

Enhance Energy Inc. and North West Redwater Partnership

2011 Report

APPENDICES i–viii

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Enhance Energy Inc. and North West Redwater Partnership

APPENDIX i



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Enhance Energy Inc. and North West Redwater Partnership

APPENDIX ii



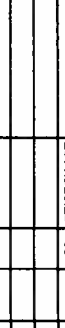
**Government
of Alberta** ■



PFID Stream Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
FROM	Agrium	V-100	E-101/102	V-105	K-200 Stage 1	V-212	K-200 Stage 2	V-213	K-200 Stage 3	V-214	K-200 Stage 4	V-215	K-200 Stage 5	V-216	K-200 Stage 6	E-226	V-300	E-401	E-401	E-405	V-410	P-490	P-411	E-401	PV on CO2 Pipeline
TO	Enhance	E-101/102	V-105	K-200 Stage 1	E-221	K-200 Stage 2	E-222	K-200 Stage 3	E-223	K-200 Stage 4	E-224	K-200 Stage 5	E-225	K-200 Stage 6	E-226	V-300	E-401	E-405	V-410	P-490	P-411	E-401	PV on CO2 Pipeline		
Mass Flow CO2	800	800	800	805	805	805	805	805	805	805	805	805	805	805	805	805	800	800	800	799	799	799	799	799	
BULK PHASE																									
Vapor Mole Frae	1.0000	1.0000	0.4082	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0099	0.0000	0.0000	0.0000	0.0000	
Temperature	98.1	96.0	43.0	42.8	96.8	43.0	97.0	43.0	97.0	43.0	97.3	43.0	97.7	43.0	98.5	43.0	46.3	8.8	-10.0	-10.0	-9.6	3.8	3.8	25.1	
Pressure	48	36	34	34	130	127	300	297	604	601	1445	1442	2109	2105	3827	3825	3820	3783	3778	3778	4123	18030	18020	18020	
Total Mole Flow	2008.1	2008.1	2008.1	824.9	824.9	801.3	801.3	801.3	787.6	780.0	780.0	775.8	775.8	773.5	773.5	772.3	765.0	765.0	765.0	33.389	33.389	33.389	33.389	33.389	
Total Mass Flow	55,796	55,796	55,796	34,587	34,587	34,170	34,170	33,923	33,923	33,787	33,787	33,711	33,711	33,668	33,668	33,646	33,389	33,389	33,389	33,389	33,389	33,389	33,389	33,389	
Volume Flow	42839.6	48817.8	16886.3	16816.4	11227.7	9418.4	8178.9	8178.9	18857.7	18478.6	18478.6	18379.2	18379.2	18324.3	18324.3	18295.2	18122.9	18122.9	18122.9	18122.9	18122.9	18122.9	18122.9	18122.9	
Total Heat Flow	6,735	6,735	-4,713	2,234	2,708	2,158	2,615	2,104	2,550	2,057	2,492	1,999	2,421	1,907	2,307	1,734	1,754	1,321	-1,104	-1,105	-1,098	-910	-478	-478	
VAPOUR PHASE																									
Vapor Mole Flow	2008.1	2008.1	818.6	824.9	824.9	801.3	801.3	801.3	787.6	780.0	780.0	775.8	775.8	773.5	773.5	772.3	765.0	765.0	765.0	0.7	-	-	-	-	
Vapor Mass Flow	55,796	55,796	34,374	34,587	34,587	34,170	34,170	33,923	33,923	33,787	33,787	33,711	33,711	33,668	33,668	33,646	33,389	33,389	33,389	23	-	-	-	-	
Vapor Actual Volume Flow	42839.6	48817.8	16816.4	16816.4	11227.7	9418.4	8178.9	8178.9	18857.7	18478.6	18478.6	18379.2	18379.2	18324.3	18324.3	18295.2	18122.9	18122.9	18122.9	15.4	-	-	-	-	
Vapor Std. Volume Flow	47572.3	47572.3	19417.6	19542.5	15542.5	16982.1	18982.1	18982.1	43,07	43,32	43,32	43,45	43,45	43,53	43,53	43,57	43,65	43,65	43,65	34.68	-	-	-	-	
Vapor Molecular Weight	27.79	27.79	41.94	41.94	41.94	42.85	42.85	42.85	43.07	43.07	43.32	43.45	43.45	43.53	43.53	43.57	43.65	43.65	43.65	78.12	-	-	-	-	
Vapor Mass Density	1.30	1.19	2.05	2.06	3.08	3.83	5.53	6.54	9.97	11.84	18.08	21.89	33.06	40.71	61.88	80.89	79.28	105.29	105.29	78.12	-	-	-	-	
Vapor Viscosity	0.014	0.014	0.015	0.015	0.018	0.016	0.018	0.016	0.018	0.018	0.018	0.018	0.018	0.017	0.017	0.018	0.018	0.018	0.018	0.016	-	-	-	-	
Vapor Specific Heat	1.318	1.317	0.903	0.903	0.949	0.885	0.943	0.885	0.946	0.906	0.980	0.933	0.984	0.995	1.069	1.162	1.146	1.449	1.384	1.384	-	-	-	-	
Vapor Thermal Conductivity	0.025	0.025	0.019	0.019	0.024	0.020	0.024	0.020	0.025	0.020	0.025	0.021	0.026	0.022	0.029	0.025	0.025	0.023	0.023	0.051	-	-	-	-	
Vapor Z Factor	0.9920	0.9927	0.9939	0.9939	0.9936	0.9887	0.9880	0.9920	0.9809	0.9681	0.9685	0.9429	0.9409	0.8961	0.8961	0.8079	0.8163	0.6949	0.7891	0.7891	-	-	-	-	
Vapor Cp / Cv	1.306	1.306	1.291	1.291	1.275	1.295	1.279	1.304	1.289	1.321	1.308	1.356	1.347	1.432	1.429	1.638	1.614	2.107	1.759	1.759	-	-	-	-	
MOLE FRACTION VAPOUR PHASE																									
Vap Carbon Dioxide	37.72	37.72	92.35	92.36	92.36	95.08	95.08	96.74	96.74	97.67	97.67	98.20	98.20	98.49	98.49	98.64	98.95	98.95	98.95	75.74	-	-	-	-	
Vap Nitrogen	0.29	0.29	0.70	0.70	0.70	0.72	0.72	0.73	0.73	0.74	0.74	0.74	0.74	0.74	0.74	0.75	0.75	0.75	0.75	20.85	-	-	-	-	
Vap Water	61.88	61.88	6.67	6.66	6.88	3.91	3.91	2.24	2.24	1.30	1.30	0.76	0.76	0.47	0.47	0.31	0.00	0.00	0.00	0.00	-	-	-	-	
Vap Ethylene Glycol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	
Vap Ammonia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	
Vapor Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	-	-	-	-	
LIQUID PHASE																									
Liquid Mole Flow	-	-	1188.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	764.3	764.3	764.3	764.3	
Liquid Mass Flow	-	-	21,422	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33,366	33,366	33,366	33,366	
Liquid Actual Volume Flow	-	-	21.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33.6	33.6	33.1	36.9	
Liquid Std Volume Flow	-	-	21.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	41.1	41.1	41.1	41.1	
Liquid Mass Density	-	-	990.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	992.1	991.9	1,009.0	903.6	
Liquid Viscosity	-	-	0.6184	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1366	0.1365	0.1429	0.1052	
Liquid Specific Heat	-	-	4.2212	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.4622	2.4511	2.0707	2.3329	
Thermal Conductivity	-	-	0.6303	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1243	0.1243	0.1302	0.1126	
Surface Tension	-	-	69.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.32	6.24	3.77	0.56	
MOLE FRACTION LIQUID PHASE																									
Liquid Carbon Dioxide	-	-	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	98.97	98.97	98.97	98.97	
Liquid Hydrogen	-	-	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.73	0.73	0.73	0.73	
Liquid Nitrogen	-	-	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.30	0.30	0.30	0.30	
Liquid Water	-	-	99.96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	
Liquid Ethylene Glycol	-	-	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	
Liquid Triethylene Glycol	-	-	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	
Liquid Ammonia	-	-	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	
Liquid Total	-	-	100.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.00	100.00	100.00	100.00	

NUMBER	REFERENCE DRAWINGS	TITLE	NO.	ISSUE	REVISIONS	DATE	BY	CHK'D	ENG	APP'D	NOTES
0	ISSUED FOR CONSTRUCTION					2011 DEC 23	JG				





LSD: 04-17-056-21 WAM
 CO2 RECOVERY FACILITY #1
 HEAT AND MASS BALANCE
 SHEET 1 OF 3
 DRAWING NO. A1-EF1-62205-021

REV.	0
0	

PROD Stream Number	113	116	117	131	132	133	134	135	136	137	138	139	140	141	142	143	144	146	150	151	153	
FROM	AC-440/441	EG Supply	K-400	EG Supply	E-101/102	EG Supply	E-221	EG Supply	E-221	EG Supply	E-222	EG Supply	E-222	EG Supply	E-223	EG Supply	E-224	EG Supply	E-225	EG Supply	E-226	EG Supply
TO	V-445	K-400	EG Return	E-101/102	EG Return	E-221	EG Return	E-222	EG Return	E-223	EG Return	E-224	EG Return	E-225	EG Return	E-226	EG Return	Delv Coolers	E-325	E-335	EG Return	EG Return
Mass Flow CO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BULK PHASE	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units
Vapor Mole Frac	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Temperature	38.0	38.0	43.8	38.0	75.0	38.0	48.0	38.0	45.0	38.0	45.0	38.0	45.0	38.0	45.0	38.0	45.0	38.0	80.0	80.0	80.0	
Pressure	1374	431	376	431	425	431	339	431	376	431	325	431	346	431	352	431	388	431	411	411	411	
Total Mole Flow	474.3	3304.6	3304.6	13383.9	13383.9	3075.2	3075.2	2921.7	2921.7	2582.9	2582.9	2439.6	2439.6	2454.7	2454.7	2682.0	2682.0	148.6	148.6	40.8	411	
Total Mass Flow	8.078	97.653	97.653	395.506	395.506	90.875	90.875	86.338	86.338	76.328	76.328	72.092	72.092	72.538	72.538	79.257	79.257	4.390	4.390	1.206	152	
Volume Flow	13.7	90.8	91.1	367.7	372.9	85.7	85.7	80.3	80.7	71.0	71.3	67.0	67.4	67.4	67.8	73.7	74.0	4.1	4.1	1.1	0.1	
Total Heat Flow	-1.296	-34.061	-33.488	-137.951	-122.502	-31.897	-30.931	-30.114	-29.478	-28.823	-28.061	-25.145	-24.614	-25.301	-24.786	-27.844	-27.059	-1.531	-1.430	-383	-49	
VAPOUR PHASE																						
Vapor Mole Flow	kgmole/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	
Vapor Mass Flow	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	
Vapor Actual Volume Flow	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	
Vapor Std. Volume Flow	sm3/h	sm3/h	sm3/h	sm3/h	sm3/h	sm3/h	sm3/h	sm3/h	sm3/h	sm3/h	sm3/h	sm3/h	sm3/h	sm3/h	sm3/h	sm3/h	sm3/h	sm3/h	sm3/h	sm3/h	sm3/h	
Vapor Molecular Weight	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	
Vapor Mass Density	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	
Vapor Viscosity	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	
Vapor Specific Heat	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	
Vapor Thermal Conductivity																						
Vapor Z Factor																						
Vapor Cp / Cv																						
MOLE FRACTION VAPOUR PHASE																						
Vap Carbon Dioxide	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
Vap Hydrogen	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
Vap Nitrogen	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
Vap Water	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
Vap Ethylene Glycol	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
Vap Ammonia	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
Vapor Total	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
LIQUID PHASE																						
Liquid Mole Flow	kgmole/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	
Liquid Mass Flow	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	kg/h	
Liquid Actual Volume Flow	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	
Liquid Std Volume Flow	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	m3/h	
Liquid Mass Density	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	kg/m3	
Liquid Viscosity	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	cp	
Liquid Specific Heat	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	kJ/kg-K	
Thermal Conductivity	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	W/m-K	
Surface Tension	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	Dyn/cm	
MOLE FRACTION LIQUID PHASE																						
Liquid Carbon Dioxide	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
Liquid Hydrogen	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
Liquid Nitrogen	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
Liquid Water	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
Liquid Ethylene Glycol	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
Liqd Triethylene Glycol	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
Liquid Ammonia	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
Liquid Total	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	

NUMBER	0	ISSUE	ISSUED FOR CONSTRUCTION	REVISIONS	DATE	BY	CHK'D	ENG	APP'D	NOTES
					2011.DEC.23	JG				

PROJ. NO.	CS09E0059	CONSULTANT'S LOGO	CABER ENGINEERING
CADFILE	A1-EF1-62205-021C		
SCALE	NTS		

DRAWING NO.	A1-EF1-62205-021
REV.	0

ENHANCE ENERGY INC.

LSD: 04-17-056-21 WAM

CO2 RECOVERY FACILITY #1

HEAT AND MASS BALANCE

SHEET 3 OF 3



Enhance Energy Inc. and North West Redwater Partnership

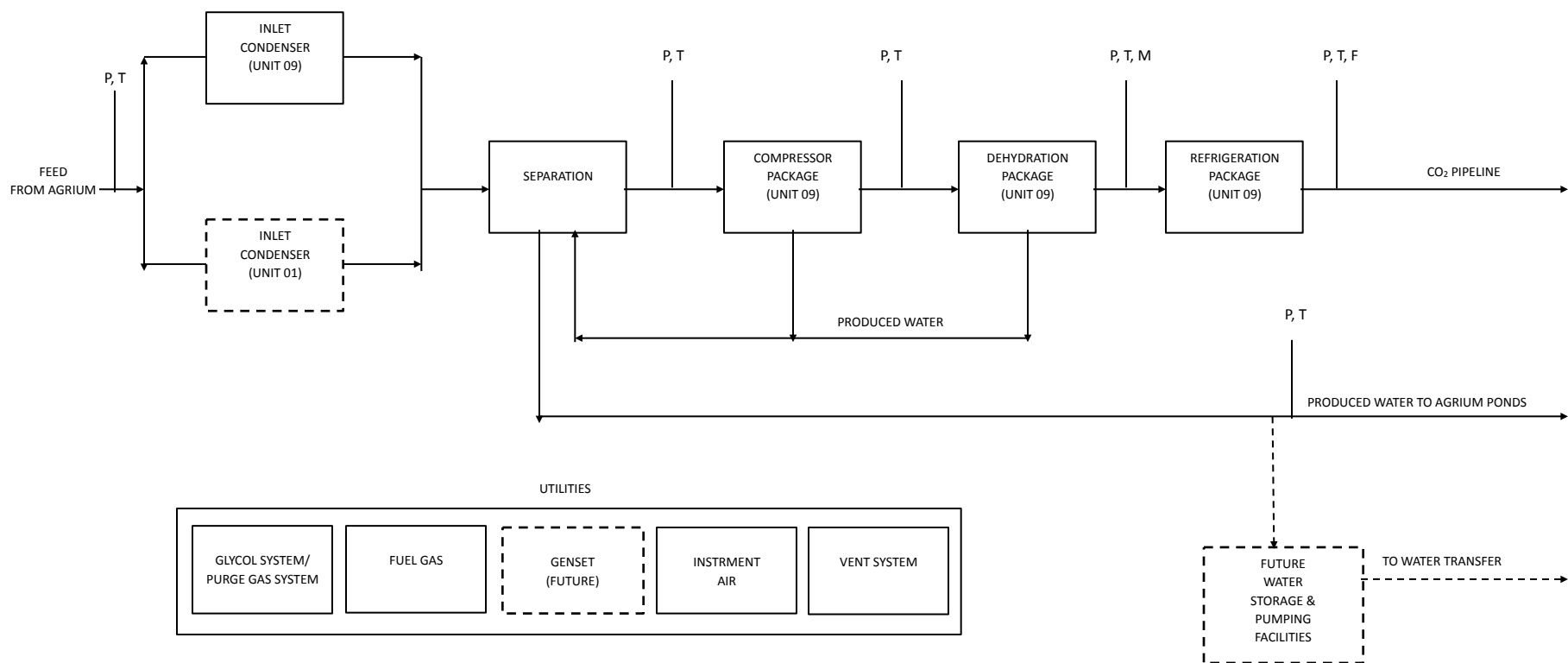
APPENDIX iii



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Enhance Energy, Inc – Agrium CO₂ Recovery Facility Process Measurement Point Diagram



P- Pressure
 T- Temperature
 F- Flow
 M- Moisture

Enhance Energy Inc. and North West Redwater Partnership

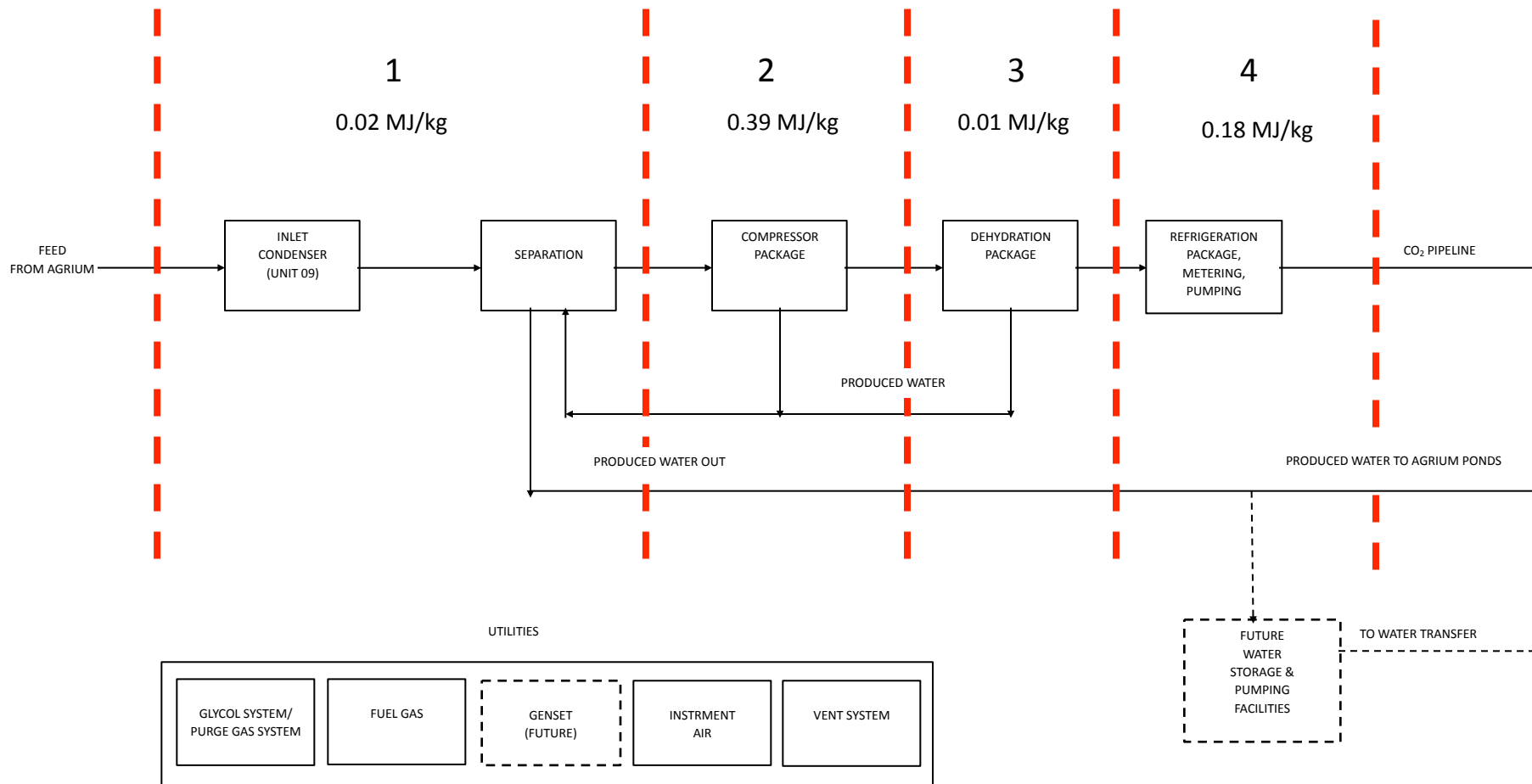
APPENDIX iv



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Enhance Energy, Inc – Agrium CO₂ Recovery Facility Energy Boundary Diagram



- 1 – Inlet / Separation
- 2- Compression
- 3- Dehydration
- 4- Refrigeration/Metering/Pumping

Note – each area shares an appropriate portion of the utility systems

Enhance Energy Inc. and North West Redwater Partnership

APPENDIX v



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Nalco Analytical Resources
 1601 West Diehl Road, Naperville, Illinois 60563-1198
 Phone: (630) 305-2316, Fax: (630) 305-2946, Analytical.Lab.Naperville@Nalco.com



Agrium Redwater
 Redwater AB Canada
 Sample Marked: T-903 Overhead Condensate
 SAP SoldTo Number: 0001000024

Sample Number: NW0702633
 Date Sampled: 16-Jan-2007
 Date Received: 15-Feb-2007
 Date Completed: 07-Mar-2007

Water Analysis Report

Cations/Metals	Filtered	Total
Aluminum (Al)	<1.0	<1.0 mg/L
Barium (Ba)	<4.1	<3.9 mg/L
Boron (B)	<1.0	<1.0 mg/L
Cadmium (Cd)	<0.41	<0.39 mg/L
Calcium (Ca)	<1.0	<1.0 mg/L
Chromium (Cr)	<0.10	<0.10 mg/L
Copper (Cu)	<0.10	<0.10 mg/L
Iron (Fe)	<0.10	<0.10 mg/L
Lead (Pb)	<2.0	<1.9 mg/L
Lithium (Li)	<0.10	<0.10 mg/L
Magnesium (Mg)	<4.1	<3.9 mg/L
Manganese (Mn)	<0.10	<0.10 mg/L
Molybdenum (Mo)	<1.0	<1.0 mg/L
Nickel (Ni)	<1.0	<1.0 mg/L
Phosphorus (P)	<10.1	<9.7 mg/L
Phosphorus (PO ₄)	<31.0	<29.7 mg/L
Potassium (K)	<7.1	6.9 mg/L
Silica (SiO ₂)	<10.8	<10.4 mg/L
Sodium (Na)	<2.0	<1.9 mg/L
Strontium (Sr)	<0.10	<0.10 mg/L
Vanadium (V)	<5.07	<4.85 mg/L
Zinc (Zn)	<0.10	<0.10 mg/L
Calcium (CaCO ₃)	<2.5	<2.4 mg/L
Magnesium (CaCO ₃)	<16.7	<16.0 mg/L
Sodium (CaCO ₃)	<4.4	<4.2 mg/L
Calculated Hardness (CaCO ₃)	NR*	NR*

