

OWNER

Blowdown, Vent Header and Vent Stack

Calculation



Document No.: [REDACTED] PRO-CAL-008

Rev. A, Issued for Review

Date: September 29, 2026

Project: [REDACTED] [REDACTED]



TORUS

[REDACTED] [REDACTED], [REDACTED] County, [REDACTED]

ISSUE SUMMARY AND APPROVAL

This page records each issue of PRO-CAL-008. The preparer, reviewer and approver sign for each revision.

Rev.	Date	Issue purpose	Description
A	2026-09-29	Issued for Review	First issue

Contributors

Rev.	Discipline	Prepared by	Reviewed by	Approved by
A	Process			

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1. OBJECTIVE

This calculation sizes the blowdown restriction orifices for the , checks the minimum temperatures reached during blowdown against the station minimum design metal temperature (MDMT) of -20 °F, checks the vent header and the RO outlet lines, and confirms the size of vent stack VS-101 for thermal radiation if the vented gas ignites. It also screens how far a flammable cloud extends from an unignited vent.

2. METHODOLOGY

TORUS divided the station into the isolatable sections that are blown down manually after an emergency shutdown: the inlet section S1, the meter and heater section S2, the outlet section S3 between SDV-102 and SDV-103, and the outlet lateral S4 to the receiving pipeline operator's tap valve. The PR-101 pig receiver barrel is vented on its own through RO-102. Section volumes come from the routed line lengths in the station piping model and the equipment dimensions.

Each blowdown was calculated as a transient. At each time step the model applies mass and energy balances to the gas in the section, takes real-gas properties from the GERG-2008 equation of state, calculates the flow through the restriction orifice as critical or subcritical nozzle flow with the real-gas compressibility and the isentropic exponent $\kappa = \rho c^2 / p$, and adds the heat that the steel walls return to the gas by natural convection. The gas cools as it expands; the heavy walls cool more slowly. A simpler isothermal or adiabatic model would either understate the cooling or overstate it, which matters because the governing concern for these orifices is low temperature.

Each orifice bore was set by searching for the bore that blows the section down to 50 psig in about 20 minutes, then rounding to a standard 1/16 in size. API 521 recommends depressuring to 50 % of design pressure within about 15 minutes for fire; this station's blowdown is manual and follows an emergency shutdown, so the Owner's target of 15 to 30 minutes was used.

The vent header was checked by isothermal compressible flow, marched from the stack tip upstream through each header segment with the flow it carries. Thermal radiation from an ignited vent follows the API 521 simple method, and the unignited release was screened with the centerline decay of a turbulent jet.

3. DESIGN INPUTS

The inputs in Table 3-1 govern the calculation.

Table 3-1: Design Inputs

Input	Value	Source
Section boundaries	S1 IJ-101 to the meter run inlet valves; S2 to SDV-102; S3 SDV-102 to SDV-103; S4 SDV-103 to the tap valve	GEN-DB-001
Line lengths and wall thicknesses	Routed lengths from the piping model; NPS 12 STD 0.375 in (line 1042 0.500 in), NPS 10 Sch 80, NPS 8 XS	MEC-CAL-001, MEC-LST-001
V-101	42 in ID x 15 ft S/S, 1.75 in shell, NPS 24 x 14 ft liquid barrel	PRO-CAL-005
Initial states	S1 1,150 psig and 45 °F; S2 1,145 psig and 45 °F; S3 1,150 psig and 44 °F after a normal trip, 1,290 psig (the overpressure protection bound, PRO-CAL-009) and 18 °F after a heater-out upset trip; S4 1,200 psig and 45 °F	Operating cases C1 and C6, OPSS trip setting
Blowdown end point and target time	50 psig in 15 to 30 minutes	Owner
Orifice discharge coefficient	0.75, sharp-edged plate in critical flow	Typical, vendor to confirm
Vent header and stack	8"-V-1070-S1, VS-101 NPS 8 x 25 ft	GEN-DB-001
Radiation parameters	F = 0.2, τ = 1.0, wind 30 ft/s, receptor 6 ft above grade, solar 317 Btu/h·ft ² added	API 521
Gas lower heating value	997.3 Btu/scf (20,400 Btu/lb)	GEN-DB-001

4. ASSUMPTIONS

1. The section walls exchange heat only with the gas. Heat from the surroundings is neglected, which is conservative for the minimum temperatures and makes the blowdown times slightly long.
2. The meter run on standby is part of S2, because it is kept pressurized with its outlet valve open.
3. The orifice discharge coefficient of 0.75 is typical for a sharp-edged plate in critical flow.
Verification required with the orifice vendor's bore calculation.
4. Sections are blown down one at a time. This is an operating requirement, stated on the P&IDs and in the operating procedures, and the stack height depends on it.
5. The API 521 flame length and fraction of heat radiated are the simple-method values. *Verification required if the Owner requires a detailed radiation model.*

