

**APPENDIX L QRA KAPUNI J WELLSITE (UPDATED TO
INCLUDE COMPRESSION FACILITIES) –
WORLEY**

TODD ENERGY LTD

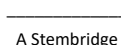

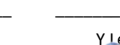


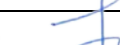

Kapuni J Wellsite Quantitative Risk Assessment

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Executive Summary

Worley New Zealand Limited (Worley) was commissioned by Todd Petroleum Mining Company Ltd (Todd) to conduct a Quantitative Risk Assessment (QRA) for the Kapuni J Wellsite in 2018/2019 to support the land consent application process.

The QRA has been updated with the following changes:

- Inclusion of the compression facilities, with provision for a future slug catcher, pig receiver and import pipeline.
- As build of initial constructed facilities as well as alignment with latest development plans incorporated into the existing QRA based on feedback from the client. Changes to process operating conditions were discussed and agreed with the client and include revision of wellhead pressures and manifold alignment.
- IOGP process leak and blowout event frequency data are updated to the most recent published data i.e., published in 2019.
- More recent version of the QRA modelling software is used.

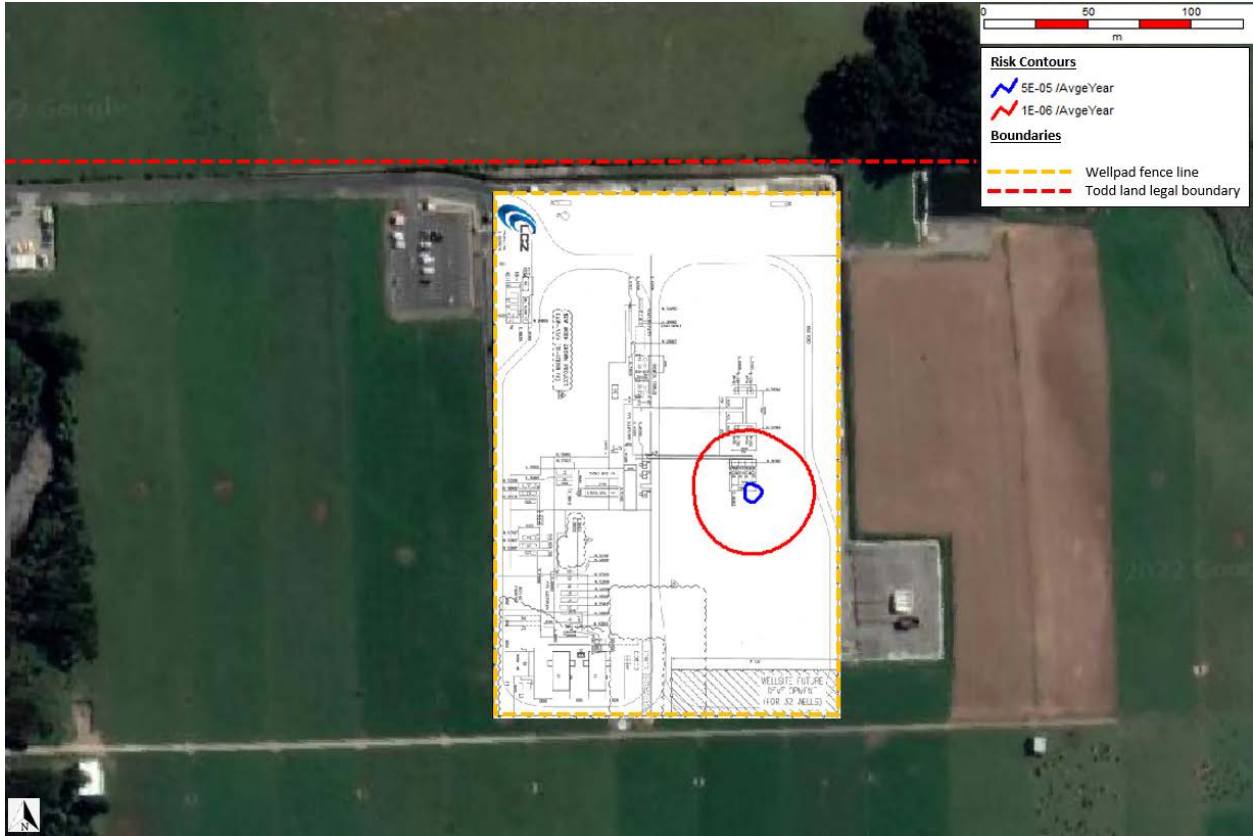
The assessment considers risks from the Kapuni J wellsite for the following cases:

- Drilling operation which considers only blowout events
- Normal operations/production for all wells. This case refers to the eventual development of Kapuni J wellsite which will have 12 producing wells along with the associated process equipment.

The key deliverable of the QRA is the individual fatality location specific individual risk (LSIR) contours which are assessed against the HIPAP4 criteria.

Drilling Operations Results

The risk contour for the Kapuni J Wellsite during drilling operation is presented in the figure below.



Risk Contour for Kapuni J Wellsite Drilling Operations

The LSIR results as assessed against the HIPAP4 criteria are given in the table below.

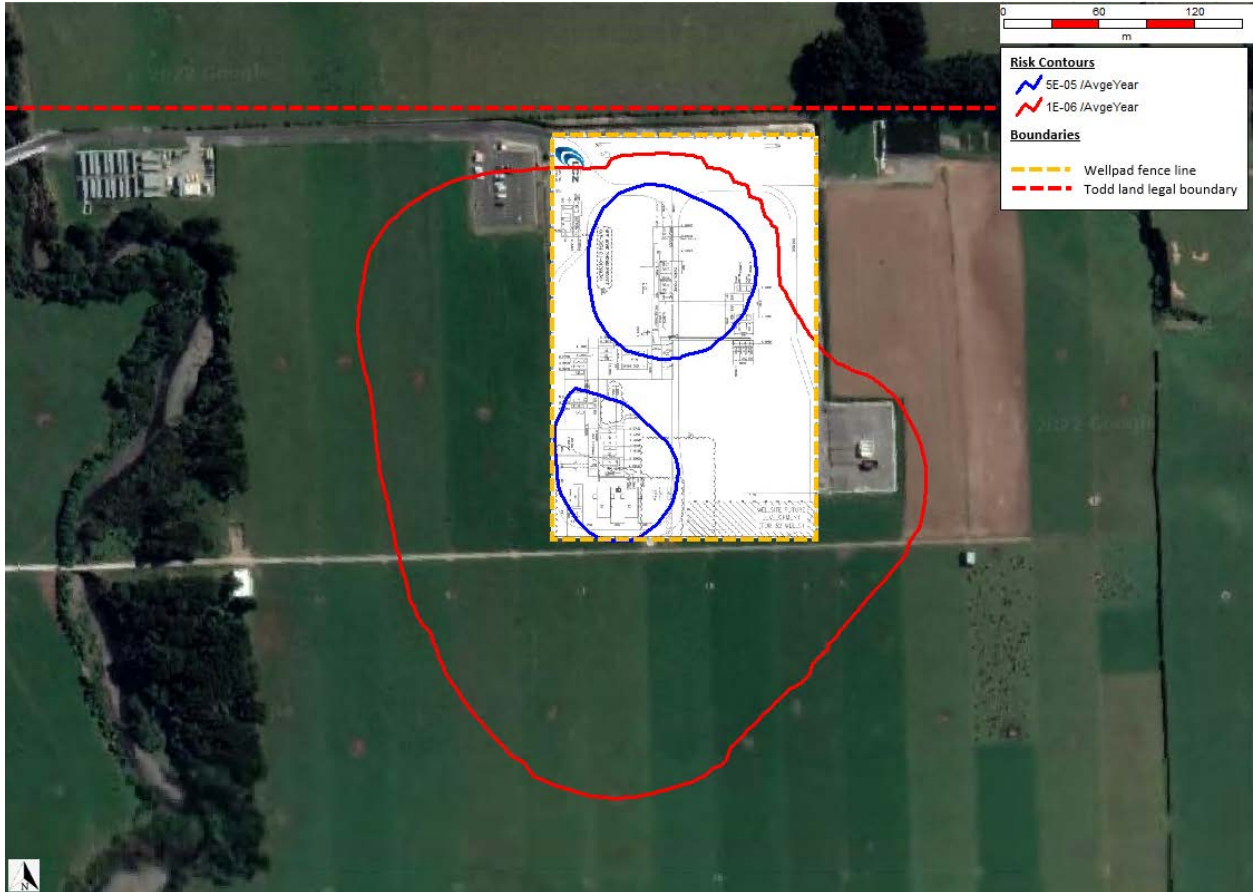
Drilling Operation LSIR Results as Assessed against the Risk Criteria

LSIR	Risk Contour	Risk Criteria	Result
5E-05 / year	Blue	Industrial 5E-05 / 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-06 / year	Red	Residential 1E-06 / year risk contour should not extend to residential, hotels, motels, tourist resorts	Criteria met. There is no residential development, hotels, tourist resorts within the contour area.

The result shows that during drilling operations, the risk contours of 5E-05 / year and 1E-06 / year stay within the wellsite fenceline.

Normal Operations with All Wells in Production

The overall risk contour during normal operations with all wells in production for the Kapuni J wellsite is presented in the figure below.



Kapuni J Normal Operations with All Wells Contour

The LSIR results as assessed against the HIPAP4 criteria are given in the table below.

Normal Operations for Phase 1 LSIR Results as Assessed against the Risk Criteria

LSIR	Risk Contour	Risk Criteria	Result
5E-05 / year	Blue	Industrial 5E-05 / 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-06 / year	Red	Residential 1E-06 / year risk contour should not extend to residential, hotels, motels, tourist resorts	Criteria met. There is no residential development, hotels, tourist resorts within the contour area.

The result shows that during normal operations, the risk contours for 5E-05 / year and 1E-06 / year stay within the wellsite fenceline.

TABLE OF CONTENTS

1.	ABBREVIATIONS	1
2.	INTRODUCTION	2
2.1	Objective.....	2
2.2	Scope	2
2.3	Site Description.....	3
3.	METHODOLOGY	5
3.1	Assessment Tools	5
3.2	Assumptions	6
4.	HAZARD IDENTIFICATION	12
4.1	Hazardous Materials.....	12
4.2	Potential Hazardous Consequences and Criteria	13
4.3	Release Scenarios	18
5.	LEAK FREQUENCY ANALYSIS	28
5.1	Drilling Case Frequencies.....	28
5.2	Pigging Frequencies.....	28
5.3	Normal Operations with all Wells.....	29
6.	RISK ANALYSIS	34
6.1	Risk Criteria.....	34
6.2	Risk Assessment Results	35
6.3	Risk Contributor Analysis.....	37
7.	CONCLUSION	39
8.	REFERENCES	40

APPENDICES

APPENDIX 1. SECTIONALIZED P&IDS

APPENDIX 2. PARTS COUNT SHEETS

1. ABBREVIATIONS

AWS	Automatic Weather Station
BLEVE	Boiling Liquid Expanding Vapour Explosion
BOP	Blowout Preventer
EDP	Emergency Depressurization
ESDV	Emergency Shutdown Valve
HCRD	Hydrocarbon Release Database
HIPAP4	NSW Hazardous Industry Planning Advisory Paper No. 4
HIPPS	High Integrity Pressure Protection System
HMB	Heat and Material Balance
HPKO	High Pressure Knock Out
IOGP	International Association of Oil and Gas Producers
IRPA	Individual Risk Per Annum
KPS	Kapuni Production Station
KRD	Kapuni Redevelopment
LFL	Lower Flammable Limit
LTS	Low Temperature Separator
MEM	Multi-Energy Method
OPP	Overpressure Protection
P&ID	Piping & Instrumentation Diagram
PLL	Potential Loss of Life
PML	Petroleum Mining Lease
PMP	Petroleum Mining Permit
RADD	Risk Assessment Data Directory
SLOD	Significant Likelihood of Death
SLOT	Specified Level of Toxicity
STDC	South Taranaki District Council
QRA	Quantitative Risk Assessment
VCE	Vapour Cloud Explosion

2. INTRODUCTION

Todd Petroleum Mining Company (Todd) has commenced development drilling activities at the Kapuni J wellsite located within rural farmland on Palmer Road, approximately 2.5 km South East from Kaponga, South Taranaki within the Petroleum Mining Permit (PMP) 60607 (previously known as Petroleum Mining Lease (PML) 38839). A Quantitative Risk Assessment (QRA) [Ref. 1] was completed in 2018/2019 to support land use consent applications. A preliminary project based QRA was further completed [Ref. 2] to include the compression system, with the purpose to support the decision to locate the compression system on Kapuni J.

This QRA update incorporates modification to the compression facilities, with provision for a future slug catcher, pig receiver and import pipeline, and revises the operating conditions for the producing wells and manifolds. The overall QRA has been updated to reflect latest published release frequency data and modelling software version, but otherwise remains unchanged.

2.1 Objective

The objective of the QRA is to determine the location specific individual risk (LSIR) associated with the Kapuni J wellsite operations.

2.2 Scope

The scope of the study is to update the Kapuni J QRA based on the changes listed below. All other modelling input and assumptions remain the same. The scope of the update include:

- Inclusion of the compression facilities, with provision for a future slug catcher, pig receiver and import pipeline (see Section 4.2)
- As build of initial constructed facilities as well as alignment with latest development plans, incorporated into the existing QRA based on feedback from the client. Changes to process operating conditions were discussed and agreed with the client and include revision of wellhead pressures and manifold alignment (see Section 4.2)
- Update the process leak frequency data used in the QRA to the latest published data (see Section 3.2.2)
- Convert the QRA model from Phast Risk version 6.7 to Safeti 8.6 (see Section 3.1)

Note that the changes implemented will result in changes to the reported level of risks. It is not within the scope to identify and assess the impact of each change, particularly those associated with software changes.

The Kapuni J QRA includes the following cases:

- Drilling phase which considers only blowout events
- Normal operations/production for all wells. This case refers to the eventual development of Kapuni J wellsite which will have 12 producing wells along with the associated process equipment.

Specific assumptions related to the scope are listed in the original QRA Assumptions Register [Ref. 3] and Section 3.2. Changes made to assumptions are detailed in the body of the report where applicable.

2.2.1 Exclusion

The following are excluded from this study:

- Third party risk contributors (external risks).
- Loss of containment from pipeline sections outside the plant boundaries.
- Non-hydrocarbon risks (e.g., transportation risk, earthquake risk).
- Calculation of individual risk per annum (IRPA) and potential loss of life (PLL) for onsite personnel, and calculation of societal risk for offsite personnel.

- Calculation of injury risk, risk of property damage and accident propagation.
- Recommendations and risk mitigation measures.

2.3 Site Description

The Kapuni J wellsite is an existing wellsite, that can host up to 12 production wells which are to be drilled in multiphase batches. Phase-1 of the project has been executed and included the drilling of four wells along with installation of well fluid processing facilities. The Kapuni J wellsite uses a modular construction philosophy. Some skid designs are based on Mangahewa G with modifications to align with existing Kapuni Field infrastructure, conditions and philosophies [Ref. 4].

The facilities installed on the wellsite during Phase 1 included the following:

- 4 production wellheads/christmas tree upper master and flow wing valves.
- 4 6" production flow lines (including instrumentation, isolation valves) with provision (spool) for later installation of Overpressure Protection (OPP) valving and instrumentation, along with individual wellstream desanders. Individual flow measurement is also included.
- 3 cyclone desanders (located away from the wellheads but upstream of the choke valve, to minimize impact of sand production on the downstream facilities). Noting these are no longer required for the Phase 1 wells and have been removed.
- 1 start-up heater (located upstream of the choke valve in the startup loop, to ensure temperatures downstream of the choke during start-up remain above hydrate formation temperatures/minimum design temperatures). This will only be used during startup. Noting that the start-up heater this is no longer required for the Phase 1 wells but may be required for the future wells. It was agreed that the start-up heater shall be excluded from the scope of the QRA update. But the fuel gas line up to the inlet of the skid shall remain pressurised during normal operation and remains in scope.
- 1 start-up cyclone desander located in the same start-up loop as the heater.
- Tie in points for temporary production testing, located in the startup loop.
- 3 production manifolds: Train A Manifold (200NB), Train B Manifold (200NB) and Train C Manifold (250NB). All 3 manifolds are designed to operate in high-pressure or low-pressure mode.
- 2 Low Temperature Separator (LTS) Skids, each skid will consist of a High Pressure Knock Out (HPKO) Vessel, Gas/Gas Heat Exchanger and Low Temperature Separator.
- 1 Low Pressure (LP) Separator Skid which will take feed from low pressure gas wells and liquid from the Low Temperature Separators.
- Tie-in and layout allowance for future wells and equipment (coolers, permanent production testing train, LTS skid, compressors).
- Methanol storage and dosing equipment (pumps). Noting only continuous dosing is provided upstream of the LTS Pressure Control Valves (PCVs).
- Pigging launching/receiving facilities.
- Overpressure protection equipment to protect low pressure rated equipment, pipework, pipelines and downstream production stations from overpressure.
- Control Systems – Process Control and Safety Instrumented Systems.
- Utilities.

The following equipment will also be installed on the Kapuni J wellsite:

- 2 gas compression packages (2 stage) and equipment (each has 2 suction scrubbers, an air-cooled intercooler and an air-cooled after cooler).
- 8 Production Wellheads/Christmas tree upper master and flow wing valves.
- 8 production flow lines (including instrumentation, isolation valves) with provision (spool) for later installation of OPP valving and instrumentation, along with individual wellstream desanders. Individual flow measurement is also included.
- An allowance for up to 2 permanent cyclone desanders for the eight production flowlines (located away from the wellheads but upstream of the choke valve, to minimize impact of sand production on the downstream facilities).
- 1 wellstream cooler (fin fan type) to be installed upstream of the LP Separator.
- 2 LP Separator pumps to pump liquid from the LP Separator to Kapuni Production Station (KPS) when the compressors are in operation.
- LP wet gas pipeline tie in from wellsite KA-1/7/19/20 and additional pig receiving facilities.
- 1 slug catcher and equipment (pumps) with liquid stream tie-in to the condensate pipeline and gas to Kapuni J LP separator and compression facilities.

The Kapuni J QRA covers all the equipment above which is for a total of 12 producing wells.

3. METHODOLOGY

The methodology followed for completing the QRA is aligned with good industry practice and the Todd Energy Fire and Gas Analysis and Quantitative Risk Assessment Methodology Guideline [Ref. 5]. The generic process, specified in the Worley NZ Onshore QRA Method Statement [Ref. 6], is illustrated in Figure 3-1 with the slight modification in that this study does not include the provision of risk mitigation measures.

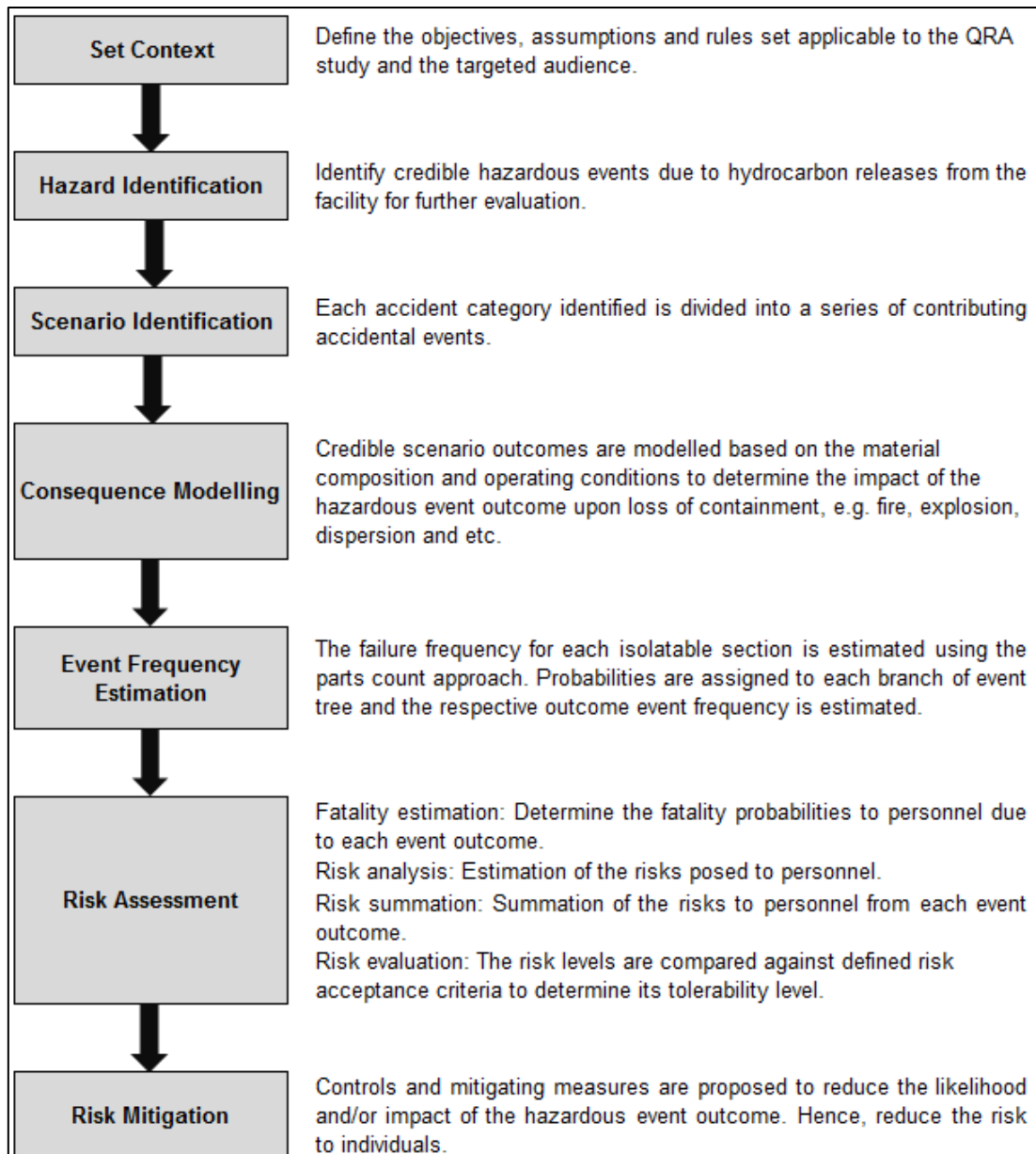


Figure 3-1: QRA Methodology

3.1 Assessment Tools

The previous QRAs were completed using DNV Safeti software package (formally known as Phast Risk) version 6.7. This QRA study has been upgraded to the more recent version of Safeti version 8.6 [Ref. 7], which include software updates and provides some improvement and accuracy in the modelling results. Safeti is an integrated consequence and risk modelling package developed by DNV Software aimed at the onshore petrochemical and chemical process industry for assessing process plant risks via comprehensive QRA. It is designed to perform all the analytical, data processing and results presentation elements of a QRA within a structured framework.

3.2 Assumptions

An assumption register [Ref. 3] was generated for the original QRA [Ref. 1] which outlines the basis of all assumptions and the input bases inherent in the QRA study. All modelling input and assumptions are consistent with the original QRA where possible, except for changes as required for the QRA update which are summarised in the report where applicable. It should be noted that some assumptions in the existing assumption register have been revised and superseded. The updated assumptions applicable for this QRA update are detailed in the following subsections.

3.2.1 Atmospheric Conditions

Meteorological conditions impact the outcomes of release modelling, including downwind flammable and toxic vapour cloud dispersion distance (influenced by atmospheric stability and wind speed), rate of pool vaporisation (ambient temperature), and atmospheric attenuation of radiant heat (temperature and relative humidity).

Wind Speed and Direction

Wind speed and direction data are taken from NIWA’s CliFlo database [Ref. 8] for the Hawera Automatic Weather Station (AWS) to represent the atmospheric conditions at the proposed Kapuni J wellsite. Data for 5-year period from January 2008 to December 2012 are taken, with wind speed and direction measurements taken every hour. The windrose is shown Figure 3-2.

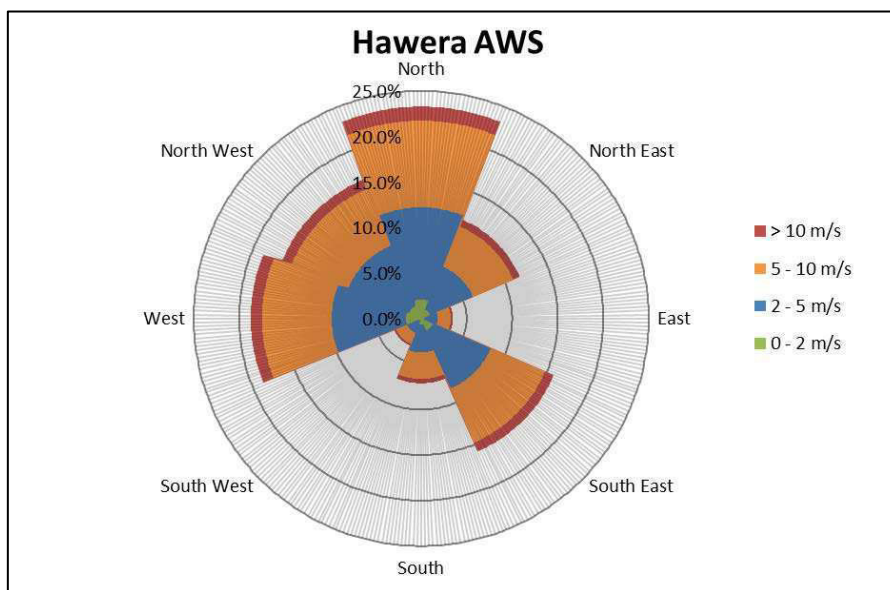


Figure 3-2: Hawera AWS Windrose

The following wind speed and atmospheric stability (Pasquill stability) combinations are used in the QRA. The wind data in tabular format is given in Table 3-1.

Table 3-1: Hawera AWS Wind Data

Wind Speed / Pasquill Stability	North	North East	East	South East	South	South West	West	North West	Total
0 - 2 m/s / F	2.1%	1.1%	0.3%	1.4%	0.6%	0.3%	1.7%	1.5%	9.0%
2 - 5 m/s / D	10.1%	5.1%	1.5%	6.9%	3.1%	1.4%	8.2%	7.2%	43.5%
> 5 m/s / D	11.1%	5.6%	1.7%	7.5%	3.4%	1.5%	8.9%	7.9%	47.5%
Total	23.3%	11.8%	3.5%	15.9%	7.1%	3.2%	18.7%	16.5%	100.0%

Note:

1. Pasquill Stability F – stable, night with moderate clouds and light/moderate wind
2. Pasquill Stability D – neutral, little sun and high wind or overcast/windy night

For the modelling, the wind speed reference height (the height at which the wind impacts a release), is set at 1 m (i.e. so as to match the release height). The Power Law wind profile is applied, where the wind speed varies with height according to a power-law profile.

Ambient Temperature and Relative Humidity

The following ambient temperature and relative humidity for Kapuni J wellsite are used in the QRA:

- Ambient temperature: 14°C
- Relative humidity: 83%

Solar Radiation

Solar radiation is not included in the thermal radiation calculations.

Topography

Phast cannot take into account the effects of the local undulating topography for the gas dispersion. The surface roughness of 30 mm is applied, which represents an area of “open flat terrain; grass, few isolated objects” to represent the area of a typical wellsite.

3.2.2 Failure Frequency Data

3.2.3 General Leak Frequency

The leak frequencies for process equipment in the original QRA were taken from the International Association of Oil and Gas Producers (IOGP) for Process Release Frequencies published in 2010. IOGP has since published a newer version of the document in September 2019 [Ref. 9].

The release frequencies of the main process equipment items from IOGP are based on the UK HSE (UK Health and Safety Executive) hydrocarbon release database (HCRD) which has been compiled by the UK HSE over a 20-year period. Two sets of data are presented in IOGP Process Release Frequencies, which include the 1992 – 2015 data and 2006 – 2015 data.

The recommended values based on experience in the period 2006 – 2015 (inclusive) are used for the QRA update. The IOGP release notes state that the number of incidents recorded per year in the database has been steadily decreasing, and it is considered appropriate to base the frequency on more recent data on the assumption that this is more representative of what will occur in the future. Hence the release frequencies for the QRA have been updated based on the last 10 years of recordings.

Failure frequency data from the HCRD contains detailed historical information on offshore hydrocarbon release incidents occurring in the UK offshore environment and is considered an industry standard for offshore QRA applications. The database categorises failure rates on a detailed basis of equipment type and size and provides a probabilistic hole size distribution associated with the failure.

The HCRD data are also normally used for QRA at onshore facilities, although the use of offshore failure rate may be considered to be conservative for use in most onshore applications, on the basis that:

- Offshore environments tend to be harsher, both external (saliferous environment) and internal (produced sand), increasing the rate of equipment corrosion and erosion;
- Congestion at offshore facilities increases the likelihood of damage through impact; and
- Restricted access to offshore facilities may limit maintenance campaigns, increasing the likelihood of failure

3.2.4 Blowout Event Frequency

Blowout events are considered in the QRA for both drilling and production operation. Blowout frequencies in the original QRA were taken from the IOGP Blowout Frequencies published in 2010. Like the process release frequencies, IOGP has since published a newer version of the document in September 2019 [Ref. 10]. As such, the frequencies for blowout events for this QRA are updated based on the latest frequencies from the database. Data related for wells not following North Sea Standards were selected.

The IOGP Blowout Frequencies considers 4 possible consequences of a blowout event:

- Blowout (surface flow)
- Blowout (underground flow)
- Diverted well release
- Well release

Surface flow blowout event is considered to be a full blowout event from the full wellbore size. This is modelled based on the expected maximum well fluid flowrate that the reservoir can supply to the wellbore instead of the wellhead pressure. This is because modelling the release based on the wellhead pressure and open hole diameter size would produce a very high flowrate. This would be an unrealistic flowrate as the well can only produce a maximum amount of well fluid. Based on information from Todd [Ref. 11], the flowrate from a Kapuni well would be:

- Absolute open flow : 18 MMscf/d

The release is modelled using the “user defined source” model where the mass flow rates and release velocities are used to estimate the effect distances of ignited events. The composition is based on the well fluid composition from the KRD Project Heat and Material Balance (HMB) Case 2 [Ref. 12].

Underground flow blowout events are considered to have no impact on the surface and are not modelled in this study.

Well release events are assumed to be releases from the wellhead and Christmas trees. It is modelled as a horizontal well fluid release at well pressure as summarised in Section 4.2. Release sizes are based on the same hole size distribution used for other release cases up to the largest line size which is 10 inch. As the wellhead and Christmas trees will not be present during drilling phase, well releases are only modelled for normal operation case.

Diverted well release event is a well release that can be shut-in or diverted to flare in a short period of time. This event is not modelled in this study as the event frequency during normal operations based on the IOGP database is zero [Ref. 10].

The frequency for blowout events during drilling operations is shown in Table 3-2.

Table 3-2: Drilling Blowout Frequencies

Development Drilling, Deep	Blowout (surface flow)	3.00E-04	per drilled well
Completion	Blowout (surface flow)	4.30E-04	per drilled well
Total Blowout Frequency		7.30E-04	per drilled well

For normal operations, a blowout may occur during production, well workover or well wireline activities. Based on information from Todd, well wirelining is expected for once per year per well, and no workover is currently planned for any of the wells during their lifetime [Ref. 13]. The blowout event frequency during normal operations is shown in Table 3-3.

Table 3-3: Normal Operations Blowout Frequencies

Production	Blowout (surface flow)	3.3E-05	per well year
	Well release	2.9E-05	per well year
Wireline	Blowout (surface flow)	9.0E-06	per wireline job
	Well release	2.6E-05	per wireline job
Wireline frequency		1	per well year
Total Blowout Frequency		4.2E-05	per well year
Total Well Release Frequency		5.5E-05	per well year

3.2.5 Leak Frequency Modification Factor

Several leak frequency modification factors were applied to the release frequency database as per Todd Energy's Fire and Gas Analysis and Quantitative Risk Assessment Methodology Guideline [Ref. 5]. The leak frequency modification factors outlined in this document are applied for this update. These are listed below:

- Piping Release Frequency
 - Pipeworks are split into categories: process (on skid) piping and interskid piping as described in the definition for equipment type 1: steel process pipes of IOGP Process Release Frequencies.
 - For interskid piping, the modification factor for “inter-unit piping” (section 3.3.3 of IOGP Process Release Frequencies) which is 0.9 is applied, i.e., 90% reduction in frequencies.
- Rupture Release Frequency
 - A review of the UK HSE Hydrocarbon Release Database (HCRD) from 1992 to 2015 has been performed and it was determined that there were 31 incidents in the full-bore release category within 24 years. These were reviewed by Todd to determine the applicability of these cases in comparison with Todd Energy facilities. For wellsites, 22 of the incidents can be discounted on the basis that the release scenarios cannot occur on an onshore wellsite. The frequency for rupture release is reduced by 65%.

The maximum flange release hole size is be limited to 22 mm as a release from a flange is normally limited to a segment of a gasket between bolts [Ref. 5].

3.2.6 Release Hole Sizes

For every component failure, there is a range of credible hole sizes from pinhole leak to full bore rupture. The hole size grouping from the IOGP Process Release Frequencies, together with the representative hole sizes used in the QRA is shown in Table 3-4.

Table 3-4: Hole Size Distribution

IOGP Hole Size Group (mm)	Representative Hole Size (mm)
1 - 3	2
3 - 10	6
10 - 50	22
50 - 150	85
> 150	Range geometric mean

The representative hole sizes are chosen using the geometric mean of the smallest and largest hole sizes in each group. This approach has the mathematical basis that aligns with numbers that are exponential in nature such as is the case for hole sizes whereby the consequence is dependent on the area of the hole size or square of the diameter. For example, the representative hole size for the range 10 – 50 mm is calculated as $(10 \times 50)^{0.5} = 22$ mm.

The same approach is taken to select the representative hole size for rupture cases (release > 150 mm). This is consistent with the approach used for other release size categories and may be appropriate given the limited FBR base data that is used by the algorithm to calculate frequency [Ref. 5].

3.2.7 Ignition Probability

Given a release, the probability of ignition is dependent on a range of factors, including:

- Release rate
- Material state (liquid or gas)
- Material physical properties (flash point, density, flammable limits)
- Ignition sources present

There are a range of correlations for applying an ignition probability to a release, and most are based on release rate and state. The UK Offshore Operators Association (UKOOA) has generated a model for predicting ignition probability which takes into account the above, as well as the nature of the surrounding area with respect to potential ignition sources. This model has been used to generate a range of typical correlations [Ref. 14]. For this QRA, the following scenarios are used:

- Scenario 5 - “Small Plant Gas LPG (gas or LPG release from small onshore plant)”, which is applicable for releases of flammable gases, vapour or liquids significantly above their normal (NAP) boiling point from small onshore plants (plant area up to 1200 m², site area up to 35,000 m²).
- Scenario 6 – “Liquid release from small onshore plant”, which is applicable for releases of flammable liquids that do not have any significant flash fraction (10% or less) if released from small onshore plants (plant area up to 1200 m², site area up to 35,000 m²) and which are not banded or otherwise contained.

The graph of ignition probabilities as a function of mass release rates is shown in Figure 3-3.

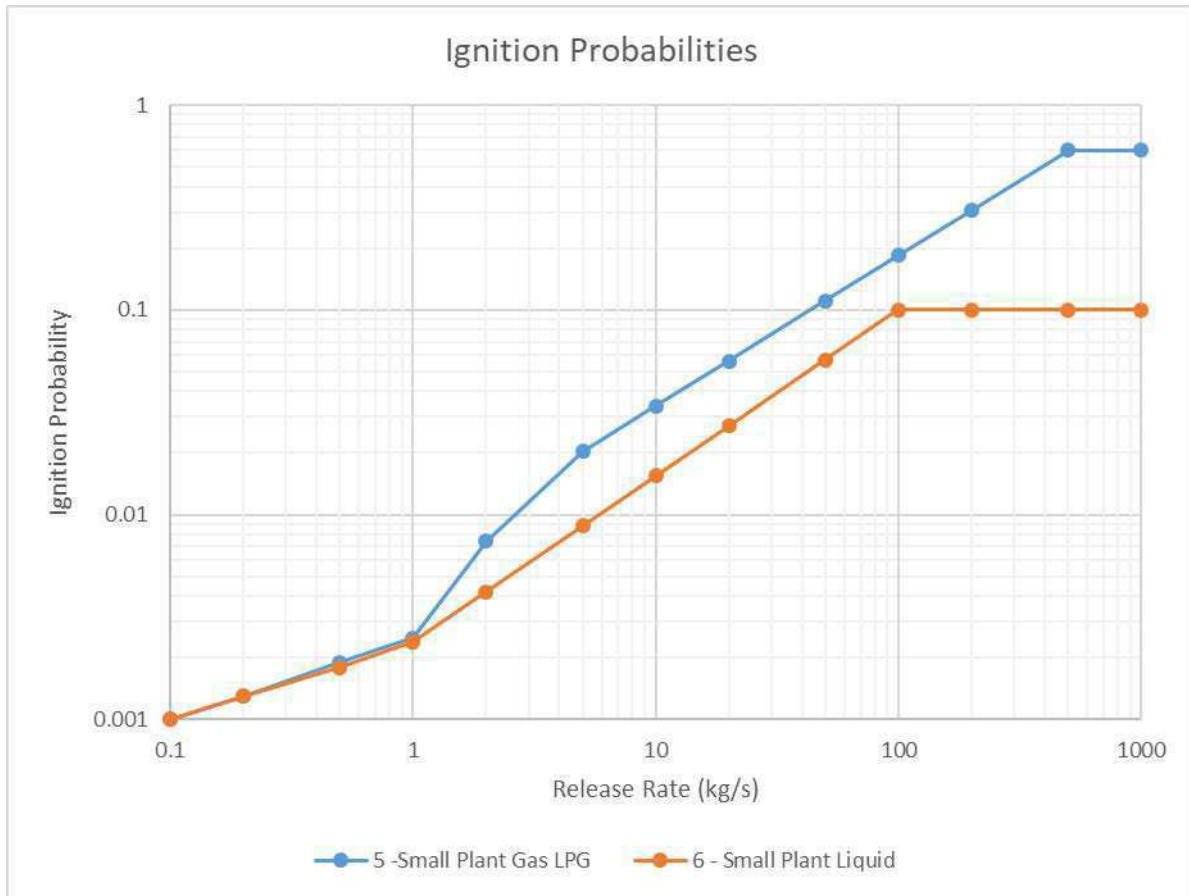


Figure 3-3: Ignition Probabilities

The graph represents the total ignition probability. An overall distribution for early to delayed ignition ratio of 30:70 to 50:50 split is considered reasonable [Ref. 14]. The timing of ignition is used as a means to predict the nature of the ignited event. Early ignition is taken to indicate a jet fire or pool fire depending on the material released. Delayed ignition is taken to indicate that the ignition would initially result in a flash fire or explosion. As per Todd’s Guideline document, an overall distribution for early to delayed ignition ratio of 30:70 is used.

4. HAZARD IDENTIFICATION

4.1 Hazardous Materials

Based on information from the KRD project documentation [Ref. 4, 12 and 19], this study considers the release of the following substances:

- Well production fluid stream from wellheads and process equipment.
- Chemicals.

The operating conditions and stream composition for the original QRA were obtained from the Heat and Material Balance (HMB) provided by the KRD project. HMB “Case 2” is chosen as the representative conditions during normal production operation. “Case 2” shows the expected wellsite conditions after a few months of production when the wellhead pressure has decreased [Ref. 12].

Some of the operating conditions were revised to reflect conditions when compression facilities are operational in the previous QRA update [Ref. 2]. As such, the material composition for release cases originating from LTS Skid B were updated. Other material compositions remain unchanged from the original QRA. The material compositions for the provision for a future slug catcher, pig receiver and import pipeline are based on existing compositions as discussed and agreed with the client.

Table 4-1: Updated Material Composition for LTS Skid B

Component Mass Fraction	HMB Stream 17	HMB Stream 18	HMB Stream 21	HMB Stream 25	HMB Stream 26	HMB Stream 27	HMB Stream 28
	HPKO In	HPKO Vap Out	LTS Vap Out / Gas In	HPKO Liq Out	LTS In	LTS Liq Out	LTS Liq
Water	0.1351	0.0342	0.0090	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide	17.2342	17.6611	17.7668	16.0770	16.0770	16.0370	16.0370
Methane	7.2882	7.5642	7.6701	0.0000	0.0000	0.0000	0.0000
Ethane	1.7801	1.7982	1.7952	5.9520	5.9520	5.1600	5.1600
Propane	1.4949	1.4552	1.4067	4.0800	4.0800	5.7990	5.7990
n-butane	1.1218	1.0113	0.9067	5.3520	5.3520	8.2680	8.2680
n-pentane	0.4329	0.3319	0.2453	3.6130	3.6130	5.4820	5.4820
n-hexane	0.0000	0.0000	0.0000	24.3300	24.3300	27.5160	27.5160
n-octane	1.8620	0.8225	0.4569	0.0000	0.0000	0.0000	0.0000
n-tridecane	1.6777	0.0369	0.0000	40.5960	40.5960	31.7380	31.7380

4.1.1 Well Production Fluid

The well fluid products from Kapuni J contains mainly flammable hydrocarbons and carbon dioxide (CO₂). Upstream of the separation equipment, the mixture is mainly in gas phase (vapour fraction >0.9). Releases from this section are modelled as gas releases with the consequences modelled as jet fire and flash fire for immediate and delayed ignition, respectively. If the flammable gas cloud reaches a congested region onsite, a VCE is possible. The same approach is followed for releases on the vapour section of the separation system.

Hydrocarbon in the liquid section of the separation system exist as mainly liquid at the operating conditions shown in the HMB. However, as they contain CO₂ and light hydrocarbons, it is expected that they will eventually flash when released to the atmosphere. Liquid hydrocarbon release is considered to lead to a spray fire, flash fire and/or pool fire event.

CO₂ is assessed in terms of the toxic effect with respect to the unignited release scenarios. It is noted that CO₂ may also cause asphyxiation by displacing oxygen in the air. However, as the wellsite is a relatively open area, it is considered that the risk from asphyxiation due to CO₂ is low. Therefore, only toxic effects of the CO₂ as described in UK HSE is assessed in this study [Ref. 18].

The effects of the potential hazardous consequences described are further detailed in Section 4.2.

4.1.2 Chemicals

Chemicals present in the wellsite include corrosion inhibitor and methanol. However, as corrosion inhibitor is non-flammable, only methanol is included in this risk assessment. Methanol is a flammable and toxic liquid which appears as colourless liquid with a mild, characteristic alcohol odour. Methanol release is modelled similarly to liquid hydrocarbon releases with the additional toxic dispersion effects from an unignited release scenario.

The effects of the potential hazardous consequences described are further detailed in Section 4.2.

4.2 Potential Hazardous Consequences and Criteria

Release of well production fluid and methanol can potentially lead to flammable and toxic effects. Leaks can occur due to failures of pipe work systems (in particular small-bore piping), flanges, valves, and failure of vessels. Immediate or delayed ignition can occur from hot work activity, naked flames, static electricity, hot surfaces, hot gases or faulty equipment and sparking.

4.2.1 Flammable Gas Dispersion

The well production fluid comprises dominant quantities of flammable gas. Following a release, a flammable gas cloud will form, the extent of which is determined by the operating conditions, size of the release, release orientation, weather conditions and degree of obstruction within the area. An unignited release could impair personnel if the hydrocarbon gas reduces the oxygen level to below breathable limits, however given the open ventilated location and layout of Kapuni J wellsite, this is not considered further.

However, if the portion of the cloud (i.e. the LFL) reaches an ignition source, the following consequences are credible.

4.2.2 Flash Fire

Flash fires may arise if released flammable gas fail to disperse (through confinement or still air conditions) and an ignition source is present.

Flash fires will occur when obstruction in the area is low and significant flame velocities are not generated, with the principal hazard exposure to high levels of radiant heat. Injury / fatality are likely for people located within the impact zone of the flash fire. The burn zone is typically the boundary of flammable limit of the cloud. A flash fire is a short duration event that burns for an insufficient duration to cause structural and equipment damage.

If personnel are within the 100% lower flammable limit (LFL) of the gas plume, 100% fatality is assumed.

4.2.3 Explosion

Should a flammable gas accumulate in a congested or confined area. Vapour Cloud Explosions (VCEs) can occur. For deflagration type explosions, the severity of the explosion depends on the material of combustion and the degree of confinement and congestion. Explosions have the potential to lead to injury / fatality, significant equipment damage and escalation.

The Kapuni J area is generally open with good ventilation expected throughout the year. However, the areas around some equipment can be quite congested. Identification of congested areas are based on the layout drawing and the current 3D model. The identified congested areas at the wellsite are marked up on the plot plan in Figure 4-1. The "Multi-Energy Explosion" model in DNV Safeti is used to model the VCE.



Figure 4-1: Kapuni J Wellsite Layout and Congested Area

The dimensions of each congested area are estimated based on the 3D model and is given in Table 4-2.

Table 4-2: Dimensions of Congested Areas

No.	Description	Width (m)	Length (m)	Height (m)	Volume (m ³)	Blockage Ratio ^{Note 1}
1	Choke Valve Skid 1	4.5	16.5	2	149	0.1
2	Air Compression Skid	6.8	10.2	4.2	291	0.15
3	Choke Valve Skid 2	4.5	16.5	2	149	0.1
4	Choke Valve Skid 3	4.5	16.5	2	149	0.1

Note 1: The area blockage ratio is the fraction of the volume of the obstructed region that is occupied by obstructions. This is approximated for each congested area by using the 3D model.

The selection of blast curve in the “Multi-Energy Explosion” is dependent on the degree of obstruction by obstacles inside the vapour cloud, degree of confinement and ignition energy. For each congested area identified, the blast strength selection criteria and corresponding blast strength class is shown in Table 4-3.

Table 4-3: Blast Strength Index of the Congested Areas

No.	Description	Obstruction ^{Note 1}	Parallel Plane Confinement ^{Note 2}	Ignition Strength ^{Note 3}	Blast Strength Class
1	Choke Valve Skid 1	Low	No	Low	2-3
2	Air Compression Skid	Low	No	Low	2-3
3	Choke Valve Skid 2	Low	No	Low	2-3
4	Choke Valve Skid 3	Low	No	Low	2-3

Notes:

1. Obstruction:
 - High – closely packed obstacles within gas cloud giving an overall volume blockage fraction (i.e. the ratio of the volume of the obstructed area occupied by the obstacles and the total volume of the obstructed area itself) in excess of 30% and with spacing between obstacles less than 3 m.
 - Low – obstacles in gas cloud but overall blockage fraction less than 30% and/or spacing between obstacles larger than 3 m.
 - None – no obstacles within gas cloud.
2. Parallel plane confinement:
 - Yes – gas cloud, or parts of it, are confined by walls / barriers on two or three sides.
 - No – gas cloud is not confined, other than by the ground.
3. Ignition strength:
 - High – the ignition source is, for instance, a confined vent explosion. This may be due to the ignition of part of the cloud by a lower energy source, for example, inside a building.
 - Low – the ignition source is a spark, flame, hot surface, etc.

The assessment criteria for explosion overpressure are based on the explosion effects taken from the HIPAP4 as given in Table 4-4.

Table 4-4: Effects of Explosion Overpressure

Explosion Overpressure (kPa)	Effects
3.5	<ul style="list-style-type: none"> 90% glass breakage No fatality and very low probability of injury
7	<ul style="list-style-type: none"> Damage to internal partitions and joinery but can be repaired Probability of injury is 10%. No fatality
21	<ul style="list-style-type: none"> Reinforced structures distort Storage tanks fail 20% chance of fatality to a person in a building
35	<ul style="list-style-type: none"> House uninhabitable Wagons and plants items overturned Threshold of eardrum damage 50% chance of fatality for a person in a building and 15% chance of fatality for a person in the open
70	<ul style="list-style-type: none"> Threshold of lung damage 100% chance of fatality for a person in a building or in the open Complete demolition of houses

4.2.4 Jet Fire and Pool Fire

Jet fire occurs either through rapid ignition or a flash fire / explosion from a delayed ignition burning back to the source of release. Jet fires are highly directional sonic momentum driven releases, and have high flame temperatures, because air-fuel mixing is efficient. Noting, liquid and two-phase jet fires are larger than gas jets (for the same pressure and hole size) as the mass release rate is higher.

A pool fire may occur if there is a spill of flammable liquid on the ground and is ignited. Pool fires typically produce lower radiant heat levels than jet fires.

The high temperatures and radiant heat of these consequences pose a hazard for surrounding equipment and personnel. Where there is direct flame impingement or elevated levels of radiant heat, significant convective heat transfer may occur, potentially resulting in injury / fatality and failure of structural members or equipment resulting in possible further escalation. Radiant heat can also affect the ability of personnel to escape from or through an area on a facility.

The method of calculating the probability of fatality for an individual, given known exposure duration and thermal heat radiation levels, is undertaken in Safeti by using a probit function. The probit function is a general formula which takes the same form, but with various constants used. The probit used for lethality calculations is taken from the TNO Green Book [Ref. 15]. The probit function is defined as follows:

$$\text{Probit} = -36.38 + 2.56 \ln (t \times q^{4/3})$$

Where:

t = exposure duration in seconds

q = thermal radiation level in W/m²

An exposure duration of 20 seconds is used, although it is noted that personnel are likely to find some form of shielding protection within this time frame.

The NSW Hazardous Industry Planning Advisory Paper No. 4 (HIPAP4) [Ref. 17] provides the following broadly qualitative consequences to thermal radiation for information:

- 2.1 kW/m² – Minimum to cause pain after 1 minute

- 4.7 kW/m² – Will cause pain in 15 – 20 s and injury (at least 2nd degree burns) after 30s exposure. Considered the criterion for injury risk, at a tolerable frequency of 50 chances in a million per year
- 12.6 kW/m² – Significant chance of fatality for extended exposure. High chance of injury
- 23 kW/m² – Likely fatality for extended exposure, and chance of fatality for instantaneous exposure
- 35 kW/m² – Significant chance of fatality for people exposed instantaneously

4.2.5 BLEVE

Boiling Liquid Expanding Vapour Explosion (BLEVE) is an escalation scenario that occurs as a result of prolonged flame impingement on above ground pressurised vessels containing materials such as liquefied petroleum gas (LPG) or lighter end hydrocarbon. BLEVE would result in an explosion overpressure together with a fireball and missile generation over some distance. As the fireball tends to drift upward and to avoid double counting on the fatality probabilities, only fatalities from the explosion overpressure effects are considered in this risk assessment. The fatality criteria are considered similar to explosion events as shown in Table 4-4 above.

The probability of BLEVE depends on various factors, including the types of flammable material and liquid inventory in the vessel, material of construction of the vessel, types and number of fire protection systems (e.g., relief valves, cooling systems), mechanism of vessel failure (external impact, jet fire impingement or pool fire impingement), etc. There is no clear guideline or criteria to determine the likelihood of a BLEVE on a pressurised vessel. For this risk assessment, BLEVE is considered credible if a pressurised vessel containing at least 4 m³ of volatile hydrocarbon (liquid butane or lighter) is exposed to direct flame impingement for 5 minutes or longer.

Liquid volume calculation for the vessels on Kapuni J are shown in Table 4-5. Noting, the dimensions of the LP Separator have increased from the original QRA. A future slug catcher has also been considered in this update.

Table 4-5: Kapuni J Vessel Liquid Volume Calculation

Tag No.	Description	Diameter (m)	Length (m)	Liquid Level (m)	Total Volume (m ³)	Liquid Volume (m ³)
V-420	Low Pressure Separator	1.7	4.5	0.7	10.2	4.0
V-230/ V-330	Low Temperature Separator A/B	1.8	5.6	0.92	14.8	7.4
V-220/ V-320	High Pressure Knockout Drum A/B	1.6	4.5	0.5	6.9	2.2
-	Future Slug Catcher	1.8	9.0	0.625	23.6	7.7

Based on the above, the LP Separator (V-420), Low Temperature Separators (V-230/V-330) and Future Slug Catcher fulfil the criteria of liquid inventory for BLEVE. However, based on the material composition, the components in the liquid section are mostly heavy hydrocarbons with volatile hydrocarbons making up less than 25% of the total composition. Therefore, BLEVE is not considered credible for any vessel in the Kapuni J Wellsite.

4.2.6 Toxic Effects

Like flammable gas dispersion, following a release, a toxic gas cloud will form, the extent of which is determined by the operating conditions, size of the release, release orientation, weather conditions and degree of obstruction within the area. A release could impair personnel if they are exposed to harmful concentrations.

Fatality probability when exposed to toxic gas as a function of exposure concentration and duration can be calculated by using a probit function of the form given below:

$$\text{Probit} = a + b \ln (C^n \times t)$$

where:

t = exposure duration in minutes

C = concentration in ppm

a, b and n = material specific probit constants

Two toxic materials are considered in the QRA, which are methanol and carbon dioxide. The probit constants for toxic materials are summarised in Table 4-6.

Table 4-6: Probit Constants for Toxic Materials

Toxic Material	a	b	n
Methanol	-23.67	1.937	1
Carbon Dioxide	-90.78	1.01	8

4.3 Release Scenarios

Release rates are calculated based on the release hole sizes and fluid pressure. The height of release from all scenarios are assumed to be at 1 m above ground. It is assumed that 70% of the releases are horizontal releases and 30% of the releases are vertical releases.

The total volume released is driven by either the release rate prior to isolation or the stored volume available for release post isolation (estimated by equipment sizes and locations of isolation valves). For each release case, the worst-case scenario (release at operating pressure until detection/isolation) is determined and used as representative for the release case. As the time for detection and isolation is not known, the initial assessment assumes immediate detection and isolation. For modelling purposes, the following release assumptions are applied:

- Release of the entire inventory is assumed.
- Jet fires are modelled based on initial release conditions, and do not take account of the depressurisation that occurs over time.