Anions

Bromide (Br)	<10.0 mg/L
Chloride (Cl)	11 mg/L
Nitrate (NO ₃)	<10.0 mg/L
Nitrite (NO ₂)	<10.0 mg/L
Sulfate (SO ₄)	<10.0 mg/L
Chloride (CaCO ₃)	15 mg/L
Nitrate (CaCO ₃)	<8.1 mg/L
Sulfate (CaCO ₃)	<10.0 mg/L

Authorized by : David R. Szymborski





Nalco Analytical Resources

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Agrium Redwater
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 Sample Marked: T-903 Overhead Condensate
 SAP SoldTo Number: 0001000024

Sample Number: NW0702633
 Date Sampled: 16-Jan-2007
 Date Received: 15-Feb-2007
 Date Completed: 07-Mar-2007

Water Analysis Report

ALK - Alkalinity

Bicarbonate (CaCO ₃)	7100 mg/L
Carbonate (CaCO ₃)	110 mg/L
Methyl Orange (CaCO ₃)	7200 mg/L
Phenolphthalein (CaCO ₃)	53 mg/L

Others

pH	8.5 pH Units
Conductivity	13000 μ S/cm
Organic Carbon (C) - Total	1100 mg/L
MS Number	MS0048

Authorized by : David R. Szymborski



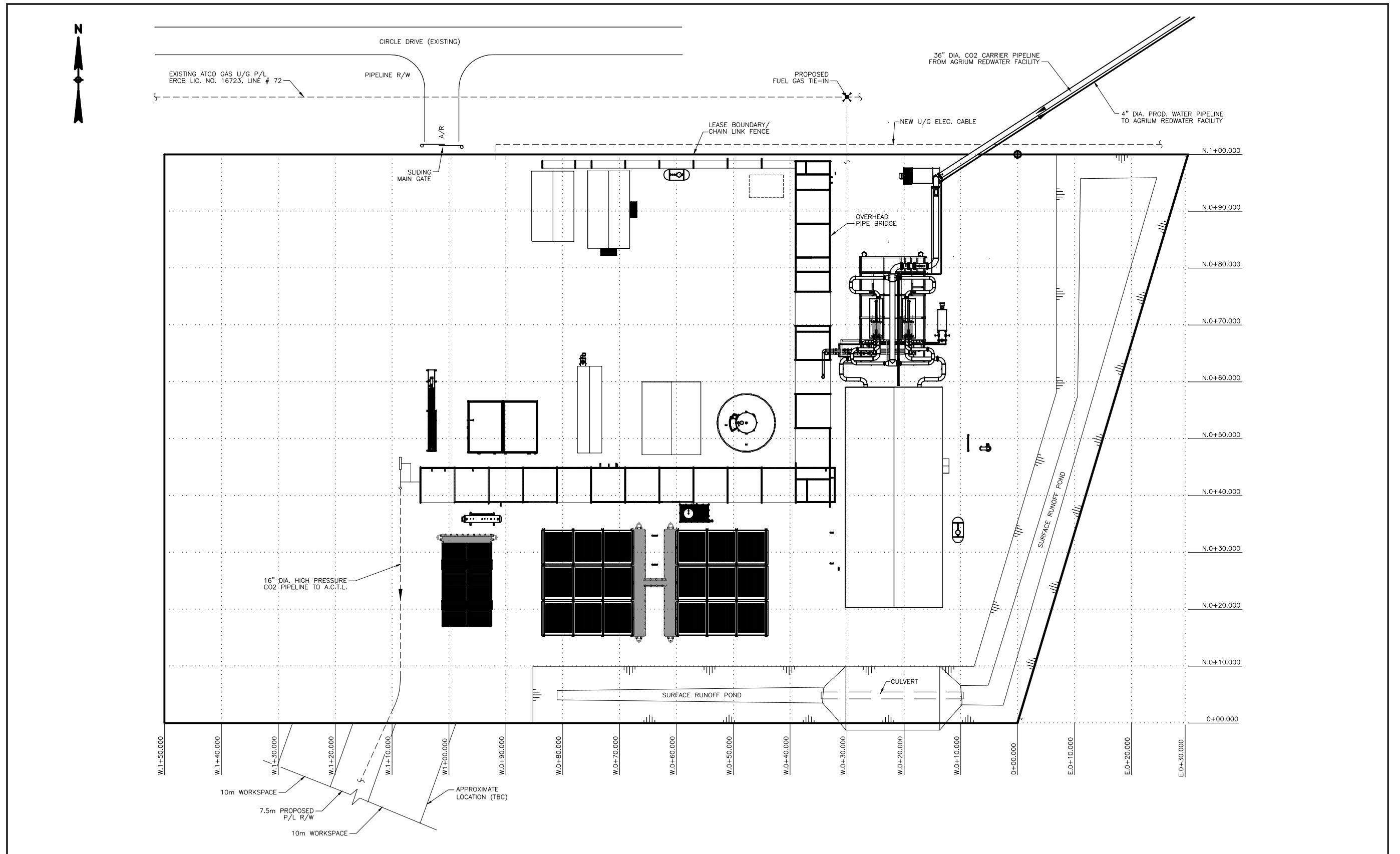
Enhance Energy Inc. and North West Redwater Partnership

APPENDIX vi



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REFERENCE DRAWINGS		REVISIONS							NOTES	PERMIT AND ENGINEER STAMP	CONSULTANTS LOGO	
NUMBER	TITLE	NO.	ISSUE	DATE	BY	CHK'D	ENG	APP'D				
		A	ISSUED FOR INFORMATION	2012.MAR.07	JG							

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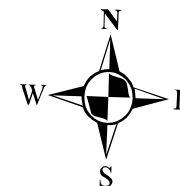
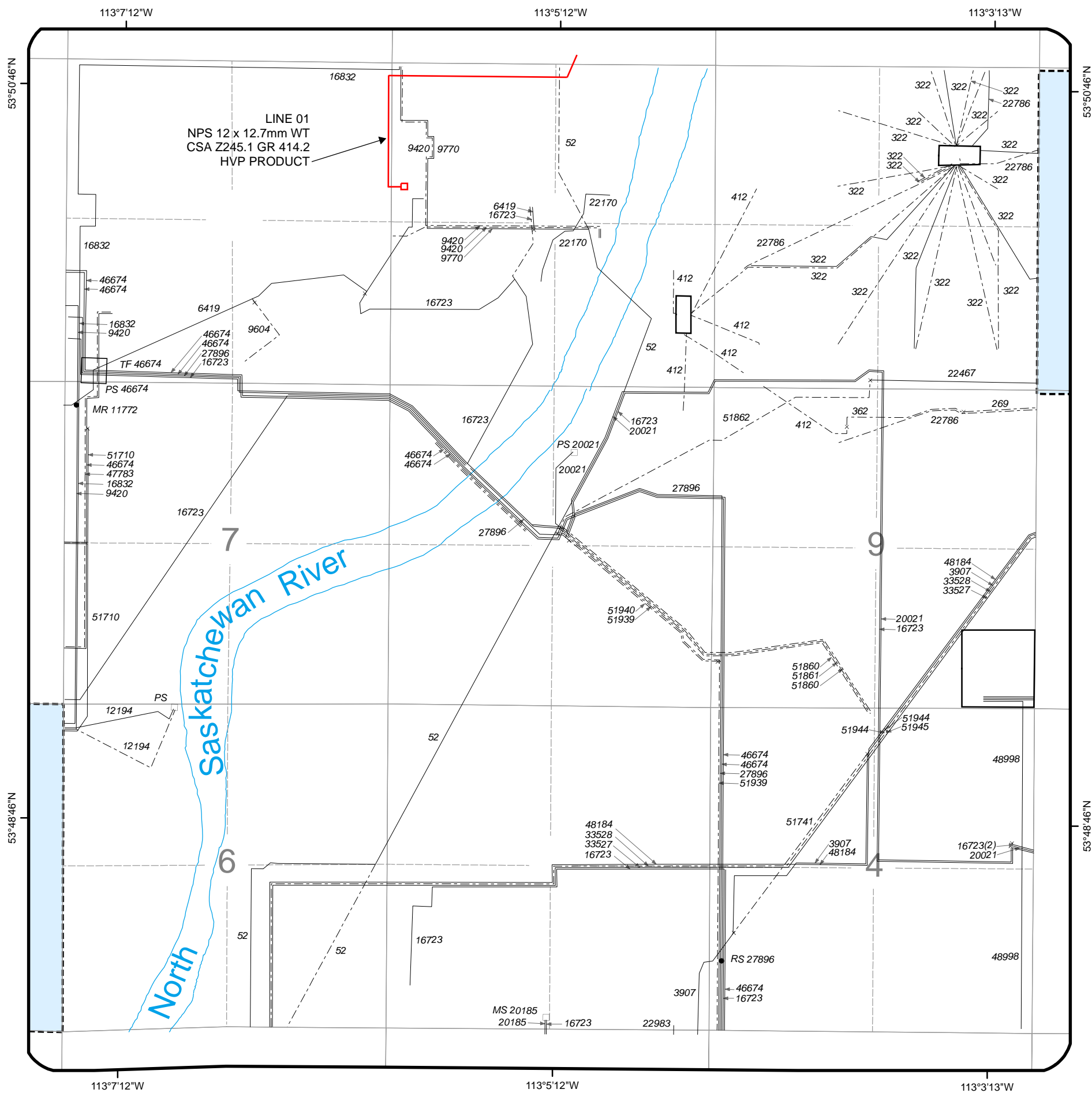
Enhance Energy Inc. and North West Redwater Partnership

APPENDIX vii



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Coordinate System: 10TM



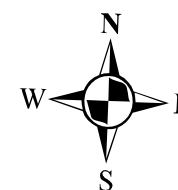
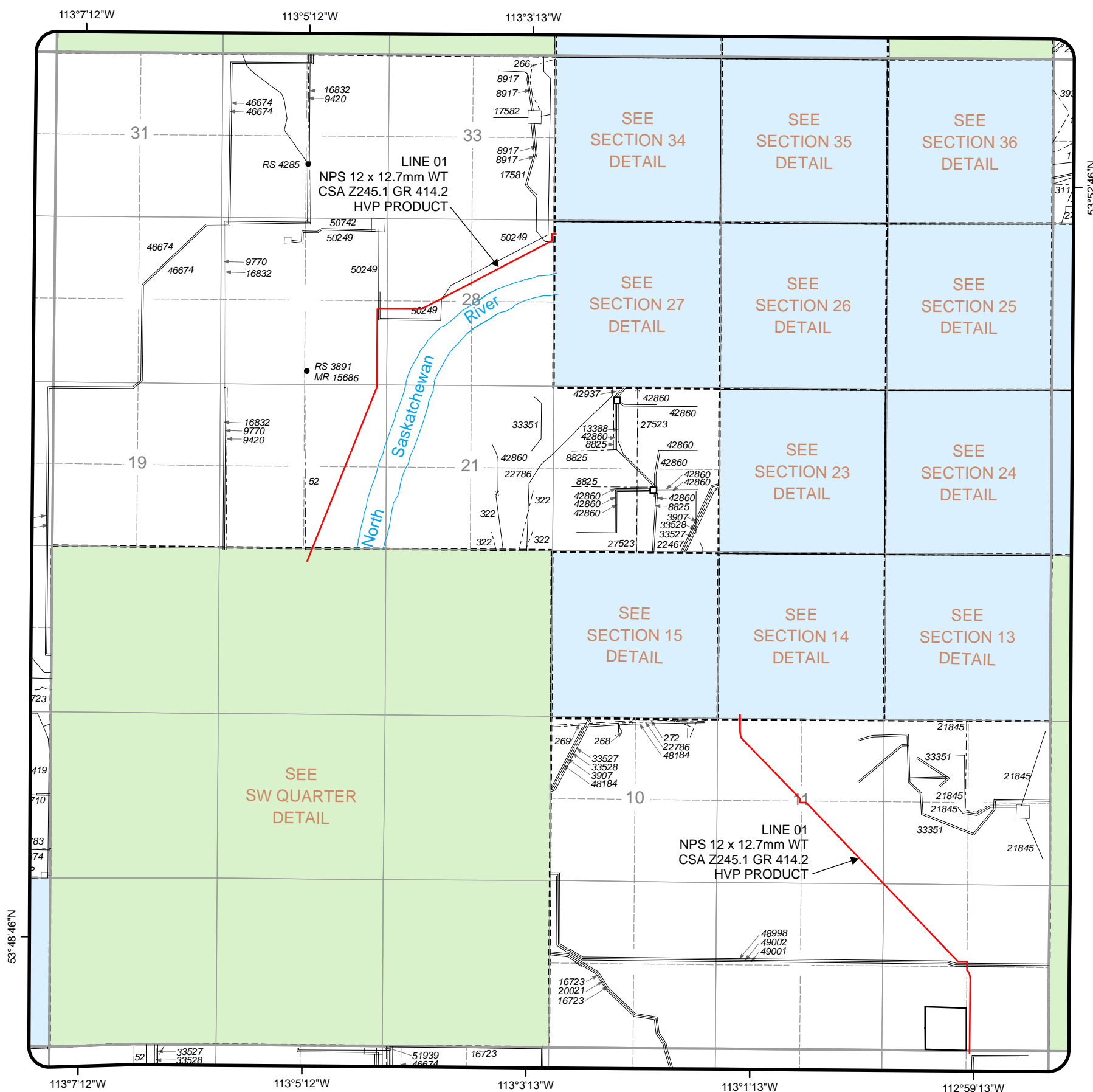
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SW .056- 21W4**

**REVISION DATE:
26 August 2010**

CAUTION
 - THIS PLOT REPRESENTS THE BEST INFORMATION AVAILABLE TO THE BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS SHOULD BE OBTAINED FROM SURVEY PLANS, OWNERS AND FIELD OBSERVATION BEFORE DIGGING.
 - LOW-PRESSURE GAS DISTRIBUTION LINES ARE NOT SHOWN.
 CONTACT THE GAS DISTRIBUTOR IN THIS AREA FOR LINE LOCATION

LEGEND

- PERMITTED: -----
- LICENSED: _____
- DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED: - - - - -



Coordinate System: 10TM



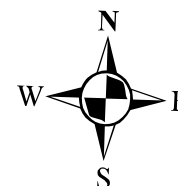
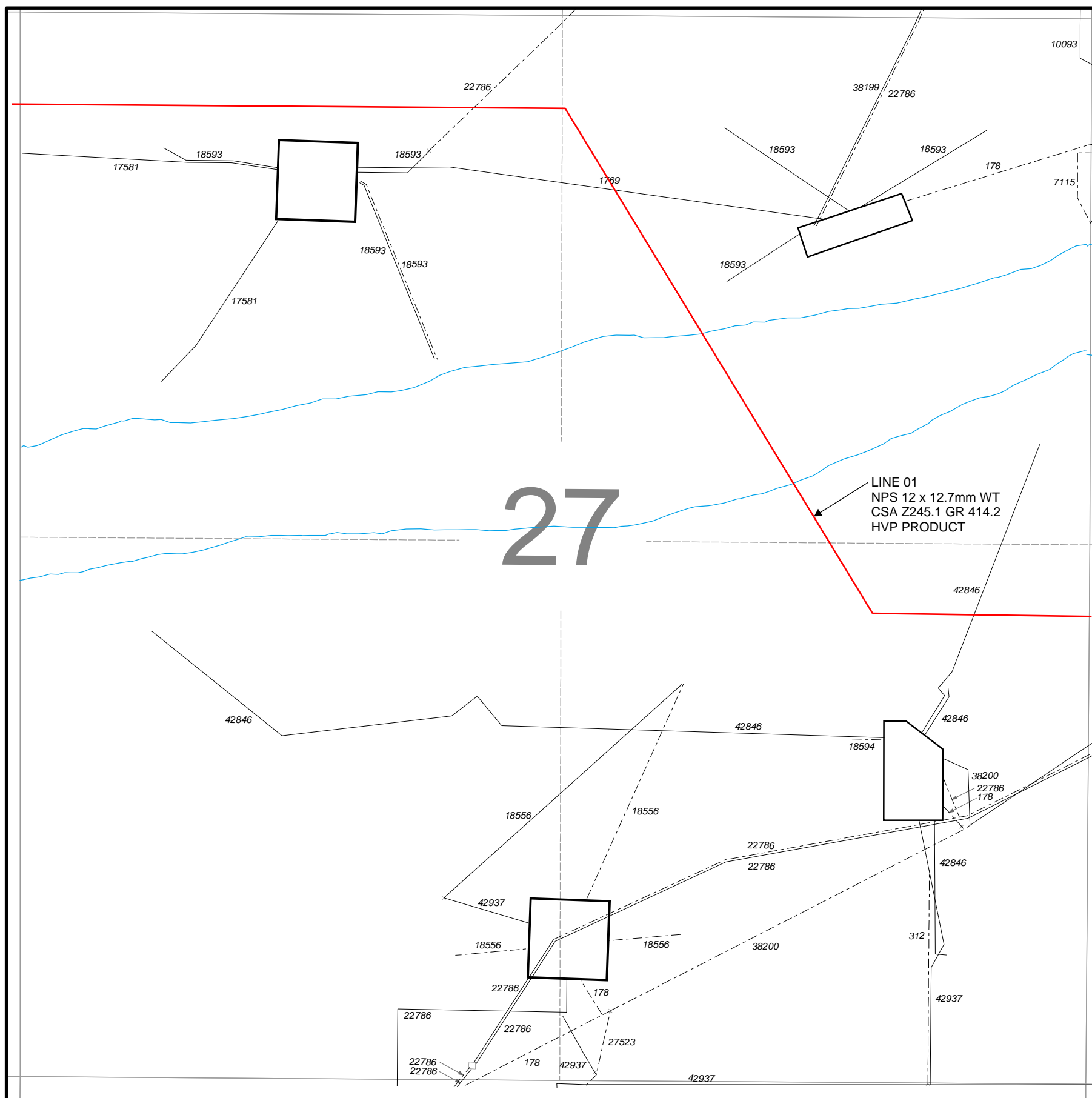
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**REVISION DATE:
30 September 2010**

CAUTION
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Coordinate System: 10TM



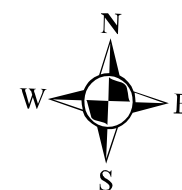
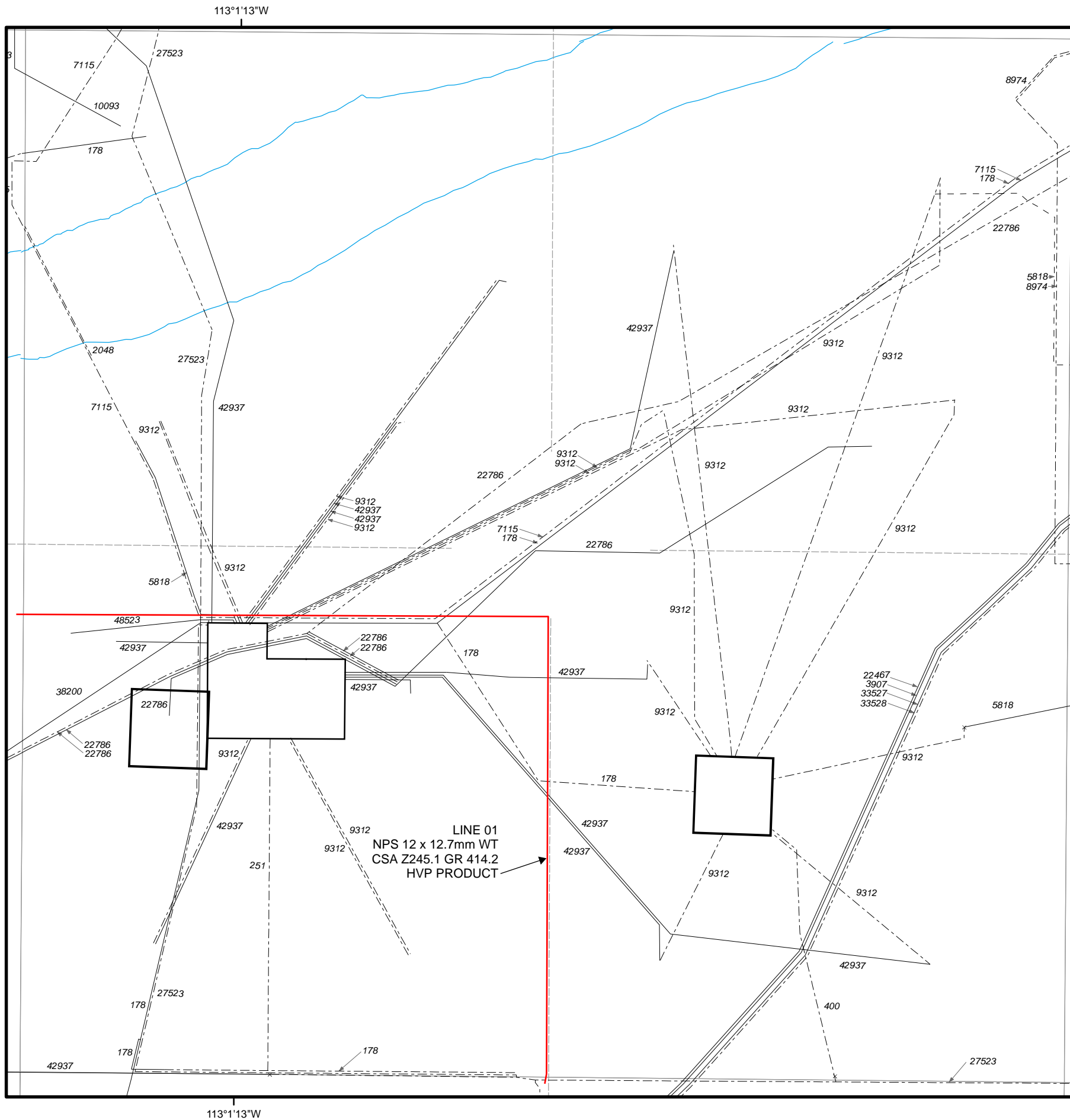
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**REVISION DATE:
27 February 2008**

CAUTION
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Coordinate System: 10TM