5. REFERENCES

1. API Standard 521, 7th Edition (2020), Pressure-relieving and Depressuring Systems.
2. API Standard 520, Part II, 7th Edition (2020), Installation of Pressure-relieving Devices.
3. ASME B31.8 (2022), Gas Transmission and Distribution Piping Systems.
4. Chen, C.J. and Rodi, W., Vertical Turbulent Buoyant Jets, Pergamon (1980).
5. Birch, A.D. et al., The Structure and Concentration Decay of High Pressure Jets of Natural Gas, Combustion Science and Technology 36 (1984).
6. Kunz, O. and Wagner, W., The GERG-2008 Wide-Range Equation of State for Natural Gases, J. Chem. Eng. Data 57 (2012).
7. GEN-DB-001, Basis of Design.
8. PRO-CAL-005, Filter Separator; PRO-CAL-007, Pressure Relief Devices and Tank Venting.
9. MEC-CAL-001, Pipe Wall Thickness; MEC-LST-001, Line List.
10. PRO-DWG-109, P&ID Vent and Blowdown (Appendix A).

6. CALCULATION

6.1. SECTION VOLUMES

Table 6-1 gives the volume of each section. S1 is the largest because it holds V-101 and the pig receiver.

Table 6-1: Section Volumes

Section	Item	Volume, ft ³
S1	12 in line 1001 (both legs)	64.0
S1	8 in kicker 1101	13.9
S1	PR-101 barrel NPS 16 x 16 ft	19.6
S1	12 in line 1002	37.8
S1	V-101 42 in ID x 15 ft S/S, 1.75 in shell, 2:1 heads	155.5
S1	V-101 lower barrel NPS 24 x 14 ft	38.7
S1	12 in V-101 bypass 1004	27.8
S1	12 in line 1003	59.4
S1	12 in meter inlet header 1010	10.5
S1	2 in fuel take-off 1050 and 1102	0.6
S1	Total	427.7
S2	10 in meter runs 1011 and 1012 (standby run pressurized)	38.3



Section	Item	Volume, ft ³
S2	10 in crossover 1015	16.7
S2	12 in line 1020 incl. outlet header	105.5
S2	H-101 coil NPS 6, 3 x 5 x 22 ft	59.7
S2	H-101 inlet/outlet manifolds, 12 in x 8 ft each	12.6
S2	12 in H-101 bypass 1021	6.2
S2	12 in line 1022 incl. CV inlet header	70.2
S2	12 in CV branches 1031 / 1032 (NPS 12)	28.8
S2	12 in CV outlet header and 1033 to SDV-102	29.2
S2	Total	367.2
S3	12 in line 1040 (SDV-102 to SDV-103)	21.2
S3	12 in BDV-183 / TSV-136 branch stubs	2.4
S3	Total	23.6
S4	12 in line 1041 (SDV-103 to IJ-102)	56.3
S4	12 in line 1042 (IJ-102 to tap valve, buried, 0.500 WT)	81.4
S4	Total	137.7

Table 6-2 gives the steel mass and internal area of each blowdown case, which set how much heat the walls return to the gas.

Table 6-2: Section Steel Mass and Internal Area

Blowdown case	Volume, ft ³	Steel mass, lb	Internal area, ft ²
S1 inlet section	427.7	33,100	1,240
S2 meter and heater section	367.2	32,500	1,780
S3 outlet section, after a heater-out upset trip	23.6	1,490	94
S3 and S4 together through RO-183	161.2	12,100	652
S4 outlet lateral	137.7	10,600	558
PR-101 barrel	22.0	1,470	72

6.2. S1 BLOWDOWN THROUGH RO-181

S1 holds 2,180 lb of gas at 1,150 psig and 45 °F. At that state the compressibility is $Z = 0.777$ and the isentropic exponent is $\kappa = 1.429$. The initial flow through a 9/16 in orifice is critical:

API 521, critical nozzle flow

$$G = P \sqrt{\frac{\kappa M}{ZRT}} \left(\frac{2}{\kappa + 1} \right)^{\frac{\kappa + 1}{2(\kappa - 1)}}, \quad W = C_d A_o G = 16,900 \text{ lb/h}$$



The transient then follows the mass and energy balances. The energy balance on the gas in the section, with the heat $\dot{Q}$ returned by the walls, is:

