

**APPENDIX D QRA KAPUNI WELLSITES ADDENDUM –
WORLEY**

TODD ENERGY LTD

Kapuni Wellsites Quantitative Risk Assessment – Addendum

610114-RPT-S0001
November 2022

Worley New Zealand Ltd
25 Gill Street, New Plymouth 4310
PO Box 705, New Plymouth 4340
New Zealand

Telephone +64-6-759 6300
Facsimile +64-6-759 6301
www.worley.com

Rev	Description	Originator	Reviewer	Worley Approver	Date	Client Approval	Date
A	Issued for Review/Comment	Y Lee	T Millen	Y Lee	10/2022		
0	Approved for Use	Y Lee	O Kilian	Y Lee	11/2022		

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APPENDICES

APPENDIX 1. P&ID SECTIONALISATION FOR KA-19

APPENDIX 2. P&ID SECTIONALISATION FOR KA-4 AND KA-14

1. ABBREVIATIONS

FTHP	Flowing Tubing Head Pressure
HIPAP4	NSW Hazardous Industry Planning Advisory Paper No. 4
LTS	Low Temperature Separator
P&ID	Piping and Instrumentation Diagram
QRA	Quantitative Risk Assessment

2. INTRODUCTION

A Quantitative Risk Assessment (QRA) has previously been completed for the Todd Energy Kapuni Wellsites [Ref. 1]. This report is an addendum to that QRA report to capture updates required for the KA-1/7/19/20 and KA-4/14 wellsites. The risk contours presented in this addendum update where relevant replace the contours presented for the KA-1/7/19/20 and KA-4/14 wellsites in the existing QRA [Ref. 1].

All inputs and assumptions are consistent with the existing QRA and the model for the existing QRA is updated to calculate the risks in the addendum. This report should be read in parallel with the existing QRA report and Assumptions Register [Ref. 3].

2.1 Scope of Work

The addendum captures the following two (2) changes:

1. For the KA-1/7/19/20 wellsite, the Low Temperature Separator (LTS) 7 skid is currently suspended and not in operation, hence the LTS 7 skid is not included in the current QRA. A sensitivity case is conducted to assess the incremental risk with the LTS 7 in operation.

Note that currently the Flowing Tubing Head Pressure (FTHP) of the wells is not sufficient to be able to flow via the LTS 7. LTS-7 operating conditions used for the sensitivity case are based on the best estimation provided by Todd.

2. For the KA-4/14 wellsite, plant modification was conducted to connect three (3) pipelines from the new Kapuni J wellsite to the KA-4/14 wellsite and install three (3) new pig receivers. These modifications were not completed when the QRA study commenced in May 2020 and hence were not captured in the QRA. The KA-4/14 wellsite QRA is updated to include these modifications and the result will be used as the new base case.

2.2 QRA Study Cases

It is noted that the existing QRA study includes the base case and sensitivity cases to study the impact of different modelling input / assumption on the risk results as per the existing QRA. The QRA base case includes the current operations of the Kapuni wellsites with wellsites' equipment up to the pipeline isolation valves (if available) or when the pipelines go underground. Underground pipelines passing through the wellsites are not included in the base case.

The sensitivity case considered in the Kapuni Wellsites QRA which include the aboveground gathering pipeline sections downstream of the pipeline isolation valves. The pipeline sections contain the entire pipeline inventory. The pipeline inventories are referenced from the Kapuni Safety Case [Ref. 1]. For the KA-1/7/19/20 wellsite, a new sensitivity case is now added as per the scope of work.

The details of the base case and sensitivity cases are summarised in Table 2-1. Note that at KA-1/7/19/20, results with both sensitivities considered concurrently will also be produced.

Table 2-1: Kapuni Wellsites QRA Base Case and Sensitivity Cases

QRA Case	Details	Potential Impact of the sensitivity case to the QRA
Base case	Current wellsites' operation up to the gathering pipeline isolation valves (if available) or when the pipelines go underground	Noted that for KA-4/14, the base case is being updated to include additional pig receivers
Sensitivity case 1	Include the aboveground gathering pipeline sections downstream of the pipeline isolation valves.	Addition QRA sections for the pipeline sections with the entire pipeline inventory. Changes to sensitivity modelling at KA-4/14 only in this addendum document.
Sensitivity case 2	Include the LTS 7 skid where is currently suspended. This is only applicable for KA-1/7/19/20 wellsite.	Addition QRA sections for the LTS 7 equipment at KA-1/7/19/20 wellsite.

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QRA Case	Details	Potential Impact of the sensitivity case to the QRA
Sensitivity case 3	Include the risks from the aboveground gathering pipeline sections downstream of the pipeline isolation valves and LTS7 skid, i.e., the total risks from sensitivity cases 1 and 2 above for KA-1/7/19/20 wellsite.	Addition QRA sections for the pipeline sections with the entire pipeline inventory and the LTS 7 equipment at KA-1/7/19/20 (i.e., cumulative of sensitivity case 1 and 2).

3. KA-1/7/19/20 WELLSITE

3.1 Release Scenarios

Table 3-1 details the section description and the respective operating conditions that are used in the QRA. The Piping and Instrumentation Diagrams (P&IDs) showing the isolatable sections for the KA-1/7/19/20 wellsite are presented in Appendix 1. There is no change to the previously reported base case release scenarios and operating conditions.

Table 3-1: Release Scenarios and Operating Conditions for KA-1/7/19/20 Wellsite

No.	Section ID	Description	Material / Stream ^{Note 1}	Pressure (barg)	Temperature (°C)	Largest Connection Size (mm)	Section Inventory (m ³)	Isolatable Inventory (m ³)
1	01_KA19_01_WLHEAD_V	Wellstream fluid from KA-19 wellhead to SDV-2140A	15	33.8	40.29	150	<i>Unlimited</i> ^{Note 2}	
2	02_KA19_02_FLWLNE_V	Wellstream fluid from wellhead SDV-2140A to choke valve HCV-2140X	15	33.8	40.29	150	0.8	6.6
3	03_KA19_02_CHKLINE_V	Wellstream fluid from choke valve HCV-2140X to Wellstream Cooler (E-2153)	16	23.1	33.6	150	1.3	6.6
4	04_KA19_02_WSCOOL_V	Wellstream fluid from Wellstream Cooler (E-2153) to Wellhead Knockout (V-2154)	17	22.8	24	150	1.2	6.6
5	05_KA19_02_WLHKOT_V	Hydrocarbon gas from Wellhead Knockout (V-2154) to SDV-2154A and manual valve 150V385	19	22.8	24	80	3.3	6.6
6	06_KA19_02_WLHKOB_L	Hydrocarbon liquid from Wellhead Knockout (V-2154) to SDV-2154B	18	22.8	24	150	2.1	2.1
16	16_KA19_04_CONPIP_L	Hydrocarbon liquid from SDV-2154B and SDV-2853A to Condensate Pipeline	18	22.8	24	100	38.2	38.2
17	17_KA19_05_GASPP1_V	Hydrocarbon gas from SDV-2154A mix with wet gas from A-5002 to XSV-2165A on the Gas Pipeline to KA-8 via KA-4/14	19	22.8	24	250	15.9	18.0
18	18_KA19_05_GPIG65_V	Scraper Trap (A-2165)	19	22.8	24	250	1.1	18.0
19	19_KA19_05_GPIG63_V	Scraper Trap (A-2163)	19	22.8	24	200	1.0	18.0
20	20_KA19_06_GASPP2_V	Hydrocarbon gas from SDV-2852C mix with dry gas from KA-4/14 wellsite to Gas Pipeline to KPS	8	28.2	23.11	250	7.2	8.3

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No.	Section ID	Description	Material / Stream ^{Note 1}	Pressure (barg)	Temperature (°C)	Largest Connection Size (mm)	Section Inventory (m ³)	Isolatable Inventory (m ³)
21	21_KA19_06_GPIG67_V	Scraper Trap (A-2167)	8	28.2	23.11	250	1.1	8.3
22	22_KA19_06_GPIG66_V	Scraper Trap (A-2166)	8	28.2	23.11	150	1.0	8.3
23	23_KA19_07_VEKGAS_V	KGTP Treated Gas to XSV-2169A for export pipeline (to Kiwi Dairy Co. & Taranaki Byproduct Co.)	Kiwi GC	21.1	38.9	250	7.7	15.4
24	24_KA19_07_PG2169_V	Scraper Trap (A-2169)	Kiwi GC	21.1	38.9	250	7.7	15.4
25	25_KA19_07_PG2164_V	Scraper Trap (A-2164)	Kiwi GC	21.1	38.9	150	7.7	15.4
26	26_KA19_08_METTNK_L	Methanol Tank (T-2191) to Methanol Pumps	Methanol	Atm	Atm	50	5.0	5.0
<i>Sensitivity Case 1 – Export Pipelines</i>								
27	27_KA19_09_KA4GPL_V	Dry gas from KA-4/14 to XSV-2167A	8	28.2	23.11	250	97.3	97.3
28	28_KA19_10_KA8GPL_V	Wet gas from XSV-2165A to KA-8/18	19	22.8	24	250	38.7	38.7
29	29_KA19_11_KIWICO_V	KGTP Treated Gas from XSV-2169A to export pipeline (to Kiwi Dairy Co. & Taranaki Byproduct Co.)	Kiwi GC	21.1	38.9	250	1100.0	1100.0
<i>Sensitivity Case 2 – LTS 7 Skid</i>								
7	07_KA19_03_CLASSF_V	Wellstream fluid from valve 150V385 through Low Temperature Separator (V-2852) to Wellhead Knockout (V-2854)	19	22.8	24	150	0.2	16.0
8	08_KA19_03_WHDKOT_V	Top product from the Wellhead Knockout (V-2854) to Gas/Gas Exchanger (E-2855/6/7)	19	26	20	150	2.2	16.0
9	09_KA19_03_WHDKOB_L	Bottom product from the Wellhead Knockout (V-2854) to SDV-2854A	18	26	20	100	2.1	7.6
10	10_KA19_03_GGEXCH_V	Hydrocarbon gas from Gas/Gas Exchanger (E-2855/6/7) to Low Temperature Separator (V-2852)	19	26	16.4	150	1.8	16.0
11	11_KA19_03_WHDKOB_L	Hydrocarbon liquid from Wellhead Knockout (V-2854) SDV-2854A to Classifier (V-2853)	18	22	20	80	0.0	7.6

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No.	Section ID	Description	Material / Stream ^{Note 1}	Pressure (barg)	Temperature (°C)	Largest Connection Size (mm)	Section Inventory (m ³)	Isolatable Inventory (m ³)
12	12_KA19_03_CLSFRT_V	Top product from the Classifier (V-2853) to Low Temperature Separator (V-2852)	19	22	20	150	1.1	16.0
13	13_KA19_03_CLSFRB_L	Bottom product from the Classifier (V-2853) to Condensate pipeline	18	22	20	50	1.1	7.6
14	14_KA19_03_LTSEPT_V	Top product from the Low Temperature Separator (V-2852) through the Gas/Gas Exchanger to the Gas Pipeline	19	22	20	150	10.7	16.0
15	15_KA19_03_LTSEPB_L	Bottom product from the Low Temperature Separator (V-2852) to SDV-2853A	18	22	20	150	4.5	7.6

Notes:

1. Stream compositions for the stream numbers are given in Table 3-2.
2. Inventory from the wellhead section is considered to be unlimited because they can be supplied from the downhole reservoir.

Table 3-2: Material Composition for KA-1/7/19/20

	8	15	16	17	18	19	Kiwi GC
Name	KA-05_KA-06/17_Combined	KA-19_Wellfluid_to_KA-19_Choke	KA-19_Choke-to_E-2153	E-2153_to_V-2154	V-2154_Liquid_to_Liquid Manifold	V-2154_Gas_to_Wet_Gas_Network	
Mole Fraction							
WATER	0.2858	0.0338	0.0338	0.0338	0.6021	0.0016	-
CARBON DIOXIDE	0.3163	0.4380	0.4380	0.4380	0.0581	0.4596	0.0316
METHANE	0.2897	0.4130	0.4130	0.4130	0.0188	0.4354	0.9005
ETHANE	0.0373	0.0521	0.0521	0.0521	0.0122	0.0543	0.0580
PROPANE	0.0225	0.0271	0.0271	0.0271	0.0205	0.0275	0.0086
n-BUTANE	0.0132	0.0128	0.0128	0.0128	0.0254	0.0122	0.0013
n-PENTANE	0.0051	0.0038	0.0038	0.0038	0.0193	0.0030	0.0001
n-HEPTANE (C7)	0.0210	0.0144	0.0144	0.0144	0.1542	0.0065	-
n-DECANE (C10)	0.0091	0.0050	0.0050	0.0050	0.0892	-	-
n-EICOSANE (C20)	-	-	-	-	0.0001	-	-

3.2 Release Frequency

The leak frequencies for the process releases are estimated for each representative hole size using parts count results and the historical leak frequencies. The leak frequencies for the KA-1/7/19/20 wellsite for the base case are shown in Table 3-3. These values are unchanged from the previous base case modelling.

Table 3-3: Hydrocarbon Release Frequencies for KA-1/7/19/20 Wellsite (Base Case)

No	QRA Event	1 - 3 mm	3 - 10 mm	10 - 50 mm	50 - 150 mm	> 150 mm	TOTAL	% Contrib.
1	01_KA19_01_WLHEAD_V	3.37E-05	1.38E-05	5.67E-06	1.13E-06	7.09E-07	5.50E-05	0.3%
	KA-19 Blowout					4.20E-05	4.20E-05	0.2%
2	02_KA19_02_FLWLNE_V	9.10E-04	3.85E-04	2.06E-04	7.36E-06	1.58E-06	1.51E-03	7.9%
3	03_KA19_02_CHKLNE_V	1.88E-03	8.15E-04	4.43E-04	3.27E-05	3.77E-06	3.18E-03	16.6%
4	04_KA19_02_WSCOOOL_V	1.25E-03	4.67E-04	1.93E-04	4.23E-05	7.70E-07	1.95E-03	10.2%
5	05_KA19_02_WLHKOT_V	1.21E-03	5.38E-04	2.88E-04	4.71E-05		2.08E-03	10.8%
6	06_KA19_02_WLHKOB_L	7.25E-04	3.42E-04	1.88E-04	5.65E-05	1.41E-06	1.31E-03	6.8%
16	16_KA19_04_CONPIP_L	1.28E-03	5.68E-04	2.99E-04	5.02E-05		2.20E-03	11.5%
17	17_KA19_05_GASPP1_V	7.89E-04	3.47E-04	1.85E-04	2.45E-05	5.30E-06	1.35E-03	7.0%
18	18_KA19_05_GPIG65_V	7.94E-07	4.05E-07	2.24E-07	5.42E-08	1.77E-08	1.49E-06	0.01%
19	19_KA19_05_GPIG63_V	3.75E-07	1.94E-07	1.08E-07	2.83E-08	8.83E-09	7.15E-07	0.004%
20	20_KA19_06_GASPP2_V	1.11E-03	4.89E-04	2.60E-04	3.01E-05	5.67E-06	1.90E-03	9.9%
21	21_KA19_06_GPIG67_V	1.84E-07	9.52E-08	5.28E-08	1.35E-08	4.42E-09	3.50E-07	0.002%
22	22_KA19_06_GPIG66_V	9.29E-08	4.81E-08	2.67E-08	1.32E-08	4.39E-12	1.81E-07	0.001%
23	23_KA19_07_VECGAS_V	1.60E-03	6.89E-04	3.71E-04	3.38E-05	3.59E-06	2.70E-03	14.1%
24	24_KA19_07_PG2169_V	1.17E-06	5.96E-07	3.30E-07	7.64E-08	2.67E-08	2.20E-06	0.011%
25	25_KA19_07_PG2164_V	1.01E-07	5.17E-08	2.86E-08	1.35E-08	4.39E-12	1.95E-07	0.001%
26	26_KA19_08_METTNK_L	4.64E-04	3.03E-04	1.12E-04	1.85E-05	5.00E-06	9.03E-04	4.7%
TOTAL		1.13E-02	4.96E-03	2.55E-03	3.44E-04	6.99E-05	1.92E-02	
% Contribution		59%	26%	13%	2%	0.4%		

The total leak frequency for the KA-1/7/19/20 wellsite (for the base case) is 1.92E-02 per year, which is equivalent to one leak every 52.1 years. Most of the leaks are predicted to be from small leaks, where 85% of the leaks are from hole sizes less than 10 mm diameter.

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The leak frequencies for the KA-1/7/19/20 wellsite for the sensitivity case 1 are shown in Table 3-4. There is no change from the previous sensitivity case modelling.

Table 3-4: Hydrocarbon Release Frequencies for KA-1/7/19/20 wellsite (Sensitivity Case 1)

No	QRA Event	1 - 3 mm	3 - 10 mm	10 - 50 mm	50 - 150 mm	> 150 mm	TOTAL	% Contrib.
27	27_KA19_09_KA4GPL_V	3.19E-05	1.42E-05	7.35E-06	1.14E-06	3.54E-07	5.50E-05	0.3%
28	28_KA19_10_KA8GPL_V	3.19E-05	1.42E-05	7.35E-06	1.14E-06	3.54E-07	5.50E-05	0.3%
29	29_KA19_11_KIWICO_V	3.19E-05	1.42E-05	7.35E-06	1.14E-06	3.54E-07	5.50E-05	0.3%
TOTAL		1.14E-02	5.00E-03	2.57E-03	3.48E-04	7.09E-05	1.93E-02	
% Contribution		59%	26%	13%	2%	0.4%		

The total leak frequency for the KA-1/7/19/20 wellsite (including the sensitivity case 1) is 1.93E-02 per year, which is equivalent to one leak every 51.7 years.

The leak frequencies for the KA-1/7/19/20 wellsite for the sensitivity case 2 are shown in Table 3-5.

Table 3-5: Hydrocarbon Release Frequencies for KA-1/7/19/20 wellsite (Sensitivity Case 2)

No	QRA Event	1 - 3 mm	3 - 10 mm	10 - 50 mm	50 - 150 mm	> 150 mm	TOTAL	% Contrib.
7	07_KA19_03_CLASSF_V	1.17E-03	5.02E-04	2.68E-04	1.48E-05	3.29E-06	1.96E-03	4.7%
8	08_KA19_03_WHDKOT_V	9.66E-04	4.25E-04	2.20E-04	4.08E-05	1.53E-06	1.65E-03	4.0%
9	09_KA19_03_WHDKOB_L	8.27E-04	3.68E-04	1.86E-04	4.81E-05		1.43E-03	3.5%
10	10_KA19_03_GGEXCH_V	2.11E-03	1.09E-03	6.58E-04	3.40E-04	2.42E-06	4.19E-03	10.1%
11	11_KA19_03_WHDKOB_L	1.97E-04	8.46E-05	3.98E-05	1.10E-05		3.32E-04	0.8%
12	12_KA19_03_CLSFRT_V	7.72E-04	3.22E-04	1.62E-04	1.08E-05	7.70E-07	1.27E-03	3.1%
13	13_KA19_03_CLSFRB_L	6.74E-04	3.12E-04	1.62E-04	5.62E-05		1.20E-03	2.9%
14	14_KA19_03_LTSEPT_V	4.45E-03	2.06E-03	1.05E-03	3.47E-04	4.18E-06	7.91E-03	19.1%
15	15_KA19_03_LTSEPB_L	1.30E-03	5.82E-04	3.03E-04	6.60E-05	2.02E-06	2.26E-03	5.4%
TOTAL		2.37E-02	1.07E-02	5.60E-03	1.28E-03	8.41E-05	4.14E-02	
% Contribution		57%	26%	14%	3%	0.2%		

The total leak frequency for the KA-1/7/19/20 wellsite (including the sensitivity case 2) is 4.14E-02 per year, which is equivalent to one leak every 24.2 years.

The total leak frequency for the KA-1/7/19/20 wellsite for sensitivity case 3 (includes the base case and both sensitivity cases) is 7.99E-2 per year, which is equivalent to one leak every 12.5 years.

3.3 Risk Results

The risk results are presented in this section. The risk contours are contributed from both flammable and toxic risks from all release scenarios based on all the hazardous materials onsite. The risk contour for the KA-1/7/19/20 wellsite for sensitivity case 2 is presented in Figure 4-1.

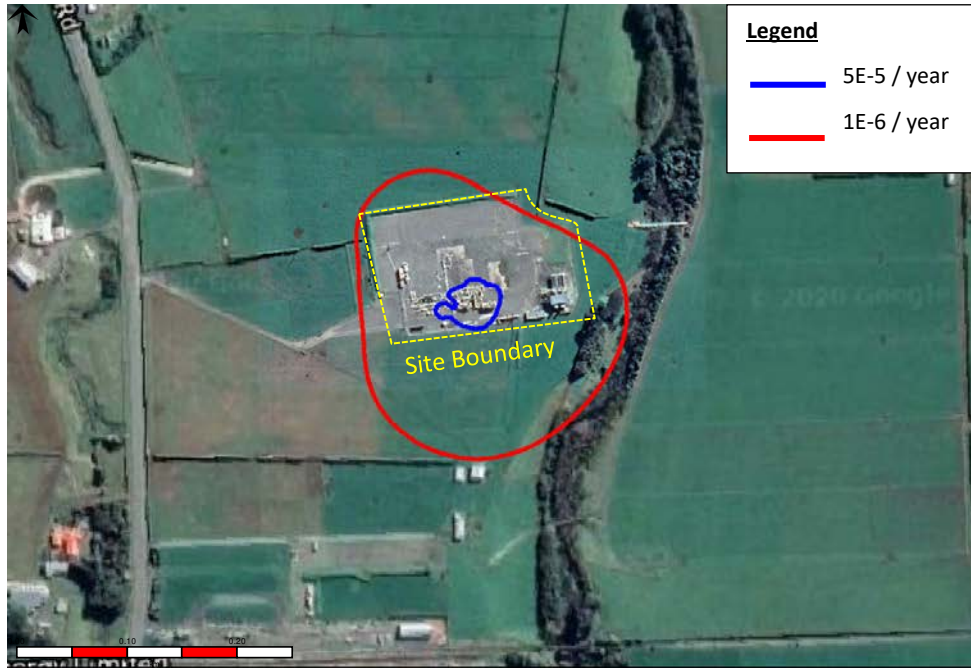


Figure 3-1: Risk Contour for KA-1/7/19/20 Wellsite (Sensitivity Case 2)

The risk assessed against the NSW Hazardous Industry Planning Advisory Paper No. 4 (HIPAP4) criteria are summarised in Table 3-6.

Table 3-6: LSIR Results Assessed Against the HIPAP4 Land Use Criteria for KA-1/7/19/20 Wellsite (Sensitivity Case 2)

LSIR	Risk Contour	HIPAP4 Land Use Criteria	Result
5E-05 / year	Blue	5E-5 / year risk contour should, as a target, be contained within the boundaries of the industrial site where applicable.	Criteria met. The 5E-05 / year risk contour is within the site boundary.
1E-6 / year	Red	1E-6 / year risk contour should not extend to residential developments, hotels, tourist resorts.	Criteria met. There are no residential developments, hotels, tourist resorts within the contour.

For comparison, the risk contour for the base case from the existing QRA [Ref. 1] is presented in Figure 3-2.

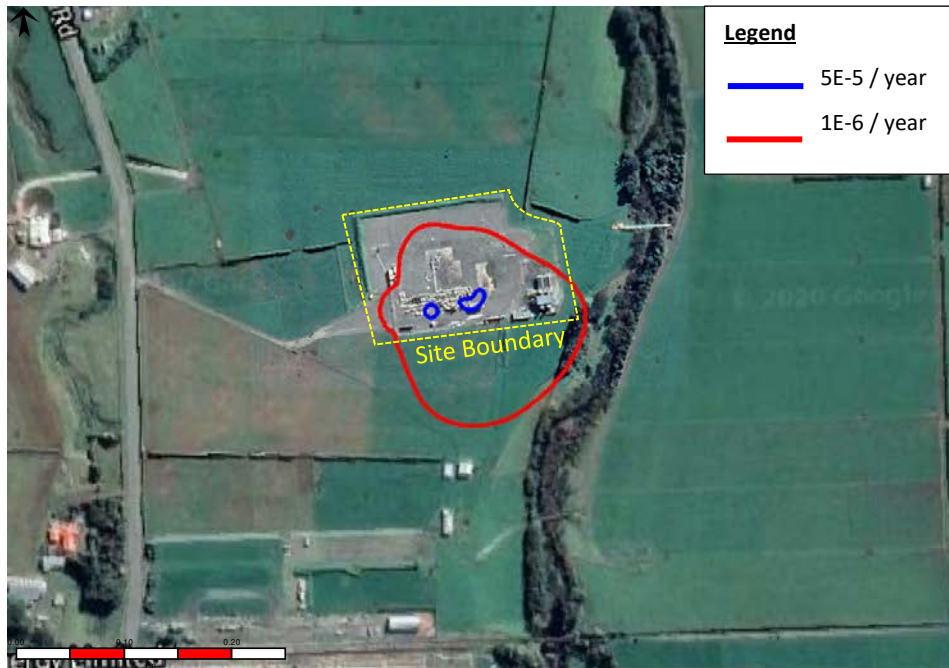


Figure 3-2: Risk Contour for KA-1/7/19/20 Wellsite (Base Case)

Figure 3-3 shows the risk contour for sensitivity case 3 (i.e., the aboveground pipelines and LTS 7 skid are included).