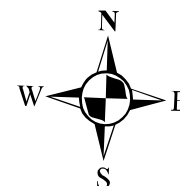
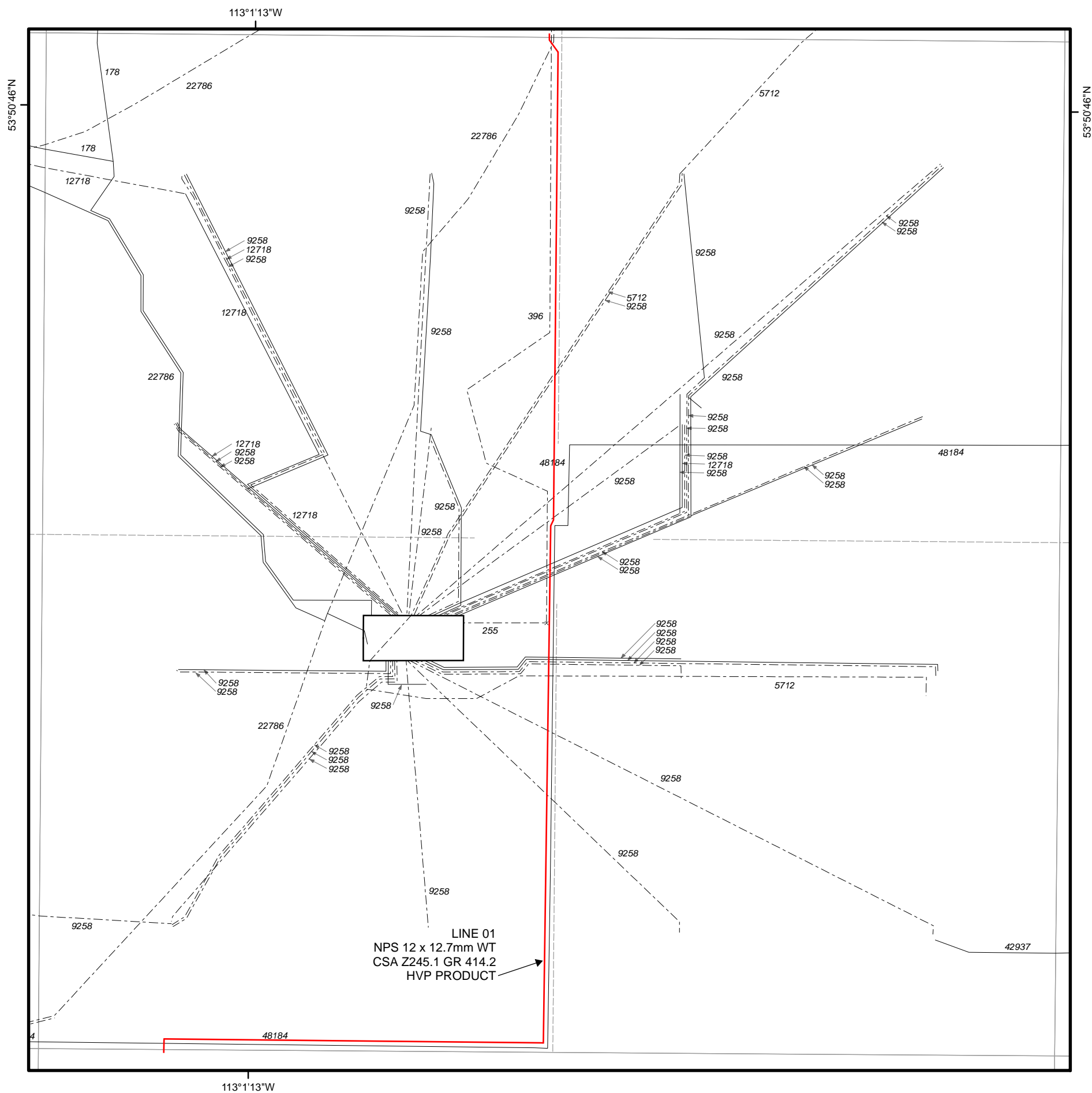
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**REVISION DATE:
26 August 2010**

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LEGEND

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- LICENSED:
- DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED:



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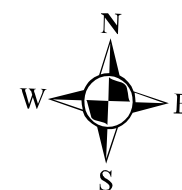
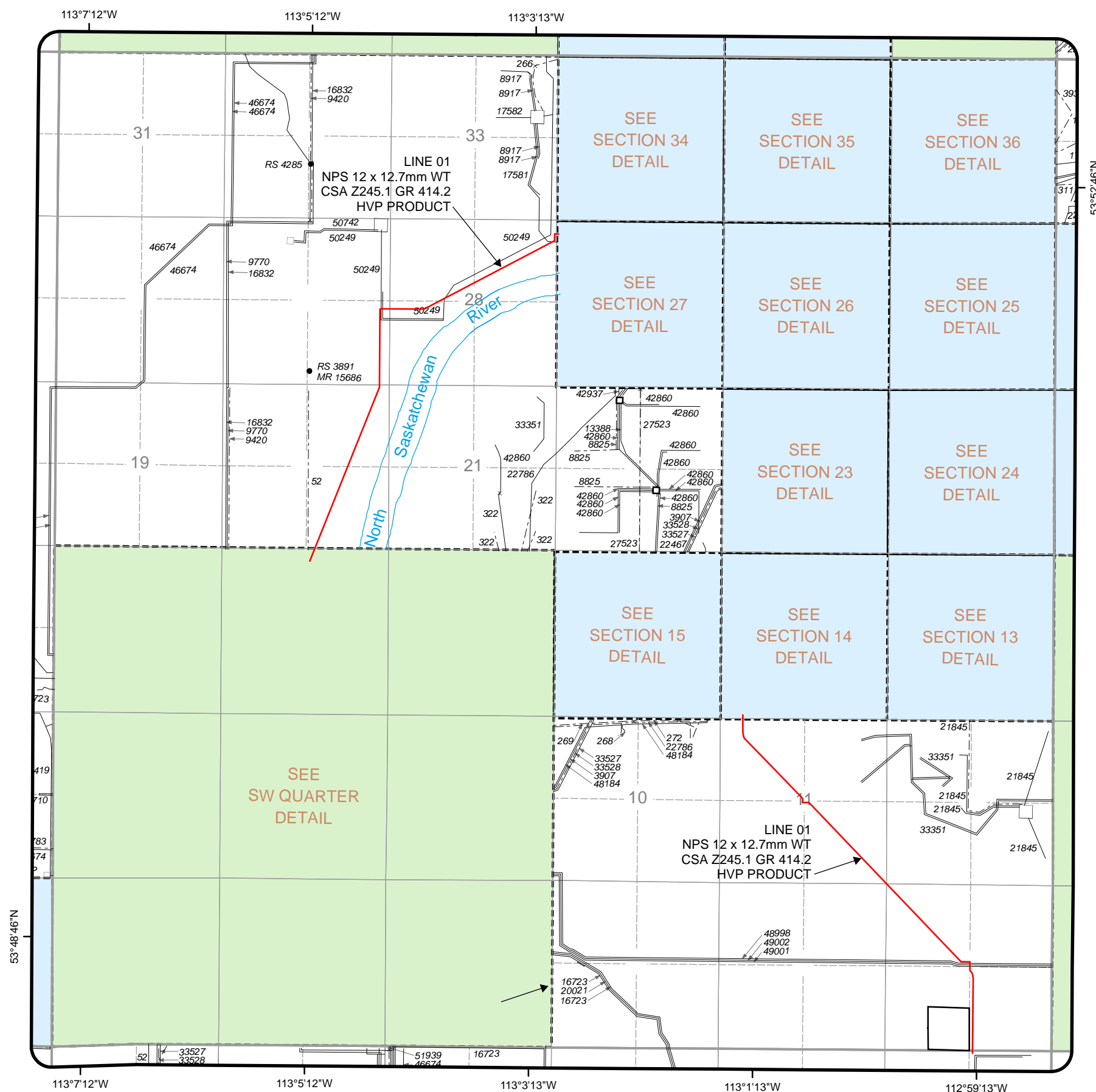
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**REVISION DATE:
02 September 2009**

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 LINES ARE NOT SHOWN.
**CONTACT THE GAS DISTRIBUTOR
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- LICENSED: _____
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ABANDONED,
OR ABANDONED
AND PARTIALLY
REMOVED: - - - - -



Coordinate System: 10TM



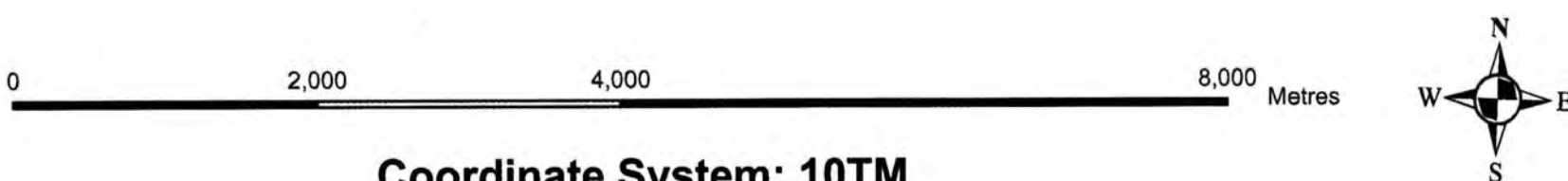
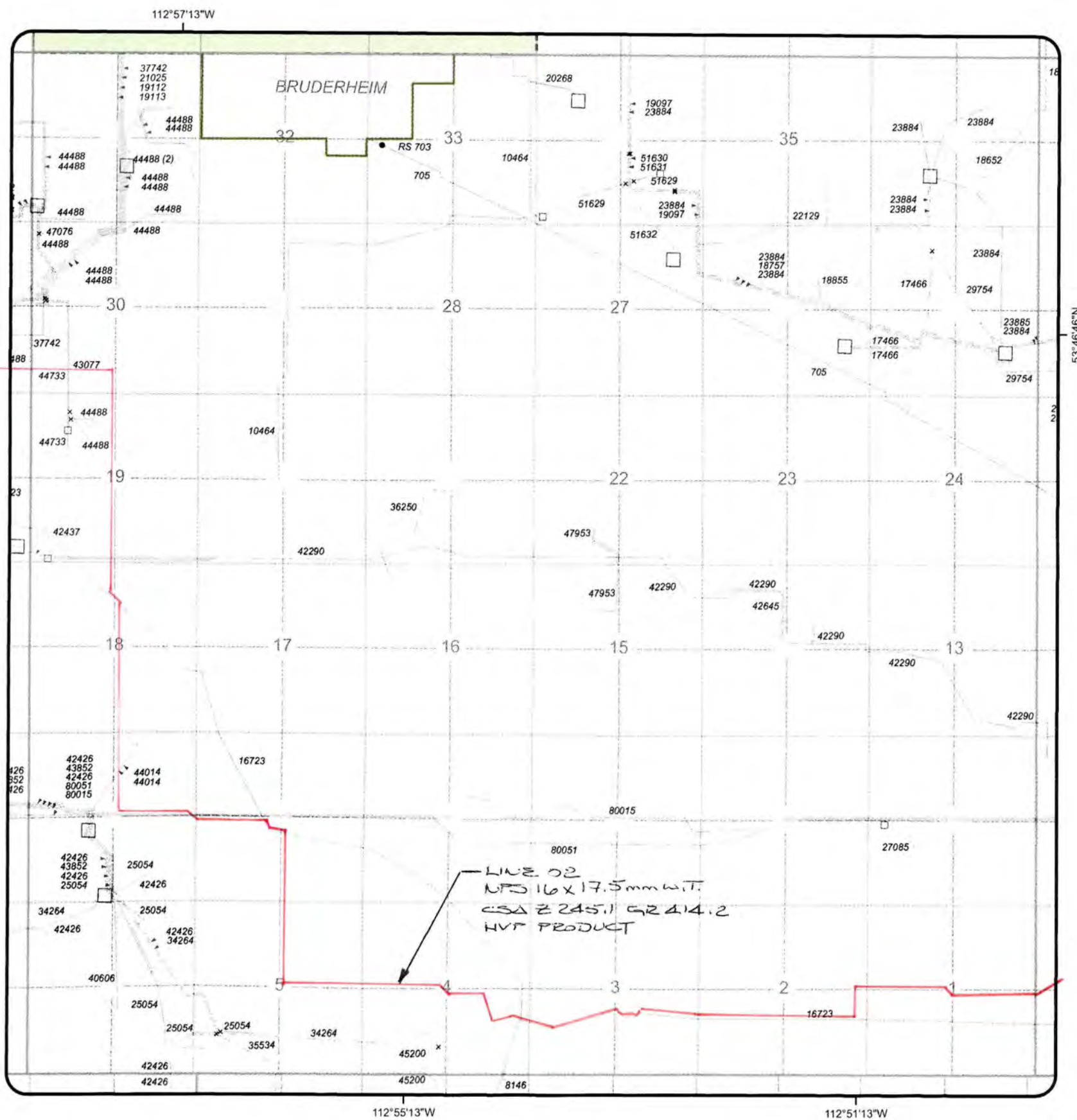
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Coordinate System: 10TM



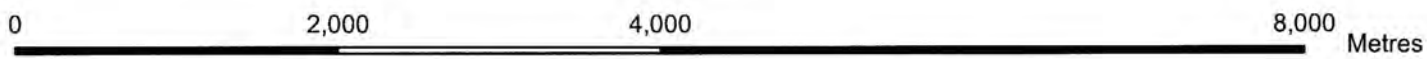
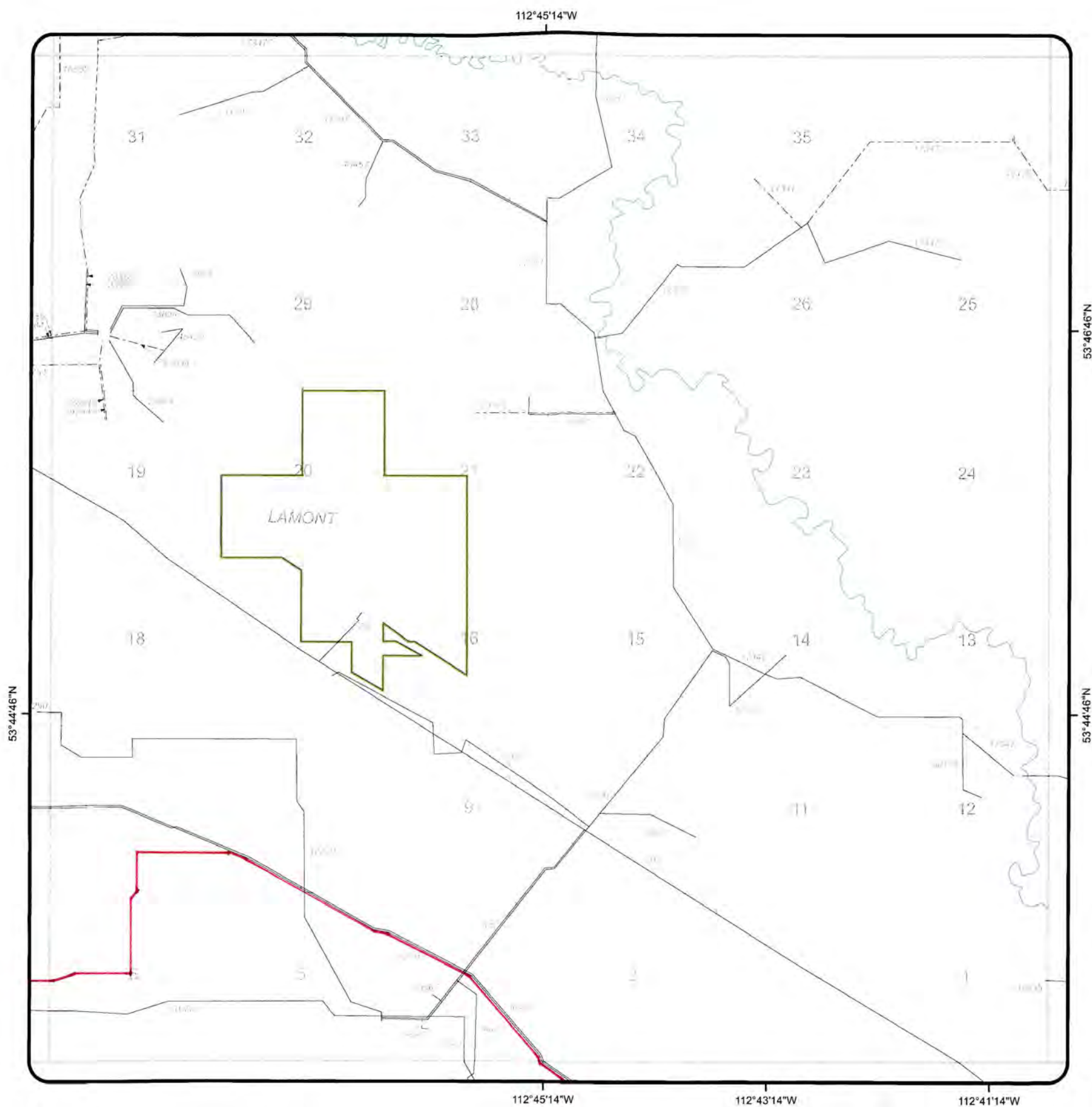
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**REVISION DATE:
11 May 2010**

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Coordinate System: 10TM



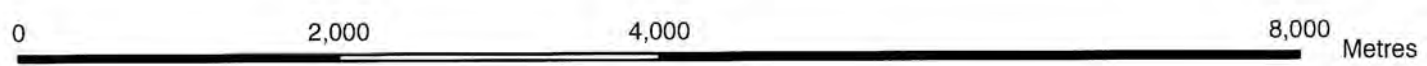
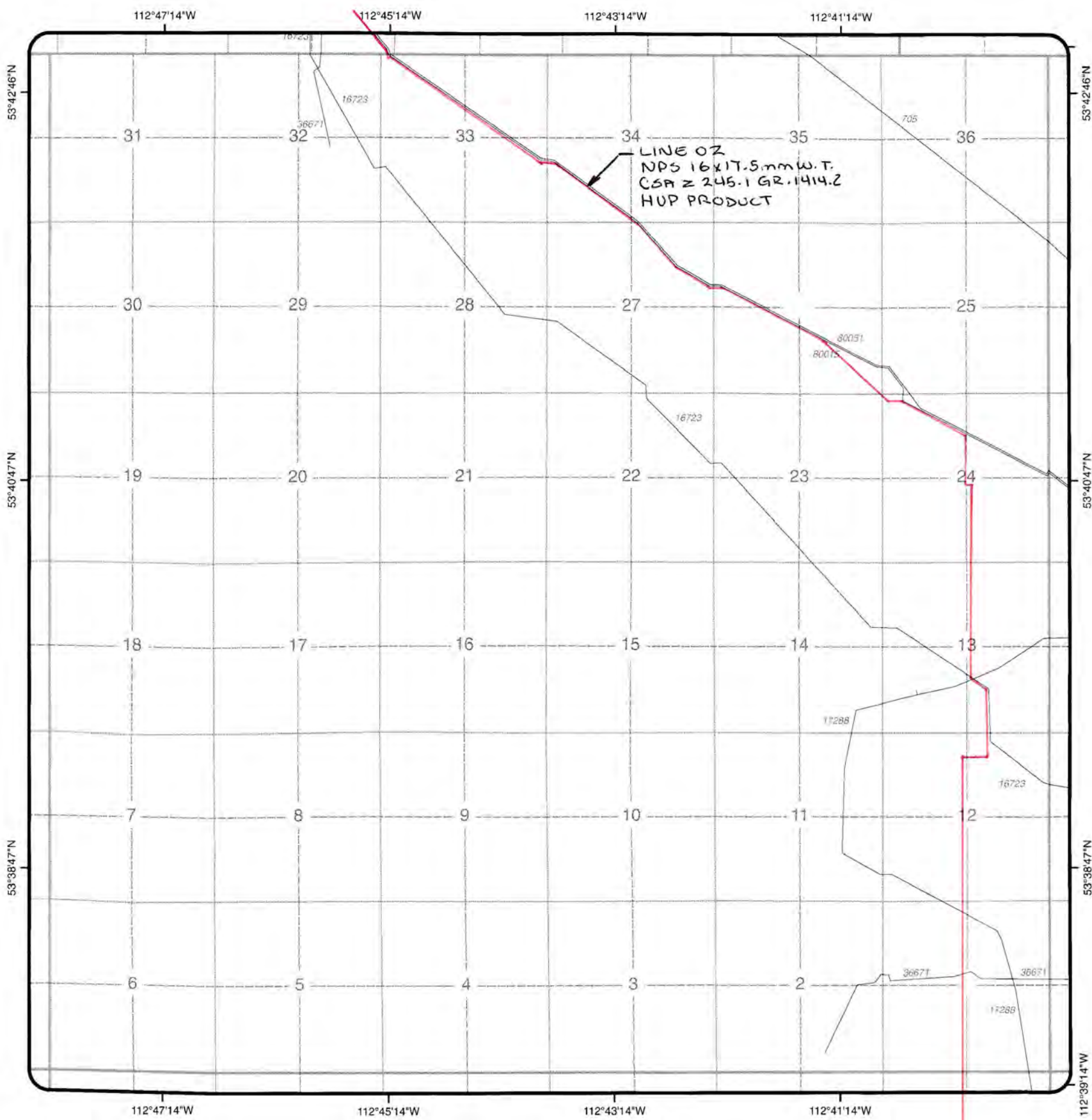
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**REVISION DATE:
27 August 2009**