First law, open system

$$m du = -W \frac{P}{\rho} dt + \dot{Q} dt, \quad \dot{Q} = hA(T_w - T), \quad h = 0.13 k \left[\frac{g\beta \Delta T \rho^2 c_p}{\mu k} \right]^{1/3}$$

A bore of 0.611 in would reach 50 psig in exactly 20 minutes, and the nearest standard bore is 5/8 in. TORUS selected the next smaller bore, 9/16 in, because the 5/8 in peak flow would need a 30 ft vent stack to meet the radiation criteria (Section 6.6), while 9/16 in keeps the time within the 15 to 30 minute window. Table 6-3 traces the blowdown, and Figure 6-1 and Figure 6-2 show it with the other sections.

Table 6-3: S1 Blowdown Transient

Time, min	Pressure, psig	Gas, °F	Wall, °F	Flow, lb/h	Downstream of RO, °F
0.0	1,150	45	45	16,900	-52
1.0	975	27	44	14,400	-63
2.0	854	18	42	12,600	-64
5.0	607	8	34	8,770	-51
10.0	338	2	26	4,780	-30
15.0	178	0	21	2,550	-16
20.0	88	1	19	1,340	-7
25.0	39	2	18	691	-1
30.0	13	4	17	355	3

RO-181 bore is 9/16 in. S1 reaches 50 psig in 23.6 minutes. The gas leaving the orifice is at -64 °F at the start; the walls stay above 17 °F.

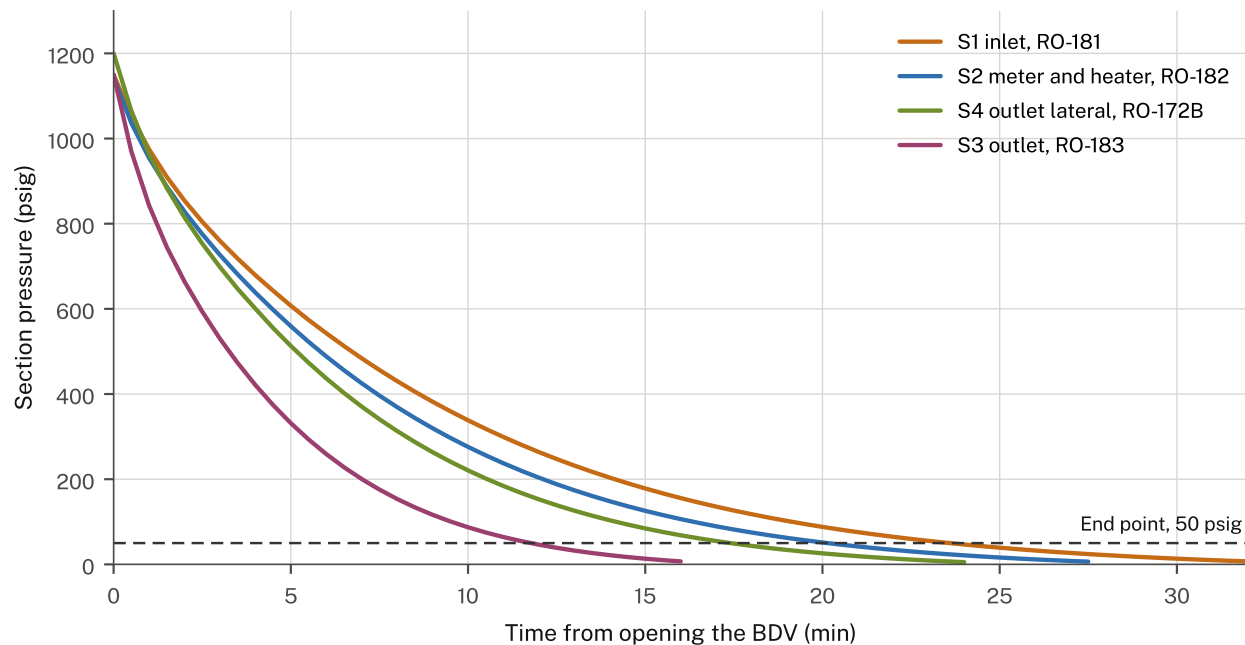
6.3. ALL SECTIONS

The same method gives the bores and times in Table 6-4. RO-183 was sized for S3 alone, the frequent case after an overpressure or emergency trip. The bore nearest the 20 minute target is 1/8 in, but at 1/8 in a maintenance blowdown of the outlet lateral through RO-183 would take more than three hours, so 3/16 in was selected. The outlet lateral has its own blowdown connection, RO-172B on line 1170, which brings it down in 17 minutes. RO-102 on the pig receiver barrel vent is 3/16 in, which vents the barrel in 11 minutes instead of relying on manual throttling of BDV-102.