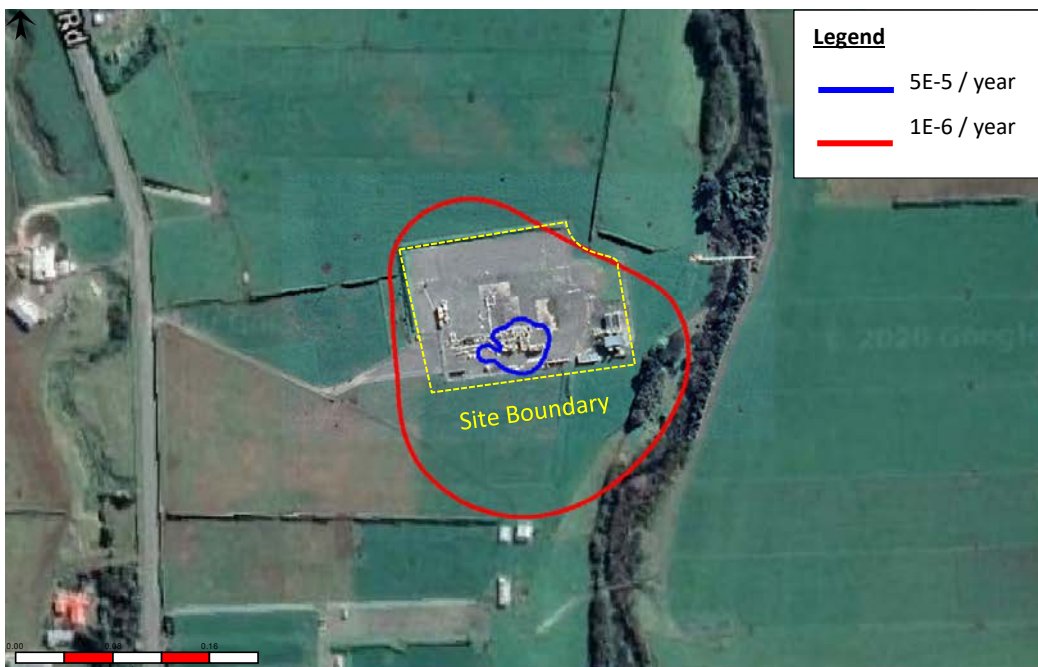


Figure 3-3: Risk Contour for KA-1/7/19/20 Wellsite (Sensitivity Case 3)

4. KA-4/14 WELLSITE

4.1 Release Scenarios

Table 4-1 details the section description and the respective operating conditions that are used in the QRA. The P&IDs showing the isolatable sections for the KA-4/14 wellsite are presented in Appendix 2. In updating the facility base case, the following changes from the previous base case are noted:

- Sections 10 and 11 have been removed, and Sections 16-21 are now included in the base case.
- New sensitivity cases 22-25 are now included.
- Process conditions for sections 13-15 in the sensitivity case have been revised.
- Reference material has been amended for streams 11, 13, 14 and 15.

Table 4-1: Release Scenarios and Operating Conditions for KA-4/14 Wellsite

No.	Section ID	Description	Material / Stream ^{Note 1}	Pressure (barg)	Temperature (°C)	Largest Connection Size (mm)	Section Inventory (m ³)	Isolatable Inventory (m ³)
1	01_KA04_01_KA4WHD_V	KA-04 wellhead	37	18	17.6	100	Unlimited ^{Note 2}	
3	03_KA04_03_KA14WH_V	KA-14 wellhead	40	19.2	18.6	100	Unlimited ^{Note 2}	
5	05_KA04_05_KA14FW_V	Wellfluid from KA-14 wellhead to SDV-2430B	40	19.2	18.6	100	0.6	0.6
6	06_KA04_06_KA14CK_V	Wellfluid from SDV-2430B to the commingled line	41	18.5	18.1	150	0.0	1.4
7	07_KA04_06_KA4FLW_V	Wellfluid from KA-4 wellhead to the commingled line	38	16.2	16.1	150	1.0	1.4
8	08_KA04_06_MIXFLW_V	KA-4 and 14 commingled flow to SDV-2404A and XSV-2441	39	18.3	13.5	100	0.4	1.4
9	09_KA04_07_METTNK_L	Methanol Tank (T-2429) to Methanol Pumps	Methanol	Amb.	Atm.	50	4.7	4.7
11	11_KA04_10_GASPIG_V	Scraper Launcher (A-2440)	33(2)	39.05	26.4	250	1.0	88.7
16	16_KA04_10_KAPJDG_V	HP dry gas from Kapuni J Wellsite from XSV-4002 feed to gas pipeline from KA-8 (A-2813)	J7	48.1	38.7	300	0.8	88.7
17	17_KA04_10_PIG400_V	KA-4/14 HP Dry Gas Pipeline Pig Receiver (941-V-400)	J7	48.1	38.7	300	1.1	88.7

KAPUNI WELLSITES
QUANTITATIVE RISK ASSESSMENT - ADDENDUM

No.	Section ID	Description	Material / Stream ^{Note 1}	Pressure (barg)	Temperature (°C)	Largest Connection Size (mm)	Section Inventory (m ³)	Isolatable Inventory (m ³)
18	18_KA04_08_CONKPJ_L	Condensate/water from Kapuni J Wellsite from XSV-4102 feed to condensate pipeline from KA-8 (A-2814) and condensate pipeline from KA-12	J16	18	16.1	150	0.2	45.5
19	19_KA04_08_PIG410_L	KA-4/14 Condensate/Water Pipeline Pig Receiver (941-V-410)	J16	18	16.1	150	1.0	45.5
20	20_KA04_08_CONKPJ_L	Condensate/water or flowback water from Kapuni J Wellsite from XSV-4202 feed to condensate pipeline from KA-8 (A-2814) and condensate pipeline from KA-12	J16	18	16.1	100	0.1	45.5
21	21_KA04_08_PIG420_L	KA-4/14 Condensate or Flowback Water Pipeline Pig Receiver (941-V-420)	J16	18	16.1	100	1.0	45.5
<i>Sensitivity Cases</i>								
13	13_KA04_10_GASPLN_V	Gas pipeline from KA-8 A-2813 to KPS Receiver A-502D	33(2)	39.05	26.4	150	85.8 ^{Note 3}	88.7
14	14_KA04_11_GASKA7_V	From XSV-2440A to Dry Gas Pipeline to KA-7	33(2)	39.05	26.4	250	97.3 ^{Note 3}	97.3
15	15_KA04_08_GASPPL_V	Condensate pipeline from KA-8 Launcher A-2814 to KA-4/14	33(2)	39.05	26.4	100	43.2 ^{Note 3}	45.5
22	22_KA04_12_HPDRYG_V	HP dry gas from Kapuni J Wellsite to XSV-4002	J7	48.1	38.7	300	99.0 ^{Note 3}	99.0
23	23_KA04_13_CONKPJ_L	Condensate/water from Kapuni J Wellsite to XSV-4102	J16	18	16.1	150	24.7 ^{Note 3}	24.7
24	24_KA04_14_CONKPJ_L	Condensate/water or flowback water from Kapuni J Wellsite to XSV-4202	J16	18	16.1	100	11.0 ^{Note 3}	11.0
25	25_KA04_15_LPMPHV_V	KA-4 and 14 commingled flow from XSV-2441 to LP Multiphase pipeline from KA-1&7 and KPS (A-2165)	39	18.3	13.5	100	250.3 ^{Note 3}	250.3

Notes:

1. Stream compositions for the stream numbers are given in Table 4-2.
2. Inventory from the wellhead section is considered to be unlimited because they can be supplied from the downhole reservoir.
3. Sections connecting to the pipeline inventories due to the lack of isolation valve.

KAPUNI WELLSITES
QUANTITATIVE RISK ASSESSMENT - ADDENDUM

Table 4-2: Material Composition for KA-4/14 Wellsite

Stream Number	33(2)	37	38	39	40	41	J7	J16
Name / Description	LTS-8_Gas_to_Dry_Gas_Pipeline	KA-4_Wellfluid_to_KA-4_Choke	KA-4_Choke_to_KA4/14_Combined	KA-4/14_Combined_to_Liquid_Manifold	KA-14_Wellfluid_to_KA-14_Choke	KA-14_Choke_to_KA-4/14_Combined	Dry gas from Kapuni J [Ref. 4]	Condensate from Kapuni J [Ref. 4]
Mole Fraction								
WATER	0.0006	0.0437	0.0437	0.0352	0.0299	0.0299	0.0003	-
CARBON DIOXIDE	0.4435	0.4224	0.4224	0.4278	0.4312	0.4312	0.4073	0.2155
METHANE	0.4528	0.4102	0.4102	0.4158	0.4193	0.4193	0.4857	-
ETHANE	0.0543	0.0511	0.0511	0.0517	0.0521	0.0521	0.0589	0.0962
PROPANE	0.0278	0.0290	0.0290	0.0292	0.0293	0.0293	0.0297	0.1289
n-BUTANE	0.0125	0.0153	0.0153	0.0152	0.0151	0.0151	0.0131	0.1524
n-PENTANE	0.0028	0.0048	0.0048	0.0046	0.0045	0.0045	0.0024	0.0845
n-HEXANE	-	-	-	-	-	-	0.0026	0.3599
n-HEPTANE (C7)	0.0057	0.0196	0.0196	0.0174	0.0161	0.0161	-	-
n-DECANE (C10)	-	0.0038	0.0038	0.0031	0.0026	0.0026	-	-
n-TRIDECANE (C13)	-	-	-	-	-	-	-	0.1951

4.2 Release Frequency

The leak frequencies for the process releases are estimated for each representative hole size using parts count results and the historical leak frequencies. The leak frequencies for the KA-4/14 wellsites for the base case are shown in Table 4-3. The KA-14 well is only in operation for 24 hours every 10 days. Note, with the exception of Section 8, all base case frequencies from the previous QRA revision (Sections 1-11) remain unchanged.

Table 4-3: Hydrocarbon Release Frequencies for KA-4/14 Wellsite (Base Case)

No	QRA Event	1 - 3 mm	3 - 10 mm	10 - 50 mm	50 - 150 mm	> 150 mm	TOTAL	% Contrib.
1	01_KA04_01_KA4WHD_V	3.37E-05	1.38E-05	5.67E-06	1.84E-06		5.50E-05	0.6%
	KA-4 Blowout				4.20E-05		4.20E-05	0.4%
3	03_KA04_03_KA14WH_V	3.37E-06	1.38E-06	5.67E-07	1.84E-07		5.50E-06	0.1%
	KA-14 Blowout				4.20E-06		4.20E-06	0.0%
5	05_KA04_05_KA14FW_V	3.06E-05	1.33E-05	6.71E-06	1.13E-06		5.17E-05	0.5%
6	06_KA04_06_KA14CK_V	1.40E-04	5.92E-05	3.22E-05	4.30E-07	1.26E-07	2.32E-04	2.4%
7	07_KA04_06_KA4FLW_V	1.33E-03	5.66E-04	2.98E-04	1.78E-05	2.14E-06	2.21E-03	22.8%
8	08_KA04_06_MIXFLW_V	1.27E-03	5.57E-04	2.76E-04	5.44E-05		2.16E-03	22.2%
9	09_KA04_07_METTNK_L	2.49E-04	2.18E-04	6.64E-05	2.66E-05	5.00E-06	5.65E-04	5.8%
11	11_KA04_10_GASPIG_V	1.83E-07	9.46E-08	5.25E-08	1.35E-08	4.39E-09	3.48E-07	0.0%
16	16_KA04_10_KAPJDG_V	1.12E-03	5.01E-04	2.66E-04	3.51E-05	8.45E-06	1.93E-03	19.9%
17	17_KA04_10_PIG400_V	4.85E-06	2.47E-06	1.37E-06	3.28E-07	1.07E-07	9.12E-06	0.1%
18	18_KA04_08_CONKPJ_L	8.91E-04	3.89E-04	2.05E-04	1.87E-05	4.30E-06	1.51E-03	15.5%
19	19_KA04_08_PIG410_L	9.67E-06	4.93E-06	2.73E-06	1.26E-06	1.80E-09	1.86E-05	0.2%
20	20_KA04_08_CONKPJ_L	5.30E-04	2.34E-04	1.20E-04	1.95E-05		9.04E-04	9.3%
21	21_KA04_08_PIG420_L	9.67E-06	4.93E-06	2.73E-06	1.26E-06		1.86E-05	0.2%
TOTAL		5.62E-03	2.56E-03	1.28E-03	2.25E-04	2.01E-05	9.72E-03	
% Contribution		58%	26%	13%	2%	0.2%		

The total leak frequency for the KA-4/14 wellsite (for the base case) is 9.72E-03 per year, which is equivalent to one leak every 103 years. Most of the leaks are predicted to be from small leaks, where 84% of the leaks are from hole sizes less than 10 mm diameter.

The leak frequencies for the KA-4/14 wellsite for the sensitivity case are shown in Table 4-4. Note, with the exception of Section 13, all base case frequencies from the previous QRA revision (Sections 14 & 15) remain unchanged.

Table 4-4: Hydrocarbon Release Frequencies for KA-4/14 Wellsite (Sensitivity Case)

No	QRA Event	1 - 3 mm	3 - 10 mm	10 - 50 mm	50 - 150 mm	> 150 mm	TOTAL	% Contrib.
13	13_KA04_10_GASPLN_V	5.11E-04	2.19E-04	1.17E-04	6.49E-06	9.87E-07	8.54E-04	7.4%
14	14_KA04_11_GASKA7_V	6.03E-05	2.81E-05	1.43E-05	2.86E-06	8.86E-07	1.06E-04	0.9%
15	15_KA04_08_GASPPL_L	4.64E-04	2.03E-04	1.10E-04	1.13E-05		7.88E-04	6.9%
22	22_KA04_12_HPDRYG_V	1.93E-04	8.22E-05	4.44E-05	3.84E-06	3.54E-07	3.24E-04	2.8%
23	23_KA04_13_CONKPJ_L	1.92E-04	8.39E-05	4.55E-05	6.10E-06	1.54E-07	3.28E-04	2.9%

No	QRA Event	1 - 3 mm	3 - 10 mm	10 - 50 mm	50 - 150 mm	> 150 mm	TOTAL	% Contrib.
24	24_KA04_14_CONKPJ_L	1.92E-04	8.39E-05	4.55E-05	6.26E-06		3.28E-04	2.9%
25	25_KA04_15_LPMPHV_V	2.12E-04	9.21E-05	4.98E-05	4.72E-06		3.59E-04	3.1%
TOTAL		7.45E-03	3.36E-03	1.71E-03	2.66E-04	2.25E-05	1.28E-02	
% Contribution		58%	26%	13%	2%	0.2%		

The total leak frequency for the KA-4/14 wellsite (including the sensitivity cases) is 1.28E-02 per year, which is equivalent to one leak every 78.1 years.

4.3 Risk Results

The risk results are presented in this section. The risk contours are contributed from both flammable and toxic risks from all release scenarios based on all the hazardous materials onsite.

4.3.1 Base Case

The new base case risk contour for the KA-4/14 wellsite is presented in Figure 4-1.



Figure 4-1: Risk Contour for KA-4/14 Wellsite (New Base Case)

The risk assessed against the HIPAP4 criteria for the base case are summarised in Table 4-5.

Table 4-5: LSIR Results Assessed Against the HIPAP4 Land Use Criteria for KA-4/14 Wellsite (Base Case)

LSIR	Risk Contour	HIPAP4 Land Use Criteria	Result
5E-05 / year	Blue	5E-5 / year risk contour should, as a target, be contained within the boundaries of the industrial site where applicable.	Criteria met. The 5E-05 / year risk contour is within the site boundary.
1E-6 / year	Red	1E-6 / year risk contour should not extend to residential developments, hotels, tourist resorts.	Criteria met. There are no residential developments, hotels, tourist resorts within the contour.

4.3.2 Sensitivity Case

The risk contour for the KA-4/14 wellsite sensitivity case 1, which includes the aboveground gathering pipeline sections is presented in Figure 4-2.



Figure 4-2: Risk Contour for KA-4/14 Wellsite (Sensitivity Case 1)

The risk contours for the sensitivity case similar to the base case and the assessment against the HIPAP4 criteria is the same, hence is it not repeated.

5. REFERENCES

1. Todd Energy, Safety Case – Kapuni Production Station, Doc. No. NOL649981, Rev 1, January 2018
2. Kapuni Wellsites, Quantitative Risk Assessment, 610114-RPT-R0002, Rev. 1, July 2022
3. Kapuni Wellsites QRA, Assumptions Register, 610114-RPT-R0001, Rev. 1, July 2022
4. Kapuni J Wellsite, Quantitative Risk Assessment, 620035-RPT-R0002, Rev. 0, May 2019

Appendix 1.
P&ID Sectionalisation for KA-19

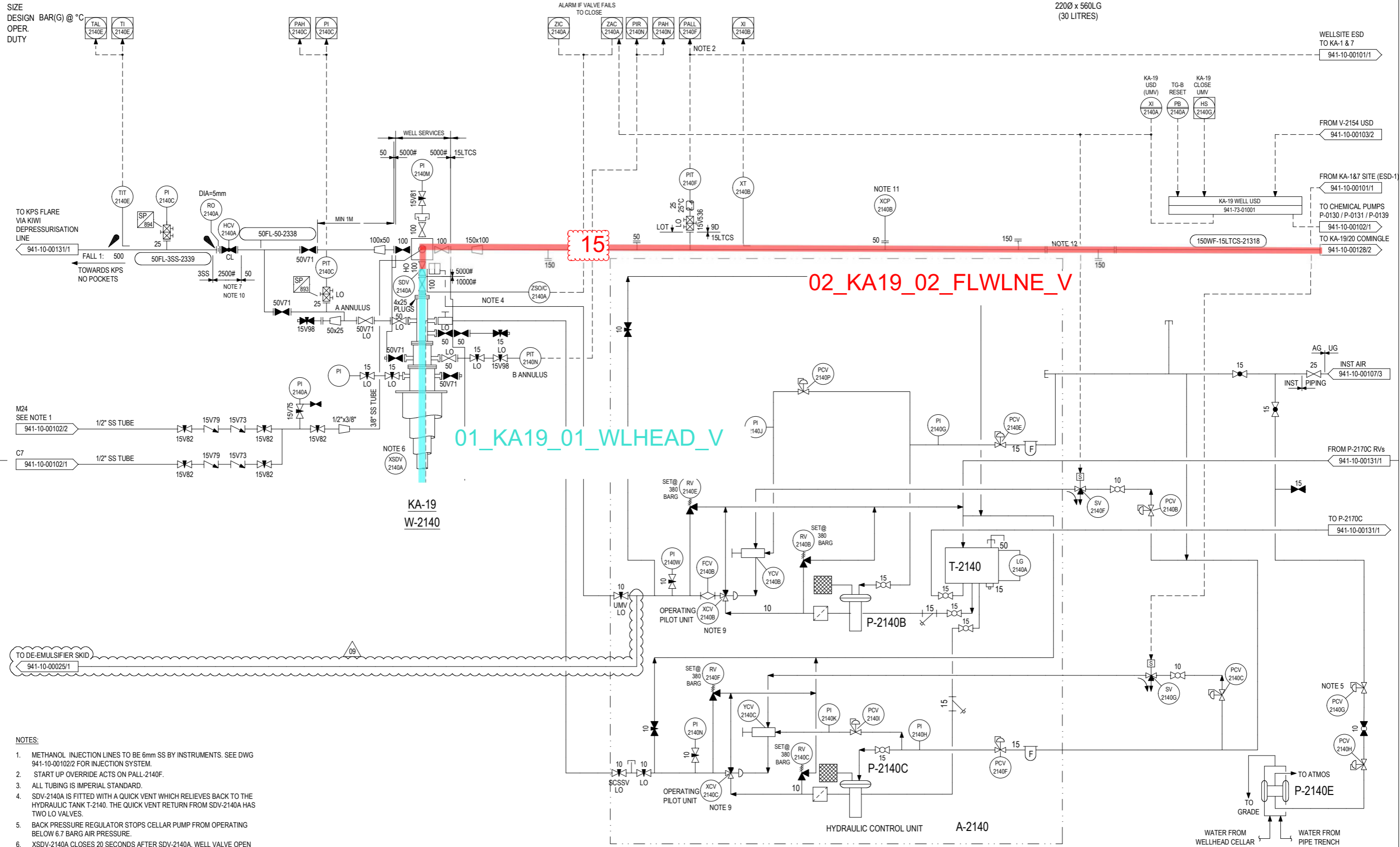
ITEM No.
NAME
SIZE
DESIGN BAR(G) @ °C
OPER.
DUTY

W-2140 KA-19
WELLHEAD

P-2140A/B/C/D
HYDRAULIC FLUID PUMPS

T-2140A/B
HYDRAULIC FLUID RESERVOIR
220Ø x 560LG
(30 LITRES)

P-2140E
WELLHEAD CELLAR PUMP



- NOTES:
- METHANOL INJECTION LINES TO BE 6mm SS BY INSTRUMENTS. SEE DWG 941-10-00102/2 FOR INJECTION SYSTEM.
 - START UP OVERRIDE ACTS ON PALL-2140F.
 - ALL TUBING IS IMPERIAL STANDARD.
 - SDV-2140A IS FITTED WITH A QUICK VENT WHICH RELIEVES BACK TO THE HYDRAULIC TANK T-2140. THE QUICK VENT RETURN FROM SDV-2140A HAS TWO LO VALVES.
 - BACK PRESSURE REGULATOR STOPS CELLAR PUMP FROM OPERATING BELOW 6.7 BARG AIR PRESSURE.
 - XSDV-2140A CLOSSES 20 SECONDS AFTER SDV-2140A. WELL VALVE OPEN SEQUENCE IS MANUALLY CONTROLLED (NO TIMERS).
 - VALVE IS SS FOR LOW TEMP OF -90°C.
 - VOID.
 - XCV-2140B/C OVERRIDE STEM LOCKED OPEN.
 - REFER TO DEPRESSURING PROCEDURE FOR CONTROL OF LOW TEMPERATURES DURING DEPRESSURISATION.
 - CORROSION PROBE.
 - DROP-OUT SPOOL FOR DESANDER CONNECTION.

