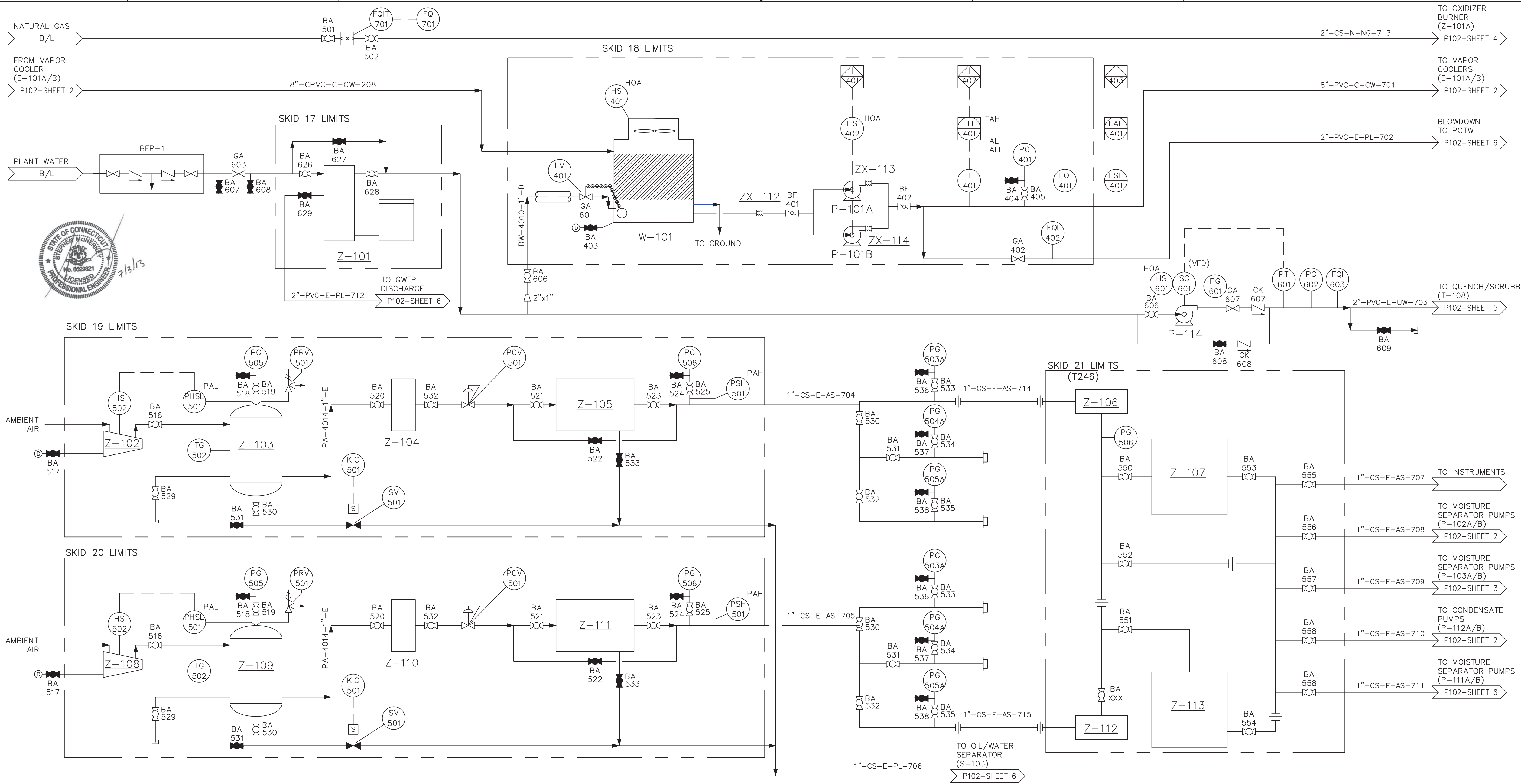
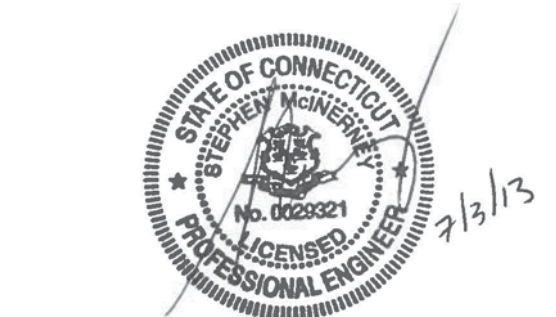
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EQUIP. No.	Z-101	W-101	P-101A/B	P-114	Z-102	Z-103	Z-104	Z-105
EQUIP. NAME	WATER CONDITIONER	COOLING TOWER	COOLING TOWER PUMPS	BOOSTER PUMP	AIR COMPRESSOR	AIR RECEIVER	FILTER COALESCER	AIR DRYER
VOLUME		500 TON				120 GALLONS		
FLOW RATE	20 GPM		1100 GPM	20 GPM	45 CFM		45 CFM	45 CFM
PRESSURE				60 PSI				
POWER				15 HP				
EQUIP. No.	Z-106	Z-107	Z-108	Z-109	Z-110	Z-111	Z-112	Z-113
EQUIP. NAME	PARTICULATE FILTER	DESSICANT DRYER	AIR COMPRESSOR	AIR RECEIVER	FILTER COALESCER	AIR DRYER	PARTICULATE FILTER	DESSICANT DRYER
VOLUME				120 GALLONS				
FLOW RATE	45 CFM	45 CFM	45 CFM		45 CFM	45 CFM	45 CFM	45 CFM
PRESSURE								
POWER			15 HP					