The release scenarios and the respective operating conditions that are used in the QRA update are presented in Table 4-7. Some of the operating conditions were revised to reflect conditions when compression facilities are operational.

For the current QRA update, operating conditions for part of the production flowline and manifold are updated, and additional equipment to be installed. The changes are provided and discussed with the client [Ref. 22], which include:

- W-010 will be sidetracked and will operate at HP. Future wells W-090 to W-012 are also assumed to operate at HP. The HP wells will flow to the LTS Trains J1 and Train J2 and share an isolatable inventory.
- W-020 to W-040 and future wells W-050 to W-080 will operate at LP. The LP wells will flow to the LP Train and share an isolatable inventory.
- The choke skid configuration for the existing skids is considered same / similar for the third choke skid for the future wells W-090 to W-012 and can be used as the representative for the parts count for leak frequencies estimation.
- For the future slug catcher and pig receiver, the following assumptions have been made:
 - The future slug catcher and pump arrangement will be similar to the design implemented at the KA-8/12/15/18 wellsite. As such, the P&IDs from this site have been used as the representative for the parts count for leak frequencies estimation [Ref. 23].
 - The future pig receiver from the KA-1/7/19/20 wellsite is the same size as the existing LP wet gas pig launcher/receiver (930-V-910). As such, the P&ID for this pig receiver has been used as the representative for the parts count for leak frequencies estimation Ref. 23].

Table 4-7: Release Scenarios and Operating Conditions

No.	Release Case	Description	Stream Comp.	Temp. (°C)	Pres. (barg)	Inventory (m ³)	Remarks
1	J01A_W001Blow_V	W010 Blowout Event	1	35	55	Note-1	Well shall be sidetracked, and will be operating at a pressure of 55 barg
2	J01B_W002Blow_V	W020 Blowout Event	1	35	20	Note-1	Will be operating at a lower pressure of 20 barg
3	J01C_W003Blow_V	W030 Blowout Event	1	35	20	Note-1	Will be operating at a lower pressure of 20 barg
4	J01D_W004Blow_V	W040 Blowout Event	1	35	20	Note-1	Will be operating at a lower pressure of 20 barg
5	J01E_W001WRel_V	W010 Well Release	1	35	20	Note-1	Will be operating at a lower pressure of 20 barg
6	J01F_W002WRel_V	W020 Well Release	1	35	20	Note-1	Will be operating at a lower pressure of 20 barg
7	J01G_W003WRel_V	W030 Well Release	1	35	20	Note-1	Will be operating at a lower pressure of 20 barg
8	J01H_W004WRel_V	W040 Well Release	1	35	20	Note-1	Will be operating at a lower pressure of 20 barg
9	J02A_W001Flow_V	Well fluids in production flowline from well W010 isolation valve (XSV-0103) up to choke valve skid boundary	1	35	55	8.1	Well W-010 shall be sidetracked, and will be operating at a pressure of 55 barg. Change in section boundaries due to different (HP) manifold to train alignment, inventory updated. Shares an inventory with other HP wells (Section J19A-I)
10	J02B_W001ChIn_V	Well fluids in well W010 production flowline within choke valve skid boundary up to choke valve	1	35	55	8.1	Well W-010 shall be sidetracked, and will be operating at a pressure of 55 barg. Change in section boundaries due to different (HP) manifold to train alignment, inventory updated. Shares an inventory with other HP wells (Section J19A-I)
11	J02C_ChMani_V	Well fluids in production manifold from choke valve up to Train J1 isolation valves (XSV-2001&2002) and Train J2 isolation valves (XSV-3001&3002)	2	44.8	55	8.1	Well W-010 shall be sidetracked, and will be operating at a pressure of 55 barg. Change in section boundaries due to different (HP) manifold to train alignment, inventory updated. Shares an inventory with other HP wells (Section J19A-I)

KAPUNI J WELLSITE
QUANTITATIVE RISK ASSESSMENT

No.	Release Case	Description	Stream Comp.	Temp. (°C)	Pres. (barg)	Inventory (m ³)	Remarks
12	J02D_W002Flow_V	Well fluids in production flowline from well W020 isolation valve (XSV-0203) up to choke valve skid boundary	1	35	20	11.8	Wells W-020 to W-040 will be operating at a lower pressure of 20 barg. Change in section boundaries due to different (LP) manifold to train alignment. Shares inventory with other LP wells (Section S17A-J)
13	J02E_W002ChIn_V	Well fluids in well W020 production flowline within choke valve skid boundary up to choke valve	1	35	20	11.8	Wells W-020 to W-040 will be operating at a lower pressure of 20 barg. Change in section boundaries due to different (LP) manifold to train alignment. Shares inventory with other LP wells (Section S17A-J)
14	J02F_W003Flow_V	Well fluids in production flowline from well W030 isolation valve (XSV-0303) up to choke valve skid boundary	1	35	20	11.8	Wells W-020 to W-040 will be operating at a lower pressure of 20 barg. Change in section boundaries due to different (LP) manifold to train alignment. Shares inventory with other LP wells (Section S17A-J)
15	J02G_W003ChIn_V	Well fluids in well W030 production flowline within choke valve skid boundary up to choke valve	1	35	20	11.8	Wells W-020 to W-040 will be operating at a lower pressure of 20 barg. Change in section boundaries due to different (LP) manifold to train alignment. Shares inventory with other LP wells (Section S17A-J)
16	J02H_W004Flow_V	Well fluids in production flowline from well W040 isolation valve (XSV-0403) up to choke valve skid boundary	1	35	20	11.8	Wells W-020 to W-040 will be operating at a lower pressure of 20 barg. Change in section boundaries due to different (LP) manifold to train alignment. Shares inventory with other LP wells (Section S17A-J)
17	J02I_W004ChIn_V	Well fluids in well W040 production flowline within choke valve skid boundary up to choke valve	1	35	20	11.8	Wells W-020 to W-040 will be operating at a lower pressure of 20 barg. Change in section boundaries due to different (LP) manifold to train alignment. Shares inventory with other LP wells (Section S17A-J)
18	J02J_ChManiC_V	Well fluids in production manifold to LP Train isolation valves (XSV-4001&4002)	1	35	20	11.8	Wells W-020 to W-040 will be operating at a lower pressure of 20 barg. Change in section boundaries due to different (LP) manifold to train alignment. Shares inventory with other LP wells (Section S17A-J)

KAPUNI J WELLSITE
QUANTITATIVE RISK ASSESSMENT

No.	Release Case	Description	Stream Comp.	Temp. (°C)	Pres. (barg)	Inventory (m ³)	Remarks
19	J03A_TrAHeader_V	Well fluids from Train J1 header from XSV-2001 and XSV-2002 through the LTS coils up to the inlet of the HPKO A (V-220)	2	44.8	54.5	15.8	Vessel dimension updated. HP wells will be operating at a pressure of 55 barg
20	J03B_HPKOAVap_V	HPKO Vessel A (V-220) vapour section through the GG exchanger tube side up to inlet of LTS A (V-230)	3	44.8	54.5	15.8	Vessel dimension updated. HP wells will be operating at a pressure of 55 barg
21	J03C_HPKOALiq_L	HPKO Vessel A (V-220) liquid section up to LCV-2203	9	44.8	54.5	2.5	Vessel dimension updated. HP wells will be operating at a pressure of 55 barg
22	J03D_LTSAVap_V	Low Temperature Separator A (V-230) vapour section through the GG exchanger shell side up to XSV-2405	6	6	48.3	15.8	Vessel dimension updated
23	J03E_LTSALiq_L	Low Temperature Separator A (V-230) liquid section up to LCV-2305	11	30.1	48.3	7.5	Vessel dimension updated
24	J03F_HPKOALCV_L	HPKO A (V-220) Liquid from LCV-2203 up to XSV-2204	10	39.2	48.3	2.5	Vessel dimension updated
25	J03G_LiqToL TSA_L	Liquid from XSV-2204 to liquid inlet of LTS A (V-230)	10	39.2	48.3	7.5	Vessel dimension updated
26	J03H_LTSALCV_L	LTS A (V-230) Liquid from LCV-2305 up to XSV-2306	12	20.2	24.2	7.5	Vessel dimension updated
27	J04A_DryGHeader_V	HP dry gas header from XSV-2405 and XSV-3405 up to pig launcher skid boundary	7	38.7	48.1	6.6	
28	J04B_DryGPLSkid_V	HP dry gas header inside pig launcher skid boundary up to pipeline isolation XSV-9202	7	38.7	48.1	6.6	
29	J04C_DryGPLaun_V	HP Dry Gas Pig Launcher (930-V-920)	7	38.7	48.1	6.6	

KAPUNI J WELLSITE
QUANTITATIVE RISK ASSESSMENT

No.	Release Case	Description	Stream Comp.	Temp. (°C)	Pres. (barg)	Inventory (m ³)	Remarks
30	J04D_DryGPRSkid_V	HP dry gas header from KA-8/12/15/18 inside pig receiver skid	7	38.7	48.1	6.6	
31	J04E_DryGPRec_V	HP dry gas from KA-8/12/15/18 Pig Receiver (930-V-900)	7	38.7	48.1	6.6	
32	J04F_FGHeater_V	Fuel gas header	7	38.7	48.1	6.6	Change of section boundary as fuel gas end users not normally in operation and agreed to be excluded
33	J05A_TrBHeader_V	Well fluids in Train J2 header from XSV-3001 and XSV-3002 through the LTS coils up to the inlet of the HPKO B (V-320)	17	42.3	54.5	15.8	Vessel dimension updated. HP wells feeding this skid will be operating at 55 barg. Composition updated per Compression update memorandum [Ref. 2]
34	J05B_HPKOVBap_V	High Pressure Knockout Vessel B (V-320) vapour section through the GG exchanger tube side up to inlet of LTS B (V-330)	18	42.3	54.5	15.8	Vessel dimension updated. HP wells feeding this skid will be operating at 55 barg. Composition updated per Compression update memorandum [Ref. 2]
35	J05C_HPKOBLiq_L	High Pressure Knockout Vessel B (V-320) liquid section up to LCV-3203	25	42.3	54.5	2.5	Vessel dimension updated. HP wells feeding this skid will be operating at 55 barg. Composition updated per Compression update memorandum [Ref. 2]
36	J05D_LTSBVap_V	Low Temperature Separator B (V-330) vapour section through the GG exchanger shell side up to XSV-3405	21	15	49.5	15.8	Vessel dimension updated. HP wells feeding this skid will be operating at 55 barg. Composition updated per Compression update memorandum [Ref. 2]
37	J05E_LTSBLiq_L	Low Temperature Separator B (V-330) liquid section up to LCV-3305	27	33.9	49.5	7.5	Vessel dimension updated. HP wells feeding this skid will be operating at 55 barg. Composition updated per Compression update memorandum [Ref. 2]
38	J05F_HPKOBLCV_L	HPKO B (V-320) Liquid from LCV-3203 up to XSV-3204	26	40.6	49.5	2.5	Vessel dimension updated. HP wells feeding this skid will be operating at 55 barg. Composition updated per Compression update memorandum [Ref. 2]
39	J05G_LiqToLTSB_L	Liquid from XSV-3204 to liquid inlet of LTS B (V-330)	26	40.6	49.5	2.5	Vessel dimension updated. HP wells feeding this skid will be operating at 55 barg. Composition updated per Compression update memorandum [Ref. 2]

KAPUNI J WELLSITE
QUANTITATIVE RISK ASSESSMENT

No.	Release Case	Description	Stream Comp.	Temp. (°C)	Pres. (barg)	Inventory (m ³)	Remarks
40	J05H_LTSBLCV_L	LTS B (V-330) Liquid from LCV-3305 up to XSV-3306	28	25.9	24.16	7.5	Vessel dimension updated. HP wells feeding this skid will be operating at 55 barg. Composition updated per Compression update memorandum [Ref. 2]
41	J06B_LPsepVap_V	Low Pressure Separator (V-420) vapour section to wet gas launcher skid boundary	13	35	20	15.7	Vessel dimension updated. Shares inventory with Sections J20A-C J06B and J24A
42	J06C_LPsepLiq_L	LP Separator (V-420) liquid section up to LP Separator Liquids Pump	15	35	20	4.2	Vessel dimension updated. Section boundary changed due to addition of LP Separator pumps. In this operating mode the pump suction is 20barg and the pump discharge is 18barg. The pumps are bypassed
43	J06D_LPsepLCV_L	LP Separator Liquids Pump Discharge to LCV-4208	16	16.1	18	4.2	Vessel dimension updated. Section boundary changed due to addition of LP Separator pumps. In this operating mode the pump suction is 20barg and the pump discharge is 18barg. The pumps are bypassed
44	J06E_LPsepPump_L	LP Separator Liquids from LCV-4208 to XSV-4215	16	16.1	18	4.2	New section due to addition of LP Separator pumps. In this operating mode the pump suction is 20barg and the pump discharge is 18barg. The pumps are bypassed
45	J07A_WetGPipe_V	LP wet gas pipeline to/from KA-8/12/15/18 inside wellsite boundary	13	20.2	20	91.6	Inventory updated as provided by Todd to reflect entire pipeline inventory.
46	J08A_LiqHeader_L	Liquid header from XSV-2306, XSV-3306, XSV-4215 and future slug catcher liquids up to liquid pig launcher skid boundary	16	16.1	18	2.2	Change of boundary due to change in configuration of liquid lines from LTS trains (removal of XSVs)
47	J08B_LiqPLSkid_L	Liquid header inside liquid pig launcher skid boundary up to pipeline isolation boundary	16	16.1	18	2.2	Operating pressure updated as provided by Todd
48	J08C_LiqPLaun_L	Liquid Pig Launcher (930-V-930)	16	16.1	18	2.2	Operating pressure updated as provided by Todd
49	J08D_FBWPLSkid_L	Liquid header inside flowback water pig launcher skid boundary up to pipeline isolation boundary	16	16.1	18	2.2	Operating pressure updated as provided by Todd

KAPUNI J WELLSITE
QUANTITATIVE RISK ASSESSMENT

No.	Release Case	Description	Stream Comp.	Temp. (°C)	Pres. (barg)	Inventory (m ³)	Remarks
50	J08E_FBWPLaunB_L	Flowback water pig launcher (930-V-940)	16	16.1	18	2.2	Operating pressure updated as provided by Todd
51	J09A_LiqPipe_L	Condensate / water pipeline to KA-4/14 inside wellsite boundary	16	16.1	18	26.1	Inventory updated as provided by Todd to reflect entire pipeline inventory.
52	J10A_FBWPipe_L	Condensate / flowback water pipeline to KA-4/14 inside wellsite boundary	16	16.1	18	11.5	Inventory updated as provided by Todd to reflect entire pipeline inventory.
53	J11A_DryKAGasPipe_V	HP dry gas in incoming pipeline from KA-8/12/15/18 within wellsite	7	38.7	48.1	58.1	Inventory updated as provided by Todd to reflect entire pipeline inventory.
54	J12A_DryGasPipe_V	HP dry gas export pipeline to KA-4/14 within wellsite boundary	7	38.7	48.1	102.2	Inventory updated as provided by Todd to reflect entire pipeline inventory.
55	J13A_MetTank_L	Methanol Dosing Tank	Methanol	14	0	4.0	Methanol tank dimension updated.
56	J13B_MetTankOut_L	Methanol Dosing Tank outlet up to methanol dosing pumps	Methanol	14	0	4.0	Methanol tank dimension updated. Section boundary updated due to revised methanol dosing arrangement
57	J13C_MetDisLTS_L	Methanol distribution system to LTS	Methanol	14	55	4.0	Methanol tank dimension updated. Section boundary updated due to revised methanol dosing arrangement. Continuous methanol injection is upstream PCV-2302 (V-230 choke) and PCV-3302 (V-330 choke). Operating pressure reduced as the pressure for the HPKO has also been reduced.
58	J16A_W005Blow_V	W050 Blowout Event	1	35	20	Note-1	Will be operating at a lower pressure of 20 barg
59	J16B_W006Blow_V	W060 Blowout Event	1	35	20	Note-1	Will be operating at a lower pressure of 20 barg
60	J16C_W007Blow_V	W070 Blowout Event	1	35	20	Note-1	Will be operating at a lower pressure of 20 barg
61	J16D_W008Blow_V	W080 Blowout Event	1	35	20	Note-1	Will be operating at a lower pressure of 20 barg
62	J16E_W005WRel_V	W050 Well Release	1	35	20	Note-1	Will be operating at a lower pressure of 20 barg
63	J16F_W006WRel_V	W060 Well Release	1	35	20	Note-1	Will be operating at a lower pressure of 20 barg
64	J16G_W007WRel_V	W070 Well Release	1	35	20	Note-1	Will be operating at a lower pressure of 20 barg

KAPUNI J WELLSITE
QUANTITATIVE RISK ASSESSMENT

No.	Release Case	Description	Stream Comp.	Temp. (°C)	Pres. (barg)	Inventory (m ³)	Remarks
65	J16H_W008WRel_V	W080 Well Release	1	35	20	Note-1	Will be operating at a lower pressure of 20 barg
66	J17A_W005Flow_V	Well fluids in production flowline from well W050 isolation valve (XSV-0503) up to choke valve skid boundary including Cyclone Desander V-131	1	35	20	11.8	Section boundary changed, assumes well will require a permanent desander. Shares inventory with other LP wells (Section J02D-J)
67	J17B_W005ChIn_V	Well fluids in well W050 production flowline within choke valve skid boundary up to choke valve	1	35	20	11.8	Shares inventory with other LP wells (Section J02D-J)
68	J17D_W006Flow_V	Well fluids in production flowline from well W060 isolation valve (XSV-0603) up to choke valve skid boundary	1	35	20	11.8	Shares inventory with other LP wells (Section J02D-J)
69	J17E_W006ChIn_V	Well fluids in well W060 production flowline within choke valve skid boundary up to choke valve	1	35	20	11.8	Shares inventory with other LP wells (Section J02D-J)
70	J17F_W007Flow_V	Well fluids in production flowline from well W070 isolation valve (XSV-0703) up to choke valve skid boundary	1	35	20	11.8	Shares inventory with other LP wells (Section J02D-J)
71	J17G_W007ChIn_V	Well fluids in well W070 production flowline within choke valve skid boundary up to choke valve	1	35	20	11.8	Shares inventory with other LP wells (Section J02D-J)
72	J17H_W008Flow_V	Well fluids in production flowline from well W080 isolation valve (XSV-0803) up to choke valve skid boundary	1	35	20	11.8	Shares inventory with other LP wells (Section J02D-J)
73	J17I_W008ChIn_V	Well fluids in well W080 production flowline within choke valve skid boundary up to choke valve	1	35	20	11.8	Shares inventory with other LP wells (Section J02D-J)
74	J17J_ChManiC_V	Well fluids in production manifold to over pressure protection SDV of train header C	1	35	20	11.8	New section due to different manifold to train alignment. Shares inventory with other LP wells (Section J02D-J)

KAPUNI J WELLSITE
QUANTITATIVE RISK ASSESSMENT

No.	Release Case	Description	Stream Comp.	Temp. (°C)	Pres. (barg)	Inventory (m ³)	Remarks
75	J18A_W009Blow_V	W090 Blowout Event	1	45	55	Note-1	HP well operating pressure reduced from 80 barg to 55 barg
76	J18B_W010Blow_V	W100 Blowout Event	1	45	55	Note-1	HP well operating pressure reduced from 80 barg to 55 barg
77	J18C_W011Blow_V	W110 Blowout Event	1	45	55	Note-1	HP well operating pressure reduced from 80 barg to 55 barg
78	J18D_W012Blow_V	W120 Blowout Event	1	45	55	Note-1	HP well operating pressure reduced from 80 barg to 55 barg
79	J18E_W009WRel_V	W090 Well Release	1	45	55	Note-1	HP well operating pressure reduced from 80 barg to 55 barg
80	J18F_W010WRel_V	W100 Well Release	1	45	55	Note-1	HP well operating pressure reduced from 80 barg to 55 barg
81	J18G_W011WRel_V	W110 Well Release	1	45	55	Note-1	HP well operating pressure reduced from 80 barg to 55 barg
82	J18H_W012WRel_V	W120 Well Release	1	45	55	Note-1	HP well operating pressure reduced from 80 barg to 55 barg
83	J19A_W009Flow_V	Well fluids in production flowline from well W090 isolation valve (XSV-0903) up to choke valve skid boundary including Cyclone Desander V-131	1	45	55	8.1	HP well pressure reduced from 80 barg to 55 barg. Section boundary changed, assumes well will require a permanent desander. Shares inventory with other HP wells (Section J02A-C)
84	J19B_W009ChIn_V	Well fluids in well W090 production flowline within choke valve skid boundary up to choke valve	1	45	55	8.1	HP well pressure reduced from 80 barg to 55 barg. Shares inventory with other HP wells (Section J02A-C)
85	J19D_W010Flow_V	Well fluids in production flowline from well W100 isolation valve (XSV-1003) up to choke valve skid boundary	1	45	55	8.1	HP well pressure reduced from 80 barg to 55 barg. Shares inventory with other HP wells (Section J02A-C)
86	J19E_W010ChIn_V	Well fluids in well W100 production flowline within choke valve skid boundary up to choke valve	1	45	55	8.1	HP well pressure reduced from 80 barg to 55 barg. Shares inventory with other HP wells (Section J02A-C)
87	J19F_W011Flow_V	Well fluids in production flowline from well W110 isolation valve (XSV-1103) up to choke valve skid boundary	1	45	55	8.1	HP well pressure reduced from 80 barg to 55 barg. Shares inventory with other HP wells (Section J02A-C)

KAPUNI J WELLSITE
QUANTITATIVE RISK ASSESSMENT

No.	Release Case	Description	Stream Comp.	Temp. (°C)	Pres. (barg)	Inventory (m ³)	Remarks
88	J19G_W011ChIn_V	Well fluids in well W110 production flowline within choke valve skid boundary up to choke valve	1	45	55	8.1	HP well pressure reduced from 80 barg to 55 barg. Shares inventory with other HP wells (Section J02A-C)
89	J19H_W012Flow_V	Well fluids in production flowline from well W120 isolation valve (XSV-1203) up to choke valve skid boundary	1	45	55	8.1	HP well pressure reduced from 80 barg to 55 barg. Shares inventory with other HP wells (Section J02A-C)
90	J19I_W012ChIn_V	Well fluids in well W120 production flowline within choke valve skid boundary up to choke valve	1	45	55	8.1	HP well pressure reduced from 80 barg to 55 barg. Shares inventory with other HP wells (Section J02A-C)
91	J20A_LPSepVapA_V	Vapour from LP Train XSV-4001&4002 through the wet gas header to low pressure separator (V-420)	13	20.2	20	15.7	Shares inventory with Sections J20A-C, J06B and J24A
92	J20B_WetGPLskid_V	Wet gas header inside pig launcher skid boundary up to pipeline isolation XSV-9102	13	20.2	20	15.7	Shares inventory with Sections J20A-C, J06B and J24A
93	J20C_WetGPLaun_V	Wet Gas Pig Launcher (930-V-910)	13	20.2	20	15.7	Shares inventory with Sections J20A-C, J06B and J24A
94	J21A_Comp1Sc1_V	LP Compressor 930-X-470 feed through vapour section of 1st stage suction scrubber 1 to 1st stage compressor	13	35	20	6.8	New section based on selected compressors
95	J21B_Comp1Stg1_V	LP Compressor 930-X-470 1st stage compressor discharge through intercooler to 2nd stage suction scrubber	13	90	36	6.8	New section based on selected compressors
96	J21C_Comp1Sc2_V	LP Compressor 930-X-470 2nd stage suction scrubber vapour to 2nd stage compressor	13	40	36	6.8	New section based on selected compressors
97	J21D_Comp1Stg2_V	LP Compressor 930-X-470 2nd stage compressor discharge through aftercooler to compressor outlet XSV	13	88	55	6.8	New section based on selected compressors

KAPUNI J WELLSITE
QUANTITATIVE RISK ASSESSMENT

No.	Release Case	Description	Stream Comp.	Temp. (°C)	Pres. (barg)	Inventory (m ³)	Remarks
98	J21E_Comp1Blow_L	LP Compressor 930-X-470 condensate from suction scrubbers through blowcase	15	40	20	1.0	New section based on selected compressors
99	J22A_Comp2Sc1_V	LP Compressor 930-X-480 feed through vapour section of 1st stage suction scrubber 1 to 1st stage compressor	13	35	20	6.8	New section based on selected compressors
100	J22B_Comp2Stg1_V	LP Compressor 930-X-480 1st stage compressor discharge through intercooler to 2nd stage suction scrubber	13	90	36	6.8	New section based on selected compressors
101	J22C_Comp2Sc2_V	LP Compressor 930-X-480 2nd stage suction scrubber vapour to 2nd stage compressor	13	40	36	6.8	New section based on selected compressors
102	J22D_Comp2Stg2_V	LP Compressor 930-X-480 2nd stage compressor discharge through aftercooler to compressor outlet XSV	13	88	55	6.8	New section based on selected compressors
103	J22E_Comp2Blow_L	LP Compressor 930-X-480 condensate from suction scrubbers through blowcase	15	40	20	1.0	New section based on selected compressors
104	J23A_CompDisc_V	LP Compressor Discharge Wet Gas Header	13	88	55	4.6	New section based on selected compressors
105	J23B_CompJ1LTS_V	LP Compressor Discharge Wet Gas to LTS Train J1	13	88	55	4.6	New section based on selected compressors
106	J23C_CompJ2LTS_V	LP Compressor Discharge Wet Gas to LTS Train J2	13	88	55	4.6	New section based on selected compressors
107	J24A_BlowtoLPS_L	LP Compressor blowcase to LP Separator	15	40	20	15.7	New section. Shares inventory with Sections J20A-C, J06B and J24A
108	F_SC_1_V	Future LP wet gas pipeline from KA-1/7/19/20 inside wellsite boundary	13	20	20	183.0	New section
109	F_SC_2_V	Future Wet gas header inside pig launcher skid boundary up to pipeline isolation XSV	13	20	20	29.1	New section

KAPUNI J WELLSITE
QUANTITATIVE RISK ASSESSMENT

No.	Release Case	Description	Stream Comp.	Temp. (°C)	Pres. (barg)	Inventory (m ³)	Remarks
110	F_SC_3_V	Future Wet Gas Pig Receiver (930-V-9XX)	13	20	20	29.1	New section
111	F_SC_4_V	Future wet gas piping inlet to Future Slug Catcher skid boundary	13	20	20	29.1	New section
112	F_SC_5_V	Future Slug Catcher skid boundary to slug catcher inlet	13	20	20	29.1	New section
113	F_SC_6_L	Future Slug Catcher Liquid and Piping to pump suction or LCV	15	20	20	8.7	New section
114	F_SC_7_L	Future Slug Catcher Pump discharge piping.	15	20	18	8.7	New section
115	F_SC_8_V	Future Slug Catcher Vapour and Gas Piping	13	35	20	29.1	New section

Note:

1. Inventory for blowout and well release events are considered to be unlimited because they can be supplied from the downhole reservoir.
2. Stream composition refers to the stream numbers in the KRD project HMB "Case 2" [Ref. 12]. Following the issue of the original QRA, a memorandum was prepared to consider the inclusion of the compression facilities at the Kapuni J wellsite [Ref. 2]. Some of the operating conditions were revised to reflect conditions when compression facilities are operational. As such, the material composition for release cases originating from LTS Skid B were updated as detailed in Section 4.1.

5. LEAK FREQUENCY ANALYSIS

5.1 Drilling Case Frequencies

As discussed above, the drilling case only considers blowout cases. Blowout case frequencies are based on the IOGP Blowout Frequencies for blowout events [Ref. 10]. The Phase 1 wells have already been completed and are not considered for the drilling frequency. It is assumed of the 8 remaining wells, drilling of up to four may be carried out per year. As such, the frequencies of blowout during drilling cases are shown in Table 5-1. Drilling of wells W-090 to W-012 are expected to have the same drilling blowout frequency.

Table 5-1: Drilling Blowout Frequency

No.	QRA Event	Blowout Frequency (per year)	% Contri.
1	J16A_W005Blow_V	7.30E-04	25%
2	J16B_W006Blow_V	7.30E-04	25%
3	J16C_W007Blow_V	7.30E-04	25%
4	J16D_W008Blow_V	7.30E-04	25%
TOTAL		2.92E-03	100%

The total blowout frequency is 2.92E-03 per year or equivalent to one blowout in 342 years.

5.2 Pigging Frequencies

Four pipeline pig launchers and two pig receivers (including the future wet gas pipeline from wellsite KA-1/7/19/20) are located at the Kapuni J wellsite to clean, condition and/or monitor the pipeline. Based on discussion with KRD process engineer, pigging will be assumed to be a half day operation [Ref. 3]. Pigging frequency depends on the pipeline service as shown below:

- Dry Gas service = every 12 months
- Condensate/Water service = every 6 months
- Wet Gas service = every 3 months

This pigging frequency are used to calculate a modification factor for the leak frequency from the pig launchers and receiver as shown in Table 5-2.

Table 5-2: Pigging Frequencies and Modification Factor

Tag Number	Name	Release Case	Service	Pigging Frequency (per year)	Average pigging duration (hours)	Modification Factor
930-V-900	HP dry gas from KA-8/12/15/18 Pig Receiver (8")	J04E_DryGPRC_V	Dry Gas	1	12	0.001
930-V-910	Wet Gas Pipeline Pig Launcher (10")	J20C_WetGPLaun_V	Wet Gas	4	12	0.005
930-V-920	HP Dry Gas Pig Launcher (930-V-920) (12")	J04C_DryGPLaun_V	Dry Gas	1	12	0.001
930-V-930	Condensate Pipeline Pig Launcher (6")	J08C_LiqPLaun_L	Liquid	2	12	0.003
930-V-940	Flowback Water Pipeline Pig Launcher (4")	J08E_FBWPLaunB_L	Liquid	2	12	0.003
930-V-9XX	Future Wet Gas Pig Receiver	F_SC_3_V	Wet Gas	4	12	0.005

5.3 Normal Operations with all Wells

For the original ORA, parts counts were completed for each QRA event based on master copy P&IDs issued on 1st of April 2019 [Ref. 19]. QRA sectionalisation has been marked up on updated P&IDs issued during 2022 and are attached as Appendix 1. This QRA update has not revised the parts counts with the exception of new QRA events (compression and future slug catcher) or QRA events where there have been significant updates to the P&IDs (LP Separator). Parts count sheets are attached as Appendix 2. Revisions to the parts counts sheets as described are indicated in **red**.

As detailed previously in Section 4.2, some of the of the detailed engineering information is not currently available. The following parts counts assumptions are applied:

- There are no P&IDs available for the additional wellheads W-090 to W-012 and associated choke manifold equipment. However, the design and installation are standardised for all wellheads. Therefore, leak frequencies for the additional wells are assumed to be same as those for W-010 to W-080. The parts count for those sections are considered as representative.
- The future slug catcher and pump arrangement will be similar to the design implemented at the KA-8/12/15/18 wellsite. As such, the P&IDs from this site are used as the representative for the parts count [Ref. 23].
- The future pig receiver associated with the future wet gas pipeline from the KA-1/7/19/20 wellsite is the same size as the existing LP wet gas pig launcher/receiver (930-V-910). As such, the P&ID for this pig receiver is used as representative for the parts count [Ref. 23].

Resulting leak frequencies for normal operations for each QRA event are given in Table 5-3 . The highest leak contributors are indicated in **red**. Parts counts are conducted based on the valve configurations as shown on the P&IDs, e.g. it is assumed that the pumps are not isolated when not in use, unless assumed otherwise.

Table 5-3: Hydrocarbon Release Frequencies for Normal Operations

No	QRA Event	1 - 3 mm	3 - 10 mm	10 - 50 mm	50 - 150 mm	> 150 mm	TOTAL	% Contrib.
1	J01A_W001Blow_V					4.20E-05	4.20E-05	0.02%
2	J01B_W002Blow_V					4.20E-05	4.20E-05	0.02%
3	J01C_W003Blow_V					4.20E-05	4.20E-05	0.02%
4	J01D_W004Blow_V					4.20E-05	4.20E-05	0.02%
5	J01E_W001WRel_V	3.50E-05	1.23E-05	4.20E-06	7.00E-07	2.82E-06	5.50E-05	0.03%
6	J01F_W002WRel_V	3.50E-05	1.23E-05	4.20E-06	7.00E-07	2.82E-06	5.50E-05	0.03%
7	J01G_W003WRel_V	3.50E-05	1.23E-05	4.20E-06	7.00E-07	2.82E-06	5.50E-05	0.03%
8	J01H_W004WRel_V	3.50E-05	1.23E-05	4.20E-06	7.00E-07	2.82E-06	5.50E-05	0.03%
9	J02A_W001Flow_V	6.24E-04	2.62E-04	1.41E-04	1.47E-06	3.22E-07	1.03E-03	0.55%
10	J02B_W001ChIn_V	6.39E-04	2.80E-04	1.41E-04	2.34E-05	2.72E-06	1.09E-03	0.58%
11	J02C_ChMani_V	2.26E-03	9.60E-04	4.81E-04	5.55E-05	4.66E-06	3.76E-03	2.00%
12	J02D_W002Flow_V	7.55E-04	3.17E-04	1.69E-04	2.08E-06	4.55E-07	1.03E-03	0.55%
13	J02E_W002ChIn_V	6.39E-04	2.80E-04	1.41E-04	2.34E-05	2.72E-06	1.09E-03	0.58%
14	J02F_W003Flow_V	7.55E-04	3.17E-04	1.69E-04	2.08E-06	4.55E-07	1.03E-03	0.55%
15	J02G_W003ChIn_V	6.39E-04	2.80E-04	1.41E-04	2.34E-05	2.72E-06	1.09E-03	0.58%
16	J02H_W004Flow_V	7.55E-04	3.17E-04	1.69E-04	2.08E-06	4.55E-07	1.03E-03	0.55%

KAPUNI J WELLSITE
QUANTITATIVE RISK ASSESSMENT

No	QRA Event	1 - 3 mm	3 - 10 mm	10 - 50 mm	50 - 150 mm	> 150 mm	TOTAL	% Contrib.
17	J02I_W004ChIn_V	6.39E-04	2.80E-04	1.41E-04	2.34E-05	2.72E-06	1.09E-03	0.58%
18	J02J_ChManiC_V	2.23E-03	9.56E-04	4.83E-04	5.17E-05	6.82E-06	3.73E-03	1.98%
19	J03A_TrAHeader_V	9.03E-04	3.95E-04	2.12E-04	1.72E-05	3.41E-06	1.53E-03	0.81%
20	J03B_HPKOAVap_V	1.66E-03	7.92E-04	4.52E-04	7.97E-05	2.81E-05	3.01E-03	1.60%
21	J03C_HPKOALiq_L	8.81E-04	4.06E-04	2.21E-04	4.62E-05		1.55E-03	0.83%
22	J03D_LTSAVap_V	2.90E-03	1.32E-03	6.88E-04	1.09E-04	2.65E-05	5.04E-03	2.68%
23	J03E_LTSALiq_L	1.26E-03	5.57E-04	2.95E-04	4.83E-05		2.16E-03	1.14%
24	J03F_HPKOALCV_L	6.08E-05	2.58E-05	1.28E-05	1.56E-06		1.01E-04	0.05%
25	J03G_LiqToLTSAL_L	1.62E-04	6.87E-05	3.20E-05	5.69E-06		2.69E-04	0.14%
26	J03H_LTSALCV_L	2.46E-04	1.07E-04	5.40E-05	6.93E-06		4.14E-04	0.22%
27	J04A_DryGHeader_V	2.65E-04	1.21E-04	6.92E-05	1.06E-05	3.21E-06	4.69E-04	0.25%
28	J04B_DryGPLskid_V	2.48E-04	1.22E-04	6.73E-05	1.57E-05	6.46E-06	4.59E-04	0.24%
29	J04C_DryGPLaun_V	3.02E-06	1.51E-06	8.32E-07	2.02E-07	5.75E-08	5.62E-06	0.00%
30	J04D_DryGPRskid_V	3.55E-04	1.61E-04	8.39E-05	1.07E-05	3.20E-06	6.14E-04	0.33%
31	J04E_DryGPRec_V	2.85E-06	1.44E-06	7.89E-07	1.97E-07	5.63E-08	5.32E-06	0.00%
32	J04F_FGHeater_V	5.51E-04	2.40E-04	1.21E-04	2.58E-05		9.39E-04	0.50%
33	J05A_TrBHeader_V	9.16E-04	4.01E-04	2.15E-04	1.80E-05	3.65E-06	1.55E-03	0.83%
34	J05B_HPKOBVap_V	1.75E-03	8.39E-04	4.77E-04	8.63E-05	3.03E-05	3.19E-03	1.69%
35	J05C_HPKOBLiq_L	8.22E-04	3.75E-04	2.04E-04	4.02E-05		1.44E-03	0.77%
36	J05D_LTSBVap_V	2.90E-03	1.32E-03	6.88E-04	1.09E-04	2.65E-05	5.04E-03	2.68%
37	J05E_LTSBLiq_L	1.15E-03	5.10E-04	2.74E-04	4.00E-05		1.97E-03	1.05%
38	J05F_HPKOBLCV_L	1.03E-04	4.71E-05	2.34E-05	5.95E-06		1.79E-04	0.10%
39	J05G_LiqToLTSB_L	1.62E-04	6.87E-05	3.20E-05	5.69E-06		2.69E-04	0.14%
40	J05H_LTSBLCV_L	2.46E-04	1.07E-04	5.40E-05	6.93E-06		4.14E-04	0.22%
41	J06B_LPsepVap_V	1.98E-03	8.73E-04	4.60E-04	7.20E-05	1.04E-05	3.39E-03	1.80%
42	J06C_LPsepLiq_L	1.42E-03	6.34E-04	3.41E-04	5.80E-05	2.69E-06	2.45E-03	1.30%
43	J06D_LPsepLCV_L	2.80E-03	1.62E-03	1.09E-03	9.27E-04	3.95E-06	6.44E-03	3.42%
44	J06E_LPsepPump_L	1.53E-04	7.10E-05	3.60E-05	8.55E-06	1.65E-06	2.70E-04	0.14%
45	J07A_WetGPipe_V	3.33E-04	1.41E-04	7.50E-05	2.93E-06	9.95E-07	5.53E-04	0.29%
46	J08A_LiqHeader_L	5.28E-04	2.32E-04	1.25E-04	1.66E-05	1.33E-06	9.03E-04	0.48%
47	J08B_LiqPLskid_L	2.48E-04	1.09E-04	5.20E-05	9.48E-06	2.50E-06	4.21E-04	0.22%
48	J08C_LiqPLaun_L	6.07E-06	3.03E-06	1.66E-06	7.01E-07	6.56E-09	1.15E-05	0.01%
49	J08D_FBWPLskid_L	4.38E-04	1.94E-04	9.80E-05	1.85E-05		7.48E-04	0.40%
50	J08E_FBWPLaunB_L	5.88E-06	2.94E-06	1.62E-06	6.94E-07		1.11E-05	0.01%
51	J09A_LiqPipe_L	1.54E-04	6.48E-05	3.46E-05	4.48E-07	9.80E-08	2.54E-04	0.14%

KAPUNI J WELLSITE
QUANTITATIVE RISK ASSESSMENT

No	QRA Event	1 - 3 mm	3 - 10 mm	10 - 50 mm	50 - 150 mm	> 150 mm	TOTAL	% Contrib.
52	J10A_FBWPipe_L	1.54E-04	6.48E-05	3.46E-05	5.46E-07		2.54E-04	0.14%
53	J11A_DryKAGasPipe_V	3.38E-04	1.46E-04	7.61E-05	5.03E-06	1.49E-06	5.67E-04	0.30%
54	J12A_DryGasPipe_V	2.64E-04	1.12E-04	6.01E-05	1.36E-06	6.37E-07	4.38E-04	0.23%
55	J13A_MetTank_L	6.90E-04	3.20E-04	2.22E-04			1.23E-03	0.65%
56	J13B_MetTankOut_L	3.73E-03	1.48E-03	7.80E-04			5.99E-03	3.18%
57	J13C_MetDisLTS_L	2.08E-03	1.32E-03	1.88E-03			5.27E-03	2.80%
58	J16A_W005Blow_V					4.20E-05	4.20E-05	0.02%
59	J16B_W006Blow_V					4.20E-05	4.20E-05	0.02%
60	J16C_W007Blow_V					4.20E-05	4.20E-05	0.02%
61	J16D_W008Blow_V					4.20E-05	4.20E-05	0.02%
62	J16E_W005WRel_V	3.50E-05	1.23E-05	4.20E-06	7.00E-07	2.82E-06	5.50E-05	0.03%
63	J16F_W006WRel_V	3.50E-05	1.23E-05	4.20E-06	7.00E-07	2.82E-06	5.50E-05	0.03%
64	J16G_W007WRel_V	3.50E-05	1.23E-05	4.20E-06	7.00E-07	2.82E-06	5.50E-05	0.03%
65	J16H_W008WRel_V	3.50E-05	1.23E-05	4.20E-06	7.00E-07	2.82E-06	5.50E-05	0.03%
66	J17A_W005Flow_V	1.61E-03	7.37E-04	4.05E-04	8.94E-05	1.22E-06	2.85E-03	1.51%
67	J17B_W005ChIn_V	6.39E-04	2.80E-04	1.41E-04	2.34E-05	2.72E-06	1.09E-03	0.58%
68	J17D_W006Flow_V	7.55E-04	3.17E-04	1.69E-04	2.08E-06	4.55E-07	1.24E-03	0.66%
69	J17E_W006ChIn_V	6.39E-04	2.80E-04	1.41E-04	2.34E-05	2.72E-06	1.09E-03	0.58%
70	J17F_W007Flow_V	1.73E-03	7.88E-04	4.31E-04	8.97E-05	1.28E-06	3.04E-03	1.62%
71	J17G_W007ChIn_V	6.39E-04	2.80E-04	1.41E-04	2.34E-05	2.72E-06	1.09E-03	0.58%
72	J17H_W008Flow_V	7.55E-04	3.17E-04	1.69E-04	2.08E-06	4.55E-07	1.24E-03	0.66%
73	J17I_W008ChIn_V	6.39E-04	2.80E-04	1.41E-04	2.34E-05	2.72E-06	1.09E-03	0.58%
74	J17J_ChManiC_V	1.83E-03	7.89E-04	4.19E-04	2.94E-05	4.96E-06	3.07E-03	1.63%
75	J18A_W009Blow_V					4.20E-05	4.20E-05	0.02%
76	J18B_W010Blow_V					4.20E-05	4.20E-05	0.02%
77	J18C_W011Blow_V					4.20E-05	4.20E-05	0.02%
78	J18D_W012Blow_V					4.20E-05	4.20E-05	0.02%
79	J18E_W009WRel_V	3.50E-05	1.23E-05	4.20E-06	7.00E-07	2.82E-06	5.50E-05	0.03%
80	J18F_W010WRel_V	3.50E-05	1.23E-05	4.20E-06	7.00E-07	2.82E-06	5.50E-05	0.03%
81	J18G_W011WRel_V	3.50E-05	1.23E-05	4.20E-06	7.00E-07	2.82E-06	5.50E-05	0.03%
82	J18H_W012WRel_V	3.50E-05	1.23E-05	4.20E-06	7.00E-07	2.82E-06	5.50E-05	0.03%
83	J19A_W009Flow_V	1.61E-03	7.37E-04	4.05E-04	8.94E-05	1.22E-06	2.85E-03	1.51%
84	J19B_W009ChIn_V	6.39E-04	2.80E-04	1.41E-04	2.34E-05	2.72E-06	1.09E-03	0.58%
85	J19D_W010Flow_V	7.55E-04	3.17E-04	1.69E-04	2.08E-06	4.55E-07	1.24E-03	0.66%
86	J19E_W010ChIn_V	6.39E-04	2.80E-04	1.41E-04	2.34E-05	2.72E-06	1.09E-03	0.58%

KAPUNI J WELLSITE
QUANTITATIVE RISK ASSESSMENT

No	QRA Event	1 - 3 mm	3 - 10 mm	10 - 50 mm	50 - 150 mm	> 150 mm	TOTAL	% Contrib.
87	J19F_W011Flow_V	1.73E-03	7.88E-04	4.31E-04	8.97E-05	1.28E-06	3.04E-03	1.62%
88	J19G_W011ChIn_V	6.39E-04	2.80E-04	1.41E-04	2.34E-05	2.72E-06	1.09E-03	0.58%
89	J19H_W012Flow_V	7.55E-04	3.17E-04	1.69E-04	2.08E-06	4.55E-07	1.24E-03	0.66%
90	J19I_W012ChIn_V	6.39E-04	2.80E-04	1.41E-04	2.34E-05	2.72E-06	1.09E-03	0.58%
91	J20A_LP SepVapA_V	1.72E-03	6.79E-04	3.17E-04	4.55E-05	1.11E-05	2.78E-03	1.47%
92	J06F_WetGPLSkid_V	3.49E-04	1.54E-04	7.87E-05	9.67E-06	2.85E-06	5.95E-04	0.32%
93	J06G_WetGPLaun_V	5.72E-06	2.89E-06	1.59E-06	4.01E-07	1.13E-07	1.07E-05	0.01%
94	J21A_Comp1Sc1_V	2.88E-03	1.26E-03	6.61E-04	6.90E-05	1.71E-05	4.89E-03	2.60%
95	J21B_Comp1Stg1_V	5.77E-03	2.52E-03	1.17E-03	2.13E-04	5.58E-05	9.73E-03	5.16%
96	J21C_Comp1Sc2_V	1.96E-03	8.76E-04	4.72E-04	4.49E-05	1.51E-05	3.37E-03	1.79%
97	J21D_Comp1Stg2_V	6.51E-03	2.85E-03	1.32E-03	4.04E-04	4.92E-06	1.11E-02	5.88%
98	J21E_Comp1Blow_L	3.08E-03	1.36E-03	6.79E-04	1.60E-04		5.28E-03	2.80%
99	J22A_Comp2Sc1_V	2.88E-03	1.26E-03	6.61E-04	6.90E-05	1.71E-05	4.89E-03	2.60%
100	J22B_Comp2Stg1_V	5.77E-03	2.52E-03	1.17E-03	2.13E-04	5.58E-05	9.73E-03	5.16%
101	J22C_Comp2Sc2_V	1.96E-03	8.76E-04	4.72E-04	4.49E-05	1.51E-05	3.37E-03	1.79%
102	J22D_Comp2Stg2_V	6.51E-03	2.85E-03	1.32E-03	4.04E-04	4.92E-06	1.11E-02	5.88%
103	J22E_Comp2Blow_L	3.08E-03	1.36E-03	6.79E-04	1.60E-04		5.28E-03	2.80%
104	J23A_CompDisc_V	6.12E-04	2.66E-04	1.41E-04	1.18E-05	1.72E-06	1.03E-03	0.55%
105	J23B_CompJ1LTS_V	1.27E-04	5.35E-05	2.51E-05	3.47E-06	8.12E-07	2.10E-04	0.11%
106	J23C_CompJ2LTS_V	1.27E-04	5.35E-05	2.51E-05	3.47E-06	8.12E-07	2.10E-04	0.11%
107	J24A_BlowtoLPS_L	2.17E-04	1.03E-04	5.91E-05	1.65E-05		3.95E-04	0.21%
108	F_SC_1_V	3.15E-04	1.36E-04	6.98E-05	6.80E-06	2.08E-06	5.29E-04	0.28%
109	F_SC_2_V	5.72E-06	2.89E-06	1.59E-06	4.01E-07	1.13E-07	1.07E-05	0.01%
110	F_SC_3_V	3.49E-04	1.54E-04	7.87E-05	9.67E-06	2.85E-06	5.95E-04	0.32%
111	F_SC_4_V	4.23E-04	1.82E-04	9.34E-05	1.03E-05	3.10E-06	7.12E-04	0.38%
112	F_SC_5_V	6.28E-04	2.68E-04	1.42E-04	1.00E-05	2.18E-06	1.05E-03	0.56%
113	F_SC_6_L	1.70E-03	7.47E-04	3.91E-04	6.13E-05	3.05E-06	2.90E-03	1.54%
114	F_SC_7_L	1.07E-03	4.67E-04	2.33E-04	4.14E-05	3.05E-06	1.81E-03	0.96%
115	F_SC_8_V	7.77E-04	3.47E-04	1.87E-04	3.15E-05	2.19E-06	1.34E-03	0.71%
TOTAL		1.09E-01	4.85E-02	2.62E-02	4.66E-03	8.68E-04	1.88E-01	

The total theoretical leak frequency is 0.19 per annum, or equivalent to one leak every 5.6 years. The leak contribution is predominantly from the 1 - 3 mm hole size, which contributes approximately 60% of the total leak frequency.

The sections with the highest leak frequencies are:

- J21D_Comp1Stg2_V and J22D_Comp2Stg2_V (5.88% each) – the section covers the LP compressors 2nd stage discharge through the aftercooler and to the compressor outlet XSVs.

- J21B_Comp1Stg1_V and J22B_Comp2Stg1_V (5.16% each) – the section covers the LP compressors 1st stage discharge through the intercooler and to the 2nd stage suction scrubber.
- J06D_LPSepLCV_L (3.42%) – the section includes the liquid discharge the LP separator pumps. Although the pumps are bypass, the flow path remains open and is a source of leaks.

The leak frequencies from these scenarios contribute to approximately 26% of the total leak frequency. The common reason for the high leak frequencies for all the above QRA events is mainly contributed by the compressor or pumps and associated equipment (e.g. instrumentation, valves and flanges) where compressors and pumps typically have high generic leak frequencies due to moving parts.

6. RISK ANALYSIS

6.1 Risk Criteria

Key deliverable for this study is the location specific individual risk (LSIR) in the form of risk contour. LSIR is the risk of fatality at a point in space to a hypothetical individual at a location for 365 days per year, 24 hours a day, unprotected and unable to escape.

As there are no standard risk criteria which have been developed for the NZ context, this deliverable is assessed against the suggested risk criteria in the NSW Hazardous Industry Planning Advisory Paper No. 4 (HIPAP4) "Risk Criteria for Land Use Planning" as shown in Table 6-1 [Ref. 17].

Table 6-1: HIPAP 4 Individual Fatality Risk criteria

Land Use	Risk Criteria Adopted (per annum)	Interpretation for QRA
Hospitals, schools, childcare facilities, old age housing	0.5×10^{-6} (or 5×10^{-7}) (1 in 2 million)	5×10^{-7} risk contour should not extend to these areas
Residential, hotels, motels, tourist resorts	1×10^{-6} (1 in 1 million)	1×10^{-6} risk contour should not extend to these areas
Commercial developments including retail centres, offices and entertainment centres	5×10^{-6} (1 in 200,000)	5×10^{-6} risk contour should not extend to these areas
Sporting complexes and active open space	10×10^{-6} (or 1×10^{-5}) (1 in 100,000)	1×10^{-5} risk contour should not extend to these areas
Industrial	50×10^{-6} (or 5×10^{-5}) (1 in 20,000)	5×10^{-5} risk contour should, as a target, be contained within the boundaries of the industrial site where applicable

The site is situated in an area classified as "rural" under the STDC Operative District Plan [Ref. 20] and surrounded by intensive dairy farmland, and as such a suitable land use category is not easily inferred from the above table. There are no industrial, sporting complexes, hospitals or commercial developments in the area surrounding the wellsite. The closest identified offsite parties are dwellings or houses. Therefore, only the "Industrial" (i.e. the 5×10^{-5} / year risk) and "Residential" (the 1×10^{-6} /year risk) are considered.

6.2 Risk Assessment Results

6.2.1 Drilling Operations Risk Results

The risk contour during drilling for Kapuni J wellsite is presented in Figure 6-1. The LSIR results as assessed against the HIPAP4 criteria are given in Table 6-2.

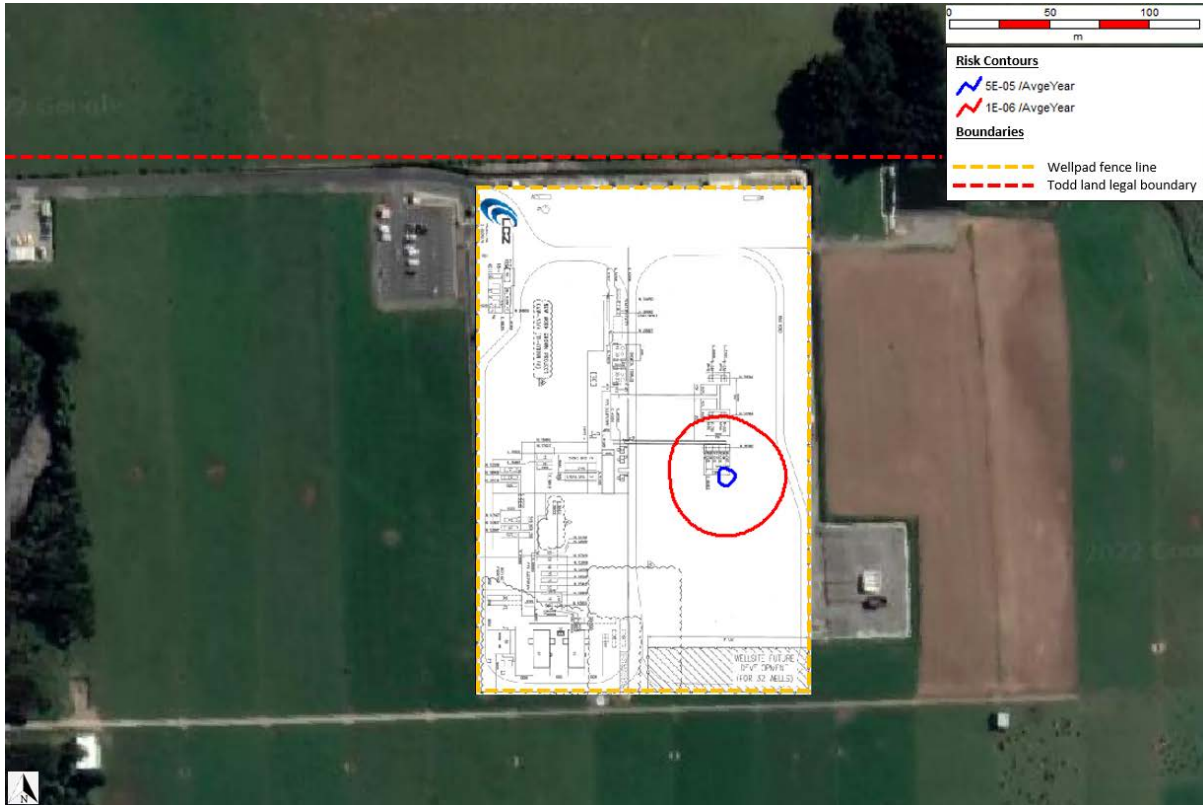


Figure 6-1 Kapuni J Drilling Risk Contour

Table 6-2 Drilling Operation LSIR Results as Assessed against the Risk Criteria

LSIR	Risk Contour	Risk Criteria	Result
5E-05 / year	Blue	Industrial 5E-05 / 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-06 / year	Red	Residential 1E-06 / year risk contour should not extend to residential, hotels, motels, tourist resorts	Criteria met. There is no residential development, hotels, tourist resorts within the contour area.

