

APPENDIX C FIRE AND EXPLOSION ASSESSMENT AND ATMOSPHERIC VENT DISPERSION STUDY

SUMMIT HYDROGEN GLADSTONE PTY LTD

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FEA (FIRE AND EXPLOSION CONSEQUENCE BASED ANALYSIS) AND ATMOSPHERIC VENT DISPERSION STUDY REPORT

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1 INTRODUCTION

1.1 Scope

This document summarizes the Fire and Explosion consequence-based Analysis (FEA) and Atmospheric Vent Dispersion study for Gladstone H2 Ecosystem Project.

The studies cover only fire, explosions and atmospheric vents in the hydrogen processing facility including Electrolyzer Container, Metering System, and components of this facility. Utility area, transformer, warehouse (BU-02), fire on buildings, and facility owned by Rio Tinto are excluded from this analysis. The objectives of these studies are discussed below.

The purpose of FEA study is to identify the impact of major potential fire and explosion hazards with the following objectives:

- Determine the safe separation distance to be used as input for Plot Plan and siting of buildings.
- Assess the effect on occupied buildings and public road.

The occupied buildings (*) to be evaluated are:

- Operator control room (BU-01) in Gladstone H2 Ecosystem plant
- Warehouse in RTA scope

() Note: GH2E Warehouse (BU-02) does not fall within the category of an occupied building. The warehouse primarily serves as a storage and logistics facility, lacking the characteristics of a space intended for regular work engagement by plant personnel. Refer to HSE Design Philosophy (S-00-1242-001) for the definition of occupied building.*

On the other hand, the purpose of atmospheric vent dispersion study is to assess potential hazards to operators generated from H₂, O₂, and N₂ vents with the main objective of defining the safe location of each atmospheric vent. Specifically, the study aims to:

- Determine the extent of flammable / toxic gas dispersion from vents discharging to atmosphere.
- Determine the thermal radiation flux as a result of ignited release from vents discharging to atmosphere.
- Assess the results per the applicable criteria for atmospheric vents

1.2 Definition

Project Name :	Gladstone H2 Ecosystem Project (GH2E Project)
Construction site :	Yarwun Alumina Refinery of Rio Tinto, Gladstone, Queensland, Australia
Owner :	Summit Hydrogen Gladstone Pty Ltd
JGC :	JGC Corporation Oceania Pty Ltd
RTA :	Off-taker of plant product, Rio Tinto Aluminum Limited
Purchaser :	Purchaser of JGC's item
Vendor :	Supplier of JGC's item
Subcontractor :	Engineering or Construction Company subcontracted under JGC
Inspector :	Owner / JGC Inspector or Third Party Inspector

1.3 Abbreviations

The following abbreviations shall be applied for this project.

ANZIGA	Australia New Zealand Industrial Gas Association
ATM Vent	Atmospheric Vent
BEDD	Basic Engineering Design Data
CGA	Compressed Gas Association
CPR	Commissie voor de Preventie van Rampen
DNV	Det Norske Veritas
EIGA	European Industrial Gases Association
EPC	Engineering, Procurement and Construction
FEA	Fire and Explosion consequence-based Analysis
FEED	Front End Engineering Design
HAZID	Hazard Identification
HVAC	Heating, Ventilation, and Air Conditioning
LFL	Lower Flammability Limit
PHAST	Process Hazard Analysis Software Tool
PFD	Process Flow Diagram
TNO	The Netherlands Organisation for Applied Scientific Research

1.4 Order of Precedence

In the event conflicting requirements are identified, the following order is to apply, in decreasing order of precedence.