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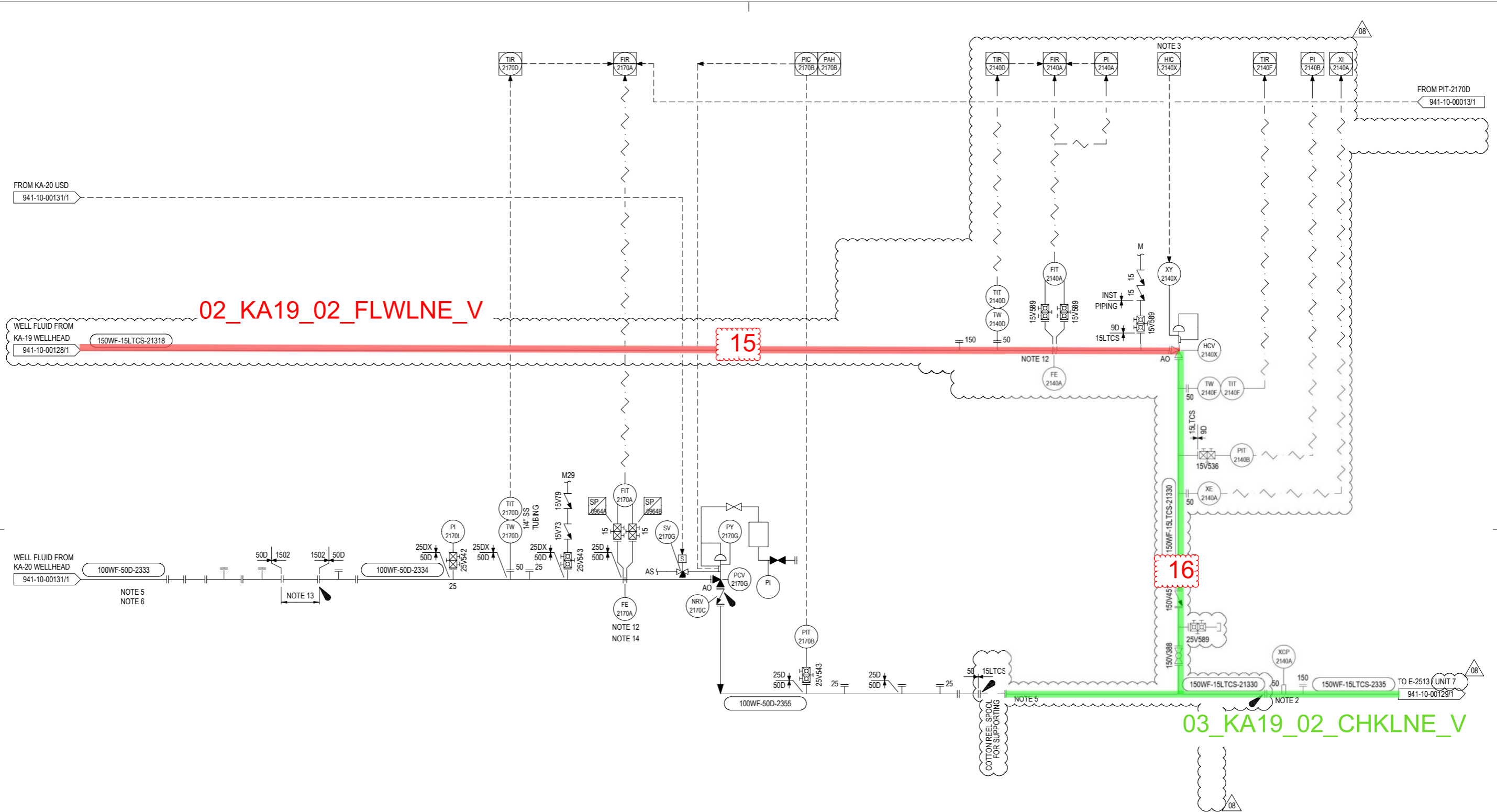
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02	02/19	CSM	K1729-045P-RE-APPR-FOR-CONSTRUCTION	GD	06	08/16	BB	ECF	ECF	XX16002 AS BUILT TO SITE MARK UP ASB 16399KW
01	08/17	CSM	K1729-045P-APPR-FOR-CONSTRUCTION	ML	05	04/16	BB	ECF	ECF	XX16002 AS BUILT TO SITE MARK UP ASB 16319KW
03	03/17	JMP	ECF-K1729-APPROVED-FOR-DESIGN	ML	04	11/15	BB	ECF	ECF	XX16002 AS BUILT TO SITE MARK UP ASB 16131KW
04	02/16	NR	ECF-K1666-APPROVED-FOR-CONSTRUCTION	ML	03	10/15	BB	ECF	ECF	XX16002 AS BUILT TO SITE MARK UP ASB 15429KW
05	08/15	EL	ECF-K1666-APPROVED-FOR-DESIGN	ML	03	10/15	BB	ECF	ECF	XX0213 AS BUILT TO SITE MARK UP ASB 15422KW
06	07/15	NR	ECF-K1666-ISSUED-FOR-HAZOP	ML	03	10/15	BB	ECF	ECF	XX0213 AS BUILT TO SITE MARK UP ASB 15422KW
07	04/14	JMP	ECF-K1334-APPROVED-FOR-CONSTRUCTION	IR	08	08/18	BB	ECF	ECF	PCR_3_2019_5 AS BUILT TO SITE MARK UP ASB T19012KW
08	04/14	JMP	ECF-K1334-APPROVED-FOR-CONSTRUCTION	IR	08	08/18	BB	ECF	ECF	ECF K1729 AS BUILT TO SITE MARK UP ASB T18022KW

DESIGNED: D WATEMBURG
DATE: _____
CHECKED: K CHANNON
APPROVED: _____
SCALE: _____
STOCKFILE: _____

KAPUNI WELLSITES
PIPING & INSTRUMENT DIAGRAM
WELLHEAD KA-19
WELLSITE KA-1 & 7

SHEET No 1 OF 2 REVISION 09
DRAWING No 941-10-00128

Todd Energy



- NOTES:**
- VOID.
 - 50mm RCS ACCESS FITTING WITH CORROSION PROBE. ELASTOMERS IN ACCESS FITTING ONLY SUITABLE FOR -34°C
 - FLOWLINE CHOKE TO BE RAMPED CLOSED UNDER USD / ESD, OR ALL KPS INLET VALVES CLOSED.
 - CRITICAL HEAT TRACING PROTECTS SAFEGUARDING INSTRUMENT FROM WAX/HYDRATE BLOCKAGE.
 - TWO PHASE AND/OR SLUG FLOW.
 - TARGET TEES FOR POTENTIAL SAND PRODUCTION.
 - REMOVABLE INSULATION ON MONO BLOCKS.
 - VOID.
 - VOID.
 - INJECTION REQUIRED ONLY WHEN OPERATING KA-20. (KA-19 SHUTDOWN AND ISOLATED).
 - VOID
 - ECCENTRIC ORIFICE.
 - DROP-OUT SPOOL REMOVED TEMPORARILY.
 - ORIFICE PLATE SIZED FOR ASME 4" 1500# RTJ FLANGE USING R39 RING GASKET. THIS IS ALSO THE API STANDARD GASKET FOR API 5000# 4-1/16" FLANGE AND THEREFORE ACCEPTABLE FOR USE WITH STOS SPEC 50 (API5000#) PIPING.

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NO	DATE	BY	DESCRIPTION	CHKD	APPR	NO	DATE	BY	DESCRIPTION	CHKD	APPR	NO	DATE	BY	DESCRIPTION	CHKD	APPR
E0	10/16	AMP	QUSP PROJECT ISSUED FOR HAZOP	GC	ML		07	02/17	CB	ECP	K1707 AS BUILT TO SITE MARK UP ASB 17029KW	JMP	AB	SF			
D0	09/16	JMP	ECP K1497 POST FRACKING AFC	ML	OKK	SF	06	10/16	BB	ECP	XX16002 AS BUILT TO SITE MARK UP ASB 16399KW	JMP	AB	SF			
C2	02/16	NR	ECP K1666 APPROVED FOR CONSTRUCTION	ML	AD	ATH	05	09/16	BB	ECP	XS16001 AS BUILT TO SITE MARK UP ASB 16369KW	JMP	AB	SF			
G1	08/16	JL	ECP K1666 APPROVED FOR DESIGN	ML	AD	ATH	04	08/16	BB	ECP	K1666 AS BUILT TO SITE MARK UP ASB 16.319KW	JMP	AB	SF			
E2	09/17	GSM	K1729 QUSP RE-APPR FOR CONSTRUCTION	ML	GD	SF	03	10/15	BB	ECP	K1593 & X0213 AS BUILT TO SITE MARK UP ASB 15419KW & 15422KW	JMP	AB	ATH			
E1	03/17	JMP	ECP K1729 APPROVED FOR DESIGN	ML	SG	SF	08	08/16	BB	ECP	K1729 AS BUILT TO SITE MARK UP ASB 178022KW	JMP	GD	KB			

KAPUNI WELLSITES

PIPING & INSTRUMENT DIAGRAM

WELLHEAD KA-19

WELLSITE KA-1 & 7

SHEET No 2 OF 2 REVISION 08

DRAWING No 941-10-00128

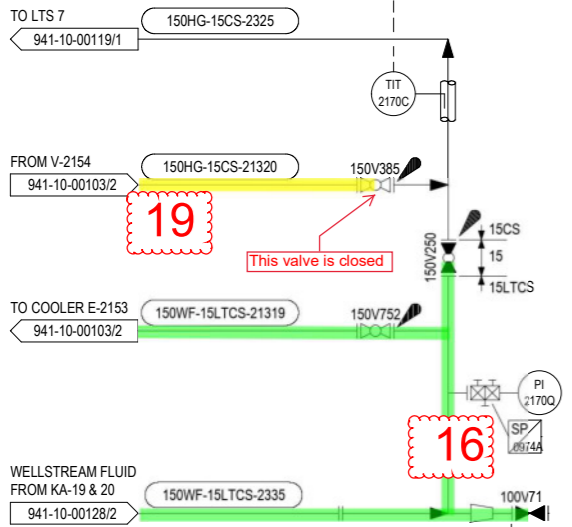
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ITEM No.
NAME
SIZE
DESIGN
OPER.
DUTY

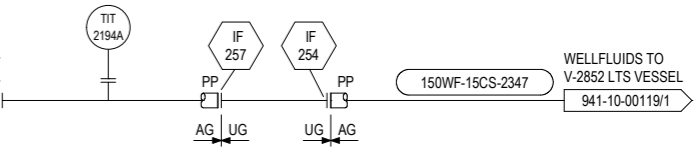
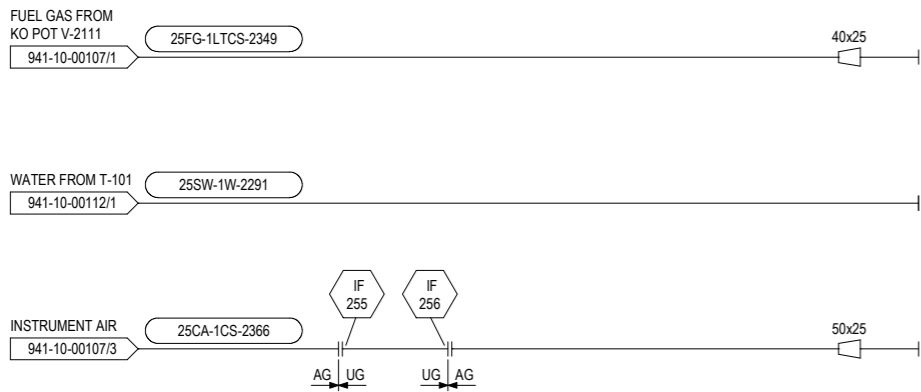
H-2194
UNIT 7 WELLSTREAM HEATER

Base Case - without LTS 7

05_KA19_02_WLHKOT_V



03_KA19_02_CHKLNE_V



NO	DATE	BY	DESCRIPTION	CHKD	APPR	NO	DATE	BY	DESCRIPTION	CHKD	APPR	NO	DATE	BY	DESCRIPTION
01	08/16	JMP	ECP K1107 FRACK FLOWBACK AFC												
02	08/16	JMP	ECP K1107 ISSUED FOR HAZOP												
03	08/16	JMP	ECP K1334 FIRST ISSUE												

DESIGNED	DATE	CHECKED	DATE	APPROVED	DATE
DRAWN	D WATEMBURG				
CHECKED					
APPROVED					
SCALE					

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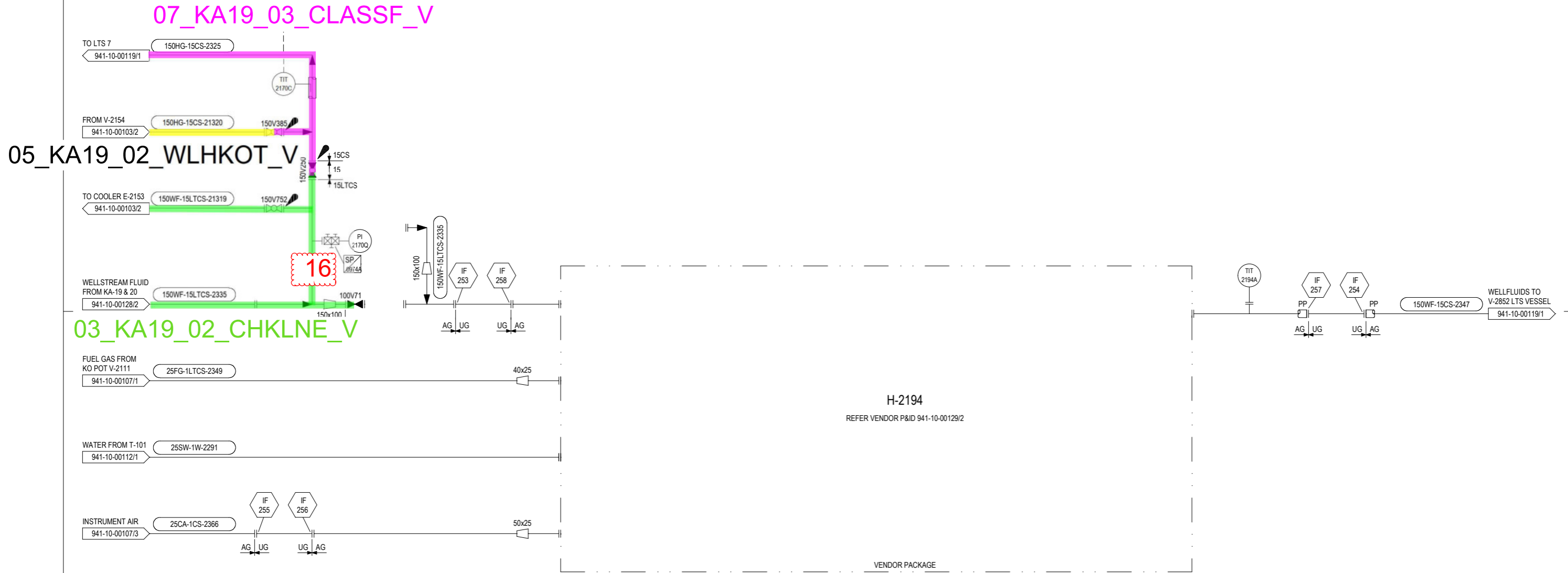


KAPUNI WELLSITES
PIPING & INSTRUMENT DIAGRAM
WELLSTREAM HEATER
WELLSITE KA-1 & 7
SHEET No 1 OF 2
REVISION 06
DRAWING No 941-10-00129

ITEM No.
NAME
SIZE
DESIGN
OPER.
DUTY

H-2194
UNIT 7 WELLSTREAM HEATER

Sensitivity Case - with LTS 7



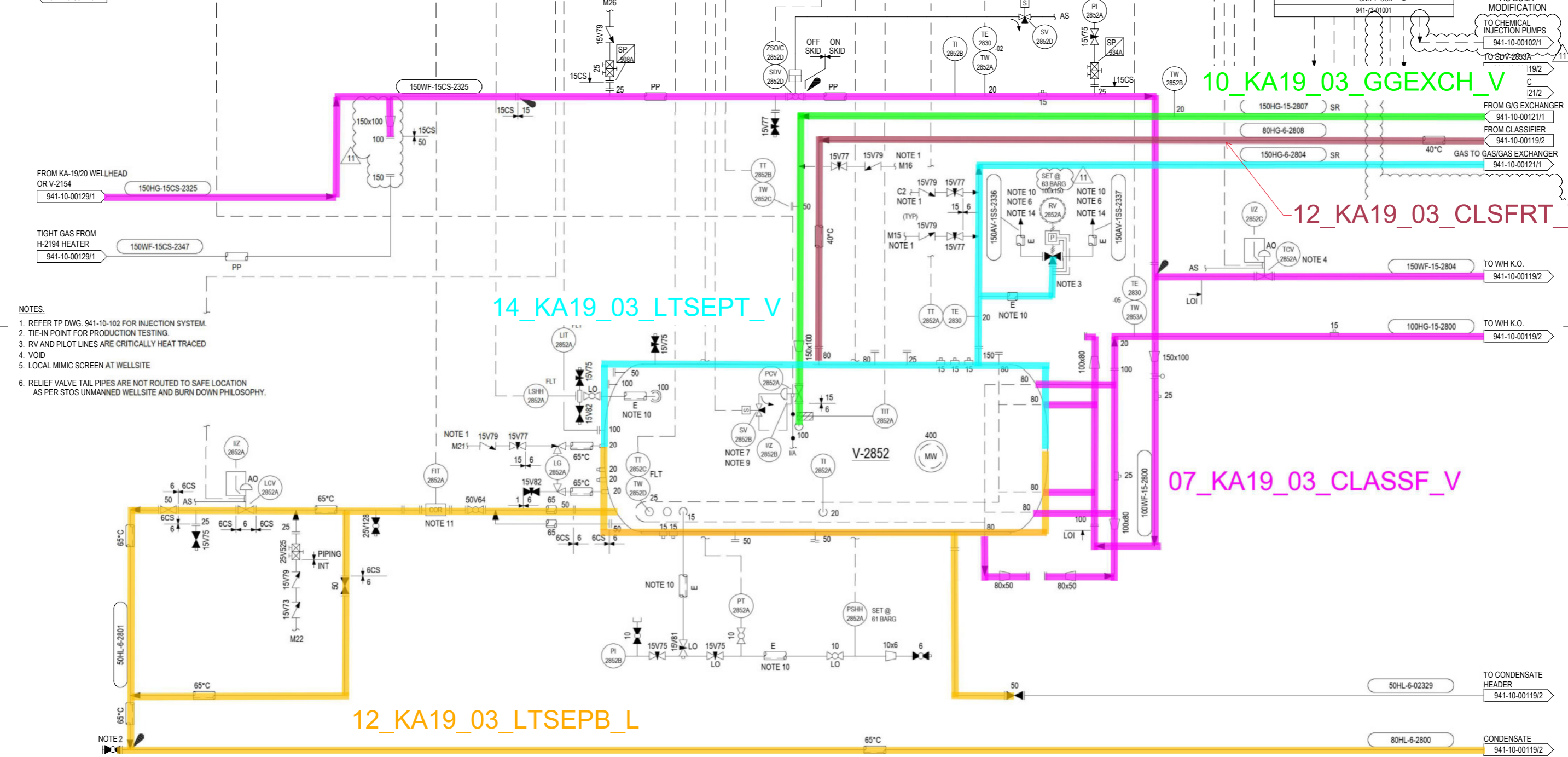
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01	08/16	JMP	ECP K1107 FRACK FLOWBACK AFC				01	04/14	DG	ATH									
02	08/16	JMP	ECP K1107 ISSUED FOR HAZOP				00		DW	ECP									
03	08/16	JMP	ECP K1334 AS BUILT TO SITE MARK UP ASB 14036KW				00		DW	ECP									
04	08/16	JMP	ECP K1334 FIRST ISSUE				00		DW	ECP									
05	08/17	JMP	ECP K1630 AS BUILT TO SITE MARK UP ASB 15429KW				02	11/15	BB	ECP									
06	08/17	JMP	ECP K1630 AS BUILT TO SITE MARK UP ASB 14259KW				02	11/15	BB	ECP									
07	08/17	JMP	ECP K1630 AS BUILT TO SITE MARK UP ASB 16319KW				03	08/16	BB	ECP									
08	08/17	JMP	ECP K1729 APPROVED FOR DESIGN				03	08/16	BB	ECP									
09	08/17	JMP	ECP K1729 APPROVED FOR CONSTRUCTION				04	06/17	BB	ECP									
10	08/17	JMP	ECP K1729 AS BUILT TO SITE MARK UP T18022KW				05	08/18	BB	ECP									
11	08/18	JMP	ECP K1729 AS BUILT TO SITE MARK UP T18022KW				05	08/18	BB	ECP									
12	08/18	JMP	ECP K1729 AS BUILT TO SITE MARK UP ASB 17187KW				04	06/17	BB	ECP									
13	08/18	JMP	ECP K1729 AS BUILT TO SITE MARK UP ASB 17187KW				04	06/17	BB	ECP									
14	08/18	JMP	ECP K1827 AS BUILT TO SITE MARK UP ASB 119019KW				06	11/19	JJP	ECP									

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ITEM No.
NAME
SIZE
DESIGN
OPER.
DUTY

FROM PIRC-2852A
941-10-00121/2

TO TCV-2852B
941-10-00121/1



- NOTES:
1. REFER TP DWG. 941-10-102 FOR INJECTION SYSTEM.
 2. TIE-IN POINT FOR PRODUCTION TESTING.
 3. RV AND PILOT LINES ARE CRITICALLY HEAT TRACED
 4. VOID
 5. LOCAL MIMIC SCREEN AT WELLSITE
 6. RELIEF VALVE TAIL PIPES ARE NOT ROUTED TO SAFE LOCATION AS PER STOS UNMANNED WELLSITE AND BURN DOWN PHILOSOPHY.

7. CHOKE VALVE PCV-2852A RAMPES TO 0% OUTPUT & MANUAL CONTROL ON USD.
8. VOID
9. LTS CHOKE CONTROL SWITCHED TO MANUAL & FULLY CLOSED (0%) UPON A UNIT 7 USD.
10. SAFETY CRITICAL HEAT TRACING
11. DO NOT HYDROTEST. FLANGES ARE 316/316L SS
12. VOID.
13. VOID.
14. HEAT TRACE RV DISCHARGE PIPE UPTO WEEP HOLE & FIRST ELBOW.

This drawing is confidential and is the property of TODD ENERGY. It must not be disclosed to any third party or used without written consent from TODD ENERGY.

NO	DATE	BY	CONSTRUCTION ISSUE	CONSULTANT	TODD	NO	DATE	BY	DESCRIPTION	CONSULTANT	TODD	NUMBER	TITLE	
E2	02/16	NR	ECP-K1666 APPROVED FOR CONSTRUCTION	ML	AB	ATH	07	04/14	DG	ECP	ECP K1334 AS BUILT TO SITE MARK UP ASS 140390KW	JMP	AB	ATH
E1	08/16	NR	ECP-K1666 APPROVED FOR DESIGN	ML	AB	ATH	06	04/13	JC	ECP	ECP K1544 AS BUILT TO SITE MARK UP ASS 130630KW	JMP	AC	ATH
E0	07/16	JMP	ECP-K1666 ISSUED FOR HAZOP	ML	AB	AF	05	04/12	LMM	ECP	ECP K1334 AS BUILT TO SITE MARK UP ASS 120580KW	VB	PB	ATH
D1	07/14	NR	ECP-KA-14 REMEDIATION - I.F.H.	ML	AB									
D0	06/14	NR	ECP-KA-14 REMEDIATION - I.F.H.	ML	AB		11	08/18	BB	ECP	ECP K1729 AS BUILT TO SITE MARK UP ASS 118022KW	JMP	GD	KB
F1	02/16	GSM	K1729 QUSP RE-APPR. FOR CONSTRUCTION	GD	SJC	SF	10	06/17	BB	ECP	ECP KX17172 AS BUILT TO SITE MARK UP ASS 171870KW	JMP	TD	SF
F0	06/17	GSM	K1729 QUSP RE-APPR. FOR CONSTRUCTION	ML	GD	SF	09	10/16	BB	ECP	ECP KX16002 AS BUILT TO SITE MARK UP ASS 163990KW	JMP	AB	SF
				ML	GD	SF	08	08/16	BB	ECP	ECP K1666 AS BUILT TO SITE MARK UP ASS 163150KW	JMP	AB	SF

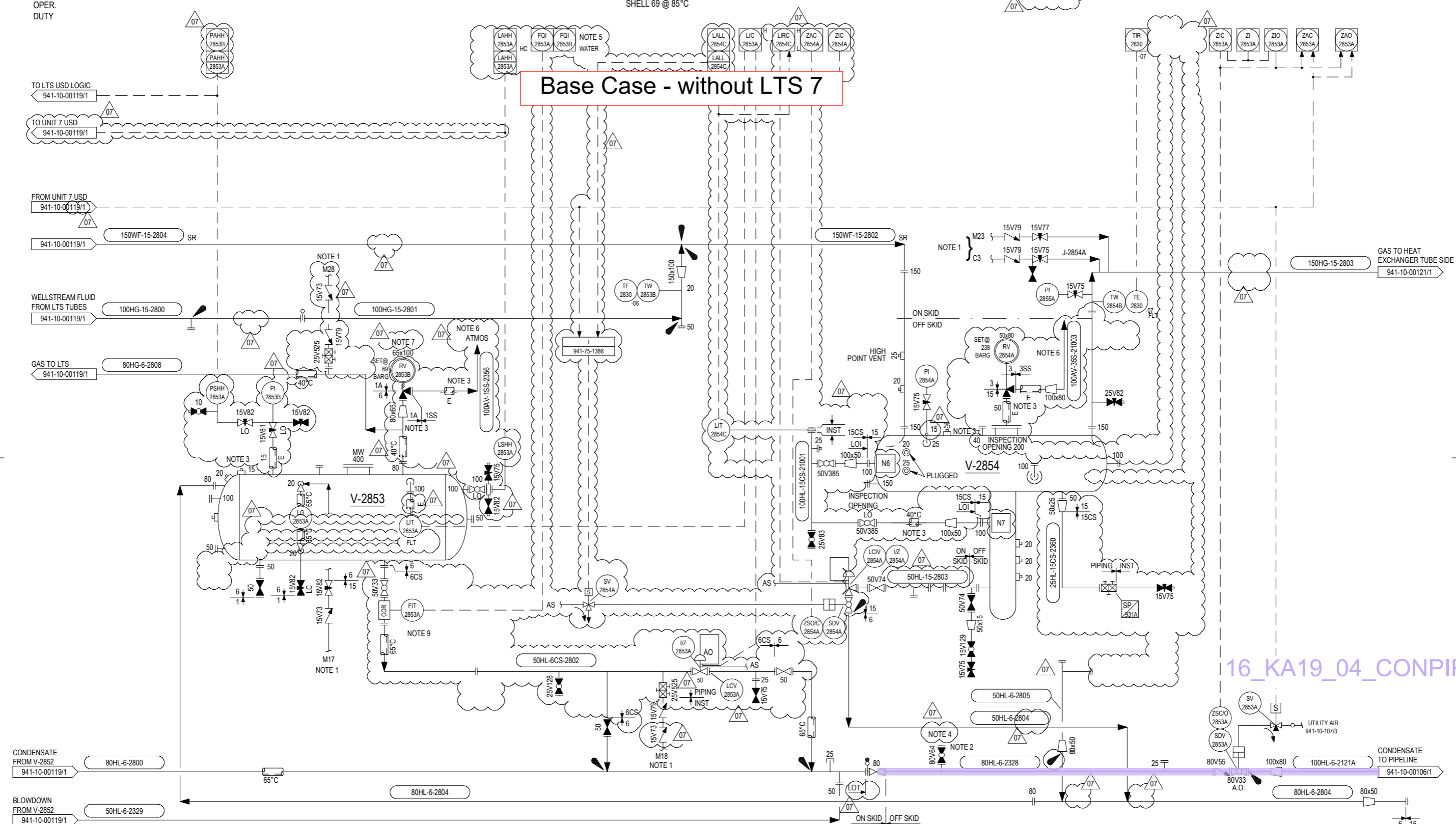
DESIGNED		DATE		KAPUNI WELLSITES	
DRAWN		DATE		PIPING & INSTRUMENT DIAGRAM	
CHECKED		DATE		KA-7 LTS	
APPROVED		DATE		WELLSITE KA-1 & 7	
SCALE		NONE		SHEET No 1 of 2	
SCALEFILE		NONE		REVISION 11	
TODD ENERGY		941-10-00119			