The result shows that during drilling operations, the risk contours for 5E-05 / year and 1E-06 / year stay within plant boundaries.

6.2.2 Normal Operations Risk Results

The risk contour during normal operations of Kapuni J wellsite with all wells in production is presented in Figure 6-2. The LSIR results as assessed against the criteria are given in Table 6-3.

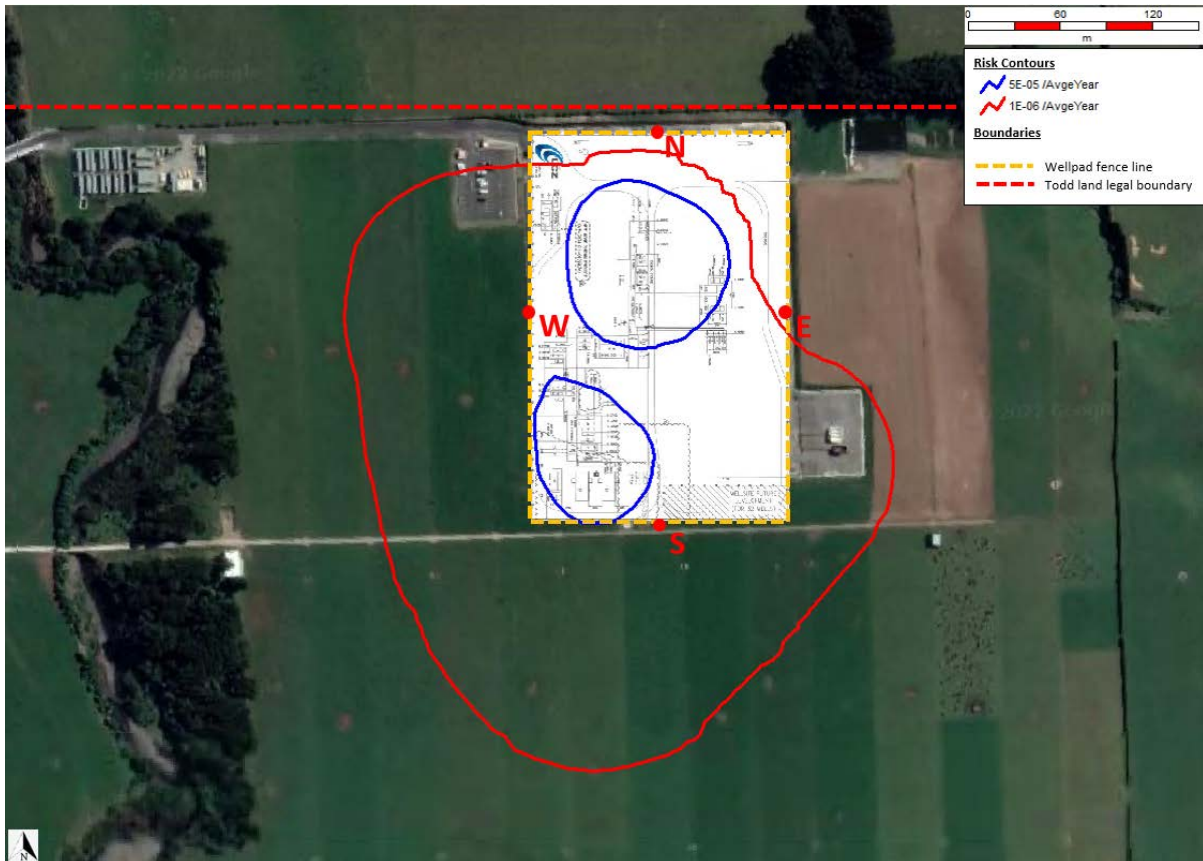


Figure 6-2: Kapuni J Normal Operations Risk Contours

Table 6-3: Normal Operations with All Wells LSIR Results as Assessed against the Risk Criteria

LSIR	Risk Contour	Risk Criteria	Result
5E-05 / year	Blue	Industrial 5E-05 / 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-06 / year	Red	Residential 1E-06 / year risk contour should not extend to residential, hotels, motels, tourist resorts	Criteria met. There is no residential development, hotels, tourist resorts within the contour area.

The result shows that during normal operations, the risk contours for 5E-05 / year and 1E-06 / year stay within plant boundaries.

The process release frequencies have reduced in this QRA update and in general the LSIR contour have reduced. However, the LSIR contours have increased at the south fence line due to the addition of the compression facilities and at the south east fence line due to the future slug catcher equipment and associated pig receiver.

6.3 Risk Contributor Analysis

Risk ranking points can be placed in the Safeti model to identify the risk contributors at various locations. Four (4) points have been placed on each of the wellpad fence lines to identify the key risk contributors during normal operation (marked as “N”, “S”, “E” and “W” on Figure 6-2). The risk contributors at each location are described below.

6.3.1 Northern Fence Line “N”

During normal operations, the total LSIR at location “N” is 2.74E-07 per year. The key risk contributors to this location are shown in Table 6-4. These account for approximately 79% of the risk contribution for the location.

Table 6-4: Key Risk Contributors to North Wellpad Fence Line during Normal Operations

Release Case	Description	Release Size (mm)	Cons. Event	% Contri.
J06D_LPsepLCV_L	LP Separator Liquids Pump Discharge to LCV-4208	85	Flash fire + jet fire	69.31%
J06C_LPsepLiq_L	LP Separator (V-420) liquid section up to LP Separator Liquids Pump	85	Flash fire	3.65%
J05E_LTSBLiq_L	Low Temperature Separator B (V-330) liquid section up to LCV-3305	85	Flash fire	3.29%
J05A_TrBHeader_V	Well fluids in Train J2 header from XSV-3001 and XSV-3002 through the LTS coils up to the inlet of the HPKO B (V-320)	Full-bore	Jet fire	3.16%

6.3.2 Eastern Fence Line “E”

During normal operations, the total LSIR at location “E” is 7.45E-07 per year. The key risk contributors to this location are shown in Table 6-5. These account for approximately 65% of the risk contribution for the location.

Table 6-5: Key Risk Contributors to East Wellpad Fence Line during Normal Operations

Release Case	Description	Release Size (mm)	Cons. Event	% Contri.
J06D_LPsepLCV_L	LP Separator Liquids Pump Discharge to LCV-4208	85	Flash fire + jet fire	44.91%
J02C_ChMani_V	Well fluids in production manifold from choke valve up to Train J1 isolation valves (XSV-2001&2002) and Train J2 isolation valves (XSV-3001&3002)	Full-bore	Jet fire	6.69%
J05E_LTSBLiq_L	Low Temperature Separator B (V-330) liquid section up to LCV-3305	85	Flash fire	5.83%
J03E_LTSALiq_L	Low Temperature Separator A (V-230) liquid section up to LCV-2305	85	Flash fire	4.78%
J03C_HPKOALiq_L	HPKO Vessel A (V-220) liquid section up to LCV-2203	85	Jet fire	3.31%

6.3.3 Southern Fence Line “S”

During normal operations, the total LSIR at location “S” is 3.26E-05 per year. The key risk contributors to this location are shown in Table 6-6. These account for approximately 68% of the risk contribution for the location.

Table 6-6: Key Risk Contributors to South Wellpad Fence Line during Normal Operations

Release Case	Description	Release Size (mm)	Cons. Event	% Contri.
J06D_LPsepLCV_L	LP Separator Liquids Pump Discharge to LCV-4208	85	Jet fire + pool fire + flash fire	60.98%
J22D_Comp2Stg2_V	LP Compressor 930-X-480 2nd stage compressor discharge through aftercooler to compressor outlet XSV	85	Jet fire + flash fire	3.57%
J21D_Comp1Stg2_V	LP Compressor 930-X-470 2nd stage compressor discharge through aftercooler to compressor outlet XSV	85	Jet fire	2.99%

6.3.4 Western Fence Line “W”

During normal operations, the total LSIR at location “W” is 2.32E-05 per year. The key risk contributors at this location are presented in Table 6-7. These account for approximately 48% of the risk contribution for the location.

Table 6-7: Key Risk Contributors to West Wellpad Fence Line during Normal Operations

Release Case	Description	Release Size (mm)	Cons. Event	% Contri.
J06D_LPsepLCV_L	LP Separator Liquids Pump Discharge to LCV-4208	85	Jet fire + pool fire + flash fire	39.23%
J03C_HPkoALiq_L	HPKO Vessel A (V-220) liquid section up to LCV-2203	22	Flash fire	2.94%
J03E_LTSALiq_L	Low Temperature Separator A (V-230) liquid section up to LCV-2305	22	Jet fire + flash fire	2.84%
J03D_LTSAVap_V	Low Temperature Separator A (V-230) vapour section through the GG exchanger shell side up to XSV-2405	85	Jet fire	2.76%

7. CONCLUSION

An update to the Kapuni J wellsite QRA has been conducted, which covers the proposed wellheads and well fluid processing equipment. The assessment considers risks from the Kapuni J wellsite for the following cases:

- Drilling operations which will consider only blowout events
- Normal operations/production for all wells. This case refers to the eventual development of Kapuni J wellsite which will have 12 producing wells.

The main updates to the QRA include the following:

- Assessment tool has been updated from DNV Phast Risk Software version 6.7 to DNV Safeti Software version 8.6.
- General leak frequencies and blowout event frequencies updated to use the IOGP published in 2019 [Ref. 9]. The updated leak frequency database has two sets of data presented which include data from 1992 – 2015 and 2006 – 2015. The recommended values based on experience in the period 2006 – 2015 (inclusive) are used for the QRA update with the revised leak frequency modifications specified in the Todd Fire and Gas Analysis and Quantitative Risk Assessment Methodology Guideline [Ref. 5].
- Addition of compression facilities, future slug catcher and future pig receiver.

The key deliverable of the QRA is the location specific individual risk which are assessed against the HIPAP4 criteria.

During drilling operations, the results show that:

- The risk contours for 5E-05 / year and 1E-06 / year stay within plant boundaries.

During normal operations with all wells in production, the results show that:

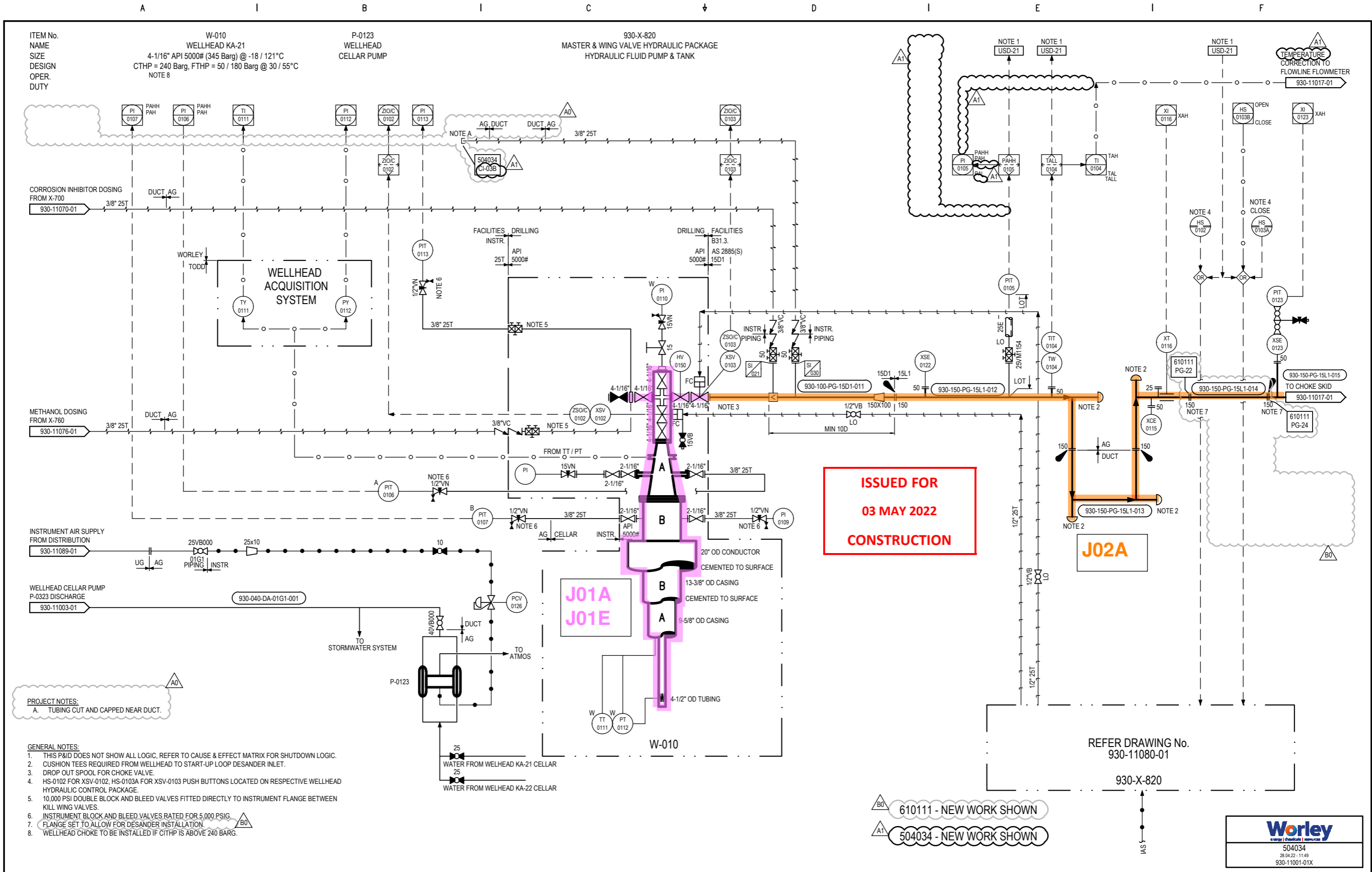
- The 5E-05 / year risk contour remains within the site boundary.
- The 1E-06 / year risk contour remains within the legal boundary of the land owned by Todd although it extends beyond the wellpad fence line on all sides (apart from the north fence).

8. REFERENCES

1. Kapuni J Wellsite, Quantitative Risk Assessment, 620035-RT-R0002, May 2019
2. Kapuni J QRA Compression QRA Model and Results Memorandum, 620011-MMO-C0001, December 2019
3. Kapuni J Wellsite, Risk Assessment Assumptions Register, 620035-TCN-R0001, May 2019
4. Kapuni Re-Development Project: Kapuni J Wellsite Facilities, Basis of Design, 620051-BOD-X0001, Rev 0, April 2019
5. Todd Energy Fire and Gas Analysis and Quantitative Risk Assessment Methodology Guideline, NZ-1005-TECD721654, Rev. 0
6. Worley NZ Onshore QRA Procedure (Using Phast Risk), PCD-473
7. DNV Safeti Software version 8.6
8. New Zealand National Climate Database (<http://cliflo.niwa.co.nz/>).
9. IOGP Risk Assessment Data Directory, Process Release Frequencies, 434-1, 2019
10. IOGP Risk Assessment Data Directory, Blowout Frequencies, 434-2, 2019
11. Email correspondence from Nik Pyselman (Todd) and Damian Phillis (WorleyParsons) dated 10 July 2018, Subject: Representative Kapuni Well Conditions.
12. Kapuni Redevelopment Project – KRD Well Site Facilities Heat and Mass Balance Case 2
13. Email correspondence from Ario Setodewo (WorleyParsons) to Roisin Johnson (Todd), Nik Pyselman (Todd) and Andrew Fake (Todd), Subject: RE: [External] Kapuni J Risk Assessment assumptions – Blowout, Dated 30 November 2018.
14. Energy Institute, Guidance on Assigning Ignition Probabilities in Onshore and Offshore Quantitative Risk Assessments Ignition Probability Review, 2nd Edition, May 2019
15. Methods for the Determination of Possible Damage to People and Objects Resulting from Release of Hazardous Materials ('TNO Green Book')
16. Methods for the Calculation of Physical Effects – due to Releases of Hazardous Materials (Liquids and Gases) ('TNO Yellow Book').
17. Hazardous Industry Planning Advisory Paper No. 4 (HIPAP4), Risk Criteria for Land Use Safety Planning, January 2011.
18. UK HSE Toxicity Levels of Chemicals (<http://www.hse.gov.uk/chemicals/haztox.htm>)
19. Kapuni Redevelopment Project – KRD Well Site Facilities Piping and Instrumentation Diagram (P&ID), 920-10-00001(X) to 920-10-00094-01(X)
20. South Taranaki District Council District Plan 2004.
21. Email correspondence from Grant Davidson (Worley) and Ario Setodewo (Worley) dated 6 May 2019, Subject: RE: Kapuni J Sensitivity Case.
22. Email correspondence from Andrew Fake (Todd) to Yvette Lee (Worley) dated 29 August 2022, Subject: Kapuni KAP-J Compression - QRA Model Inputs
23. Email correspondence from Andrew Fake (Todd) to Yvette Lee and Alice Stembridge (Worley) dated 5 October 2022, Subject: TEL Kapuni - KAP-J Compression QRA Study

Appendix 1.

Sectionalized P&IDs



ISSUED FOR
03 MAY 2022
CONSTRUCTION

J02A

J01A
J01E

REFER DRAWING No.
930-11080-01

930-X-820

610111 - NEW WORK SHOWN

504034 - NEW WORK SHOWN

ITEM No. W-010
NAME WELLHEAD KA-21
SIZE 4-1/16" API 5000# (345 Barg) @ -18 / 121°C
DESIGN CTHP = 240 Barg, FTHP = 50 / 180 Barg @ 30 / 55°C
OPER. NOTE 8
DUTY

P-0123
WELLHEAD
CELLAR PUMP

930-X-820
MASTER & WING VALVE HYDRAULIC PACKAGE
HYDRAULIC FLUID PUMP & TANK

CORROSION INHIBITOR DOSING
FROM X-700

METHANOL DOSING
FROM X-760

INSTRUMENT AIR SUPPLY
FROM DISTRIBUTION

WELLHEAD CELLAR PUMP
P-0323 DISCHARGE

PROJECT NOTES:
A. TUBING CUT AND CAPPED NEAR DUCT.

- GENERAL NOTES:
- THIS P&ID DOES NOT SHOW ALL LOGIC. REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - CUSHION TEES REQUIRED FROM WELLHEAD TO START-UP LOOP DESANDER INLET.
 - DROP OUT SPOOL FOR CHOKE VALVE.
 - HS-0102 FOR XSV-0102, HS-0103A FOR XSV-0103 PUSH BUTTONS LOCATED ON RESPECTIVE WELLHEAD HYDRAULIC CONTROL PACKAGE.
 - 10,000 PSI DOUBLE BLOCK AND BLEED VALVES FITTED DIRECTLY TO INSTRUMENT FLANGE BETWEEN KILL WING VALVES.
 - INSTRUMENT BLOCK AND BLEED VALVES RATED FOR 5,000 PSIG.
 - FLANGE SET TO ALLOW FOR DESANDER INSTALLATION.
 - WELLHEAD CHOKE TO BE INSTALLED IF CITHP IS ABOVE 240 BARG.

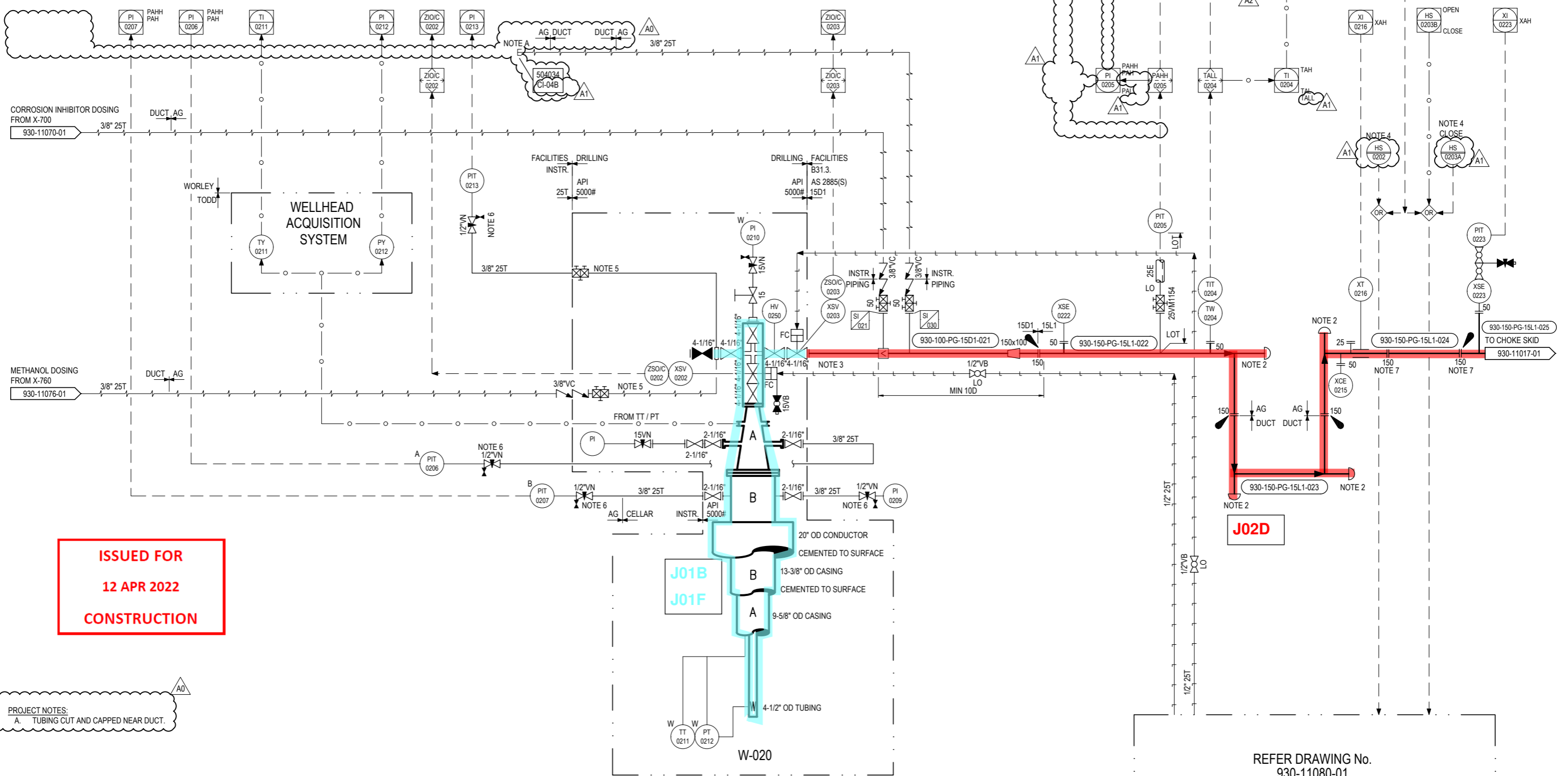
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A2	KAW-3003 - APPROVED FOR CONSTRUCTION	RS	KMc	OCK	OCK	KB	04/22									A1	N.T.S.	930	11	001	01X	A2	0
A1	KAW-3003 - APPROVED FOR DESIGN	NR	JM	GD	GD	KB	11/21																
BD	PCR_2_2021_77 - APPROVED FOR CONSTRUCTION	NR	JM	GD	GD	KB	11/21																
A0	KAW-3003 - ISSUED FOR HAZOP	HBM	JM	GD	GD		10/21																

Worley

504034
28.04.22 - 11:49
930-11001-01X

ITEM No. W-020
 NAME WELLHEAD KA-22
 SIZE 4-1/16" API 5000# (345 Barg) @ -18 / 121°C
 DESIGN CTHP = 240 Barg, FTHP = 50 / 180 Barg @ 30 / 55°C
 OPER. NOTE 8
 DUTY

930-X-820
 MASTER & WING VALVE HYDRAULIC PACKAGE
 HYDRAULIC FLUID PUMP & TANK



**ISSUED FOR
 12 APR 2022
 CONSTRUCTION**

PROJECT NOTES:
 A. TUBING CUT AND CAPPED NEAR DUCT.

- GENERAL NOTES:
- THIS P&ID DOES NOT SHOW ALL LOGIC, REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - CUSHION TEES REQUIRED FROM WELLHEAD TO START-UP LOOP DESANDER INLET.
 - DROP OUT SPOOL FOR CHOKE VALVE.
 - HS-0202 FOR XSV-0202, HS-0203A FOR XSV-0203 PUSH BUTTONS LOCATED ON RESPECTIVE WELLHEAD HYDRAULIC CONTROL PACKAGE.
 - 10,000 PSI DOUBLE BLOCK AND BLEED VALVES FITTED DIRECTLY TO INSTRUMENT FLANGE BETWEEN KILL WING VALVES.
 - INSTRUMENT BLOCK AND BLEED VALVES RATED FOR 5,000 PSIG.
 - FLANGE SET TO ALLOW FOR DESANDER INSTALLATION.
 - WELLHEAD CHOKE TO BE INSTALLED IF CITHP IS ABOVE 240 Barg.

REFER DRAWING No.
 930-11080-01
 930-X-820

504034 - NEW WORK SHOWN

Worley
 energy | chemicals | minerals
 504034
 28.03.22 - 09.57
 930-11002-01X

REV	BY	CHK	ENG	APP	TODD	DATE	REV	REVISIONS	BY	CHK	ENG	APP	TODD	DATE
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A1	KAW	JM	GD	GD	KB	11/21								
A0	KAW	JM	GD	GD		10/21	0	AS BUILT PCR_K1706 (620051)	HBM	DJP	GD			06/21

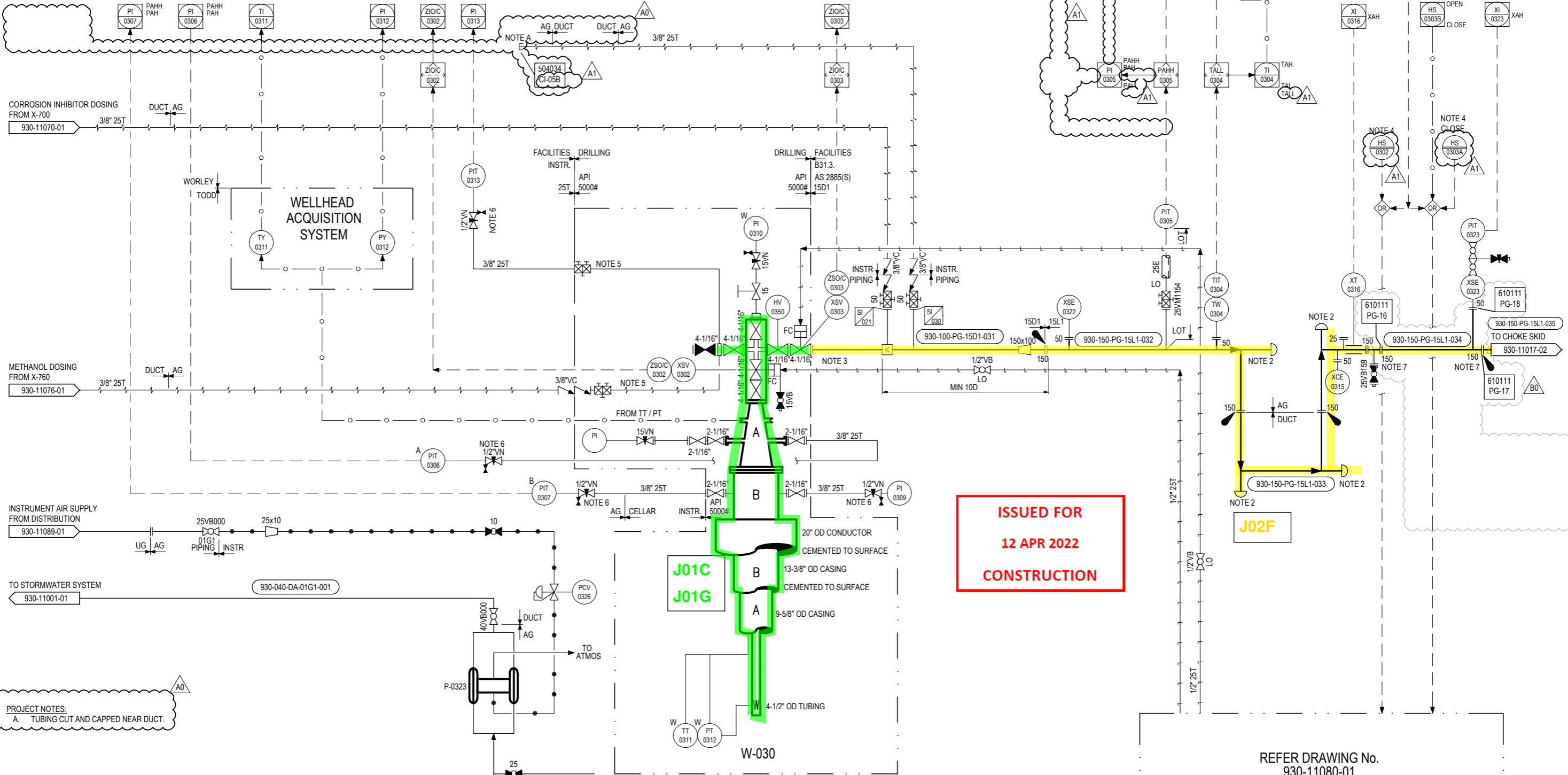
TODD ENERGY
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ASSET:	KAPUNI J WELLSITE	930 KAPUNI J WELLSITE PIPING & INSTRUMENT DIAGRAM WELLHEAD KA-22											
SCALE:	A1 N.T.S.	AREA NO.	930	SERIES	11	DRG. NO.	002	SHEET	01X	CONST	A2	REVISION	0
REFERENCE DRAWINGS													

ITEM No. W-030
 NAME WELLHEAD KA-23
 SIZE 4-1/16" API 5000# (345 Barg) @ -18 / 121°C
 DESIGN CTHP = 240 Barg, FTHP = 50 / 180 Barg @ 30 / 55°C
 OPER. NOTE 8
 DUTY

P-0323
 WELLHEAD
 CELLAR PUMP

930-X-820
 MASTER & WING VALVE HYDRAULIC PACKAGE
 HYDRAULIC FLUID PUMP & TANK



PROJECT NOTES:
 A. TUBING CUT AND CAPPED NEAR DUCT.

- GENERAL NOTES:
- THIS P&ID DOES NOT SHOW ALL LOGIC. REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - CUSHION TEES REQUIRED FROM WELLHEAD TO START-UP LOOP DESANDER INLET.
 - DROP OUT SPOOL FOR CHOKE VALVE.
 - HS-0302 FOR XSV-0302, HS-0303A FOR XSV-0303 PUSH BUTTONS LOCATED ON RESPECTIVE WELLHEAD HYDRAULIC CONTROL PACKAGE.
 - 10,000 PSI DOUBLE BLOCK AND BLEED VALVES FITTED DIRECTLY TO INSTRUMENT FLANGE BETWEEN KILL WING VALVES.
 - INSTRUMENT BLOCK AND BLEED VALVES RATED FOR 5,000 PSIG.
 - FLANGE SET TO ALLOW FOR DESANDER INSTALLATION.
 - WELLHEAD CHOKE TO BE INSTALLED IF CITHP IS ABOVE 240 Barg.

ISSUED FOR
 12 APR 2022
 CONSTRUCTION

REFER DRAWING No.
 930-11080-01
 930-X-820

610111 - NEW WORK SHOWN
 504034 - NEW WORK SHOWN

Worley
 energy | chemicals | resources
 504034
 28.03.22 - 16.00
 930-11003-01X

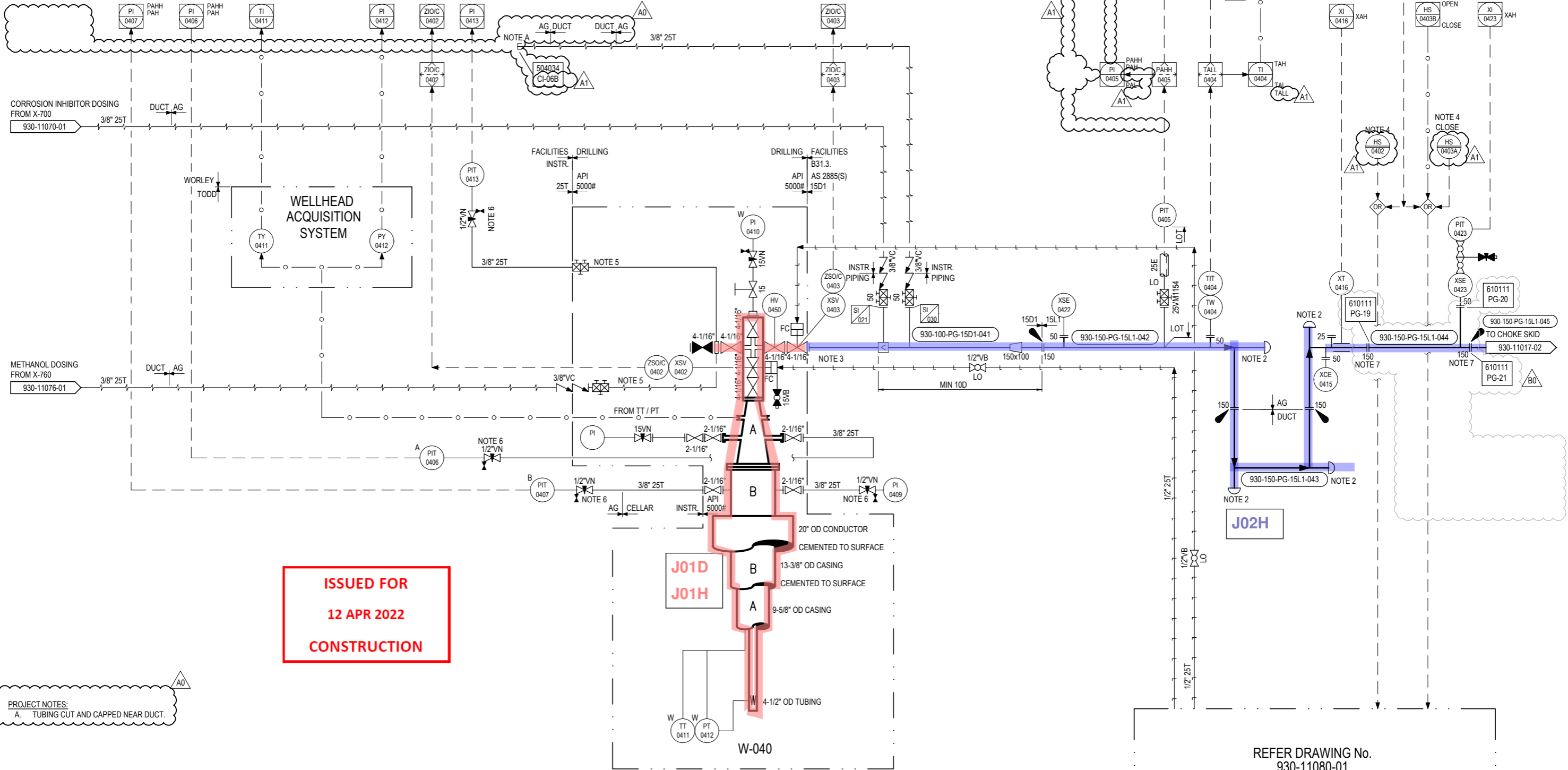
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A1	KAW-3003					11/21								
B0	PCR_2_2021_77					11/21								
A0	KAW-3003					10/21								

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ASSET:	KAPUNI J WELLSITE	930 KAPUNI J WELLSITE PIPING & INSTRUMENT DIAGRAM WELLHEAD KA-23
SCALE:	N.T.S.	AREA NO. 930
SHEET	01X	SERIES 11
CONST	A2	DRG. NO. 003
REVISION	0	SHEET 01X

ITEM No. W-040
 NAME WELLHEAD KA-24
 SIZE 4-1/16" API 5000# (345 Barg) @ -18 / 121°C
 DESIGN CTHP = 240 Barg, FTHP = 50 / 180 Barg @ 30 / 55°C
 OPER. NOTE 8
 DUTY

930-X-820
 MASTER & WING VALVE HYDRAULIC PACKAGE
 HYDRAULIC FLUID PUMP & TANK



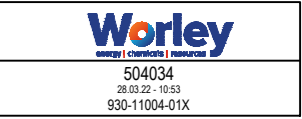
**ISSUED FOR
 12 APR 2022
 CONSTRUCTION**

PROJECT NOTES:
 A. TUBING CUT AND CAPPED NEAR DUCT.

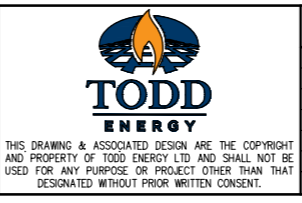
- GENERAL NOTES:
- THIS P&ID DOES NOT SHOW ALL LOGIC, REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - CUSHION TEES REQUIRED FROM WELLHEAD TO START-UP LOOP DESANDER INLET.
 - DROP OUT SPOOL FOR CHOKE VALVE.
 - HS-0402 FOR XSV-0402, HS-0403A FOR XSV-0403 PUSH BUTTONS LOCATED ON RESPECTIVE WELLHEAD HYDRAULIC CONTROL PACKAGE.
 - 10,000 PSI DOUBLE BLOCK AND BLEED VALVES FITTED DIRECTLY TO INSTRUMENT FLANGE BETWEEN KILL WING VALVES.
 - INSTRUMENT BLOCK AND BLEED VALVES RATED FOR 5,000 PSIG.
 - FLANGE SET TO ALLOW FOR DESANDER INSTALLATION.
 - WELLHEAD CHOKE TO BE INSTALLED IF CITHP IS ABOVE 240 Barg.

610111 - NEW WORK SHOWN
 504034 - NEW WORK SHOWN

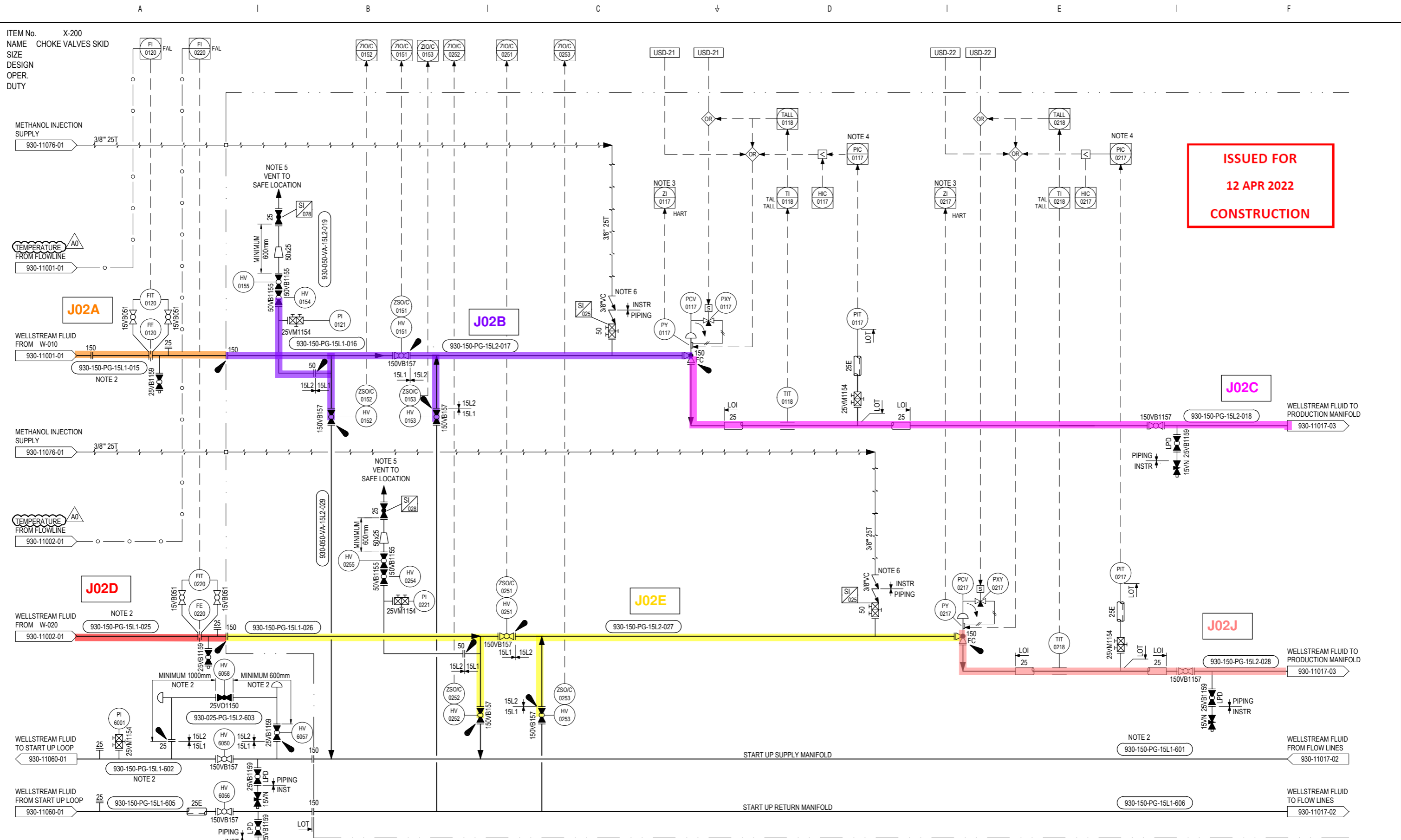
REFER DRAWING No.
 930-11080-01
 930-X-820



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B0	NR	JM	GD	GD	KB	11/21	
A0	HBM	JM	GD	GD		10/21	AS BUILT PCR_K1706 (620051)



ASSET:	KAPUNI J WELLSITE	930 KAPUNI J WELLSITE PIPING & INSTRUMENT DIAGRAM WELLHEAD KA-24											
SCALE:	N.T.S.	AREA NO.	930	SERIES	11	DRG. NO.	004	SHEET	01X	CONST	A2	REVISION	0
REFERENCE DRAWINGS													



ISSUED FOR
12 APR 2022
CONSTRUCTION

ITEM No. X-200
NAME CHOKE VALVES SKID
SIZE
DESIGN
OPER.
DUTY

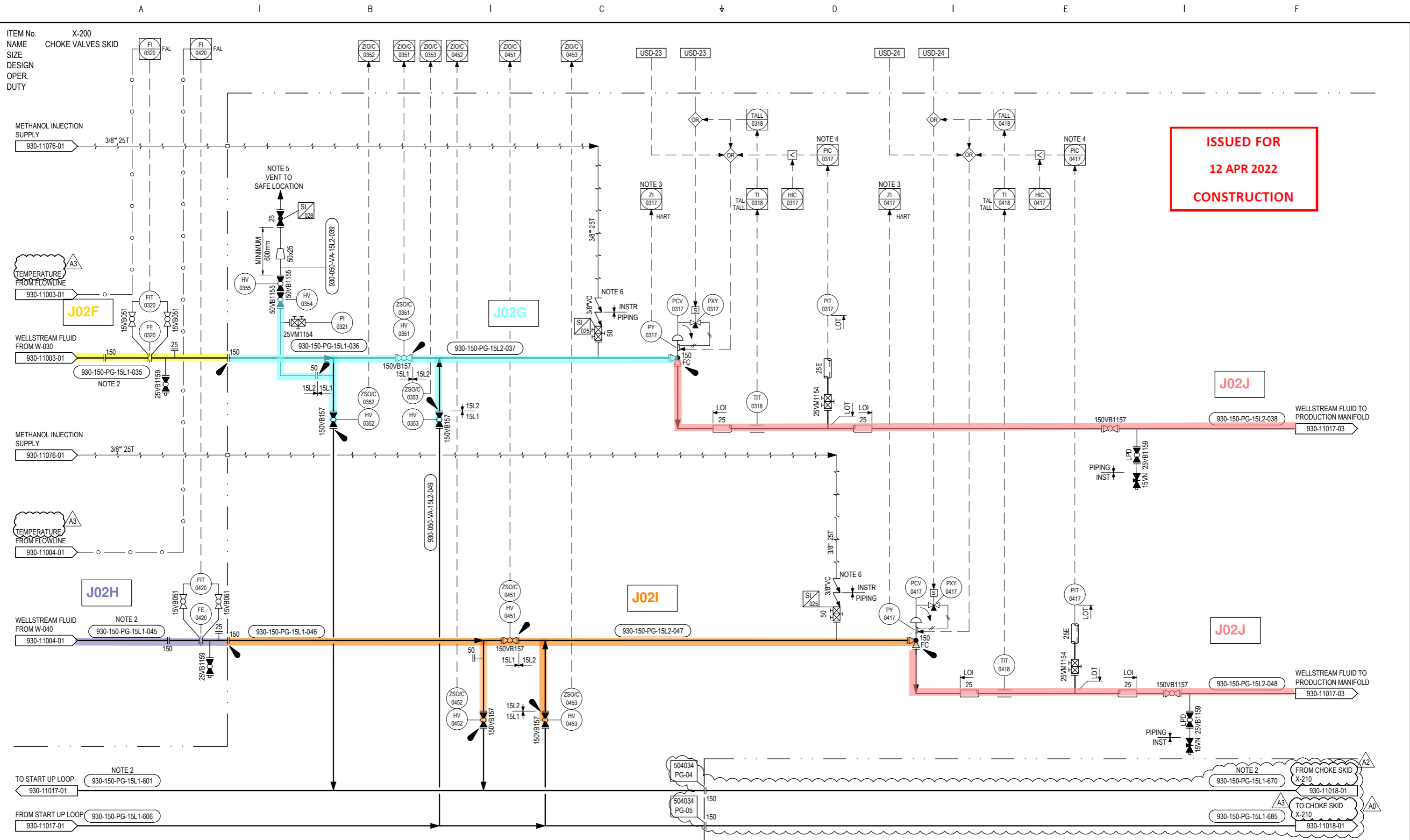
- GENERAL NOTES:
1. THIS P&ID DOES NOT SHOW ALL LOGIC REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 2. CUSHION TEES AND TARGET CROSSES REQUIRED TO START UP LOOP DESANDER INLET
 3. DEVIATION ALARM RAISED IF DEVIATION EXISTS BETWEEN REQUESTED POSITION AND POSITION FEEDBACK.
 4. PIC OVERRIDE SET POINT BASED ON MANIFOLD LINE OUT.

- GENERAL NOTES (CONT.):
5. REFER TO STANDARD DRAWING 000-50032-01 FOR DN 25 RAIN FLAP DETAILS.
 6. CHECK VALVES TO BE OF DISIMILAR TYPE.

504034 - NEW WORK SHOWN

Worley
504034
31.03.22 - 15.53
930-11017-01X

										ASSET: KAPUNI J WELLSITE		KAPUNI J WELLSITE PIPING & INSTRUMENT DIAGRAM CHOKE VALVES SKID											
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A0	KAW-3003 - APPROVED FOR CONSTRUCTION	RS	JM	GD	GD	03/22			AS BUILT PCR K1706 (620051)	VK	DJP	GD	KB	06/21									
REV		BY	CHK	ENG	APP	DATE	REV	DATE	REVISIONS	BY	CHK	ENG	APP	DATE	REVISIONS	SCALE: A1 N.T.S.	AREA NO. 930	SERIES 11	DRG. NO. 017	SHEET 01X	CONST. A0	REVISION	



ISSUED FOR
12 APR 2022
CONSTRUCTION

GENERAL NOTES:

1. THIS P&ID DOES NOT SHOW ALL LOGIC REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
2. CUSHION TEES AND TARGET CROSSES REQUIRED TO START UP LOOP DESANDER INLET.
3. DEVIATION ALARM RAISED IF DEVIATION EXISTS BETWEEN REQUESTED POSITION AND POSITION FEEDBACK.
4. PIC OVERRIDE SET POINT BASED ON MANIFOLD LINE OUT.

GENERAL NOTES (CONT.)

5. REFER TO STANDARD DRAWING 000-50032-01 FOR DN 25 RAIN FLAP DETAILS.
6. CHECK VALVES TO BE OF DISIMILAR TYPE.

A3 A2 A1 A0 504034 - NEW WORK SHOWN

504034
28.03.22 - 10:55
930-11017-02X

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A2	KAW	JM	GD	GD	KB	11/21								
A1	KAW	JM	GD	GD		10/21								
A0	504034	DJP	GD			07/21	0	AS BUILT PCR_K1706 (620051)	VK	DJP	GD		KB	06/21

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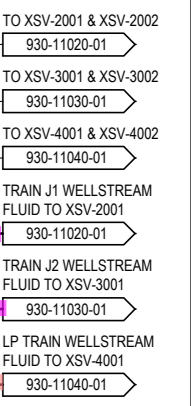
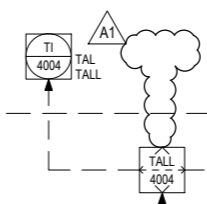
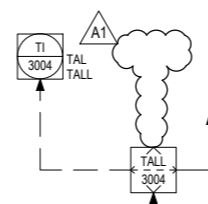
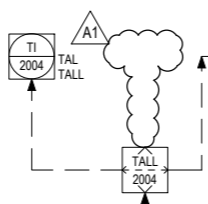
ASSET: **KAPUNI**

**930 KAPUNI J WELLSITE
PIPING & INSTRUMENT DIAGRAM
CHOKE VALVES SKID**

SCALE: **A1** N.T.S. AREA NO. **930** SERIES **11** DRG. NO. **017** SHEET **02X** CONST **A3** REVISION **0**

ITEM No.
NAME
SIZE
DESIGN
OPER.
DUTY

930-X-200
CHOKE VALVES SKID



ISSUED FOR
12 APR 2022
CONSTRUCTION

TRAIN J1 MANIFOLD
930-200-PG-15L1-202

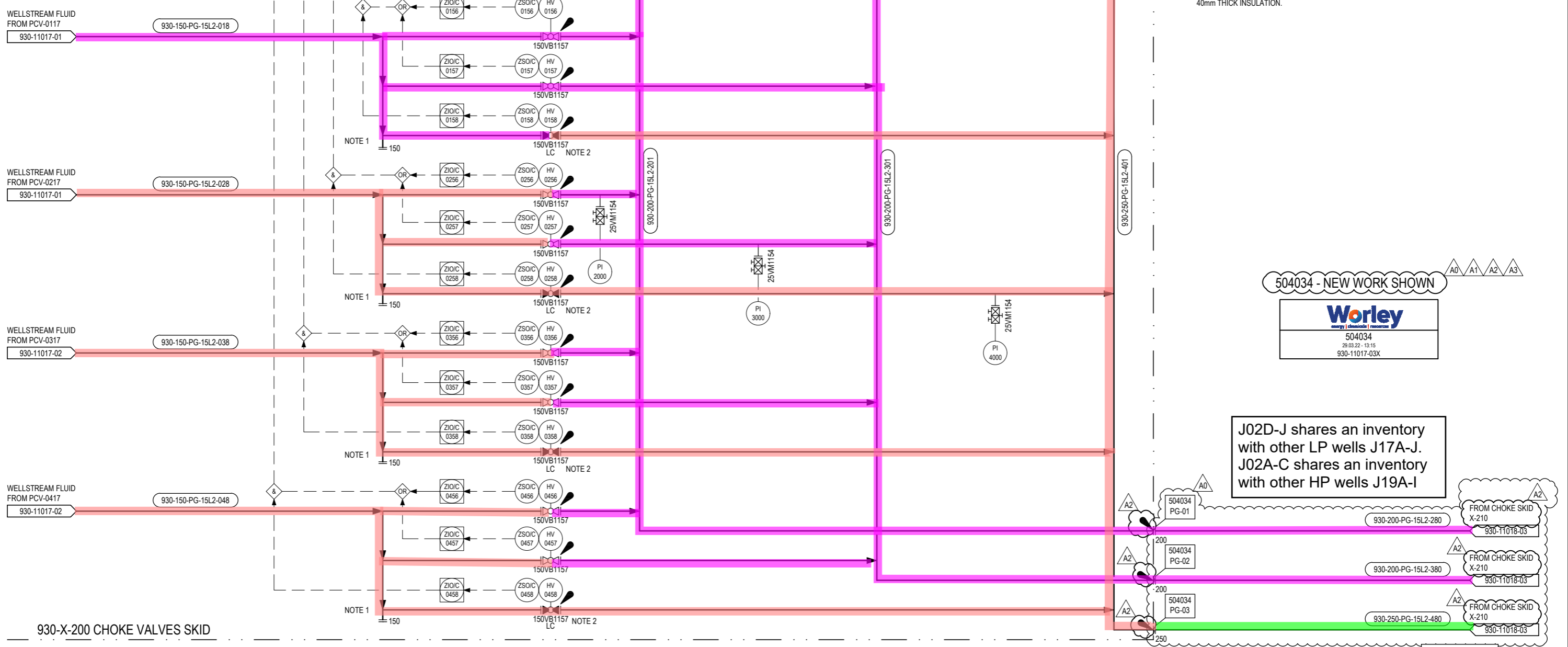
TRAIN J2 MANIFOLD
930-200-PG-15L1-302

LP TRAIN MANIFOLD
930-250-PG-15L1-402

J02C

J02J

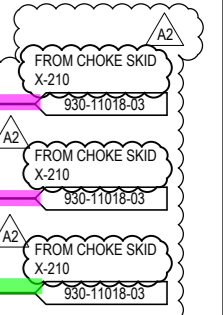
- GENERAL NOTES:
- SPACE ALLOWANCE FOR FUTURE 200NB TRAIN.
 - HV-0158, HV-0258, HV-0358 & HV-0458 TO BE LOCKED CLOSED UNTIL THEIR WELL CITHP < 110 Barg.
 - VOID
 - PIPING TO BE INSULATED WITH NO HEAT TRACE 200mm UPSTREAM & DOWNSTREAM OF TIT WITH 40mm THICK INSULATION.