Table 6-4: Blowdown Results

Blowdown case	Initial state	Inventory, lb	RO bore, in	Peak flow, lb/h	To 50 psig, min	To 5 psig, min
S1 inlet section	1,150 psig, 45 °F	2,180	9/16	16,900	23.6	33
S2 meter and heater section	1,145 psig, 45 °F	1,860	9/16	16,800	20.1	28
S3 outlet section, after a normal trip	1,150 psig, 44 °F	121	3/16	1,880	11.8	16
S3 outlet section, after a heater-out upset trip	1,290 psig, 18 °F	160	3/16	2,360	13.3	18
S3 and S4 together through RO-183	1,200 psig, 45 °F	868	3/16	1,970	80.8	112
S4 outlet lateral	1,200 psig, 45 °F	741	3/8	7,890	17.4	24
PR-101 barrel	1,150 psig, 45 °F	112	3/16	1,870	11.0	15

Figure 6-1. Section Pressure During Blowdown



6.4. MINIMUM TEMPERATURES

Table 6-5 gives the lowest temperatures reached. Downstream of every orifice the gas falls well below the -20 °F MDMT, to -126 °F in the worst case, because the Joule-Thomson expansion across the orifice adds to the cooling inside the section. Carbon steel impact tested at -50 °F (ASTM A333 Grade 6) does not cover this. The piping downstream of every restriction orifice, the vent header and the stack are therefore specified in stainless steel (spec S1, minimum design temperature -150 °F).

Table 6-5: Minimum Temperatures During Blowdown, °F

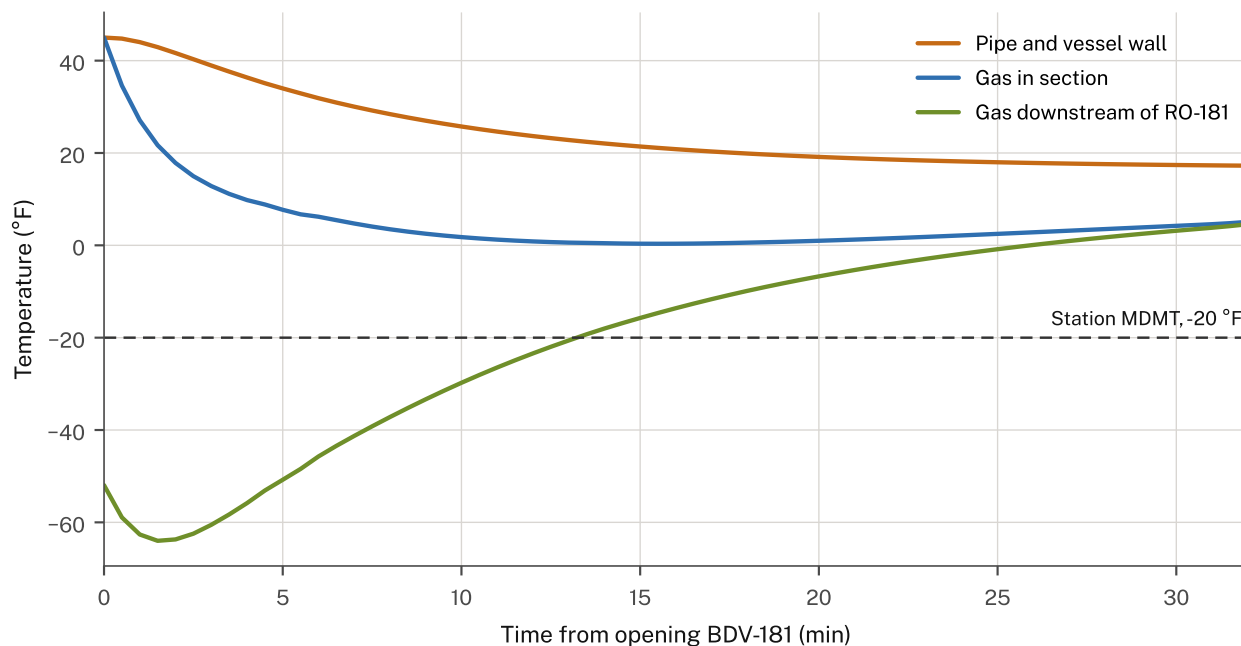
Blowdown case	Gas in section	Wall	Gas downstream of RO
S1 inlet section	0	17	-64
S2 meter and heater section	7	20	-61
S3 outlet section, after a normal trip	-10	12	-70
S3 outlet section, after a heater-out upset trip	-44	-23	-126
S3 and S4 together through RO-183	7	11	-61
S4 outlet lateral	-1	16	-69
PR-101 barrel	-13	16	-71