ITEM No.
NAME
SIZE
DESIGN BAR(G) @ °C
OPER
DUTY

V-2853
CLASSIFIER
915mm OD x 3175mm TAN/TAN
TUBE 238 @ 85°C
SHELL 69 @ 85°C

V-2854
WELLHEAD KNOCKOUT
1068mm OD x 4572mm TAN/TAN
288 @ -3/85°C

Base Case - without LTS 7



9. DO NOT HYDROTEST FLANGES ARE 316SS /316L

NO	DATE	BY	CONSTRUCTION ISSUE	CONSULTANT	STOS	NO	DATE	BY	EWR	DESCRIPTION	CONSULTANT	STOS	REFERENCE DRAWINGS
01	01/14	JMP	EOP-K1334 APPROVED FOR CONSTRUCTION	JR	AB	07	04/14	DG	ECP	ECP K1334 AS BUILT TO SITE MARK UP ASB 14039KW	JMP	AB	ATH
02	09/13	MH	EOP-K1334 RE-APPROVED FOR CONSTRUCTION	JR	AB	06	04/13	JC	ECP	ECP K1344 AS BUILT TO SITE MARK UP ASB 13063KW	JMP	AC	ATH
03	09/12	SG	EOP-K1334 RE-APPROVED FOR CONSTRUCTION	MR	AB	05	09/11	SG	ECP	ECP K1392 AS BUILT TO SITE MARK UP ASB 11199KW	VB	JS	AI
04	05/12	SG	EOP-K1334 APPROVED FOR CONSTRUCTION	MF	PB	04	01/11	KP	ECP	ECP K1379 AS BUILT TO SITE MARK UP ASB 10250KW	VB	LM	AI
05	08/11	LMM	EOP-K1334 RE-APPROVED FOR CONSTRUCTION	MS	AB	03	10/10	MH	ECP	ECP K1400 AS BUILT TO SITE MARK UP ASB 10222KW	VB	AP	AI
06	07/11	BA	EOP-K1334 RE-APPROVED FOR CONSTRUCTION	MK	KS	02	05/10	BA	ECP	ECP K1379 AS BUILT TO SITE MARK UP ASB 10094KW	VB	AP	AI
07	06/11	VB	EOP-K1332 APPROVED FOR CONSTRUCTION	GD	AP	01	12/08	DW	ECP	ECP K1152 AS BUILT TO SITE MARK UP ASB 8198KW	VB	PWM	AI
08	09/10	LMM	EOP-K1334 APPROVED FOR CONSTRUCTION	KC	NS	00	07/08	VB	ECP	FIRST ISSUE	CSM		

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DESIGNED: R SHEARSTON 23.10.82
 CHECKED: M L SHWER 23.10.82
 APPROVED: M L SHWER 23.10.82
 APPROVED: P.BARRON 26.10.82
 SCALE: NONE

KAPUNI WELLSITES
PIPING & INSTRUMENT DIAGRAM
UNIT 7 HPKO & CLASSIFIER
KAPUNI WELLSITE No 1 & 7

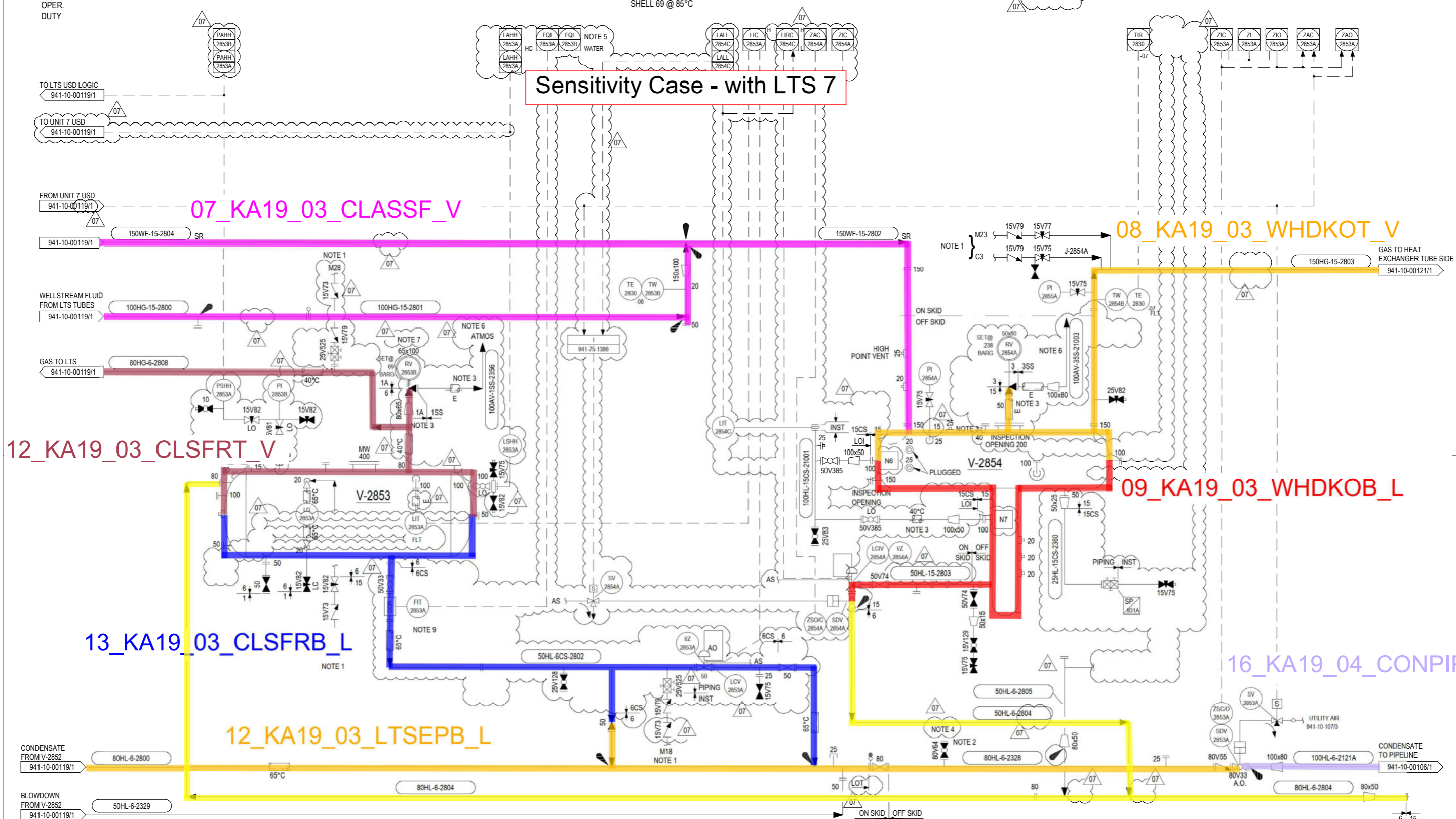
W0100299 SHEET No 2 OF 2 REVISION 07
 SHELL TODD OIL SERVICES LIMITED
 PRIVATE BAG NEW PLYMOUTH NEW ZEALAND
 DRAWING No 941-10-00119

ITEM No.
NAME
SIZE
DESIGN BAR(G) @ °C
OPER
DUTY

V-2853
CLASSIFIER
915mm OD x 3175mm TAN/TAN
TUBE 238 @ 85°C
SHELL 69 @ 85°C

V-2854
WELLHEAD KNOCKOUT
1068mm OD x 4572mm TAN/TAN
288 @ -3/85°C

Sensitivity Case - with LTS 7



07_KA19_03_CLASSF_V

08_KA19_03_WHDKOT_V

12_KA19_03_CLSFRT_V

09_KA19_03_WHDKOB_L

13_KA19_03_CLSFRB_L

16_KA19_04_CONPIP_L

12_KA19_03_LTSEPB_L

11_KA19_03_WHDKOB_L

- NOTES
- REFER TO DWG. 941-10-102 INJECTION SYSTEM.
 - CONNECTION FOR PRODUCTION TESTING.
 - CRITICAL HEAT TRACING.
 - CONNECTION FOR WELL TESTING.
 - HC, WATER TOTALIZED FLOW BASED ON ASSUMED LIQUID DENSITIES & CORIOLIS MASS FLOW AND DENSITY MEASUREMENT.
 - RV TAIL PIPES ARE NOT ROUTED TO SAFE LOCATION AS PER STOS UNMANNED WELLSITE AND BURNDOWN PHILOSOPHY. HEAT TRACE RV DISCHARGE PIPE UPTO THE WEEP HOLE/FIRST ELBOW.
 - THE GOVERNING CASE FOR RV-2853B IS HP GAS BREAKTHROUGH VIA WELLHEAD KO LEVEL CONTROL VALVE LCV-2854A.
 - VOID.

9. DO NOT HYDROTEST FLANGES ARE 316SS /316L

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NO	DATE	BY	CONSTRUCTION ISSUE	CONSULTANT	STOS	NO	DATE	BY	EWR	DESCRIPTION	CONSULTANT	STOS	REFERENCE DRAWINGS
01	01/14	JMP	EOP-K1334 APPROVED FOR CONSTRUCTION	JR	AB	07	04/14	DG	ECP	ECP K1334 AS BUILT TO SITE MARK UP ASB 14039KW	JMP	AB	ATH
02	02/13	MH	EOP-K1334 RE-APPROVED FOR CONSTRUCTION	JR	AB	06	04/13	JC	ECP	ECP K1344 AS BUILT TO SITE MARK UP ASB 13063KW	JMP	AC	ATH
03	02/12	SG	EOP-K1334 RE-APPROVED FOR CONSTRUCTION	ARG	MK	05	02/11	SG	ECP	ECP K1332 AS BUILT TO SITE MARK UP ASB 11199KW	VB	JS	AI
04	05/12	SG	EOP-K1334 APPROVED FOR CONSTRUCTION	ARG	MK	04	01/11	KP	ECP	ECP K1379 AS BUILT TO SITE MARK UP ASB 10250KW	VB	LM	AI
05	06/11	LMM	EOP-K1334 RE-APPROVED FOR CONSTRUCTION	ARG	MK	03	10/10	MH	ECP	ECP K1400 AS BUILT TO SITE MARK UP ASB 10222KW	VB	AP	AI
06	07/11	BA	EOP-K1334 RE-APPROVED FOR CONSTRUCTION	ARG	MK	02	05/10	BA	ECP	ECP K1379 AS BUILT TO SITE MARK UP ASB 10094KW	VB	AP	AI
07	06/11	VB	EOP-K1332 APPROVED FOR CONSTRUCTION	ARG	AP	01	12/08	DW	ECP	ECP K1152 AS BUILT TO SITE MARK UP ASB 8198KW	VB	PWM	AI
08	07/08	VB	FIRST ISSUE			00	07/08	VB	ECP	FIRST ISSUE	CSM		

DESIGNED: R SHEARSTON 23.10.82
 CHECKED: M L SHWER 23.10.82
 APPROVED: M L SHWER 23.10.82
 APPROVED: P.BARRON 26.10.82
 SCALE: NONE

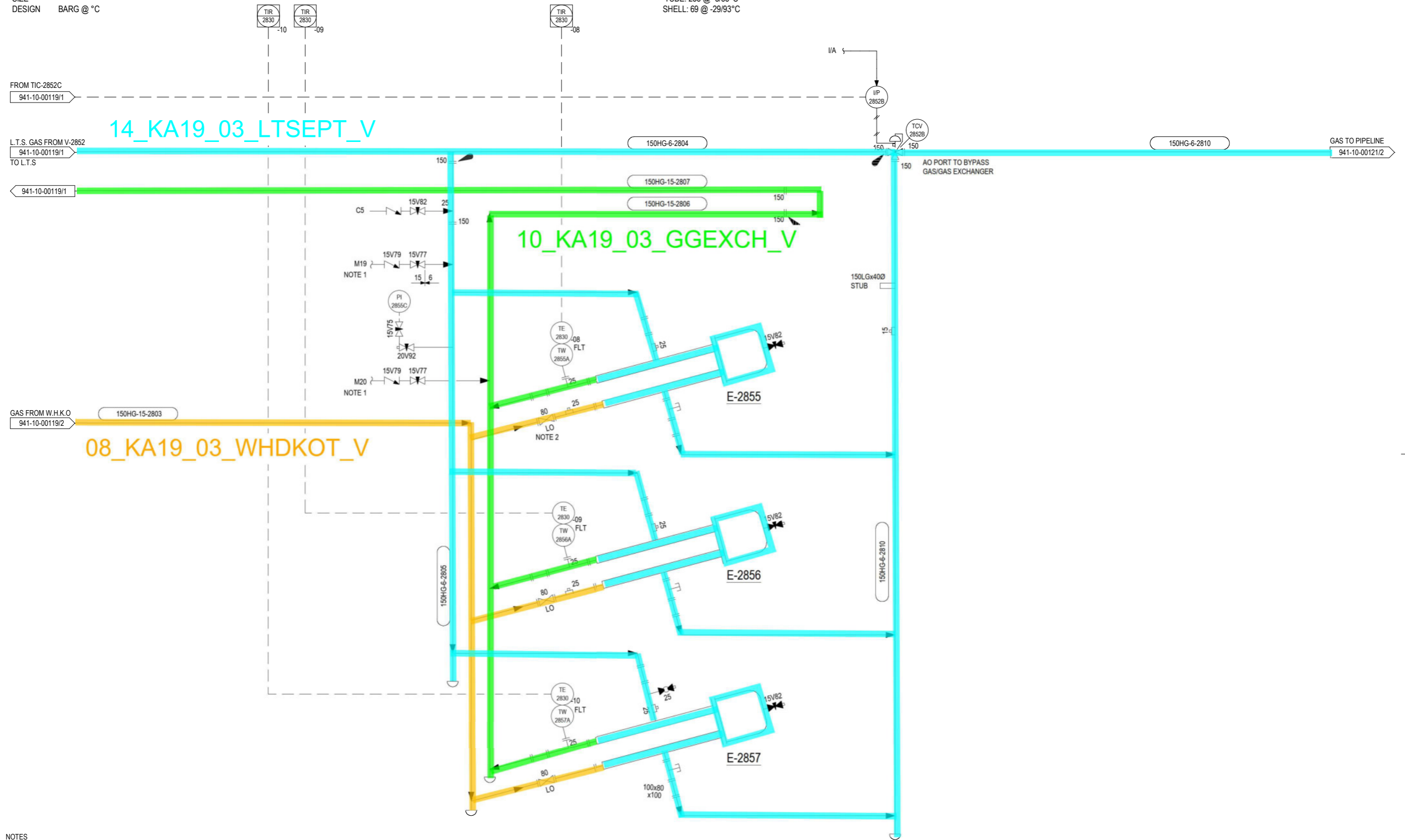
KAPUNI WELLSITES
 PIPING & INSTRUMENT DIAGRAM
 UNIT 7 HPKO & CLASSIFIER
 KAPUNI WELLSITE No 1 & 7

SH SHELL TODD OIL SERVICES LIMITED
 PRIVATE BAG NEW PLYMOUTH NEW ZEALAND

WO100299 SHEET No 2 OF 2 REVISION 07
 DRAWING No 941-10-00119

ITEM No.
NAME
SIZE
DESIGN BARG @ °C

E-2855, E-2856, E-2857
GAS/GAS EXCHANGERS
TUBE: 238 @ -3/85°C
SHELL: 69 @ -29/93°C



NOTES
1: REFER TO DWG. 941-10-102 FOR INJECTION SYSTEM.
2: AS BUILT MODIFICATION.

This drawing is confidential and is the property of TODD ENERGY. It must not be disclosed to any third party or lent without written consent from TODD ENERGY.

NO	DATE	BY	CHKD	APPR	NO	DATE	BY	CHKD	APPR	DESCRIPTION
03	09/11	LMM	EGP	K133M	RE-ISSUED FOR HAZOP	MK	KS			
02	14/08	BA	EGP	K133M	APPROVED FOR DESIGN	KG	NS			
01	08/10	LMM	EGP	K133M	ISSUED FOR HAZOP	KG	NS			
07	09/12	LMM	EGP	K133M	RE-ISSUED APP FOR CONSTRUCTION	MK	ATH			
06	06/12	SG	EGP	K133M	APPROVED FOR CONSTRUCTION	MF	PB			
05	09/11	SG	EGP	K133M	RE-ISSUED APPROVED FOR DESIGN	MK	KS			
04	08/11	LMM	EGP	K133M	RE-ISSUED FOR HAZOP	MK	KS			
03	04/14	DG	ECP	K133A	AS BUILT TO SITE MARK UP H3678 (11924)	JMP	AB			
02	01/11	KP	ECP	K1379	AS BUILT TO SITE MARK UP ASB 10250KW	VB	LM			
01	12/08	DW	ECP	K1152	AS BUILT TO SITE MARK UP ASB 8198KW	VB	PWM			
A0	08/07	VB			FIRST ISSUE					

DESIGNED	B MORE	DATE	10.9.82
CHECKED	M.L SHWER	DATE	23.10.82
APPROVED	M.L SHWER	DATE	23.10.82
SCALE	P BARRON	DATE	26.10.82

KAPUNI WELLSITES
PIPING & INSTRUMENT DIAGRAM
UNIT 7 GAS/GAS EXCHANGERS
KAPUNI WELLSITE KA-1 & 7

STICKFILE W0100300 SHEET No. 1 OF 1 REVISION 05
Todd Energy
DRAWING No. 941-10-00121

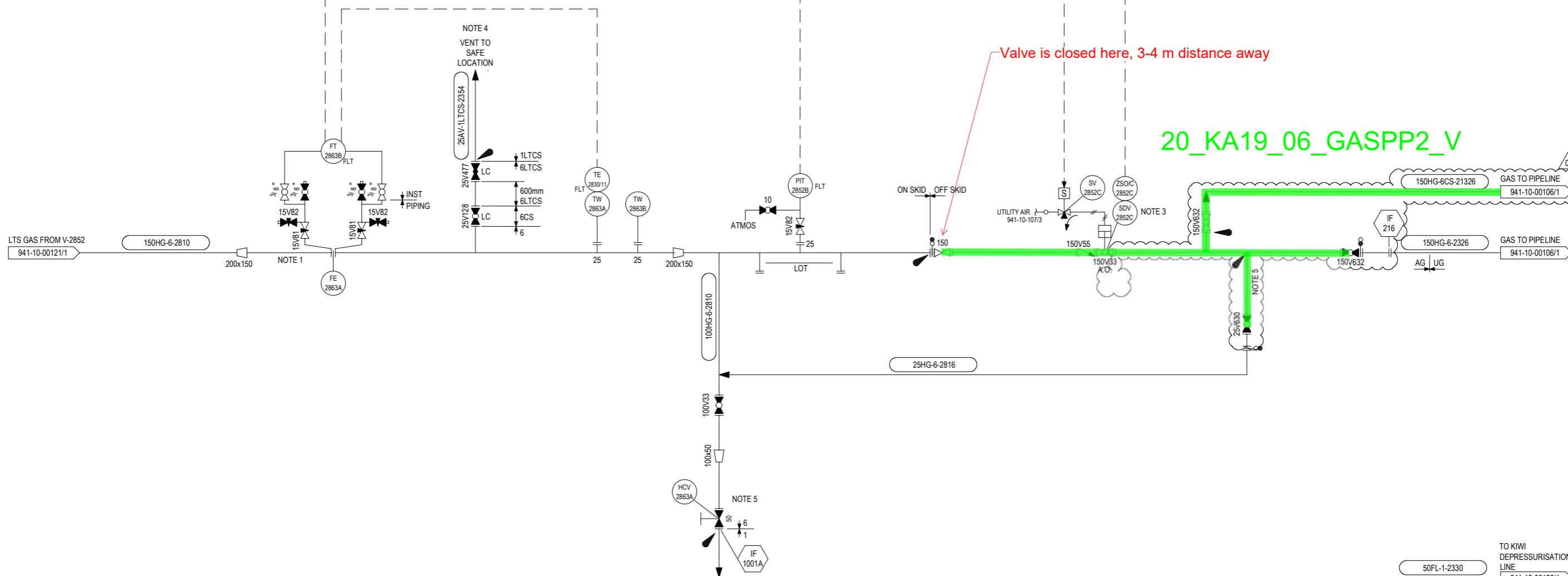
ITEM No.
NAME
SIZE
DESIGN

BARG @ °C
YESTERDAY'S FLOW TOTAL
YESTERDAY'S FLOW AVERAGE
PREVIOUS OPERATING HOURS

Base Case - without LTS 7

FROM KA 7
USD LOGIC
941-10-00119/1

TO SSL-2852A
941-10-00119/1



NOTES

1. THE 200NB SECTION OF THIS LINE IS SCH 80.
2. VOID.
3. SDV-2852C HAS DELAYED CLOSURE COMPARED TO KA-TG-B WELLHEAD SDV TO ALLOW THE LTS SKID TO DROP TO GATHERING LINE PRESSURE
4. VENT POINT ONLY TO BE USED ONCE THE SYSTEM HAS BEEN FULLY VENTED VIA KIWII DEPRESSURING LINE.
5. REFER TO DEPRESSURING/REPRESSURING PROCEDURE FOR CONTROL OF LOW TEMPERATURES ISSUES.

This drawing is confidential and is the property of TODD ENERGY. It must not be disclosed to any third party or used without written consent from TODD ENERGY.

NO.	DATE	BY	CHKD	APPR	NO	DATE	BY	CHKD	APPR	NO	DATE	BY	CHKD	APPR	NUMBER	TITLE
E3	09/17	GM														
E3	09/17	JMP														
E1	18/18	AMP				05	08/18	BB	ECP							
E0	08/18	AMP				04	03/15	DG	ECP							
B6	09/12	LMM				03	04/14	DG	ECP							
B5	05/12	VB				02	01/11	KP	ECP							
B4	08/11	LMM				01	11/08	MH	ECP							
						A0	08/07	VB								

DESIGNED: V BRENNAN DATE: 08/07
 DRAWN: N STONIER DATE: 08/07
 CHECKED: D LIND DATE: 08/07
 APPROVED: DATE: 08/07

KAPUNI WELLSITES
 PIPING & INSTRUMENT DIAGRAM
 KA-7 LTS
 KAPUNI WELLSITE KA-1 & 7

SCALE: STICKFILE

SHEET No: 2 OF 2 REVISION: 05
 DRAWING No: 941-10-00121

Todd Energy

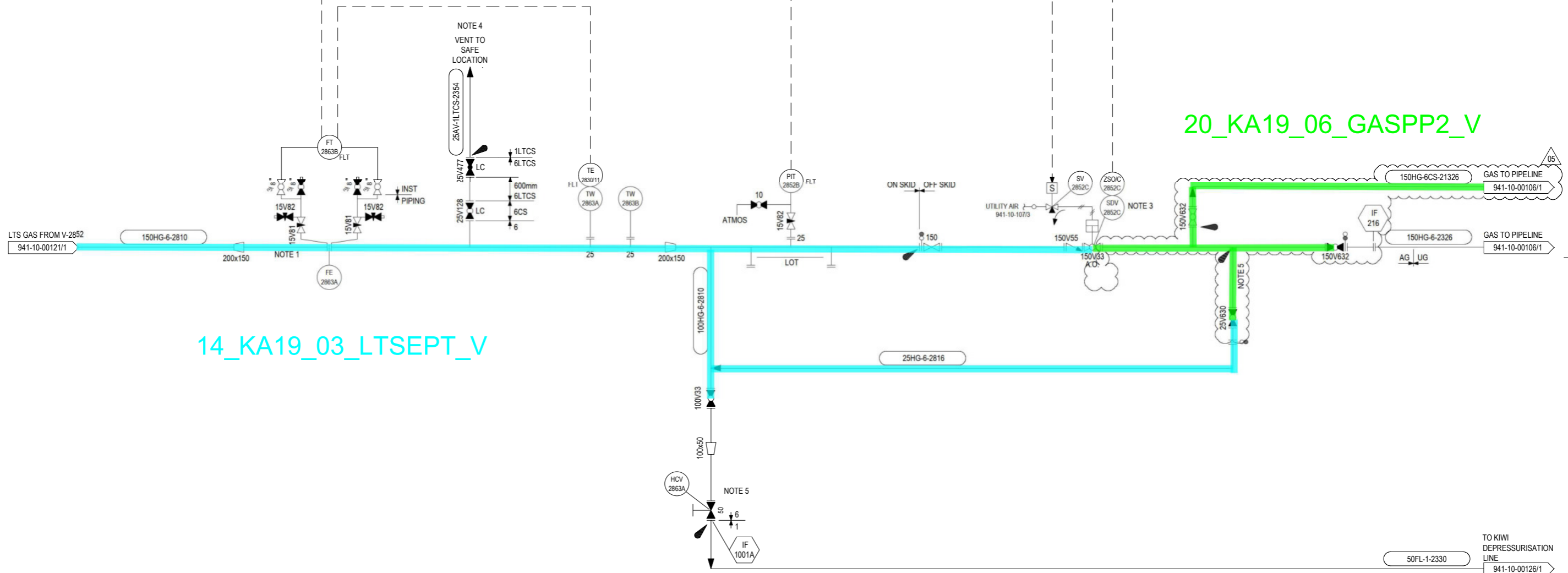
ITEM No.
NAME
SIZE
DESIGN

BARG @ °C
YESTERDAY'S FLOW TOTAL
YESTERDAY'S FLOW AVERAGE
PREVIOUS OPERATING HOURS

Sensitivity Case - with LTS 7

FROM KA 7
USD LOGIC
941-10-00119/1

TO SSL-2852A
941-10-00119/1



14_KA19_03_LTSEPT_V

20_KA19_06_GASPP2_V

NOTES

- THE 200NB SECTION OF THIS LINE IS SCH 80.
- VOID.
- SDV-2852C HAS DELAYED CLOSURE COMPARED TO KA-TG-B WELLHEAD SDV TO ALLOW THE LTS SKID TO DROP TO GATHERING LINE PRESSURE
- VENT POINT ONLY TO BE USED ONCE THE SYSTEM HAS BEEN FULLY VENTED VIA KIWII DEPRESSURING LINE.
- REFER TO DEPRESSURING/REPRESSURING PROCEDURE FOR CONTROL OF LOW TEMPERATURES ISSUES.