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Coordinate System: 10TM



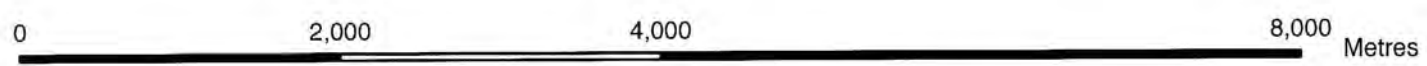
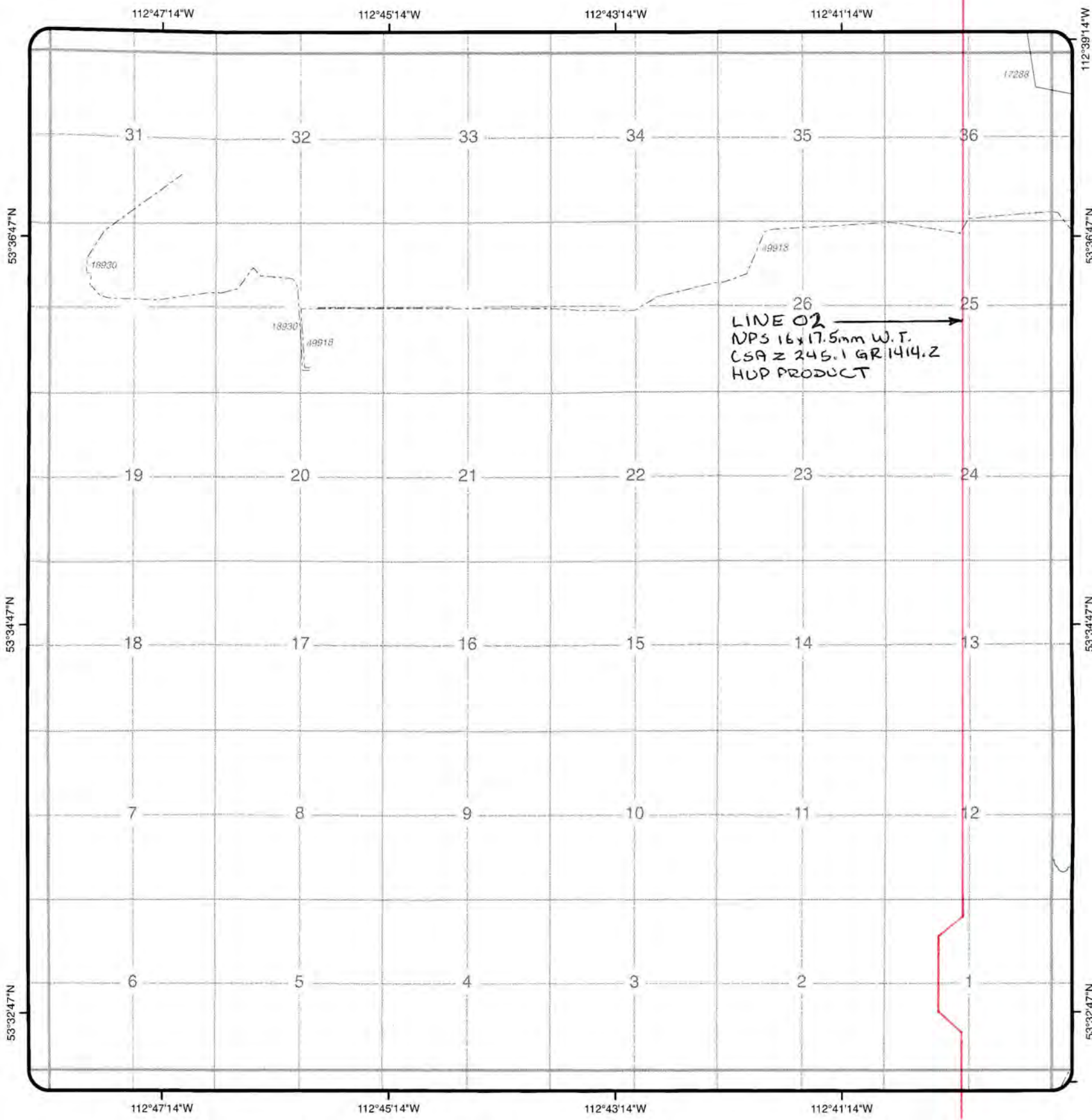
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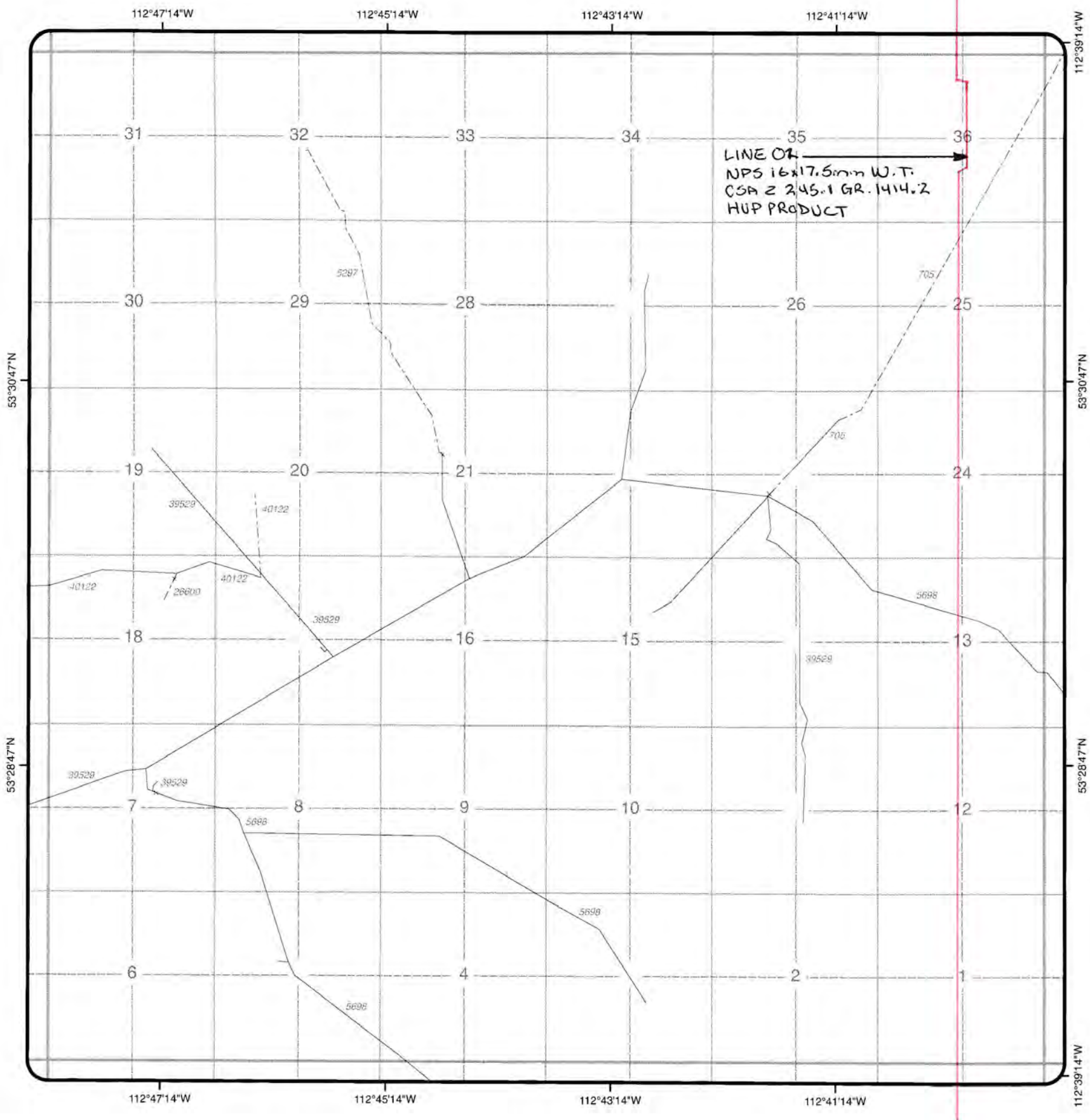
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**REVISION DATE:
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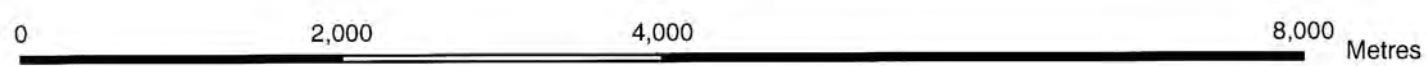
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LEGEND

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DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED:	- - - - -



LINE 02
 NPS 16x17.5mm W.T.
 CSA 2 245.1 GR. 1414.2
 HUP PRODUCT



Coordinate System: 10TM



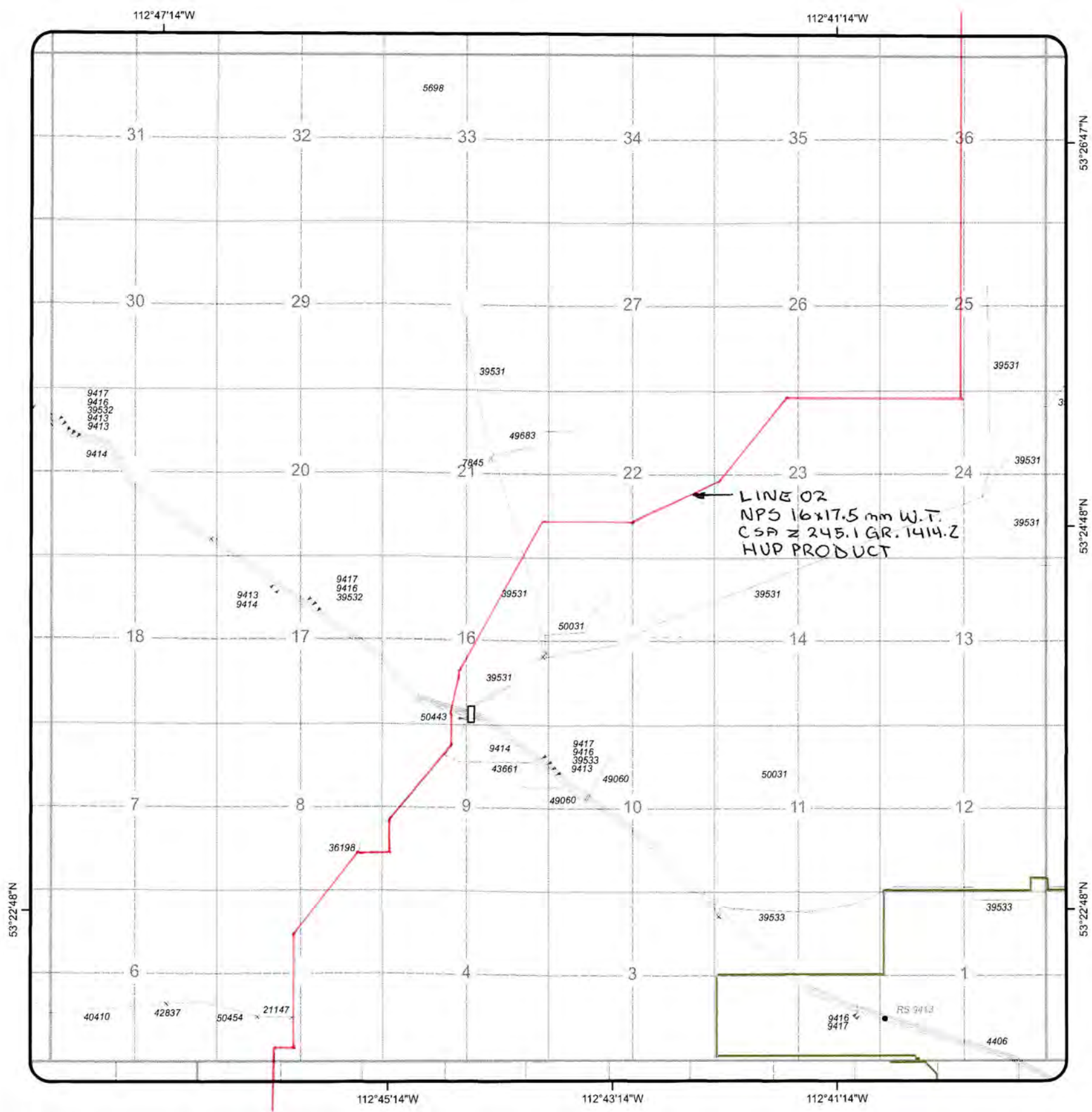
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**REVISION DATE:
 02 April 2008**

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Coordinate System: 10TM



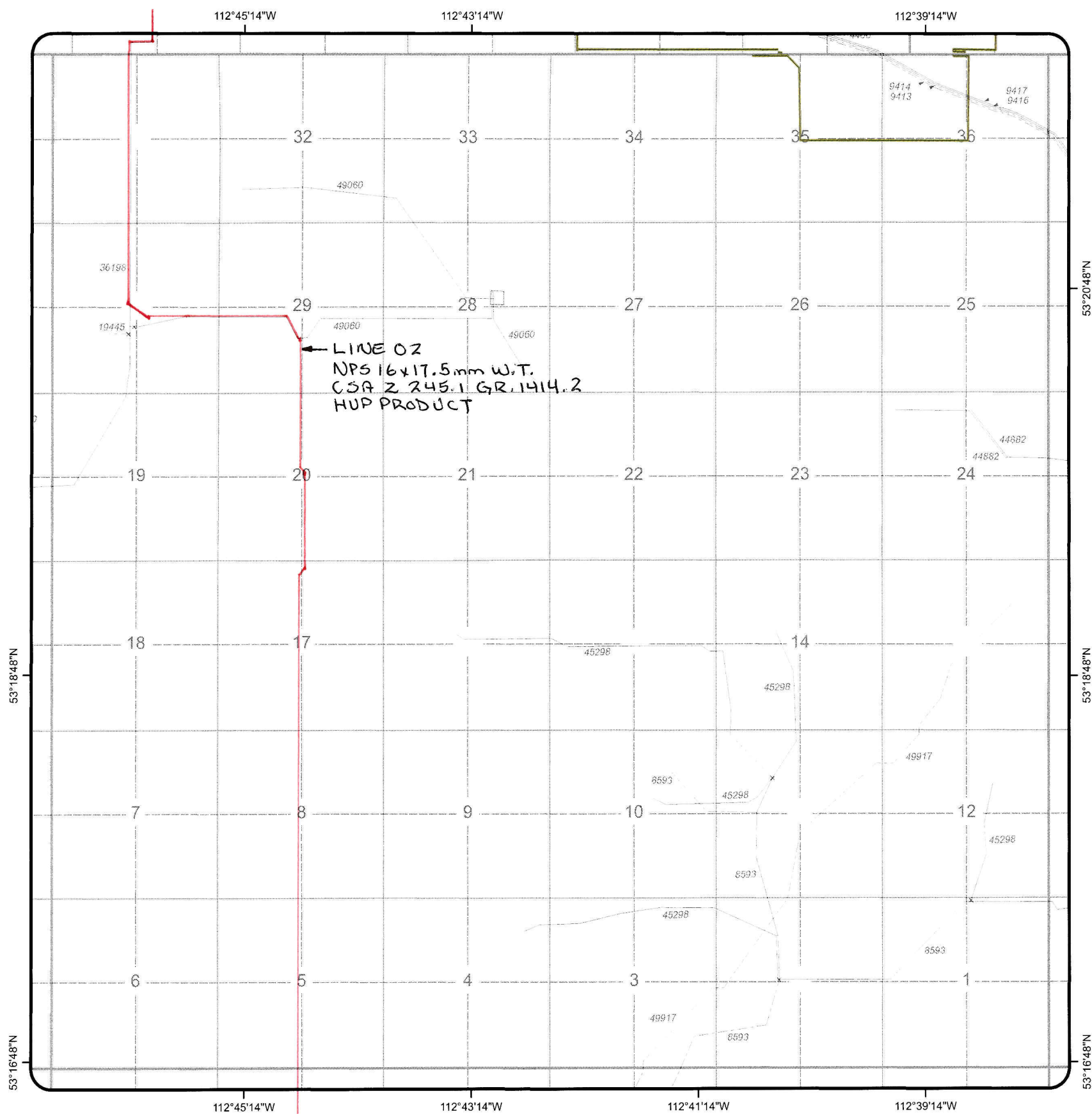
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**REVISION DATE:
28 January 2009**

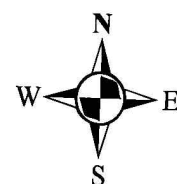
CAUTION
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PERMITTED:	-----
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LINE 02
 NPS 16x17.5mm W.T.
 CSA Z 245.1 GR. 1414.2
 HUP PRODUCT



Coordinate System: 10TM



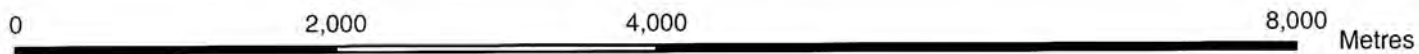
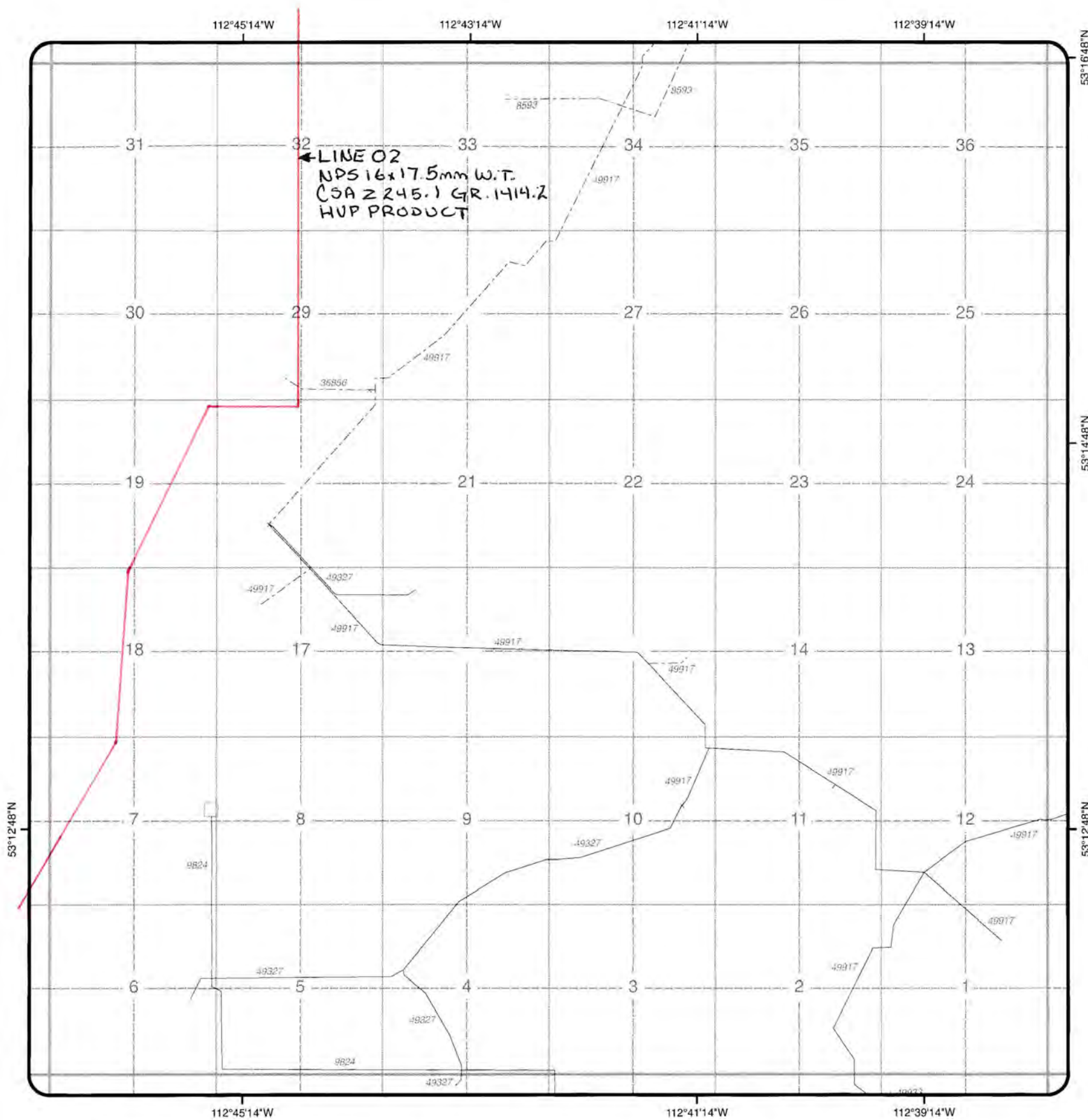
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**REVISION DATE:
 22 September 2008**

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- LICENSED: _____
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Coordinate System: 10TM



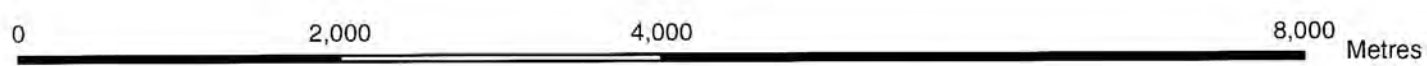
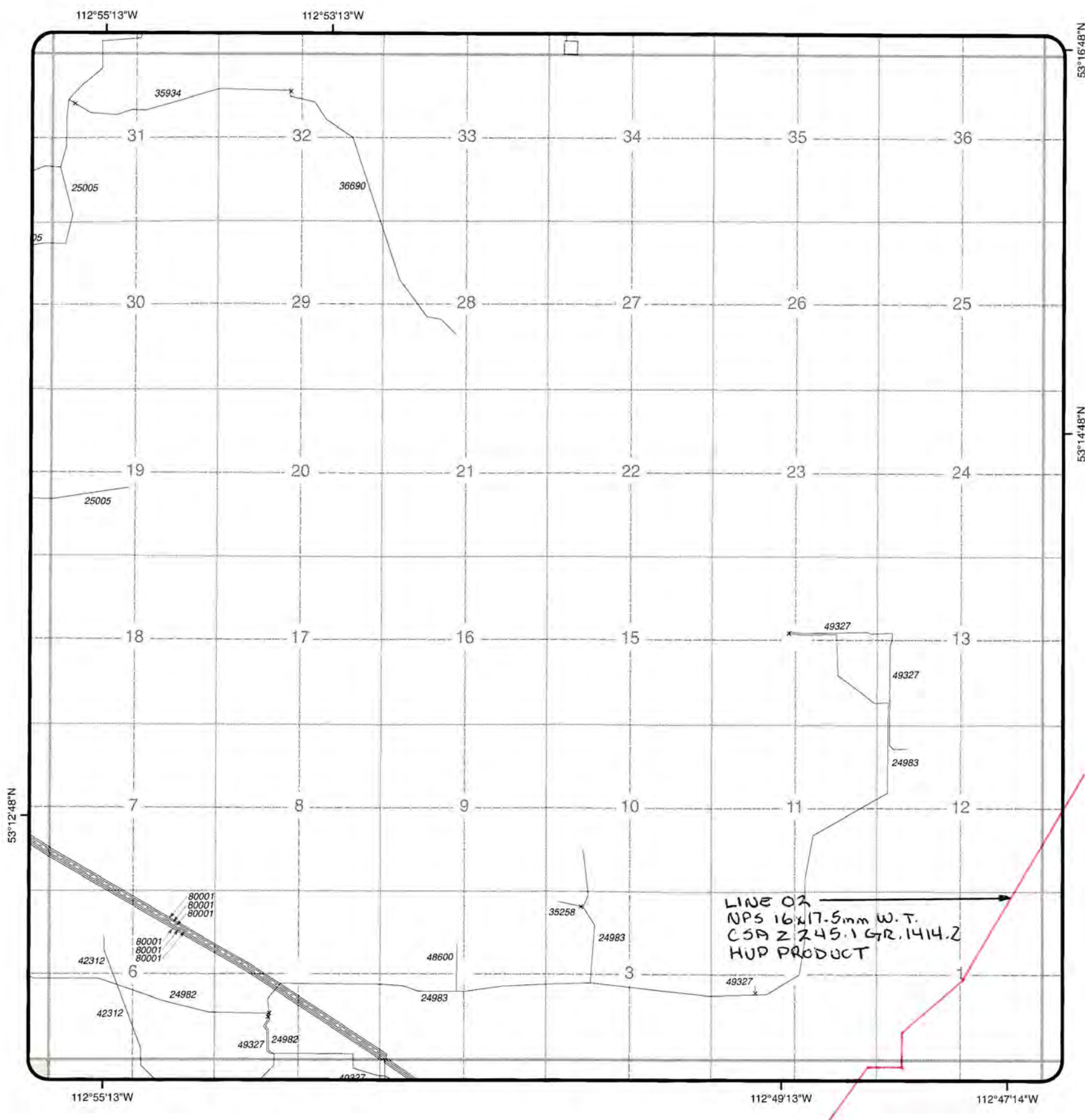
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**REVISION DATE:
12 January 2009**