Upstream of the orifices, the walls stay above the MDMT in every case except one. S3 blown down directly after a heater-out upset trip, when it is trapped at up to 1,290 psig and 18 °F, reaches a wall temperature of -23 °F. This is below the -20 °F MDMT. S3 is short and thin-walled compared with its gas inventory, so its walls return little heat. After a normal trip the same section stays above 12 °F.

S3 shall not be blown down after a heater-out upset trip until its pipe skin temperature, measured with a contact thermometer at BDV-183, has risen to 40 °F or above. This restriction shall be stated on the P&ID at BDV-183 and in the operating procedure.

Figure 6-2 shows how the gas and walls of S1 cool during blowdown. The gas temperature downstream of RO-181 is lowest in the first minutes, then rises as the section pressure falls and the pressure drop across the orifice shrinks.

Figure 6-2. S1 Temperatures During Blowdown



6.5. RO OUTLET LINES AND VENT HEADER

Each orifice discharges into a branch line that joins header 8"-V-1070-S1. Table 6-6 checks the branch lines at the peak flow of a simultaneous blowdown. The ratio of the pressure downstream of the orifice to the section pressure stays well below the critical ratio of about 0.5, so every orifice stays in critical flow throughout, and its flow does not depend on the header. With NPS 2 branch lines the RO-181 and RO-182 discharges reach sonic velocity where they join the header, which risks acoustic fatigue at the branch connection. NPS 3 still gives Mach 1.00. Lines 4"-V-1072-S1 and 4"-V-1073-S1 are therefore NPS 4. Line 2"-V-1074-S1 from RO-183 carries a small flow and stays NPS 2.

Table 6-6: RO Outlet Branch Lines at Peak Flow

Orifice and line size	Pressure at orifice outlet, psia	Mach at header	Outlet to section pressure ratio
RO-181, NPS 2	171	1.00	0.147
RO-181, NPS 3	61	1.00	0.052
RO-181, NPS 4	34	0.61	0.029
RO-182, NPS 2	165	1.00	0.143
RO-182, NPS 3	59	1.00	0.051
RO-182, NPS 4	34	0.61	0.029
RO-183, NPS 2	32	0.34	0.024

Table 6-7 checks the header and stack for a single S1 blowdown, a simultaneous blowdown of S1, S2 and S3, and the simultaneous case with PSV-101 relieving at its rated capacity. The highest header Mach number in the simultaneous blowdown is 0.37, below the 0.7 limit TORUS applies to vent headers to avoid noise and vibration.

Table 6-7: Vent Header and Stack Hydraulics at Peak Flow

Case	Segment	Flow, lb/h	Inlet pressure, psia	Outlet pressure, psia	Mach out	Velocity out, ft/s
S1 alone	VS-101 stack	16,900	14.4	14.1	0.19	227
S1 alone	Header, junction to stack	16,900	14.6	14.4	0.19	221
S1 alone	Header, west leg from V-101 area	16,900	15.7	14.6	0.18	218
S1, S2 and S3 together	VS-101 stack	36,000	15.5	14.1	0.37	410
S1, S2 and S3 together	Header, junction to stack	36,000	16.3	15.5	0.34	373
S1, S2 and S3 together	Header, west leg from V-101 area	16,900	17.1	16.3	0.15	166
S1, S2 and S3 together	Header, RO-182 tie-in to junction	19,100	17.1	16.3	0.17	189
S1, S2 and S3 together	Header, RO-183 tie-in to RO-182 tie-in	2,360	17.2	17.1	0.02	22
S1, S2, S3 and PSV-101	VS-101 stack	54,100	17.7	14.1	0.56	616
S1, S2, S3 and PSV-101	Header, junction to stack	54,100	19.4	17.7	0.45	491
S1, S2, S3 and PSV-101	Header, west leg from V-101 area	34,900	22.2	19.4	0.26	289
S1, S2, S3 and PSV-101	Header, RO-182 tie-in to junction	19,100	20.1	19.4	0.14	158
S1, S2, S3 and PSV-101	Header, RO-183 tie-in to RO-182 tie-in	2,360	20.1	20.1	0.02	19

Header 8"-V-1070-S1 is adequate. RO outlet lines 1072 and 1073 are NPS 4; line 1074 is NPS 2.