- Local Codes & Regulations
- Project Specifications
- Australian Standards
- International Standards
- RTA Standards

2 STANDARD CODE AND REGULATIONS

2.1 Australian Codes, Regulations and Standards

Code / Doc. No.	Description
AS/NZS IEC 80079.20.1-2019	Part 20-1: Material characteristics for gas and vapour classification — Test methods and data

2.2 International Codes and Standards

Code / Doc. No.	Description
TNO CPR 14E	Methods for the calculation of physical effects due to releases of hazardous materials (liquids and gases)
CGA G-5.5	Standard for Hydrogen Systems
EIGA 154-09	Safe Location of Oxygen and Inert Gas Vents
ANZIGA EIGA DOC 211/17	Hydrogen Vent Systems for Customer Applications

2.3 Referenced Project Documents

Code / Doc. No.	Description
S-00-1220-001	BASIC ENGINEERING DESIGN DATA (BEDD)
S-00-1242-001	GENERAL PHILOSOPHY FOR HSE DESIGN
S-00-1241-001	GENERAL SPECIFICATION FOR FIRE PROTECTION

Code / Doc. No.	Description
T-00-1242-001	FEED HAZID CLOSE OUT REPORT
T-00-1242-005	EPC HAZID STUDY REPORT
D-00-1223-001	PROCESS FLOW DIAGRAM FOR HYDROGEN PRODUCTION FACILITY
S-00-1223-004	PLANT EMISSION AND EFFLUENT SUMMARY
V-215A-101-A-DGN-020	GENERAL ARRANGEMENT DRAWING
V-215A-101-A-DGN-040	EXPLOSION PROTECTION DOCUMENT
V-215A-101-A-DGN-050	PLANT EFFLUENTS AND EMISSION TABLE
D-00-1225-001	PLOT PLAN
T-00-1242-003_1_FEED	FEA REPORT (FIRE AND EXPLOSION CONSEQUENCE BASED ANALYSIS)

2.4 Referenced RTA Specifications & Standards

Code / Doc. No.	Description
GNMS0304	Guidance Note – Mitigating process safety hazards on occupied buildings

3 METHODOLOGY

3.1 Overall Approach: Fire and Explosion consequence based Analysis (FEA) Study

The sequence of steps below are followed in FEA study.

1. Identify major fire and explosion hazards and determine possible scenarios. The major hazards contributing to the fire and explosion consequence with fatalities to people are extracted from the results of HAZID Study Report. Refer to Section 6.1 and HAZID Study Report (T-00-1242-005).
2. Determine the inputs required and calculation conditions based on the available information in BEDD, PFDs, Plot Plan and/or by agreed assumption.
3. Consequence analysis: Severity level of the impact of thermal radiation/blast load was assessed on each criterion.

3.2 Overall Approach: Atmospheric Vent Dispersion Study

The sequence of steps below are followed in atmospheric vent dispersion study.

1. Identify all existing vents discharging to the atmosphere at safe location. Refer to Process Flow Diagram for Hydrogen Production Facility (D-00-1223-001) for the identification of vents.
2. Perform screening and classify each vent as either hazardous service or non-hazardous requiring dispersion study or not.
 - Vents in hazardous service (*) satisfying screening criteria in the table below are evaluated for dispersion study.

Fluid Characteristics of Vent	Hazard
Flammable Gas	Flammability / Radiation
Toxic substance	Toxicity

Fluid Characteristics of Vent	Hazard
Nitrogen-rich gas	Oxygen deficiency
Oxygen-rich gas	Oxygen enrichment
High temperature	Hot burn
Low temperature	Cold burn

(*) Exception: atmospheric vent in hazardous service releasing < 0.001 kg/s due to small flow rate which shall be located to safe location at least 3 m above platform/working level where operator access is expected.

- For vents not in hazardous service, dispersion study is not required.
3. Gather inputs and other calculation parameters such as weather and release conditions which are required by Phast. Refer to BEDD, PFDs, Plot Plan and/or agreed assumption for the latest available information.
 4. Consequence analysis: Impact of gas dispersion was assessed based on the applicable criteria for the discharged fluid.

3.3 Applicable Software

The FEA and atmospheric vent dispersion have been carried out using Phast version 8.61, which is DNV’s consequence modelling and calculation software.

Jet Fire Model: The Miller model is used for calculating the effects of jet fire in this analysis. The consequence modelling calculates a wide range of radiation results.