CAUTION
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- LICENSED: _____
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Coordinate System: 10TM



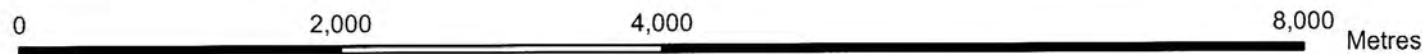
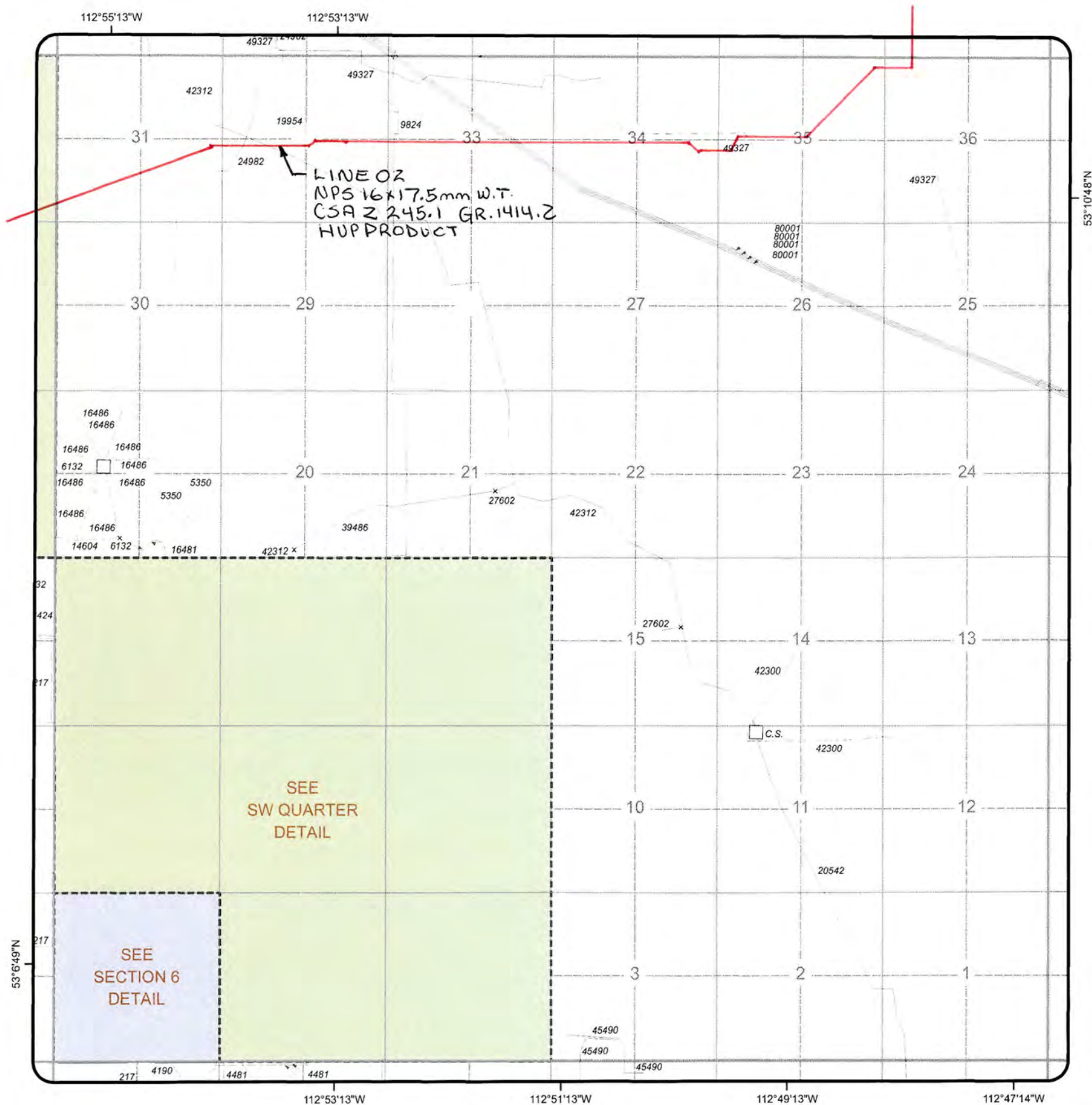
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**REVISION DATE:
28 January 2009**

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Coordinate System: 10TM



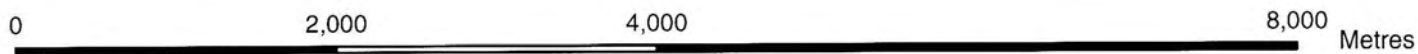
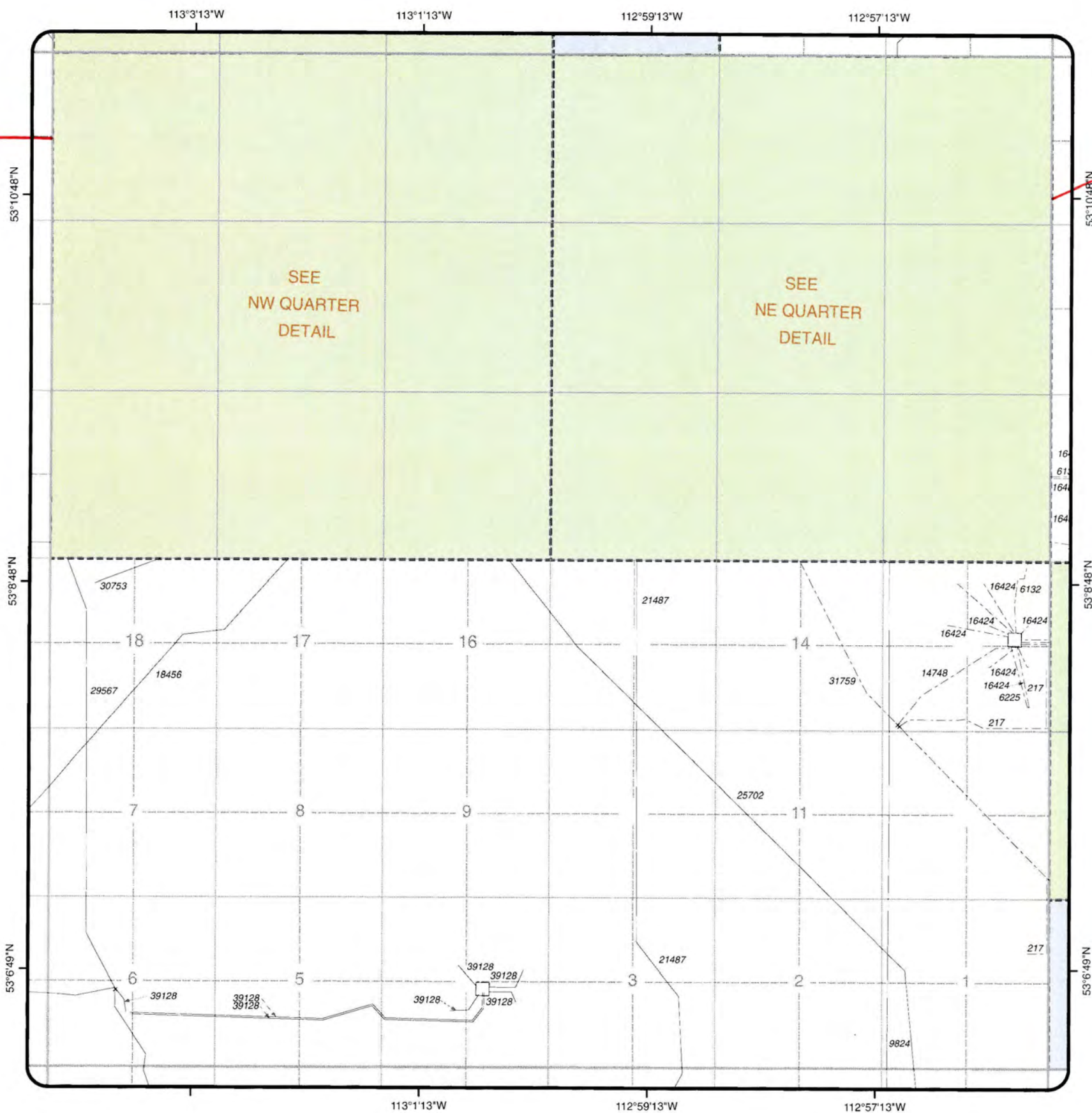
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REVISION DATE:
19 November 2008

CAUTION
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LICENSED:	—————
DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED:	-----



Coordinate System: 10TM



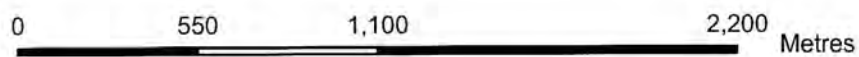
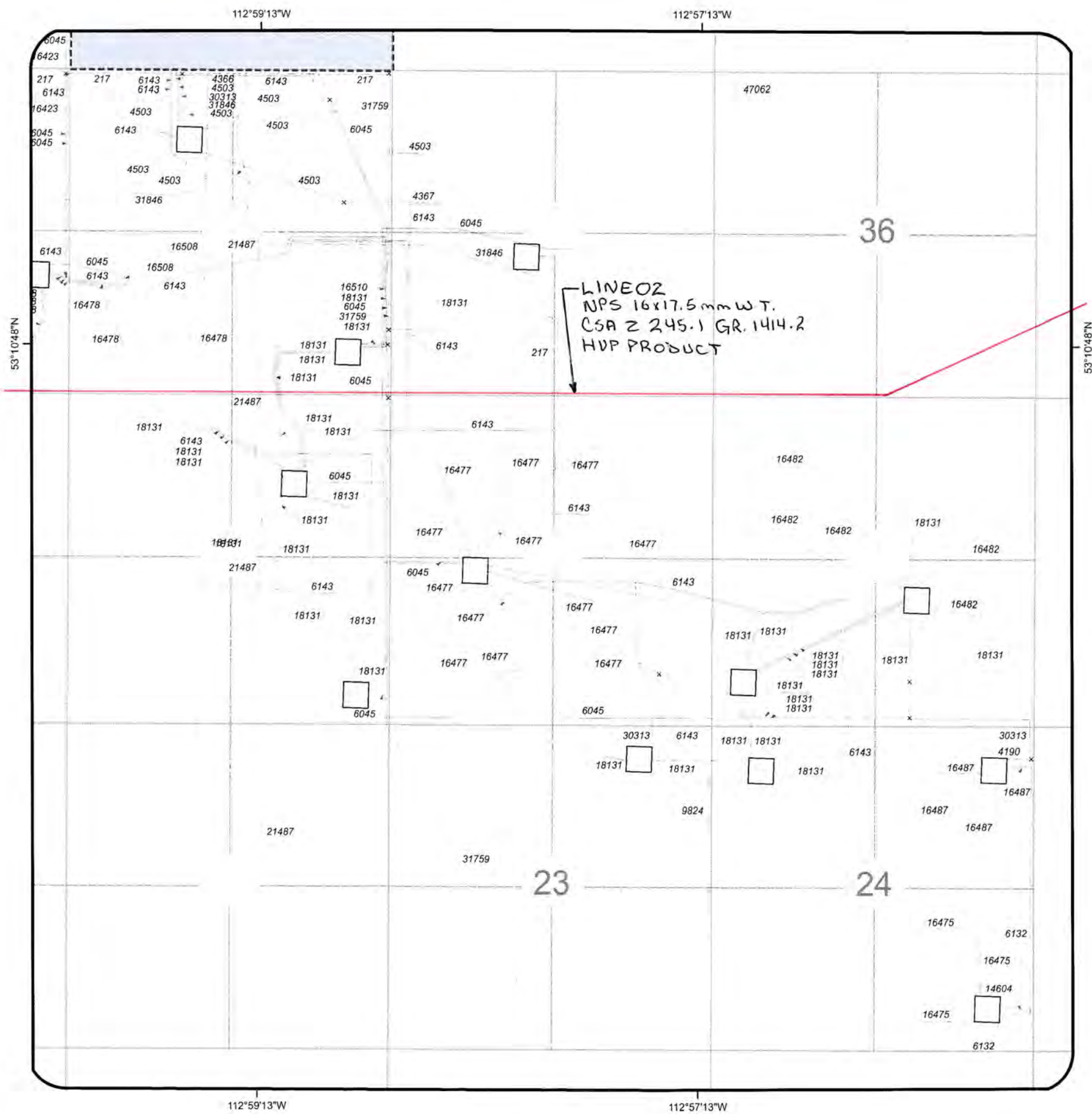
**ALL PIPELINES IN
TWP 048- 21W4**

**REVISION DATE:
10 March 2008**

CAUTION
 - THIS PLOT REPRESENTS THE BEST INFORMATION AVAILABLE TO THE BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS SHOULD BE OBTAINED FROM SURVEY PLANS, OWNERS AND FIELD OBSERVATION BEFORE DIGGING.
 - LOW-PRESSURE GAS DISTRIBUTION LINES ARE NOT SHOWN.
 CONTACT THE GAS DISTRIBUTOR IN THIS AREA FOR LINE LOCATION

LEGEND

- PERMITTED:
- LICENSED:
- DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED:



Coordinate System: 10TM



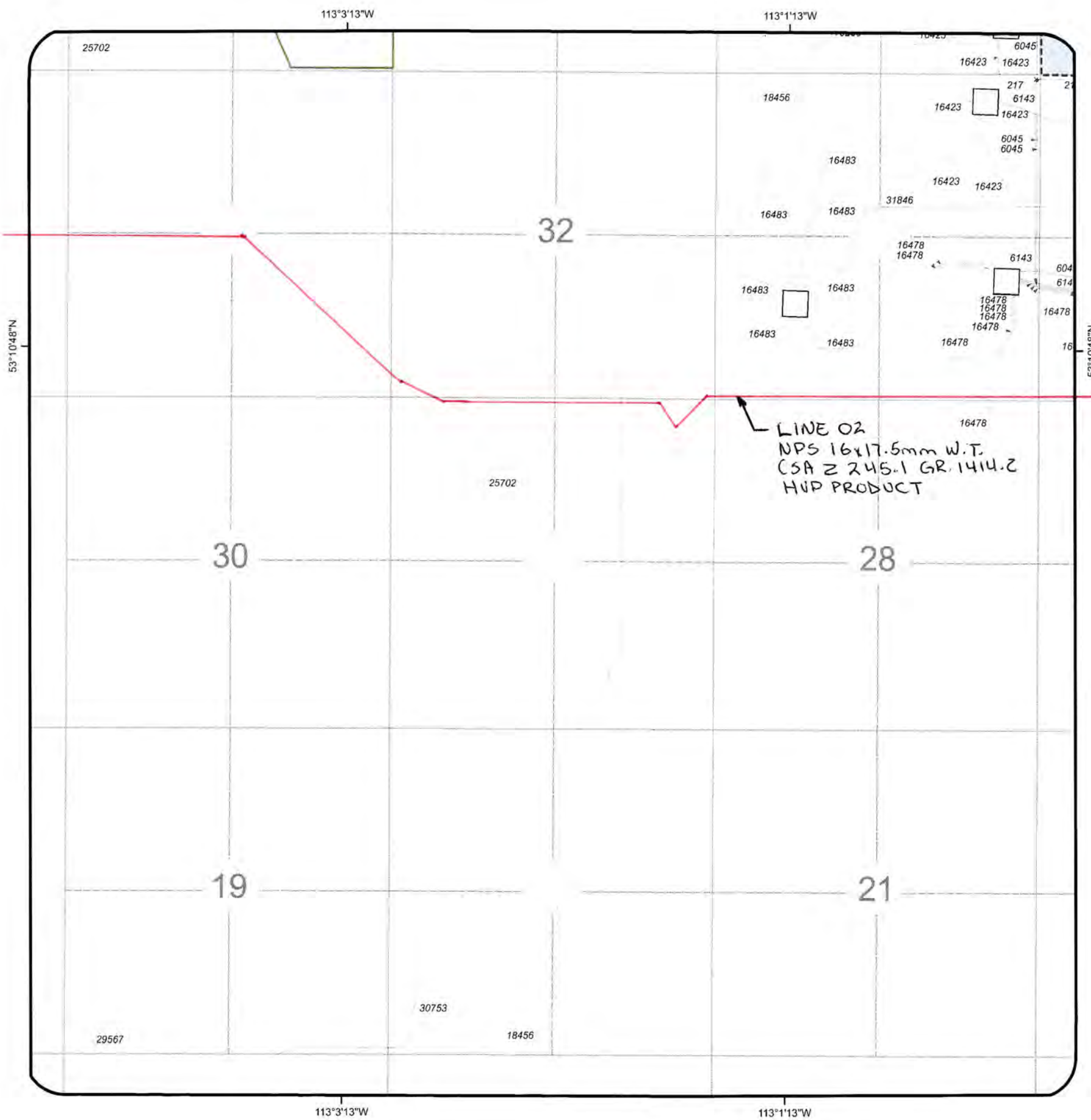
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NE . 048- 21W4**

**REVISION DATE:
27 February 2008**

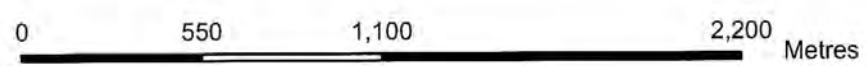
CAUTION
 - THIS PLOT REPRESENTS THE BEST INFORMATION AVAILABLE TO THE BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS SHOULD BE OBTAINED FROM SURVEY PLANS, OWNERS AND FIELD OBSERVATION BEFORE DIGGING.
 - LOW-PRESSURE GAS DISTRIBUTION LINES ARE NOT SHOWN.
 CONTACT THE GAS DISTRIBUTOR IN THIS AREA FOR LINE LOCATION

LEGEND

- PERMITTED:
- LICENSED:
- DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED:



LINE 02
 NPS 16x17.5mm W.T.
 CSA Z 245.1 GR. 1414.2
 HVP PRODUCT



Coordinate System: 10TM



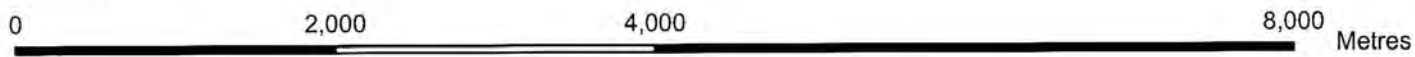
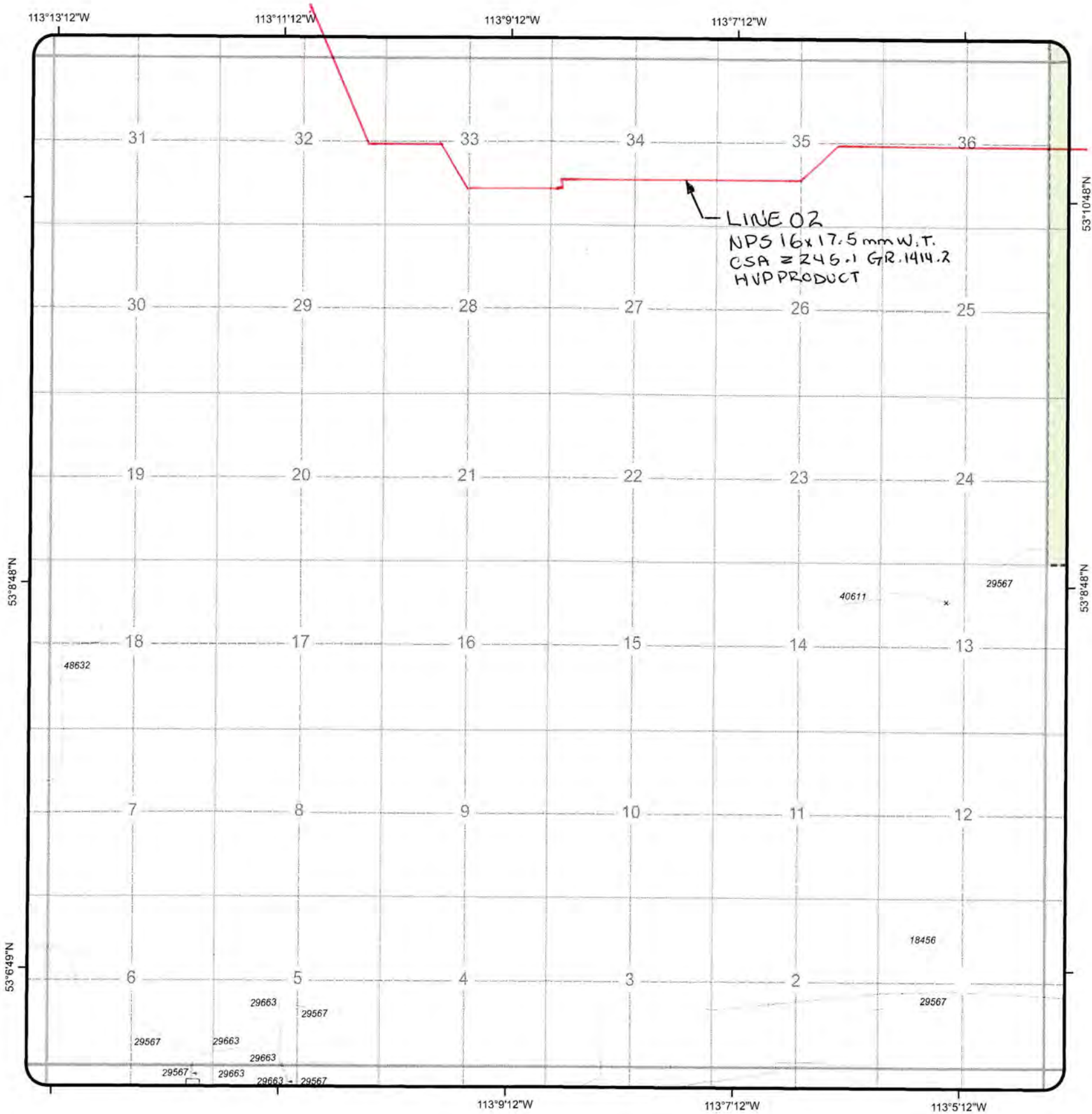
**ALL PIPELINES IN
 NW . 048- 21W4**