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NO	DATE	BY	CHKD	APPR	NO	DATE	BY	CHKD	APPR	NO	DATE	BY	CHKD	APPR	NUMBER	TITLE
E3	09/17	GM														
E3	09/17	JMP														
E1	18/18	JMP				05	08/18	BB	ECP							
E0	08/18	JMP				04	03/15	DG	ECP							
B6	09/12	LMM				03	04/14	DG	ECP							
B5	05/12	VB				02	01/11	KP	ECP							
B4	08/11	LMM				01	11/08	MH	ECP							
						A0	08/07	VB								

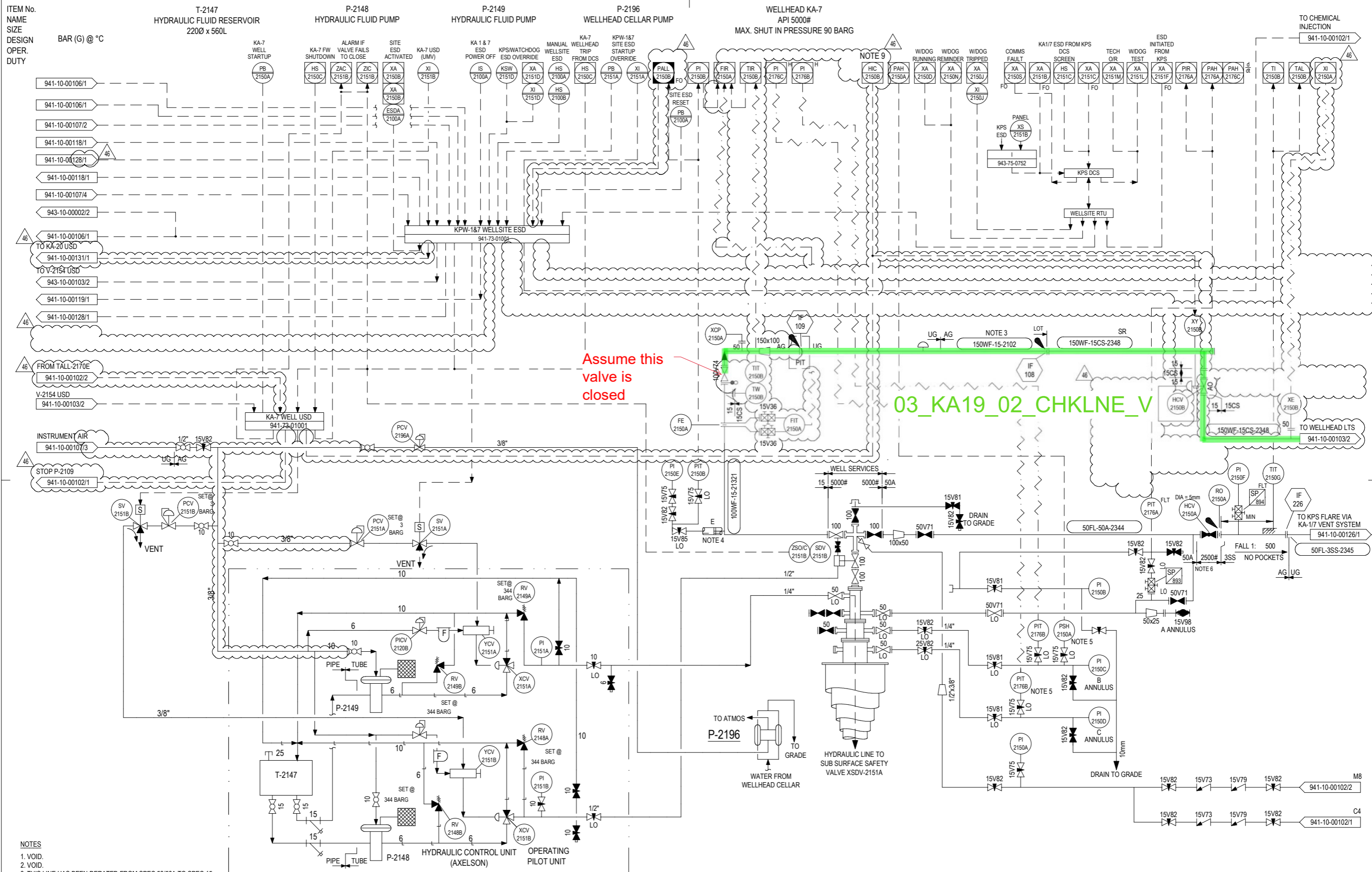
DESIGNED	V BRENNAN	DATE	08/07
DRAWN	N STONIER	DATE	08/07
CHECKED	D LIND	DATE	08/07
APPROVED			
SCALE			

KAPUNI WELLSITES
PIPING & INSTRUMENT DIAGRAM
KA-7 LTS
KAPUNI WELLSITE KA-1 & 7

STICKFILE

SHEET No 2 OF 2 REVISION 05
DRAWING No 941-10-00121

Todd Energy



Assume this valve is closed

03_KA19_02_CHKLINE_V

- NOTES**
1. VOID.
 2. VOID.
 3. THIS LINE HAS BEEN DERATED FROM SPEC 50/50A TO SPEC 15. FLANGES REMAIN AT 5000#.
 4. SAFETY CRITICAL HEAT TRACING
 5. WIRELESS INSTRUMENT.
 6. VALVE IS SUITABLE FOR LOW TEMP OF -90°C.
 7. VOID
 8. SIGNAL DISCONNECTED IN DCS LOGIC AS KA-1 US SUSPENDED (K1334)
 9. FLOWLINE CHOKE TO BE RAMPED CLOSED UNDER USD, ESD, KPS ESD OR ALL KPS INLET VALVES CLOSED.

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NO	DATE	BY	CONSTRUCTION ISSUE	CONSULTANT	TODD	NO	DATE	BY	DESCRIPTION	CHKD	APPR	CHKD	APPR	NUMBER	TITLE
46	08/18	BB	ECP K11729 K1666 & KA-7 REMEDIATION AS BUILT TO ASB T18022KW & T18059KW	JMP	GD	46	08/18	BB	ECP K11729 K1666 & KA-7 REMEDIATION AS BUILT TO ASB T18022KW & T18059KW	JMP	GD				
45	06/17	BB	ECP XJ11712 AS BUILT TO SITE MARK UP ASB 17187KW	JMP	TD	45	06/17	BB	ECP XJ11712 AS BUILT TO SITE MARK UP ASB 17187KW	JMP	TD				
44	10/16	BB	ECP XK16002 AS BUILT TO SITE MARK UP ASB 16399KW	JMP	AB	44	10/16	BB	ECP XK16002 AS BUILT TO SITE MARK UP ASB 16399KW	JMP	AB				
43	06/16	BB	ECP K1677 AS BUILT TO SITE MARK UP ASB 16206KW	JMP	AB	43	06/16	BB	ECP K1677 AS BUILT TO SITE MARK UP ASB 16206KW	JMP	AB				
42	04/16	BB	ECP XK18002 AS BUILT TO SITE MARK UP ASB 16131KW	JMP	AB	42	04/16	BB	ECP XK18002 AS BUILT TO SITE MARK UP ASB 16131KW	JMP	AB				
41	07/15	BB	ECP K1579 AS BUILT TO SITE MARK UP ASB 15211KW	JMP	AB	41	07/15	BB	ECP K1579 AS BUILT TO SITE MARK UP ASB 15211KW	JMP	AB				
40	03/15	NR	ECP X0213 AS BUILT TO SITE MARK UP ASB 15056KW	JMP	AB	40	03/15	NR	ECP X0213 AS BUILT TO SITE MARK UP ASB 15056KW	JMP	AB				
39	04/14	DG	ECP K1334 AS BUILT TO SITE MARK UP ASB 14036KW	JMP	AB	39	04/14	DG	ECP K1334 AS BUILT TO SITE MARK UP ASB 14036KW	JMP	AB				

DESIGNED: R. H. SYME
DATE: 10.10.78
DRAWN: R. H. SYME
CHECKED: []
APPROVED: []
SCALE: NTS

KAPUNI WELLSITES
PIPING & INSTRUMENT DIAGRAM
WELLHEAD KA-7
KAPUNI WELLSITE KA 1 & 7

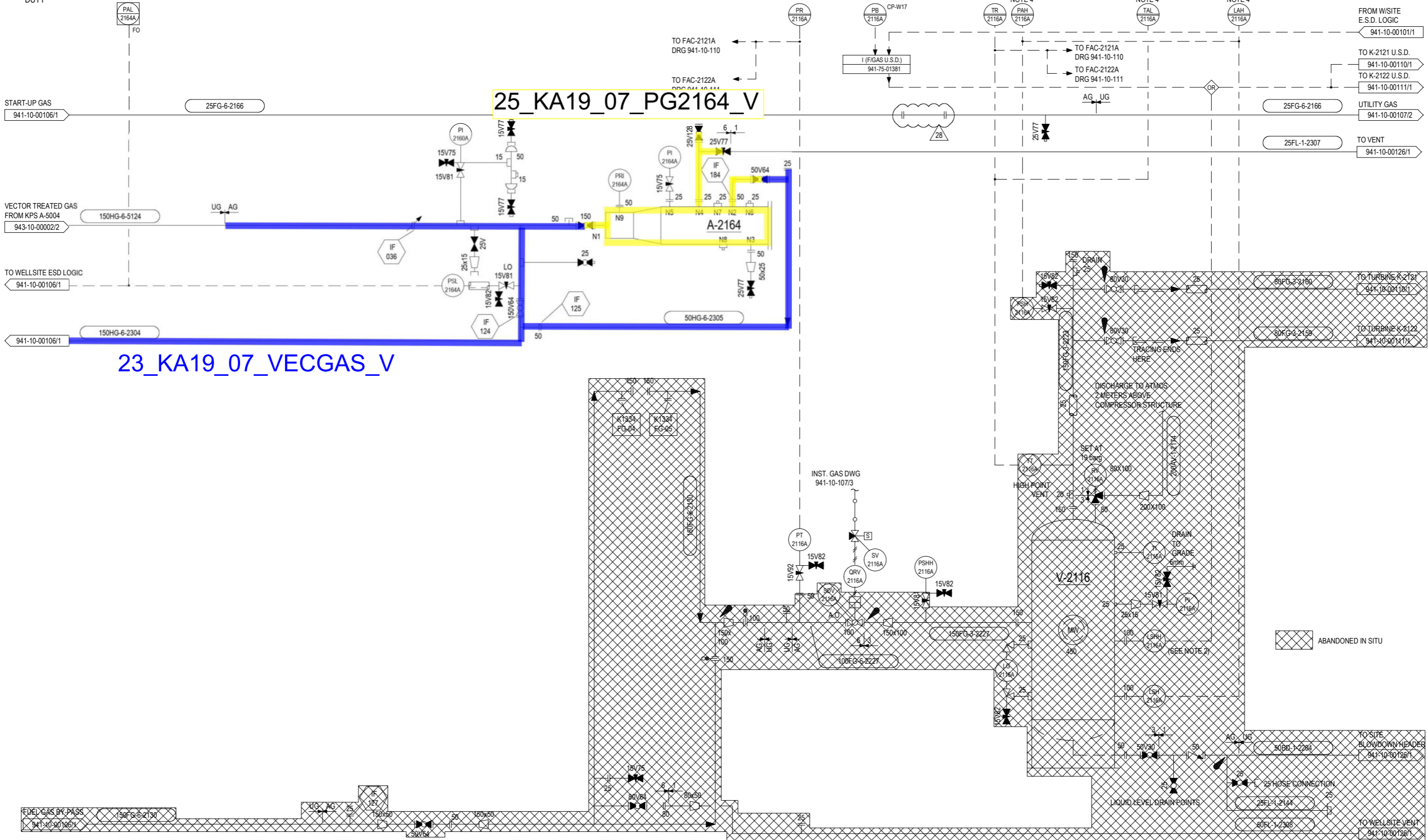
SHEET No: 1 OF 2
REVISION: 46
DRAWING No: 941-10-00101

Todd Energy

ITEM No.
NAME
SIZE
DESIGN BAR(G) @ °C
OPER.
DUTY

A-2164
SCRAPER TRAP

V-2116
FUEL GAS KNOCK OUT
914 O.D x 2500 TAN/TAN
19.6 @ 100



25_KA19_07_PG2164_V

PROJECT NOTES

- NOTES:
1. FLOWSHEET SHOWN IN RECYCLED GAS MODE
 2. LSHH-2116A DOES NOT CLOSE SDV-2116A (FUEL GAS K.O INLET)
 3. LSL-2189 UNIT = NORGRN S/666/126
 4. LOCAL MIMIC SCREEN AT WELLSITE.

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NO	DATE	BY	CHKD	APPR	CHKD	APPR	NO	DATE	BY	CHKD	APPR	NUMBER	TITLE			
07	04/13	GMH	EQP-K1334	APPROVED FOR DESIGN	JR	AB	ATH	23	07/04	RJR	SMR	SMR K35212 AS BUILT TO SITE MARK UP	BB	CS	MSR	
08	04/13	JUB	EQP-K1334	RE-ISSUED FOR HAZOP NO CHANGE	JR	AC	ATH	22	06/03	BRT	K995	AS BUILT TO SITE MARK UP ASB 979K & 990K	MG	JP	MSR	
09	04/13	MH	EQP-K1334	RE-ISSUED FOR HAZOP	JR	MK	ATH						JMP	TD	BF	
10	04/13	GG	EQP-K1334	RE-ISSUED APP FOR CONSTRUCTION	JR	MK	ATH	28	06/17	AMP	ECP	ECP XK17172 AS BUILT TO SITE MARK UP ASB 17181K	JMP	AB	ATH	
11	04/13	VB	EQP-K1334	APPROVED FOR CONSTRUCTION	JR	MK	ATH	27	04/14	DG	ECP	ECP K1334 AS BUILT TO SITE MARK UP ASB 14038KW	JMP	AC	ATH	
12	04/13	GG	EQP-K1334	RE-APPROVED FOR CONSTRUCTION	JR	AB	ATH	26	07/13	MH	ECP	ECP K1544 AS BUILT TO SITE MARK UP ASB 13155KW	JMP	AC	ATH	
13	04/13	MH	EQP-K1334	RE-APPROVED FOR CONSTRUCTION	JR	AB	ATH	25	02/11	JW	ECP	ECP K1379 AS BUILT TO SITE MARK UP ASB 10238KW	VB	RW	AI	
14	04/13	JC	EQP-K1334	APPROVED FOR CONSTRUCTION	JR	AB	ATH	24	07/09	MH	ECP	ECP K1328 AS BUILT TO SITE MARK UP ASB 9155KW	VB	PVM	AI	

DESIGNED: P.A. DATE: 8-3-79
 DRAWN: L.H. DATE: 15-3-79
 CHECKED: L.H. DATE: 16-3-79
 APPROVED: E.BUYCK DATE: 16-3-79
 APPROVED: R.PREBBLE DATE: 16-3-79

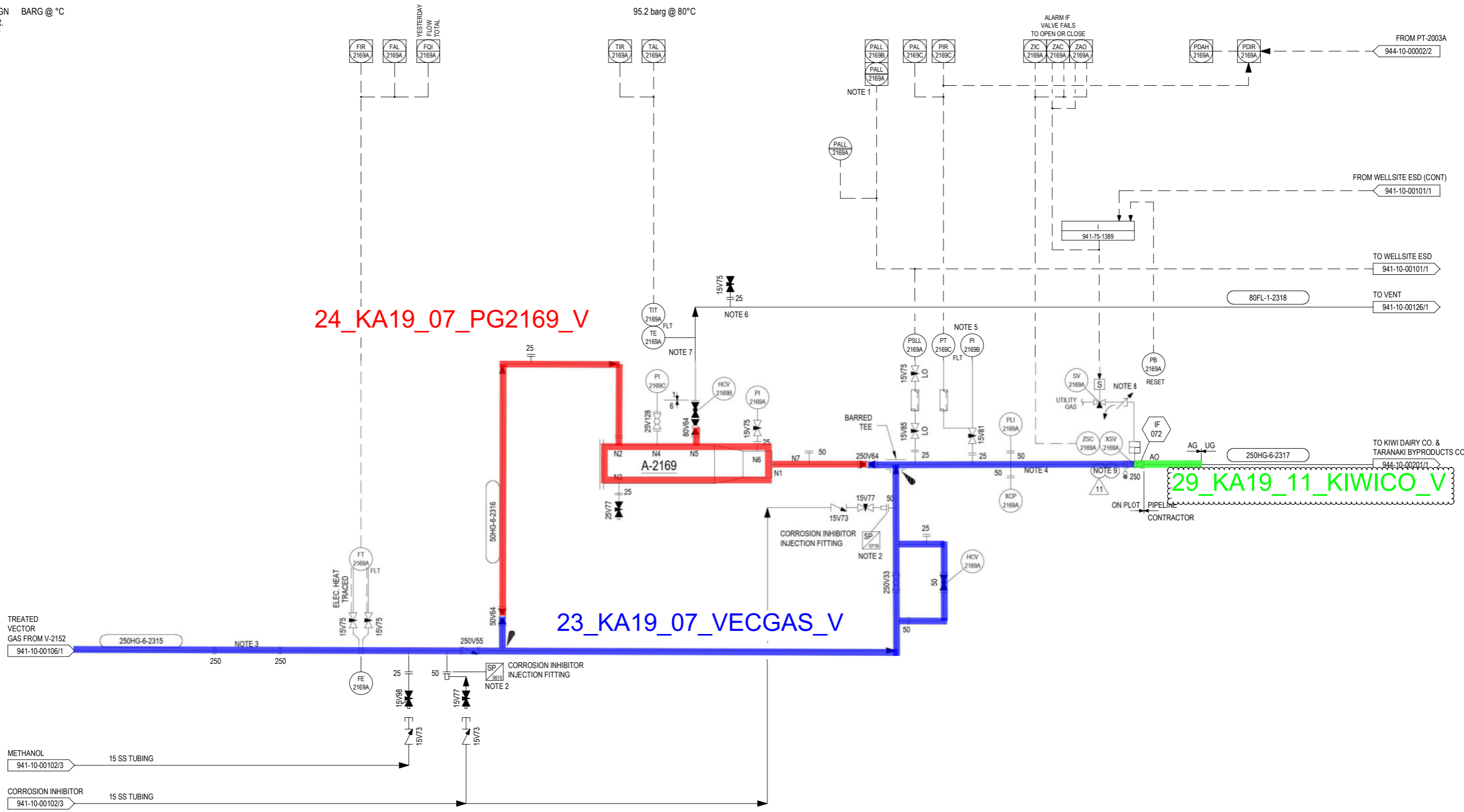
SCALE: _____

STOCKFILE: _____ SHEET No: 1 OF 1 REVISION: 28

SHELL TODD OIL SERVICES LIMITED
 PRIVATE BAG NEW PLYMOUTH NEW ZEALAND
 DRAWING No: 941-10-00113

ITEM No.
 NAME
 SIZE
 DESIGN BARG @ °C
 OPER.
 DUTY

A-2169
 SCRAPER TRAP
 95.2 barg @ 80°C



- NOTES:
1. LOCAL MIMIC SCREEN AT WELLSITE.
 2. INJECTION FITTING & NOZZLE TO ENSURE INHIBITOR IS ATOMISED.
 3. REMOVABLE SPOOL FOR FUTURE COMPRESSOR TIE-INS.
 4. PIPELINE DESIGN PRESSURE 70 BARG.
 5. INSTRUMENT IMPULSE LINES TO BE HEAT TRACED.
 6. PRESSURE NOT TO EXCEED 5 BARG.
 7. PIPE SURFACE TEMPERATURE.
 8. SWAGELOK DIELECTRIC FITTING INSTALLED TO MAINTAIN CATHODIC PROTECTION.
 9. KSW-XSV-2169A TO ALLOW ESD TESTING WITHOUT STOPPING GAS SUPPLY TO VECTOR/FONTEIRA PIPELINE.

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NO	DATE	BY	CHKD	APPR	NO	DATE	BY	CHKD	APPR	DESCRIPTION
01	07/09	VB			07	01/11	KP	ECP		ECP K1379 AS BUILT TO SITE MARK UP ASB 10250KW
02	06/09	LM			06	07/09	MH	ECP		ECP K1328 AS BUILT TO SITE MARK UP ASB 9159KW
03	06/09	LM			05	12/08	MH	ECP		ECP K1282 AS BUILT TO SITE MARK UP ASB 8214KW
04	07/09	VB			11	08/19	SH	ECP		ECP K1720 AS BUILT TO SITE MARK UP ASB 118009KW
05	06/09	LM			10	03/17	BB	ECP		ECP KX17172 AS BUILT TO SITE MARK UP ASB 17079KW
06	09/09	MW			09	04/12	LM	ECP		ECP K1334 AS BUILT TO SITE MARK UP ASB 12058KW
07	09/09	GSM			08	03/12	MH	ECP		ECP K1470 AS BUILT TO SITE MARK UP ASB 12049KW

DESIGNED	G ROBERTSON	DATE	02/95
CHECKED	M WEST	DATE	2/95
APPROVED	K ALLUM	DATE	2/95
SCALE	S HARVEY	DATE	2/95

STICKFILE: W0100158 SHEET No: 1 OF 1 REVISION: 11

Todd Energy
 KAPUNI WELLSITES
 PIPING & INSTRUMENT DIAGRAM
 GAS SCRAPER LAUNCHER A-2169
 KA-1&7 (KIWI PIPELINE)

DRAWING No: 941-10-00118

ITEM No.
NAME
SIZE
DESIGN BARG @ °C
OPER.
DUTY

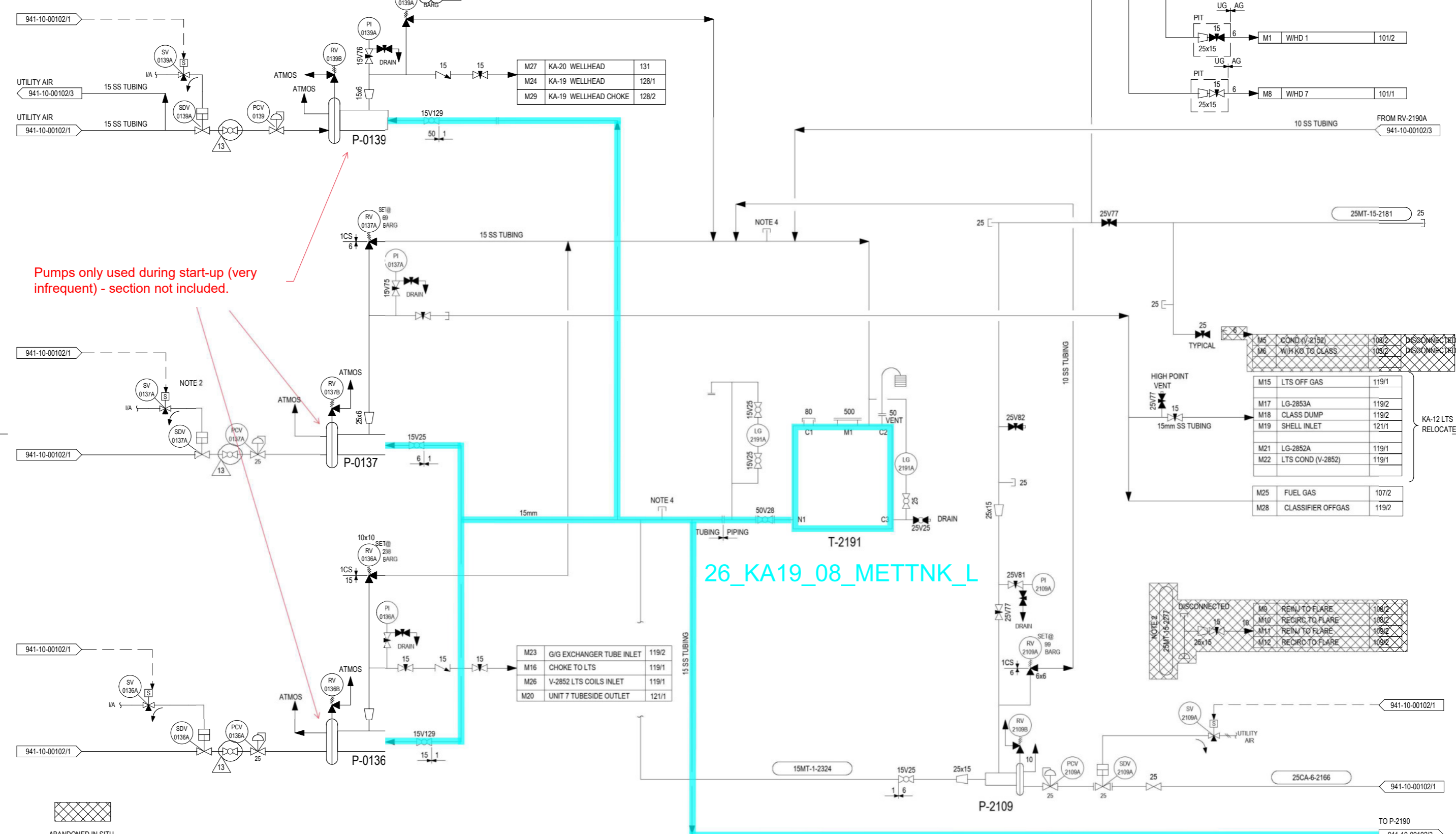
P-0136
METHANOL PUMP
0.6m3/DAY
238 @ 38°C

P-0137
METHANOL PUMP
0.163m3/DAY
69 @ 38°C
NOTE 3

P-0139
METHANOL PUMP
0.6m3/DAY
345 @ 38°C

T-2191
METHANOL TANK
5m3
ATMOS

P-2109
METHANOL PUMP
0.3 m3 / DAY
99 @ 38°C



Pumps only used during start-up (very infrequent) - section not included.