Explosion Model: Blast effects are calculated by the mean Multi Energy method in Phast. The method considers the congestion of the space occupied by the flammable gas cloud. The consequence modelling calculates the overpressure radius of the explosion.

Atmospheric Vent Model: Dispersion of hazardous gases in the atmosphere are calculated by Pressure Vessel – Leak Model in Phast. The consequence modelling calculates a wide range of horizontal and vertical extents considering multiple weather conditions.

3.4 Area to be Evaluated

Area to be evaluated and distance from hazard is assumed from GH2E Plot Plan and Overall Plot Plan with RTA Facilities. For plot plan of GH2E facility, refer to Attachment 2.

4 FIRE AND EXPLOSION HAZARDS

Major Hazards to be analyzed in the FEA Study is referenced from the FEED HAZID recommendations (T-00-1242-001) and EPC HAZID Study Report (T-00-1242-005) and summarized in Table 4.1.

These are identified hazards meet all the following conditions:

- HAZID Study evaluation resulted in “High” or “Very High” at least for one risk category.
- Expected Fire or Explosion in “Consequence” of HAZID Study results.
- Recommended to study the impact of fire and/or explosion on surrounding area, or to Evaluate/Consider enough separation distance.

Table 4.1. Major Hazards with Recommendations for FEA Study

No.	Guide word/Hazard	Cause	Consequence	Safeguard	Risk Category			Recommendation
					People	Asset	Env.	
H-1	Release of inventory	Hydrogen leak (Inside container)	Explosion/Fire	- Fire & Gas Detector - Air ventilation by HVAC - Emergency shut off in case of HVAC shut-down - Hazardous Area Classification and suitable selection for instrumentation and electrical items	High	High	Low	- Check the necessity of explosion proof for electrical equipment in accordance with Rio Tinto's specification. - Evaluate enough separation distance between PEM Container and occupied buildings/area such as existing control room, maintenance workshop, parking. - Study the impact of fire and explosion on this scenario to the surrounding area especially for public road. - Protection against hydrogen permeations to be considered e.g. material selection of instrumentation
H-2	Release of inventory	Hydrogen leak (Outside container) 30 barg	Explosion/Fire	- Shield wall to prevent dispersion of leaked H2 gas - Fire & Gas Detector inside shield wall - Automatic Emergency Shut-down by F&G detection	Medium	Medium	Low	- Study the impact of fire and explosion on this scenario to the surrounding area.

4.1 Scenarios

The following scenarios in case of jet fire and explosion are listed in a case-to-case basis:

Jet fire scenario

(Case 1-1) HAZID No. H-1: Release of inventory, Hydrogen leak (Inside container)

- Hydrogen leak from the flange of Electrolyzer inside the container

(Case 1-2) HAZID No. H-2: Release of inventory, Hydrogen leak (Outside container)

- Hydrogen leak from the flange of Metering system

(Case 1-3) HAZID No. H-8: Overpressure, Increased Hydrogen operating pressure due to process control deviation

- Hydrogen leak from the flange of Electrolyzer inside the container

*For Jet fire scenario, the barrier effect of the container and shield wall is not considered in the modeling and calculation to evaluate the consequence conservatively according to GNMS0304 Mitigating process safety hazards on occupied buildings.

Explosion scenario

(Case 2-1) HAZID No. H-1: Release of inventory, Hydrogen leak (Inside container)

- Congested area inside Electrolyzer Container

(Case 2-2) HAZID No. H-2: Release of inventory, Hydrogen leak (Outside container)

- Congested area at shield wall surrounding Metering System

(Case 2-3) HAZID No. H-8: Overpressure, Increased hydrogen operating pressure due to process control deviation

- Congested area inside Electrolyzer Container

*For Explosion scenario, the HVAC ventilation in Electrolyzer Container is not considered in the modeling and calculation to evaluate the consequence conservatively according to GNMS0304 Mitigating process safety hazards on occupied buildings.