**REVISION DATE:
 27 February 2008**

CAUTION
 - THIS PLOT REPRESENTS THE BEST INFORMATION AVAILABLE TO THE BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS SHOULD BE OBTAINED FROM SURVEY PLANS, OWNERS AND FIELD OBSERVATION BEFORE DIGGING.
 - LOW-PRESSURE GAS DISTRIBUTION LINES ARE NOT SHOWN.
 CONTACT THE GAS DISTRIBUTOR IN THIS AREA FOR LINE LOCATION

LEGEND

PERMITTED:	-----
LICENSED:	—————
DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED:	-----



Coordinate System: 10TM



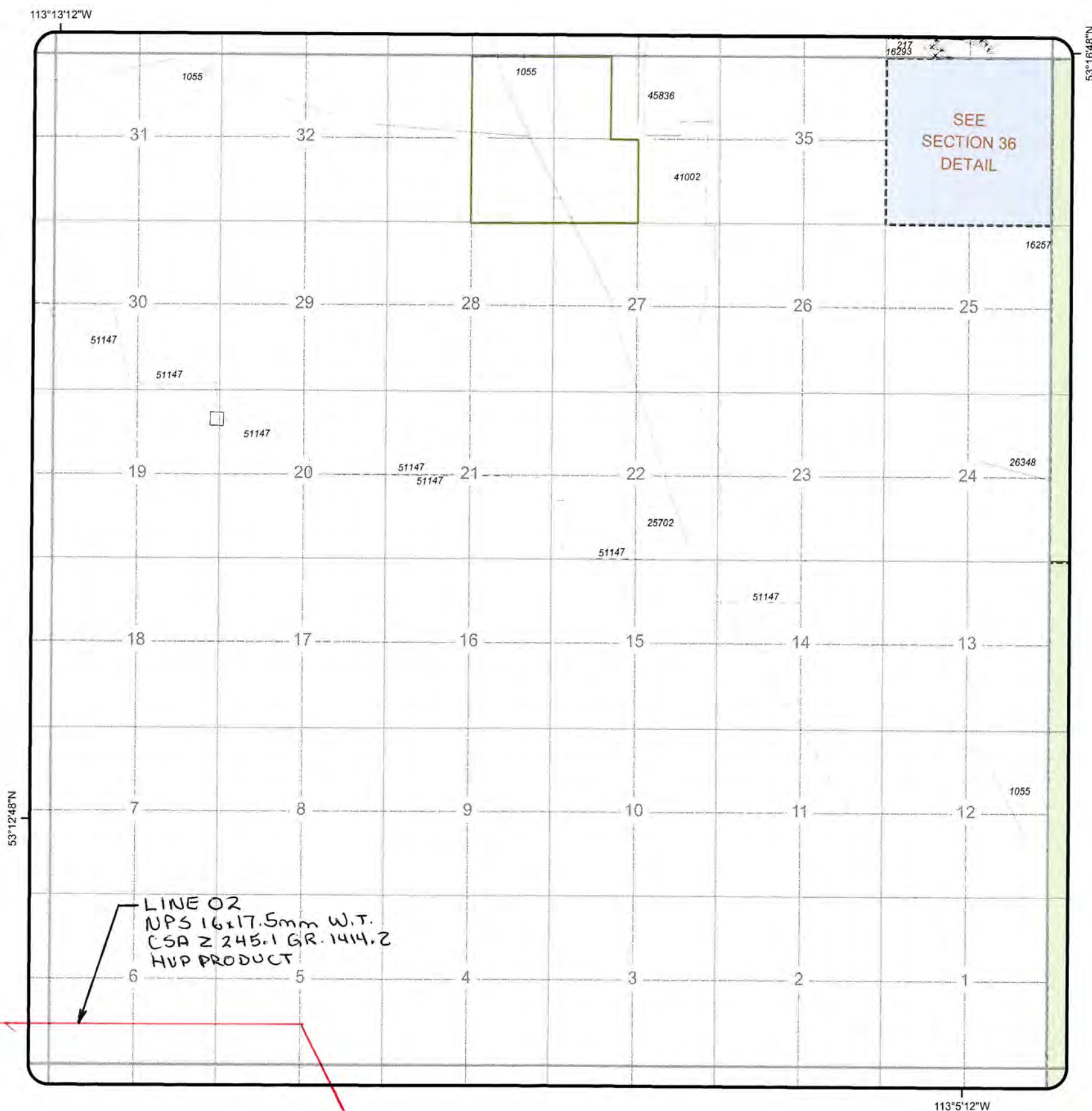
**ALL PIPELINES IN
TWP 048- 22W4**

**REVISION DATE:
27 February 2008**

CAUTION
 - THIS PLOT REPRESENTS THE BEST INFORMATION AVAILABLE TO THE BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS SHOULD BE OBTAINED FROM SURVEY PLANS, OWNERS AND FIELD OBSERVATION BEFORE DIGGING.
 - LOW-PRESSURE GAS DISTRIBUTION LINES ARE NOT SHOWN.
 CONTACT THE GAS DISTRIBUTOR IN THIS AREA FOR LINE LOCATION

LEGEND

- PERMITTED: -----
- LICENSED: _____
- DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED: - - - - -



LINE 02
 NPS 16x17.5mm W.T.
 CSA Z 245.1 GR. 1414.2
 HVP PRODUCT



Coordinate System: 10TM



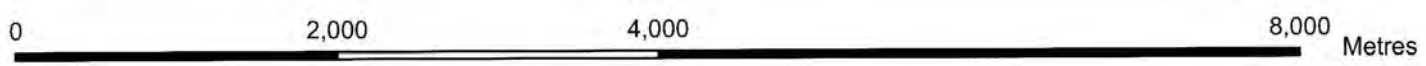
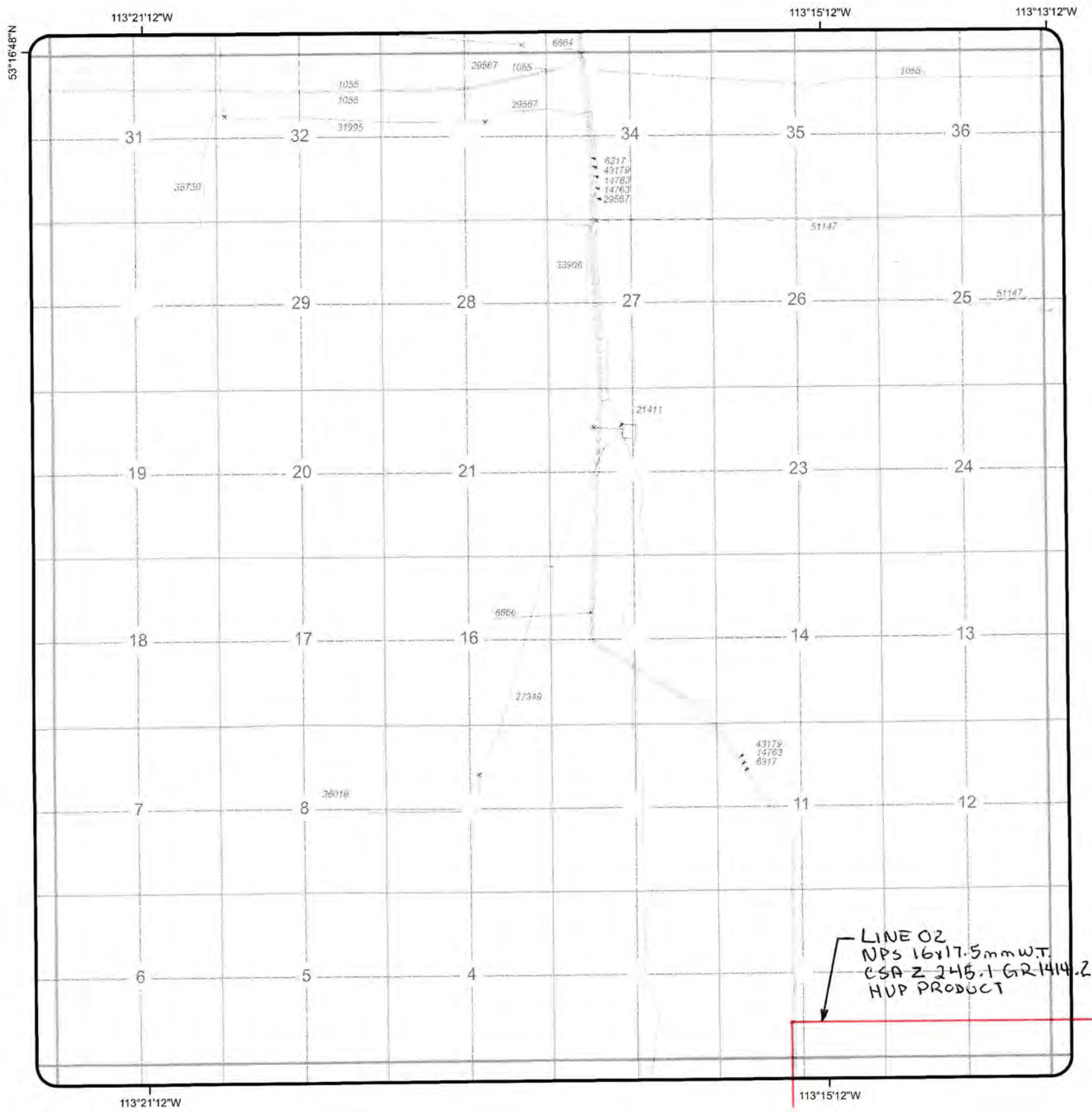
**ALL PIPELINES IN
 TWP 049- 22W4**

**REVISION DATE:
 21 January 2009**

CAUTION
 - THIS PLOT REPRESENTS THE BEST INFORMATION AVAILABLE TO THE BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS SHOULD BE OBTAINED FROM SURVEY PLANS, OWNERS AND FIELD OBSERVATION BEFORE DIGGING.
 - LOW-PRESSURE GAS DISTRIBUTION LINES ARE NOT SHOWN.
 CONTACT THE GAS DISTRIBUTOR IN THIS AREA FOR LINE LOCATION

LEGEND

- PERMITTED: -----
- LICENSED: _____
- DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED: - - - - -



Coordinate System: 10TM



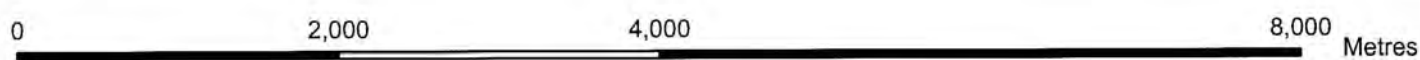
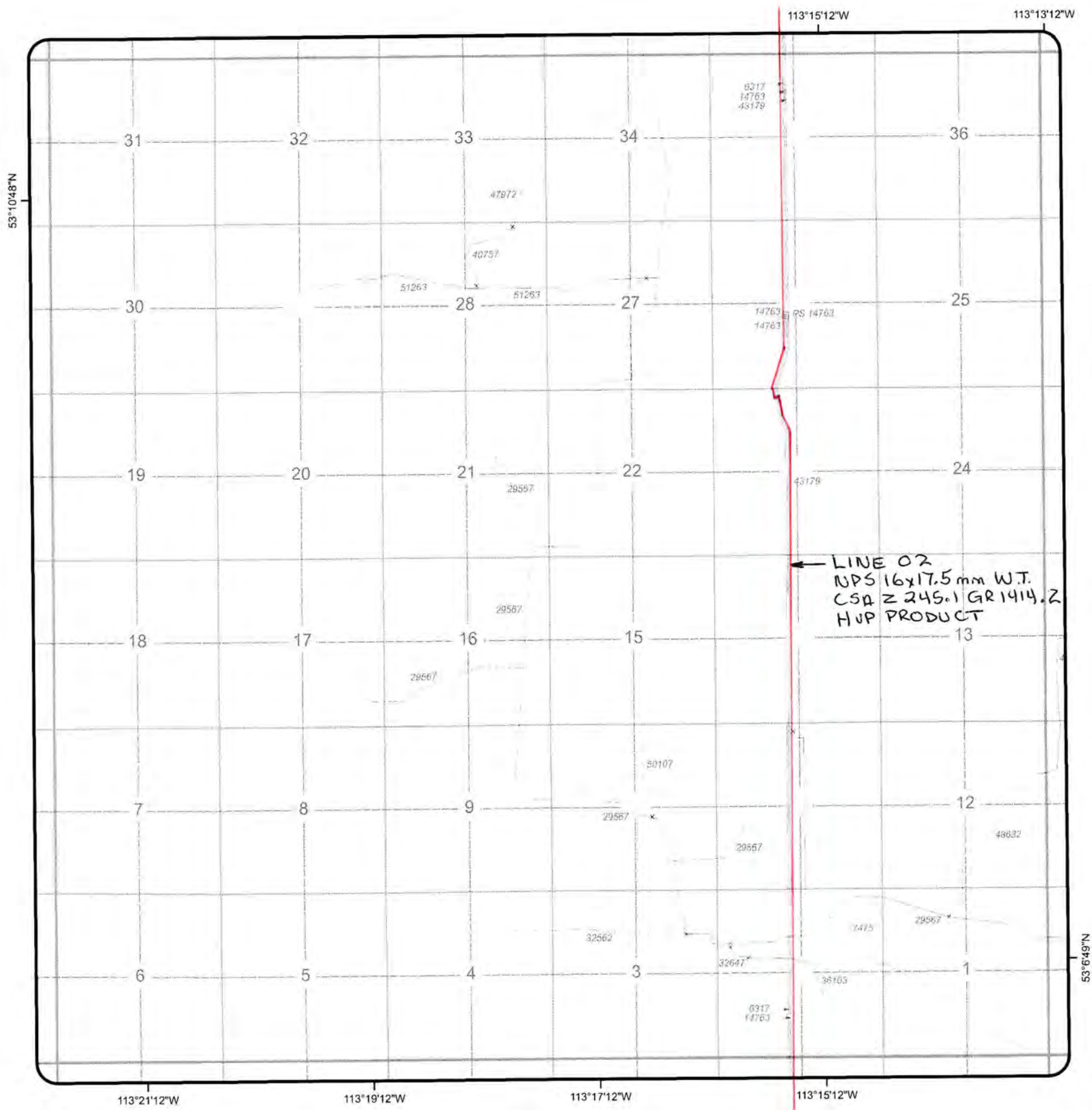
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TWP 049- 23W4**

**REVISION DATE:
21 January 2009**

CAUTION
 - THIS PLOT REPRESENTS THE BEST INFORMATION AVAILABLE TO THE BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS SHOULD BE OBTAINED FROM SURVEY PLANS, OWNERS AND FIELD OBSERVATION BEFORE DIGGING.
 - LOW-PRESSURE GAS DISTRIBUTION LINES ARE NOT SHOWN.
 CONTACT THE GAS DISTRIBUTOR IN THIS AREA FOR LINE LOCATION

LEGEND

PERMITTED:	-----
LICENSED:	—————
DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED:	-----



Coordinate System: 10TM



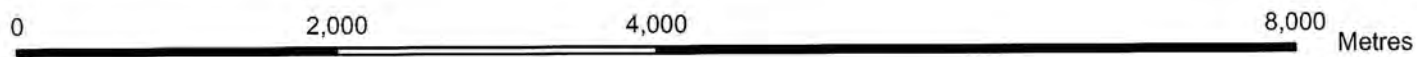
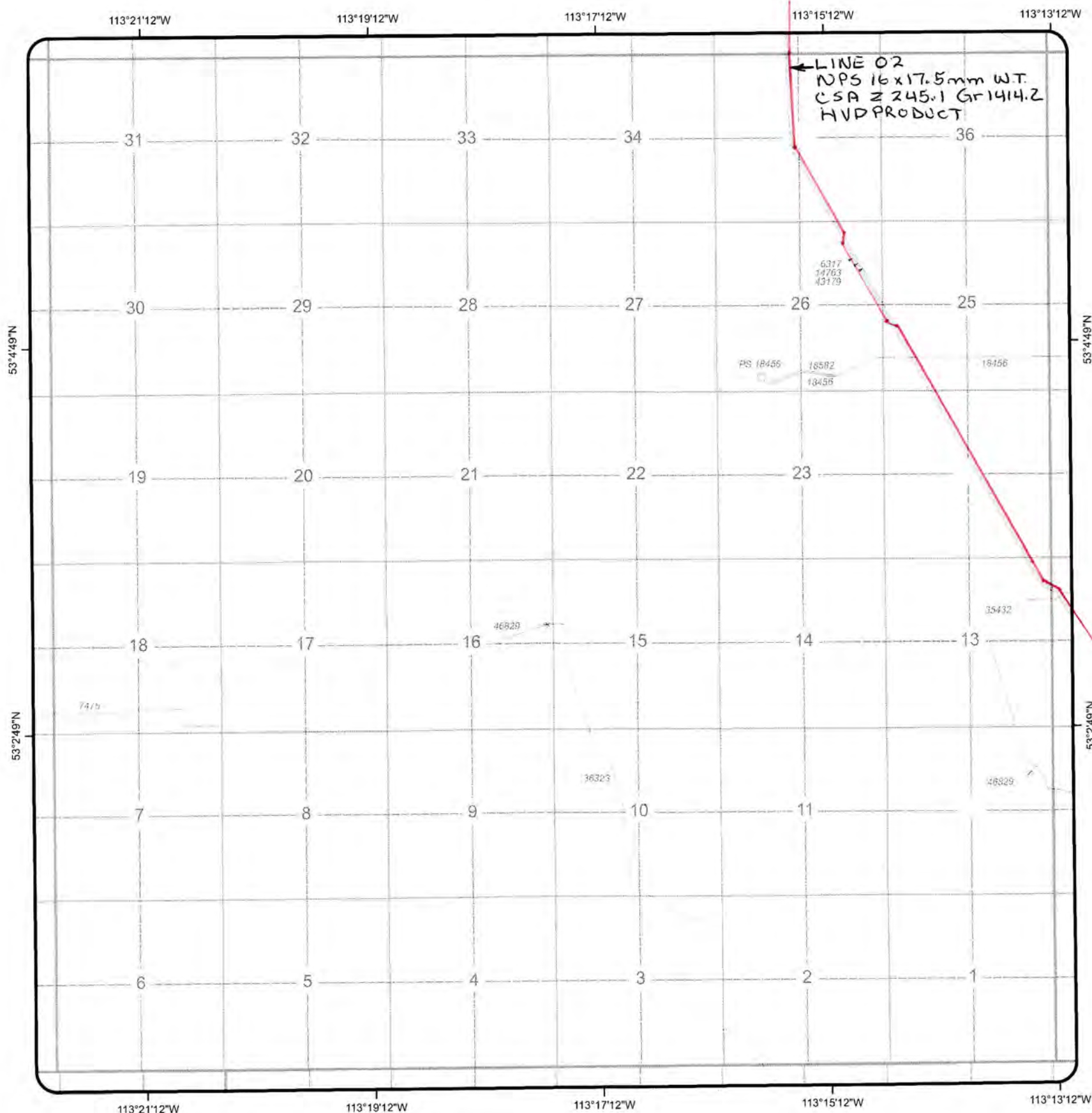
**ALL PIPELINES IN
TWP 048- 23W4**

**REVISION DATE:
22 January 2009**

CAUTION
 - THIS PLOT REPRESENTS THE BEST INFORMATION AVAILABLE TO THE BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS SHOULD BE OBTAINED FROM SURVEY PLANS, OWNERS AND FIELD OBSERVATION BEFORE DIGGING.
 - LOW-PRESSURE GAS DISTRIBUTION LINES ARE NOT SHOWN.
 CONTACT THE GAS DISTRIBUTOR IN THIS AREA FOR LINE LOCATION

LEGEND

- PERMITTED: -----
- LICENSED: _____
- DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED: - - - - -



Coordinate System: 10TM



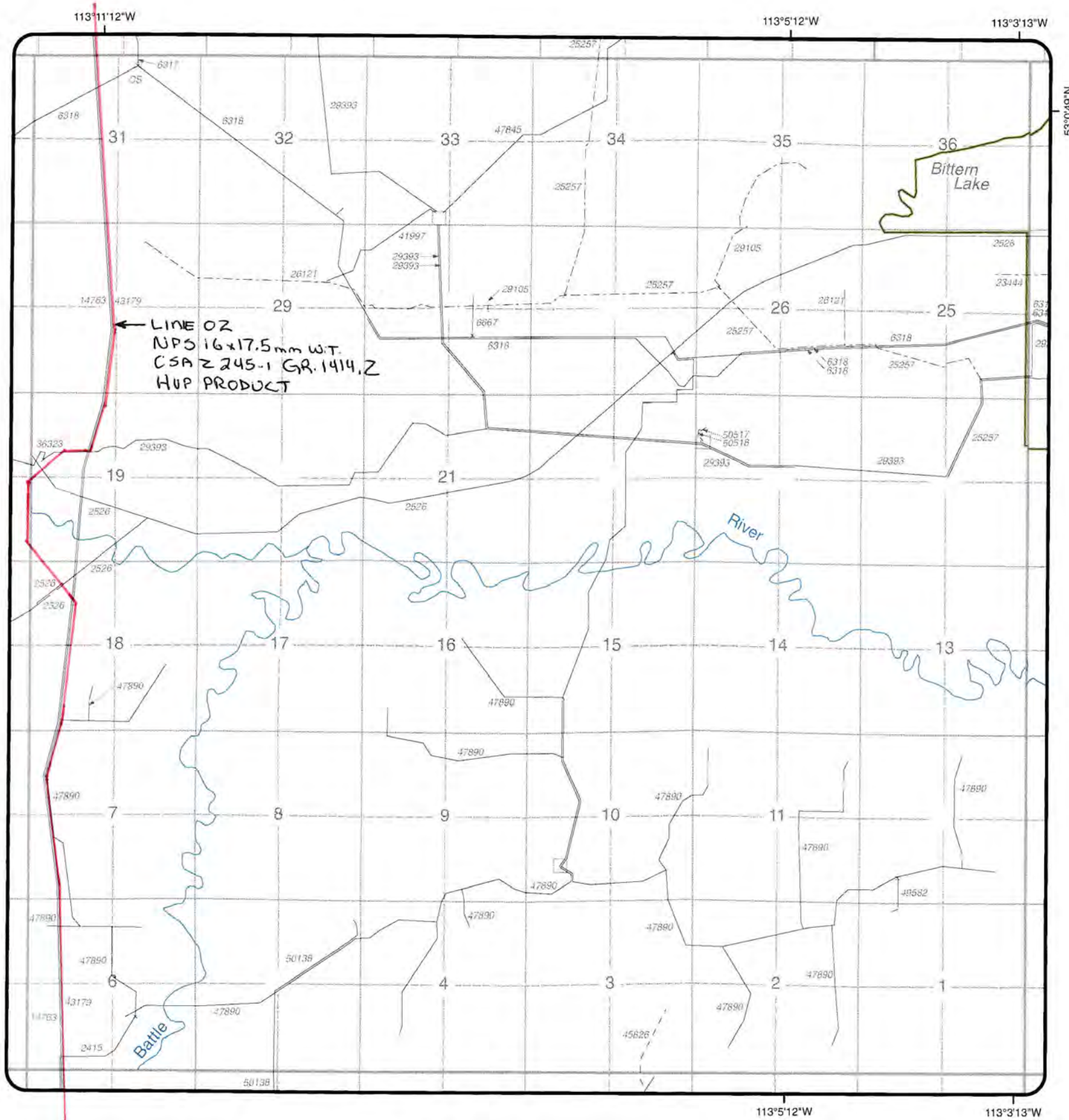
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**REVISION DATE:
27 February 2008**