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**TERRATHERM**  
SRsNE SUPERFUND SITE  
PIPING & INSTRUMENTATION DIAGRAM  
UTILITIES

SIZE D | FILE NO. P102 | DWG NO. P102 | REV L

SCALE: AS SHOWN | DNS | SHEET 7 OF 7

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SYMBOL	IDENTIFICATION LETTERS					TYPICAL LETTER COMBINATIONS																				
	FIRST—LETTER		SUCCEEDING—LETTERS			CONTROLLERS				READOUT DEVICES RECORDING INDICATING		SWITCHES AND ALARM DEVICES HIGH—LOW COMB			TRANSMITTERS RECORDING INDICATING BLIND			SOLENOIDS, RELAYS, COMPUTING DEVICES	PRIMARY ELEMENT	TEST POINT	WELL OR PROBE	VIEWING DEVICE, GLASS	SAFETY DEVICE	FINAL ELEMENT		
	MEASURED VARIABLE (8)	VARIABLE MODIFIER (9)	READOUT/PASSIVE FUNCTION (10)	OUTPUT/ACTIVE FUNCTION (10)	FUNCTION MODIFIER (11)	RECORDING	INDICATING	BLIND	SELF—ACTUATED CONTROL VALVES																	
A	ANALYSIS (3)		ALARM			ARC	AIC	AC		AR	AI	ASH	ASL	ASHL	ART	AIT	AT	AY	AE	AP	AW					AV
B	BURNER, COMBUSTION					BRC	BIC	BC		BR	BI	BSH	BSL	BSHL	BRT	BIT	BT	BY	BE		BW	BG				BZ
C	CONDUCTIVITY (1)			CONTROL	CLOSE (3)																					
D	DENSITY (1)	DIFFERENTIAL			DEVIATION (3)																					
E	VOLTAGE		ELEMENT			ERC	EIC	EC		ER	EI	ESH	ESL	ESHL	ERT	EIT	ET	EY	EE							EZ
F	FLOW	RATIO				FRC FQRC FFRC	FIC FIQC FFIC	FC FQC FFC	FCV, FICV	FR FQR FFR	FI FOI FFI	FSH FCSH FFSH	FSL FQSL FFSL	FSHL	FRT	FIT FQIT	FT FQT	FY FQY	FE FCE FFE		FP			FG		FV FQV FFV
G	PH (2)		GAUGE (5)			GRC	GIC	GC		GR	GI	GSH	GSL	GSHL	GRT	GIT	GT		GE							
H	HAND				HIGH		HIC	HC						HS												HV
I	CURRENT		INDICATE (5)		MIDDLE	IRC	IIC			IR	II	ISH	ISL	ISHL	IRT	IIT	IT	IY	IE							IZ
J	POWER		SCAN (3)			JRC	JIC			JR	JI	JSH	JSL	JSHL	JRT	JIT	JT	JY	JE							JV