504034 - NEW WORK SHOWN

Worley
504034
29.03.22 - 13.15
930-11017-03X

J02D-J shares an inventory with other LP wells J17A-J.
J02A-C shares an inventory with other HP wells J19A-I



930-X-200 CHOKE VALVES SKID

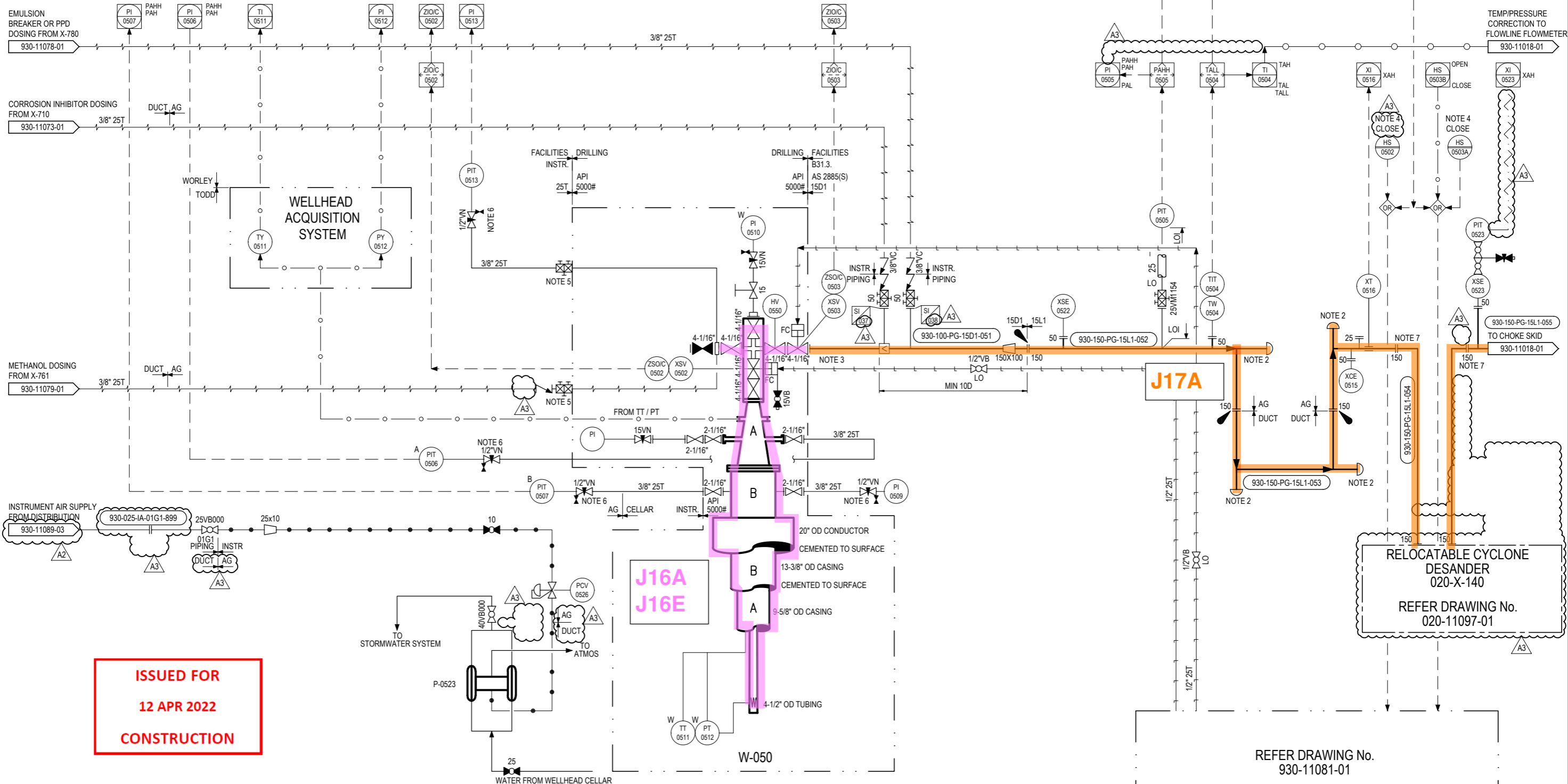
J17J

										ASSET: KAPUNI		930 KAPUNI J WELLSITE PIPING & INSTRUMENT DIAGRAM PRODUCTION MANIFOLD																																																						
<small>THIS DRAWING & ASSOCIATED DESIGN ARE THE COPYRIGHT AND PROPERTY OF TODD ENERGY LTD AND SHALL NOT BE USED FOR ANY PURPOSE OR PROJECT OTHER THAN THAT DESIGNATED WITHOUT PRIOR WRITTEN CONSENT.</small>										REFERENCE DRAWINGS		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>SCALE: A1</td> <td>AREA NO: 930</td> <td>SERIES: 11</td> <td>DRG. NO: 017</td> <td>SHEET: 03X</td> <td>CONST: A3</td> <td>REVISION: 0</td> </tr> </table>					SCALE: A1	AREA NO: 930	SERIES: 11	DRG. NO: 017	SHEET: 03X	CONST: A3	REVISION: 0																																											
SCALE: A1	AREA NO: 930	SERIES: 11	DRG. NO: 017	SHEET: 03X	CONST: A3	REVISION: 0																																																												
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REV	BY	CHK	ENG	APP	TODD	DATE	REV	REVISIONS	DATE																																																									
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A1	KAW	JM	GD	GD		10/21																																																												
A0	504034	DJP	GD			07/21	0	AS BUILT PCR_K1706 (620051)	06/21																																																									

ITEM No. W-050
 NAME WELLHEAD KA-25
 SIZE 4-1/16" API 5000# (345 Barg) @ -18 / 121°C
 DESIGN CTHP = 240 Barg, FTHP = 50 / 180 Barg @ 30 / 55°C
 OPER. NOTE 8
 DUTY

P-0523
 WELLHEAD
 CELLAR PUMP

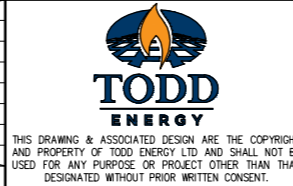
930-X-830
 MASTER & WING VALVE HYDRAULIC PACKAGE
 HYDRAULIC FLUID PUMP & TANK



ISSUED FOR
12 APR 2022
CONSTRUCTION

- GENERAL NOTES:
- THIS P&ID DOES NOT SHOW ALL LOGIC, REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - CUSHION TEES REQUIRED FROM WELLHEAD TO START-UP LOOP DESANDER INLET.
 - DROP OUT SPOOL FOR CHOKE VALVE.
 - HS-0502 FOR XSV-0502, HS-0503A FOR XSV-0503 PUSH BUTTONS LOCATED ON RESPECTIVE WELLHEAD HYDRAULIC CONTROL PACKAGE.
 - 10,000 PSI DOUBLE BLOCK AND BLEED VALVES FITTED DIRECTLY TO INSTRUMENT FLANGE BETWEEN KILL WING VALVES.
 - INSTRUMENT BLOCK AND BLEED VALVES RATED FOR 5,000 PSIG.
 - FLANGE SET TO ALLOW FOR FUTURE DROP OUT SPOOL WHEN PERMANENT DESANDER IS NOT REQUIRED.
 - WELLHEAD CHOKE TO BE INSTALLED IF CITHP IS ABOVE 240 Barg.

REV	BY	CHK	ENG	APP	TODD	DATE	REVISIONS
A3	KAW	JM	GD	GD	KB	03/22	
A2	KAW	JM	GD	GD	KB	11/21	
A1	KAW	JM	GD	GD		10/21	
A0	504034	HBM	DJP	GD		07/21	

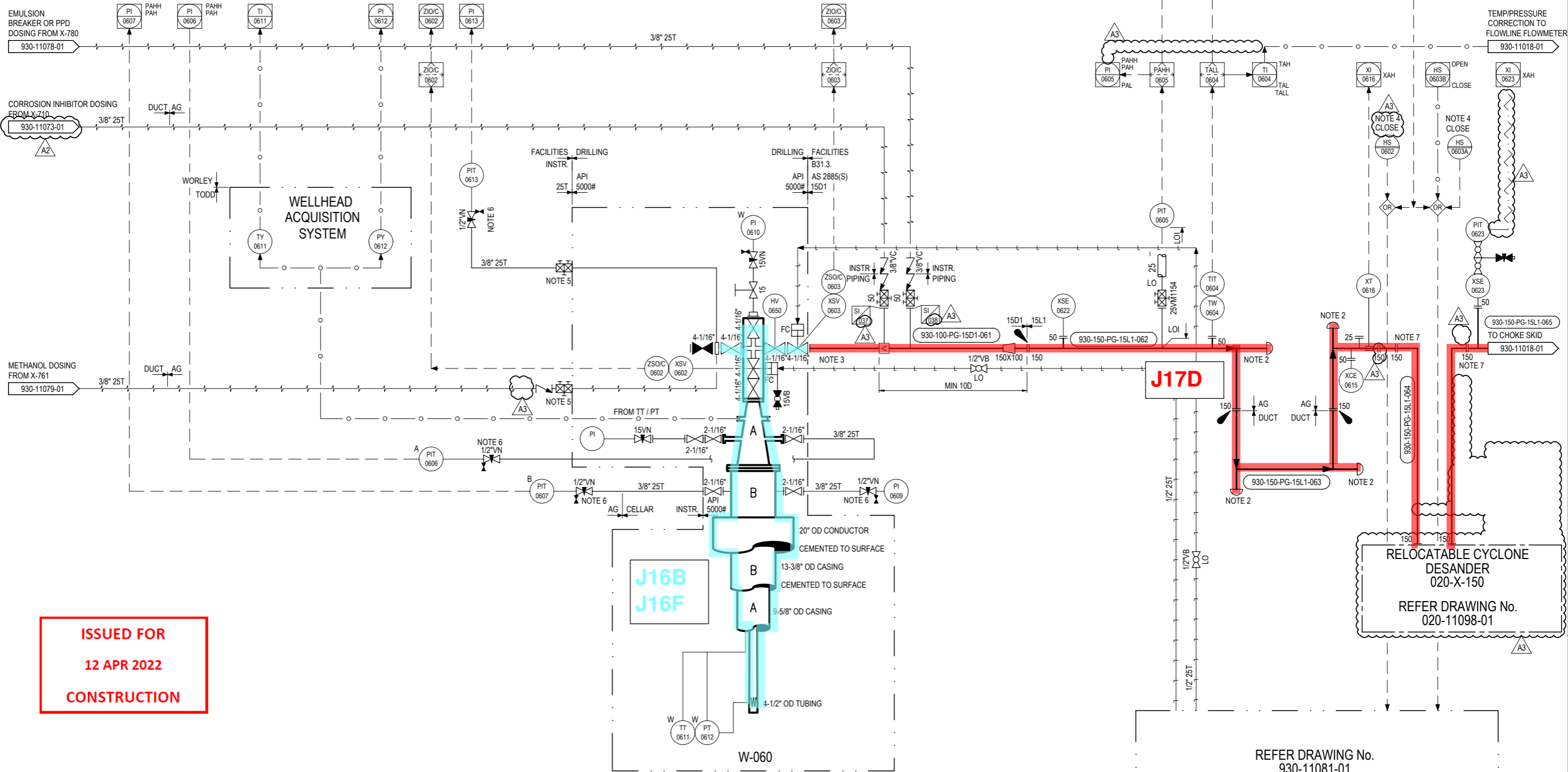


ASSET:	KAPUNI J WELLSITE
REFERENCE DRAWINGS	

930 KAPUNI J WELLSITE PIPING & INSTRUMENT DIAGRAM WELLHEAD KA-25	
SCALE:	A1 N.T.S.
AREA NO.	930
SERIES	11
DRG. NO.	005
SHEET	01X
CONST	A3
REVISION	

ITEM No. W-060
 NAME WELLHEAD KA-26
 SIZE 4-1/16" API 5000# (345 Barg) @ -18 / 121°C
 DESIGN CTHP = 240 Barg, FTHP = 50 / 180 Barg @ 30 / 55°C
 OPER. NOTE 8
 DUTY

930-X-830
 MASTER & WING VALVE HYDRAULIC PACKAGE
 HYDRAULIC FLUID PUMP & TANK



**ISSUED FOR
12 APR 2022
CONSTRUCTION**

- GENERAL NOTES:**
- THIS P&ID DOES NOT SHOW ALL LOGIC, REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - CUSHION TEES REQUIRED FROM WELLHEAD TO START-UP LOOP DESANDER INLET.
 - DROP OUT SPOOL FOR CHOKE VALVE.
 - HS-0602 FOR XSV-0602, HS-0603A FOR XSV-0603 PUSH BUTTONS LOCATED ON RESPECTIVE WELLHEAD HYDRAULIC CONTROL PACKAGE.
 - 10,000 PSI DOUBLE BLOCK AND BLEED VALVES FITTED DIRECTLY TO INSTRUMENT FLANGE BETWEEN KILL WING VALVES.
 - INSTRUMENT BLOCK AND BLEED VALVES RATED FOR 5,000 PSIG.
 - FLANGE SET TO ALLOW FOR FUTURE DROP OUT SPOOL WHEN PERMANENT DESANDER IS NOT REQUIRED.
 - WELLHEAD CHOKE TO BE INSTALLED IF CITHP IS ABOVE 240 Barg.

A3 A2 504034 - NEW WORK SHOWN

Worley
 energy | chemicals | resources
 504034
 28.03.22 - 10.53
 930-11006-01X

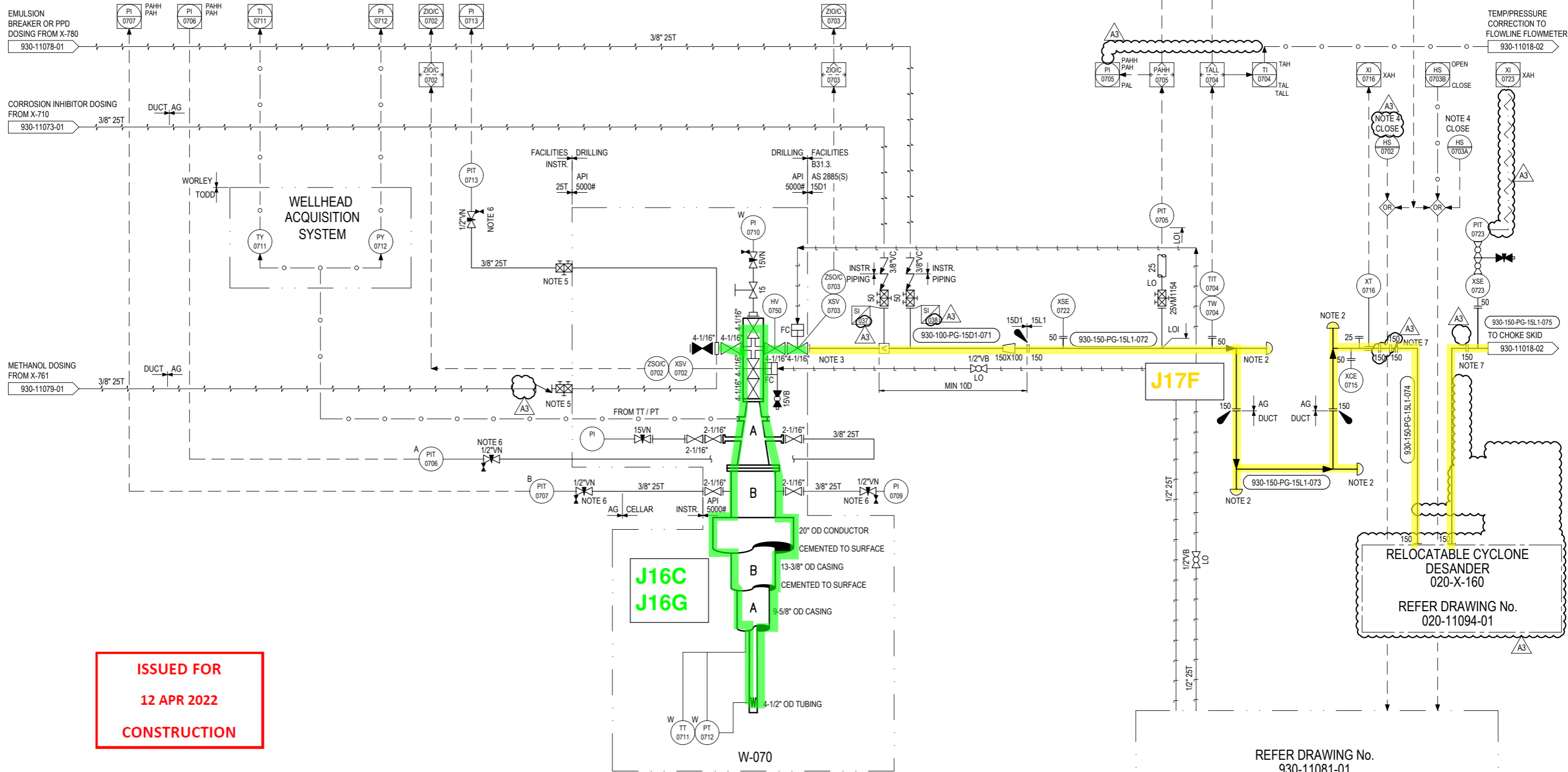
REV	BY	CHK	ENG	APP	TODD	DATE	REVISIONS
A3	RS	JM	GD	GD	KB	03/22	
A2	NR	JM	GD	GD	KB	11/21	
A1	HBM	JM	GD	GD		10/21	
A0	HBM	DJP	GD			07/21	

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ASSET:	KAPUNI J WELLSITE	
PROJECT:	930 KAPUNI J WELLSITE PIPING & INSTRUMENT DIAGRAM WELLHEAD KA-26	
SCALE:	A1 N.T.S.	AREA NO. 930
SHEET:	01X	CONST. A3
DRG. NO.	006	SERIES 11

ITEM No. W-070
 NAME WELLHEAD KA-27
 SIZE 4-1/16" API 5000# (345 Barg) @ -18 / 121°C
 DESIGN CTHP = 240 Barg, FTHP = 50 / 180 Barg @ 30 / 55°C
 OPER. NOTE 8
 DUTY

930-X-830
 MASTER & WING VALVE HYDRAULIC PACKAGE
 HYDRAULIC FLUID PUMP & TANK



ISSUED FOR
12 APR 2022
CONSTRUCTION

- GENERAL NOTES:**
- THIS P&ID DOES NOT SHOW ALL LOGIC, REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - CUSHION TEES REQUIRED FROM WELLHEAD TO START-UP LOOP DESANDER INLET.
 - DROP OUT SPOOL FOR CHOKE VALVE.
 - HS-0702 FOR XSV-0702, HS-0703A FOR XSV-0703 PUSH BUTTONS LOCATED ON RESPECTIVE WELLHEAD HYDRAULIC CONTROL PACKAGE.
 - 10,000 PSI DOUBLE BLOCK AND BLEED VALVES FITTED DIRECTLY TO INSTRUMENT FLANGE BETWEEN KILL WING VALVES.
 - INSTRUMENT BLOCK AND BLEED VALVES RATED FOR 5,000 PSIG.
 - FLANGE SET TO ALLOW FOR FUTURE DROP OUT SPOOL WHEN PERMANENT DESANDER IS NOT REQUIRED.
 - WELLHEAD CHOKE TO BE INSTALLED IF CITHP IS ABOVE 240 Barg.

REV	BY	CHK	ENG	APP	TODD	DATE	REVISIONS
A3	KAW	JM	GD	GD	KB	03/22	
A2	KAW	JM	GD	GD	KB	11/21	
A1	KAW	JM	GD	GD		10/21	
A0	504034	HBM	DJP	GD		07/21	

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ASSET: KAPUNI J WELLSITE

930 KAPUNI J WELLSITE
 PIPING & INSTRUMENT DIAGRAM
 WELLHEAD KA-27

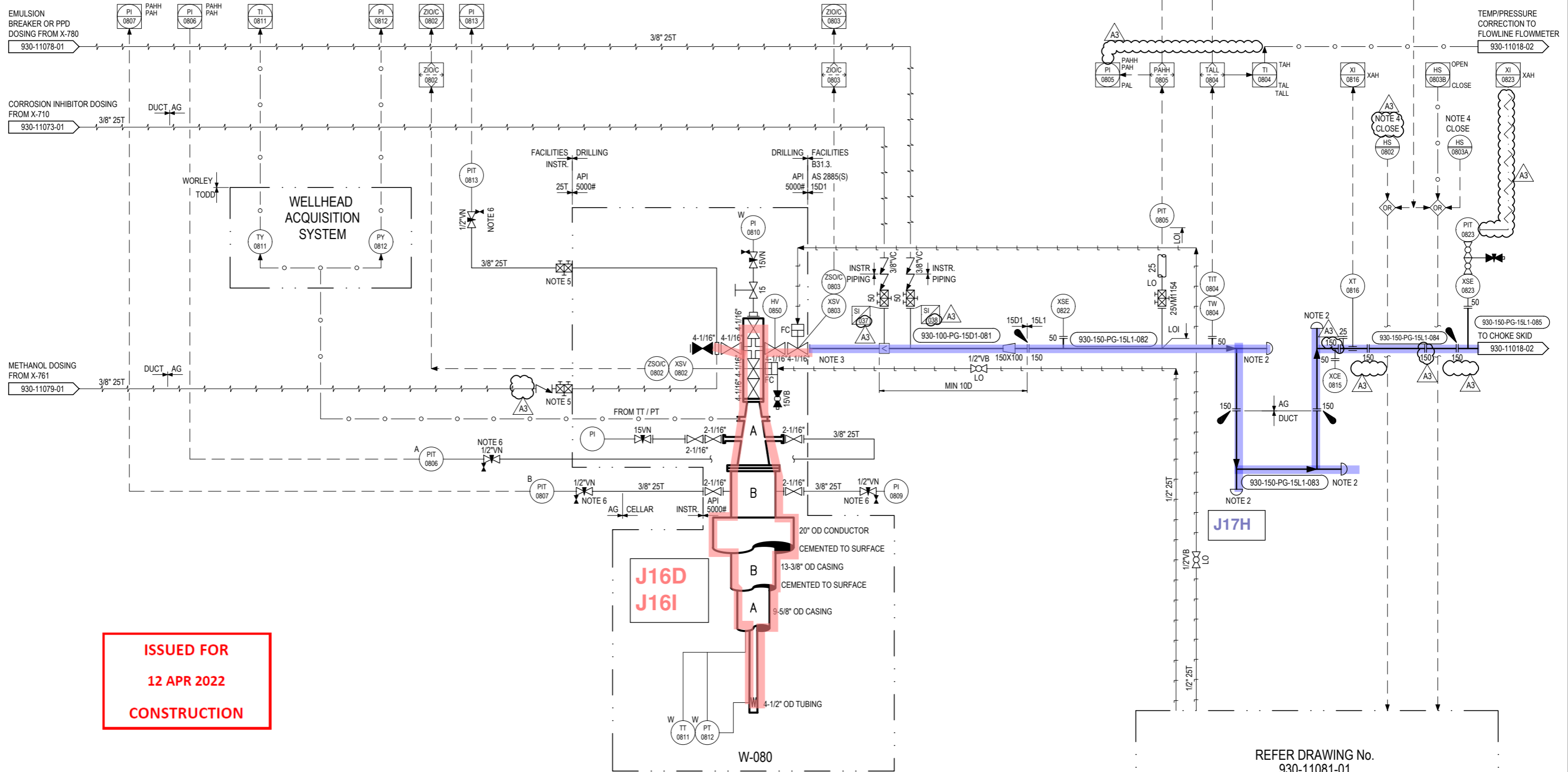
SCALE: A1 N.T.S.	AREA NO. 930	SERIES 11	DRG. NO. 007	SHEET 01X	CONST. A3	REVISION
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Worley

504034
31.03.22 - 15.45
930-11007-01X

ITEM No. W-080
 NAME WELLHEAD KA-28
 SIZE 4-1/16" API 5000# (345 Barg) @ -18 / 121°C
 DESIGN CTHP = 240 Barg, FTHP = 50 / 180 Barg @ 30 / 55°C
 OPER. NOTE 8
 DUTY

930-X-830
 MASTER & WING VALVE HYDRAULIC PACKAGE
 HYDRAULIC FLUID PUMP & TANK



**ISSUED FOR
 12 APR 2022
 CONSTRUCTION**


REFER DRAWING No.
 930-11081-01
 930-X-830

- GENERAL NOTES:
- THIS P&ID DOES NOT SHOW ALL LOGIC, REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - CUSHION TEES REQUIRED FROM WELLHEAD TO START-UP LOOP DESANDER INLET.
 - DROP OUT SPOOL FOR CHOKE VALVE.
 - HS-0802 FOR XSV-0802, HS-0803A FOR XSV-0803 PUSH BUTTONS LOCATED ON RESPECTIVE WELLHEAD HYDRAULIC CONTROL PACKAGE.
 - 10,000 PSI DOUBLE BLOCK AND BLEED VALVES FITTED DIRECTLY TO INSTRUMENT FLANGE BETWEEN KILL WING VALVES.
 - INSTRUMENT BLOCK AND BLEED VALVES RATED FOR 5,000 PSIG.
 - DELETED
 - WELLHEAD CHOKE TO BE INSTALLED IF CITHP IS ABOVE 240 Barg.

504034 - NEW WORK SHOWN


 504034
 28.03.22 - 10.01
 930-11008-01X

REV	BY	CHK	ENG	APP	TODD	DATE	REVISIONS
A3	RS	JM	GD	GD	KB	03/22	
A2	NR	JM	GD	GD	KB	12/21	
A1	HBM	JM	GD	GD		10/21	
A0	HBM	DJP	GD			07/21	


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ASSET: KAPUNI J WELLSITE		930 KAPUNI J WELLSITE PIPING & INSTRUMENT DIAGRAM WELLHEAD KA-28					
SCALE: A1	N.T.S.	AREA NO: 930	SERIES: 11	DRG. NO: 008	SHEET: 01X	CONST: A3	REVISION:
REFERENCE DRAWINGS							

A I B I C D I E I F

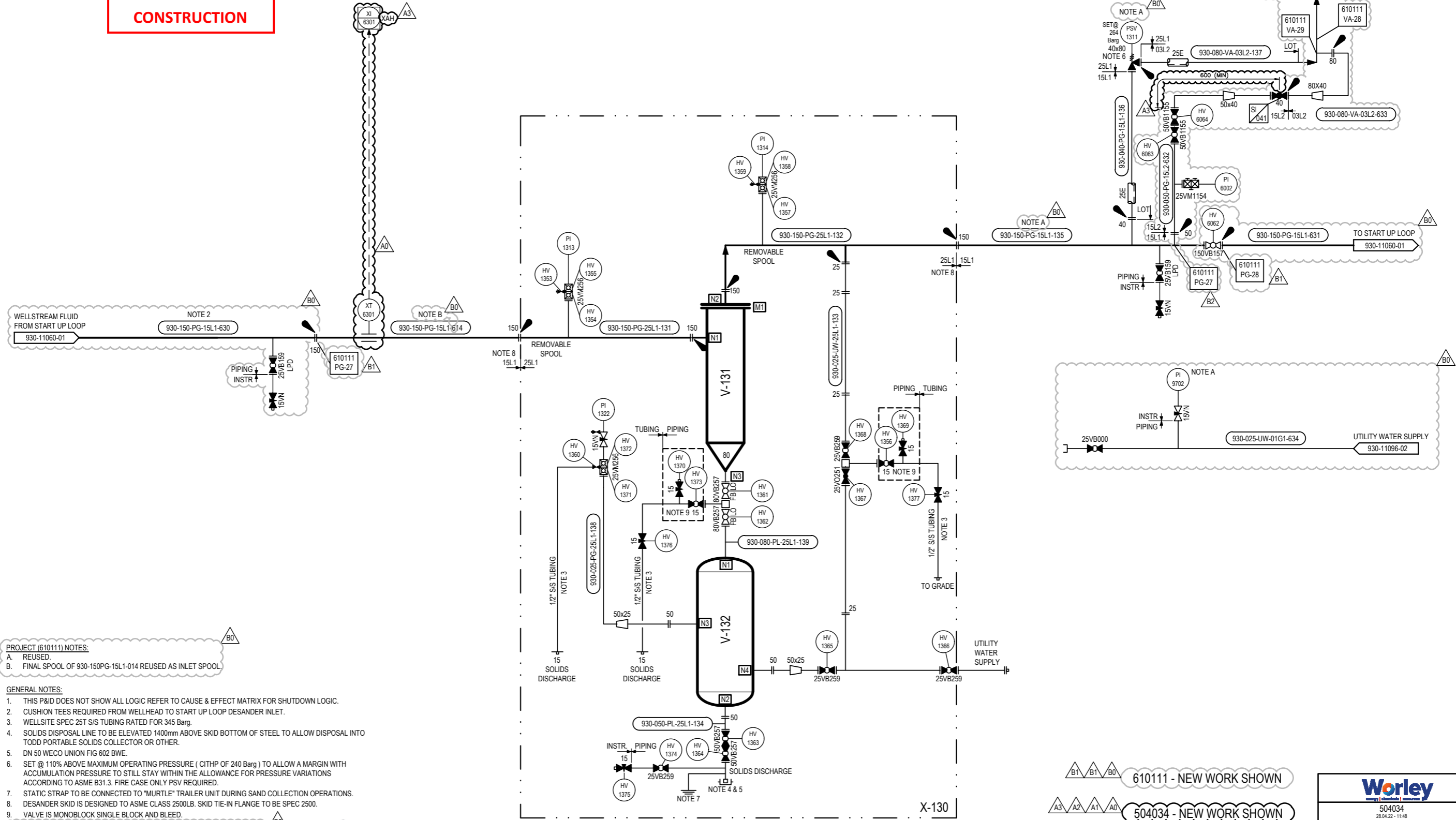
ITEM No.
NAME
SIZE
DESIGN
OPER.
DUTY

ISSUED FOR
03 MAY 2022
CONSTRUCTION

X-130
CYCLONE DESANDER SKID

V-131
CYCLONE DESANDER
6 Sm³/5 @ 180 Barg
386 Barg @ -29 / 100°C
D95 = < 100 MICRONS
N/A

V-132
ACCUMULATOR VESSEL
55 Litre
5 Litre OF SAND / DAY
30 Kg OF SAND / DAY (MAX. DURING START UP)
N/A



PROJECT (610111) NOTES:
A. REUSED.
B. FINAL SPOOL OF 930-150PG-15L1-014 REUSED AS INLET SPOOL.

- GENERAL NOTES:**
- THIS P&ID DOES NOT SHOW ALL LOGIC REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - CUSHION TEES REQUIRED FROM WELLHEAD TO START UP LOOP DESANDER INLET.
 - WELLSITE SPEC 25T S/S TUBING RATED FOR 345 Barg.
 - SOLIDS DISPOSAL LINE TO BE ELEVATED 1400mm ABOVE SKID BOTTOM OF STEEL TO ALLOW DISPOSAL INTO TODD PORTABLE SOLIDS COLLECTOR OR OTHER.
 - DN 50 WECO UNION FIG 602 BWE.
 - SET @ 110% ABOVE MAXIMUM OPERATING PRESSURE (CITHP OF 240 Barg) TO ALLOW A MARGIN WITH ACCUMULATION PRESSURE TO STILL STAY WITHIN THE ALLOWANCE FOR PRESSURE VARIATIONS ACCORDING TO ASME B31.3. FIRE CASE ONLY PSV REQUIRED.
 - STATIC STRAP TO BE CONNECTED TO "MURTL" TRAILER UNIT DURING SAND COLLECTION OPERATIONS.
 - DESANDER SKID IS DESIGNED TO ASME CLASS 2500LB. SKID TIE-IN FLANGE TO BE SPEC 2500.
 - VALVE IS MONOBLOCK SINGLE BLOCK AND BLEED.
 - REFER TO STANDARD DRAWING STD-50016-01 FOR DN 80 RAIN FLAP DETAILS.

REV	BY	CHK	ENG	APP	TODD	DATE	REV	AS BUILT	REVISIONS	BY	CHK	ENG	APP	TODD	DATE
A3	KAW	3003	-	APPROVED FOR CONSTRUCTION	RS	KMc	OCK	OCK	KB	03/22					
B2	PCR	2_2021_77	-RE-	APPROVED FOR CONSTRUCTION	RS	JM	GD	GD	KB	03/22					
A2	KAW	3003	-	APPROVED FOR DESIGN	NR	JM	GD	GD	KB	11/21					
B1	PCR	2_2021_77	-RE-	APPROVED FOR CONSTRUCTION	VK	JM	GD	GD	KB	12/21					
B0	PCR	2_2021_77	-	APPROVED FOR CONSTRUCTION	NR	JM	GD	GD	KB	11/21					
A1	KAW	3003	-	ISSUED FOR HAZOP	HBM	JM	GD	GD	.	10/21					
A0	504034	-	ISSUED FOR REVIEW	VK	DJP	GD	.	.	07/21	0				06/21	

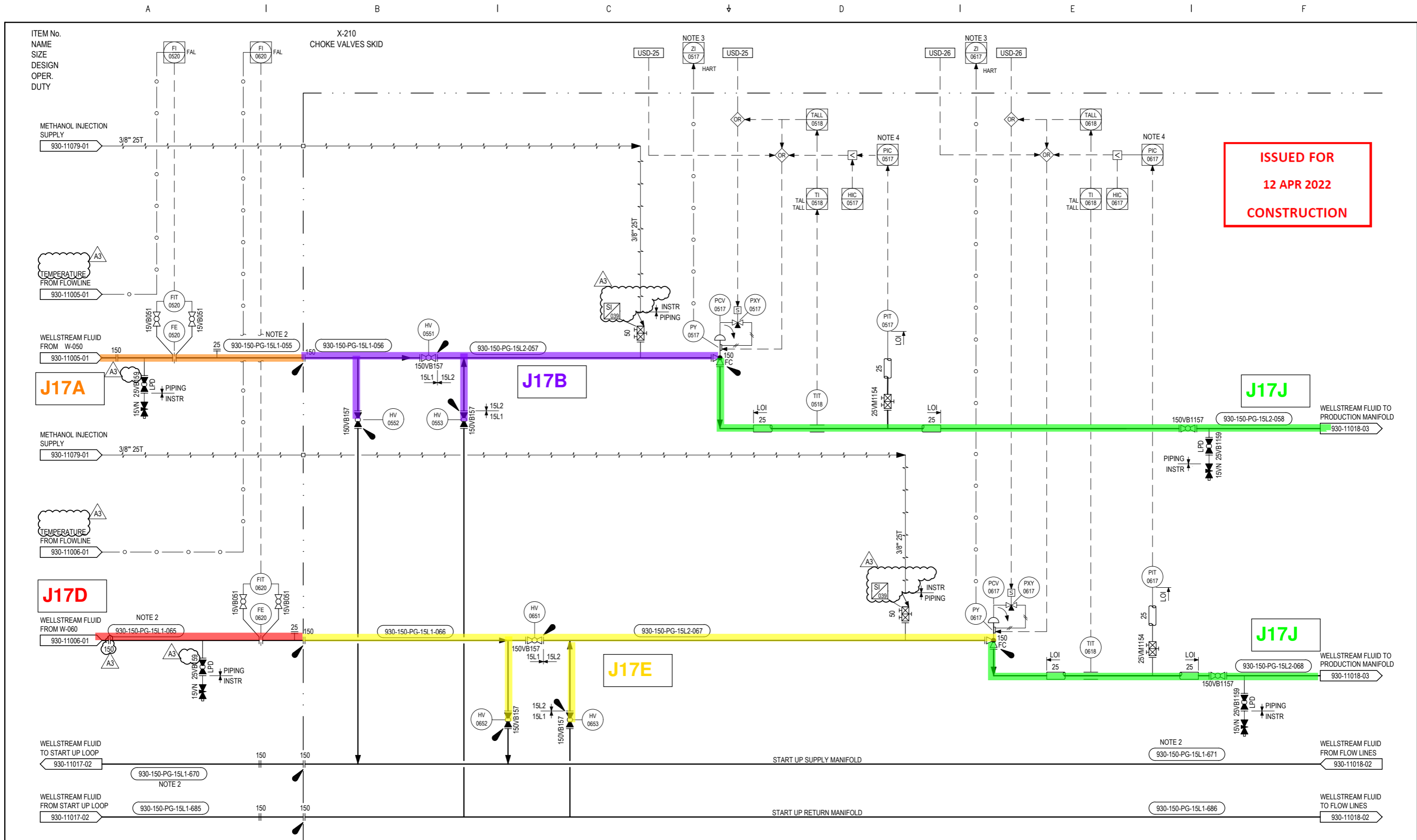
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ASSET: **KAPUNI**

930 KAPUNI J WELLSITE
PIPING & INSTRUMENT DIAGRAM
CYCLONE DESANDER SKID 1

SCALE: **A1 N.T.S.** AREA NO. **930** SERIES **11** DRG. NO. **013** SHEET **01X** CONST **A3** REVISION **0**

504034
28.04.22 - 11:48
930-11013-01X



ISSUED FOR
12 APR 2022
CONSTRUCTION

- GENERAL NOTES:**
1. THIS P&ID DOES NOT SHOW ALL LOGIC REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 2. CUSHION TEES AND TARGET CROSSES REQUIRED TO START UP LOOP DESANDER INLET
 3. DEVIATION ALARM RAISED IF DEVIATION EXISTS BETWEEN REQUESTED POSITION AND POSITION FEEDBACK.
 4. PIC OVERRIDE SET POINT BASED ON MANIFOLD LINE OUT.
 5. CHECK VALVES TO BE OF DISIMILAR TYPE.

A3 A2 504034 - NEW WORK SHOWN

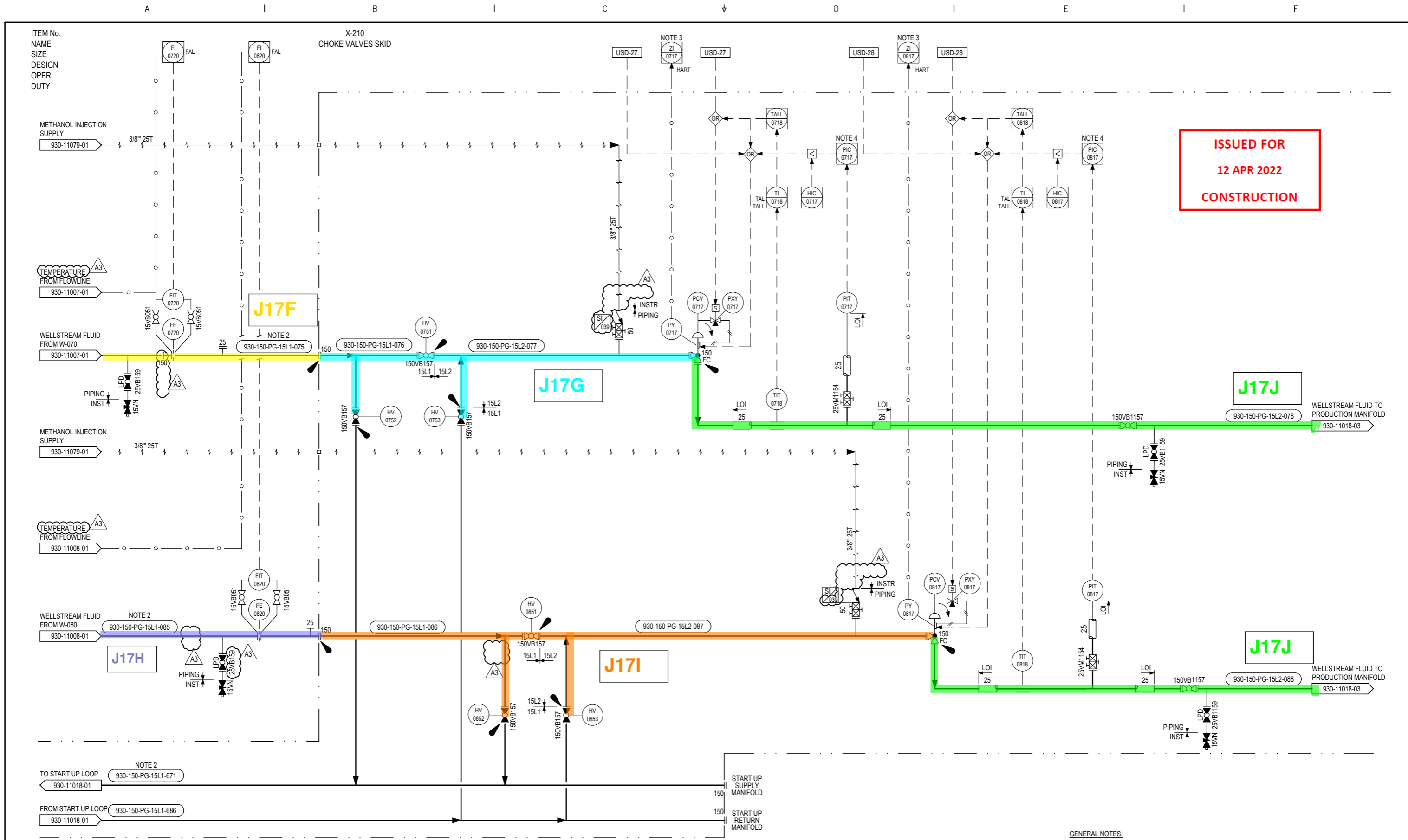
Worley
504034
30.03.22 - 09.29
930-11018-01X

REV	CONSTRUCTION ISSUE	BY	CHK	ENG	APP	TODD	DATE	REV	REVISIONS	BY	CHK	ENG	APP	TODD	DATE
A3	KAW-3003 - APPROVED FOR CONSTRUCTION	RS	JM	GD	GD	KB	03/22								
A2	KAW-3003 - APPROVED FOR DESCIN	NR	JM	GD	GD	KB	12/21								
A1	KAW-3003 - ISSUED FOR HAZOP	HBM	JM	GD	GD		10/21								
A0	504034 - ISSUED FOR REVIEW	HBM	DJP	GD			07/21								

TODD ENERGY

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ASSET:	KAPUNI J WELLSITE	930 KAPUNI J WELLSITE PIPING & INSTRUMENT DIAGRAM CHOKE VALVES SKID 930-X-210	SCALE: A1 N.T.S.	AREA NO. 930	SERIES 11	DRG. NO. 018	SHEET 01X	CONST A3	REVISION
REFERENCE DRAWINGS									



**ISSUED FOR
12 APR 2022
CONSTRUCTION**

- GENERAL NOTES:**
1. THIS P&ID DOES NOT SHOW ALL LOGIC REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 2. CUSHION TEES AND TARGET CROSSES REQUIRED TO START UP LOOP DESANDER INLET.
 3. DEVIATION ALARM RAISED IF DEVIATION EXISTS BETWEEN REQUESTED POSITION AND POSITION FEEDBACK.
 4. PIC OVERRIDE SET POINT BASED ON MANIFOLD LINE OUT.
 5. DELETED.

A3 A2 504034 - NEW WORK SHOWN

504034
 29.03.22 - 13.30
 930-11018-02X

REV	CONSTRUCTION ISSUE	BY	CHK	ENG	APP	TODD	DATE	REVISIONS	BY	CHK	ENG	APP	TODD	DATE
A3	KAW-3003 - APPROVED FOR CONSTRUCTION	RS	JM	GD	GD	KB	03/22							
A2	KAW-3003 - APPROVED FOR DESCN	NR	JM	GD	GD	KB	12/21							
A1	KAW-3003 - ISSUED FOR HAZOP	HBM	JM	GD	GD	.	10/21							
A0	504034 - ISSUED FOR REVIEW	HBM	DJP	GD	.	.	07/21							

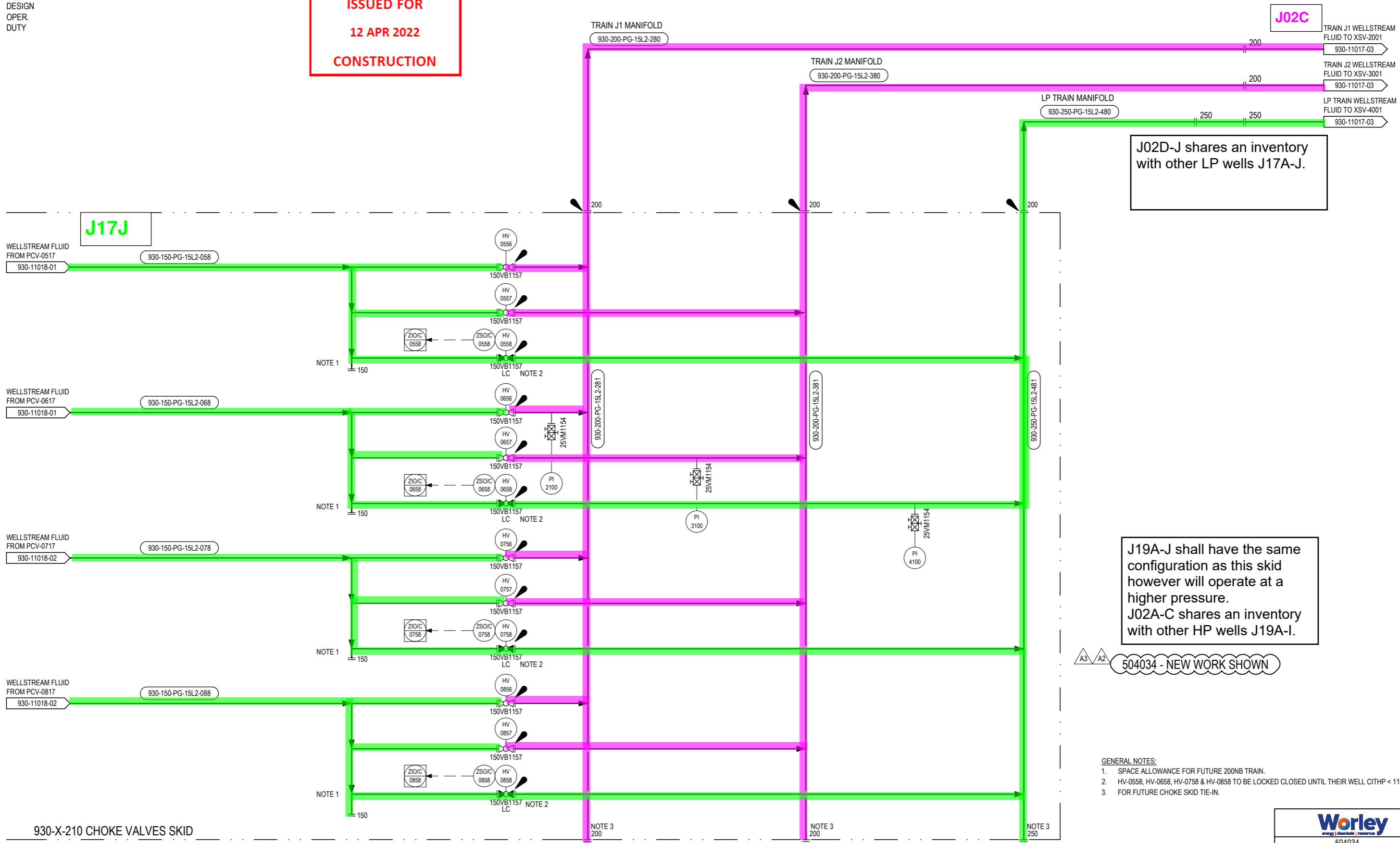
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ASSET:	KAPUNI J WELLSITE
REFERENCE DRAWINGS	

930 KAPUNI J WELLSITE PIPING & INSTRUMENT DIAGRAM CHOKE VALVES SKID 930-X-210	
SCALE:	N.T.S.
AREA NO.	930
SERIES	11
DRG. NO	018
SHEET	02X
CONST	A3
REVISION	

ITEM No. 930-X-210
 NAME CHOKE VALVES SKID
 SIZE
 DESIGN
 OPER.
 DUTY

ISSUED FOR
 12 APR 2022
 CONSTRUCTION



J02D-J shares an inventory with other LP wells J17A-J.

J19A-J shall have the same configuration as this skid however will operate at a higher pressure. J02A-C shares an inventory with other HP wells J19A-I.

504034 - NEW WORK SHOWN

- GENERAL NOTES:
- SPACE ALLOWANCE FOR FUTURE 200NB TRAIN.
 - HV-0558, HV-0658, HV-0758 & HV-0858 TO BE LOCKED CLOSED UNTIL THEIR WELL CITHP < 110 Barg.
 - FOR FUTURE CHOKE SKID TIE-IN.

930-X-210 CHOKE VALVES SKID

Worley
 504034
 29.03.22 - 12.03
 930-11018-03X

REV	DESCRIPTION	BY	CHK	ENG	APP	TODD	DATE
A3	KAW-3003 - APPROVED FOR CONSTRUCTION	RS	JM	GD	GD	KB	03/22
A2	KAW-3003 - APPROVED FOR DESIGN	NR	JM	GD	GD	KB	11/21
A1	KAW-3003 - ISSUED FOR HAZOP	HBM	JM	GD	GD		10/21
A0	504034 - ISSUED FOR REVIEW	HBM	DJP	GD			07/21

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ASSET: KAPUNI J WELLSITE

REFERENCE DRAWINGS

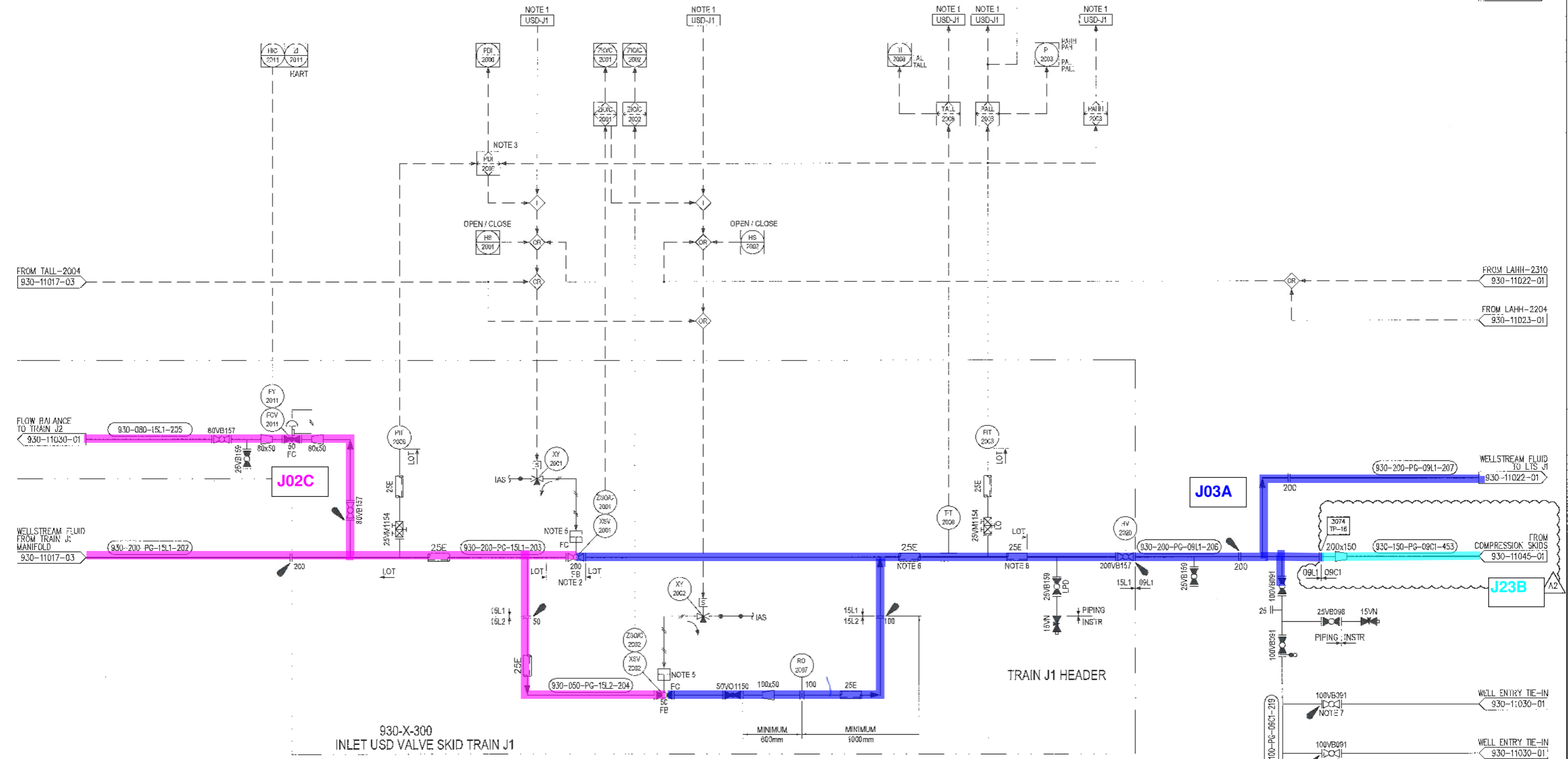
930 KAPUNI J WELLSITE
 PIPING & INSTRUMENT DIAGRAM
 PRODUCTION MANIFOLD 930-X-210

SCALE: A1 N.T.S.	AREA NO. 930	SERIES 11	DRG. NO. 018	SHEET 03X	CONST A3	REVISION
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ITEM No
NAME
SIZE
DESIGN
OPER
DUTY

930-X-300
INLET USD VALVE SKID TRAIN J1

TO XSV-2405
930-11023-01



- NOTES
- THIS P&ID DOES NOT SHOW ALL LOGIC, REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - TRAIN A SHUTDOWN VALVE XSV-2001 TO BE LOCATED AS CLOSE AS POSSIBLE TO THE CHOKO SKID MANIFOLD, TO MINIMIZE VENTED INVENTORIES.
 - DIFFERENTIAL PRESSURE MUST BE LESS THAN 10 BAR FOR TRAIN SHUTDOWN VALVE TO OPEN.
 - VOID.
 - BYPASS VALVE XSV-2002 IS INTERLOCKED WITH XSV-2001 AND WILL CLOSE WHEN XSV-2001 IS OPERATED.
 - PIPING TO BE INSULATED WITH NO HEAT TRACE 200mm UPSTREAM & DOWNSTREAM OF TIT WITH 40mm THICK INSULATION.
 - WELL ENTRY USE ONLY, VALVE TO LP TRAIN TO BE LOCKED CLOSED BEFORE OPENING VALVES TO J1 AND J2 TRAINS.