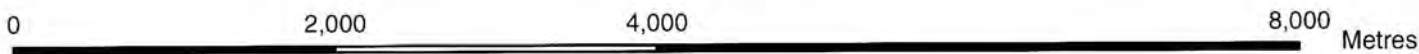
CAUTION
 - THIS PLOT REPRESENTS THE BEST INFORMATION AVAILABLE TO THE BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS SHOULD BE OBTAINED FROM SURVEY PLANS, OWNERS AND FIELD OBSERVATION BEFORE DIGGING.
 - LOW-PRESSURE GAS DISTRIBUTION LINES ARE NOT SHOWN.
 CONTACT THE GAS DISTRIBUTOR IN THIS AREA FOR LINE LOCATION

LEGEND

- PERMITTED: -----
- LICENSED: _____
- DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED: - - - - -



← LINE OZ
 NPS 16x17.5mm W.T.
 CSA Z 245-1 GR. 1414, 2
 HUP PRODUCT



Coordinate System: 10TM



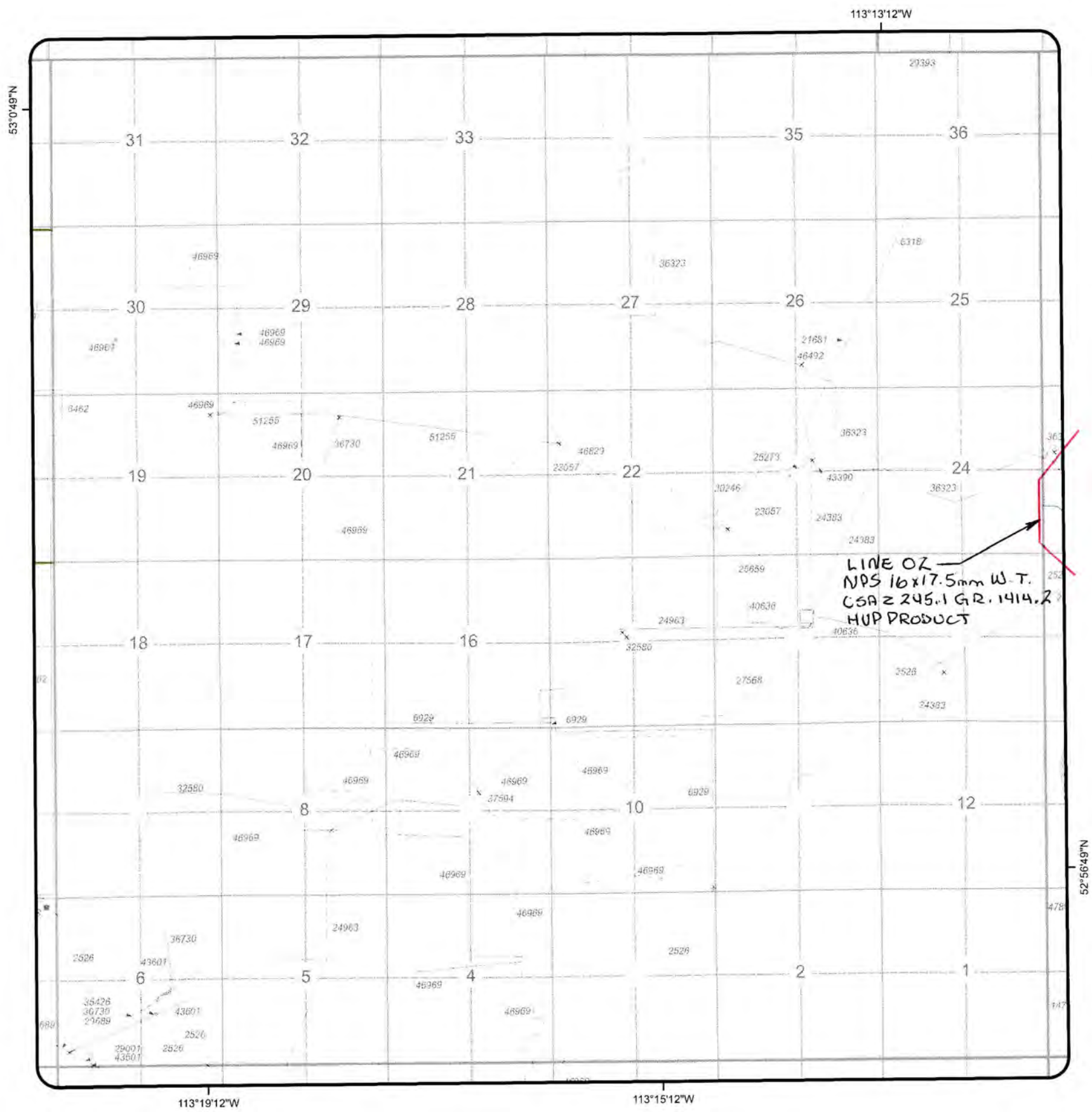
**ALL PIPELINES IN
 TWP 046- 22W4**

**REVISION DATE:
 28 January 2009**

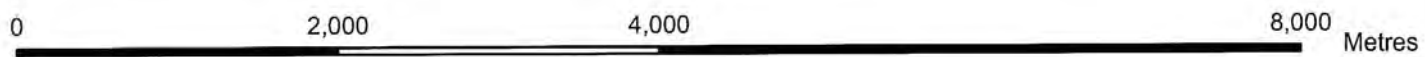
CAUTION
 - THIS PLOT REPRESENTS THE BEST INFORMATION AVAILABLE TO THE BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS SHOULD BE OBTAINED FROM SURVEY PLANS, OWNERS AND FIELD OBSERVATION BEFORE DIGGING.
 - LOW-PRESSURE GAS DISTRIBUTION LINES ARE NOT SHOWN.
 CONTACT THE GAS DISTRIBUTOR IN THIS AREA FOR LINE LOCATION

LEGEND

- PERMITTED: -----
- LICENSED: _____
- DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED: - - - - -



LINE 02
 NPS 16x17.5mm W.T.
 CSA Z 245.1 GR. 1414.2
 HUP PRODUCT



Coordinate System: 10TM



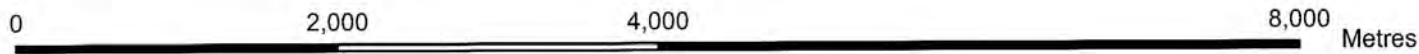
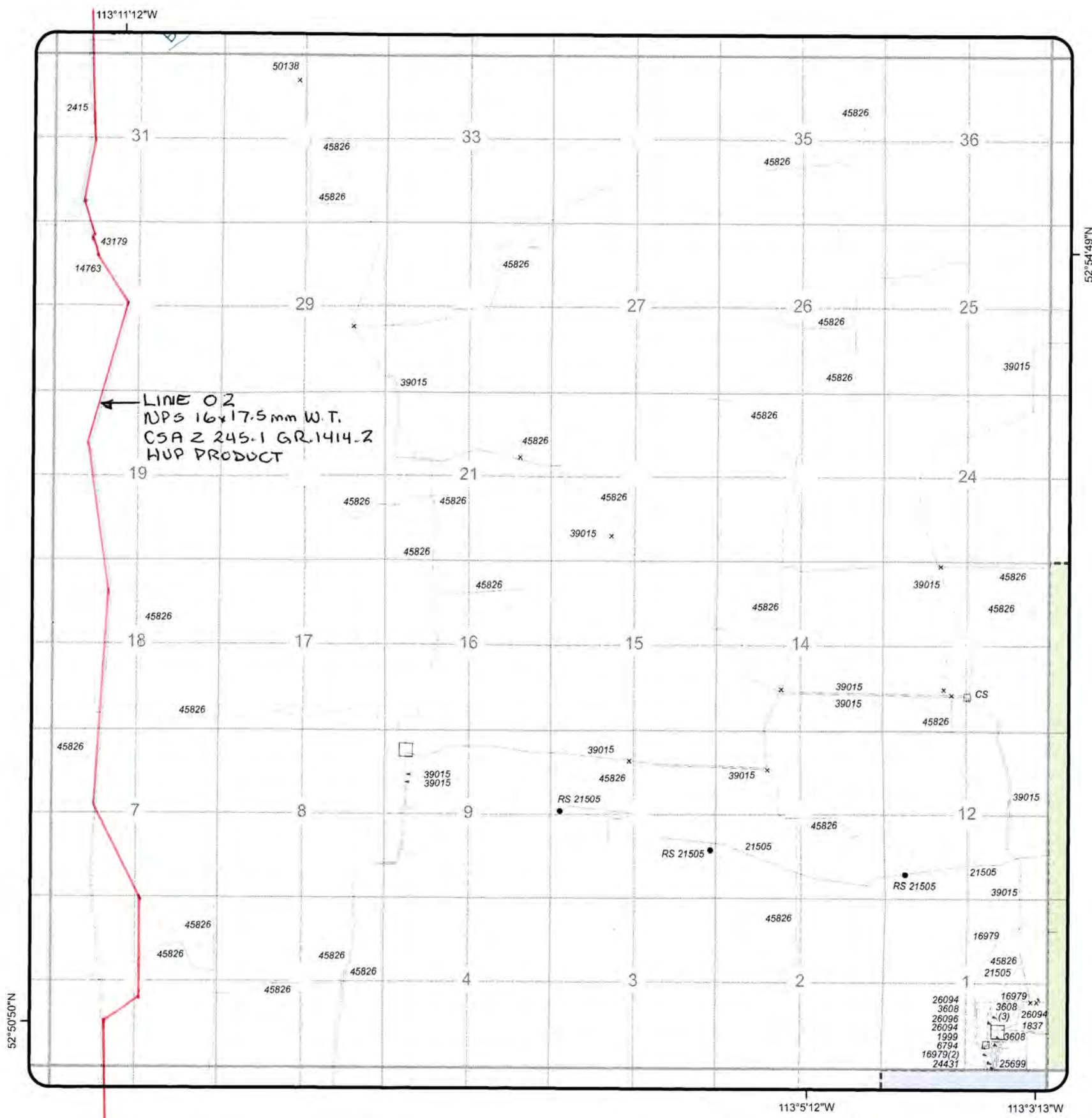
**ALL PIPELINES IN
 TWP 046- 23W4**

**REVISION DATE:
 20 January 2009**

CAUTION
 - THIS PLOT REPRESENTS THE BEST
 INFORMATION AVAILABLE TO THE
 BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS
 SHOULD BE OBTAINED FROM SURVEY
 PLANS, OWNERS AND FIELD
 OBSERVATION BEFORE DIGGING.
 - LOW-PRESSURE GAS DISTRIBUTION
 LINES ARE NOT SHOWN.
 CONTACT THE GAS DISTRIBUTOR
 IN THIS AREA FOR LINE LOCATION

LEGEND

- PERMITTED: -----
- LICENSED: _____
- DISCONTINUED,
 ABANDONED,
 OR ABANDONED
 AND PARTIALLY
 REMOVED: - - - - -



Coordinate System: 10TM



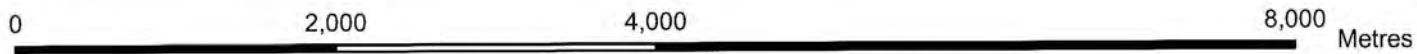
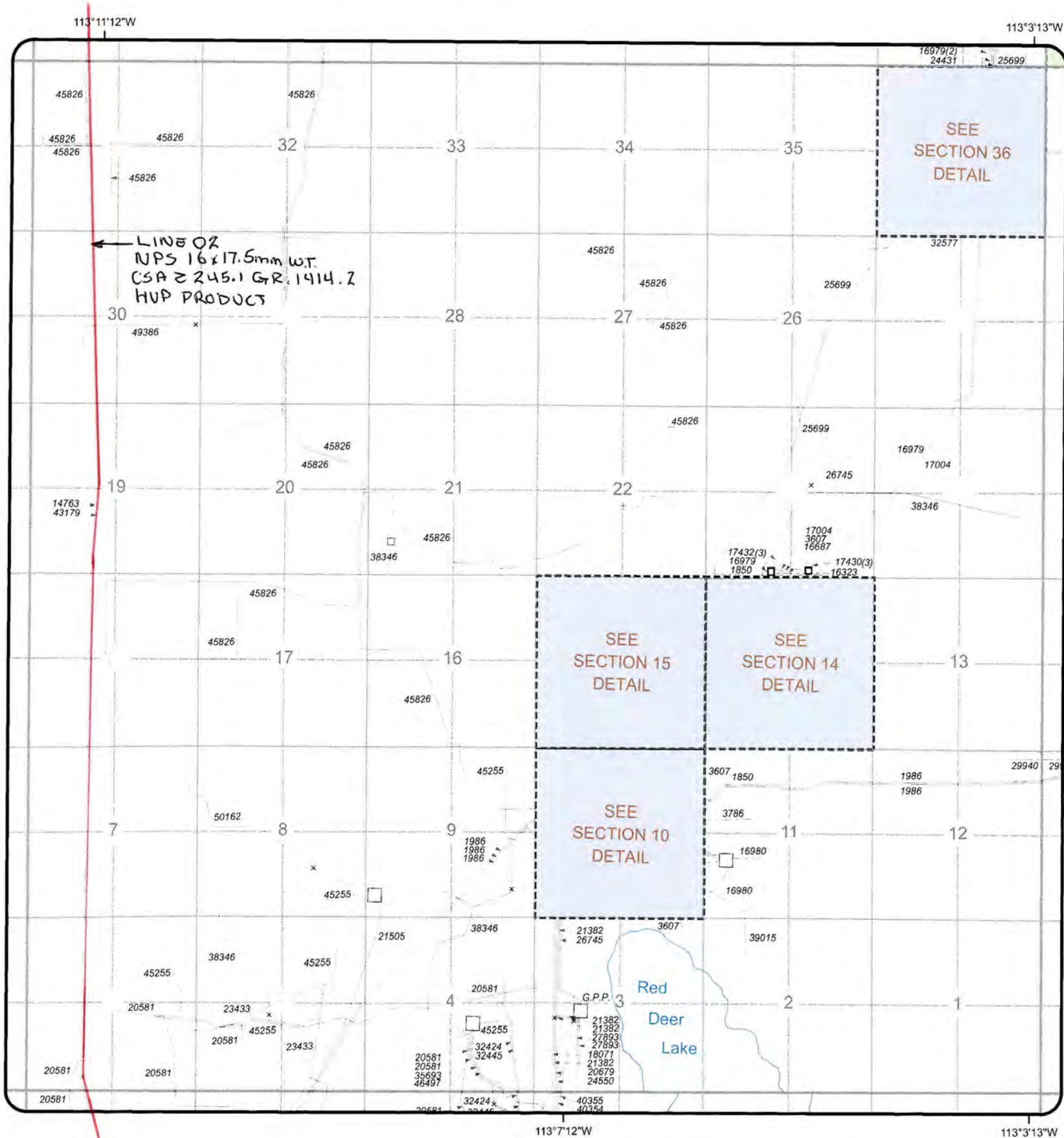
**ALL PIPELINES IN
TWP 045- 22W4**

**REVISION DATE:
28 January 2009**

CAUTION
 - THIS PLOT REPRESENTS THE BEST INFORMATION AVAILABLE TO THE BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS SHOULD BE OBTAINED FROM SURVEY PLANS, OWNERS AND FIELD OBSERVATION BEFORE DIGGING.
 - LOW-PRESSURE GAS DISTRIBUTION LINES ARE NOT SHOWN.
 CONTACT THE GAS DISTRIBUTOR IN THIS AREA FOR LINE LOCATION

LEGEND

- PERMITTED:
- LICENSED:
- DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED:



Coordinate System: 10TM



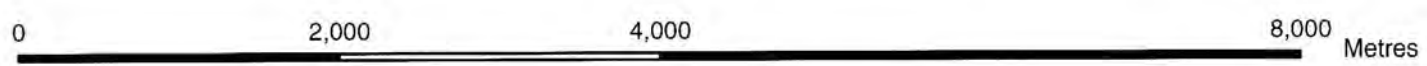
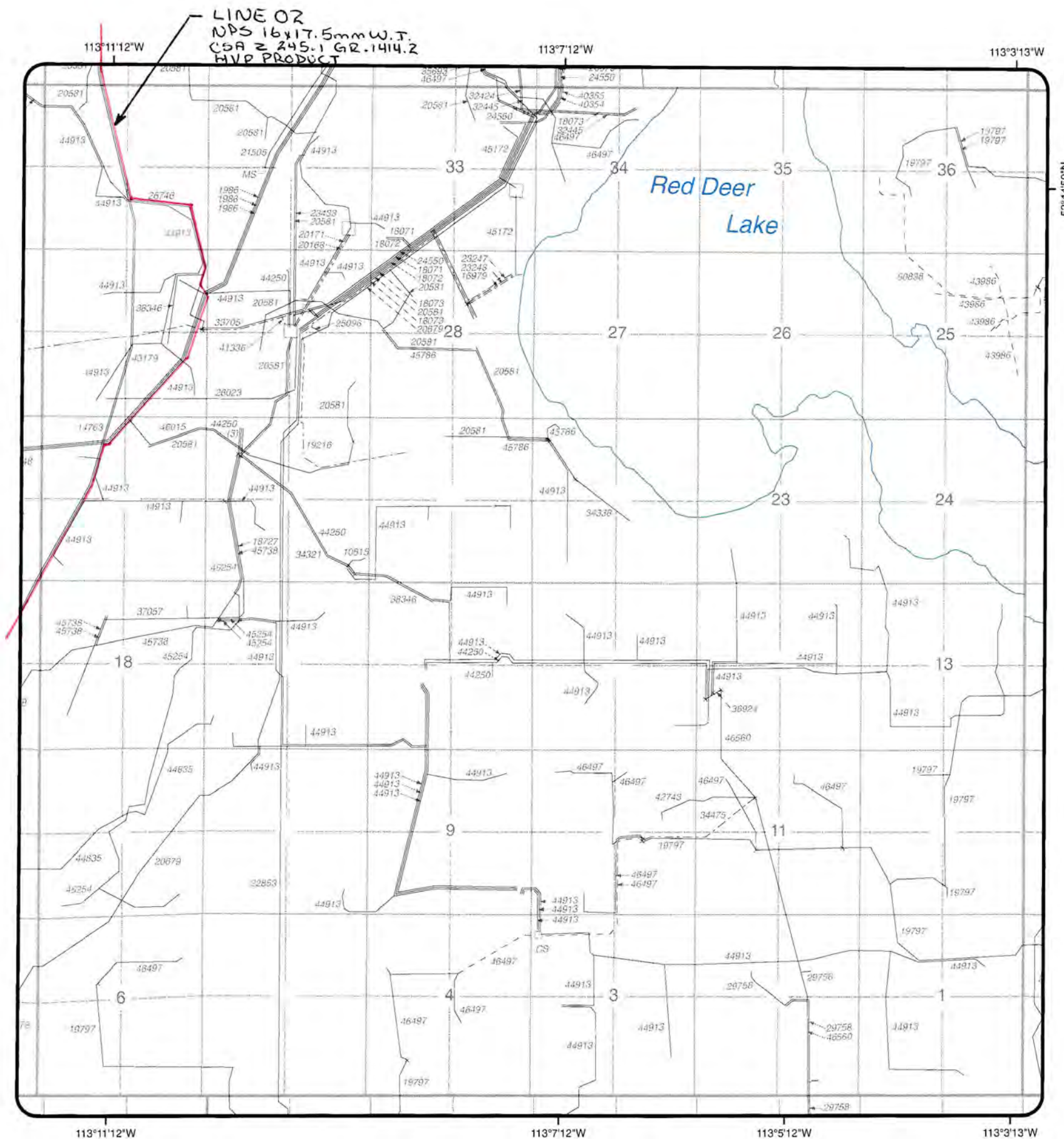
**ALL PIPELINES IN
TWP 044- 22W4**

**REVISION DATE:
03 February 2009**

CAUTION
 - THIS PLOT REPRESENTS THE BEST INFORMATION AVAILABLE TO THE BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS SHOULD BE OBTAINED FROM SURVEY PLANS, OWNERS AND FIELD OBSERVATION BEFORE DIGGING.
 - LOW-PRESSURE GAS DISTRIBUTION LINES ARE NOT SHOWN.
 CONTACT THE GAS DISTRIBUTOR IN THIS AREA FOR LINE LOCATION

LEGEND

- PERMITTED: -----
- LICENSED: _____
- DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED: - - - - -