4.2 Flammability Characteristics

Flammability Characteristic of Hydrogen is indicated below:

- Lower Flammable Limit : 4 vol%
- Upper Flammable Limit : 77 vol% AS/NZS IEC 80079.20.1-2019
Table 1
- Laminar Flame Speed : 3.25 m/s
- Reactivity : High

5 ATMOSPHERIC VENT DISPERSION

Process vents subject to dispersion study are identified in Process Flow Diagram for Hydrogen Production Facility (D-00-1223-001) as shown in Figure 5.1 below.

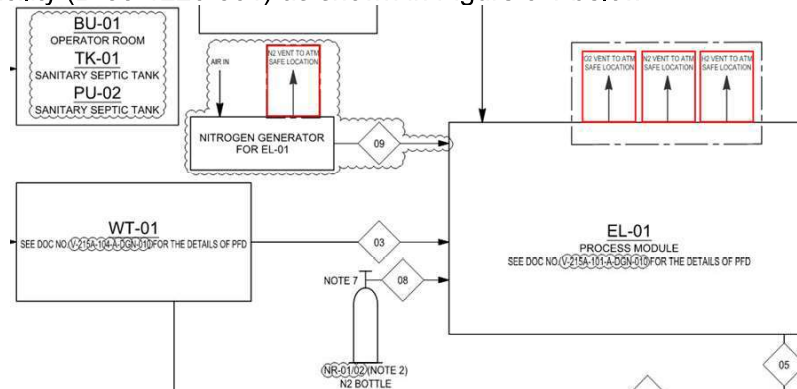


Figure 5.1 Process Flow Diagram for Hydrogen Production Facility (D-00-1223-001) Rev. 2
 (Note: Exact quantities of vent lines to ATM not shown above and only indicative of the presence of these vents to ATM.)

The process conditions used in the dispersion study vary based on the scenario considered. Refer to Section 5.1 to 5.3 for detailed information.

5.1 Hydrogen Vents from Electrolyzer Package (EL-01)

The information below is applied as inputs for the main hydrogen stack.

Venting Scenario	: Intermittent	
Release Direction	: Upward vertically	
Vent Diameter	: 3 in	
Release Elevation	: 7.36 m from grade	(V-215A-101-A-DGN-020)
Release Temperature	: 30 °C	
Mass flow rate	: 0.0132 kg/s	
Composition	: 99.9 % by mole of H ₂ 0.1 % by mole of H ₂ O	

The information below is applied as inputs for the secondary hydrogen stack.

Venting Scenario	: Continuous	
Release Direction	: Upward vertically	
Vent Diameter	: 1 in	
Release Elevation	: 6.82 m from grade	(V-215A-101-A-DGN-020)

Release : 30 °C
Temperature
Mass flow rate : 3.5E-05 kg/s (*)
Composition : 99.9 % by mole of H₂
0.1 % by mole of H₂O

(*) Not subject to dispersion study as per exception in Section 3.2

5.2 Oxygen Vents from Electrolyzer Package (EL-01)

The information below is applied as inputs for the main oxygen stack.

Venting Scenario : Continuous
Release Direction : Upward inclined at 45 deg
Vent Diameter : 3 in
Release Elevation : 5.88 m from grade (V-215A-101-A-DGN-020)
Release : 13 °C (V-215A-101-A-DGN-010)
Temperature
Mass flow rate : 0.106 kg/s (V-215A-101-A-DGN-010)
Composition : 99.2 % by mole of O₂
0.8 % by mole of H₂O

The information below is applied as inputs for the secondary oxygen stack.

Venting Scenario : Continuous
Release Direction : Upward inclined at 45 deg
Vent Diameter : 1 in
Release Elevation : 4.63 m from grade (V-215A-101-A-DGN-020)
Release : 25 °C
Temperature
Mass flow rate : 0.0012 kg/s
Composition : 99.2 % by mole of O₂
0.8 % by mole of H₂O

5.3 Nitrogen Vents from Nitrogen Generator and Electrolyzer Package (EL-01)

For the dispersion of nitrogen, two vents are subject for analysis. Vent A is from Nitrogen Generator for EL-01, and Vent B is from Electrolyzer Package, EL-01.

The information below is applied as inputs for Vent A.