K	TIME	DERIVATIVE with time		CONTROL STATION (3)		KRC	KIC	KC	KCV	KR	KI	KSH	KSL	KSHL	KRT	KIT	KT	KY	KE							KV
L	LEVEL		LIGHT		LOW	LRC	LIC	LC	LCV	LR	LI	LSH	LSL	LSHL	LRT	LIT	LT	LY	LE			LW	LG			LV
M	MOISTURE (1)					MRC	MIC	MC		MR	MI	MSH	MSL	MSHL	MRT	MIT	MT		ME							
N	LEL (2)					NRC	NIC	NC		NR	NI	NSH	NSL	NSHL	NRT	NIT	NT		NE							
O			RESTRICTION		OPEN (3)																					
P	PRESSURE		POINT (TEST CONNECTION)			PRC PDR	PIC PDIC	PC PDIC	PCV PDCV	PR PDR	PI PDI	PSH PDSH	PSL PDSL	PSHL	PRT PDRT	PIT PDIT	PT PDT	PY PDY	PE PE	PP PP					PSV PSE	PV PDV
Q	QUANTITY	INTEGRAL, TOTALIZE	INTEGRAL, TOTALIZE			QRC	QIC			QR	QI	QSH	QSL	QSHL	QRT	QIT	QT	QY	QE							QZ
R	RADIATION (3)		RECORD		RUN (3)	RRC	RIC	RC		RR	RI	RSH	RSL	RSHL	RRT	RIT	RT	RY	RE			RW				RZ
S	SPEED, FREQUENCY	SAFETY (7)		SWITCH	STOP (3)	SRC	SIC	SC	SCV	SR	SI	SSH	SSL	SSHL	SRT	SIT	ST	SY	SE							SV
T	TEMPERATURE			TRANSMIT, TRANSMITTER		TRC TDRC	TIC TDIC	TC TDC	TCV TDCV	TR TDR	TI TDI	TSH TDSH	TSL TDSL	TSHL	TRT TDRT	TIT TDIT	TT TDT	TY TDY	TE TE	TP TP	TW TW				TSE	TV TDV
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION						UR	UI							UY								UV
V	VIBRATION (3)			VALVE, DAMPER, LOUVER						VR	VI	VSH	VSL	VSHL	VRT	VIT	VT	VY	VE							VZ
W	WEIGHT (3)		WELL, PROBE			WRC WDRC	WIC WDIC	WC WDC	WCV WDCV	WR WDR	WI WDI	WSH WDSh	WSL WDSL	WSHL	WRT WDRT	WIT WDIT	WT WDT	WY WDY	WE WE							WZ WDZ
X	DRAWING SPECIFIC (4)	DRAWING SPECIFIC (4), X—AXIS (3)		DRAWING SPECIFIC (4)	DRAWING SPECIFIC (4)																					
Y	EVENT, STATE	Y—AXIS (3)		AUXILIARY DEVICES			YIC	YC		YR	YI	YSH	YSL				YT	YY	YE							YZ
Z	POSITION	SAFETY INSTRUMENTED SYSTEM (7)				ZRC ZDRC	ZIC ZDIC	ZC ZDC	ZCV ZDCV	ZR ZDR	ZI ZDI	ZSH ZDSH	ZSL ZDSL	ZSHL	ZRT ZDRT	ZIT ZDIT	ZT ZDT	ZY ZDY	ZE ZDE							ZV ZDV