Coordinate System: 10TM



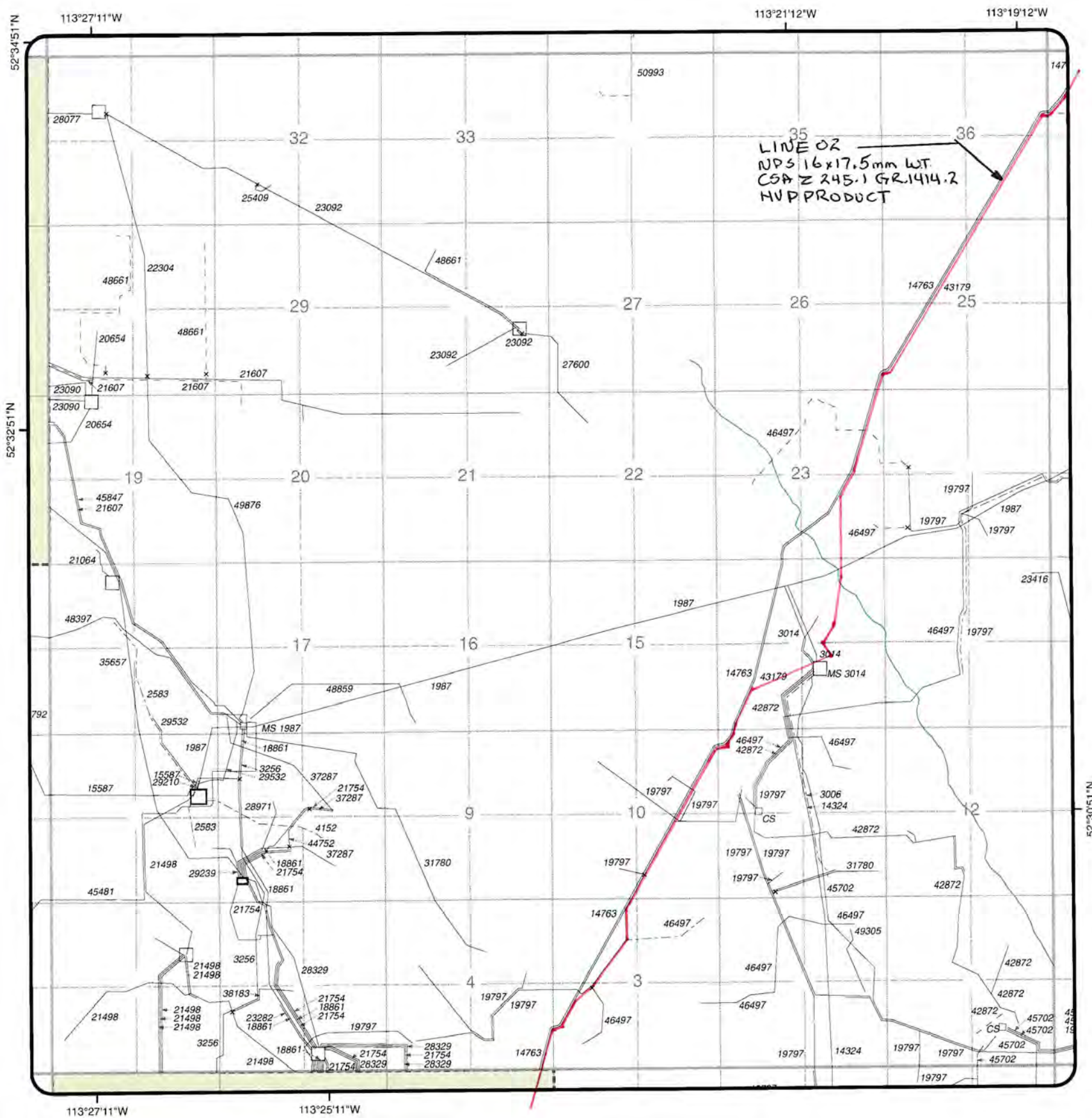
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TWP 043- 22W4**

**REVISION DATE:
27 January 2009**

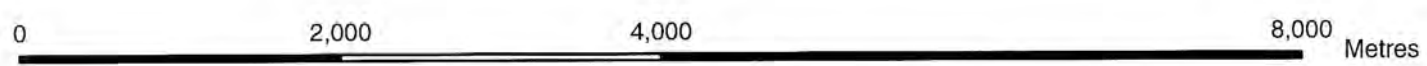
CAUTION
 - THIS PLOT REPRESENTS THE BEST INFORMATION AVAILABLE TO THE BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS SHOULD BE OBTAINED FROM SURVEY PLANS, OWNERS AND FIELD OBSERVATION BEFORE DIGGING.
 - LOW-PRESSURE GAS DISTRIBUTION LINES ARE NOT SHOWN.
 CONTACT THE GAS DISTRIBUTOR IN THIS AREA FOR LINE LOCATION

LEGEND

- PERMITTED:
- LICENSED:
- DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED:



LINE OR
 NPS 16x17.5mm WT
 CSA Z 245.1 GR.1414.2
 HVP PRODUCT



Coordinate System: 10TM



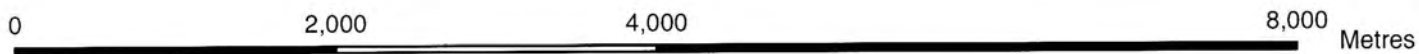
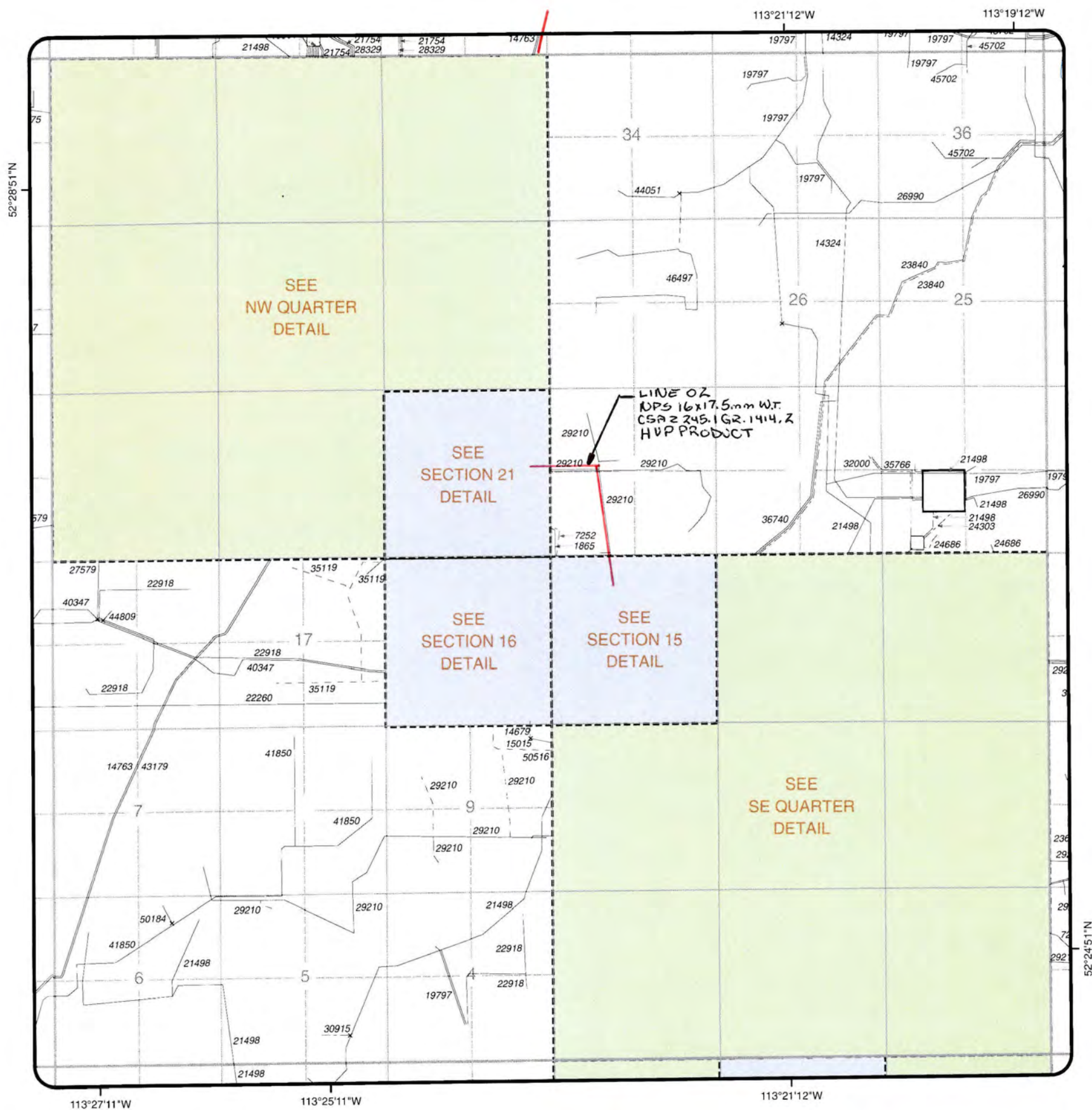
**ALL PIPELINES IN
 TWP 041- 24W4**

**REVISION DATE:
 27 January 2009**

CAUTION
 - THIS PLOT REPRESENTS THE BEST INFORMATION AVAILABLE TO THE BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS SHOULD BE OBTAINED FROM SURVEY PLANS, OWNERS AND FIELD OBSERVATION BEFORE DIGGING.
 - LOW-PRESSURE GAS DISTRIBUTION LINES ARE NOT SHOWN.
 CONTACT THE GAS DISTRIBUTOR IN THIS AREA FOR LINE LOCATION

LEGEND

PERMITTED:	-----
LICENSED:	—————
DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED:	-----



Coordinate System: 10TM



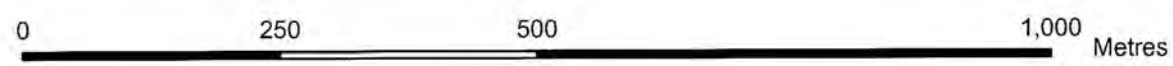
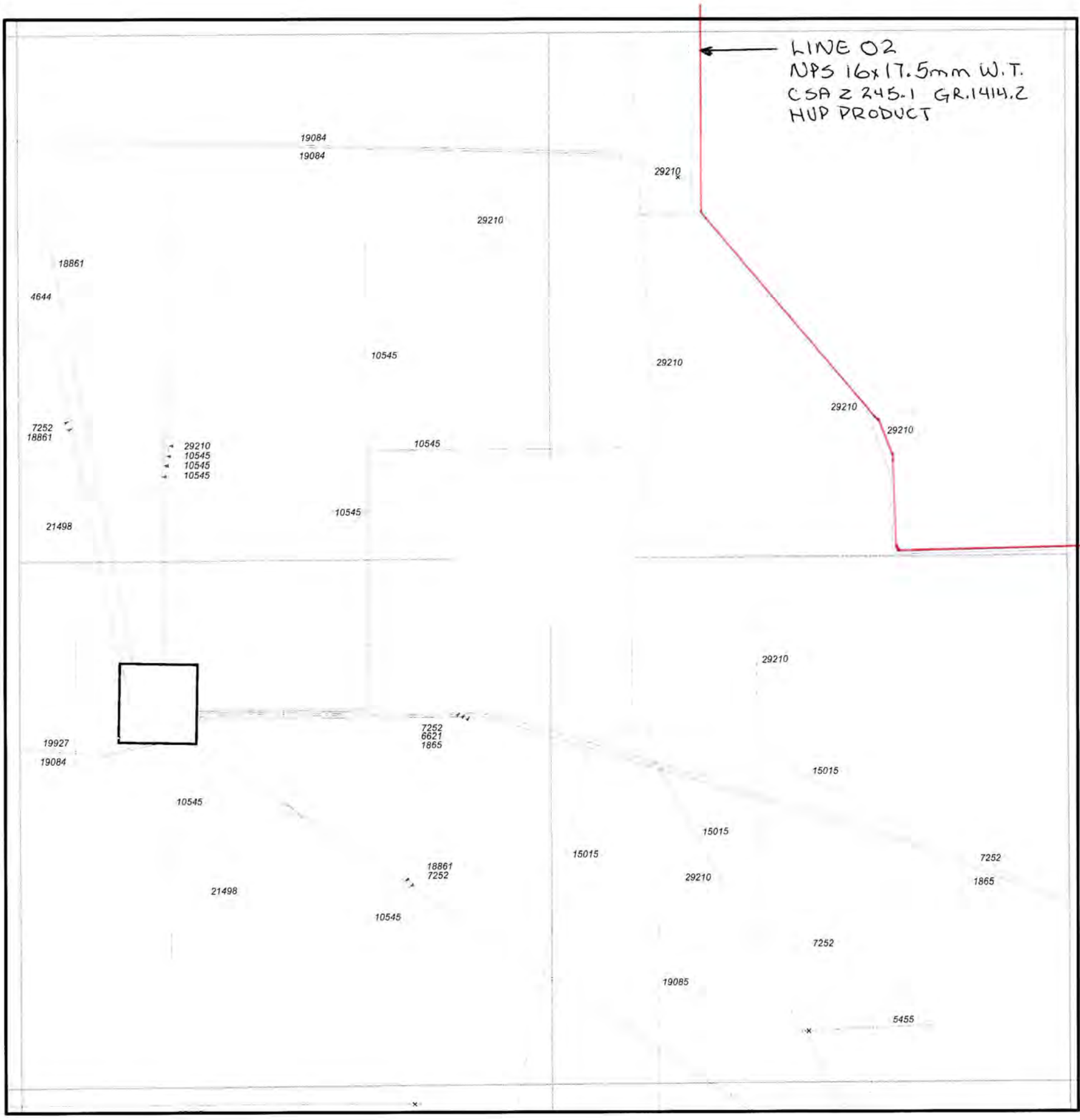
**ALL PIPELINES IN
TWP 040- 24W4**

**REVISION DATE:
06 February 2009**

- CAUTION**
- THIS PLOT REPRESENTS THE BEST INFORMATION AVAILABLE TO THE BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS SHOULD BE OBTAINED FROM SURVEY PLANS, OWNERS AND FIELD OBSERVATION BEFORE DIGGING.
 - LOW-PRESSURE GAS DISTRIBUTION LINES ARE NOT SHOWN. CONTACT THE GAS DISTRIBUTOR IN THIS AREA FOR LINE LOCATION

LEGEND

- PERMITTED: -----
- LICENSED: _____
- DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED: - - - - -



Coordinate System: 10TM



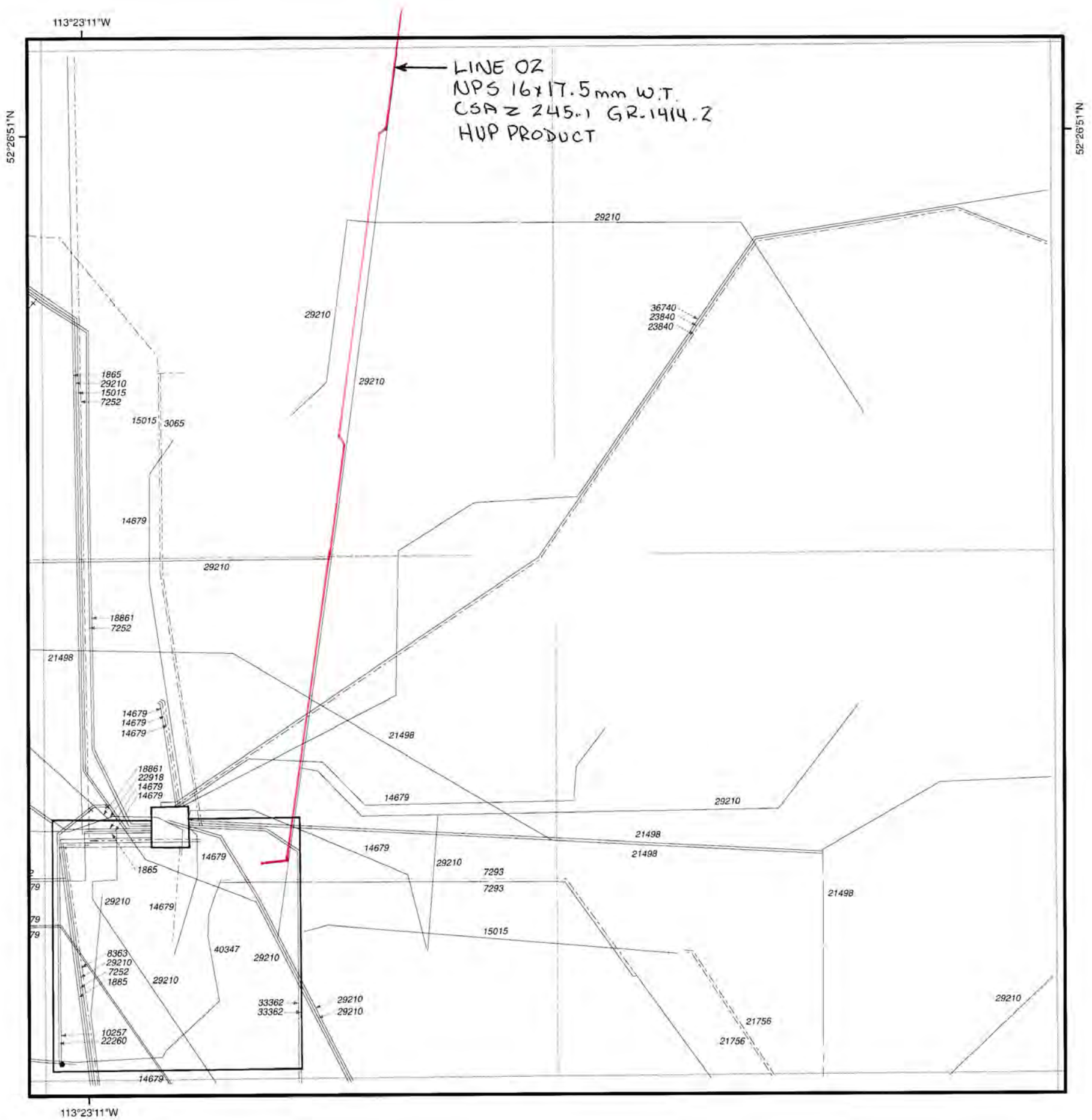
**ALL PIPELINES IN
SEC 21 TWP 040- 24W4**

**REVISION DATE:
04 September 2008**

CAUTION
 - THIS PLOT REPRESENTS THE BEST INFORMATION AVAILABLE TO THE BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS SHOULD BE OBTAINED FROM SURVEY PLANS, OWNERS AND FIELD OBSERVATION BEFORE DIGGING.
 - LOW-PRESSURE GAS DISTRIBUTION LINES ARE NOT SHOWN.
 CONTACT THE GAS DISTRIBUTOR IN THIS AREA FOR LINE LOCATION

LEGEND

PERMITTED:	-----
LICENSED:	—————
DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED:	- - - - -



Coordinate System: 10TM



**ALL PIPELINES IN
SEC 15 TWP 040- 24W4**

**REVISION DATE:
27 February 2008**

CAUTION
 - THIS PLOT REPRESENTS THE BEST INFORMATION AVAILABLE TO THE BOARD AT THIS TIME.
 - SPECIFIC PIPELINE LOCATIONS SHOULD BE OBTAINED FROM SURVEY PLANS, OWNERS AND FIELD OBSERVATION BEFORE DIGGING.
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 CONTACT THE GAS DISTRIBUTOR IN THIS AREA FOR LINE LOCATION

LEGEND

PERMITTED:	-----
LICENSED:	—————
DISCONTINUED, ABANDONED, OR ABANDONED AND PARTIALLY REMOVED:	-----

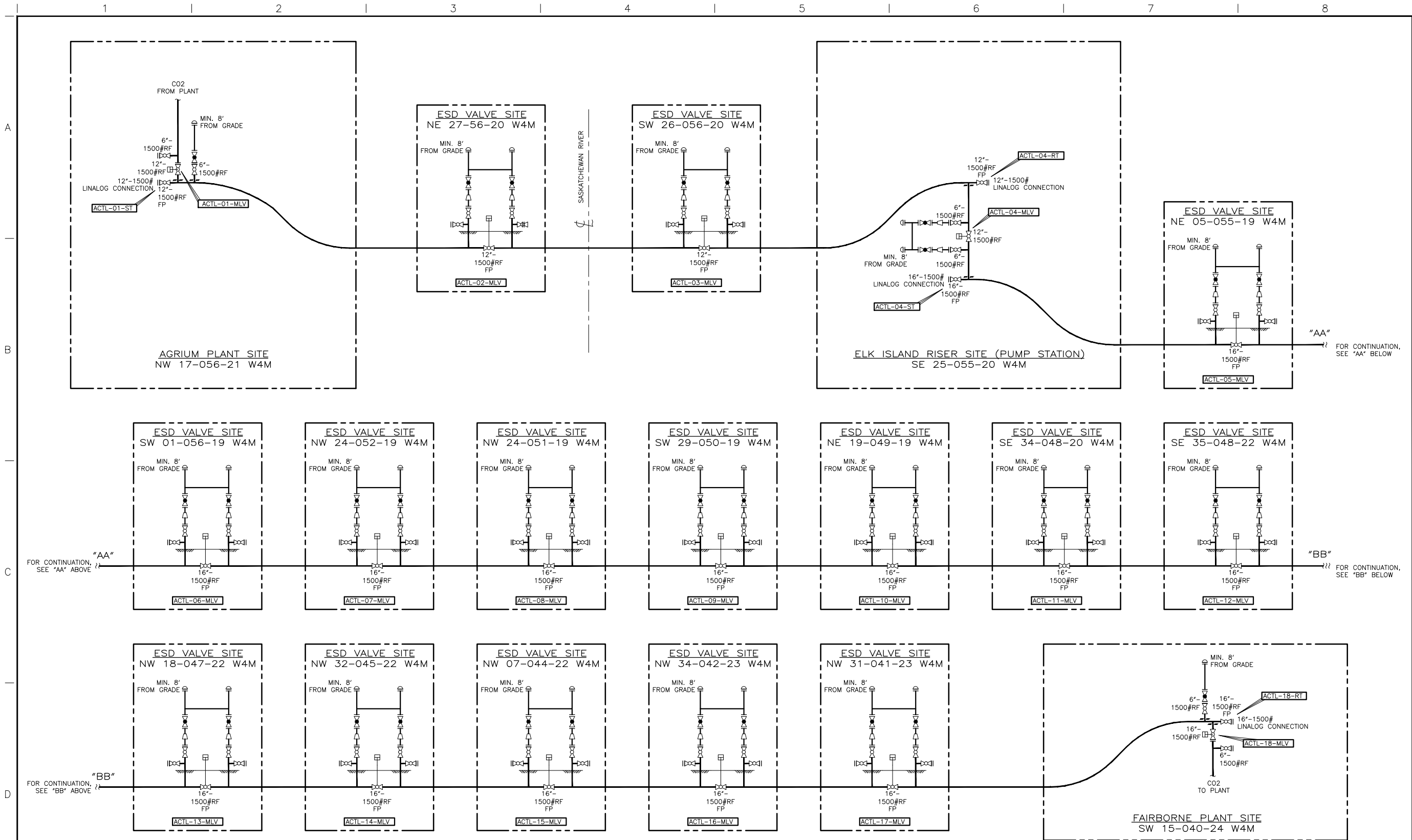
Enhance Energy Inc. and North West Redwater Partnership

APPENDIX viii



**Government
of Alberta** ■





REFERENCE DRAWINGS	DWG. NO.	NO.	DATE	PROJECT DESCRIPTION	PROJ.	BY	APPD.	ISSUE STAGE	DATE	BY	CHKD.	APPD.
								A - ISSUED FOR REVIEW	11-02-11	RSN	SAW	

ENGINEER'S STAMP		S.A.W. ENGINEERING LTD. 		SITE: CO2 TRUNKLINES	
PERMIT No. P10437 PROFESSIONAL STAMP AFFIXED ABOVE SHALL APPLY ONLY TO REV(S) 0				MAIN L.S.D.: - SCALE: NONE EPCN No.: SAW-11-004	
TITLE: CO2 TRUNKLINES SYSTEM SCHEMATIC AREA: ALBERTA		FILE NO.: 11-004-SCH-0001			