Venting Scenario : Continuous
Release Direction : Horizontal (assumption only)
Vent Diameter : 1 in (assumption only)
Release Elevation : 3 m from grade (assumption only)
Release : 40 °C
Temperature
Mass flow rate : 0.0035 kg/s
Composition : 99.9 % by mole of N₂
0.1 % by mole of O₂

The information below is applied as inputs for Vent B.

Venting Scenario : Continuous
 Release Direction : Horizontal
 Vent Diameter : 1 in
 Release Elevation : 3 m from grade (assumption only)
 Release Temperature : 40 °C
 Mass flow rate : 0.0021 kg/s D-00-1223-001
 Composition : 99.93 % by mole of N₂
 0.07 % by mole of O₂

6 STUDY CONDITIONS

FEA and ATM Vent dispersion studies are evaluated as per the following basis:

6.1 Process Information

The following process information used in modelling scenarios are listed below:

1. Process Flow Diagram (PFD)
 - Document No. D-00-1223-001
 - Document Title: Process Flow Diagram for Hydrogen Production Facility
 - Revision No. 2
2. Plot Plan (*)
 - Document No. D-00-1225-001
 - Document Title: Plot Plan
 - Revision No. 2 as per Attachment-2

(*) Note: The FEA Study and ATM Vent Dispersion Studies serve as input to succeeding plot plan revision for the safety distances in siting of the buildings and process equipment.
3. Piping and Instrumentation Diagram
 - Document No. D-00-1225-102
 - Document Title: Piping and Instrumentation Diagram for Hydrogen Production Facility
 - Revision No. 2

6.2 Weather Condition

Table 6.1 Weather Condition

Wind Condition (Note 1)	1.5/F (F – Stable; Night time) 5/D (D – Neutral; Day time)
Average Ambient Air Temperature	25 °C
Average Relative Humidity	59 % at 3 PM
Design Solar Radiation Flux	1.2 kW/m ² (Note 2)
Surface Roughness	0.183 m over land (Note 2)
Notes: (1) Based on Mitigating process safety hazards on occupied buildings, GNMS0304. (2) Based on site conditions	

6.3 Operating Condition

Operating conditions for Electrolyzer Container and Metering System are summarized in Table 6.2.

Table 6.2 Operating Condition

	Electrolyzer	Metering System
Operating Pressure [barg]	30	30
Design Pressure [barg]	40	40
Flow Rate [Nm ³ /hr]	535.2	535.2
Inventory	(Note 2)	negligible

Pressure requirements for each jet fire and explosion case are listed in Table 6.3.

Table 6.3 Pressure Requirement

Applicable Case	Pressure, barg	Basis
Case 1-1 Case 1-2 Case 2-1 Case 2-2	30	Operating Pressure
Case 1-3 Case 2-3 (Note 2)	120	3 x Design Pressure, (3x40) (Note 1)

Notes:

- (1) Based on Mitigating process safety hazards on occupied buildings, GNMS0304.
- (2) Based on process volume occupation ratio (Refer to Section 6.5). Inventory will be completely discharged within 1~2 seconds even in process operating pressure (30 barg). Therefore, higher process pressure due to process control deviation such as Case 2-3 does not change the leaked flammable gas volume. Finally, there is no difference in the explosion model between Case 2-1 and 2-3.
- (*) Based on the latest available Vendor information (V-215A-101-A-DGN-041/020)

6.4 Jet Fire Condition

The end-point criteria for Jet Fire Scenario are summarized below:

Release Material and Phase	: Hydrogen vapour only
H ₂ Piping Size	: 1 inch
Leak Hole Size (Full bore rupture of 1" piping)	: 25 mm
Leak Elevation	: 1 m above grade
Leak Direction	: Horizontal
Model	: Miller

6.5 Vapor Cloud Explosion (Multi Energy Model) Condition

Vacancy ratio considered for the flammable gas volume considers vacant level to be filled with stoichiometric mixture of fuel and air per TNO CPR 14E.

The end-point criteria for Vapor Cloud Explosion Scenario are summarized for Case 2-1/2-3 and 2-2, respectively.