M27	KA-20 WELLHEAD	131
M24	KA-19 WELLHEAD	128/1
M29	KA-19 WELLHEAD CHOKE	128/2

M23	G/G EXCHANGER TUBE INLET	119/2
M16	CHOKE TO LTS	119/1
M26	V-2852 LTS COILS INLET	119/1
M20	UNIT 7 TUBESIDE OUTLET	121/1

M5	COND (V-2132)	108/2	DISCONNECTED
M6	W/H TO CLASS	108/2	DISCONNECTED
M15	LTS OFF GAS	119/1	
M17	LG-2853A	119/2	
M18	CLASS DUMP	119/2	
M19	SHELL INLET	121/1	
M21	LG-2852A	119/1	
M22	LTS COND (V-2852)	119/1	
M25	FUEL GAS	107/2	
M28	CLASSIFIER OFFGAS	119/2	

KA-12 LTS RELOCATED

M9	REINJ TO FLARE	108/2	DISCONNECTED
M10	REINJ TO FLARE	108/2	DISCONNECTED
M11	REINJ TO FLARE	108/2	DISCONNECTED
M12	REINJ TO FLARE	108/2	DISCONNECTED

26_KA19_08_METTNK_L

- NOTES:
- ALL TUBING IS IMPERIAL STANDARD.
 - FUEL GAS USD WILL REQUIRE TO BE RESET TO OPERATE METHANOL PUMP P-0137, EVEN IF INJECTING METHANOL TO ANOTHER LOCATION.
 - P-0137 WILL BE LINED OUT TO THE FUEL GAS SYSTEM WHEN THE SITE IS UNMANNED. THE PUMP WILL BE SET TO MINIMUM STROKE (APPROX 0.53 L/H).
 - FUTURE CONNECTION

This drawing is confidential and is the property of TODD ENERGY. It must not be disclosed to any third party or used without written consent from TODD ENERGY.

NO	DATE	BY	CONSTRUCTION ISSUE	CONSULTANT	TODD	NO	DATE	BY	ECP	DESCRIPTION	CONSULTANT	TODD	REFERENCE DRAWINGS
H1	09/17	JMP	ECP-K1245-APPROVED FOR DESIGN	ML	GG	07	07/08	MH	ECP	ECP K1245 AS BUILT TO SITE MARK UP ASB 8129KW	VB	PVM	AI
H0	19/16	AMP	QSP-PROJECT ISSUED FOR HAZOP	GG	ML					ECP XX18002 AS BUILT TO SITE MARK UP ASB 119007WK	JMP	AB	MW
G1	09/17	JMP	ECP-K1459-APPROVED FOR DESIGN	GD	JA	13	08/19	BB	ECP	ECP K1729 & KA-7 REMEDIATION AS BUILT TO ASB T18022KW & T18060KW	JMP	GD	KB
F6	06/19	JG	ECP-K1334-APPROVED FOR CONSTRUCTION	JR	AB	12	08/18	BB	ECP	ECP XX0137 AS BUILT TO SITE MARK UP ASB 18522KW	JMP	AB	SJ
H1	09/18	JMP	KA-7 FACILITIES APPR FOR CONSTRUCTION		AH	10	04/14	DG	ECP	ECP K1334 AS BUILT TO SITE MARK UP ASB 14036KW	JMP	AB	ATH
J0	09/18	JMP	KA-7 FACILITIES ISSUED FOR HAZOP		SB	09	02/14	MH	ECP	ECP K1459 AS BUILT TO SITE MARK UP ASB 13285KW	JMP	AB	ATH
H2	09/17	GSM	K1279 QSP APPR FOR CONSTRUCTION	ML	GD	08	12/08	DW	ECP	ECP K1152 AS BUILT TO SITE MARK UP ASB 8198KW	VB	PVM	AI

DESIGNED: K ALLUM DATE: 3/95
 DRAWN: G ROBERTSON DATE: 3/95
 CHECKED: M WEST DATE: 3/95
 APPROVED: K ALLUM DATE: 3/95
 APPROVED: S HARVEY DATE: 3/95
 SCALE: 1:1

KAPUNI WELLSITES
 PIPING & INSTRUMENT DIAGRAM
 METHANOL INHIBITOR
 KAPUNI WELLSITE 1 & 7

Todd Energy

SHEET No: 2 of 3 REVISION: 13
 DRAWING No: 941-10-00102

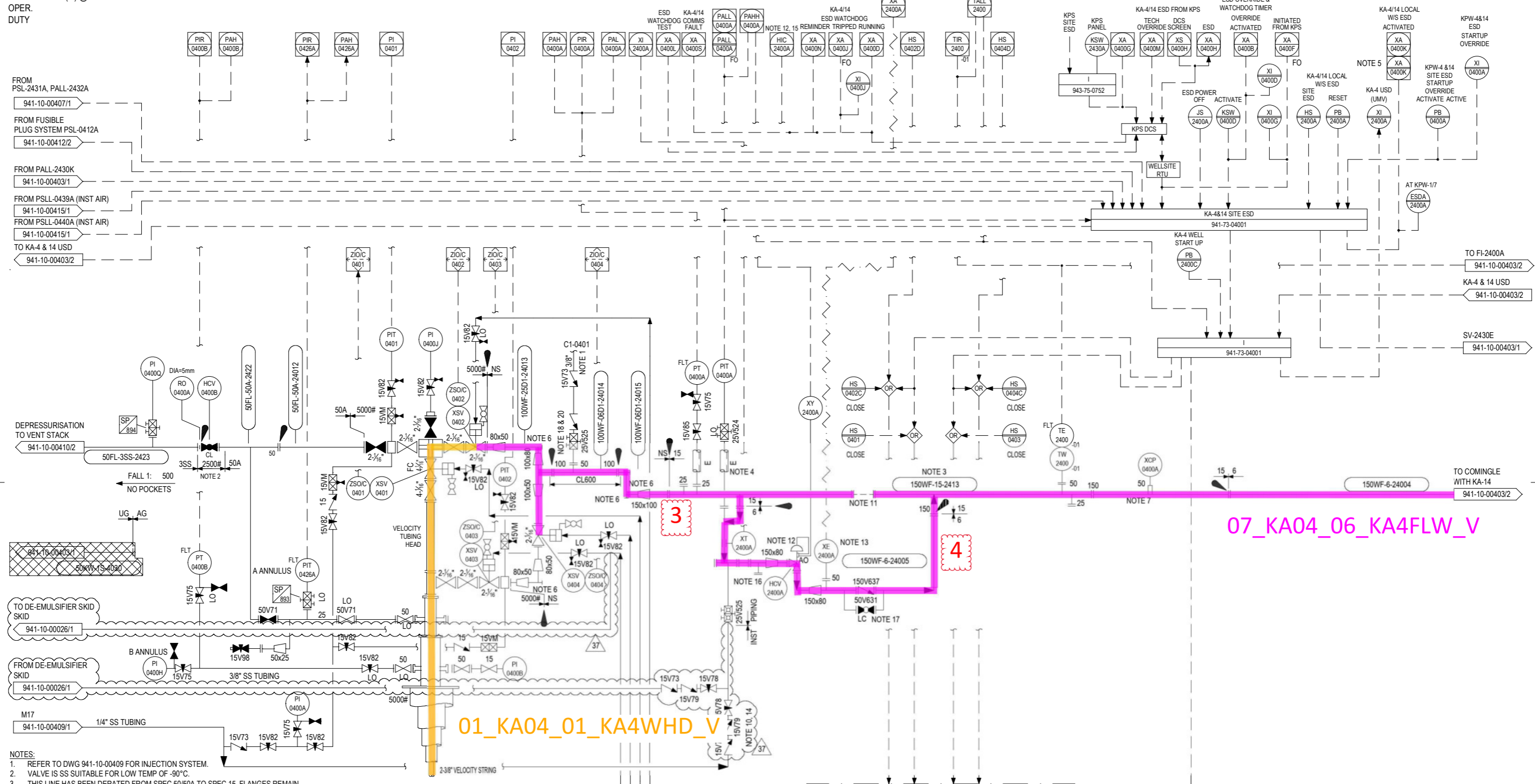
Appendix 2.
P&ID Sectionalisation for KA-4 and KA-14

ITEM No.
NAME
SIZE
DESIGN BAR(G) @ °C
OPER.
DUTY

KA-4
WELLHEAD
MAX. SHUT IN PRESSURE 80 BARG

P-2446
WELLHEAD CELLAR PUMP

HYDRAULIC CONTROL UNIT
WELLHEAD CELLAR PUMP



- NOTES:
- REFER TO DWG 941-10-00409 FOR INJECTION SYSTEM.
 - VALVE IS SS SUITABLE FOR LOW TEMP OF -90°C.
 - THIS LINE HAS BEEN DERATED FROM SPEC 50/50A TO SPEC 15. FLANGES REMAIN 5000#.
 - SAFETY CRITICAL HEAT TRACING.
 - LOCAL MIMIC SCREEN AT WELLSITE.
 - CUSHION TEE.
 - 50mm RCS ACCESS FITTING.
 - BACK PRESSURE REGULATOR STOPS CELLAR PUMP FROM OPERATING BELOW 7.5 BARG AIR PRESSURE.
 - WHERE 'NS' (NON SPEC) IS USED IN THE LINE NUMBER REFER TO ISOMETRIC FOR SPOOL MATERIALS.
 - MeOH USED FOR START UP.
 - EXISTING VALVE REPLACED WITH BLINDED DUMMY SPOOL.
 - USED FOR START UP. WIDE OPEN IN NORMAL OPERATION.
 - SAND PROBE
 - 2 NON RETURN VALVES OF DISSIMILAR TYPE REQUIRED.
 - FLOWLINE CHOKE TO BE RAMPED CLOSED UNDER USD OR ALL KPS INLET VALVES CLOSED (CONDENSATE).
 - TARGET TEE.
 - VALVE USED FOR DEPRESSURISATION DOWN STREAM OF NRV THROUGH WELLHEAD.
 - MONOBLOCK C/W INTEGRAL CHECK VALVE.
 - 5000 PSI DOUBLE BLOCK & BLEED VALVES & CHECK VALVES FITTED DIRECTLY TO INSTRUMENT FLANGE BETWEEN KILL WING VALVES.
 - MONOBLOCK & BLEED C/W INJECTION QUILL.

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NO	DATE	BY	CONSTRUCTION ISSUE	CHKD	APPR	CHKD	APPR	NO	DATE	BY	DESCRIPTION	CHKD	APPR	CHKD	APPR	NUMBER	TITLE
33	03/16	BB	ECP					33	03/16	BB	ECP						
32	10/15	NR	ECP					32	10/15	NR	ECP						
31	03/14	MH	ECP					31	03/14	MH	ECP						
37	09/18	BB						37	09/18	BB							
36	09/18	AB	ECP					36	09/18	AB	ECP						
35	05/19	KC	ECP					35	05/19	KC	ECP						
34	05/18	CSM	ECP					34	05/18	CSM	ECP						

DESIGNED	DATE	DATE	DATE
MB/WZ	28-8-73	28-8-73	28-8-73
MB/DK	28-8-73	28-8-73	28-8-73
C BEATH	28-8-80		
SCALE	NONE		

KAPUNI WELLSITES
PIPING & INSTRUMENT DIAGRAM
WELLHEAD KA-4
WELLSITE 4 & 14

SHEET No 1 of 1 REVISION 37
DRAWING No 941-10-00401

Todd Energy



ITEM No.
NAME
SIZE
DESIGN BAR(G) @ °C
OPER.
DUTY

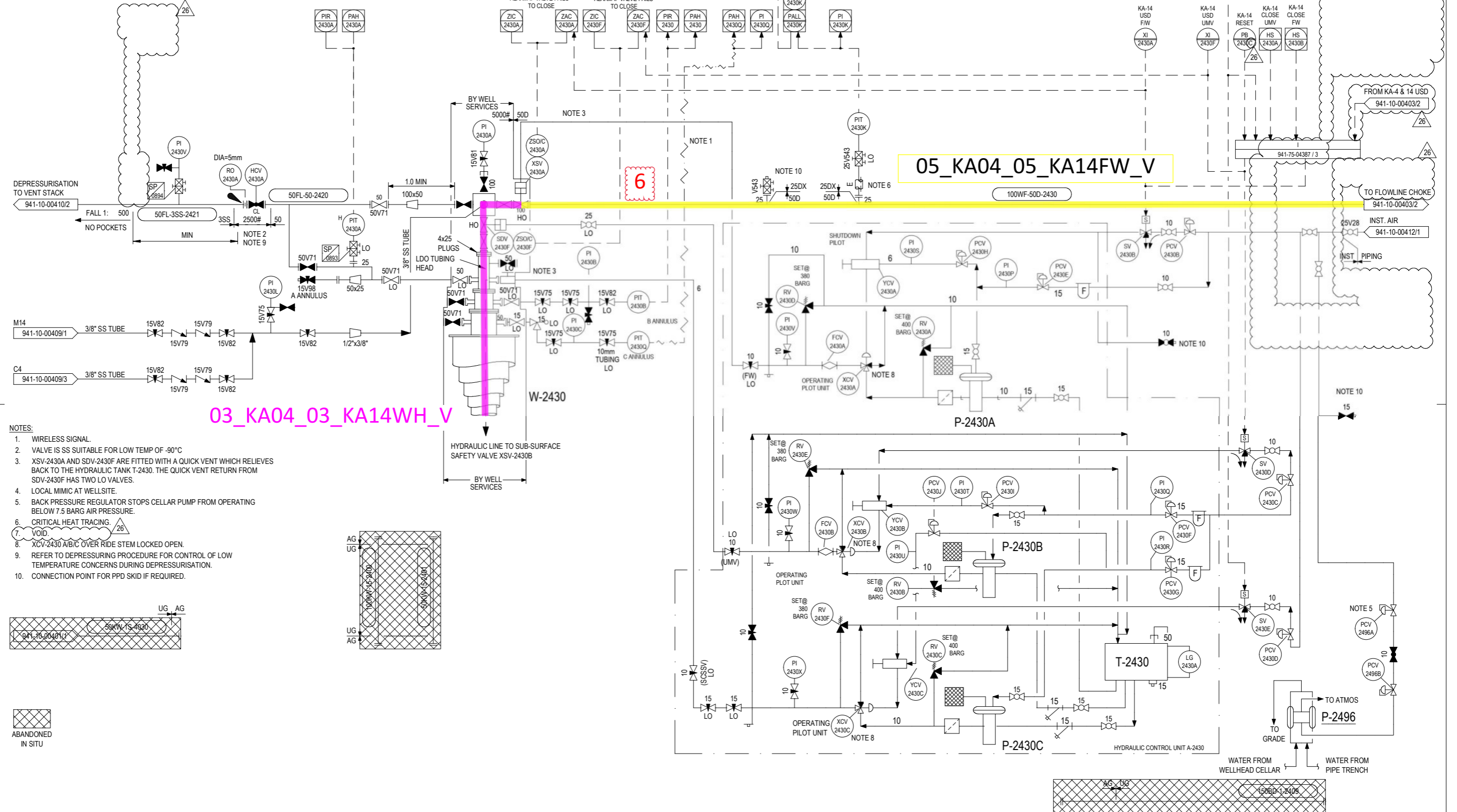
TO WELLSITE ESD
941-10-00401/1

W-2430
WELLSITE 14 WELLHEAD KA-14
API-5000
SHUT IN THP (110 barg) ²⁶

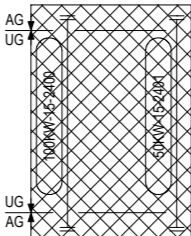
P-2430A/B/C
HYDRAULIC FLUID PUMP

T-2430
HYDRAULIC FLUID RESERVOIR
30 LITRE

P-2496
WELLHEAD CELLAR PUMP
FROM WELLSITE
ESD LOGIC
941-10-00401/1



- NOTES:
1. WIRELESS SIGNAL.
 2. VALVE IS SS SUITABLE FOR LOW TEMP OF -90°C
 3. XSV-2430A AND SDV-2430F ARE FITTED WITH A QUICK VENT WHICH RELIEVES BACK TO THE HYDRAULIC TANK T-2430. THE QUICK VENT RETURN FROM SDV-2430F HAS TWO LO VALVES.
 4. LOCAL MIMIC AT WELLSITE.
 5. BACK PRESSURE REGULATOR STOPS CELLAR PUMP FROM OPERATING BELOW 7.5 BARG AIR PRESSURE.
 6. CRITICAL HEAT TRACING
 7. VOID.
 8. XCV-2430 A/B/C OVER RIDE STEM LOCKED OPEN.
 9. REFER TO DEPRESSURING PROCEDURE FOR CONTROL OF LOW TEMPERATURE CONCERNS DURING DEPRESSURISATION.
 10. CONNECTION POINT FOR PPD SKID IF REQUIRED.



NO.	DATE	BY	DESCRIPTION	CHKD.	APPR.	NO.	DATE	BY	DESCRIPTION	CHKD.	APPR.
01	09/17	RR	K1129 CUSP APPR FOR CONSTRUCTION	ML	GD	SF	26	05/18	CSM	ECP	ECP K11729 AS BUILT TO SITE MARK UP ASB 18011KW
02	09/17	JMP	ECP-K11729 RE ISSUED AFC	ML	SG	SF	25	05/17	RR	ECP	ECP K11728 AS BUILT TO SITE MARK UP ASB 17171KW
03	02/17	JMP	ECP-K1128 APPROVED FOR DESIGN	ML	NS	SF	24	03/16	BB	ECP	ECP K11800Z AS BUILT TO SITE MARK UP ASB 18059KW
04	10/16	JMP	CUSP PROJECT ISSUED FOR HAZOP	SG	ML		23	11/15	BB	ECP	ECP K1630 AS BUILT TO SITE MARK UP ASB 15425KW
05	07/13	JC	ECP-K1334 RE ISSUED AFC	AH	AC	ATH	22	10/15	BB	ECP	ECP X0213 AS BUILT TO SITE MARK UP ASB 15422KW
06	11/12	MH	ECP-K1334 RE ISSUED AFC	AKH	MK	ATH	21	07/15	NR	ECP	ECP K1481 AS BUILT TO SITE MARK UP ASB 15159KW

DESIGNED: M. SASSMAN DATE: 6-87
 DRAWN: G. HENULT DATE: 6-87
 CHECKED: G. HENULT DATE: 6-87
 APPROVED: BF DATE: 8-87
 SCALE: NTS

KAPUNI WELLSITES
PIPING & INSTRUMENT DIAGRAM
WELLHEAD KA-14
WELLSITE KA-4 & 14

Todd Energy
 SHEET No: 1 of 2 REVISION: 26
 DRAWING No: 941-10-00403

ITEM No.
NAME
SIZE
DESIGN BAR(G) @ °C
OPER.
DUTY

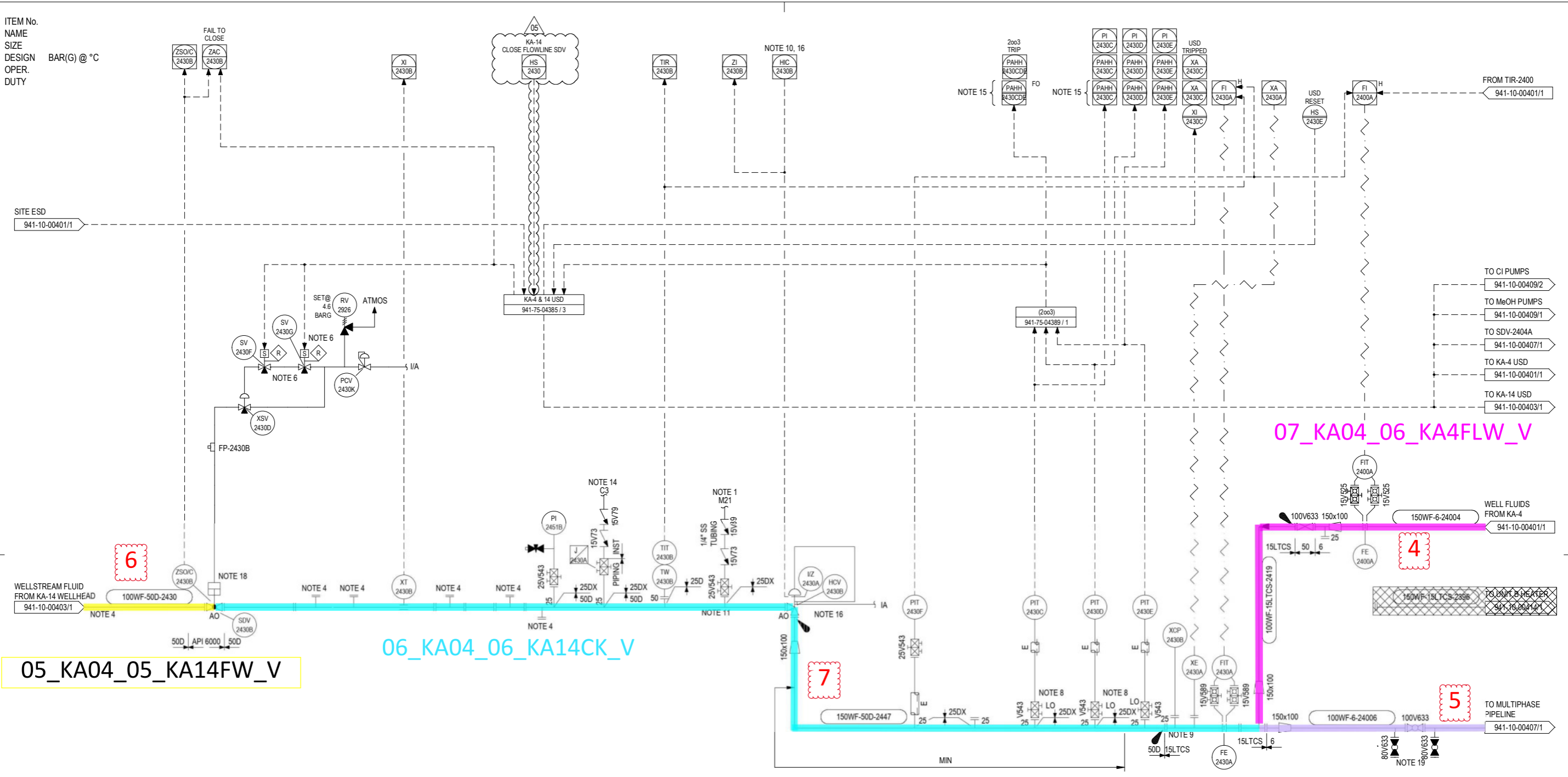
SITE ESD
941-10-00401/1

05_KA04_05_KA14FW_V

06_KA04_06_KA14CK_V

07_KA04_06_KA4FLW_V

08_KA04_06_MIXFLW_V



- NOTES:
1. METHANOL INJECTION LINES TO BE 1/4" SS BY INSTRUMENTS. SEE DWG 941-10-409/2 FOR METHANOL INJECTION SYSTEM.
 2. CLAMP ON SAND FILTER MONITOR.
 3. ALL TUBING IS IMPERIAL STANDARD.
 4. TARGET TEE INCLUDED FOR POTENTIAL SAND PRODUCTION.
 5. VOID.
 6. ANTI-TAMPER MANUAL RESET SOLENOIDS, CANNOT BE RESET UNTIL PAHH SYSTEM IS RESET
 7. VOID.
 8. REMOVEABLE INSULATION ON MONOBLOCKS.
 9. 50mm RCS ACCESS FITTING WITH CORROSION PROBE. ELASTOMERS IN ACCESS FITTING ONLY SUITABLE FOR -34°C.
 10. VALVE OPENING TO BE CONTROLLED AND SET BY OPERATOR.
 11. TWO PHASE AND/OR SLUG FLOW.
 12. COTTON REEL SPOOL INSTALLED BETWEEN 100V93 VALVES
 13. VOID.
 14. C3 TO BE INSTALLED AT LEAST 2m FROM CHOKE VALVE.
 15. LOCAL MIMIC SCREEN AT WELLSITE.
 16. FLOWLINE CHOKE CONTROL SWITCHED TO MANUAL AND FULLY CLOSED (0%) UPON USD, OR ALL KPS INLET VALVES CLOSED.
 17. VOID.
 18. AXIAL FLOW SHUT OFF VALVE.
 19. CONNECTIONS FOR PORTABLE WELL TESTING SEPARATOR.