NEW WORK SHOWN CLOUDED
KAW-3074 (11-01099.74)



REV	DATE	REV	DATE	BY	CHK	ENG	APP	TODD	DATE
A2	08/22	1	AS BUILT PER SITE MARK-UP PROJ 12526	JM	MAW	KB			01/22
A1	06/22	0	AS BUILT PCR_1706 (82CC51)	HBM	CJP	GD			06/21

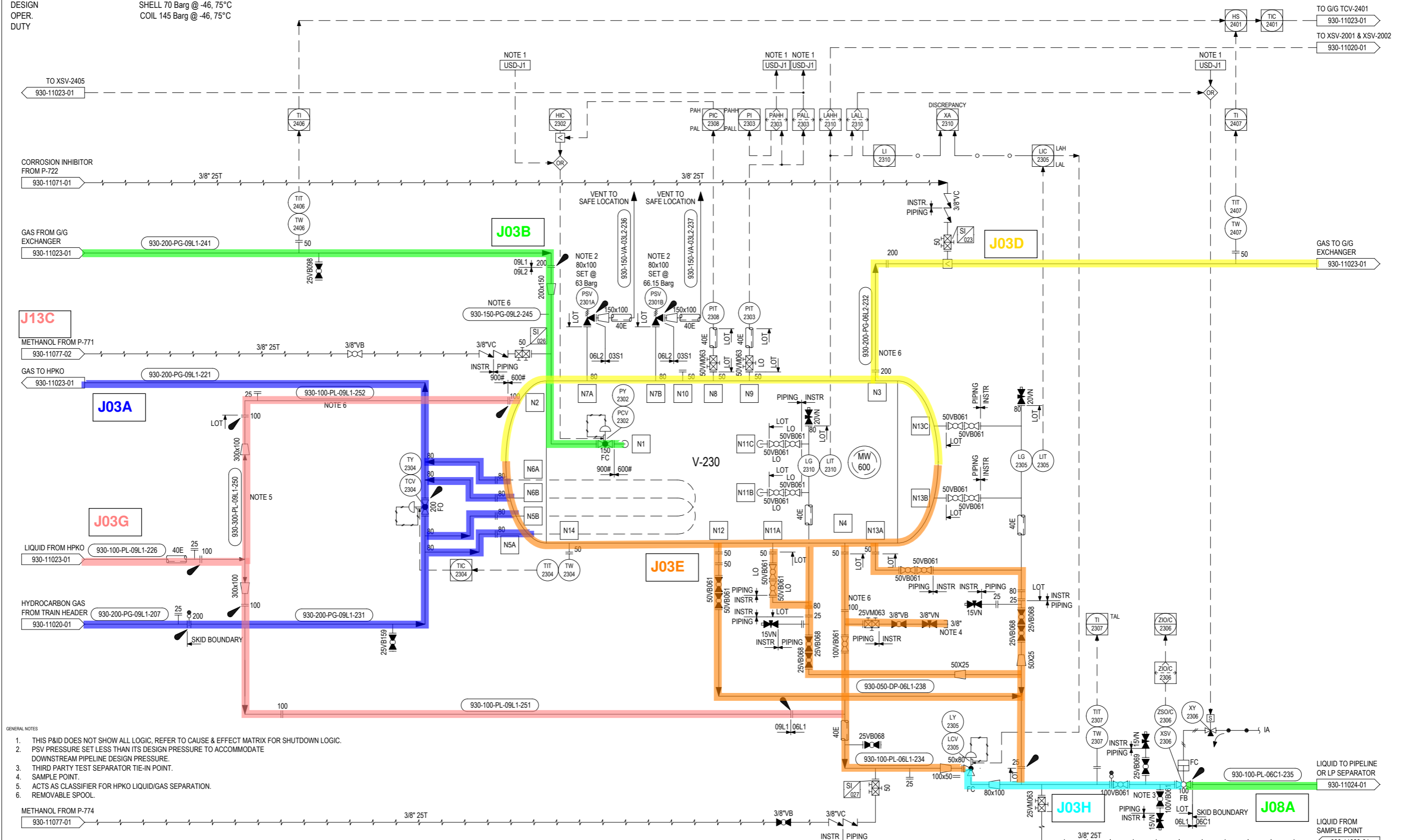
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ASSET: KAPUNI J WELLSITE

KAPUNI J WELLSITE
PIPING & INSTRUMENTATION DIAGRAM
INLET USD VALVE J1 TRAIN

SCALE: A1 NTS	AREA NO: 930	SERIES: 11	ORG. NO: 020	SHEET: 01	CONST: A2	REVISION: X
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ITEM No. V-230
 NAME LOW TEMPERATURE SEPARATOR
 SIZE 1.83m ID x 5.52m S/S
 DESIGN SHELL 70 Barg @ -46, 75°C
 OPER. COIL 145 Barg @ -46, 75°C
 DUTY



- GENERAL NOTES
1. THIS P&ID DOES NOT SHOW ALL LOGIC, REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 2. PSV PRESSURE SET LESS THAN ITS DESIGN PRESSURE TO ACCOMMODATE DOWNSTREAM PIPELINE DESIGN PRESSURE.
 3. THIRD PARTY TEST SEPARATOR TIE-IN POINT.
 4. SAMPLE POINT.
 5. ACTS AS CLASSIFIER FOR HPKO LIQUID/GAS SEPARATION.
 6. REMOVABLE SPOOL.

No	DATE	DRN	CHKD	ENGD	APPD	TODD	DESCRIPTION	NUMBER	TITLE
0	06/21	HBM	DJP	GD		KB	AS BUILT PCR_K1706 (620051)		

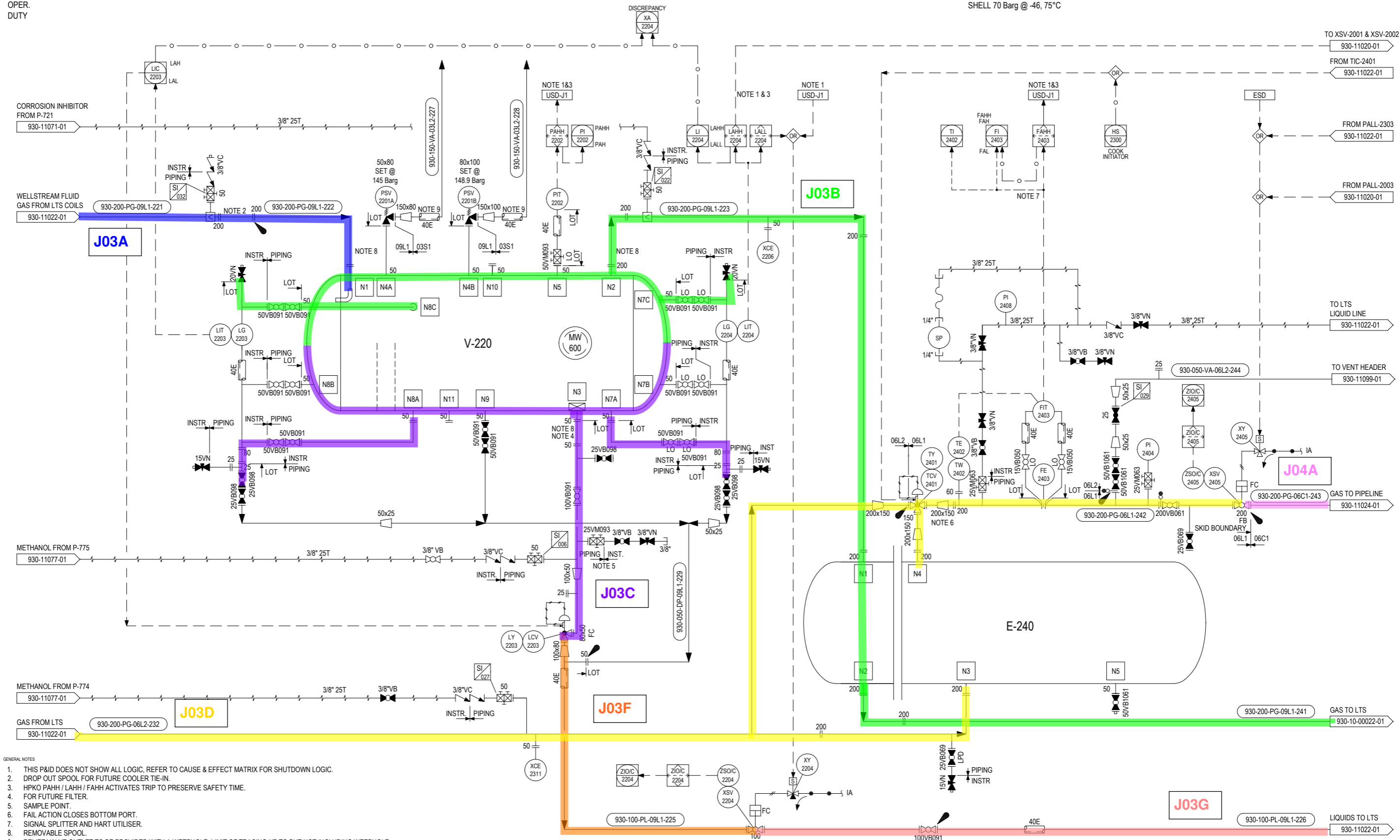


LOCATION	KAPUNI J WELLSITE		DRAWN	V.KAING	12/18	TITLE	KAPUNI J WELLSITE PIPING & INSTRUMENT DIAGRAM LTS J1 VESSEL	
PROJECT No.			CHECKED	D.STEWART	12/18			
SCALE	N.T.S.		DES ENGD			APPROVED	G.DAVIDSON	12/18
			PROJ ENGD					
			APPROVED					
ORIGINAL SIZE	A1					DRAWING No.	930-11022-01	
						REVISION	0	

ITEM No.
NAME
SIZE
DESIGN
OPER.
DUTY

V-220
HIGH PRESSURE KNOCKOUT
1.55m ID x 4.65m T/T
SHELL 145 Barg @ -29, 75°C

E-240
GAS / GAS EXCHANGER
SURFACE 539.8 m
2 TUBE 145 Barg @ -46, 75°C
SHELL 70 Barg @ -46, 75°C



- GENERAL NOTES
1. THIS P&ID DOES NOT SHOW ALL LOGIC, REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 2. DROP OUT SPOOL FOR FUTURE COOLER TIE-IN.
 3. HPKO PAHH / LAHH / FAHH ACTIVATES TRIP TO PRESERVE SAFETY TIME.
 4. FOR FUTURE FILTER.
 5. SAMPLE POINT.
 6. FAIL ACTION CLOSES BOTTOM PORT.
 7. SIGNAL SPLITTER AND HART UTILISER.
 8. REMOVABLE SPOOL.
 9. RELIEF VALVE OUTLET TO BE PROVIDED WITH A WEEPHOLE. LIMIT OF TRACING UP TO BUT NOT INCLUDING WEEPHOLE.

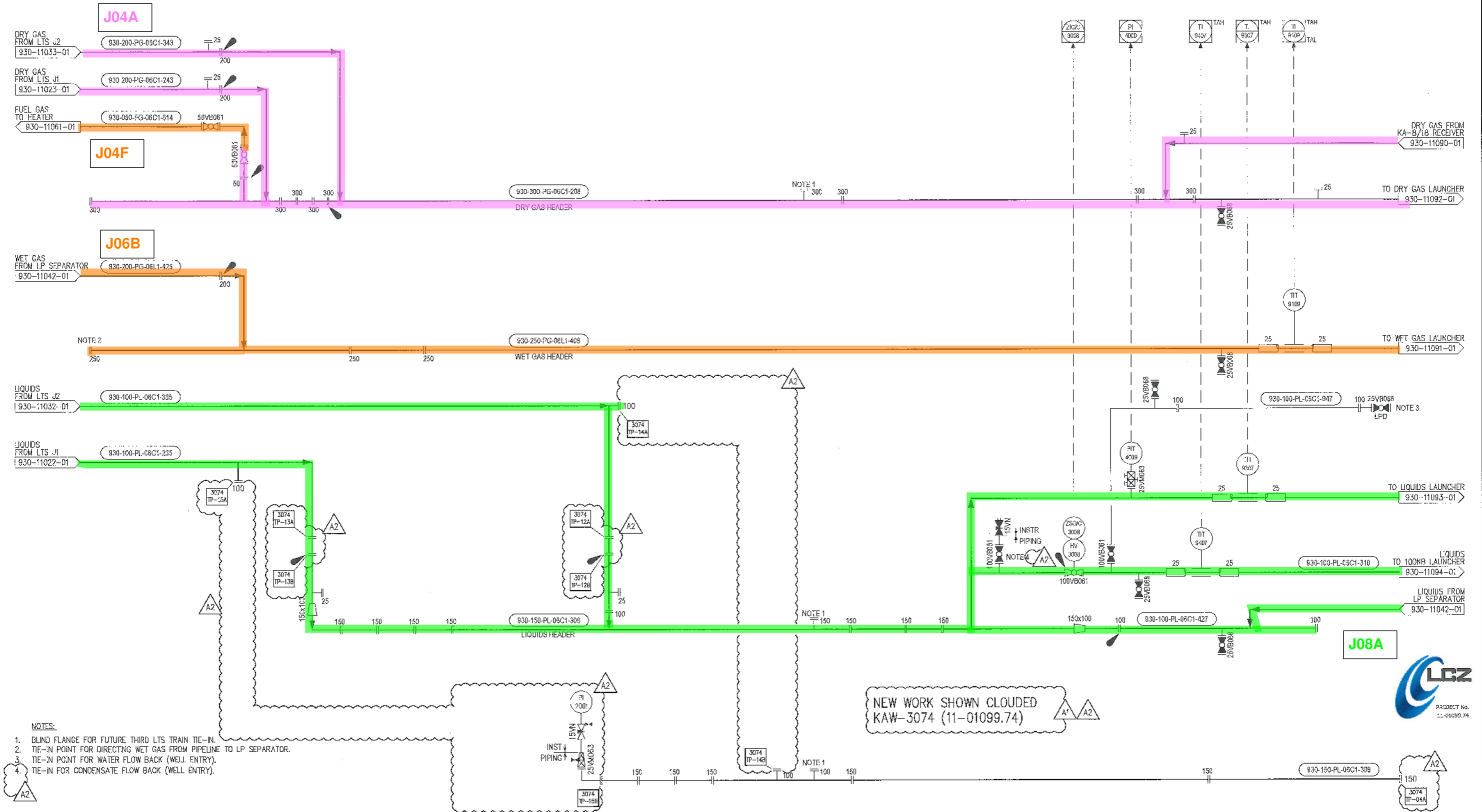
No	DATE	DRN	CHKD	ENGD	APPO	TODD	DESCRIPTION	NUMBER	TITLE
0	06/21	HBM	DJP	GD		KB	AS BUILT PCR_K1706 (620051)		



LOCATION	KAPUNI J WELLSITE		DRAWN	V.KAING	12/18	TITLE	KAPUNI J WELLSITE PIPING & INSTRUMENT DIAGRAM LTS J1 HPKO & GAS TO GAS EXCHANGER	
PROJECT No.			CHECKED	D.STEWART	12/18			
			DES ENGD	G.DAVIDSON	12/18			
			PROJ ENGD	G.DAVIDSON	12/18			
SCALE	N.T.S.		APPROVED	G.DAVIDSON	12/18	ORIGINAL SIZE	DRAWING No. 930-11023-01	
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A I B I C D I E F

ITEM No
NAME
SIZE
DESIGN
OPER
DUTY



- NOTES:
- BLIND FLANGE FOR FUTURE THIRD LTS TRAIN TIE-IN.
 - TIE-IN POINT FOR DIRECTING WET GAS FROM PIPELINE TO LP SEPARATOR.
 - TIE-IN POINT FOR WATER FLOW BACK (WELL ENTRY).
 - TIE-IN FOR CONDENSATE FLOW BACK (WELL ENTRY).

NEW WORK SHOWN CLOUDED
KAW-3074 (11-01099.74)



REV	DESCRIPTION	BY	CHK	ENG	APP	TODD	DATE	REV	REVISIONS	BY	CHK	ENG	APP	TODD	DATE
A2	WELLSITE COMPRESSION ISSUED FOR HAZOP PROJECT KAW-3074	JM	VP	LG	AS	KB	06/22	1	AS BUILT FOR SITE MARK-UP FROM 12/28	JM	MAW	KB	01/22		
A1	WELLSITE COMPRESSION ISSUED FOR REVIEW PROJECT KAW-3074	VP	JB	LG	AS	KB	06/22	0	AS BUILT FOR K1706 (629031)	VK	D.P.	GD	KB	06/21	
	CONSTRUCTION ISSUE														

TODD ENERGY

ASSET: KAPUNI J WELLSITE

KAPUNI J WELLSITE
PIPING & INSTRUMENTATION DIAGRAM
GATHERING HEADERS

SCALE: A1 NTS

AREA NO. 930

SERIES 11

DRG. NO. 024

SHEET 01

CONST. A2

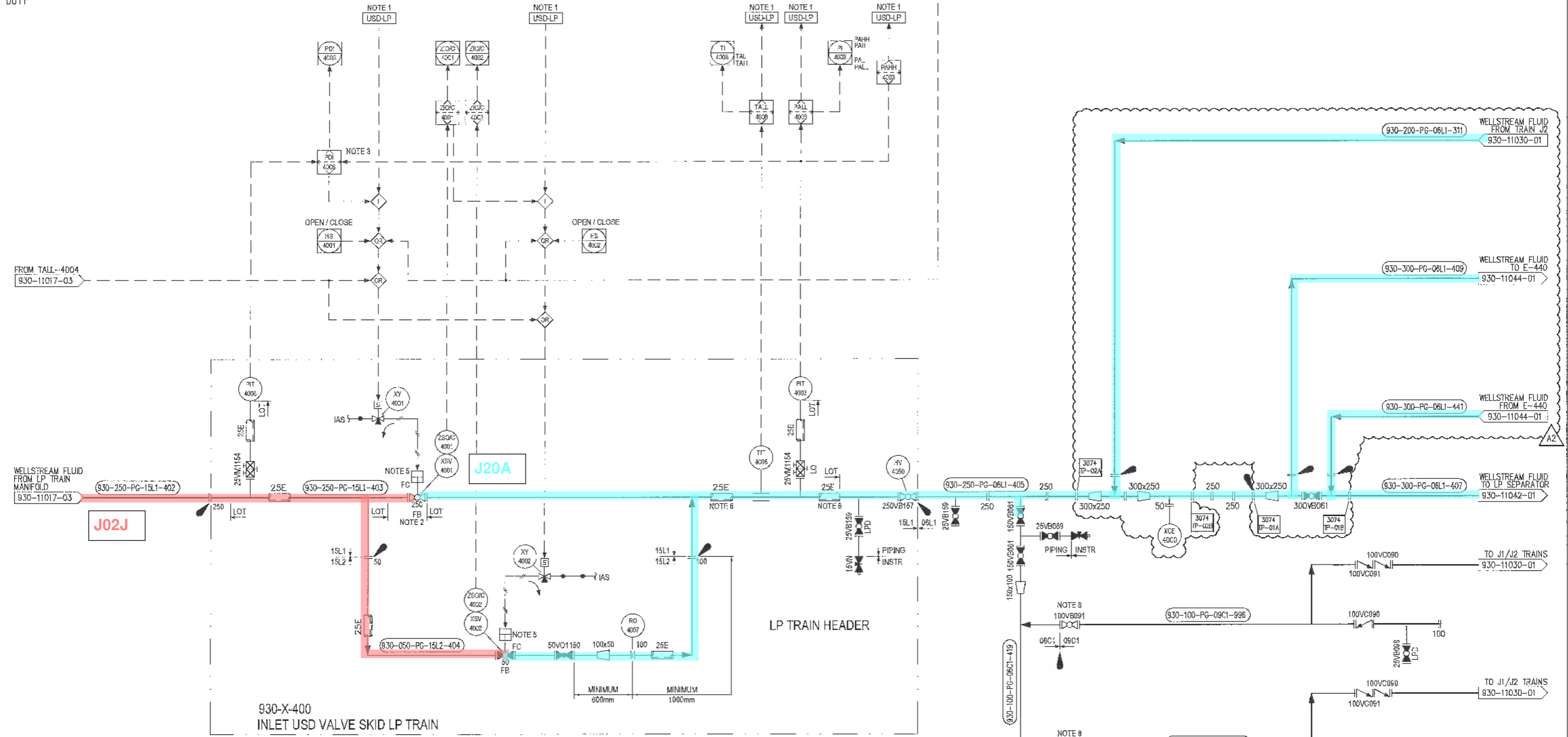
REVISION

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REFERENCE DRAWINGS

ITEM No 930-X-400
 NAME INLET USD VALVE SKID LP TRAIN
 SIZE
 DESIGN
 OPER
 DUTY

FROM LAH-4202
 930-11042-01



- NOTES:
1. THIS P&ID DOES NOT SHOW ALL LOGIC, REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 2. LP TRAIN SHUTDOWN VALVE XSV-4001 TO BE LOCATED AS CLOSE AS POSSIBLE TO THE CHOKO SKID MANIFOLD, TO MINIMIZE VENTED INVENTORIES.
 3. DIFFERENTIAL PRESSURE MUST BE LESS THAN 10 BAR FOR LP TRAIN SHUTDOWN VALVE TO OPEN.
 4. VOID.
 5. BYPASS VALVE XY-4002 IS INTERLOCKED WITH XSV-4001 AND WILL CLOSE WHEN XSV-4001 IS OPENED.
 6. PIPING TO BE INSULATED WITH NO HEAT TRACE 200mm UPSTREAM & DOWNSTREAM OF TIT WITH 40mm THICK INSULATION.
 7. VOID.
 8. WELL ENTRY USE ONLY. VALVE TO LP TRAIN CAN ONLY BE OPENED IF VALVES TO J1 AND J2 TRAINS ARE LOCKED CLOSED.

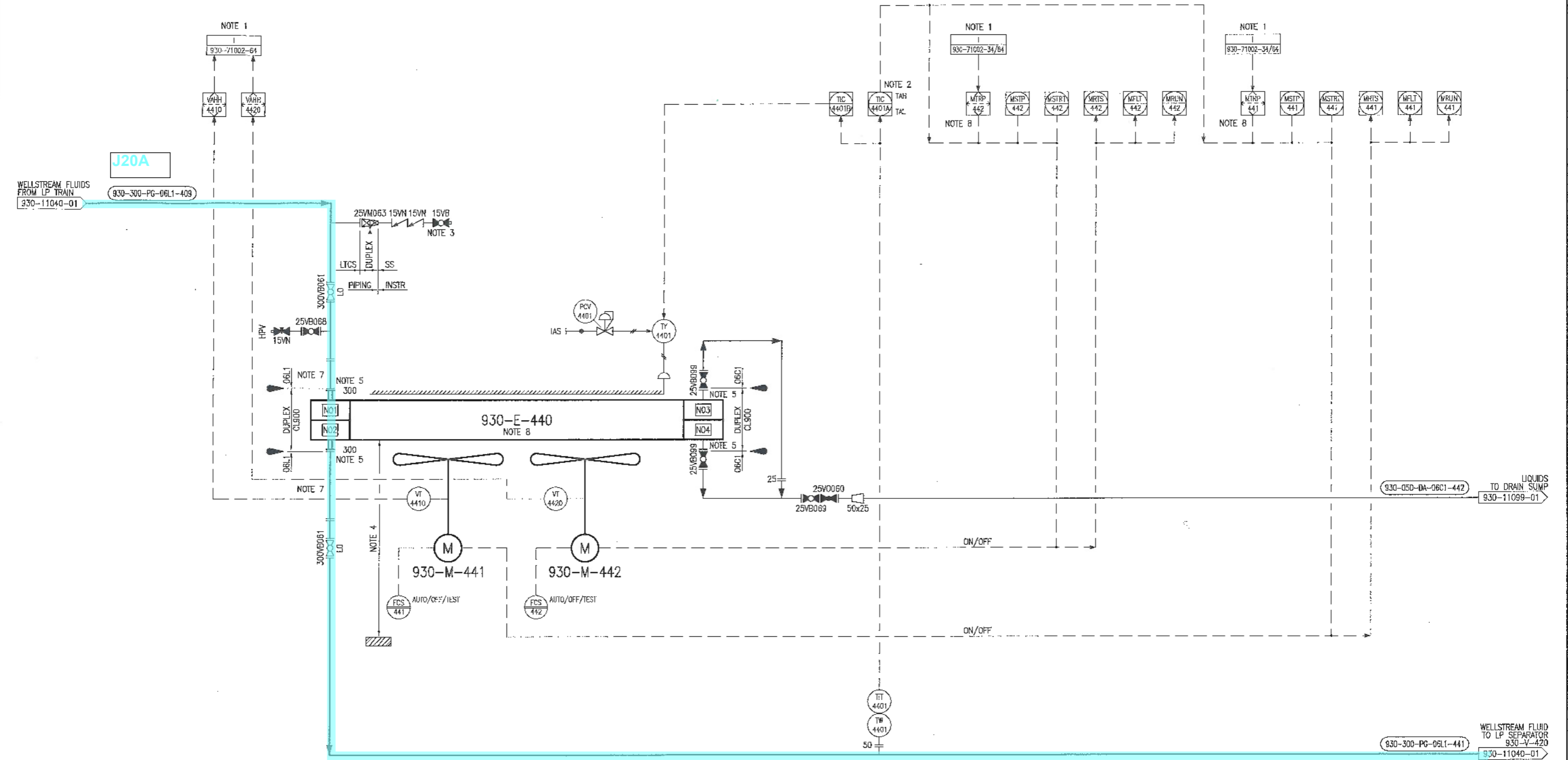
NEW WORK SHOWN CLOUDED
 KAW-3074 (11-01099.74)



ASSET: KAPUNI J WELLSITE KAPUNI J WELLSITE PIPING & INSTRUMENTATION DIAGRAM INLET USD VALVE LP TRAIN		SCALE: A1 AREA NO. 930 SERIES 11 DRG. NO. 040 SHEET 01 CONST. A2
REV CONSTRUCTION ISSUE 930-11040-01	VP: JE LG AS KB LG AS KB DATE: 06/22 AS BUILT FOR K1708 (620051)	JH: MAW H-BM: JUP GO DATE: 06/21 AS BUILT PER-SITE MARK-UP PROJ 12828
TIT: AS DATE: 06/22 AS BUILT PER-SITE MARK-UP PROJ 12828		TIT: AS DATE: 06/22 AS BUILT PER-SITE MARK-UP PROJ 12828

ITEM No
NAME
SIZE/MODEL
DESIGN
OPER
DUTY

930-E-440
WELLSTREAM COOLER
6.5 m x 9.0 m
95 barg @ -29/75°C
20 barg @ 55°C TBC



- NOTES:
- REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - TEMPERATURE IS PRIMARILY CONTROLLED BY LOUVER OPENING/CLOSING. IF THE TEMPERATURE CANNOT BE CONTROLLED BY THE LOUVERS, FIRST FAN WILL BE STARTED/STOPPED AND FINALLY THE SECOND FAN WILL BE STARTED/STOPPED.
 - FUTURE METHANOL INJECTION
 - AIR COOLER ELEVATION FROM GRADE AS PER MECHANICAL/PIPING REQUIREMENTS.
 - MATING FLANGE AT COOLER CONNECTION IS CLASS 900 COOLER NOZZLES ARE DUPLEX MATERIAL TBC
 - DELETED
 - BREAKOUT FLANGES FOR FLUSHING OF AIR COOLER.
 - WELLSTREAM COOLER AUTOMATICALLY RESETS FOLLOWING A SITE ESD RESET.

ALL NEW WORK
KAW-3074 (11-01099.74)



REV	BY	CHK	ENG	APP	TODD	DATE	REV	REVISIONS	BY	CHK	ENG	APP	TODD	DATE
A2	VP	JIB	LG	AS	KB	08/22								
A1	VP	JIB	LG	AS	KB	06/22								

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ASSET: KAPUNI J WELLSITE

REFERENCE DRAWINGS

KAPUNI J WELLSITE
PIPING & INSTRUMENTATION DIAGRAM
WELLSTREAM COOLER 930-E-440

SCALE: A1	N.T.S.	AREA NO. 930	SERIES 11	DRG. NO. 044	SHEET 01	CONST. A2	REVISION
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ITEM No
 NAME
 SIZE
 DESIGN
 OPER
 DUTY

930-V-420
 LOW PRESSURE SEPARATOR
 1700mm ID x 4500mm T/T
 95 barg @ -46 / 75°C
 5 / 20 barg @ 30 / 50°C

NEW WORK SHOWN CLOUDED
 KAW-3074 (11-01099.74)

CORROSION INHIBITOR
 SUPPLY
 930-11072-01

WELLSTREAM FLUID
 930-11040-01

LIQUIDS FROM KAP-J
 COMPRESSION SKIDS
 930-11045-01

LIQUIDS FROM PSV-4703
 930-11047-01

LIQUIDS FROM PSV-4713
 930-11047-01

LIQUIDS FROM LP SEPARATOR
 LIQUID PUMPS
 930-11047-01



- NOTES:
- THIS P&ID DOES NOT SHOW ALL LOGIC REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - WET GAS SAMPLE POINT PANEL TO BE LOCATED ON LP SEPARATOR SKID.
 - NOZZLES N4 & N5 ARE FITTED WITH VORTEX BREAKERS.
 - FUTURE EMULSION BREAKER CHEMICAL INJECTION.
 - VANE PACK AND DEMISTER.
 - VOID.
 - LOW FLOW ALARM SET POINT CALCULATED FROM PUMP SPEED.
 - SAMPLE POINT.
 - VANE PACK INLET DEVICE.
 - REMOVABLE SPOOL.
 - CONVERT FROM INTERFACE TO OVERALL LEVEL.
 - PUMP BYPASS.
 - CONVERT FROM THREE PHASE SEPARATOR TO TWO PHASE SEPARATOR.
 - LIC-4208 IN USE WHEN PUMP IS BYPASSED.

- CONSTRUCTION NOTES:
- C1. EXISTING SAMPLE POINT TO BE RECYCLED. C2. EXISTING VALVES TO BE RECYCLED. C3. EXISTING SHUTDOWN VALVE XSV-3010 TO BE RECYCLED. C4. EXISTING FLOW METER TO BE RECYCLED.

In this operating mode the pump suction is 20barg and the pump discharge is 18barg. The pumps are bypassed.

Gas from future slug catcher, add a valve, pipe will be 10"

Liquid from future slug catcher pumps

REV	BY	CHK	ENG	APP	TODD	DATE	REV	REVISIONS
A1	VP	JB	LG	AS	KB	06/22	0	AS-BUILT PCR_K1706 (620051)
A2	CJ	DV	LG	AS	KB	06/22	0	AS-BUILT PCR_K1706 (620051)
REV	BY	CHK	ENG	APP	TODD	DATE	REV	REVISIONS

	ASSET:	KAPUNI J WELLSITE
	KAPUNI J WELLSITE PIPING & INSTRUMENT DIAGRAM LP SEPARATOR VESSEL 930-V-420	
SCALE:	A1 N.T.S.	
AREA NO.	930	
SERIES	11	
DRG. NO.	042	
SHEET	01	
CONST	A2	
REVISION		

ITEM No
NAME
SIZE
DESIGN
OPER
DUTY

FROM LIC-4700
930-11042-01

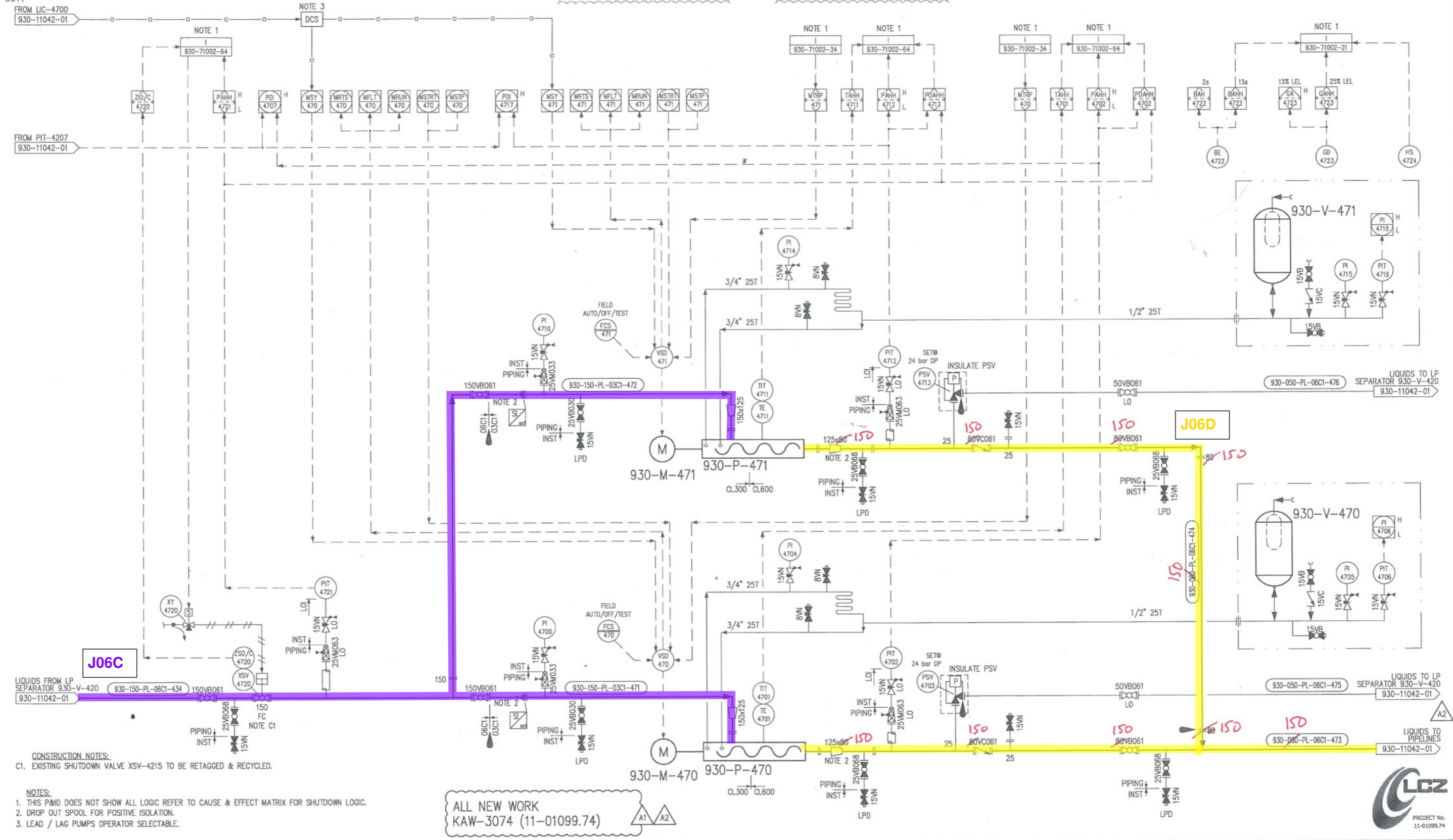
FROM PIT-4207
930-11042-01

930-P-470
LP SEPARATOR LIQUIDS PUMP
DN125 CL300 SUCTION/DN125 CL600 DISCHARGE
65 barg @ 85°C
30 m3/h @ 5 bar DIF, 16 m3/h @ 18 bar DIF
22 kW TBC

930-P-471
LP SEPARATOR LIQUIDS PUMP
DN150 CL300 SUCTION/DN150 CL600 DISCHARGE
65 barg @ 85°C
30 m3/h @ 5 bar DIF, 16 m3/h @ 18 bar DIF
22 kW TBC

930-V-470
PUMP SEAL OIL ACCUMULATOR
229mm OD x 1401mm CAPACITY: 35 litre
360 barg TBC

930-V-471
PUMP SEAL OIL ACCUMULATOR
229mm OD x 1401mm CAPACITY: 35 litre
360 barg TBC



CONSTRUCTION NOTES:
C1. EXISTING SHUTDOWN VALVE XSV-4215 TO BE RETAGGED & RECYCLED.

NOTES:
1. THIS P&ID DOES NOT SHOW ALL LOGIC REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
2. DROP OUT SPOOL FOR POSITIVE ISOLATION.
3. LEAD / LAG PUMPS OPERATOR SELECTABLE.

ALL NEW WORK
KAW-3074 (11-01099.74)

REV	BY	CHK	ENG	APP	TODD	DATE	REV	CHG	ENG	APP	TODD	DATE
A2	VP	JB	LC	AS	KB	08/22						
A1	VP	JB	LC	AS	KB	06/22						
	BY	CHK	ENG	APP	TODD	DATE						

TODD ENERGY

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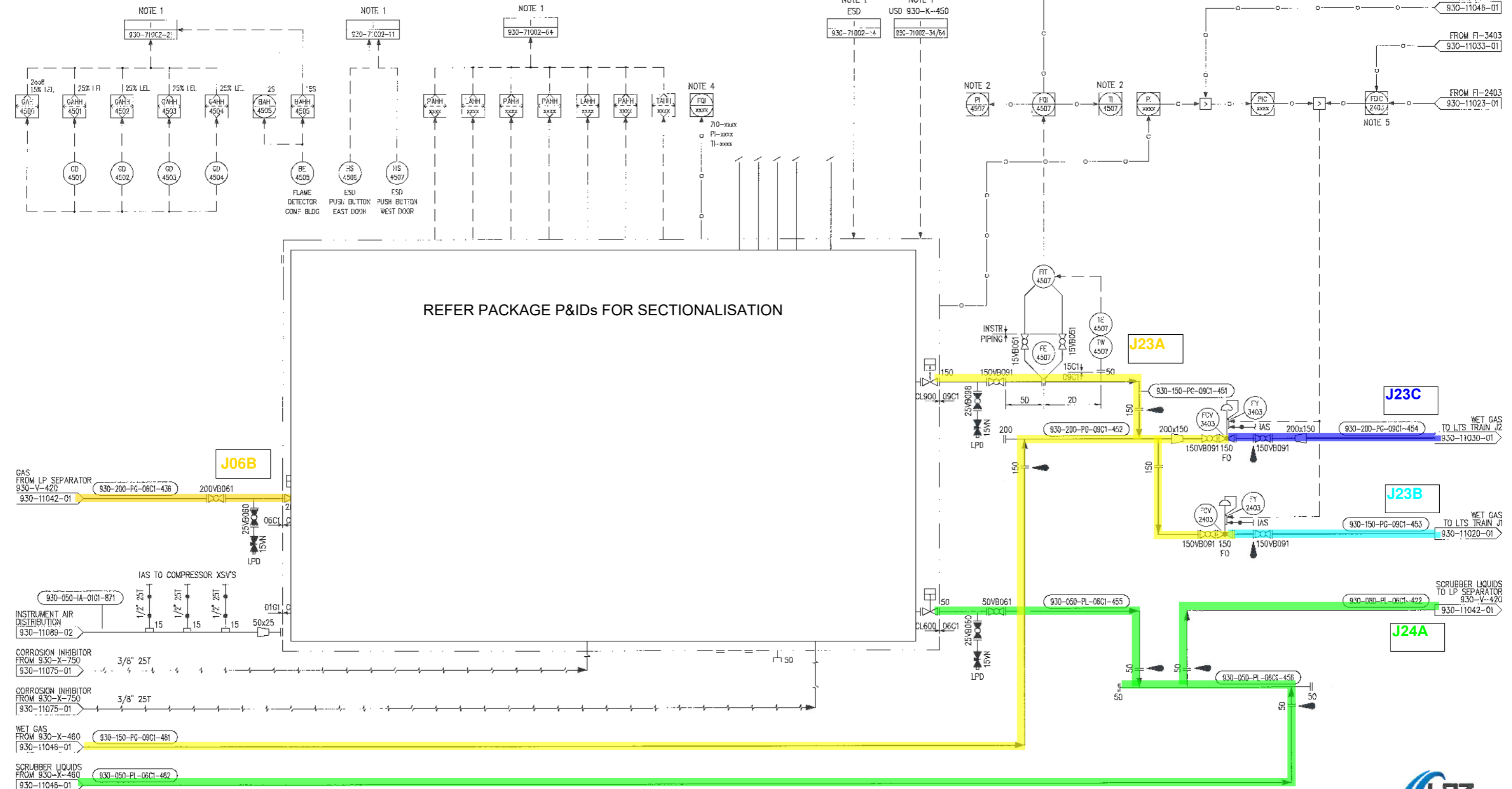
ASSET: KAPUNI J WELLSITE

KAPUNI J WELLSITE DEVELOPMENT
PIPING & INSTRUMENT DIAGRAM
LP SEPARATOR LIQUIDS PUMPS 930-P-470 & 930-P-471

SCALE: A1 N.T.S.	AREA NO. 930	SERIES 11	DRG. NO. 047	SHEET 01	CONST A2	REVISION
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ITEM No
NAME
SIZE
DESIGN
OPER
DUTY

930-X-450
GAS COMPRESSION PACKAGE
90 barg @ 150°C
CAPACITY: 17 MMSCFD, 11 barg SUCTION, 55 barg DISCHARGE
25 MMSCFD, 18 barg SUCTION, 55 barg DISCHARGE
ELECTRIC DRIVE: 1500 kW
FAN MOTOR: 56 kW **TBC.**



- NOTES
1. THIS P&ID DOES NOT SHOW ALL LOGIC REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 2. PRESSURE AND TEMPERATURE INDICATION USING HART.
 3. REFER TO PROPAC DRAWINGS.
 4. CALCULATED BLOWDOWN FLOW.
 5. DIFFERENTIAL FLOW CONTROLLER, SPLIT RANGE CONTROL.

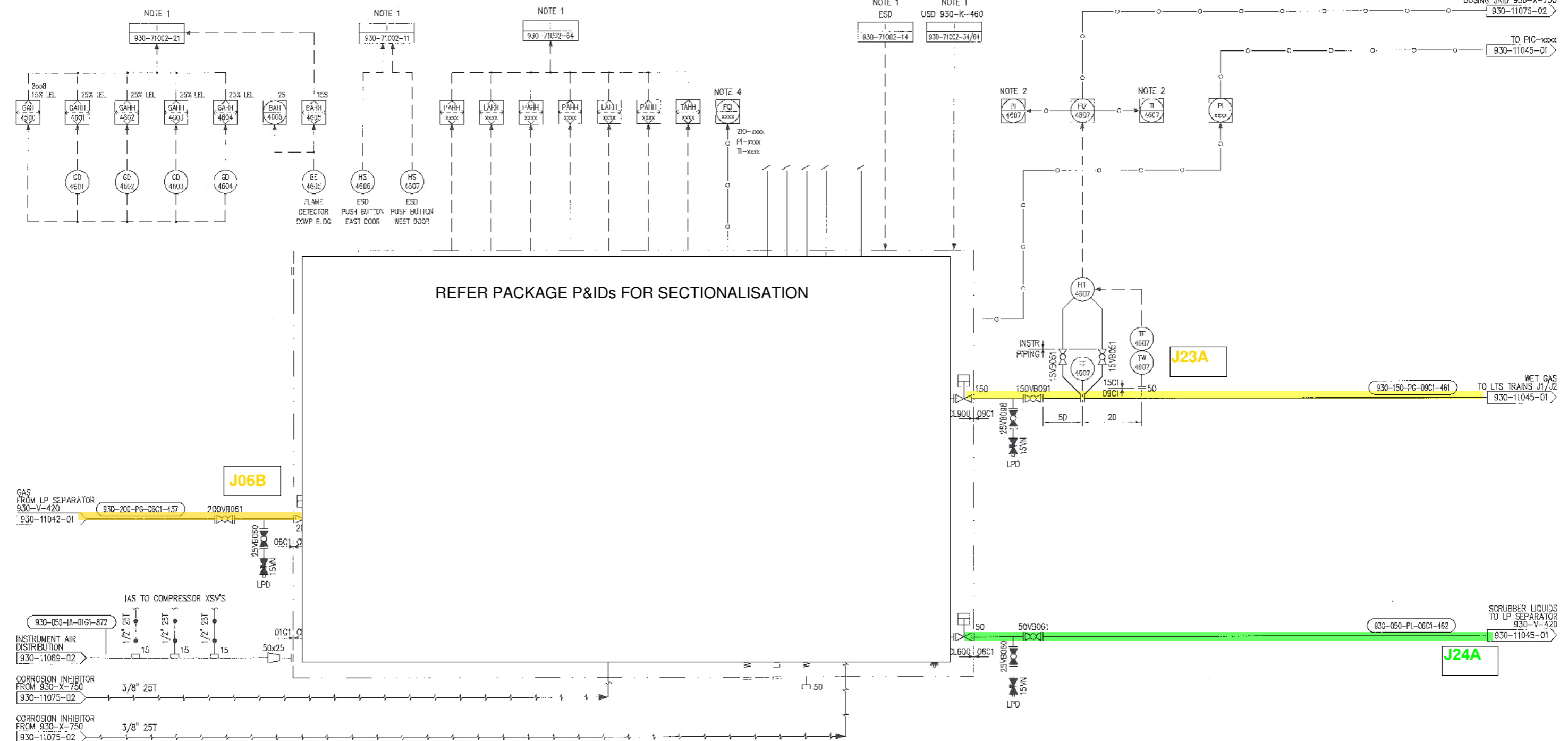
ALL NEW WORK
KAW-3074 (11-01099.74)



										ASSET: KAPUNI J		KAPUNI J WELLSITE DEVELOPMENT PIPING & INSTRUMENTATION DIAGRAM GAS COMPRESSION PACKAGE 930-X-450											
A2 WELLSITE COMPRESSION - ISSUED FOR HAZOP PROJECT KAW-3074 A1 WELLSITE COMPRESSION - ISSUED FOR REVIEW PROJECT KAW-3074										SCALE: A1 N.T.S.		AREA NO. 930		SERIES 11		DRG. NO. 045		SHEET 01		CONST. A2		REVISION	
REV	BY	CHK	ENG	APP	TODD	DATE	REV	REVISIONS	BY	CHK	ENG	APP	TODD	DATE	REFERENCE DRAWINGS								

ITEM No
NAME
SIZE
DESIGN
OPER
DUTY

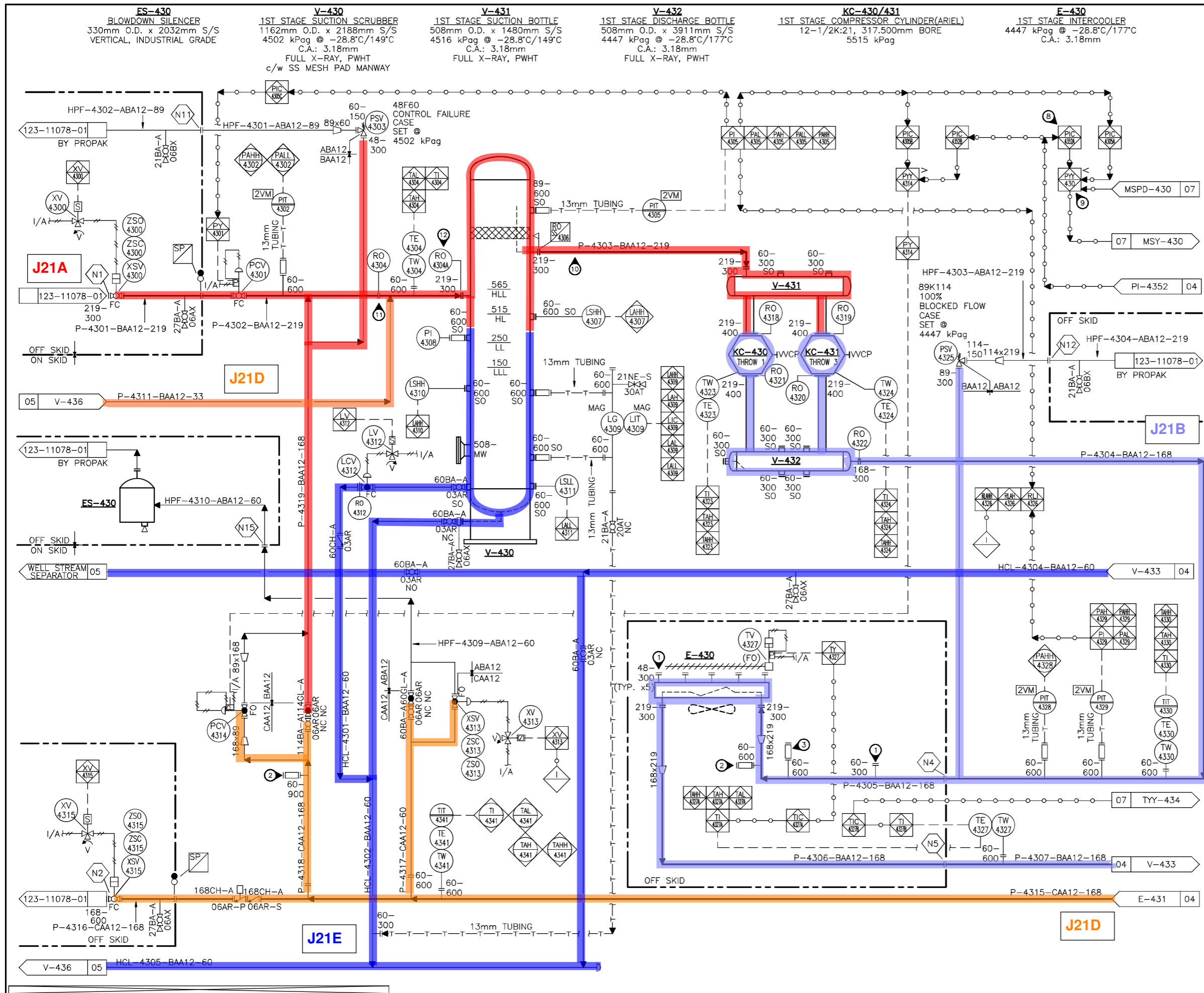
930-X-460
GAS COMPRESSION PACKAGE
90 barg @ 150°C
CAPACITY: 17 MMSCFD, 11 barg SUCTION, 55 barg DISCHARGE
25 MMSCFD, 18 barg SUCTION, 55 barg DISCHARGE
ELECTRIC DRIVE: 1500 kW
FAN MOTOR: 56 kW **TBC**



ALL NEW WORK
KAW-3074 (11-01099.74)



												ASSET: KAPUNI J WELLSITE		KAPUNI J WELLSITE DEVELOPMENT PIPING & INSTRUMENTATION DIAGRAM GAS COMPRESSION PACKAGE 930-X-460										
A2	WELLSITE COMPRESSION	- ISSUED FOR HAZOP PROJECT KAW-3074	VP	JB	15/01/22	KB	08/22																	
A1	WELLSITE COMPRESSION	- ISSUED FOR REVIEW PROJECT KAW-3074	VP	JE	15/01/22	KB	06/22																	
REV	CONSTRUCTION ISSUE		BY	CHK	ENG	APP	TODD	DATE	REV	REVISIONS	BY	CHK	ENG	APP	TODD	DATE	REFERENCE DRAWINGS	SCALE: A1 N.T.S.	AREA NO. 930	SERIES 11	DRG. NO. 046	SHEET 01	CONST A2	REVISION



- GENERAL NOTES**
1. CORROSION INSPECTION POINT. (TODD SUPPLY)
 2. METHANOL INJECTION PORT. (TODD SUPPLY)
 3. CORROSION INHIBITOR INJECTION PORT c/w SS QUILL & MONOBLOCK. (TODD SUPPLY)
 4. ALL VALVES (MANUAL AND ACTUATED) TO BE FIRESAFE.
 5. ALL INSTRUMENT AND EQUIPMENT TAGS BEGIN WITH A 123-PREFIX.
 6. ALL PIPING 10% X-RAY.
 7. 13mm TUBING TO BE 1.65mm WALL THICKNESS.
 8. EXTERNAL INPUT FOR SUCTION PRESSURE CONTROL SETPOINT.
 9. EXTERNAL INPUT FOR SPEED SETPOINT.
 10. RO-4306 THICKNESS TO ALLOW FOR FLEXIBILITY FOR FIELD INSTALL (16mm).
 11. RO-4304 GASKET RO.
 12. RO-4304A FULL BORE RO.