6.6. VS-101 RADIATION

If the vented gas ignites, the flame length and the radiation at a receptor follow the API 521 simple method:

API 521, flame length (curve fit) and radiation from a point source



$$L = 0.00326 Q^{0.478} (m, W), \quad K = \frac{\tau F Q}{4\pi D^2}$$

where D is the distance from the flame center, taken at mid-flame and tilted by the wind, to a receptor 6 ft above grade. Table 6-8 gives the radiation, including 317 Btu/h·ft² of solar radiation, for the 25 ft stack.

Table 6-8: Radiation from an Ignited Vent, VS-101 at 25 ft

Case	Flow, lb/h	Heat release, MMBtu/h	Flame length, ft	Tip velocity, ft/s	K at base, Btu/h·ft ²	K at 50 ft	K at 100 ft
S1 alone, peak	16,900	344	72	227	2,150	1,410	771
S1+S2+S3 simultaneous, peak	36,000	734	103	410	2,670	1,970	1,140
PSV-101 fire relief (rated)	18,100	369	74	453	2,190	1,410	781

TORUS applied two criteria from the API 521 table of permissible radiation: at most 3,000 Btu/h·ft² anywhere at grade, where exposure is limited to escape, and at most 1,500 Btu/h·ft² at 50 ft and beyond and at each blowdown valve, where an operator may need to act for a few minutes. Table 6-9 gives the radiation at the three blowdown valve positions.

Table 6-9: Radiation at the Blowdown Valve Positions, Btu/h·ft²

Position	Distance to VS-101, ft	S1 alone, peak	S1+S2+S3 simultaneous, peak	PSV-101 fire relief (rated)
BDV-181	119	657	955	666
BDV-182	87	879	1,300	888
BDV-183	169	499	678	506

The lowest stack meeting both criteria is 22 ft for a single-section blowdown and 43 ft for a simultaneous blowdown of S1, S2 and S3. Raising the stack to 43 ft was considered and rejected: the blowdowns are manual, and blowing down one section at a time costs only operator time.

VS-101 NPS 8 x 25 ft is confirmed, on the condition that sections are blown down one at a time.

6.7. DISPERSION OF AN UNIGNITED RELEASE

The gas concentration on the axis of a turbulent jet decays with distance from the tip:

Chen and Rodi; pseudo-source per Birch

$$c_m(x) = 5.4 \sqrt{\frac{\rho_j}{\rho_a}} \frac{d_{ps}}{x}$$

The design gas lower flammable limit (LFL), by Le Chatelier's rule with the inerts as diluent, is 4.65 vol %. Table 6-10 gives the distance along the jet axis to the LFL and to half of it. Because the decay scales with the exit diameter, not the flow, the LFL distance is about the same for every case. In a 30 ft/s wind the jet bends over within the momentum length shown, and then dilutes as a buoyant plume; the cold gas remains lighter than air, so the flammable cloud stays elevated.

Table 6-10: Flammable Extent of an Unignited Vertical Release

Case	Tip velocity, ft/s	Distance to LFL, ft	Distance to 50 % LFL, ft	Momentum length in wind, ft
S1 alone, peak	227	107	215	5
S1+S2+S3 simultaneous, peak	410	116	233	9
S1 at 50 psig (end of blowdown)	13	101	203	0

No ignition source, platform or air intake shall be located within 50 ft horizontally of VS-101 at or above its tip elevation. The analyzer shelter B-101 air intake shall face away from the stack.

7. RESULTS AND CONCLUSIONS

TORUS draws the following conclusions:

1. The blowdown orifice bores are RO-181 9/16 in, RO-182 9/16 in, RO-183 3/16 in, RO-172B 3/8 in and RO-102 3/16 in. The sections reach 50 psig in 24 minutes (S1), 20 minutes (S2), 12 minutes (S3), 17 minutes (S4) and 11 minutes (pig receiver barrel).
2. The gas downstream of the orifices reaches -126 °F. The RO outlet piping, the vent header and VS-101 shall be stainless steel (spec S1).
3. S3 shall not be blown down after a heater-out upset trip until its pipe skin has warmed to 40 °F, because its wall would otherwise fall to -23 °F.
4. RO outlet lines 1072 and 1073 shall be NPS 4 to keep the flow subsonic at the header.
5. Header 8"-V-1070-S1 and VS-101 NPS 8 x 25 ft are adequate, provided sections are blown down one at a time.
6. A detailed dispersion model should be considered for the design review if the Owner requires one.