Applicable for Case 2-1 and 2-3:

Explosion Efficiency Method	: 100% efficiency
Explosion Strength	: 7
H ₂ Mass Inventory	: 3.3 kg
Process Room Volume	: 49.4 m ³
Process Room Vacancy Ratio	: 77.6 %
Flammable Gas Volume	: 38.3 m ³ (49.4 m ³ x 77.6%) (Refer to ATTACHMENT-1)
Mass Inventory in Stoichiometric Ratio with Air	: 0.97 kg

Applicable for Case 2-2:

Explosion Efficiency Method	: 100% efficiency
Explosion Strength	: 7
Flammable Gas in Stoichiometric Ratio with Air	: 0.576 kg
Confined Gas Volume (based on 10ft high cube-shaped container)	: 18 m ³

6.6 Atmospheric Vent Dispersion Condition

The end-point criteria for the dispersion analysis and safe location criteria are discussed in Table 6.4 and 6.5, respectively.

Table 6.4 Dispersion Criteria

Component	Criteria
Flammable Gas	50 % LFL
Thermal Radiation from Ignited Flammable Gas	4 kW/m ²
O ₂ Enriched Atmosphere	O ₂ > 23.5%
Asphyxiation	O ₂ < 19.5%

Table 6.5 Safe Location Criteria

Dispersion Scenario	Safe Location Criteria
Hydrogen (H ₂) Dispersion	Equipment and building shall not be within half LFL (Lower Flammable Limit) because there is possibility of fire event within half LFL. Operator shall be restricted the access into 4 kW/m ² thermal radiation contour
Oxygen (O ₂) Dispersion	Operator shall be restricted the access into 23.5 % of Oxygen.
Nitrogen (N ₂) Dispersion	Operator shall be restricted the access into 19.5 % of Oxygen

6.7 Tolerability Criteria

The consequence brought by Major Hazard shall be assessed with tolerability criteria to determine severity level or building design. The severity level for the facility owned by Rio Tinto shall be determined with the tolerability criteria that is defined in Rio Tinto Standard, GNMS0304 Mitigating process safety hazards on occupied buildings.

Tolerability Criteria for fire and explosion are indicated below.

6.7.1 Tolerability Criteria for Control Room and Public Road

6.7.1.1 Criteria for the Effect of Heat Radiation

Summarized below are the end-point criteria used in the study for the effect of Heat Radiation which are also discussed in Table 6.6:

4 kW/m² : For People
 12.5 kW/m² : For Wood / Plastic (Building)
 37.5 kW/m² : For Equipment

Table 6.6 Effects of Thermal Radiation

Radiation (kW/m ²)	Observed Effect
37.5	Sufficient to cause damage to process equipment. Minimum energy to be required to ignite wood at indefinitely long exposures.
12.5	Minimum energy required for piloted ignition of wood, melting of plastic tubing (Note 1).
9.5	Pain threshold reached after 8s; second degree burns after 20s.
4.0	Sufficient to cause pain to personnel if unable to reach cover within 20s; however, blistering of the skin (second degree burns) is likely; 0 % lethality
1.6	Will cause no discomfort for long exposure

Notes:
 (1) Within the piloted ignition distance, ignition of an occupied building would occur as a result of the ignition of easily combustible materials by thermal radiation. These buildings can provide protection to occupants until ignition occurs. Locating these buildings beyond the piloted ignition distance, buildings are assumed to afford protection from fires indefinitely.

*Guidelines for Evaluating the characteristics of Vapor Cloud Explosions, Flash Fires, and BLEVEs; CCPS (1994).