NO	DATE	BY	DESCRIPTION	CHKD	APPR	NO	DATE	BY	DESCRIPTION	CHKD	APPR	NO	DATE	BY	DESCRIPTION
C4	09/17	JMP	K1729 QUSP APPR. FOR CONSTRUCTION	ML	GD										
C3	09/17	JMP	EOP K1649 RE-APPROVED FOR DESIGN	ML	GD										
E2	09/17	JMP	EOP K1729 APPROVED FOR DESIGN	ML	NS		05	08/19	SH	ECP					
E1	08/16	AMP	QUSP PROJECT ISSUED FOR HAZOP	SG	ML		04	05/18	CSM	ECP					
E0	08/16	AMP	QUSP PROJ. ISSUED FOR REVIEW	ML	SG		03	05/17	RR	ECP					
B1	08/14	NR	ECP KA-14 REMEDIATION AFC				02	09/15	NR	ECP					
B0	07/14	JMP	KA-14 REMEDIATION FOR HAZOP	ML	AB		01	03/14	MH	ECP					

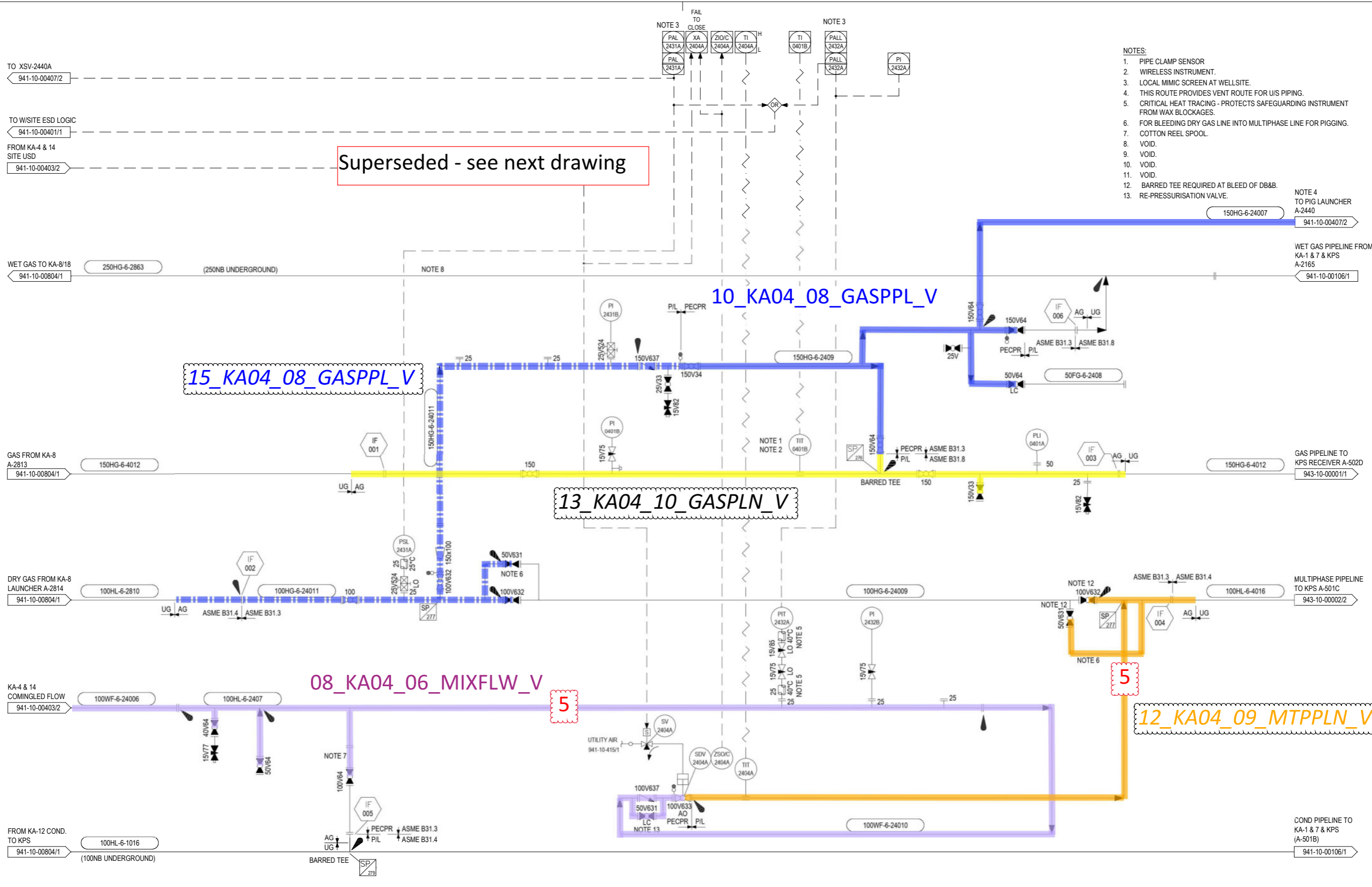
DESIGNED: M SASSMAN DATE: 6-87
 DRAWN: M SASSMAN DATE: 6-87
 CHECKED: G HENEULT DATE: 6-87
 APPROVED: G HENEULT DATE: 6-87
 APPROVED: BF DATE: 8-87
 SCALE: 1:1

KAPUNI WELLSITES
PIPING & INSTRUMENT DIAGRAM
 WELLHEAD KA-14
 WELLSITE KA-4 & 14

STOCKFILE: SHEET No. 2 OF 2 REVISION: 05
 DRAWING No. 941-10-00403

Todd Energy

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- NOTES:
- PIPE CLAMP SENSOR
 - WIRELESS INSTRUMENT.
 - LOCAL MIMIC SCREEN AT WELLSITE.
 - THIS ROUTE PROVIDES VENT ROUTE FOR U/S PIPING.
 - CRITICAL HEAT TRACING - PROTECTS SAFEGUARDING INSTRUMENT FROM WAX BLOCKAGES.
 - FOR BLEEDING DRY GAS LINE INTO MULTIPHASE LINE FOR PIGGING.
 - COTTON REEL SPOOL.
 - VOID.
 - VOID.
 - VOID.
 - VOID.
 - VOID.
 - BARRED TEE REQUIRED AT BLEED OF DB&B.
 - RE-PRESSURISATION VALVE.
- NOTE 4
TO PIG LAUNCHER
A-2440
- NOTE 5
TO PIG LAUNCHER
A-2165

Superseded - see next drawing

15_KA04_08_GASPPL_V

10_KA04_08_GASPPL_V

13_KA04_10_GASPLN_V

08_KA04_06_MIXFLW_V

12_KA04_09_MTPPLN_V

5

5

NO	DATE	BY	DESCRIPTION	CONSTRUCTION ISSUE	CONSULTANT	TODD	NO	DATE	BY	DESCRIPTION	CONSTRUCTION ISSUE	CONSULTANT	TODD
01	05/17	JMP	ECP K11729 AS BUILT TO SITE MARK UP ASB 18001KW				23	05/18	CSM	ECP			
02	06/17	JMP	ECP K11729 AS BUILT TO SITE MARK UP ASB 17181KW				22	06/17	AMP	ECP			
03	08/17	JMP	ECP K11729 RE-APPROVED FOR DESIGN				21	08/13	NR	ECP			
04	08/17	JMP	ECP K1334-05 & K1334 AS BUILT TO SITE MARK UP ASB 1318KW & 14039KW				20	10/12	JC	ECP			
05	10/16	JMP	ECP K1470 & K1324 AS BUILT TO SITE MARK UP ASB 12213KW & 12288KW				19	03/12	LMM	ECP			
06	10/16	JMP	ECP K1334-05 APPROVED FOR DESIGN				18	01/11	KP	ECP			
07	10/16	JMP	ECP K1334-05 APPROVED FOR HAZOP										
08	10/16	JMP	ECP K1334-05 APPROVED FOR CONGT										
09	10/16	JMP	ECP K1334-05 APPROVED FOR HAZOP										
10	10/16	JMP	ECP K1334-05 APPROVED FOR DESIGN										
11	10/16	JMP	ECP K1334-05 APPROVED FOR HAZOP										
12	10/16	JMP	ECP K1334-05 APPROVED FOR HAZOP										
13	10/16	JMP	ECP K1334-05 APPROVED FOR HAZOP										
14	10/16	JMP	ECP K1334-05 APPROVED FOR HAZOP										
15	10/16	JMP	ECP K1334-05 APPROVED FOR HAZOP										
16	10/16	JMP	ECP K1334-05 APPROVED FOR HAZOP										
17	10/16	JMP	ECP K1334-05 APPROVED FOR HAZOP										
18	10/16	JMP	ECP K1334-05 APPROVED FOR HAZOP										
19	10/16	JMP	ECP K1334-05 APPROVED FOR HAZOP										
20	10/16	JMP	ECP K1334-05 APPROVED FOR HAZOP										
21	10/16	JMP	ECP K1334-05 APPROVED FOR HAZOP										
22	10/16	JMP	ECP K1334-05 APPROVED FOR HAZOP										
23	10/16	JMP	ECP K1334-05 APPROVED FOR HAZOP										
24	10/16	JMP	ECP K1334-05 APPROVED FOR HAZOP										

KAPUNI WELLSITES

PIPING & INSTRUMENT DIAGRAM

GATHERING LINES KA 14

WELLSITE 4 & 14

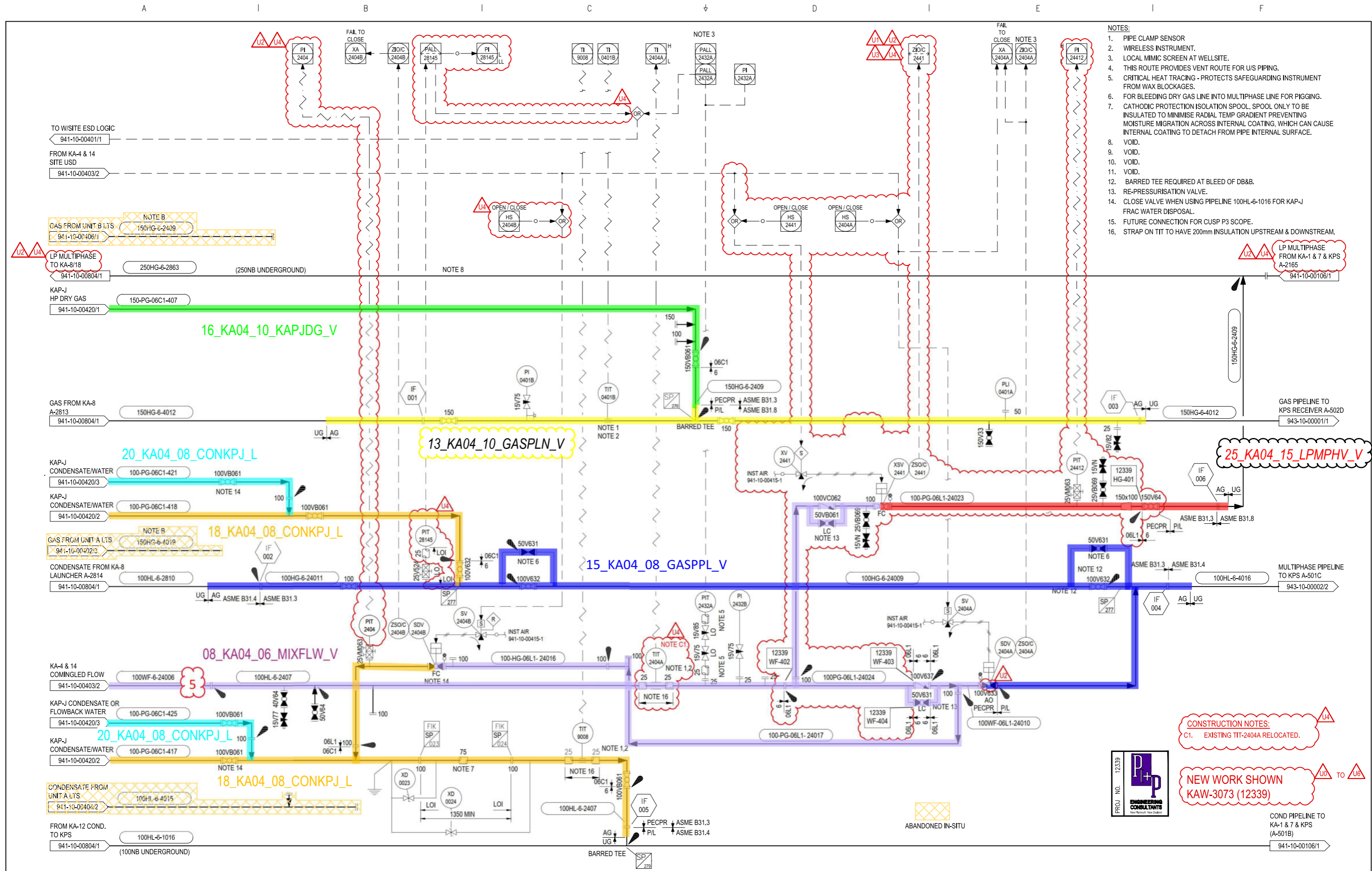
DESIGNED	DATE	6-87
DRAWN	M SASSMAN	6-87
CHECKED	T HEWETT	8-87
APPROVED	T HEWETT	8-87
APPROVED	BG	8-87
SCALE	NONE	

STOCKFILE: WX100021 SHEET No: 1 OF 2 REVISION: 24

Todd Energy

DRAWING No: 941-10-00407

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- NOTES:
- PIPE CLAMP SENSOR
 - WIRELESS INSTRUMENT.
 - LOCAL MIMIC SCREEN AT WELLSITE.
 - THIS ROUTE PROVIDES VENT ROUTE FOR U/S PIPING.
 - CRITICAL HEAT TRACING - PROTECTS SAFEGUARDING INSTRUMENT FROM WAX BLOCKAGES.
 - FOR BLEEDING DRY GAS LINE INTO MULTIPHASE LINE FOR PIGGING.
 - CATHODIC PROTECTION ISOLATION SPOOL. SPOOL ONLY TO BE INSULATED TO MINIMISE RADIAL TEMP GRADIENT PREVENTING MOISTURE MIGRATION ACROSS INTERNAL COATING, WHICH CAN CAUSE INTERNAL COATING TO DETACH FROM PIPE INTERNAL SURFACE.
 - VOID.
 - VOID.
 - VOID.
 - VOID.
 - BARRED TEE REQUIRED AT BLEED OF DB&B.
 - RE-PRESSURISATION VALVE.
 - CLOSE VALVE WHEN USING PIPELINE 100HL-6-1016 FOR KAP-J FRAC WATER DISPOSAL.
 - FUTURE CONNECTION FOR CUSP P3 SCOPE.
 - STRAP ON TIT TO HAVE 200mm INSULATION UPSTREAM & DOWNSTREAM.

CONSTRUCTION NOTES:
C1. EXISTING TIT-2404A RELOCATED.

NEW WORK SHOWN
KAW-3073 (12339)



REV	BY	CHK	ENG	APP	TODD	DATE	REV	REVISIONS	BY	CHK	ENG	APP	TODD	DATE
U6	MAW	GRP	NS	ZA	KB	04/22	25	AS BUILT FOR K1706 (11730)	MAW	GRP	JMT	.	KB	12/21
U5	MAW	GRP	NS	ZA	KB	02/22	24	ECP XK18002 AS BUILT TO SHE MARK UP ASB T19007KK	CL	JMP	SG	.	MW	11/19
U4	DB	GRP	NS	ZA	KB	09/20	23	ECP K1729 AS BUILT TO SITE MARK UP ASB 18001KW	CSM	JMP	GD	.	KB	05/18
REV	MAW	GRP	NS	ZA	KB	02/22	22	ECP XK17172 AS BUILT TO SITE MARK UP ASB 17181KK	AMP	JMP	TD	.	SF	06/17

TODD ENERGY

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ASSET:	KAPUNI		KAPUNI WELLSITES										
			PIPING & INSTRUMENT DIAGRAM										
			GATHERING LINES KA 14										
			WELLSITE KA-4 & 14										
SCALE:	A1	AREA NO.	941	SERIES	10	DRG. NO.	00407	SHEET	1X	CONST	U6	REVISION	24

ITEM No.
NAME
SIZE
DESIGN
OPER.
DUTY

A-2440
SCRAPER LAUNCHER

Superseded - see next drawing

11_KA04_08_GASPIG_V

10_KA04_08_GASPPL_V

14_KA04_11_GASKA7_V

FROM DRY GAS PIPELINE
150HG-6-2409
941-10-00407/1

FROM PSL-2431A
941-10-00407/1

TO VENT FL-0401
941-10-00410/2

DRY GAS TO KA-7
941-10-00106/1

- NOTES
1. AVOID USING PIG TRAP VENT LINE FOR DEPRESSURISING KA-177 TO KA-4/14 FLOWLINE.
 2. 250NB SCH 30 ERW API 5L X46 MDPE COATED CLASS 600 FLANGES 94.5 BARG @ 60°C TO NZS 5223 : PART 1 1986

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NO	DATE	BY	CHKD	APPR	NO	DATE	BY	CHKD	APPR	DESCRIPTION
G1	08/14	MM			07	04/12	MM			ECP K1334 AS BUILT TO SITE MARK UP ASB 12059KW
H4	08/17	RR			06	01/11	KP			ECP K1379 AS BUILT TO SITE MARK UP ASB 10259KW
H3	08/17	JMP			05	12/08	DW			ECP K1152 AS BUILT TO SITE MARK UP ASB 8159KW
H2	08/17	JMP			04	05/06	DW			ECP K1041 AS BUILT TO SITE MARK UP ASB 6063KW
H1	10/16	JMP			03	05/07	JMP			ECP K1004 AS BUILT TO SITE MARK UP ASB 5052KW
H0	08/16	MM			02	06/04	SK			AS BUILT TO SITE MARK UPS
G5	12/11	SG			08	05/18	CSM			ECP K1729 AS BUILT TO SITE MARK UP ASB 18001KW

DESIGNED	DATE	DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
M WEST	5/93	J CARLEY	5/93	P NARASHIMAN	5/93	S HARVEY	5/93

SCALE: NTS

STICKFILE: WX100150

SHEET No: 2 OF 2

REVISION: 08

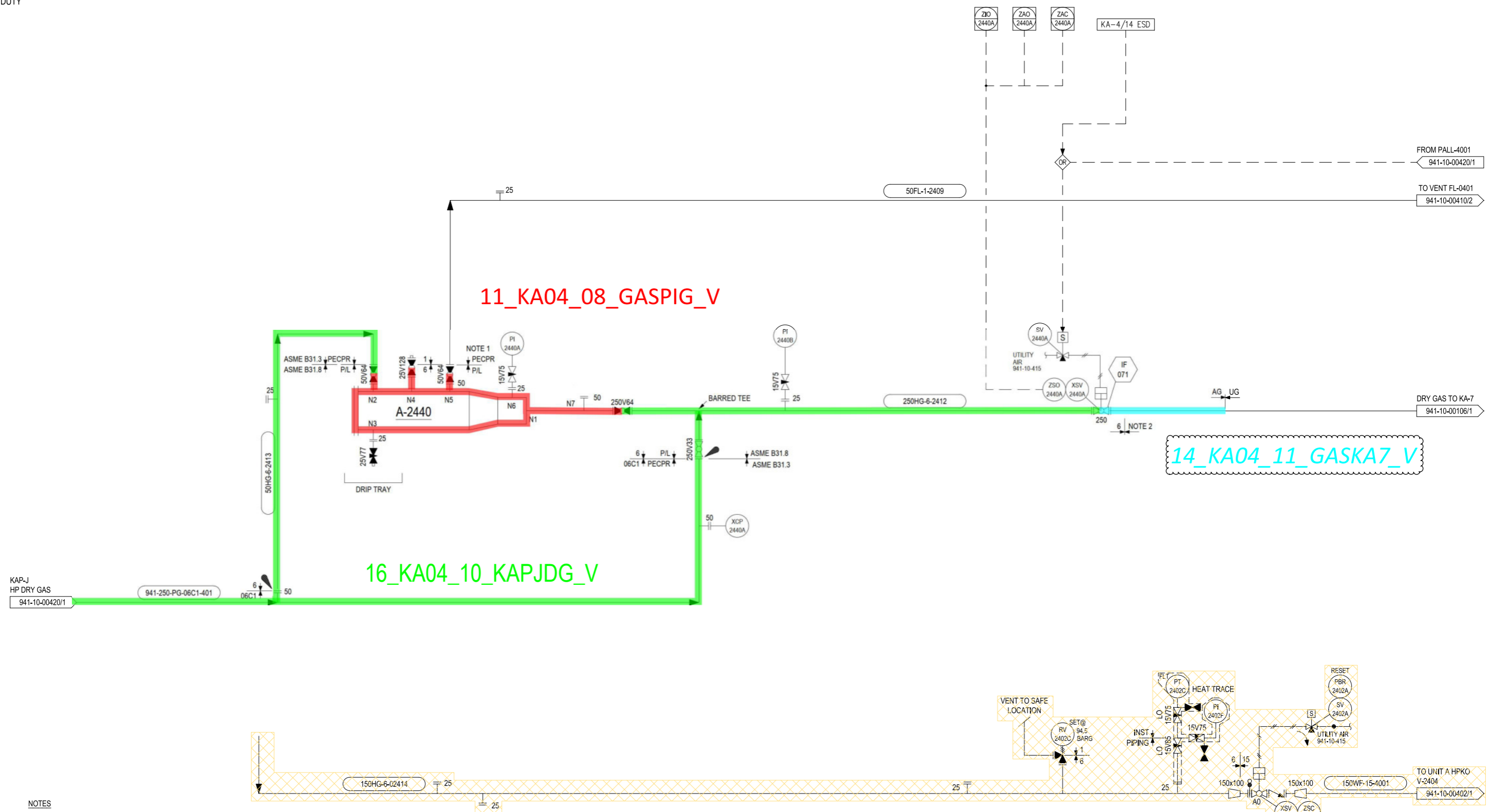
DRAWING No: 941-10-00407



KAPUNI WELLSITES
PIPING & INSTRUMENT DIAGRAM
GAS SCRAPER LAUNCHER A-2440
WELLSITE 4 & 14

ITEM No.
NAME
SIZE
DESIGN
OPER.
DUTY

A-2440
SCRAPER LAUNCHER



- NOTES**
1. AVOID USING PIG TRAP VENT LINE FOR DEPRESSURISING KA-1/7 TO KA-4/14 FLOWLINE.
 2. 250NB SCH 30 ERW API 5L X46 MDPE COATED CLASS 600 FLANGES 94.5 BARG @ 60°C TO NZS 5223 : PART 1 1986



REV	REVISIONS	BY	CHK	ENG	APP	TODD	DATE
09	AS BUILT FOR K1706 (11730)	MAW	GRP	JMT	.	KB	12/21
08	ECP K1729 AS BUILT TO SITE MARK UP ASB 18001KW	CSM	JMP	GD	.	KB	05/18
07	ECP K1334 AS BUILT TO SITE MARK UP ASB 12058KW	LMM	VB	PB	.	ATH	04/12
06	ECP K1379 AS BUILT TO SITE MARK UP ASB 10250KW	KP	VB	LM	.	AI	01/11