P. ENG. STAMP		PERMIT TO PRACTICE STAMP	
SIGNATURES:		ORIG:	CHK:
		ENG:	APR:
3	2022-04-19	ISSUED AS-BUILT	RKB VAK TJS TJS
2	2022-01-04	ISSUED FOR CONSTRUCTION - CLIENT CHANGES	KAS VAK TJS TJS
1	2021-12-15	ISSUED FOR CONSTRUCTION	KAS VAK TJS TJS
REV	YYYY-MM-DD	DESCRIPTION	BY CHK ENG APR
REVISION HISTORY			
PROPAK			
440 East Lake Road, Airdrie Alberta, Canada T4A 2J8			
TITLE: TODD ENERGY E1200-KBK4-2, MANGAHEWA WELLSITE COMPRESSION PROJECT PROCESS MECHANICAL FLOWSHEET		ORIGINATOR: K. SEDHAIN	DATE (YYYY-MM-DD) 2021-12-15
TODD REF.: 123-11080-03		SCALE: NTS	BORDER SIZE D
DWG NO.: MFS-215623-100-003		REV: 3	

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V-433
 2ND STAGE SUCTION SCRUBBER
 933mm O.D. x 2200mm S/S
 4502 kPag @ -28.8°C/149°C
 C.A.: 3.18mm
 FULL X-RAY, PWHT
 c/w SS MESH PAD

KC-432/433
 2ND STAGE COMPRESSOR CYLINDERS (ARIEL)
 7-1/4K:21, 171.450mm BORE
 16650 kPag

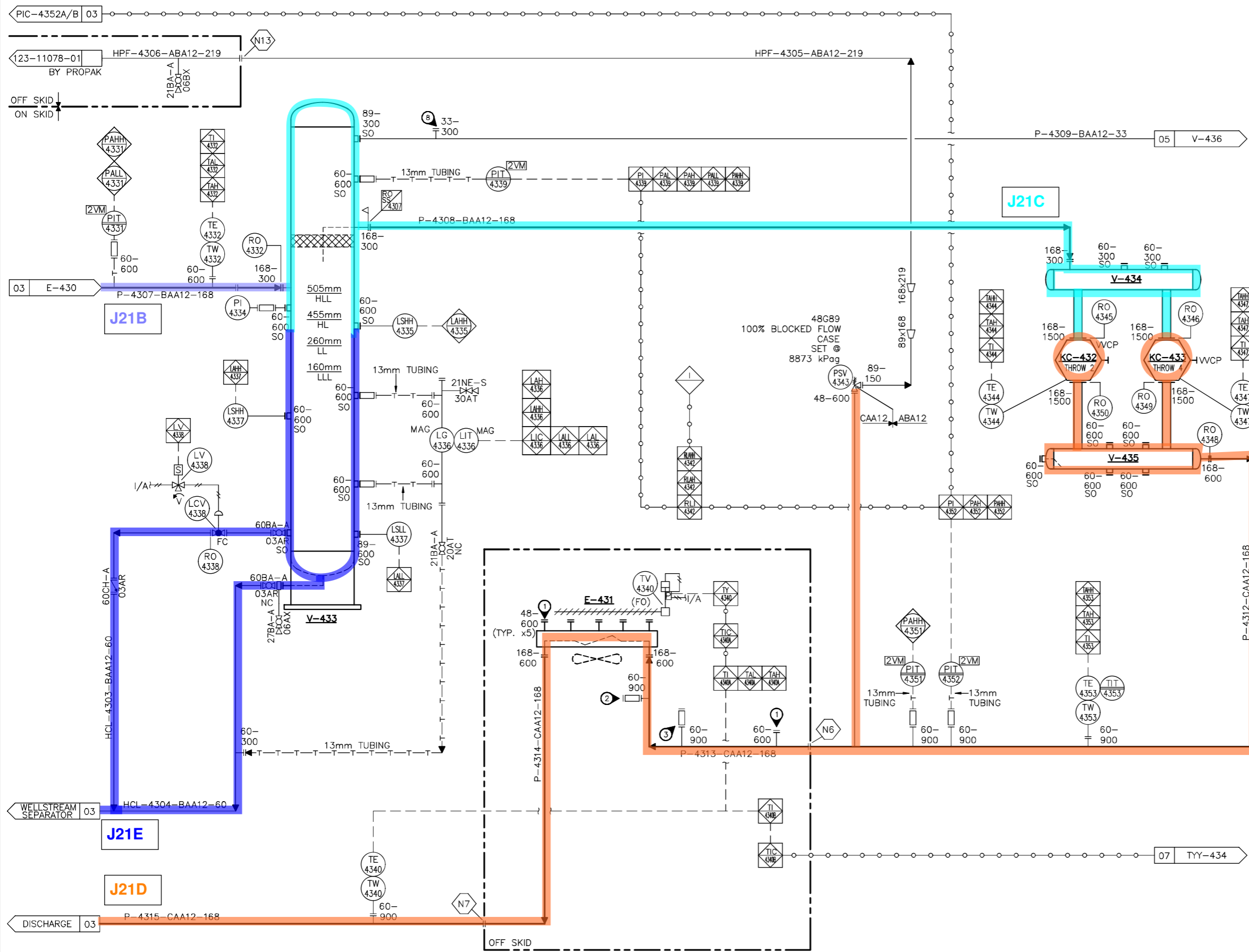
V-434
 2ND STAGE SUCTION BOTTLE
 508mm O.D. x 1480mm S/S
 4516 kPag @ -28.8°C/149°C
 C.A.: 3.18mm
 FULL X-RAY, PWHT

V-435
 2ND STAGE DISCHARGE BOTTLE
 508mm O.D. x 3921mm S/S
 8873 kPag @ -28.8°C/177°C
 C.A.: 3.18mm
 FULL X-RAY, PWHT

E-431
 2ND STAGE AFTERCOOLER
 8873 kPag @ -28.8°C/177°C
 C.A.: 3.18mm

GENERAL NOTES

1. CORROSION INSPECTION POINT. (TODD SUPPLY)
2. METHANOL INJECTION PORT. (TODD SUPPLY)
3. CORROSION INHIBITOR INJECTION PORT c/w SS QUILL & MONOBLOCK. (TODD SUPPLY)
4. ALL VALVES (MANUAL AND ACTUATED) TO BE FIRESAFE.
5. ALL INSTRUMENT AND EQUIPMENT TAGS BEGIN WITH A 123-PREFIX.
6. ALL PIPING 10% X-RAY.
7. 13mm TUBING TO BE 1.65mm WALL THICKNESS.
8. FUTURE SUPPLY.



P. ENG. STAMP		PERMIT TO PRACTICE STAMP	
SIGNATURES:	ORIG:	CHK:	ENG:
			APR:

REV	YYYY-MM-DD	DESCRIPTION	BY	CHK	ENG	APR
3	2022-04-19	ISSUED AS-BUILT		RKB	VAK	TJS
2	2022-01-04	ISSUED FOR CONSTRUCTION - CLIENT CHANGES		KAS	VAK	TJS
1	2021-12-15	ISSUED FOR CONSTRUCTION		KAS	VAK	TJS

REVISION HISTORY

PROPAK
 440 East Lake Road, Airdrie
 Alberta, Canada T4A 2J8

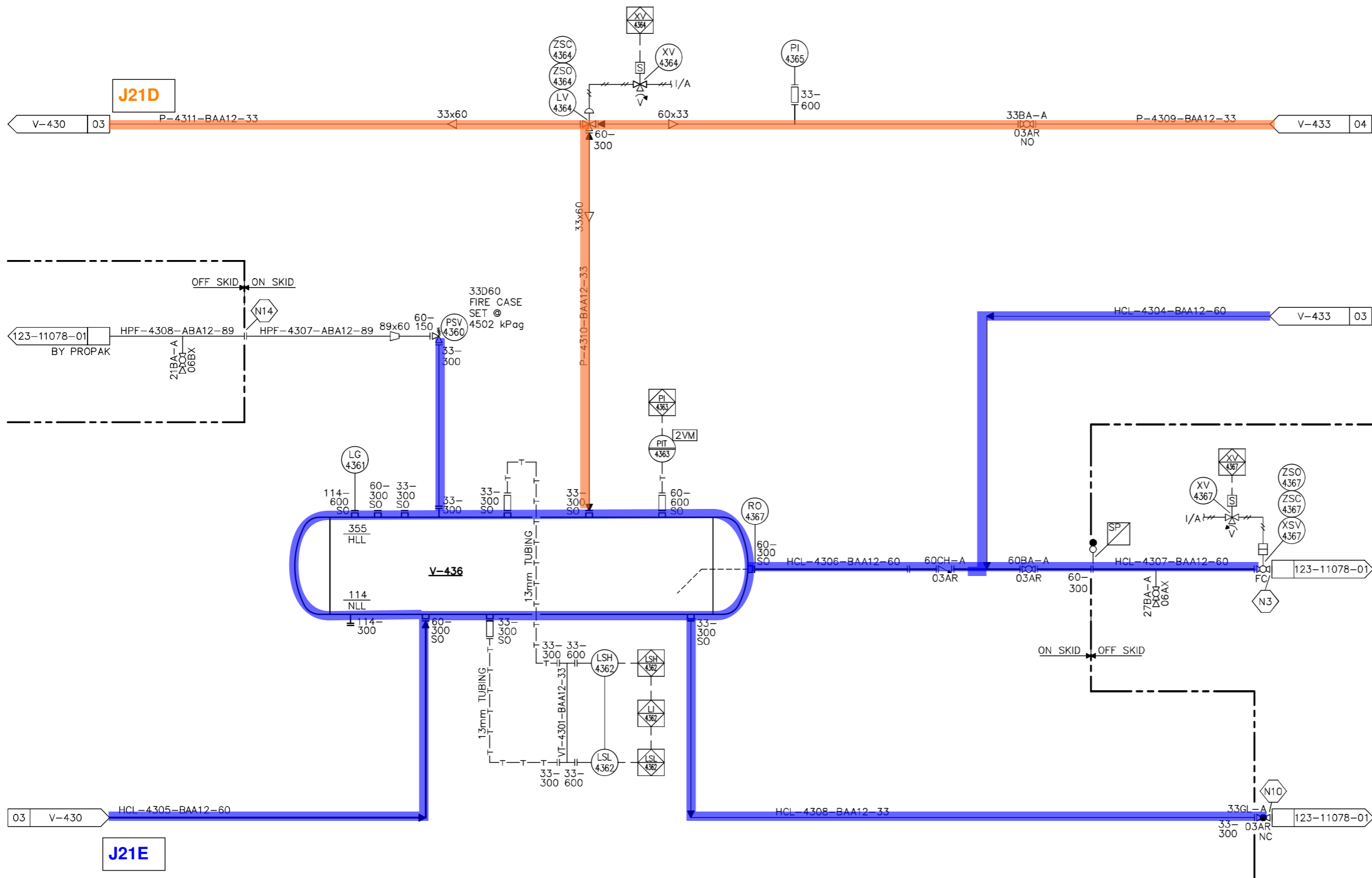
TITLE: **TODD ENERGY**
 E1200-KBK4-2, MANGAHEWA WELLSITE COMPRESSION PROJECT
 PROCESS
 MECHANICAL FLOWSHEET

ORIGINATOR: K. SEDHAIN
 DATE (YYYY-MM-DD): 2021-12-15
 SCALE: NTS
 BORDER SIZE: D

TODD REF.: 123-11080-04
 DWG NO.: MFS-215623-100-004
 REV: 3

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V-436
 BLOWCASE
 457mm O.D. x 2500mm S/S
 4502 kPag @ -28.8°C/149°C
 C.A.: 3.18mm
 FULL X-RAY, PWHT



- GENERAL NOTES:**
1. ALL INSTRUMENT AND EQUIPMENT TAGS BEGIN WITH A 123-PREFIX.
 2. ALL 13mm TUBING TO BE 1.65mm WALL THICKNESS.

P. ENG STAMP	PERMIT TO PRACTICE STAMP
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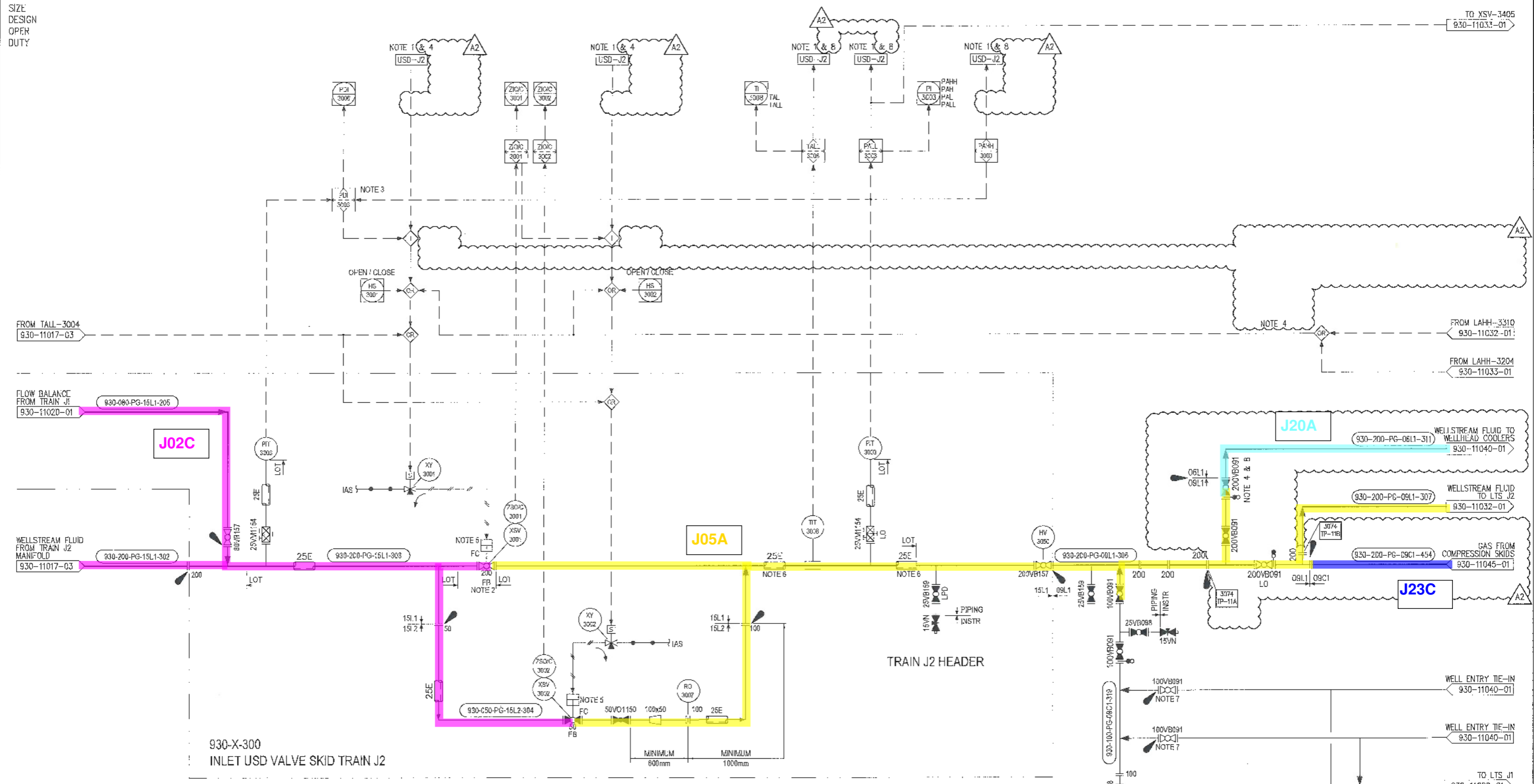
SIGNATURES:	ORIG:	CHK:	ENG:	APR:		
3	2022-04-19	ISSUED AS-BUILT	RKB	VAK	TJS	TJS
2	2022-01-04	ISSUED FOR CONSTRUCTION - CLIENT CHANGES	KAS	VAK	TJS	TJS
1	2021-12-15	ISSUED FOR CONSTRUCTION	KAS	VAK	TJS	TJS
REV	YYYY-MM-DD	DESCRIPTION	BY	CHK	ENG	APR

REVISION HISTORY					
 440 East Lake Road, Airdrie Alberta, Canada T4A 2J8					

TITLE: E1200-KBK4-2, MANGAHEWA WELLSITE COMPRESSION PROJECT PROCESS MECHANICAL FLOWSHEET		ORIGINATOR: K. SEDHAIN
TODD REF.: 123-11080-05		DATE (YYYY-MM-DD): 2021-12-15
DWG NO.: MFS-215623-100-005	SCALE: NTS	BORDER SIZE: D
REV:		3

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ITEM No 930-X-300
 NAME INLET USD VALVE SKID TRAIN J2
 SIZE
 DESIGN
 OPER
 DUTY



NEW WORK SHOWN CLOUDED
 KAW-3074 (11-01099.74)



REV	BY	CHK	ENG	APP	TODD	DATE	REV	REVISIONS
A2	VP	LG	AS	XB		08/22	1	AS BUILT PER-SITE MARK-UP PRC. 12828
A1	VP	LG	AS	XB		06/22	0	AS BUILT PRC_K1706 (62005)

TODD ENERGY

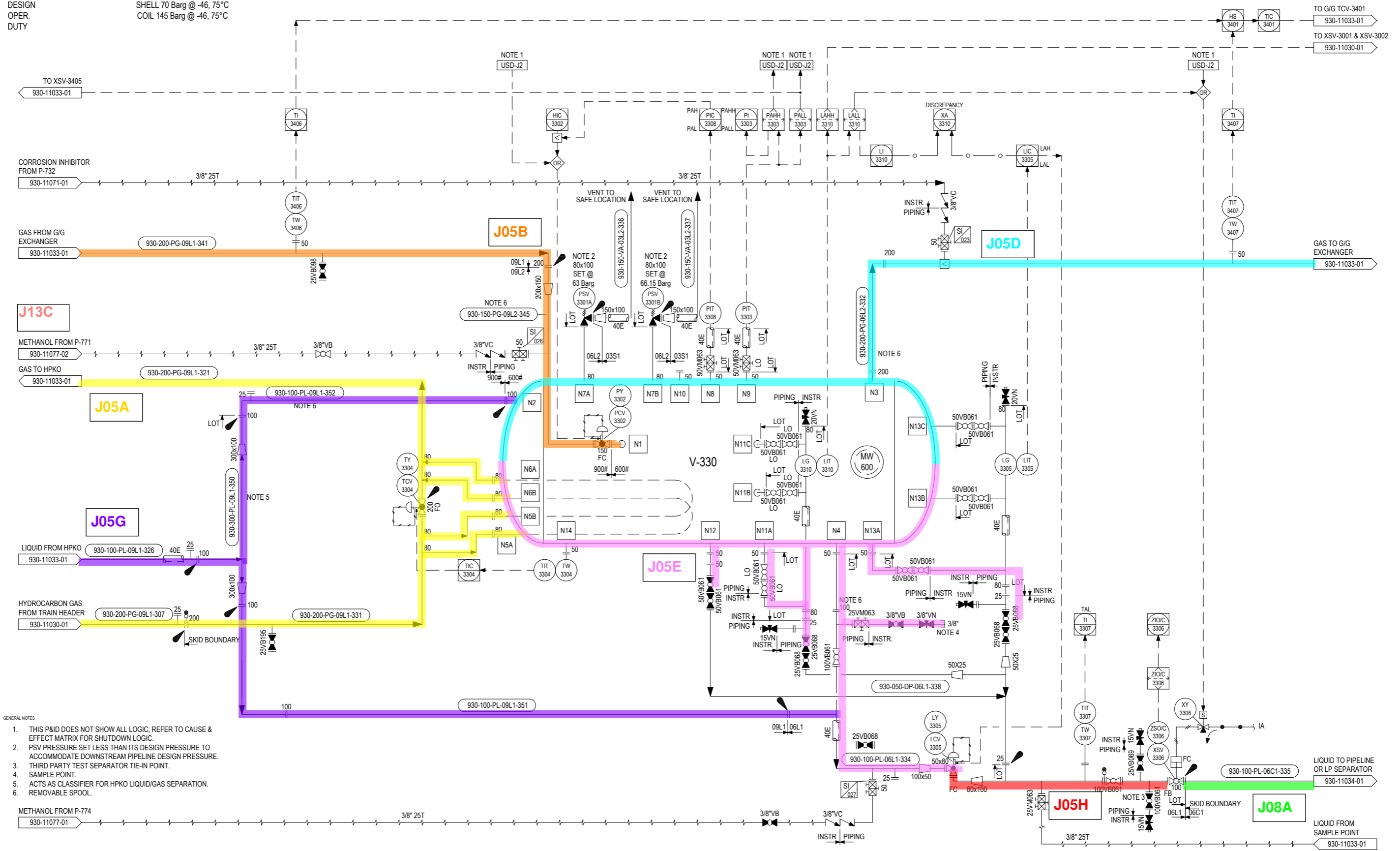
ASSET: KAPUNI J WELLSITE

REFERENCE DRAWINGS

KAPUNI J WELLSITE
 PIPING & INSTRUMENTATION DIAGRAM
 INLET USD VALVE TRAIN J2

SCALE: A1 NTS	AREA NO. 930	SERIES 11	DRG. NO. 030	SHEET 01	CONST. A2	REVISION
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ITEM No. V-330
 NAME LOW TEMPERATURE SEPARATOR
 SIZE 1.83m ID x 5.52m S/S
 DESIGN SHELL 70 Barg @ -46, 75°C
 OPER. COIL 145 Barg @ -46, 75°C
 DUTY



- GENERAL NOTES
- THIS P&ID DOES NOT SHOW ALL LOGIC, REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - PSV PRESSURE SET LESS THAN ITS DESIGN PRESSURE TO ACCOMMODATE DOWNSTREAM PIPELINE DESIGN PRESSURE.
 - THIRD PARTY TEST SEPARATOR TIE-IN POINT.
 - SAMPLE POINT.
 - ACTS AS CLASSIFIER FOR HPKO LIQUID/GAS SEPARATION.
 - REMOVABLE SPOOL.

No	DATE	DRN	CHKD	ENGD	APPR	TODD	DESCRIPTION	NUMBER	TITLE
0	06/21	HBM	DJP	GD		KB	AS BUILT PCR_K1706 (620051)		



LOCATION KAPUNI J WELLSITE	DRAWN V.KAING 12/18	TITLE KAPUNI J WELLSITE PIPING & INSTRUMENT DIAGRAM LTS J2 VESSEL
PROJECT No.	CHECKED D.STEWART 12/18	
SCALE N.T.S.	DES ENGD	
	APPROVED G.DAVIDSON 12/18	
ORIGINAL SIZE A1		DRAWING No. 930-11032-01
		REVISION 0

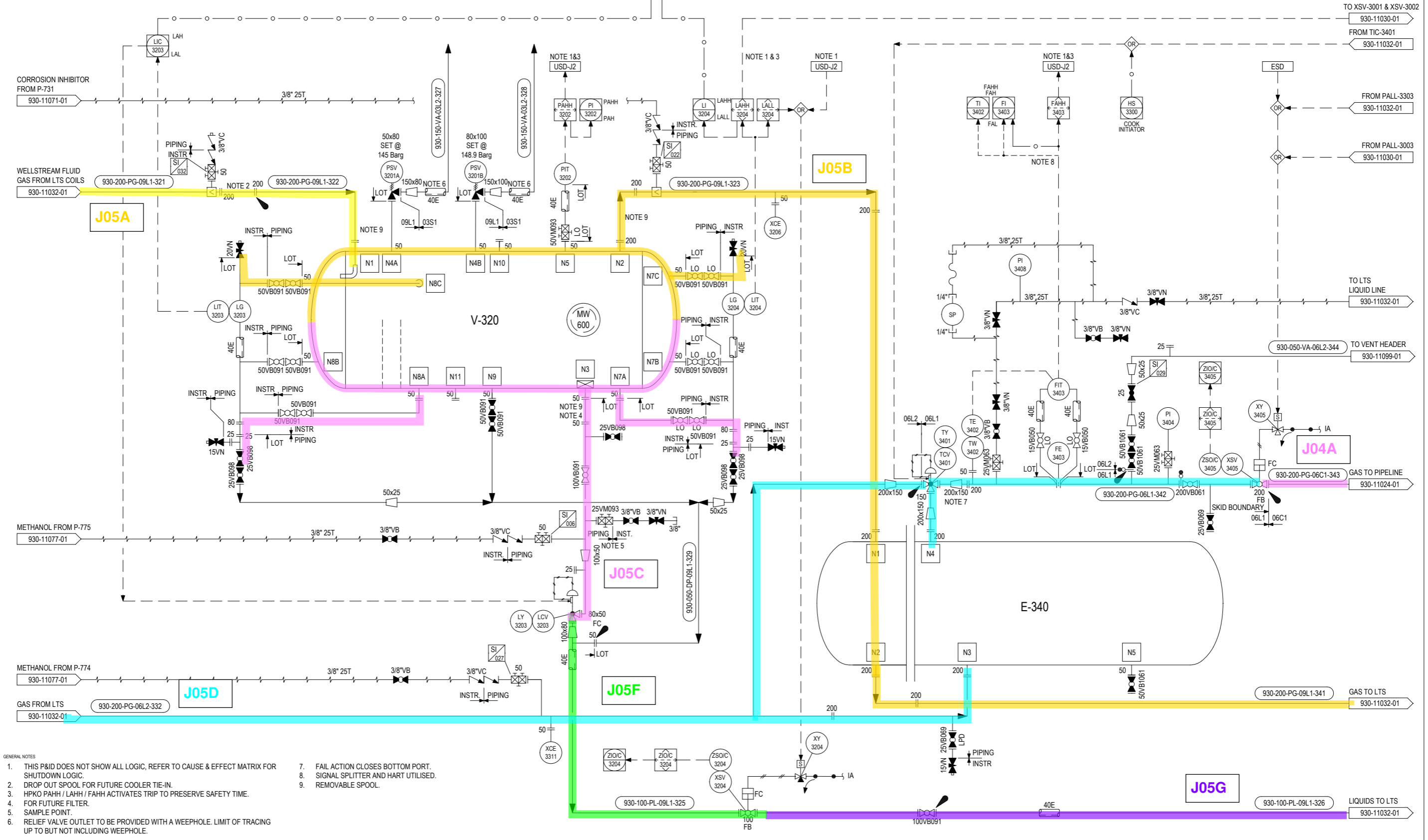
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ITEM No.
NAME
SIZE
DESIGN
OPER.
DUTY

V-320
HIGH PRESSURE KNOCKOUT
1.55m ID x 4.65m T/T
SHELL 145 Barg @ -29, 75°C

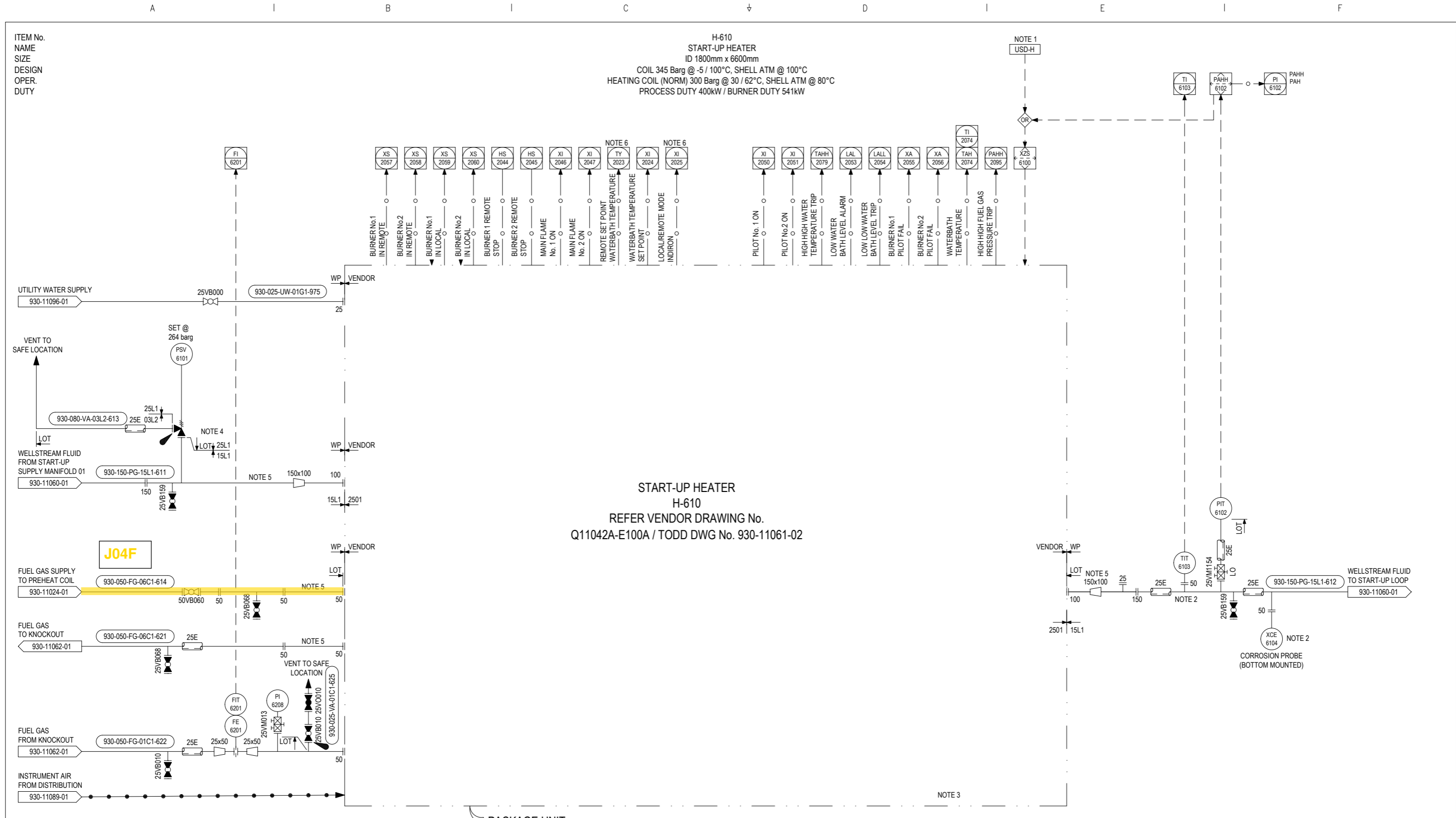
E-340
GAS / GAS EXCHANGER
SURFACE 539.8 m
TUBE 145 Barg @ -46, 75°C
SHELL 70 Barg @ -46, 75°C



- GENERAL NOTES
1. THIS P&ID DOES NOT SHOW ALL LOGIC, REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 2. DROP OUT SPOOL FOR FUTURE COOLER TIE-IN.
 3. HPA PAHH / LAHH / FAHH ACTIVATES TRIP TO PRESERVE SAFETY TIME.
 4. FOR FUTURE FILTER.
 5. SAMPLE POINT.
 6. RELIEF VALVE OUTLET TO BE PROVIDED WITH A WEEPHOLE. LIMIT OF TRACING UP TO BUT NOT INCLUDING WEEPHOLE.
 7. FAIL ACTION CLOSES BOTTOM PORT.
 8. SIGNAL SPLITTER AND HART UTILISED.
 9. REMOVABLE SPOOL.

No	DATE	DRN	CHKD	ENGD	APPD	TODD	REVISIONS
0	06/21	HBM	DJP	GD	KB	AS BUILT PCR_K1706 (620051)	

	LOCATION	KAPUNI J WELLSITE					
	PROJECT No.						
	SCALE	N.T.S.	A1 BDR				
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DRAWN	V.KAING	12/18	TITLE KAPUNI J WELLSITE PIPING & INSTRUMENT DIAGRAM LTS J2 HPKO & GAS TO GAS EXCHANGER				
CHECKED	D.STEWART	12/18					
DES ENGD							
PROJ ENGD	G.DAVIDSON	12/18					
APPROVED			ORIGINAL SIZE	DRAWING No.	930-11033-01	REVISION	0



START-UP HEATER
H-610
REFER VENDOR DRAWING No.
Q11042A-E100A / TODD DWG No. 930-11061-02

1. THIS P&ID DOES NOT SHOW ALL LOGIC REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
2. INSULATE AT LEAST 200mm UPSTREAM AND 200mm DOWNSTREAM OF TIT- 6103 USING 50mm INSULATION.
3. BOTH VENDOR TP4 & TP5 DRAIN ONTO THE START-UP HEATER SKID AND ARE SHOWN ON THE VENDOR DRAWING.
4. THE PSV IS SET HIGHER THAN DESIGN PRESSURE (AND CITHP) OF THE PROCESS PIPEWORK TO AND FROM THE HEATER COILS (240 Barg, IN ORDER TO AVOID SPURIOUS LIFTING. HOWEVER, ASME B31.3 ALLOWS UP TO A 20% ALLOWANCE FOR PRESSURE VARIATION FOR NO MORE THAN 50 HOURS AT ANY ONE TIME AND NOT MORE THAN 500 HOURS PER YEAR.
5. REMOVABLE SPOOLS FOR HEATER BUNDLE REMOVAL.

6. LOCAL / REMOTE SETPOINT MODE CAN BE SELECTED AT HEATER PANEL.

REV	REVISIONS	BY	CHK	ENG	APP	TODD	DATE
1	AS BUILT AS PER SITE MARK UP	RSD	JCC	ZA	.	KB	04/22
0	AS BUILT PCR_K1706 (620051)	HBM	DJP	GD	.	KB	06/21



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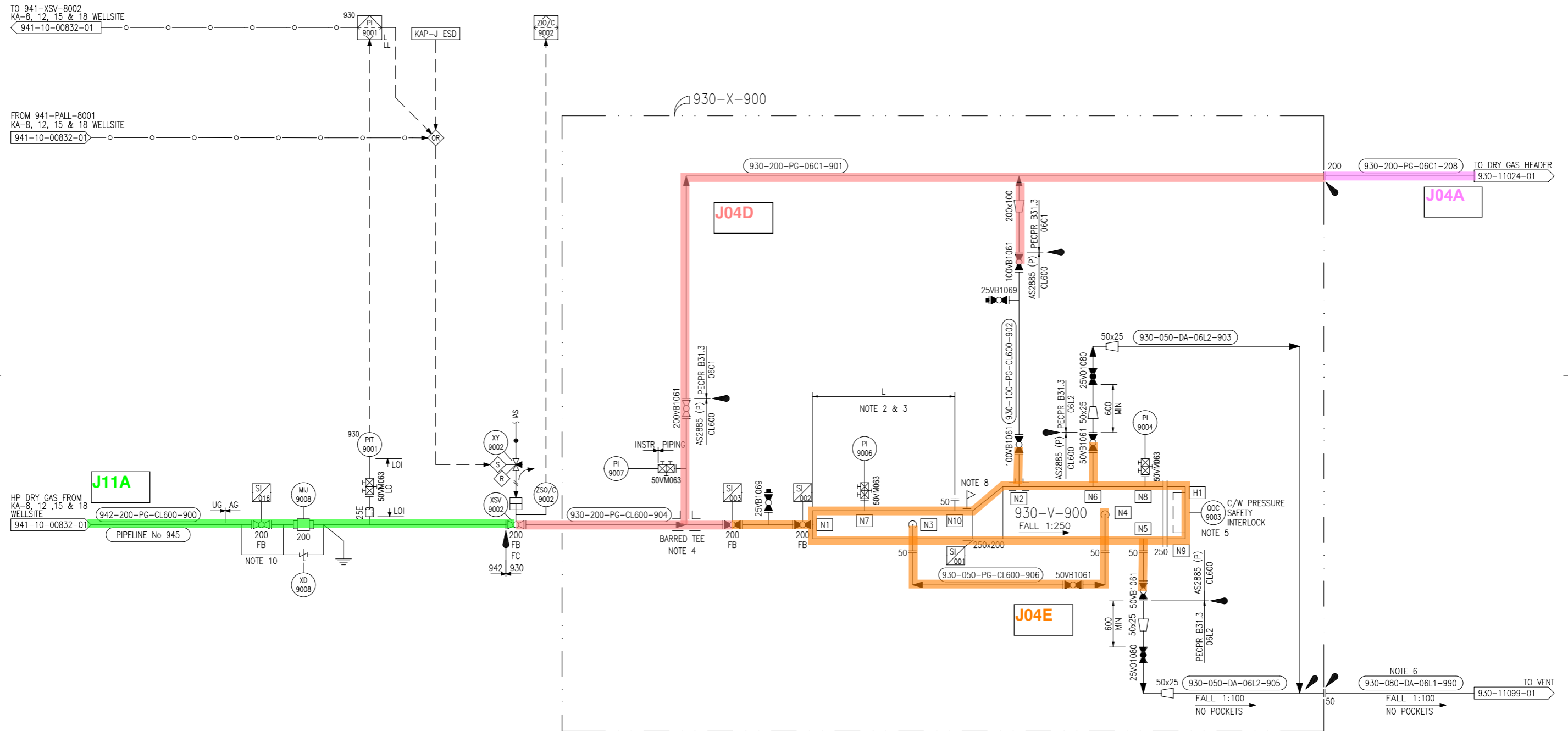
ASSET:	MCKEE AND MANGAHEWA
REFERENCE DRAWINGS	

KAPUNI J WELLSITE		KAPUNI J WELLSITE		SERIES		DRG. NO		SHEET		REVISION	
PIPING & INSTRUMENT DIAGRAM		START-UP HEATER SKID		11		061		01		1	
SCALE:	AREA NO.	SERIES		DRG. NO		SHEET		REVISION			
A1 N.T.S.	930	11		061		01		1			

ITEM No FIRST GAS PIPELINE No. 945
 NAME KA-8, 12, 15 & 18 HP DRY GAS PIPELINE
 SIZE DN200 CL600
 DESIGN 90 barg @ -10/60 °C
 OPER 45/55 barg @ 10/35 °C
 DUTY

930-X-900
 KA-8, 12, 15 & 18 HP DRY GAS PIG RECEIVER SKID
 DN200 CL600

930-V-900
 KA-8, 12, 15 & 18 HP DRY GAS PIPELINE PIG RECEIVER
 DN200 CL600
 90 barg @ -10/60 °C
 45/55 barg @ 10/35 °C



- GENERAL NOTES
- REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC. (930-73002-11/21/31/41).
 - PROVISIONS TO BE MADE TO 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 MOUNTED IN TRUE VERTICAL.
 - DN50 LINE CONNECTED TO DN80 HEADER.
 - VOID.
 - CLAMP ON TYPE PIG SIGNALER.
 - VOID.
 - BONDING CABLE TO PROVIDE CATHODIC PROTECTION CONTINUITY AROUND MANUAL VALVE.

REVISIONS										DESIGNED				DRAWN				CHECKED				APPROVED				SCALE		SHEET No		REVISION	
NO	DATE	BY	DESCRIPTION	CHKD	APPR	CHKD	APPR	NO	DATE	BY	GRP	SAR	KK	ZA	KB	CHKD	APPR	CHKD	APPR	NUMBER	TITLE	SCALE	STICKFILE	1	1	1	1				
1	08/21	MAW	AS BUILT - K1706 (11730)																												
2	05/18	GRP	FIRST ISSUE																												
3																															
4																															
5																															
6																															
7																															
8																															
9																															
10																															

ITEM No
NAME
SIZE
DESIGN
OPER
DUTY

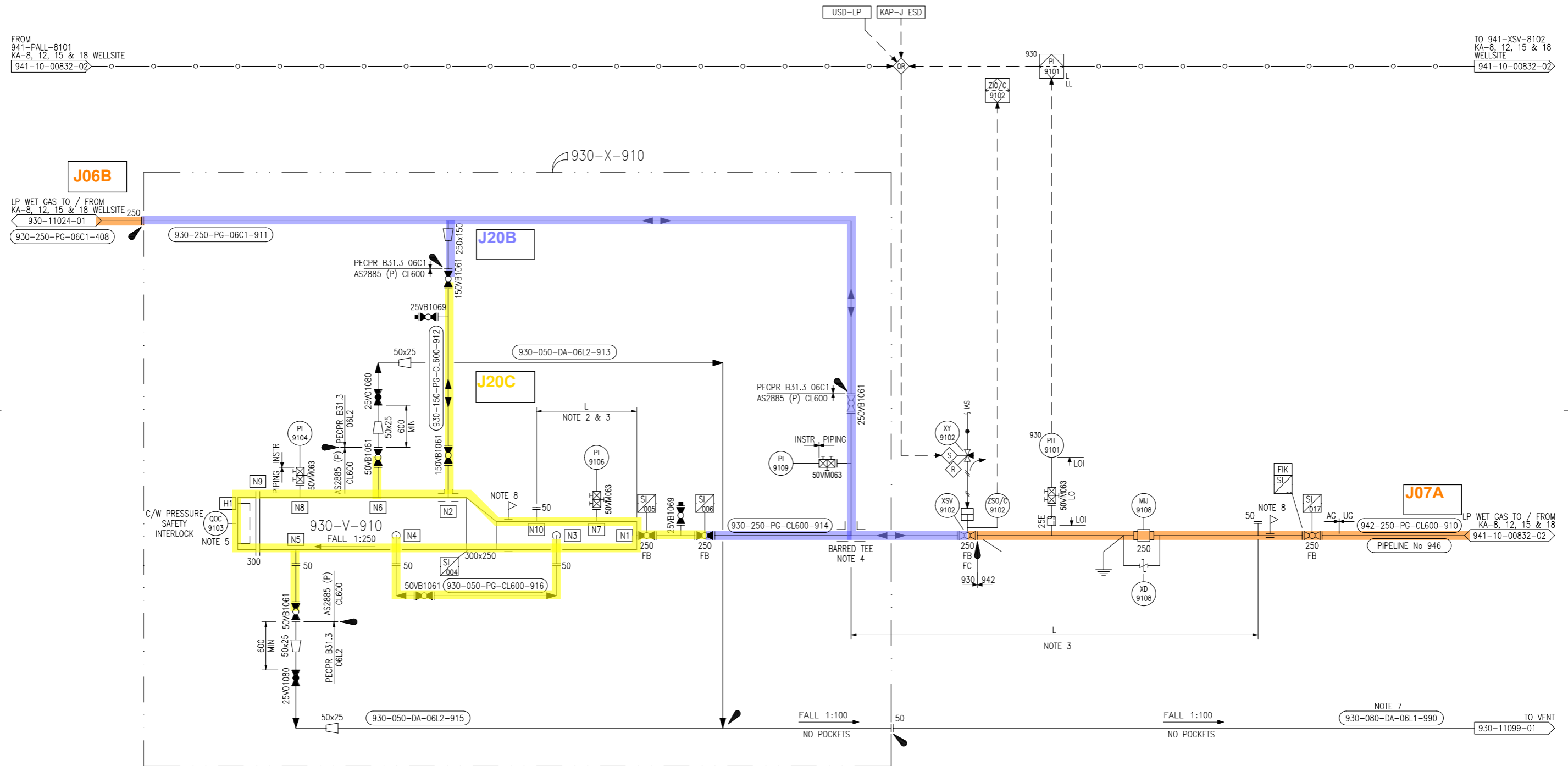
930-X-910
KAP-J LP WET GAS PIG LAUNCHER/RECEIVER SKID
DN250 CL600
-

930-V-910
KAP-J LP WET GAS PIPELINE PIG LAUNCHER/RECEIVER
DN250 CL600
90 barg @ -10/60 °C
20/30 barg @ 10/30 °C

FIRST GAS PIPELINE No. 946
KAP-J LP WET GAS PIPELINE
DN250 CL600
90 barg @ -10/60 °C
20/30 barg @ 10/30 °C

FROM
941-PALL-8101
KA-8, 12, 15 & 18 WELLSITE
941-10-00832-02

TO 941-XSV-8102
KA-8, 12, 15 & 18
WELLSITE
941-10-00832-02



- GENERAL NOTES
- REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC. (930-73002-11/21/31/41).
 - PROVISIONS TO BE MADE TO PIG LAUNCHER/RECEIVER FOR INTELLIGENT PIGGING.
 - L=MIN LENGTH EQUAL TO MAX LENGTH OF INTELLIGENT PIG.
 - BARRER TEE NOT TO HAVE INTERNAL DIAMETER REDUCED.
 - QUICK OPENING CLOSURE TO BE FLANGED. QUICK OPENING CLOSURE TO BE MOUNTED IN TRUE VERTICAL.
 - VOID.
 - DN50 LINE CONNECTED TO DN80 HEADER.
 - CLAMP ON TYPE PIG SIGNALER.
 - VOID.
 - BONDING CABLE TO PROVIDE CATHODIC PROTECTION CONTINUITY AROUND MANUAL VALVE.

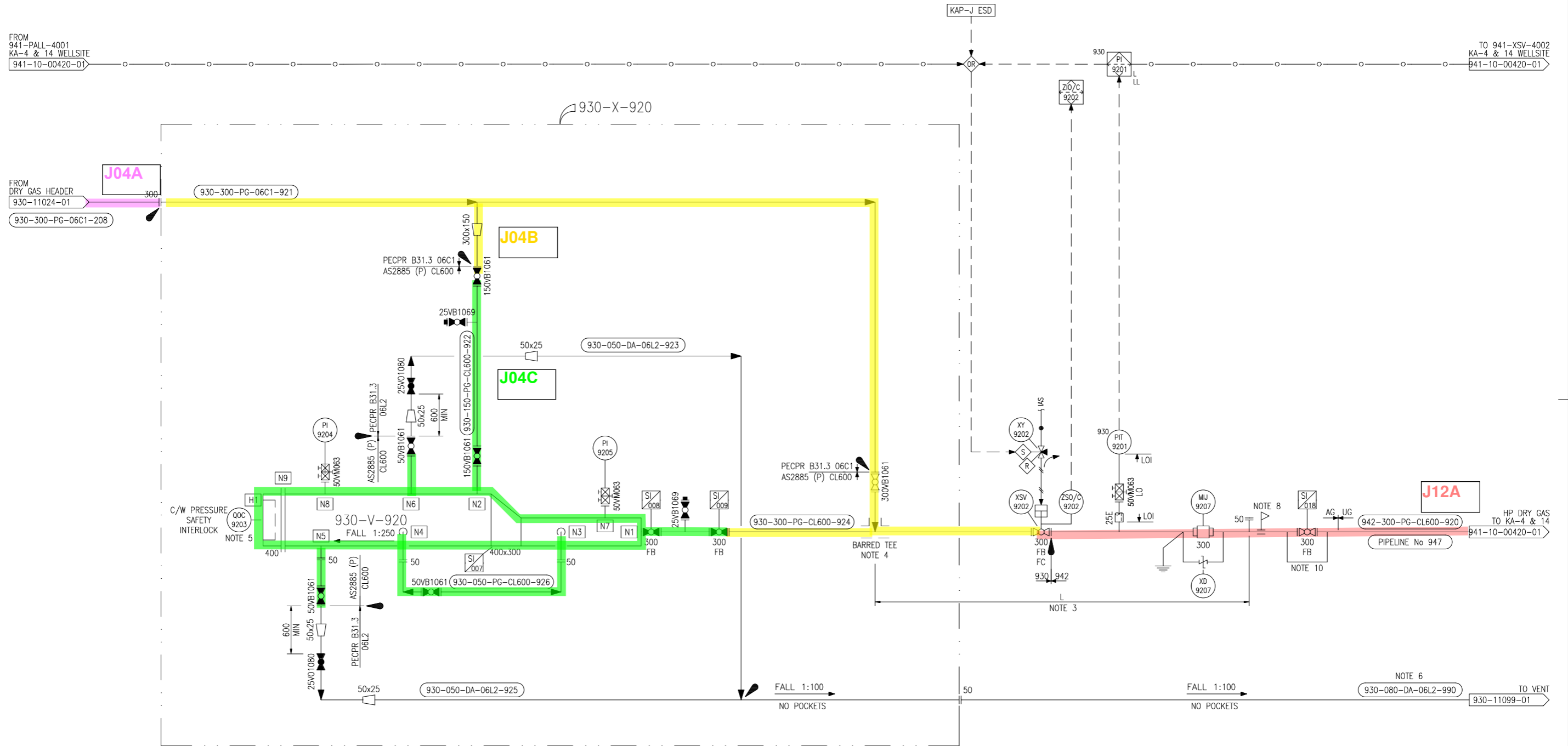
REVISIONS										DESIGNED				DRAWN				CHECKED				APPROVED				SCALE		STICKFILE		SHEET No		REVISION	
NO	DATE	BY	DESCRIPTION	CHKD	APPR	CHKD	APPR	NO	DATE	BY	GRP	JMT	ZA	KB	SAR	G PARKER	S ROWE	K KRUTZ	A FAKE	NUMBER	TITLE	SCALE	STICKFILE	SHEET No	REVISION								
1	06/21	MAW	AS BUILT - K1706 (11730)																					1	1								
00	05/18	GRP	FIRST ISSUE - K1706 (11730)																					1	1								

ITEM No
NAME
SIZE
DESIGN
OPER
DUTY

930-X-920
KAP-J HP DRY GAS PIG LAUNCHER SKID
DN300 CL600
-

930-V-920
KAP-J HP DRY GAS PIPELINE PIG LAUNCHER
DN300 CL600
90 barg @ -10/60 °C
40/55 barg @ 10/35 °C

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



- GENERAL NOTES
- REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC. (930-73002-11/21/31/41).
 - PROVISIONS TO BE MADE TO PIG LAUNCHER FOR INTELLIGENT PIGGING.
 - L=MIN LENGTH EQUAL TO MAX LENGTH OF INTELLIGENT PIG.
 - BARRED TEE NOT TO HAVE INTERNAL DIAMETER REDUCED.
 - QUICK OPENING CLOSURE TO BE FLANGED. QUICK OPENING CLOSURE TO BE MOUNTED IN TRUE VERTICAL.
 - DN50 LINE CONNECTED TO DN80 HEADER.
 - VOID.
 - CLAMP ON TYPE PIG SIGNALER.
 - VOID.
 - BONDING CABLE TO PROVIDE CATHODIC PROTECTION CONTINUITY AROUND MANUAL VALVE.

NO	DATE	BY	DESCRIPTION	CHKD	APPR	NO	DATE	BY	DESCRIPTION
1	08/21	MAW	AS BUILT - K1706 (11730)						
2	05/18	GRP	FIRST ISSUE - K1706 (11730)						

DESIGNED	DATE	KAPUNI WELLSITES	
J THOMAS	05/18	PIPING & INSTRUMENT DIAGRAM	
G PARKER	05/18	KAP-J TO KA-4/14 - PIPELINE No. 947	
S ROWE	05/18	DN300 CL600 930-V-920 PIG LAUNCHER	
K KRUTZ	05/18		
A FAKE	05/18		
NONE			

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SHEET No. 1 OF 1
 DRAWING No. 930-11092-01

ITEM No
NAME
SIZE
DESIGN
OPER
DUTY

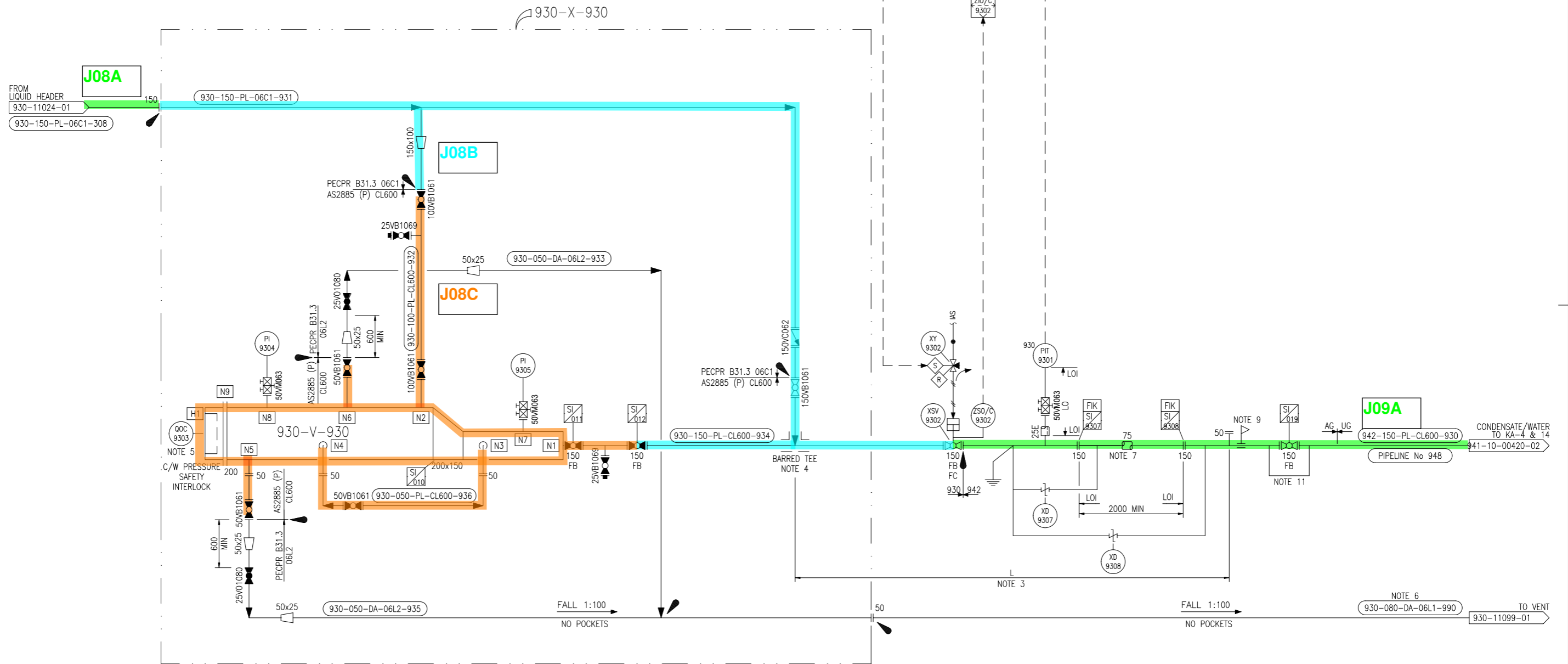
930-X-930
KAP-J CONDENSATE/WATER PIG LAUNCHER SKID
DN150 CL600

930-V-930
KAP-J CONDENSATE/WATER PIPELINE PIG LAUNCHER
DN150 CL600
90 barg @ -10/60 °C
16/25 barg @ 15/30 °C

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

FROM
941-PALL-4101
KA-4 & 14 WELLSITE
941-10-00420-02

TO 941-XSV-4102
KA-4 & 14 WELLSITE
941-10-00420-02



- GENERAL NOTES
- REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC. (930-73002-11/21/31/41).
 - PROVISIONS TO BE MADE TO PIG LAUNCHER FOR INTELLIGENT PIGGING.
 - L=MIN LENGTH EQUAL TO MAX LENGTH OF INTELLIGENT PIG.
 - BARRED TEE NOT TO HAVE INTERNAL DIAMETER REDUCED.
 - QUICK OPENING CLOSURE TO BE MOUNTED IN TRUE VERTICAL.
 - DN50 LINE CONNECTED TO DN80 HEADER.
 - 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.
 - BONDING CABLE TO PROVIDE CATHODIC PROTECTION CONTINUITY AROUND MANUAL VALVE.