6.7.1.2 Criteria for the Effect of Blast Load

Summarized below are the end-point criteria used in the study for the effect of Blast Load which are also discussed in Table 6.7:

20.7 mbarg : (= 0.3 psig, Safe Distance)
 69.0 mbarg : (= 1.0 psig)
 137.9 mbarg : (= 2.0 psig)

Table 6.7 Damage Effects associated with Explosion Overpressures

Pressure (psig)	Level of Damage
0.02	Annoying noise (137 dB), if of low frequency (10-15 Hz)
0.03	Occasional breaking of large glass windows already under strain
0.04	Loud noise (143 dB). Sonic boom glass failure

Pressure (psig)	Level of Damage
0.1	Breakage of small windows under strain
0.15	Typical pressure for glass breakage
0.3	“Safe distance” (probability of 0.95 no serious damage beyond this value) Missile limit Some damage to house ceilings; 10% window glass broken
0.4	Limited minor structural damage
0.5-1.0	Large and small windows usually shattered
0.7	Minor damage to house structures
1.0	Partial demolition of houses, made uninhabitable
1-2	Corrugated asbestos shattered Corrugated steel or aluminum panels, fastenings fail, followed by buckling Wood panels (standard housing) fastening fail, panels blown in
1.3	Steel frame of clad building slightly distorted
2.0	Partial collapse of walls and roofs of houses
2-3	Concrete or cinder block walls, not reinforced, shattered
2.3	Lower limit of serious structural damage
2.5	50% destruction of brickwork of houses

*Diagnostic Features of Explosion Damage, 6th International Meeting on Forensic; CCPS (1994)

6.7.2 Tolerability Criteria for the Facility Owned by Rio Tinto

Severity Criteria are defined in Rio Tinto Standard, GNMS0304 Mitigating process safety hazards on occupied buildings, as below.

Table 6.8 Severity criteria

Severity Level	Overpressure	Thermal Radiation	Hypoxia [O ₂ concentration]	Toxin Concentration ¹⁶	Engulfment ¹⁷
1	2kPa to 7kPa	2.5kW/m ² to 5 kW/m ²	14% to 17%	Between AEGL1 and AEGL2	Below 150mm
2	7kPa to 15kPa	5 kW/m ² to 13 kW/m ²	12% to 14%		150mm to 250mm
3 *	15kPa to 20kPa	13 kW/m ² to 23 kW/m ²	10% to 12%	Between AEGL2 and AEGL3	Above 250mm
4 *	20kPa to 35kPa	23 kW/m ² to 35 kW/m ²			
5 *	35kPa to 70 kPa	Above 35 kW/m ²	10%	Above AEGL3	
6 *	Above 70kPa				

*GNMS0304 Mitigating process safety hazards on occupied buildings

Furthermore, initial acceptance criteria are defined in Rio Tinto Standard, GNMS0304 Mitigating process safety hazards on occupied buildings. Initial acceptance shall be evaluated by Table 6.9 with Severity level determined by Table 6.8. All buildings by Rio Tinto, including nearby RTA Warehouse to be evaluated are categorized “Operation Building”.

Table 6.9 Initial Acceptance Criteria - Consequence based analysis

Severity Level	Operations Building	Service Building, including Temporary / Portable Accommodation ¹	Administration Building and at the Site Boundary
1	Tolerable	Tolerable if risk management measures implemented to a level commensurate for green zone.	Tolerable if risk management measures implemented to a level commensurate for yellow zone
2	Tolerable if risk management measures implemented to a level commensurate for green zone.	Tolerable if risk management measures implemented to a level commensurate for yellow zone	Detailed analysis required or treated as not tolerable
3	Tolerable if risk management measures implemented to a level commensurate for yellow zone	Detailed analysis required or treated as not tolerable (Not tolerable for temporary / portable buildings)	Detailed analysis required or treated as not tolerable
4	Detailed analysis required or treated as not tolerable	Detailed analysis required or treated as not tolerable	Detailed analysis required or treated as not tolerable
5	Detailed analysis required or treated as not tolerable	Detailed analysis required or treated as not tolerable	Not Tolerable
6	Detailed analysis required or treated as not tolerable	Not Tolerable	Not Tolerable

* GNMS0304 Mitigating process safety hazards on occupied buildings

7 STUDY RESULTS

The following subsections show the results for the Jet Fire Scenario, Vapor Cloud Explosion Scenario, and the ATM Vent Dispersion Analysis. Furthermore, Section 7.3 presents whether each concern areas has sufficient safety distance. Contours on plot plan are shown in Attachment-3.