The orifice vendor's bore calculation remains open (HOLD H-15).

APPENDIX A. P&ID VENT AND BLOWDOWN



VS-101

VENT STACK

NPS 8 x 25 FT ABOVE GRADE, HELICAL STRAKES ON TOP 8 FT
(PRO-CAL-008)
SPEC S1: CLASS 150 304L / 316L SS, MIN. DESIGN -150 F
OPEN VERTICAL DISCHARGE, NO RAIN CAP FLAPPER

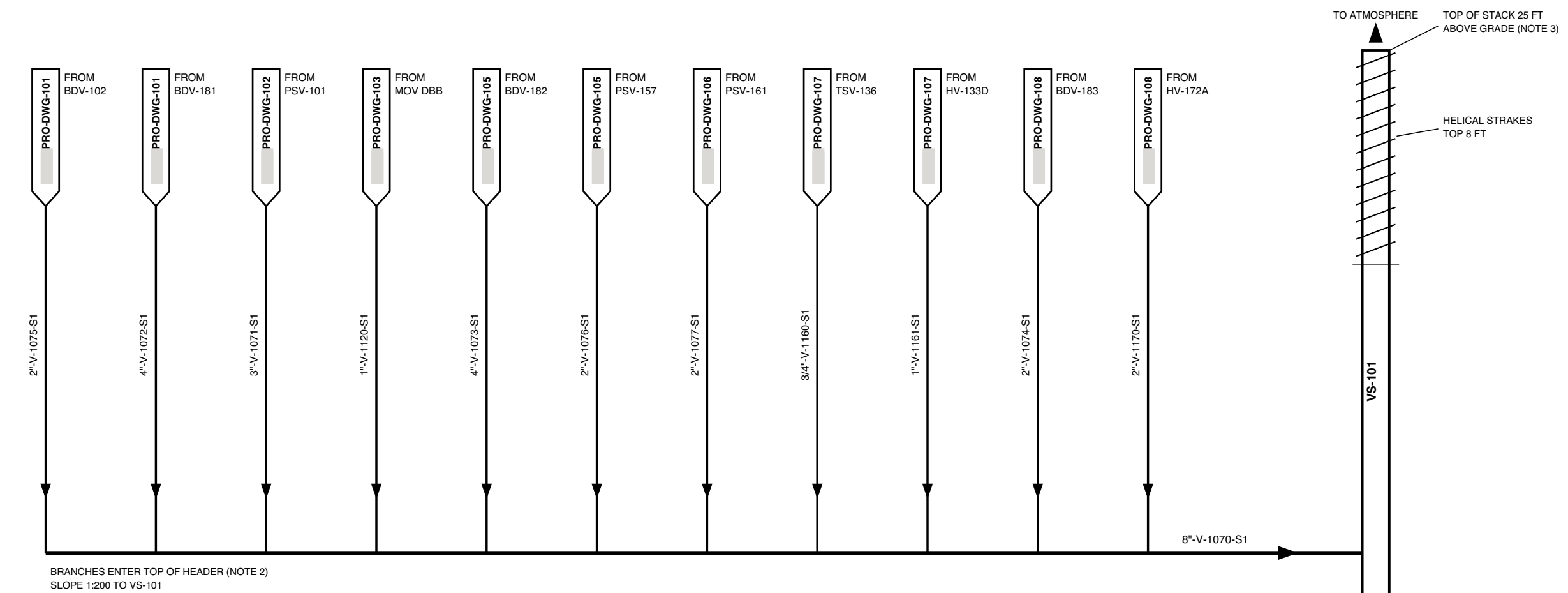
HEADER 1070

STATION VENT HEADER

8"-V-1070-S1, CLASS 150 STAINLESS
OPEN TO ATMOSPHERE THROUGH VS-101, NO BLOCK VALVES
SLOPE 1:200 MIN. CONTINUOUS TO VS-101