NO	DATE	BY	DESCRIPTION	CHKD	APPR	CHKD	APPR	NO	DATE	BY	DESCRIPTION	CHKD	APPR	CHKD	APPR	NUMBER	TITLE
1	08/21	MAW	AS BUILT - K1706 (11730)														
2	05/18	GRP	FIRST ISSUE														
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	

DESIGNED	J THOMAS	DATE	05/18
DRAWN	G PARKER	DATE	05/18
CHECKED	S ROWE	DATE	05/18
APPROVED	K KRUTZ	DATE	05/18
SCALE	NONE		

KAPUNI WELLSITES
PIPING & INSTRUMENT DIAGRAM
 KAP-J TO KA-4 & 14 - PIPELINE No. 948
 DN150 CL600 930-V-930 PIG LAUNCHER

STICKFILE SHEET No. 1 of 1 REVISION 1
 DRAWING No. 930-11093-01

Todd Energy

ITEM No
NAME
SIZE
DESIGN
OPER
DUTY

930-X-940
CONDENSATE / FLOWBACK WATER PIG LAUNCHER SKID
DN100 CL600

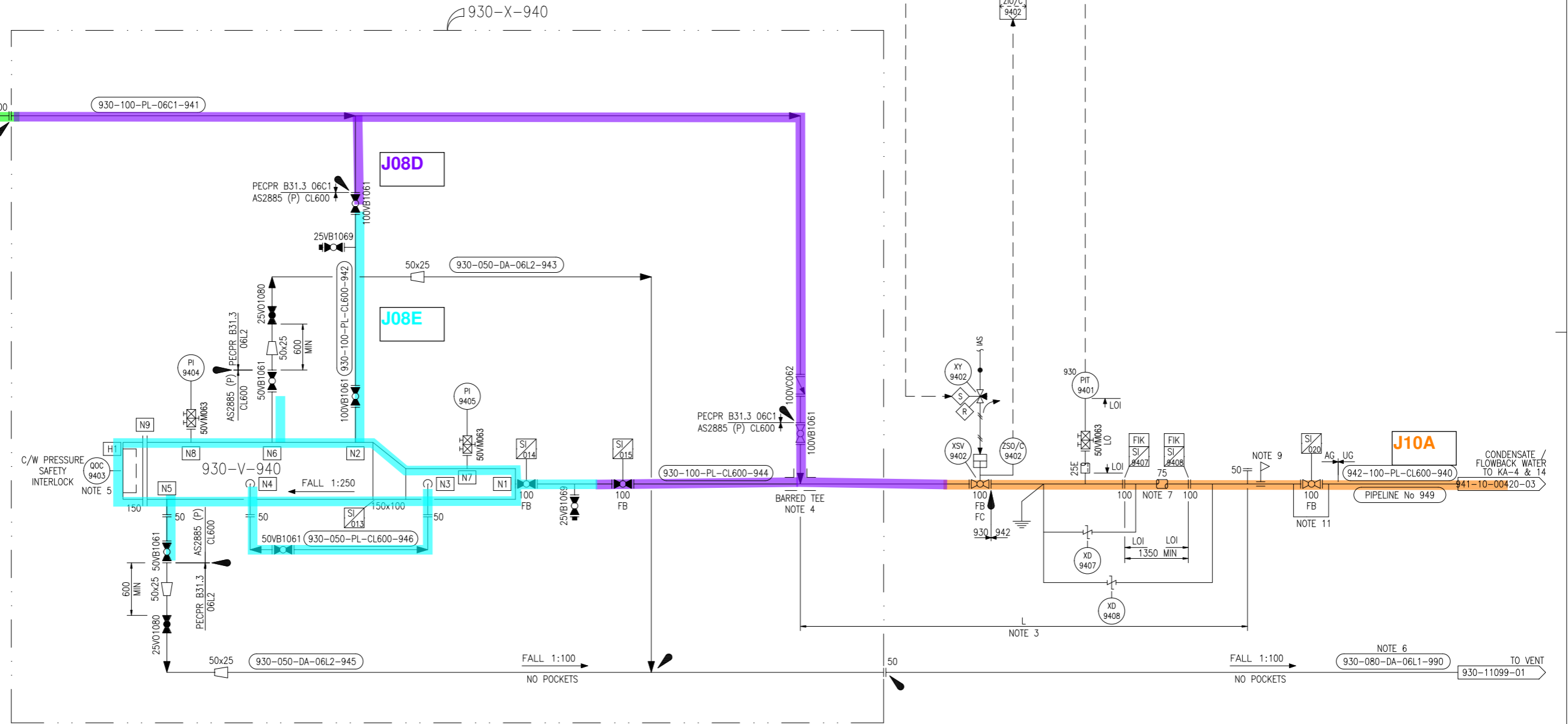
930-V-940
KAP-J CONDENSATE / FLOWBACK WATER PIPELINE PIG LAUNCHER
DN100 CL600
85 barg @ -10/60 °C
16/25 barg @ 15/30 °C

FIRST GAS PIPELINE No. 949
KAP-J CONDENSATE / FLOWBACK WATER PIPELINE
DN100 CL600
85 barg @ -10/60 °C
16/25 barg @ 15/30 °C

FROM
941-PALL-4201
KA-4 & 14 WELLSITE
941-10-00420-03

TO 941-XSV-4202
KA-4 & 14 WELLSITE
941-10-00420-03

CONDENSATE / FLOWBACK WATER FROM LIQUID HEADER
J08A
930-11024-01
930-100-PL-06C1-310



- GENERAL NOTES
- REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC. (930-73002-11/21/31/41).
 - PROVISIONS TO BE MADE TO PIG LAUNCHER FOR INTELLIGENT PIGGING.
 - L=MIN LENGTH EQUAL TO MAX LENGTH OF INTELLIGENT PIG.
 - BARRED TEE NOT TO HAVE INTERNAL DIAMETER REDUCED.
 - QUICK OPENING CLOSURE TO BE MOUNTED IN TRUE VERTICAL.
 - DN50 LINE CONNECTED TO DN80 HEADER.
 - 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.
 - BONDING CABLE TO PROVIDE CATHODIC PROTECTION CONTINUITY AROUND MANUAL VALVE.

NO	DATE	BY	DESCRIPTION	CHKD	APPR	NO	DATE	BY	DESCRIPTION
1	06/21	MAW	AS BUILT - K1706 (11730)						
2	05/18	GRP	FIRST ISSUE						
3									
4									
5									
6									
7									
8									
9									
10									
11									

DESIGNED J THOMAS	DATE 05/18	<p>KAPUNI WELLSITES PIPING & INSTRUMENT DIAGRAM KAP-J TO KA-4/14 - PIPELINE No. 949 DN100 CL600 930-V-940 PIG LAUNCHER</p>
DRAWN G PARKER	05/18	
CHECKED S ROWE	05/18	
APPROVED K KRUTZ	05/18	
APPROVED A FAKE	05/18	
SCALE NONE		
STICKFILE		SHEET No 1 OF 1
DRAWING No 930-11094-01		REVISION 1



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ITEM No
NAME
SIZE
DESIGN
OPER
DUTY

930-X-910
KAP-J LP WET GAS PIG LAUNCHER/RECEIVER SKID
DN250 CL600

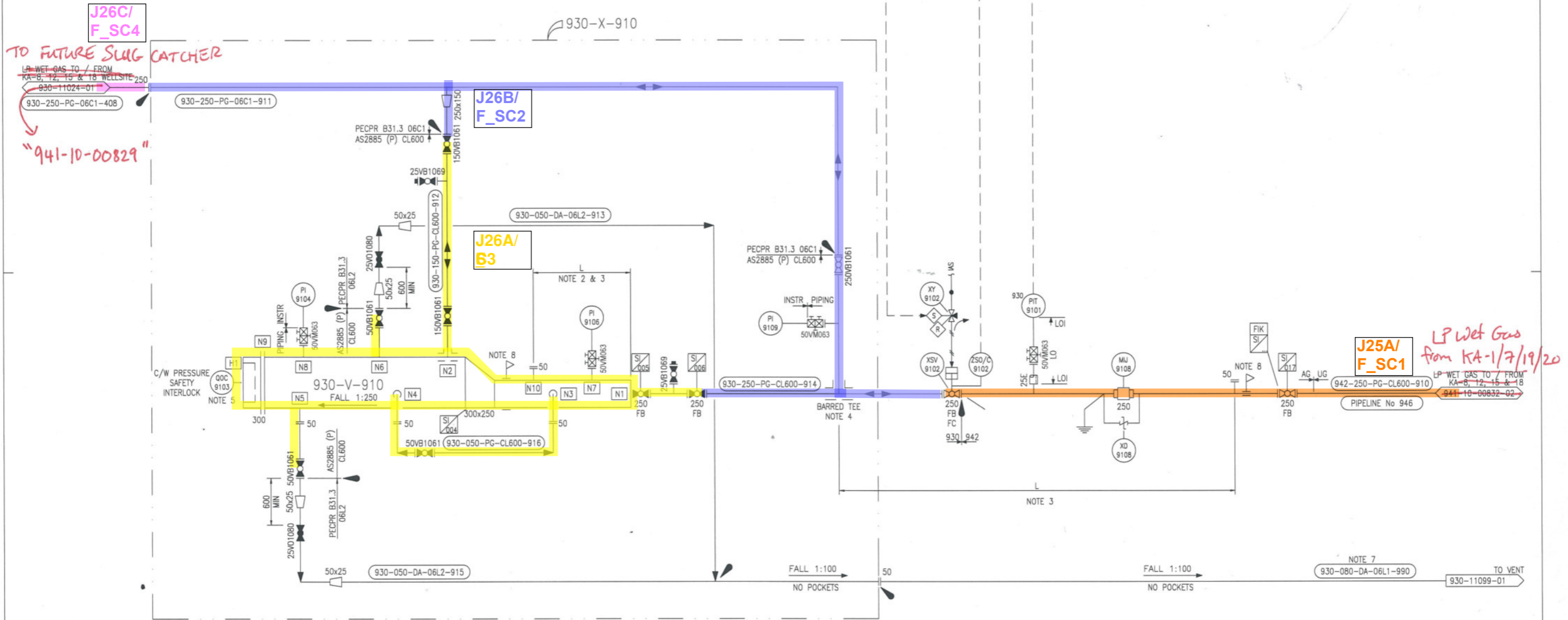
930-V-910
KAP-J LP WET GAS PIPELINE PIG LAUNCHER/RECEIVER
DN250 CL600
90 barg @ -10/60 °C
20/30 barg @ 10/30 °C

**FUTURE PIG
RECEIVER.**

FIRST GAS PIPELINE No. 946
KAP-J LP WET GAS PIPELINE
DN250 CL600
90 barg @ -10/60 °C
20/30 barg @ 10/30 °C

FROM
941-PALL-8101
KA-8, 12, 15 & 18 WELLSITE
941-10-00832-02

TO 941-XSV-8102
KA-8, 12, 15 & 18
WELLSITE
941-10-00832-02



- GENERAL NOTES
- REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC. (930-73002-11/21/31/41).
 - PROVISIONS TO BE MADE TO PIG LAUNCHER/RECEIVER FOR INTELLIGENT PIGGING.
 - L=MIN LENGTH EQUAL TO MAX LENGTH OF INTELLIGENT PIG.
 - BARRED TEE NOT TO HAVE INTERNAL DIAMETER REDUCED.
 - QUICK OPENING CLOSURE TO BE FLANGED. QUICK OPENING CLOSURE TO BE MOUNTED IN TRUE VERTICAL.
 - VOID.
 - DN50 LINE CONNECTED TO DN80 HEADER.
 - CLAMP ON TYPE PIG SIGNALER.
 - VOID.
 - BONDING CABLE TO PROVIDE CATHODIC PROTECTION CONTINUITY AROUND MANUAL VALVE.

This drawing and associated design is the copyright and property of TODD TARANAKI LIMITED and shall not be used for any purpose or project other than that designated without prior consent.

NO	DATE	BY	DESCRIPTION	CHKD	APPR	CHKD	APPR	NO	DATE	BY	DESCRIPTION	CHKD	APPR	CHKD	APPR	NUMBER	TITLE
1	08/21	MAW	AS BUILT - K1708 (11730)														
00	05/18	GRP	FIRST ISSUE - K1708 (11730)														

DESIGNED	J THOMAS	DATE	05/18
DRAWN	G PARKER	DATE	05/18
CHECKED	S ROWE	DATE	05/18
APPROVED	K KRUTZ	DATE	05/18
APPROVED	A FARE	DATE	05/18
SCALE	NONE		

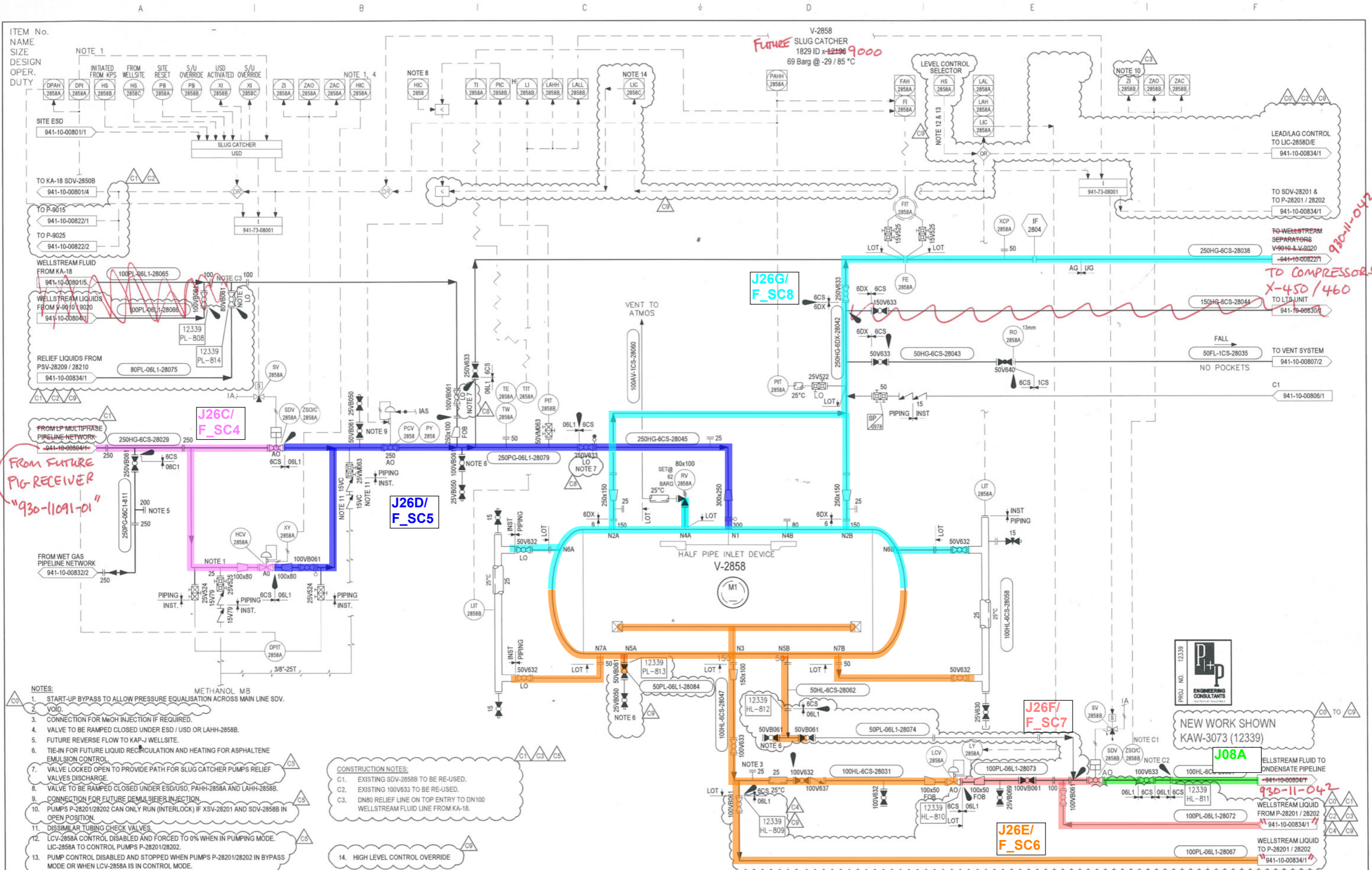
KAPUNI WELLSITES
PIPING & INSTRUMENT DIAGRAM
KAP-J TO KA-8, 12, 15 & 18 - PIPELINE No. 946
DN250 CL600 930-V-910 PIG LAUNCHER/RECEIVER

STICKFILE

SHEET No 1 of 1 REVISION 1

DRAWING No 930-11091-01





ITEM No.
NAME
SIZE
DESIGN
OPER.
DUTY

NOTE 1
INITIATED FROM KPS
FROM WELLSITE
SITE RESET
S/U OVERRIDE
USD ACTIVATED
S/U OVERRIDE
ZIC
ZAO
ZAC
HIC
NOTE 1, 4
NOTE 8
NOTE 14
NOTE 10
NOTE 12 & 13
NOTE 11

V-2858
SLUG CATCHER
1829 ID x 2196 9000
69 Barg @ -29 / 85 °C
FUTURE

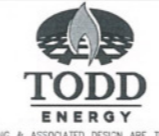
From FUTURE
PIG-RECEIVER
"930-11091-01"

930-11-042
TO COMPRESSORS
X-450/460
TO VENT SYSTEM
941-10-00870/2
941-10-00806/1

- NOTES:
1. START-UP BYPASS TO ALLOW PRESSURE EQUALISATION ACROSS MAIN LINE SDV.
2. VOID.
3. CONNECTION FOR MeOH INJECTION IF REQUIRED.
4. VALVE TO BE RAMPED CLOSED UNDER ESD / USD OR LAHH-2858B.
5. FUTURE REVERSE FLOW TO KAP-J WELLSITE.
6. TIE-IN FOR FUTURE LIQUID RECIRCULATION AND HEATING FOR ASPHALTENE EMULSION CONTROL.
7. VALVE LOCKED OPEN TO PROVIDE PATH FOR SLUG CATCHER PUMPS RELIEF VALVES DISCHARGE.
8. VALVE TO BE RAMPED CLOSED UNDER ESD/USD, PAHH-2858A AND LAHH-2858B.
9. CONNECTION FOR FUTURE DEMULSIFIER INJECTION.
10. PUMPS P-28201/28202 CAN ONLY RUN (INTERLOCK) IF XSV-28201 AND SDV-2858B IN OPEN POSITION.
11. DISSIMILAR TUBING CHECK VALVES.
12. LCV-2858A CONTROL DISABLED AND FORCED TO 0% WHEN IN PUMPING MODE. LIC-2858A TO CONTROL PUMPS P-28201/28202.
13. PUMP CONTROL DISABLED AND STOPPED WHEN PUMPS P-28201/28202 IN BYPASS MODE OR WHEN LCV-2858A IS IN CONTROL MODE.

- CONSTRUCTION NOTES:
C1. EXISTING SDV-2858B TO BE RE-USED.
C2. EXISTING 100V633 TO BE RE-USED.
C3. DN80 RELIEF LINE ON TOP ENTRY TO DN100 WELLSTREAM FLUID LINE FROM KA-18.
14. HIGH LEVEL CONTROL OVERRIDE

REV	DATE	BY	CHK	ENG	APP	TODD	DATE	REV	REVISIONS	BY	CHK	ENG	APP	TODD	DATE
C9	07/22														
C8	02/22														
C7	04/21							03	AS BUILT FOR K1706 (11730)	MAW	GRP	JMT		KB	12/21
C6	03/21							02	AS BUILT FOR PCR_3_2021_35 (12339)	DB	ACM	NS		KB	08/21
C5	02/21							01	ECP K1729 AS-BUILT TO SITE MARK UP ASB T18025KW	CSM	JMP	GD		KB	05/18
C4	09/20							00	FIRST ISSUE	JMP					06/16



ASSET: KAPUNI

941-10-E25	CHEMICAL INJECTION
941-10-E05	FUSIBLE PLUG
941-10-E24/1	STORM WATER SYSTEM

REFERENCE DRAWINGS

WELLSITES
PIPING & INSTRUMENT DIAGRAM
SLUG CATCHER
WELLSITE KA-8, 12, 15 & 18
Go-By

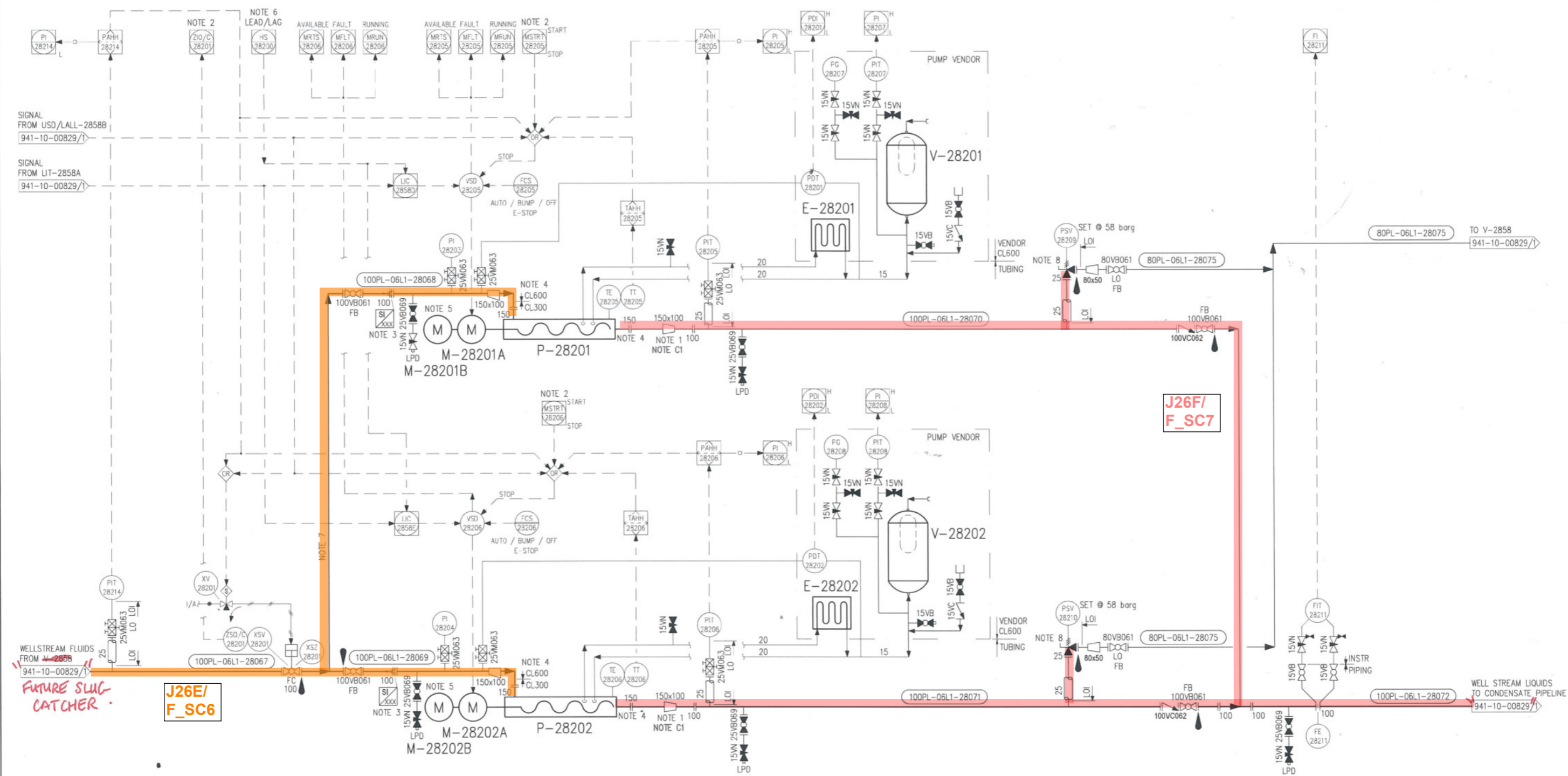
SCALE: NTS	AREA NO: 941	SERIES: 10	DRG. NO: 00829	SHEET: 1X	CONST: C9	REVISION: 03
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ITEM No
NAME
SIZE
DESIGN
OPER
DUTY

FEATURE P-28201 / 28202
SLUG CATCHER PUMPS
DN 150 SUCTION / DN 150 DISCHARGE
18.7m³/h @ 40 bar (max) DIFFERENTIAL
37 kW

E-28201/28202
PUMP SEAL OIL COOLER

V-28201 / 28202
PUMP SEAL OIL ACCUMULATOR
35 LITRE
360 barg @ 40°C



- NOTES:
- DROP OUT SPOOL FOR PUMP STATOR REMOVAL.
 - PUMP P-28201 / P28202 CAN ONLY RUN (INTERLOCK) IF XSV-28201 AND SDV-2858B ARE IN OPEN POSITION.
 - TEMPORARY STRAINER TO BE REMOVED AFTER COMMISSIONING.
 - PUMP HAS A CL300 SUCTION AND CL600 DISCHARGE FLANGE CONNECTION.
 - PUMP COOLING FAN MOTOR.
 - DUTY SELECTOR SWITCH ALLOWS LEAD CONTROLLER TO BE ASSIGNED TO THE DUTY PUMP AND LAG CONTROLLER TO THE STAND BY PUMP.
 - PUMP SUCTION PIPING DOWNSTREAM OF XSV-28201 DE-RATED DUE TO CL300 FLANGE CONNECTED TO THE PUMPS.
 - RELIEF VALVE BONNET VENT TO GRADE AT SAFE LOCATION.

CONSTRUCTION NOTES:
C1. ALLOW MIN. 2m LONG TO ALLOW PUMP STATOR REMOVAL

ALL NEW WORK KAW-3073 (12339)

REV	DESCRIPTION	BY	CHK	ENG	APP	TODD	DATE	REV	DESCRIPTION	BY	CHK	ENG	APP	TODD	DATE
A7	KAW-3073 (12339) APPROVED FOR CONSTRUCTION	GRP	MAW	NS	ZA	KB	07/22								
A6	ISSUED FOR DETAIL DESIGN - KAW-3073 (12339)	GRP	MAW	NS	ZA	KB	02/22								
A5	ISSUED FOR REVIEW PCR_3_2020_B1 (12339)	DB	MAW	NS	-	AF									
A4	ISSUED FOR REVIEW PCR_3_2020_B1 (12339)	DB	GRP	NS	-	KB	11/20	00	FIRST ISSUE						

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ASSET: KAPUNI

KAPUNI WELLSITES
PIPING & INSTRUMENT DIAGRAM
SLUG CATCHER PUMPS P-28201 & P-28202
WELLSITE KA-8, 12, 15 & 18 **GO-BY**

SCALE: NTS	AREA NO: 941	SERIES: 10	DRG. NO: 00834	SHEET: 1X	CONST: A7	REVISION: 00
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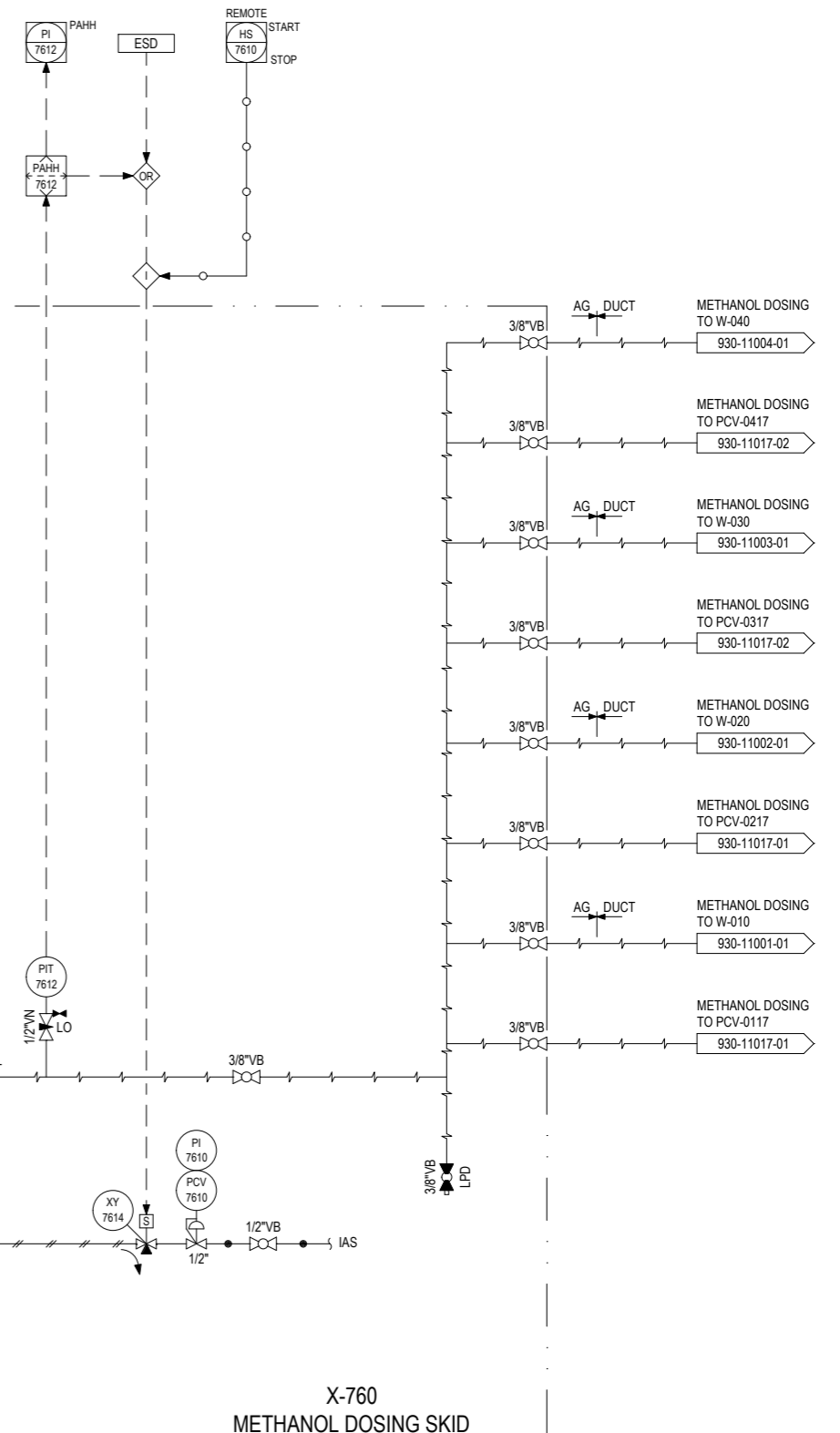
ITEM No.
NAME
SIZE
DESIGN
OPER.
DUTY

T-760
METHANOL DOSING TANK
4000 Litre TANK (STAINLESS STEEL)
-0.002 / 35 kPag @ -3 / 31°C
ATM @ AMB

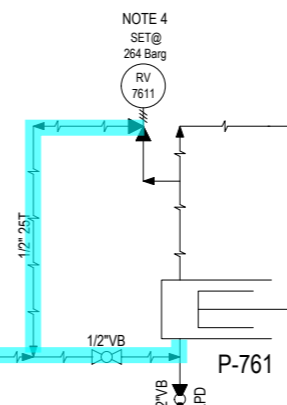
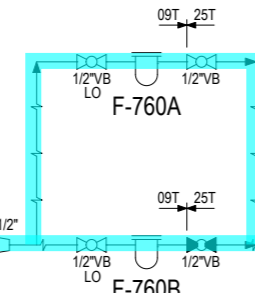
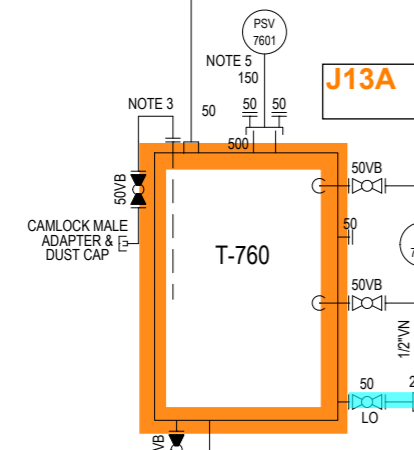
X-760
METHANOL DOSING SKID

F-760A / B
METHANOL FILTER
100 MESH
21 BARG

P-761
METHANOL DOSING PUMP
33.4 Litre / hr @ 345 Barg



NOTE 6 & 7
50



- GENERAL NOTES
- THIS P&ID DOES NOT SHOW ALL LOGIC, REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - TOP OF VENT TO BE LOCATED ABOVE TOP OF TANK T-760.
 - FILLING CONNECTION WITH DIP LEG TO TANK BOTTOM TO ALLOW BOTTOM FILLING.
 - PSV SPECIFIED FOR 264 Barg TO COVER WORST CASE CITHP OF 240 Barg.
 - EMERGENCY MANHOLE COVER 6" VENT INSTALLED WITH MECHANICAL RESTRAINT TO PREVENT TOTAL BLOW OFF. SET AT 3.4 kPa.
 - FLAME ARRESTOR WITH WEATHER PROOF HOOD.
 - OPERATIONAL VENT TO DISCHARGE TO SAFE LOCATION AT LEAST 3m ABOVE WORKING HEIGHT.
 - TIE-IN POINT FOR FUTURE METHANOL SUPPLY.
 - TANKER MUST BE EARTHED DURING TANK FILLING.

No	DATE	DRN	CHKD	ENGD	APPD	TODD	DESCRIPTION	NUMBER	TITLE
0	06/21	HBM	DJP	GD	.	KB	AS BUILT PCR_K1706 (620051)	.	.
REVISIONS									
REFERENCE DRAWINGS									



LOCATION KAPUNI J WELLSITE	DRAWN V.KAING 12/18	TITLE KAPUNI J WELLSITE PIPING & INSTRUMENT DIAGRAM DOSING SUPPLY METHANOL
PROJECT No	CHECKED D.STEWART 12/18	
SCALE N.T.S.	DES ENGD	
	PROJ ENGD	
	APPROVED C.DAVIDSON 12/18	
	TODD	
	ORIGINAL SIZE A1	DRAWING No 930-11076-01
		REVISION 0

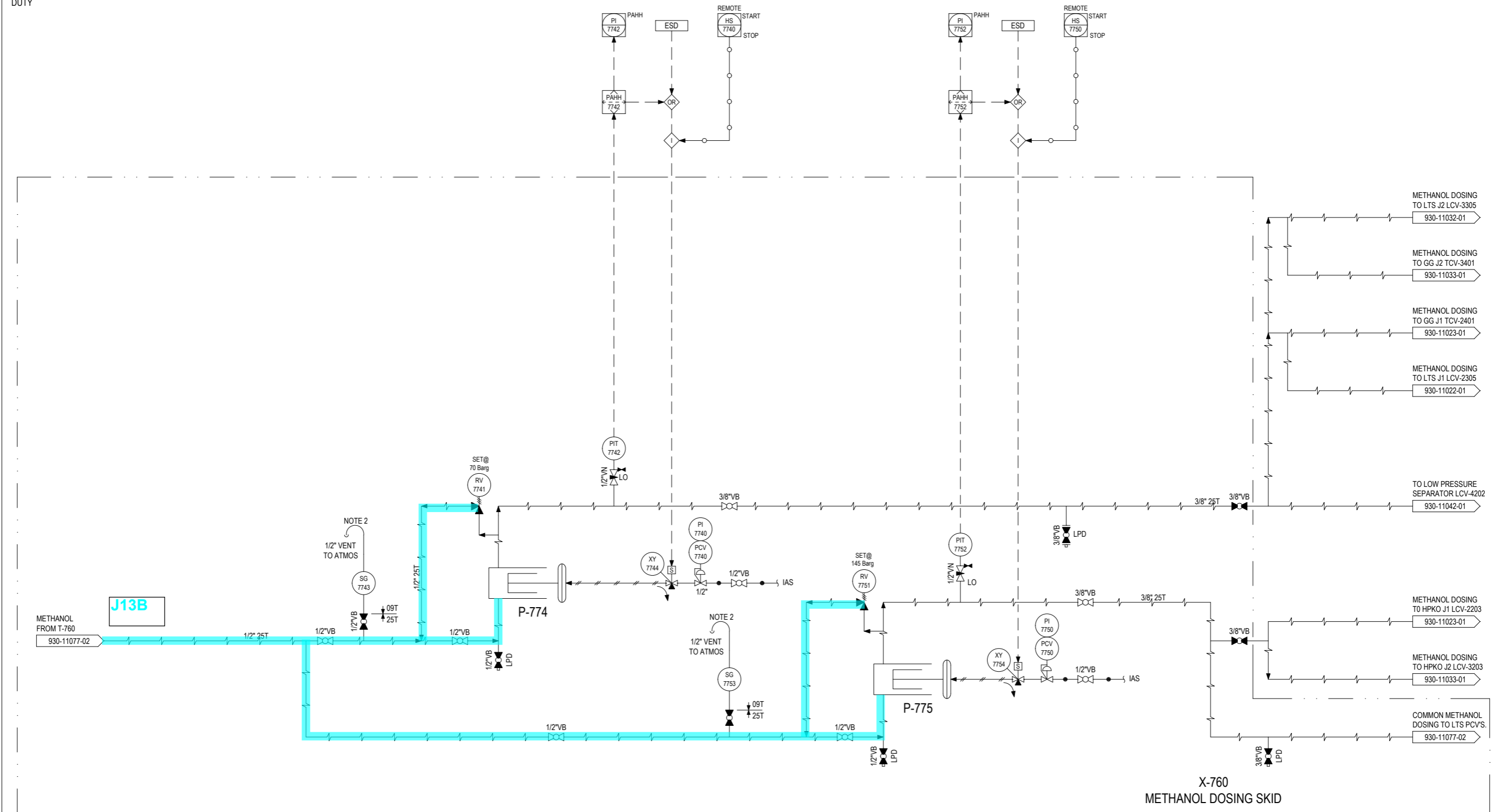
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ITEM No.
NAME
SIZE
DESIGN
OPER.
DUTY

X-760
METHANOL DOSING SKID

P-774
METHANOL DOSING PUMP
33.4 Litre / hr @ 345 Barg

P-775
METHANOL DOSING PUMP
33.4 Litre / hr @ 345 Barg



- GENERAL NOTES
- THIS P&ID DOES NOT SHOW ALL LOGIC, REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - TOP OF VENT TO BE LOCATED ABOVE TOP OF TANK T-760.

No	DATE	DRN	CHKD	ENGD	APPD	TODD	DESCRIPTION	NUMBER	TITLE
0	06/21	HBM	DJP	GD	.	KB	AS BUILT PCR_K1706 (620051)	.	.
REVISIONS									
REFERENCE DRAWINGS									



LOCATION KAPUNI J WELLSITE	DRAWN V.KAING 12/18	TITLE KAPUNI J WELLSITE PIPING & INSTRUMENT DIAGRAM DOSING SUPPLY METHANOL
PROJECT No	CHECKED D.STEWART 12/18	
SCALE N.T.S.	DES ENGD	
	PROJ ENGD	
	APPROVED C.DAVIDSON 12/18	
	TODD	
	ORIGINAL SIZE A1	DRAWING No 930-11077-01
		REVISION 0

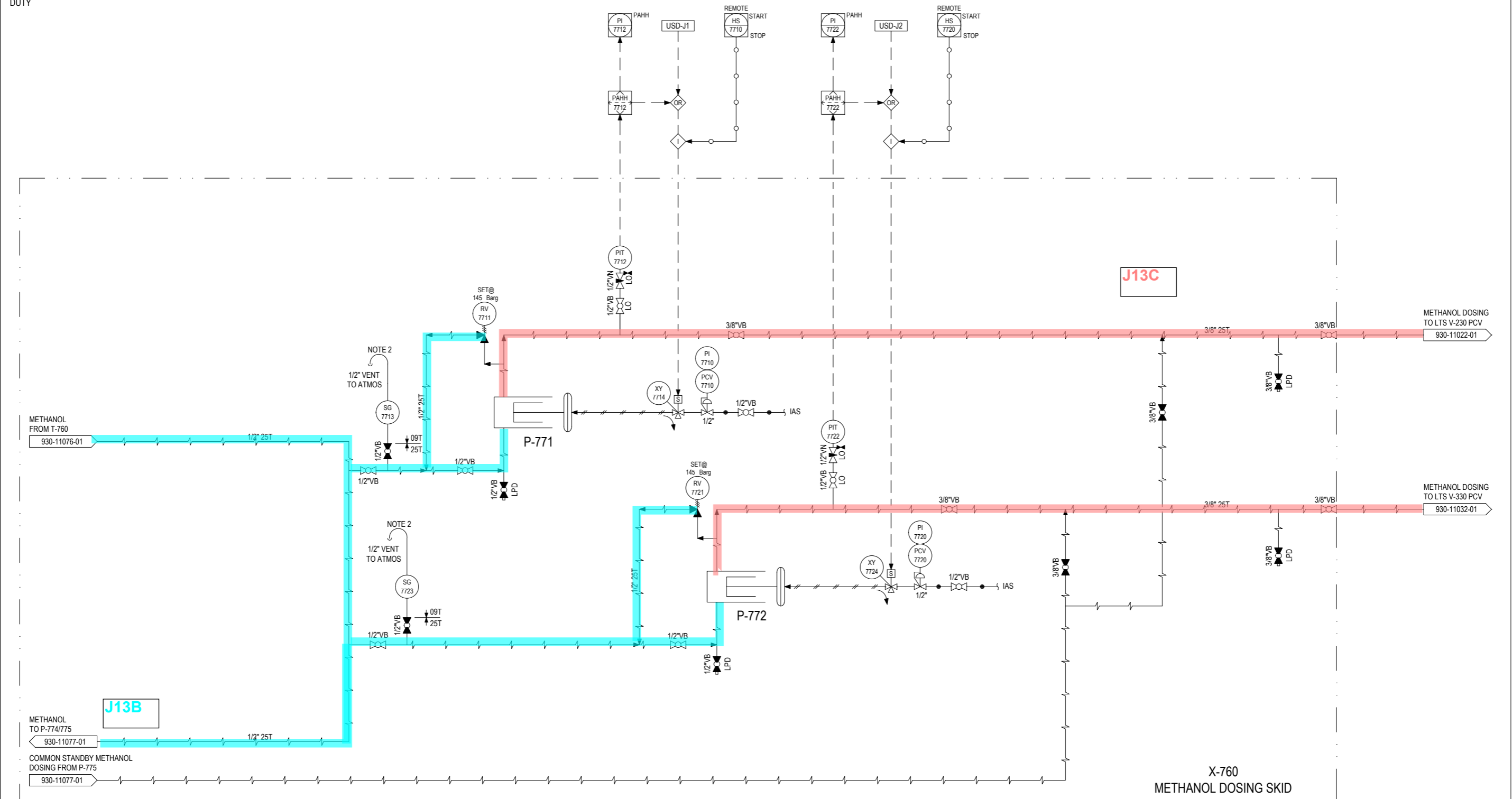
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ITEM No.
NAME
SIZE
DESIGN
OPER.
DUTY

X-760
METHANOL DOSING SKID

P-771
METHANOL DOSING PUMP
33.4 Litre / hr @ 345 Barg

P-772
METHANOL DOSING PUMP
33.4 Litre / hr @ 345 Barg



- GENERAL NOTES
- THIS P&ID DOES NOT SHOW ALL LOGIC, REFER TO CAUSE & EFFECT MATRIX FOR SHUTDOWN LOGIC.
 - TOP OF VENT TO BE LOCATED ABOVE TOP OF TANK T-760.

No	DATE	DRN	CHKD	ENGD	APPD	TODD	DESCRIPTION	NUMBER	TITLE
0	06/21	HBM	DJP	GD	.	KB	AS BUILT PCR_K1706 (620051)	.	.
							REVISIONS	REFERENCE DRAWINGS	



LOCATION
KAPUNI J WELLSITE

PROJECT No

SCALE | N.T.S. | A1 BDR

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DRAWN	V.KAING	12/18
CHECKED	D.STEWART	12/18
DES ENGD		
PROJ ENGD		
APPROVED	C.DAVIDSON	12/18
TODD		

ORIGINAL SIZE
A1

TITLE
KAPUNI J WELLSITE
PIPING & INSTRUMENT DIAGRAM
DOSING SUPPLY METHANOL

DRAWING No
930-11077-02

REVISION
0

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Appendix 2. Parts Count Sheets

Section ID J02A
Full Name J02A_W001Flow_V
Pressure 55 barg
Temperature 35 C
Material Composition 1
Description Well fluids in production flowline from well W010 isolation valve (XSV-0103) up to choke v.

Parts count updated, as desander removed

Equipment	Size	P& ID			
		TOTAL	11001-01	11017-01	
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	4	4		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch	46	6	40	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	2	2		
	6 inch	13	11	2	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J02B
 Full Name J02B_W001ChIn_V

Pressure 55 barg
 Temperature 35 C

Material Composition 1

Description Well fluids in well W010 production flowline within choke valve skid boundary up to choke

Equipment	Size	P& ID			
		TOTAL	11017-01		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	3	3		
	6 inch	3	3		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	2	2		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch	5	5		
	6 inch	10.1	10.1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	4	4		
	6 inch	5	5		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID
 Full Name
 Pressure
 Temperature
 Material Composition
 Description

J02C
 J02C_ChMani_V
 55 barg
 44.8 C
 2

Parts count updated, as section boundary changed

Well fluids in production manifold from each choke valve up to overpressure protection SDV of train headers A & B

Equipment	Size	P& ID					
		TOTAL	11017-01	11017-03	11020-01	11030-01	
Process Vessel	<= 6 inch						
	> 6 inch						
Manual Valves	2 inch	4	1	2	1		
	6 inch	6	1	2	2	1	
	12 inch						
	18 inch						
	24 inch						
	36 inch						
Actuated Valves	2 inch	3			2	1	
	6 inch						
	12 inch	2			1	1	
	18 inch						
	24 inch						
	36 inch						
Small Bore Fittings	2 inch	7	1	2	1	1	2
Reciprocating Pump	<= 6 inch						
	> 6 inch						
Centrifugal Pump	<= 6 inch						
	> 6 inch						
Process Pipe (Interskid)	2 inch						
	6 inch	5	5				
	12 inch	15					
	18 inch					10	5
	24 inch						
	36 inch						
Process Pipe (Within Skid)	2 inch	5				5	
	6 inch	15	5	5			5
	12 inch						
	18 inch						
	24 inch						
	36 inch						
Pig Trap	<= 6 inch						
	> 6 inch						
Tube Side Heat Exchanger	<= 6 inch						
	> 6 inch						
Shell Side Heat Exchanger	<= 6 inch						
	> 6 inch						
Plate Heat Exchanger	<= 6 inch						
	> 6 inch						
Fin Fan Heat Exchanger	<= 6 inch						
	> 6 inch						
Flange	2 inch	12	1	4	5	2	
	6 inch	28	3	11	4	2	8
	12 inch	16		6	2	2	6
	18 inch						
	24 inch						
	36 inch						
Filters	<= 6 inch						
	> 6 inch						
Recip Compressors	<= 6 inch						
	> 6 inch						
Centrif Compressors	<= 6 inch						
	> 6 inch						

Section ID J02D
 Full Name J02D_W002Flow_V

Pressure 20 barg

Temperature 35 C

Material Composition 1

Description Well fluids in production flowline from well W020 isolation valve (XSV-0203) up to choke v.

Equipment	Size	P& ID			
		TOTAL	11002-01	11017-01	
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
Small Bore Fittings	2 inch	5	5		
	36 inch				
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch	65	65		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	2	2		
	6 inch	12	10	2	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J02E
Full Name J02E_W002ChIn_V
Pressure 20 barg
Temperature 35 C
Material Composition 1
Description Well fluids in well W020 production flowline within choke valve skid boundary up to choke v:

Equipment	Size	P& ID			
		TOTAL	11017-01		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	3	3		
	6 inch	3	3		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	2	2		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch	5	5		
	6 inch	10.1	10.1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	4	4		
	6 inch	5	5		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J02F
 Full Name J02F_W003Flow_V

Pressure 20 barg
 Temperature 35 C

Material Composition 1

Description Well fluids in production flowline from well W030 isolation valve (XSV-0303) up to choke v.

Equipment	Size	P& ID			
		TOTAL	11003-01	11017-02	
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
Small Bore Fittings	2 inch	5	5		
	6 inch				
	12 inch				
	18 inch				
	24 inch				
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch	65		65	
	12 inch				
	18 inch				
	24 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	2	2		
	6 inch	12	10	2	
	12 inch				
	18 inch				
	24 inch				
Filters	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J02G
 Full Name J02G_W003ChIn_V

Pressure 20 barg

Temperature 35 C

Material Composition 1

Description Well fluids in well W030 production flowline within choke valve skid boundary up to choke

Equipment	Size	P& ID			
		TOTAL	11017-02		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	3	3		
	6 inch	3	3		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	2	2		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch	5	5		
	6 inch	10.1	10.1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	4	4		
	6 inch	5	5		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J02H
 Full Name J02H_W004Flow_V

Pressure 20 barg

Temperature 35 C

Material Composition 1

Description Well fluids in production flowline from well W040 isolation valve (XSV-0403) up to choke v.