INSTRUMENT IDENTIFICATION	HAND SWITCH DESIGNATIONS
<p>THIS INFORMATION IS BASED UPON ANSI/ISA-5.1-2009 INSTRUMENTATION SYMBOLS AND IDENTIFICATION" AND ISA-5.3-1983 "GRAPHIC SYMBOLS FOR DISTRIBUTED CONTROL/SHARED DISPLAY INSTRUMENTATION, LOGIC AND COMPUTER SYSTEM. BOTH PUBLICATIONS ARE STANDARD OF ISA, INTERNATIONAL SOCIETY OF AUTOMATION.</p>	<p>E –EMERGENCY STOP</p> <p>J –JOG</p> <p>2PBL –2 PUSH BUTTONS (ON-OFF) MOMENTARY WITH BACK LIGHT(S)</p>
EXPLANATORY NOTES FOR TABLE	
<ol style="list-style-type: none"> <li>1. TERRATHERM HAS CHOSEN THE SPECIFIC RECOMMENDED FIRST-LETTER LABELS FOR [C], [D] AND [M] PER THE STANDARD.</li> <li>2. TERRATHERM HAS CHOSEN THE SPECIFIC LABEL FOR THE FIRST-LETTER [G] AS pH, AND [N] AS LEL.</li> <li>3. LABELS ARE GIVEN PER THE STANDARD, BUT ARE UNCOMMON FOR TERRATHERM'S APPLICATIONS. THEIR USE SHOULD BE AVOIDED AND NO SUBSTITUTION FOR THEIR MEANINGS IS ALLOWED.</li> <li>4. FIRST-LETTER OR SUCCEEDING-LETTER [X] IS USED AS "DRAWING SPECIFIC" AND IS TO BE DEFINED BY A NOTE ON THE DRAWING.</li> <li>5. READOUT/PASSIVE FUNCTION LETTERS [G] AND [I] ARE DIFFERENTIATED BY A GAUGE READOUT HAVING ITS ELEMENT INTEGRAL TO THE INSTRUMENT AND AN INDICATION READOUT BEING SEPARATE FROM ITS ELEMENT.</li> <li>6. READOUT/PASSIVE FUNCTION LETTER [L] INDICATED A LIGHT THAT IS INTENDED TO INDICATE OPERATING STATUS AND IS NOT INTENDED FOR ALARM INDICATION.</li> <li>7. VARIABLE MODIFIER LETTERS [S] AND [Z] ARE DIFFERENTIATED RESPECTIVELY AS SAFETY VALVES WITH THE VARIABLE LETTERS [F] FLOW, [P] PRESSURE OR [T] TEMPERATURE; AND AS COMPONENTS OF A SAFETY INSTRUMENTED SYSTEM.</li> <li>8. ALL INSTRUMENT LABELS MUST BEGIN WITH A LETTER FROM THE "MEASURED VARIABLE" COLUMN. NO OTHER LETTERS NOR MEANINGS ARE ALLOWED.</li> <li>9. "VARIABLE MODIFIER" IS USED AS REQUIRED AS IN THE CASE OF A [DPS] DIFFERENTIAL PRESSURE SWITCH OF AS A [PSV] PRESSURE SAFETY VALVE.</li> <li>10. "READOUT/PASSIVE FUNCTION" AND OUTPUT/ACTIVE FUNCTION" CAN BE USED CONSECUTIVELY, AS IN THE CASE OF A [PDIS] DIFFERENTIAL PRESSURE INDICATION SWITCH OR A [LIT] LEVEL INDICATION TRANSMITTER.</li> <li>11. "FUNCTION MODIFIER" ARE USED TO DIFFERENTIATE THE RELATIVE POSITION OF SWITCHES AND ALARMS. THE COMBINATION OF [HH] HIGH-HIGH IS AN ACCEPTABLE PRACTICE.</li> </ol>	<p>2PB –2 MOMENTARY PUSH BUTTONS (ON-OFF)</p> <p>JSR –JOG, STOP, RUN</p> <p>HOA –HAND, OFF, AUTO</p> <p>SS –START, STOP</p> <p>OC –OPEN, CLOSE</p> <p>OCA –OPEN, CLOSE, AUTO</p> <p>MR –MANUAL, REMOTE</p> <p>FOR –FORWARD, OFF, REVERSE</p>

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REVISIONS										
A	1/07/11	BC	DB	DR	PRELIMINARY SUBMITTAL TO CLIENT.					PA
REV	DATE	BY	CHK	ENG	DESCRIPTION					APPROVED



<h1>TERRATHERM</h1> <h2>PIPING AND INSTRUMENTATION DIAGRAM LEGEND SHEET</h2>				
SIZE D	FILE NO. P&IDLGND1	DWG NO. P&ID LEGEND SHT 1	REV A	
SCALE: AS SHOWN    DNS			SHEET    1 OF 4	

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