NOTES

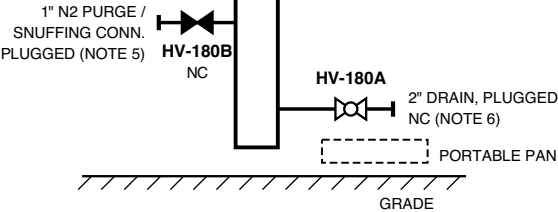
- HEADER 1070, VS-101 AND ALL BRANCHES DOWNSTREAM OF THEIR PSV / TSV OR RO ARE SPEC S1: CLASS 150 304/304L OR 316/316L STAINLESS, MIN. DESIGN -150 F. GAS DOWNSTREAM OF THE ROS REACHES -121 F. A6 / S1 SPEC BREAKS ARE AT THE RO AND PSV OUTLETS ON THE SOURCE SHEETS. NO BLOCK VALVES IN THE HEADER OR STACK.
- BRANCHES CONNECT TO THE TOP OF THE HEADER (45 DEG LATERAL WHERE PRACTICAL). HEADER SELF-DRAINS TO THE VS-101 BASE; NO POCKETS.
- VS-101 NPS 8 x 25 FT WITH HELICAL STRAKES ON THE TOP 8 FT, CONFIRMED BY PRO-CAL-008. LOCATION PER PLOT PLAN MEC-DWG-001.
- BLOW DOWN ONE SECTION AT A TIME (O&M PROCEDURE REQUIREMENT). SIMULTANEOUS BLOWDOWN OF SECTIONS WOULD NEED A 43 FT STACK. BLOWDOWNS ARE MANUAL AFTER AN ESD; NO AUTOMATIC BLOWDOWN (BASIS 9.3).
- NO SNUFFING STEAM. A 1 IN PLUGGED CONNECTION AT THE STACK BASE ALLOWS NITROGEN PURGE OR PORTABLE SNUFFING OF A LIGHTNING-IGNITED VENT.
- STACK BASE DRAIN HV-180A (2 IN, NC, PLUGGED) DRAINS RAINWATER / CONDENSATE INTO A PORTABLE COLLECTION PAN, EMPTIED BY VACUUM TRUCK. THERE IS NO DRAIN LINE TO T-101 (LINE 1180 DELETED).
- LINES 1072 AND 1073 ARE NPS 4; PSV-161 DISCHARGES THROUGH NEW LINE 2"-V-1077-S1 (REPLACES 1150). BACKPRESSURE PER PRO-CAL-007.



VENT HEADER BRANCH SCHEDULE

LINE	SOURCE	SERVICE	FROM DWG
2"-V-1075-S1	BDV-102	PR-101 BARREL VENT (RO-102)	PRO-DWG-101
4"-V-1072-S1	BDV-181	INLET SECTION BLOWDOWN (RO-181)	PRO-DWG-101
3"-V-1071-S1	PSV-101	V-101 RELIEF, FIRE CASE, SET 1,440 PSIG	PRO-DWG-102
1"-V-1120-S1	MOV DBB	METER SKID DBB BODY BLEEDS	PRO-DWG-103
4"-V-1073-S1	BDV-182	METER / HEATER SECTION BLOWDOWN (RO-182)	PRO-DWG-105
2"-V-1076-S1	PSV-157	H-101 COIL RELIEF, SET 1,440 PSIG	PRO-DWG-105
2"-V-1077-S1	PSV-161	FUEL GAS RELIEF, SET 250 PSIG	PRO-DWG-106
3/4"-V-1160-S1	TSV-136	THERMAL RELIEF SDV-102 / SDV-103	PRO-DWG-107
1"-V-1161-S1	HV-133D	LINE 1033 MAINTENANCE VENT	PRO-DWG-107
2"-V-1074-S1	BDV-183	OUTLET SECTION BLOWDOWN (RO-183)	PRO-DWG-108
2"-V-1170-S1	HV-172A	OUTLET LATERAL BLOWDOWN (RO-172B)	PRO-DWG-108

CAUTION: BLOW DOWN ONE SECTION AT A TIME (NOTE 4).
VS-101 IS SIZED FOR ONE BLOWDOWN SOURCE; SIMULTANEOUS BLOWDOWN NEEDS A 43 FT STACK.



NOTES / REFERENCES
REF: PRO-DWG-100 SH 1-2 (LEGEND)
REF: GEN-DB-001 SECTIONS 8, 9.3, 10
REF: PRO-CAL-008 BLOWDOWN AND VENT STACK
REF:

REVISIONS			
REV	DATE	DESCRIPTION	BY CHK APP
A	2026-09-29	ISSUED FOR REVIEW (IFR)	
PRELIMINARY - ISSUED FOR REVIEW - NOT FOR CONSTRUCTION			

ENGINEER OF RECORD SEAL
NOT SEALED
PRELIMINARY
PE NO. _____

PROJECT
120 MMSCFD RECEIPT INTO
COUNTY,
DISCIPLINE: PROCESS
SCALE: NTS

P&ID VENT AND BLOWDOWN
VENT HEADER 1070 AND VENT STACK VS-101
DRAWN: ____ CHECKED: ____ APPROVED: ____
DWG NO. PRO-DWG-109
SHEET 1 OF 1 REV A