Equipment	Size	P& ID			
		TOTAL	11004-01	11017-02	
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	5	5		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch	65		65	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	2	2		
	6 inch	12	10	2	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J02I
 Full Name J02I_W004ChIn_V

Pressure 20 barg
 Temperature 35 C

Material Composition 1

Description Well fluids in well W040 production flowline within choke valve skid boundary up to choke

Equipment	Size	P& ID			
		TOTAL	11017-02		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	3	3		
	6 inch	3	3		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	2	2		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch	5	5		
	6 inch	10.1	10.1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	4	4		
	6 inch	5	5		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J02J
Full Name J02J_ChManiC_V
Pressure 20 barg
Temperature 35 C
Material Composition 1
Description Well fluids in production manifold to over pressure protection SDV of train header C

Equipment	Size	P& ID				
		TOTAL	11017-01	11017-02	11017-03	11040-01
Process Vessel	<= 6 inch					
	> 6 inch					
Manual Valves	2 inch	3	1	2		
	6 inch	15	1	2	12	
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Actuated Valves	2 inch	1				1
	6 inch					
	12 inch	1				1
	18 inch					
	24 inch					
	36 inch					
Small Bore Fittings	2 inch	9	1	6	1	1
Reciprocating Pump	<= 6 inch					
	> 6 inch					
Centrifugal Pump	<= 6 inch					
	> 6 inch					
Process Pipe (Interskid)	2 inch	5			5	
	6 inch	10	5	5		
	12 inch	1				1
	18 inch					
	24 inch					
	36 inch					
Process Pipe (Within Skid)	2 inch	10			5	5
	6 inch	20	5	5	10	
	12 inch	4				4
	18 inch					
	24 inch					
	36 inch					
Pig Trap	<= 6 inch					
	> 6 inch					
Tube Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Shell Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Plate Heat Exchanger	<= 6 inch					
	> 6 inch					
Fin Fan Heat Exchanger	<= 6 inch					
	> 6 inch					
Flange	2 inch	5	1	2		2
	6 inch	24	3	6	15	
	12 inch	4			2	2
	18 inch					
	24 inch					
	36 inch					
Filters	<= 6 inch					
	> 6 inch					
Recip Compressors	<= 6 inch					
	> 6 inch					
Centrif Compressors	<= 6 inch					
	> 6 inch					

Section ID J03A
Full Name J03A_TrAHeader_V
Pressure 54.5 barg
Temperature 44.8 C
Material Composition 2
Description Well fluids in train A header from XSV-2001 and XSV-2002 through the LTS coils up to the

Equipment	Size	P& ID			
		TOTAL	11020-01	11022-01	11023-01
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	2	2		
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1		1	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	4	4		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch	25.9	8.9	17	
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	5	5		
	12 inch	7	3	2	2
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	3	3		
	6 inch	22	9	9	4
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J03B
Full Name J03B_HP KOAVap_V
Pressure 54.5 barg
Temperature 44.8 C
Material Composition 3
Description HPKO Vessel A (V-220) vapour section through the GG exchanger tube side up to inlet of

Equipment	Size	P& ID			
		TOTAL	11022-01	11023-01	
Process Vessel	<= 6 inch				
	> 6 inch	0.5		0.5	
Manual Valves	2 inch	4		4	
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	7	2	5	
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch	6	3	3	
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch	1		1	
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	4		4	
	6 inch	8	2	6	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J03C
Full Name J03C_HPKOALiq_L
Pressure 54.5 barg
Temperature 44.8 C
Material Composition 9
Description HPKO Vessel A (V-220) liquid section up to LCV-2203

Equipment	Size	P& ID			
		TOTAL	11023-01		
Process Vessel	<= 6 inch				
	> 6 inch	0.5	0.5		
Manual Valves	2 inch	8	8		
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	3	3		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	3	3		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	11	11		
	6 inch	9	9		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J03D
Full Name J03D_LTSAVap_V
Pressure 48.3 barg
Temperature 6 C
Material Composition 6
Description Low Temperature Separator A (V-230 220) vapour section through the GG exchanger she

Equipment	Size	P& ID			
		TOTAL	11022-01	11023-01	
Process Vessel	<= 6 inch				
	> 6 inch	0.5	0.5		
Manual Valves	2 inch	8	4	4	
	6 inch				
	12 inch	1		1	
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	2		2	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	10	7	3	
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch	22.3	6	16.3	
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch	1		1	
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	13	7	6	
	6 inch	11	1	10	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J03E
Full Name J03E_LTSALiq_L
Pressure 48.3 barg
Temperature 30.1 C
Material Composition 11
Description Low Temperature Separator A (V-230 220) liquid section up to LCV-2305

Equipment	Size	P& ID			
		TOTAL	11022-01		
Process Vessel	<= 6 inch				
	> 6 inch	0.5	0.5		
Manual Valves	2 inch	6	6		
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	6	6		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch	9.8	9.8		
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	6	6		
	6 inch	4	4		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID	J03F	
Full Name	J03F_HPKOALCV_L	
Pressure	48.3	barg
Temperature	39.2	C
Material Composition	10	
Description	HPKO A (V-220) Liquid from LCV-2203 up to XSV-2204	

Equipment	Size	P& ID				
		TOTAL	11023-01			
Process Vessel	<= 6 inch					
	> 6 inch					
Manual Valves	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Actuated Valves	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
Small Bore Fittings	2 inch					
	36 inch					
Reciprocating Pump	<= 6 inch					
	> 6 inch					
Centrifugal Pump	<= 6 inch					
	> 6 inch					
Process Pipe (Interskid)	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Process Pipe (Within Skid)	2 inch					
	6 inch	4	4			
	12 inch					
	18 inch					
	24 inch					
Pig Trap	<= 6 inch					
	> 6 inch					
Tube Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Shell Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Plate Heat Exchanger	<= 6 inch					
	> 6 inch					
Fin Fan Heat Exchanger	<= 6 inch					
	> 6 inch					
Flange	2 inch	2	2			
	6 inch	2	2			
	12 inch					
	18 inch					
	24 inch					
Filters	<= 6 inch					
	> 6 inch					
Recip Compressors	<= 6 inch					
	> 6 inch					
Centrif Compressors	<= 6 inch					
	> 6 inch					

Section ID J03G
Full Name J03G_LiqToLTSA_L
Pressure 48.3 barg
Temperature 39.2 C
Material Composition 10
Description Liquid from XSV-2204 to liquid inlet of LTS A (V-230)

Equipment	Size	P& ID			
		TOTAL	11022-01	11023-01	
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch				
	6 inch	1		1	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch				
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	11.6	3.9	7.7	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch				
	6 inch	5	2	3	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID	J03H	
Full Name	J03H_LTSALCV_L	
Pressure	24.2	barg
Temperature	20.2	C
Material Composition	12	
Description	LTS A (V-230) Liquid from LCV-2305 up to XSV-2306	

Equipment	Size	P& ID			
		TOTAL	11022-01	11023-01	
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	1	1		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	3.5	3.5		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch				
	6 inch	2	2		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID

J04A

Full Name

J04A_DryGHeader_V

Pressure

48.1 barg

Temperature

38.7 C

Material Composition

7

Description

Dry gas header from XSV-2405 and XSV-3405 up to pig launcher skid boundary

Equipment	Size	P& ID					
		TOTAL	11024-01	11023-01	11033-01	11092-01	11090-01
Process Vessel	<= 6 inch						
	> 6 inch						
Manual Valves	2 inch	1	1				
	6 inch						
	12 inch						
	18 inch						
	24 inch						
	36 inch						
Actuated Valves	2 inch						
	6 inch						
	12 inch						
	18 inch						
	24 inch						
	36 inch						
Small Bore Fittings	2 inch						
Reciprocating Pump	<= 6 inch						
	> 6 inch						
Centrifugal Pump	<= 6 inch						
	> 6 inch						
Process Pipe (Interskid)	2 inch	5	5				
	6 inch						
	12 inch	32.8		16.4	16.4		4.4
	18 inch	58.9	54.5			4.4	
	24 inch						
	36 inch						
Process Pipe (Within Skid)	2 inch						
	6 inch						
	12 inch						
	18 inch						
	24 inch						
	36 inch						
Pig Trap	<= 6 inch						
	> 6 inch						
Tube Side Heat Exchanger	<= 6 inch						
	> 6 inch						
Shell Side Heat Exchanger	<= 6 inch						
	> 6 inch						
Plate Heat Exchanger	<= 6 inch						
	> 6 inch						
Fin Fan Heat Exchanger	<= 6 inch						
	> 6 inch						
Flange	2 inch	5	5				
	6 inch	4	2	1	1		
	12 inch	9	8			1	
	18 inch						
	24 inch						
	36 inch						
Filters	<= 6 inch						
	> 6 inch						
Recip Compressors	<= 6 inch						
	> 6 inch						
Centrif Compressors	<= 6 inch						
	> 6 inch						

Section ID J04B
Full Name J04B_DryGPLSkid_V
Pressure 48.1 barg
Temperature 38.7 C
Material Composition 7
Description Dry gas header inside pig launcher skid boundary up to pipeline isolation XSV

Equipment	Size	P& ID				
		TOTAL	11092-01			
Process Vessel	<= 6 inch					
	> 6 inch					
Manual Valves	2 inch					
	6 inch					
	12 inch	1	1			
	18 inch					
	24 inch					
	36 inch					
Actuated Valves	2 inch					
	6 inch					
	12 inch	1	1			
	18 inch					
	24 inch					
	36 inch					
Small Bore Fittings	2 inch					
Reciprocating Pump	<= 6 inch					
	> 6 inch					
Centrifugal Pump	<= 6 inch					
	> 6 inch					
Process Pipe (Interskid)	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Process Pipe (Within Skid)	2 inch					
	6 inch					
	12 inch					
	18 inch	10.5	10.5			
	24 inch					
	36 inch					
Pig Trap	<= 6 inch					
	> 6 inch					
Tube Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Shell Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Plate Heat Exchanger	<= 6 inch					
	> 6 inch					
Fin Fan Heat Exchanger	<= 6 inch					
	> 6 inch					
Flange	2 inch					
	6 inch	1	1			
	12 inch	4	4			
	18 inch					
	24 inch					
	36 inch					
Filters	<= 6 inch					
	> 6 inch					
Recip Compressors	<= 6 inch					
	> 6 inch					
Centrif Compressors	<= 6 inch					
	> 6 inch					

Section ID	J04C	
Full Name	J04C_DryGPLaun_V	
Pressure	48.1	barg
Temperature	38.7	C
Material Composition	7	
Description	Dry Gas Pig Launcher (930-V-920)	

Equipment	Size	P& ID			
		TOTAL	11092-01		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	10	10		
	6 inch	2	2		
	12 inch	2	2		
	18 inch				
	24 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
Small Bore Fittings	2 inch	3	3		
	6 inch				
	12 inch				
	18 inch				
	24 inch				
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	7	7		
	12 inch				
	18 inch	2	2		
	24 inch				
Pig Trap	<= 6 inch				
	> 6 inch	1	1		
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	13	13		
	6 inch	3	3		
	12 inch	3	3		
	18 inch				
	24 inch				
Filters	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J04D
Full Name J04D_DryGPRSkid_V
Pressure 48.1 barg
Temperature 38.7 C
Material Composition 7
Description Dry gas header from KA-8/12/15/18 inside pig receiver skid

Equipment	Size	P& ID			
		TOTAL	11090-01		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	1	1		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch	10.5	10.5		
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch				
	6 inch	7	7		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J04E
Full Name J04E_DryGPRec_V
Pressure 48.1 barg
Temperature 38.7 C
Material Composition 7
Description Dry Gas from KA-8/12/15/18 Pig Receiver (930-V-900)

Equipment	Size	P& ID			
		TOTAL	11090-01		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	9	9		
	6 inch	2	2		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	2	2		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	7	7		
	12 inch	2	2		
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch	1	1		
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	13	13		
	6 inch	7	7		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J04F
 Full Name J04F_FGHeater_V
 Pressure 48.1 barg
 Temperature 38.7 C
 Material Composition 7
 Description Dry Gas from header up to fuel gas heater

Parts count updated, as fuel gas heater only used during start-up and excluded from scope, 150m of fuel gas line included

Equipment	Size	P& ID			
		TOTAL	11024-01	11061-01	
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	4	2	2	
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	2		2	
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch	150	150		
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	6	1	5	
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J05A
 Full Name J05A_TrBHeader_V

Pressure 54.5 barg

Temperature 42.3 C

Material Composition 17

Description Well fluids in train B header from XSV-3001 and XSV-3002 through the LTS coils up to the

Equipment	Size	P& ID			
		TOTAL	11030-01	11032-01	11033-01
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	2	2		
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1		1	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	4	4		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch	40.9	8.9	32	
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	5	5		
	12 inch	7	3	2	2
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	3	3		
	6 inch	22	9	9	4
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J05B
Full Name J05B_HPKOBVap_V
Pressure 54.5 barg
Temperature 42.3 C
Material Composition 18
Description High Pressure Knockout Vessel B (V-320) vapour section through the GG exchanger tube

Equipment	Size	P& ID			
		TOTAL	11032-01	11033-01	
Process Vessel	<= 6 inch				
	> 6 inch	0.68		0.68	
Manual Valves	2 inch	4		4	
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	7	2	5	
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch	10	7	3	
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch	1		1	
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	4		4	
	6 inch	8	2	6	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J05C
Full Name J05C_HPKOBLiq_L
Pressure 54.5 barg
Temperature 42.3 C
Material Composition 25
Description High Pressure Knockout Vessel B (V-320) liquid section up to LCV-3203

Equipment	Size	P& ID			
		TOTAL	11033-01		
Process Vessel	<= 6 inch				
	> 6 inch	0.32	0.32		
Manual Valves	2 inch	8	8		
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	3	3		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	3	3		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	11	11		
	6 inch	9	9		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J05D
Full Name J05D_LTSBVap_V
Pressure 49.5 barg
Temperature 15 C
Material Composition 21
Description Low Temperature Separator B (V-330) vapour section through the GG exchanger shell sic

Equipment	Size	P& ID			
		TOTAL	11032-01	11033-01	
Process Vessel	<= 6 inch				
	> 6 inch	0.5	0.5		
Manual Valves	2 inch	8	4	4	
	6 inch				
	12 inch	1		1	
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	2		2	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	10	7	3	
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch	22.3	6	16.3	
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch	1		1	
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	13	7	6	
	6 inch	11	1	10	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J05E
Full Name J05E_LTSBLiq_L
Pressure 49.5 barg
Temperature 33.9 C
Material Composition 27
Description Low Temperature Separator B (V-330) liquid section up to LCV-3305

Equipment	Size	P& ID			
		TOTAL	11032-01		
Process Vessel	<= 6 inch				
	> 6 inch	0.5	0.5		
Manual Valves	2 inch	6	6		
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	6	6		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	4	4		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	6	6		
	6 inch	4	4		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J05F
Full Name J05F_HP Kobe LCV_L
Pressure 49.5 barg
Temperature 40.6 C
Material Composition 26
Description HPKO B Liquid from LCV-3203 up to XSV-3204

Equipment	Size	P& ID				
		TOTAL	11033-01			
Process Vessel	<= 6 inch					
	> 6 inch					
Manual Valves	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Actuated Valves	2 inch					
	6 inch	1	1			
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Small Bore Fittings	2 inch					
Reciprocating Pump	<= 6 inch					
	> 6 inch					
Centrifugal Pump	<= 6 inch					
	> 6 inch					
Process Pipe (Interskid)	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Process Pipe (Within Skid)	2 inch					
	6 inch	1	1			
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Pig Trap	<= 6 inch					
	> 6 inch					
Tube Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Shell Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Plate Heat Exchanger	<= 6 inch					
	> 6 inch					
Fin Fan Heat Exchanger	<= 6 inch					
	> 6 inch					
Flange	2 inch					
	6 inch	2	2			
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Filters	<= 6 inch					
	> 6 inch					
Recip Compressors	<= 6 inch					
	> 6 inch					
Centrif Compressors	<= 6 inch					
	> 6 inch					

Section ID J05G
Full Name J05G_LiqToLTSB_L
Pressure 49.5 barg
Temperature 40.6 C
Material Composition 26
Description Liquid from XSV-3204 to liquid inlet of LTS B (V-330)

Equipment	Size	P& ID			
		TOTAL	11032-01	11033-01	
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch				
	6 inch	1		1	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch				
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	11.6	3.9	7.7	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch				
	6 inch	5	2	3	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J05H
Full Name J05H_LTSBLCV_L
Pressure 24.16 barg
Temperature 25.9 C
Material Composition 28
Description LTS B Liquid from LCV-3305 up to XSV-3306

Equipment	Size	P& ID				
		TOTAL	11032-01			
Process Vessel	<= 6 inch					
	> 6 inch					
Manual Valves	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Actuated Valves	2 inch					
	6 inch	1	1			
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Small Bore Fittings	2 inch	1	1			
Reciprocating Pump	<= 6 inch					
	> 6 inch					
Centrifugal Pump	<= 6 inch					
	> 6 inch					
Process Pipe (Interskid)	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Process Pipe (Within Skid)	2 inch					
	6 inch	3.5	3.5			
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Pig Trap	<= 6 inch					
	> 6 inch					
Tube Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Shell Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Plate Heat Exchanger	<= 6 inch					
	> 6 inch					
Fin Fan Heat Exchanger	<= 6 inch					
	> 6 inch					
Flange	2 inch					
	6 inch	2	2			
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Filters	<= 6 inch					
	> 6 inch					
Recip Compressors	<= 6 inch					
	> 6 inch					
Centrif Compressors	<= 6 inch					
	> 6 inch					

Section ID J06B
Full Name J06B_LP SepVap_V
Pressure 20 barg
Temperature 35 C
Material Composition 13
Description Low Pressure Separator (V-420) vapour section to compressor

Parts count updated, as LP Separator configuration changed

Equipment	Size	P& ID				
		TOTAL	11042-01	11045-01	11046-01	11024-01
Process Vessel	<= 6 inch	0.5	0.5			
	> 6 inch					
Manual Valves	2 inch	5	3	1	1	
	6 inch					
	12 inch	4	2	1	1	
	18 inch					
	24 inch					
	36 inch					
Actuated Valves	2 inch					
	6 inch	2	2			
	12 inch	3	1	1	1	
	18 inch					
	24 inch					
	36 inch					
Small Bore Fittings	2 inch	6	6			
Reciprocating Pump	<= 6 inch					
	> 6 inch					
Centrifugal Pump	<= 6 inch					
	> 6 inch					
Process Pipe (Interskid)	2 inch					
	6 inch					
	12 inch	78	20	5	5	48
	18 inch					
	24 inch					
	36 inch					
Process Pipe (Within Skid)	2 inch					
	6 inch					
	12 inch	5	5			
	18 inch					
	24 inch					
	36 inch					
Pig Trap	<= 6 inch					
	> 6 inch					
Tube Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Shell Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Plate Heat Exchanger	<= 6 inch					
	> 6 inch					
Fin Fan Heat Exchanger	<= 6 inch					
	> 6 inch					
Flange	2 inch	8	6	1	1	
	6 inch	5	5			
	12 inch	26	15	3	3	5
	18 inch					
	24 inch					
	36 inch					
Filters	<= 6 inch					
	> 6 inch					
Recip Compressors	<= 6 inch					
	> 6 inch					
Centrif Compressors	<= 6 inch					
	> 6 inch					

Section ID J06C
Full Name J06C_LPsepLiq_L
Pressure 20 barg
Temperature 35 C
Material Composition 15
Description LP Separator (V-420) liquid section up to LP Separator Liquids Pump

Parts count updated, as LP Separator configuration changed

Equipment	Size	P& ID			
		TOTAL	11042-01	11047-01	
Process Vessel	<= 6 inch	0.5	0.5		
	> 6 inch				
Manual Valves	2 inch	8	5	3	
	6 inch	4	1	3	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1		1	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	6	3	3	
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch	2	2		
	6 inch	6	6		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	12	9	3	
	6 inch	18	7	11	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J06D
Full Name J06D_LPsepLCV_L
Pressure 18 barg
Temperature 16.1 C
Material Composition 16
Description LP Separator Liquids Pump Discharge to LCV-4208

Parts count updated, as LP Separator configuration changed

Equipment	Size	P& ID			
		TOTAL	11042-01	11047-01	
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	4		4	
	6 inch	4	2	2	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch	3	1	2	
	6 inch	2		2	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	2		2	
Reciprocating Pump	<= 6 inch	2		2	
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	6	6		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	11	1	10	
	6 inch	19	5	14	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J06E
Full Name J06E_LP SepPump_L
Pressure 18 barg
Temperature 16.1 C
Material Composition 16
Description LP Separator Liquids from LCV-4208 to XSV-4215

New section, as LP Separator configuration changed

Equipment	Size	P& ID			
		TOTAL	J06E_42_01		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	1	1		
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch				
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	2	2		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	2	2		
	6 inch	2	2		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J20B
Full Name J06F_WetGPLSkid_V
Pressure 20 barg
Temperature 35 C
Material Composition 13
Description Wet gas header inside pig launcher skid boundary up to pipeline isolation XSV

Equipment	Size	P& ID			
		TOTAL	11091-01		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch	1	1		
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	1	1		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch	10.5	10.5		
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch				
	6 inch	3	3		
	12 inch	2	2		
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J20C
Full Name J06G_WetGPLaun_V
Pressure 20 barg
Temperature 35 C
Material Composition 13
Description Wet Gas Pig Launcher (930-V-910)

Equipment	Size	P& ID			
		TOTAL	11091-01		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	10	10		
	6 inch	2	2		
	12 inch	2	2		
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	2	2		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	7	7		
	12 inch	2	2		
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch	1	1		
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	14	14		
	6 inch	3	3		
	12 inch	3	3		
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J07A
Full Name J07A_WetGPipe_V
Pressure 20 barg
Temperature 20.2 C
Material Composition 13
Description Wet gas pipeline inside wellsite boundary

Equipment	Size	P& ID				
		TOTAL	11091-01			
Process Vessel	<= 6 inch					
	> 6 inch					
Manual Valves	2 inch					
	6 inch					
	12 inch	1	1			
	18 inch					
	24 inch					
Actuated Valves	36 inch					
	2 inch					
	6 inch					
	12 inch					
	18 inch					
Small Bore Fittings	24 inch					
	36 inch					
	2 inch	2	2			
	6 inch					
	12 inch					
Reciprocating Pump	18 inch					
	> 6 inch					
Centrifugal Pump	<= 6 inch					
	> 6 inch					
Process Pipe (Interskid)	2 inch					
	6 inch					
	12 inch	14	14			
	18 inch					
	24 inch					
Process Pipe (Within Skid)	36 inch					
	2 inch					
	6 inch					
	12 inch					
	18 inch					
Pig Trap	24 inch					
	36 inch					
	<= 6 inch					
	> 6 inch					
	Tube Side Heat Exchanger	<= 6 inch				
> 6 inch						
Shell Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Plate Heat Exchanger	<= 6 inch					
	> 6 inch					
Fin Fan Heat Exchanger	<= 6 inch					
	> 6 inch					
Flange	2 inch					
	6 inch					
	12 inch	4	4			
	18 inch					
	24 inch					
Filters	36 inch					
	<= 6 inch					
Recip Compressors	> 6 inch					
	<= 6 inch					
Centrif Compressors	> 6 inch					
	<= 6 inch					

Section ID

J08A

Full Name

J08A_LiqHeader_L

Parts count updated, as section boundary changed

Pressure

18 barg

Temperature

16.1 C

Material Composition

16

Description

Liquid header up to liquid pig launcher skid boundary

Equipment	Size	P& ID				
		TOTAL	11042-01	11024-01	11022-01	11032-01
Process Vessel	<= 6 inch					
	> 6 inch					
Manual Valves	2 inch	4		4		
	6 inch	1		1		
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Actuated Valves	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Small Bore Fittings	2 inch	1		1		
Reciprocating Pump	<= 6 inch					
	> 6 inch					
Centrifugal Pump	<= 6 inch					
	> 6 inch					
Process Pipe (Interskid)	2 inch					
	6 inch	114.3	5	99.3	5	5
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Process Pipe (Within Skid)	2 inch					
	6 inch	4			2	2
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Pig Trap	<= 6 inch					
	> 6 inch					
Tube Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Shell Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Plate Heat Exchanger	<= 6 inch					
	> 6 inch					
Fin Fan Heat Exchanger	<= 6 inch					
	> 6 inch					
Flange	2 inch	7		7		
	6 inch	22	1	19	1	1
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Filters	<= 6 inch					
	> 6 inch					
Recip Compressors	<= 6 inch					
	> 6 inch					
Centrif Compressors	<= 6 inch					
	> 6 inch					

Section ID J08B
Full Name J08B_LiqPLSkid_L
Pressure 18 barg
Temperature 16.1 C
Material Composition 16
Description Liquid header inside liquid pig launcher skid boundary up to pipeline isolation boundary

Equipment	Size	P& ID			
		TOTAL	11093-01		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch				
	6 inch	2	2		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch				
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	10.5	10.5		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch				
	6 inch	5	5		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J08C
Full Name J08C_LiqPLaun_L
Pressure 18 barg
Temperature 16.1 C
Material Composition 16
Description Condensate/Water Pig Launcher (930-V-930)

Equipment	Size	P& ID			
		TOTAL	11093-01		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	10	10		
	6 inch	2	2		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	3	3		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	9	9		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch	1	1		
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	15	15		
	6 inch	6	6		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J08D
Full Name J08D_FBWPLSkid_L
Pressure 18 barg
Temperature 16.1 C
Material Composition 16
Description Liquid header inside flowback water pig launcher skid boundary up to pipeline isolation bo

Equipment	Size	P& ID			
		TOTAL	11094-01		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	2	2		
	6 inch	3	3		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	1	1		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	10.5	10.5		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	2	2		
	6 inch	7	7		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J08E
Full Name J08E_FBWPLaunB_L
Pressure 18 barg
Temperature 16.1 C
Material Composition 16
Description Flowback water pig launcher (930-V-940)

Equipment	Size	P& ID			
		TOTAL	11094-01		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	10	10		
	6 inch	2	2		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	3	3		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	10	10		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch	1	1		
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	15	15		
	6 inch	6	6		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J09A
Full Name J09A_LiqPipe_L
Pressure 18 barg
Temperature 16.1 C
Material Composition 16
Description Liquid pipeline inside wellsite boundary

Equipment	Size	P& ID				
		TOTAL	11093-01			
Process Vessel	<= 6 inch					
	> 6 inch					
Manual Valves	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Actuated Valves	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Small Bore Fittings	2 inch	1	1			
Reciprocating Pump	<= 6 inch					
	> 6 inch					
Centrifugal Pump	<= 6 inch					
	> 6 inch					
Process Pipe (Interskid)	2 inch					
	6 inch	14	14			
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Process Pipe (Within Skid)	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Pig Trap	<= 6 inch					
	> 6 inch					
Tube Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Shell Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Plate Heat Exchanger	<= 6 inch					
	> 6 inch					
Fin Fan Heat Exchanger	<= 6 inch					
	> 6 inch					
Flange	2 inch					
	6 inch	3	3			
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Filters	<= 6 inch					
	> 6 inch					
Recip Compressors	<= 6 inch					
	> 6 inch					
Centrif Compressors	<= 6 inch					
	> 6 inch					

Section ID	J10A	
Full Name	J10A_FBWPipe_L	
Pressure	18	barg
Temperature	16.1	C
Material Composition	16	
Description	Flowback water pipeline inside wellsite boundary	

Equipment	Size	P& ID				
		TOTAL	11094-01			
Process Vessel	<= 6 inch					
	> 6 inch					
Manual Valves	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Actuated Valves	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Small Bore Fittings	2 inch	1	1			
Reciprocating Pump	<= 6 inch					
	> 6 inch					
Centrifugal Pump	<= 6 inch					
	> 6 inch					
Process Pipe (Interskid)	2 inch					
	6 inch	14	14			
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Process Pipe (Within Skid)	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Pig Trap	<= 6 inch					
	> 6 inch					
Tube Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Shell Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Plate Heat Exchanger	<= 6 inch					
	> 6 inch					
Fin Fan Heat Exchanger	<= 6 inch					
	> 6 inch					
Flange	2 inch					
	6 inch	3	3			
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Filters	<= 6 inch					
	> 6 inch					
Recip Compressors	<= 6 inch					
	> 6 inch					
Centrif Compressors	<= 6 inch					
	> 6 inch					

Section ID	J11A	
Full Name	J11A_DryKAGasPipe_V	
Pressure	48.1	barg
Temperature	38.7	C
Material Composition	7	
Description	Dry gas in incoming pipeline from KA-8/12/15/18 within wellsite	

Equipment	Size	P& ID				
		TOTAL	11090-01			
Process Vessel	<= 6 inch					
	> 6 inch					
Manual Valves	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Actuated Valves	2 inch					
	6 inch	1	1			
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Small Bore Fittings	2 inch	2	2			
Reciprocating Pump	<= 6 inch					
	> 6 inch					
Centrifugal Pump	<= 6 inch					
	> 6 inch					
Process Pipe (Interskid)	2 inch					
	6 inch					
	12 inch	14	14			
	18 inch					
	24 inch					
	36 inch					
Process Pipe (Within Skid)	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Pig Trap	<= 6 inch					
	> 6 inch					
Tube Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Shell Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Plate Heat Exchanger	<= 6 inch					
	> 6 inch					
Fin Fan Heat Exchanger	<= 6 inch					
	> 6 inch					
Flange	2 inch					
	6 inch	1	1			
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Filters	<= 6 inch					
	> 6 inch					
Recip Compressors	<= 6 inch					
	> 6 inch					
Centrif Compressors	<= 6 inch					
	> 6 inch					

Section ID J12A
Full Name J12A_DryGasPipe_V
Pressure 48.1 barg
Temperature 38.7 C
Material Composition 7
Description Dry gas export pipeline within wellsite boundary

Equipment	Size	P& ID				
		TOTAL	11092-01			
Process Vessel	<= 6 inch					
	> 6 inch					
Manual Valves	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Actuated Valves	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Small Bore Fittings	2 inch	2	2			
Reciprocating Pump	<= 6 inch					
	> 6 inch					
Centrifugal Pump	<= 6 inch					
	> 6 inch					
Process Pipe (Interskid)	2 inch					
	6 inch					
	12 inch					
	18 inch	14	14			
	24 inch					
	36 inch					
Process Pipe (Within Skid)	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Pig Trap	<= 6 inch					
	> 6 inch					
Tube Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Shell Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Plate Heat Exchanger	<= 6 inch					
	> 6 inch					
Fin Fan Heat Exchanger	<= 6 inch					
	> 6 inch					
Flange	2 inch					
	6 inch					
	12 inch	1	1			
	18 inch					
	24 inch					
	36 inch					
Filters	<= 6 inch					
	> 6 inch					
Recip Compressors	<= 6 inch					
	> 6 inch					
Centrif Compressors	<= 6 inch					
	> 6 inch					

Section ID J13A
Full Name J13A_MetTank_L
Pressure barg
Temperature 14 C
Material Composition Methanol
Description Methanol Dosing Tank

Equipment	Size	P& ID				
		TOTAL	XX32 (11076-01)			
Process Vessel	<= 6 inch	1	1			
	> 6 inch					
Manual Valves	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Actuated Valves	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Small Bore Fittings	2 inch	3	3			
Reciprocating Pump	<= 6 inch					
	> 6 inch					
Centrifugal Pump	<= 6 inch					
	> 6 inch					
Process Pipe (Interskid)	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Process Pipe (Within Skid)	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Pig Trap	<= 6 inch					
	> 6 inch					
Tube Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Shell Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Plate Heat Exchanger	<= 6 inch					
	> 6 inch					
Fin Fan Heat Exchanger	<= 6 inch					
	> 6 inch					
Flange	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Filters	<= 6 inch					
	> 6 inch					
Recip Compressors	<= 6 inch					
	> 6 inch					
Centrif Compressors	<= 6 inch					
	> 6 inch					

Section ID J13B
Full Name J13B_MetTankOut_L
Pressure barg
Temperature 14 C
Material Composition Methanol
Description Methanol Dosing Tank outlet up to methanol dosing pumps

Parts count updated, as methanol dosing configuration changed

Equipment	Size	P& ID				
		TOTAL	11076-01	11077-01	11077-02	
Process Vessel	<= 6 inch					
	> 6 inch					
Manual Valves	2 inch	26	10	8	8	
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Actuated Valves	2 inch	5	1	2	2	
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Small Bore Fittings	2 inch					
Reciprocating Pump	<= 6 inch					
	> 6 inch					
Centrifugal Pump	<= 6 inch					
	> 6 inch					
Process Pipe (Interskid)	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Process Pipe (Within Skid)	2 inch	15	5	5	5	
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Pig Trap	<= 6 inch					
	> 6 inch					
Tube Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Shell Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Plate Heat Exchanger	<= 6 inch					
	> 6 inch					
Fin Fan Heat Exchanger	<= 6 inch					
	> 6 inch					
Flange	2 inch	3	3			
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Filters	<= 6 inch	2	2			
	> 6 inch					
Recip Compressors	<= 6 inch					
	> 6 inch					
Centrif Compressors	<= 6 inch					
	> 6 inch					

Section ID J13C
Full Name J13C_MetDisLTS_L
Pressure 120 barg
Temperature 14 C
Material Composition Methanol
Description Methanol distribution system to LTS

Parts count updated, as methanol dosing configuration changed

Equipment	Size	P& ID				
		TOTAL	11077_02	11022-01	11032-01	
Process Vessel	<= 6 inch					
	> 6 inch					
Manual Valves	2 inch	14	8	3	3	
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Actuated Valves	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Small Bore Fittings	2 inch	2	2			
Reciprocating Pump	<= 6 inch	2	2			
	> 6 inch					
Centrifugal Pump	<= 6 inch					
	> 6 inch					
Process Pipe (Interskid)	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Process Pipe (Within Skid)	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Pig Trap	<= 6 inch					
	> 6 inch					
Tube Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Shell Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Plate Heat Exchanger	<= 6 inch					
	> 6 inch					
Fin Fan Heat Exchanger	<= 6 inch					
	> 6 inch					
Flange	2 inch	2	2			
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Filters	<= 6 inch					
	> 6 inch					
Recip Compressors	<= 6 inch					
	> 6 inch					
Centrif Compressors	<= 6 inch					
	> 6 inch					

Section ID J17A
Full Name J17A_W005Flow_V
Pressure 20 barg
Temperature 35 C
Material Composition 1
Description Well fluids in production flowline from well W050 isolation valve (XSV-0503) up to choke v.

Parts count copied from Kap-J Compression J02A with permanent desander.

Equipment	Size	P& ID			
		TOTAL	11005-01	11018-01	11013-01
Process Vessel	<= 6 inch	1			1
	> 6 inch				
Manual Valves	2 inch	13			13
	6 inch	3			3
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	6	4		2
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch	5			5
	6 inch	66	6	40	20
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	18	2		16
	6 inch	24	11	2	11
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J17B
Full Name J17B_W005ChIn_V
Pressure 20 barg
Temperature 35 C
Material Composition 1
Description Well fluids in well W050 production flowline within choke valve skid boundary up to choke

Parts count copied from Kap-J Compression J02B without desander

Equipment	Size	P& ID			
		TOTAL	11018-01		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	3	3		
	6 inch	3	3		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	2	2		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch	5	5		
	6 inch	10.1	10.1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	4	4		
	6 inch	5	5		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J17D
Full Name J17D_W006Flow_V
Pressure 20 barg
Temperature 35 C
Material Composition 1
Description Well fluids in production flowline from well W060 isolation valve (XSV-0603) up to choke v.

**Parts count copied from Kap-J
 Compression J02D without
 desander**

Equipment	Size	P& ID			
		TOTAL	11006-01	11018-01	
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
Small Bore Fittings	2 inch	5	5		
	36 inch				
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch	65	65		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	2	2		
	6 inch	12	10	2	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J17E
Full Name J17E_W006ChIn_V
Pressure 20 barg
Temperature 35 C
Material Composition 1
Description Well fluids in well W060 production flowline within choke valve skid boundary up to choke v:

Parts count copied from Kap-J
Compression J02E without desander

Equipment	Size	P& ID			
		TOTAL	11018-01		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	3	3		
	6 inch	3	3		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	2	2		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch	5	5		
	6 inch	10.1	10.1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	4	4		
	6 inch	5	5		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J17F
Full Name J17F_W007Flow_V
Pressure 20 barg
Temperature 35 C
Material Composition 1
Description Well fluids in production flowline from well W070 isolation valve (XSV-0703) up to choke v.

Parts count copied from Kap-J Compression J02F

Equipment	Size	P& ID			
		TOTAL	11007-01	11018-02	11013-01
Process Vessel	<= 6 inch	1			1
	> 6 inch				
Manual Valves	2 inch	13			13
	6 inch	3			3
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	7	5		2
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch	5			5
	6 inch	75		65	10
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	18	2		16
	6 inch	23	10	2	11
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J17G
Full Name J17G_W007ChIn_V
Pressure 20 barg
Temperature 35 C
Material Composition 1
Description Well fluids in well W070 production flowline within choke valve skid boundary up to choke

Parts count copied from Kap-J Compression J02G

Equipment	Size	P& ID			
		TOTAL	11018-02		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	3	3		
	6 inch	3	3		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	2	2		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch	5	5		
	6 inch	10.1	10.1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	4	4		
	6 inch	5	5		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J17H
Full Name J17H_W008Flow_V
Pressure 20 barg
Temperature 35 C
Material Composition 1
Description Well fluids in production flowline from well W080 isolation valve (XSV-0803) up to choke v.

Parts count copied from Kap-J Compression J02H

Equipment	Size	P& ID			
		TOTAL	11008-01	11018-02	
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	5	5		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch	65		65	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	2	2		
	6 inch	12	10	2	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J171
Full Name J171_W008ChIn_V
Pressure 20 barg
Temperature 35 C
Material Composition 1
Description Well fluids in well W080 production flowline within choke valve skid boundary up to choke

Parts count copied from Kap-J Compression J021

Equipment	Size	P& ID			
		TOTAL	11018-02		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	3	3		
	6 inch	3	3		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	2	2		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch	5	5		
	6 inch	10.1	10.1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	4	4		
	6 inch	5	5		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID	J17J		New section, updated train manifold to train alignment
Full Name	J17J_ChManiC_V		
Pressure	20	barg	
Temperature	35	C	
Material Composition	1		
Description	Well fluids in production manifold to over pressure protection SDV of train header C		

Equipment	Size	P& ID				
		TOTAL	11017-03	11018-01	11018-02	11018-03
Process Vessel	<= 6 inch					
	> 6 inch					
Manual Valves	2 inch	4		2	2	
	6 inch	16		2	2	12
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Actuated Valves	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Small Bore Fittings	2 inch	9		4	4	1
Reciprocating Pump	<= 6 inch					
	> 6 inch					
Centrifugal Pump	<= 6 inch					
	> 6 inch					
Process Pipe (Interskid)	2 inch					
	6 inch	10	5	5		
	12 inch	10			10	
	18 inch					
	24 inch					
	36 inch					
Process Pipe (Within Skid)	2 inch					
	6 inch	10	5	5		
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Pig Trap	<= 6 inch					
	> 6 inch					
Tube Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Shell Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Plate Heat Exchanger	<= 6 inch					
	> 6 inch					
Fin Fan Heat Exchanger	<= 6 inch					
	> 6 inch					
Flange	2 inch	4		2	2	
	6 inch	32		6	6	20
	12 inch	5	1			4
	18 inch					
	24 inch					
	36 inch					
Filters	<= 6 inch					
	> 6 inch					
Recip Compressors	<= 6 inch					
	> 6 inch					
Centrif Compressors	<= 6 inch					
	> 6 inch					

Section ID J20A
Full Name J20A_LP SepVapA_V
Pressure 20 barg
Temperature 35 C
Material Composition 13
Description Vapour from overpressure skid Train C and wet gas pig launcher skid boundary through th

Equipment	Size	P& ID				
		TOTAL	11042-01	11044-01	11040-01	
Process Vessel	<= 6 inch					
	> 6 inch					
Manual Valves	2 inch	3			3	
	6 inch	1			1	
	12 inch	4		2	2	
	18 inch					
	24 inch					
Actuated Valves	36 inch					
	2 inch					
	6 inch					
	12 inch					
	18 inch					
Small Bore Fittings	24 inch					
	36 inch					
	2 inch	1			1	
	6 inch					
	12 inch					
Reciprocating Pump	18 inch					
	24 inch					
Centrifugal Pump	36 inch					
	2 inch					
Process Pipe (Interskid)	6 inch					
	12 inch					
	18 inch	100			100	
	24 inch					
	36 inch					
	2 inch					
Process Pipe (Within Skid)	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
	2 inch					
Pig Trap	6 inch					
	2 inch					
Tube Side Heat Exchanger	6 inch					
	2 inch					
Shell Side Heat Exchanger	6 inch					
	2 inch					
Plate Heat Exchanger	6 inch					
	2 inch					
Fin Fan Heat Exchanger	6 inch					
	2 inch	1		1		
Flange	2 inch	10	2	2	6	
	6 inch	3			3	
	12 inch	30	4	8	18	
	18 inch					
	24 inch					
Filters	36 inch					
	2 inch					
Recip Compressors	6 inch					
	2 inch					
Centrif Compressors	6 inch					
	2 inch					

Section ID J21A
Full Name J21A_Comp1Sc1_V
Pressure 20 barg
Temperature 35 C
Material Composition 13
Description LP Compressor 930-X-470 feed through vapour section of 1st stage suction scrubber 1 to

New section, parts count copied from Mangahewa C QRA

Equipment	Size	P& ID			
		TOTAL	MC24_FCOMSC_12 7_11079_01X	MC24_FCOMSC_Q1 80150_200_03	
Process Vessel	<= 6 inch				
	> 6 inch	1.75		1.75	
Manual Valves	2 inch	1	1		
	6 inch	1		1	
	12 inch	1	1		
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch	2		2	
	6 inch				
	12 inch	1		1	
	18 inch				
	24 inch				
Small Bore Fittings	2 inch	14		14	
	6 inch				
	12 inch				
	18 inch				
	24 inch				
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch	30	30		
	18 inch				
	24 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	4	1	3	
	6 inch	5		5	
	12 inch	10	2	8	
	18 inch				
	24 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J21B
Full Name J21B_Comp1Stg1_V
Pressure 36 barg
Temperature 90 C
Material Composition 13
Description LP Compressor 930-X-470 1st stage compressor discharge through intercooler to 2nd sta

New section, parts count copied from Mangahewa C QRA

Equipment	Size	P& ID			
		TOTAL	MC24_FCOMDC_Q1 80150_200_03	MC24_FCOMDC_Q1 80150_200_04	
Process Vessel	<= 6 inch				
	> 6 inch	1	1		
Manual Valves	2 inch	1	1		
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
Small Bore Fittings	2 inch	7	6	1	
	6 inch				
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch	5.5	5.5		
	18 inch				
	24 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch	1	1		
Flange	2 inch	12	12		
	6 inch	4	4		
	12 inch	7	6	1	
	18 inch				
	24 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch	0.5	0.5		
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J21C
Full Name J21C_Comp1Sc2_V
Pressure 36 barg
Temperature 40 C
Material Composition 13
Description LP Compressor 930-X-470 2nd stage suction scrubber vapour to 2nd stage compressor

New section, parts count copied from Mangahewa C QRA

Equipment	Size	P& ID			
		TOTAL	MC24_SCOMSC_Q1 80150_200_04		
Process Vessel	<= 6 inch				
	> 6 inch	1.75	1.75		
Manual Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	11	11		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch	2.2	2.2		
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	5	5		
	6 inch	3	3		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J21D
Full Name J21D_Comp1Stg2_V
Pressure 55 barg
Temperature 88 C
Material Composition 13
Description LP Compressor 930-X-470 2nd stage compressor discharge through aftercooler to compr

New section, parts count copied from Mangahewa C QRA

Equipment	Size	P& ID			
		TOTAL	MC24_SCOMDC_Q 180150_200_04	MC24_SCOMDC_Q 180150_200_05	MC24_SCOMDC_Q 180150_200_03
Process Vessel	<= 6 inch	1	1		
	> 6 inch				
Manual Valves	2 inch	3	1	1	1
	6 inch	3			3
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch	3		2	1
	6 inch	3	1		2
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	7	6	1	
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch	5.5	5.5		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch	1	1		
	> 6 inch				
Flange	2 inch	26	13	8	5
	6 inch	19	9		10
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch	0.5	0.5		
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J21E
Full Name J21E_Comp1Blow_L
Pressure 20 barg
Temperature 40 C
Material Composition 15
Description LP Compressor 930-X-470 condensate from suction scrubbers through blowcase

New section, parts count copied from Mangahewa C QRA

Equipment	Size	P&ID					
		TOTAL	MC24_BLWCSB_Q 180150_200_03	MC24_BLWCSB_Q 180150_200_04	MC24_BLWCSB_Q 180150_200_05	MC24_BLWCSB_12 7_11079_01X	MC24_BLWCSB_12 7_11077_01X
Process Vessel	<= 6 inch	1.5	0.25	0.25	1		
	> 6 inch						
Manual Valves	2 inch	11	5	3	3		2
	6 inch						
	12 inch						
	18 inch						
	24 inch						
	36 inch						
Actuated Valves	2 inch	7	4	2	1		
	6 inch						
	12 inch						
	18 inch						
	24 inch						
Small Bore Fittings	2 inch	10	4	2	4		
Reciprocating Pump	<= 6 inch						
	> 6 inch						
Centrifugal Pump	<= 6 inch						
	> 6 inch						
Process Pipe (Interskid)	2 inch						
	6 inch						
	12 inch						
	18 inch						
	24 inch						
Process Pipe (Within Skid)	2 inch	5.5		5.5			
	6 inch						
	12 inch						
	18 inch						
	24 inch						
Pig Trap	<= 6 inch						
	> 6 inch						
Tube Side Heat Exchanger	<= 6 inch						
	> 6 inch						
Shell Side Heat Exchanger	<= 6 inch						
	> 6 inch						
Plate Heat Exchanger	<= 6 inch						
	> 6 inch						
Fin Fan Heat Exchanger	<= 6 inch						
	> 6 inch						
Flange	2 inch	36	13	11	12	1	5
	6 inch						
	12 inch						
	18 inch						
	24 inch						
Filters	<= 6 inch						
	> 6 inch						
Recip Compressors	<= 6 inch						
	> 6 inch						
Centrif Compressors	<= 6 inch						
	> 6 inch						

Section ID J23A
Full Name J23A_CompDisc_V
Pressure 55 barg
Temperature 88 C
Material Composition 13
Description LP Compressor Discharge Wet Gas Header

Equipment	Size	P& ID			
		TOTAL	11046-01	11045-01	
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	2	1	1	
	6 inch	6	1	5	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	3	2	1	
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch	30		30	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	2	1	1	
	6 inch	10	3	7	
	12 inch	1		1	
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J23B
Full Name J23B_CompJ1LTS_V
Pressure 55 barg
Temperature 88 C
Material Composition 13
Description LP Compressor Discharge Wet Gas to LTS Train J1

Equipment	Size	P& ID			
		TOTAL	11045-01	11020-01	
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch				
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch	80		80	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch				
	6 inch	3	3		
	12 inch	1		1	
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J23C
Full Name J23C_CompJ2LTS_V
Pressure 55 barg
Temperature 88 C
Material Composition 13
Description LP Compressor Discharge Wet Gas to LTS Train J2

Equipment	Size	P& ID			
		TOTAL	11045-01	11030-01	
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
Actuated Valves	36 inch				
	2 inch				
	6 inch				
	12 inch				
	18 inch				
Small Bore Fittings	24 inch				
	36 inch				
	2 inch				
	6 inch				
	12 inch				
Reciprocating Pump	18 inch				
	<= 6 inch				
Centrifugal Pump	> 6 inch				
	<= 6 inch				
Process Pipe (Interskid)	> 6 inch				
	2 inch				
	6 inch	80		80	
	12 inch				
	18 inch				
Process Pipe (Within Skid)	24 inch				
	36 inch				
	2 inch				
	6 inch				
	12 inch				
Pig Trap	18 inch				
	24 inch				
	36 inch				
	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch				
	6 inch	3	3		
	12 inch	1		1	
	18 inch				
	24 inch				
Filters	36 inch				
	<= 6 inch				
Recip Compressors	> 6 inch				
	<= 6 inch				
Centrif Compressors	> 6 inch				
	<= 6 inch				

Section ID J24A
Full Name J24A_BlowtoLPS_L
Pressure 20 barg
Temperature 40 C
Material Composition 15
Description LP Compressor blowcase to LP Separator

Equipment	Size	P& ID				
		TOTAL	11045-01	11045-01	11042-01	
Process Vessel	<= 6 inch					
	> 6 inch					
Manual Valves	2 inch	5	2	2	1	
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Actuated Valves	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Small Bore Fittings	2 inch					
Reciprocating Pump	<= 6 inch					
	> 6 inch					
Centrifugal Pump	<= 6 inch					
	> 6 inch					
Process Pipe (Interskid)	2 inch	30	30			
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Process Pipe (Within Skid)	2 inch					
	6 inch					
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Pig Trap	<= 6 inch					
	> 6 inch					
Tube Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Shell Side Heat Exchanger	<= 6 inch					
	> 6 inch					
Plate Heat Exchanger	<= 6 inch					
	> 6 inch					
Fin Fan Heat Exchanger	<= 6 inch					
	> 6 inch					
Flange	2 inch	14	9	4	1	
	6 inch	5			5	
	12 inch					
	18 inch					
	24 inch					
	36 inch					
Filters	<= 6 inch					
	> 6 inch					
Recip Compressors	<= 6 inch					
	> 6 inch					
Centrif Compressors	<= 6 inch					
	> 6 inch					

Section ID J25A
Full Name F_SC_1_V
Pressure 20 barg
Temperature 20 C
Material Composition 13
Description Future Wet gas pipeline inside wellsite boundary (from Wellsite KA-1/7/19/20)

New section, provision for future slug catcher. Parts count based on LP wet gas pig launcher/receiver (930-V-910)

Equipment	Size	P& ID			
		TOTAL	11091-01		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch				
	6 inch				
	12 inch	1	1		
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch	1	1		
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	1	1		
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch	25	25		
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	1	1		
	6 inch				
	12 inch	5	5		
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J26C
Full Name F_SC_4_V
Pressure 20 barg
Temperature 20 C
Material Composition 13
Description Future wet gas piping inlet to Future Slug Catcher skid boundary

New section, provision for future slug catcher. Parts count based on design implemented at the KA-8/12/15/18 wellsite

Equipment	Size	P& ID			
		TOTAL	941-10-00829-1X		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch				
	6 inch				
	12 inch	1	1		
	18 inch				
	24 inch				
Actuated Valves	36 inch				
	2 inch				
	6 inch	1	1		
	12 inch	1	1		
	18 inch				
Small Bore Fittings	24 inch				
	36 inch				
	2 inch	1	1		
	6 inch				
	12 inch				
Reciprocating Pump	18 inch				
	<= 6 inch				
Centrifugal Pump	> 6 inch				
	<= 6 inch				
Process Pipe (Interskid)	> 6 inch				
	2 inch				
	6 inch				
	12 inch	10	10		
	18 inch				
Process Pipe (Within Skid)	24 inch				
	36 inch				
	2 inch				
	6 inch				
	12 inch				
Pig Trap	18 inch				
	24 inch				
	36 inch				
	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch				
	6 inch	1	1		
	12 inch	8	8		
	18 inch				
	24 inch				
Filters	36 inch				
	<= 6 inch				
	> 6 inch				
	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J26D
Full Name F_SC_5_V
Pressure 20 barg
Temperature 20 C
Material Composition 13
Description Future Slug Catcher skid boundary to slug catcher inlet

New section, provision for future slug catcher. Parts count based on design implemented at the KA-8/12/15/18 wellsite

Equipment	Size	P& ID			
		TOTAL	941-10-00829-1X		
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	1	1		
	6 inch	2	2		
	12 inch	1	1		
	18 inch				
	24 inch				
Actuated Valves	2 inch				
	6 inch				
	12 inch	1	1		
	18 inch				
	24 inch				
Small Bore Fittings	2 inch	3	3		
	6 inch				
	12 inch				
	18 inch				
	24 inch				
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch				
	6 inch				
	12 inch		5		
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	2	2		
	6 inch	4	4		
	12 inch	6	6		
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J26E
Full Name F_SC_6_L
Pressure 20 barg
Temperature 20 C
Material Composition 15
Description Future Slug Catcher Liquid and Piping to pump suction or LCV

New section, provision for future slug catcher. Parts count based on design implemented at the KA-8/12/15/18 wellsite

Equipment	Size	P& ID			
		TOTAL	941-10-00829-1X	941-10-00834-1X	
Process Vessel	<= 6 inch	0.5	0.5		
	> 6 inch				
Manual Valves	2 inch	5	3	2	
	6 inch	6	4	2	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch	1	1		
	6 inch	1		1	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	7	2	5	
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch	5	5		
	6 inch	4		4	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	11	9	2	
	6 inch	19	9	10	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J26F
Full Name F_SC_7_L
Pressure 18 barg
Temperature 20 C
Material Composition 15
Description Future Slug Catcher Pump discharge piping.

New section, provision for future slug catcher. Parts count based on design implemented at the KA-8/12/15/18 wellsite

Equipment	Size	P& ID			
		TOTAL	941-10-00829-1X	941-10-00834-1X	
Process Vessel	<= 6 inch				
	> 6 inch				
Manual Valves	2 inch	4	1	3	
	6 inch	6	2	4	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Actuated Valves	2 inch	2		2	
	6 inch	1	1		
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Small Bore Fittings	2 inch	2		2	
Reciprocating Pump	<= 6 inch				
	> 6 inch				
Centrifugal Pump	<= 6 inch				
	> 6 inch				
Process Pipe (Interskid)	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Process Pipe (Within Skid)	2 inch	5	5		
	6 inch	4		4	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Pig Trap	<= 6 inch				
	> 6 inch				
Tube Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Shell Side Heat Exchanger	<= 6 inch				
	> 6 inch				
Plate Heat Exchanger	<= 6 inch				
	> 6 inch				
Fin Fan Heat Exchanger	<= 6 inch				
	> 6 inch				
Flange	2 inch	9	2	7	
	6 inch	22	7	15	
	12 inch				
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				

Section ID J26G
Full Name F_SC_8_V
Pressure 20 barg
Temperature 35 C
Material Composition 13
Description Future Slug Catcher Vapour and Gas Piping

New section, provision for future slug catcher. Parts count based on design implemented at the KA-8/12/15/18 wellsite

Equipment	Size	P& ID			
		TOTAL	941-10-00829-1X		
Process Vessel	<= 6 inch	0.5	0.5		
	> 6 inch				
Manual Valves	2 inch				
	6 inch				
	12 inch	1	1		
	18 inch				
	24 inch				
Actuated Valves	36 inch				
	2 inch				
	6 inch	1	1		
	12 inch				
	18 inch				
Small Bore Fittings	24 inch				
	36 inch				
	2 inch	3	3		
	6 inch				
	12 inch				
Reciprocating Pump	18 inch				
	<= 6 inch				
Centrifugal Pump	> 6 inch				
	<= 6 inch				
Process Pipe (Interskid)	> 6 inch				
	2 inch				
	6 inch				
	12 inch	10	10		
	18 inch				
	24 inch				
Process Pipe (Within Skid)	36 inch				
	2 inch				
	6 inch				
	12 inch				
	18 inch				
	24 inch				
Pig Trap	36 inch				
	<= 6 inch				
Tube Side Heat Exchanger	> 6 inch				
	<= 6 inch				
Shell Side Heat Exchanger	> 6 inch				
	<= 6 inch				
Plate Heat Exchanger	> 6 inch				
	<= 6 inch				
Fin Fan Heat Exchanger	> 6 inch				
	<= 6 inch				
Flange	2 inch	5	5		
	6 inch	5	5		
	12 inch	6	6		
	18 inch				
	24 inch				
	36 inch				
Filters	<= 6 inch				
	> 6 inch				
Recip Compressors	<= 6 inch				
	> 6 inch				
Centrif Compressors	<= 6 inch				
	> 6 inch				