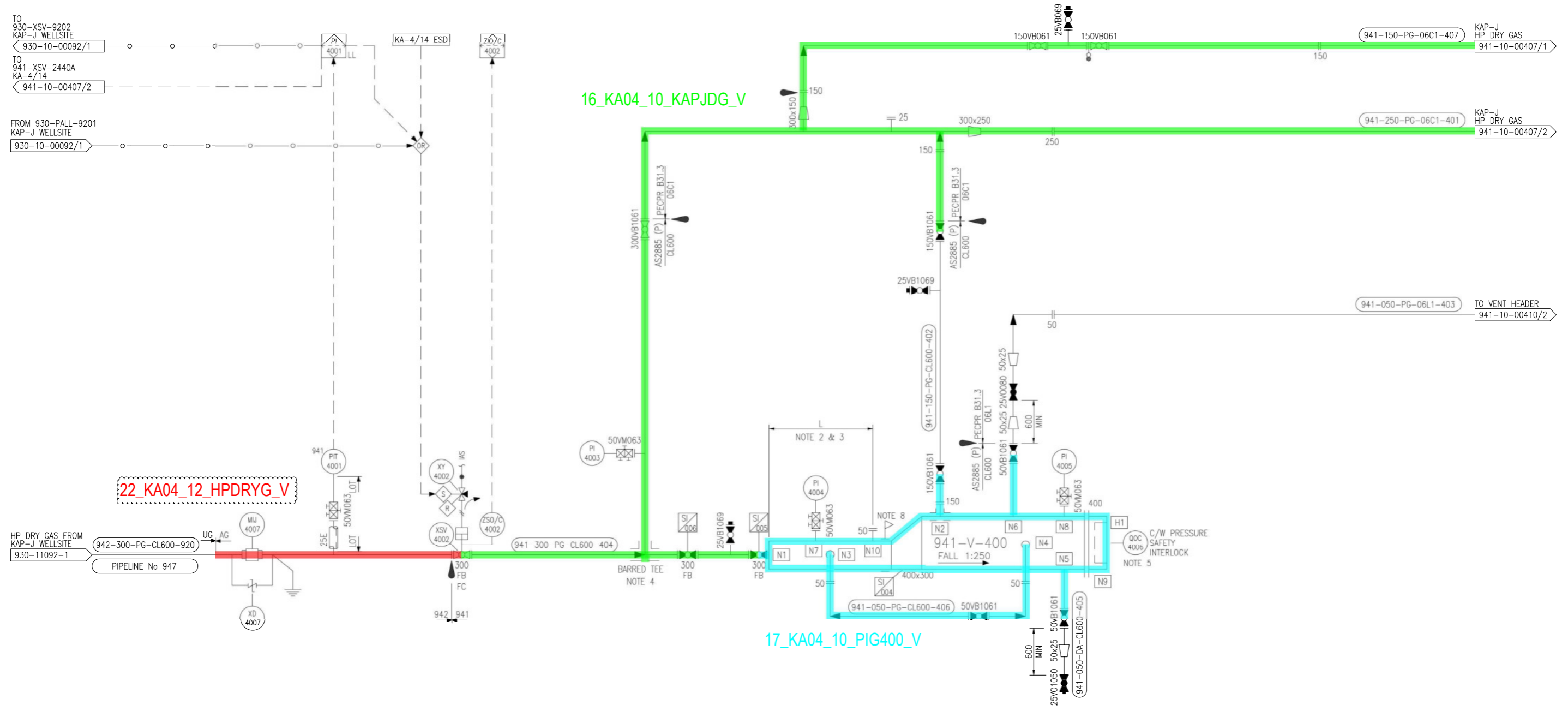
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ASSET:	KAPUNI
REFERENCE DRAWINGS	

KAPUNI WELLSITES PIPING & INSTRUMENT DIAGRAM GAS SCRAPER LAUNCHER A-2440 WELLSITE 4 & 14	
A1 SCALE:	AREA NO. 941
SERIES 10	DRG. NO. 00407
SHEET 2	REVISION 09

ITEM No FIRST GAS PIPELINE No. 947
 NAME KAP-J HP DRY GAS PIPELINE
 SIZE DN300 CL600
 DESIGN 90 barg @ -10/60 °C
 OPER 40/55 barg @ 10/35 °C
 DUTY

941-V-400
 KA-4/14 HP DRY GAS PIPELINE PIG RECEIVER
 DN300 CL600
 90 barg @ -10/60 °C
 40/55 barg @ 10/35 °C



REV	REVISIONS	BY	CHK	ENG	APP	TODD	DATE
01	AS BUILT FOR K1706 (11730)	MAW	GRP	JMT	.	KB	12/21
00	FIRST ISSUE	GRP	SAR	KK	.	.	05/18

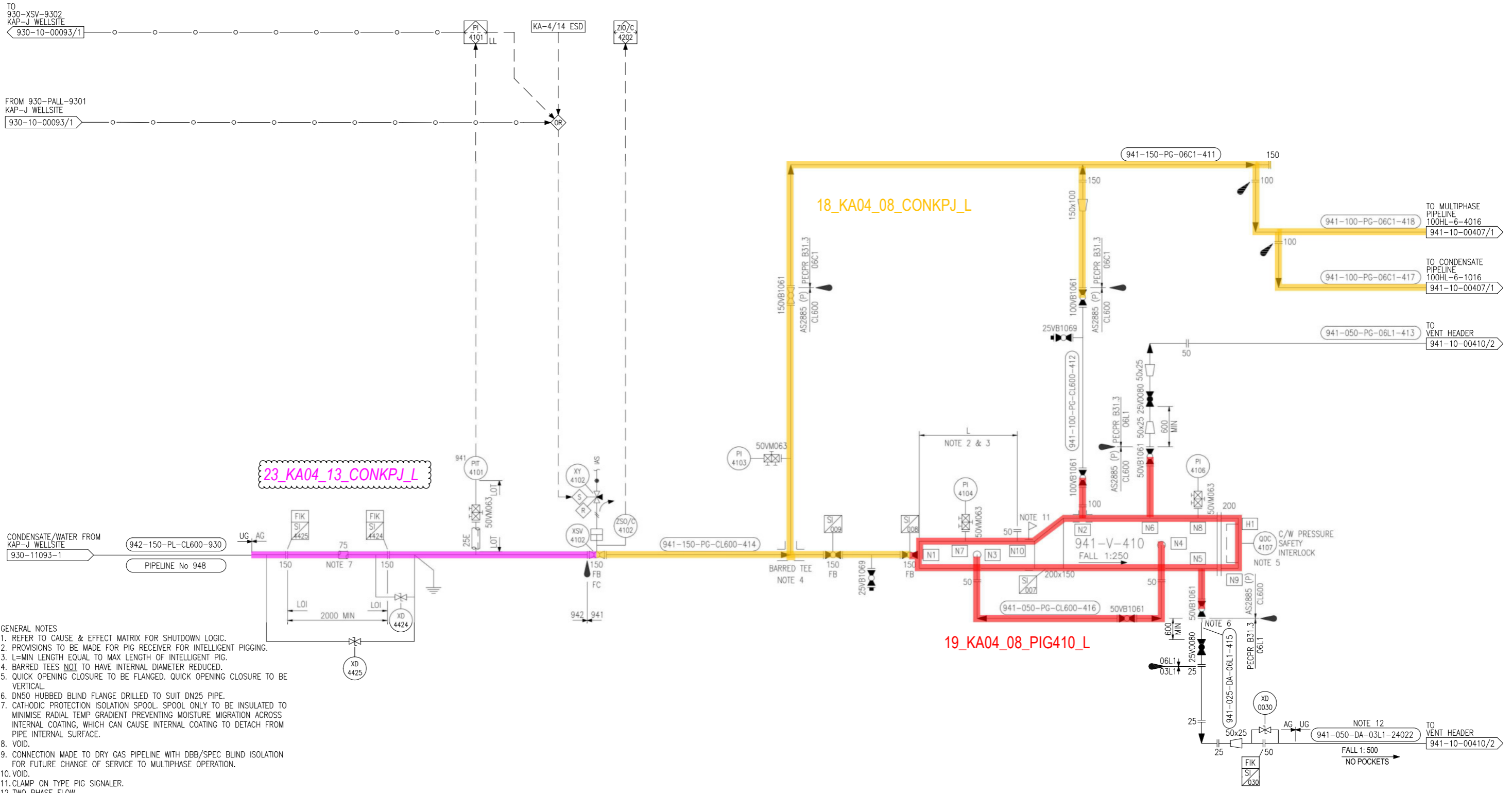
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ASSET:	KAPUNI
REFERENCE DRAWINGS	941-73-04001 CAUSE AND EFFECT MATRIX

KAPUNI WELLSITES		PIPING & INSTRUMENT DIAGRAM		KAP-J TO KA-4/14 - PIPELINE No. 947		DN300 941-V-400 PIG RECEIVER	
SCALE:	A1	AREA NO.	941	SERIES	10	DRG. NO	00420
SHEET	1	REVISION	01				

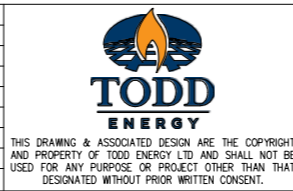
ITEM No FIRST GAS PIPELINE No. 948
 NAME KAP-J CONDENSATE/WATER PIPELINE
 SIZE DN150 CL600
 DESIGN 90 barg @ -10/60 °C
 OPER 16/25 barg @ 15/30 °C
 DUTY

941-V-410
 KA-4/14 CONDENSATE/WATER PIPELINE PIG RECEIVER
 DN150 CL600
 90 barg @ -10/60 °C
 16/25 barg @ 15/30 °C



- GENERAL NOTES
- REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - PROVISIONS TO BE MADE FOR PIG RECEIVER FOR INTELLIGENT PIGGING.
 - L=MIN LENGTH EQUAL TO MAX LENGTH OF INTELLIGENT PIG.
 - BARRED TEES NOT TO HAVE INTERNAL DIAMETER REDUCED.
 - QUICK OPENING CLOSURE TO BE FLANGED. QUICK OPENING CLOSURE TO BE VERTICAL.
 - DN50 HUBBED BLIND FLANGE DRILLED TO SUIT DN25 PIPE.
 - CATHODIC PROTECTION ISOLATION SPOOL. SPOOL ONLY TO BE INSULATED TO MINIMISE RADIAL TEMP GRADIENT PREVENTING MOISTURE MIGRATION ACROSS INTERNAL COATING, WHICH CAN CAUSE INTERNAL COATING TO DETACH FROM PIPE INTERNAL SURFACE.
 - VOID.
 - CONNECTION MADE TO DRY GAS PIPELINE WITH DBB/SPEC BLIND ISOLATION FOR FUTURE CHANGE OF SERVICE TO MULTIPHASE OPERATION.
 - VOID.
 - CLAMP ON TYPE PIG SIGNALER.
 - TWO PHASE FLOW.

REV	REVISIONS	BY	CHK	ENG	APP	TODD	DATE
01	AS BUILT FOR K1706 (11730)	MAW	GRP	JMT	.	KB	12/21
00	FIRST ISSUE	GRP	SAR	KK	.	.	05/18

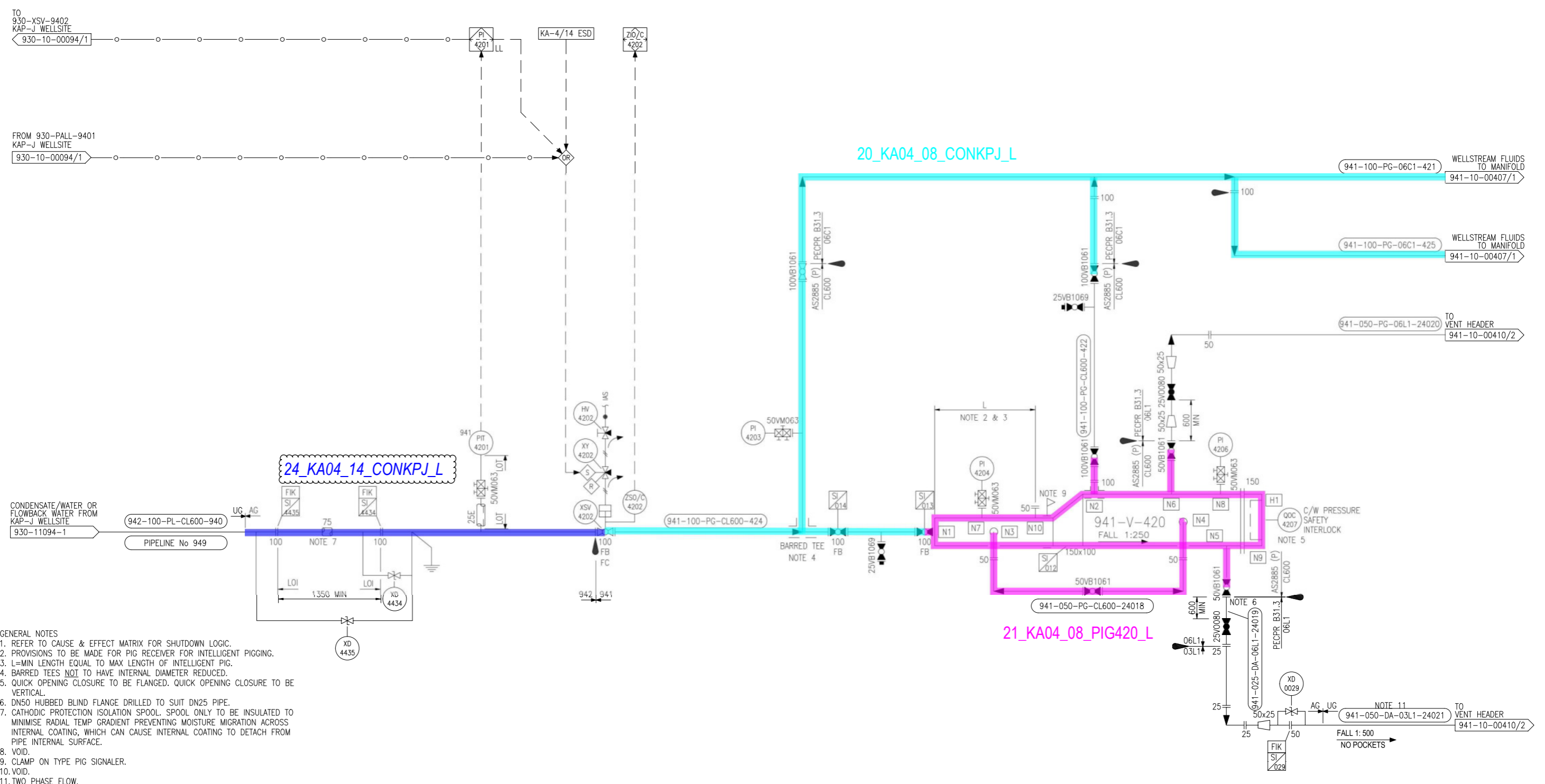


ASSET:	KAPUNI
REFERENCE DRAWINGS	941-73-04001 CAUSE AND EFFECT MATRIX

KAPUNI WELLSITES PIPING & INSTRUMENT DIAGRAM KAP-J TO KA-4/14 - PIPELINE No. 948 DN150 941-V-410 PIG RECEIVER					
A1 SCALE:	AREA NO. 941	SERIES 10	DRG. NO. 00420	SHEET 2	REVISION 01

ITEM No FIRST GAS PIPELINE No. 949
 NAME KAP-J CONDENSATE OR FLOWBACK WATER PIPELINE
 SIZE DN100 CL600
 DESIGN 85 barg @ -10/60 °C
 OPER 16/25 barg @ 15/30 °C
 DUTY

941-V-420
 KAP-4/14 CONDENSATE OR FLOWBACK WATER PIPELINE PIG RECEIVER
 DN100 CL600
 85 barg @ -10/60 °C
 16/25 barg @ 15/30 °C



- GENERAL NOTES
- REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - PROVISIONS TO BE MADE FOR PIG RECEIVER FOR INTELLIGENT PIGGING.
 - L=MIN LENGTH EQUAL TO MAX LENGTH OF INTELLIGENT PIG.
 - BARRED TEES NOT TO HAVE INTERNAL DIAMETER REDUCED.
 - QUICK OPENING CLOSURE TO BE FLANGED, QUICK OPENING CLOSURE TO BE VERTICAL.
 - DN50 HUBBED BLIND FLANGE DRILLED TO SUIT DN25 PIPE.
 - CATHODIC PROTECTION ISOLATION SPOOL. SPOOL ONLY TO BE INSULATED TO MINIMISE RADIAL TEMP GRADIENT PREVENTING MOISTURE MIGRATION ACROSS INTERNAL COATING, WHICH CAN CAUSE INTERNAL COATING TO DETACH FROM PIPE INTERNAL SURFACE.
 - VOID.
 - CLAMP ON TYPE PIG SIGNALER.
 - VOID.
 - TWO PHASE FLOW.

REV	REVISIONS	BY	CHK	ENG	APP	TODD	DATE
01	AS BUILT FOR K1706 (11730)	MAW	GRP	JMT	.	KB	12/21
00	FIRST ISSUE	GRP	SAR	KK	.	.	05/18

TODD ENERGY

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ASSET: KAPUNI

941-73-04001 CAUSE AND EFFECT MATRIX

REFERENCE DRAWINGS

KAPUNI WELLSITES
 PIPING & INSTRUMENT DIAGRAM
 KAP-J TO KA-4/14 - PIPELINE No. 948
 DN100 941-V-420 PIG RECEIVER

SCALE: A1

AREA NO. 941

SERIES 10

DRG. NO 00420

SHEET 3

REVISION 01

ITEM No.
NAME
SIZE
DESIGN
OPER.
DUTY

P-2426
METHANOL PUMP
0.3m3/DAY
99 BARG @ 38°C

P-2424
METHANOL PUMP
0.3m3/DAY
99 BARG @ 38°C

P-2429
METHANOL PUMP
0.6m3/DAY
345 BARG @ 38°C

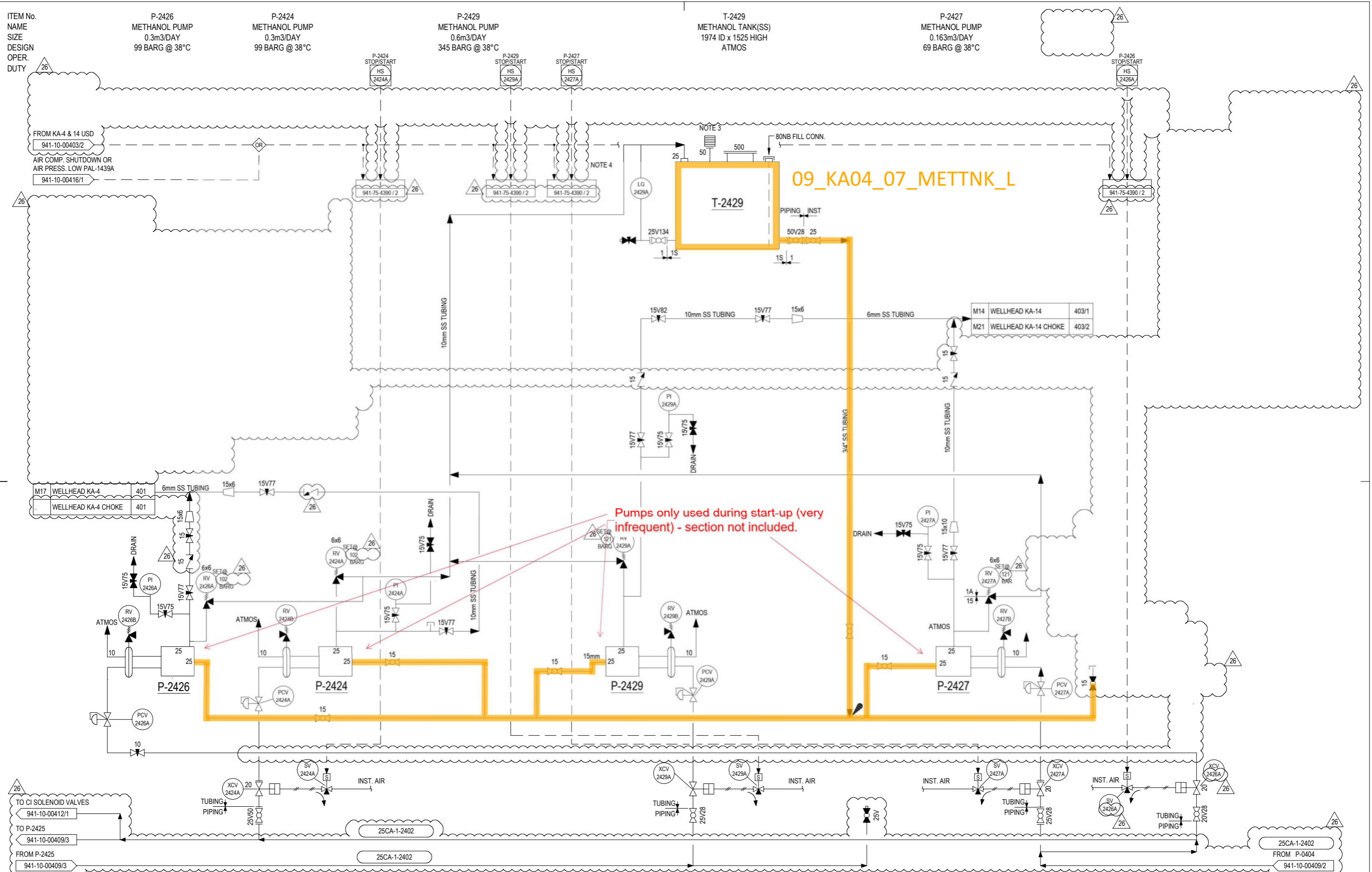
T-2429
METHANOL TANK(SS)
1974 ID x 1525 HIGH
ATMOS

P-2427
METHANOL PUMP
0.163m3/DAY
69 BARG @ 38°C

FROM KA-4 & 14 USD
941-10-00403/2
AIR COMP. SHUTDOWN OR
AIR PRESS. LOW PAL-1439A
941-10-00416/1

09_KA04_07_METTNK_L

Pumps only used during start-up (very infrequent) - section not included.



TO CI SOLENOID VALVES
941-10-00412/1
TO P-2425
941-10-00409/3
FROM P-2425
941-10-00409/3

TO CI SOLENOID VALVES
941-10-00412/1
TO P-2425
941-10-00409/3
FROM P-2425
941-10-00409/3

TO CI SOLENOID VALVES
941-10-00412/1
TO P-2425
941-10-00409/3
FROM P-2425
941-10-00409/3

TO CI SOLENOID VALVES
941-10-00412/1
TO P-2425
941-10-00409/3
FROM P-2425
941-10-00409/3

TO CI SOLENOID VALVES
941-10-00412/1
TO P-2425
941-10-00409/3
FROM P-2425
941-10-00409/3

- NOTES:
- VOID.
 - VOID.
 - FLAME ARRESTOR SUPPLIED WITH TANK.
 - VOID.
 - VOID.

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NO	DATE	BY	CONSTRUCTION ISSUE	CONSULTANT	TODD	NO	DATE	BY	DESCRIPTION	CONSULTANT	TODD	NO	DATE	BY	DESCRIPTION	CONSULTANT	TODD
10	06/13	MM	ECP-K1495 APPROVED FOR CONSTRUCTION	AB	AC	ATH	23	12/13	JC	ECP	ECP	K1495 AS BUILT TO SITE MARK UP ASB 13281KW	JMP	AB	ATH		
11	06/13	JC	ECP-K1568 APPROVED FOR CONSTRUCTION	JR	AB	ATH	22	10/13	JJS	ECP	ECP	K1568 AS BUILT TO SITE MARK UP ASB 13228KW	JMP	AC	ATH		
12	04/13	MM	ECP-K1334 APPROVED FOR DESIGN	JR	AB	ATH	21	10/13	JJS	ECP	ECP	K1344 AS BUILT TO SITE MARK UP ASB 13228KW	JMP	AC	ATH		
13	02/18	GSM	K1729 CUSP RE-APPR FOR CONSTRUCTION	GD	GD	SF	20	01/11	KP	ECP	ECP	K1379 AS BUILT TO SITE MARK UP ASB 10250KW	VB	LM	AI		
14	06/17	JMP	K1729 CUSP RE-APPR FOR CONSTRUCTION	ML	GD	SF	26	05/18	CSM	ECP	ECP	K1729 AS BUILT TO SITE MARK UP ASB 18001KW	JMP	GD	KB		
15	02/17	JMP	ECP-K17172 APPROVED FOR DESIGN	ML	NS	SF	25	01/18	LS	ECP	ECP	KX17172 AS BUILT TO SITE MARK UP ASB 1171202	JMP	TD	KB		
16	10/16	JMP	CUSP PROJECT ISSUED FOR HAZOP	GG	ML	SF	24	09/15	NR	ECP	ECP	K1334 AS BUILT TO SITE MARK UP ASB 15314KW	JMP	AB	ATH		

DESIGNED: M SASSMAN DATE: 6-87
 DRAWN: M SASSMAN DATE: 6-87
 CHECKED: T HEWETT DATE: 8-87
 APPROVED: T HEWETT DATE: 8-87
 APPROVED: BG DATE: 8-87
 SCALE:
 STICKFILE:
 WJX100023 SHEET No: 1 OF 3 REVISION: 26
 DRAWING No: 941-10-00409

Todd Energy