7.1 Jet Fire Scenario Results

The calculation results for Cases 1-1, 1-2, and 1-3 generated from the Jet Fire scenario are summarized in Table 7.1 below.

Table 7.1. Jet Fire Scenario Result Summary

	Flame Length		Heat Radiation						Reference
			4 kW/m ²		12.5 kW/m ²		37.5 kW/m ²		
	1.5/F	5/D	1.5/F	5/D	1.5/F	5/D	1.5/F	5/D	
	m	m	m	m	m	m	m	m	
Case 1-1	16.2	16.2	31.5	31.5	21.5	21.5	17.0	17.0	Figure 1-1 to 1-6
Case 1-2	16.0	16.0	31.3	31.3	21.3	21.3	16.9	16.9	Figure 2-1 to 2-6
Case 1-3	29.5	29.5	56.2	56.2	38.6	38.6	30.7	30.7	Figure 3-1 to 3-6

As a result, the required distance is 56.2 m for person, and 38.6 m for buildings.

7.1.1 Case 1-1: Hydrogen Leak from the flange of Electrolyzer inside the container

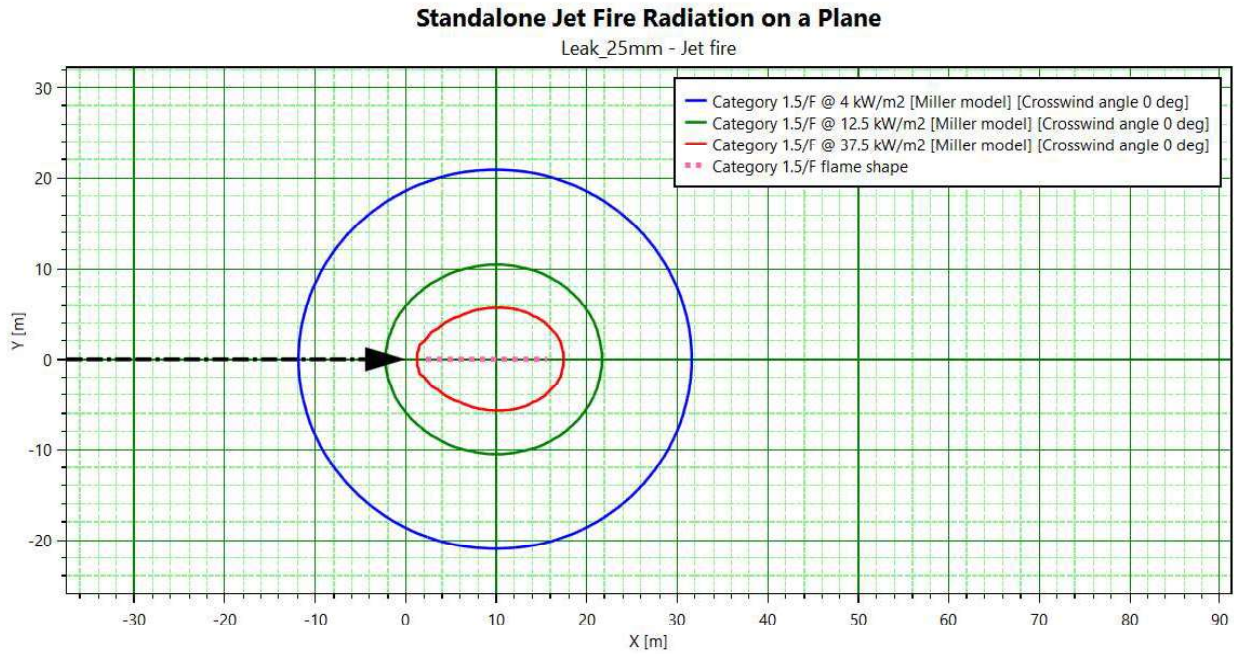


Figure 1.1 Jet Fire Heat Radiation Contour 1 m from the grade, Plan View (Wind: 1.5/F)

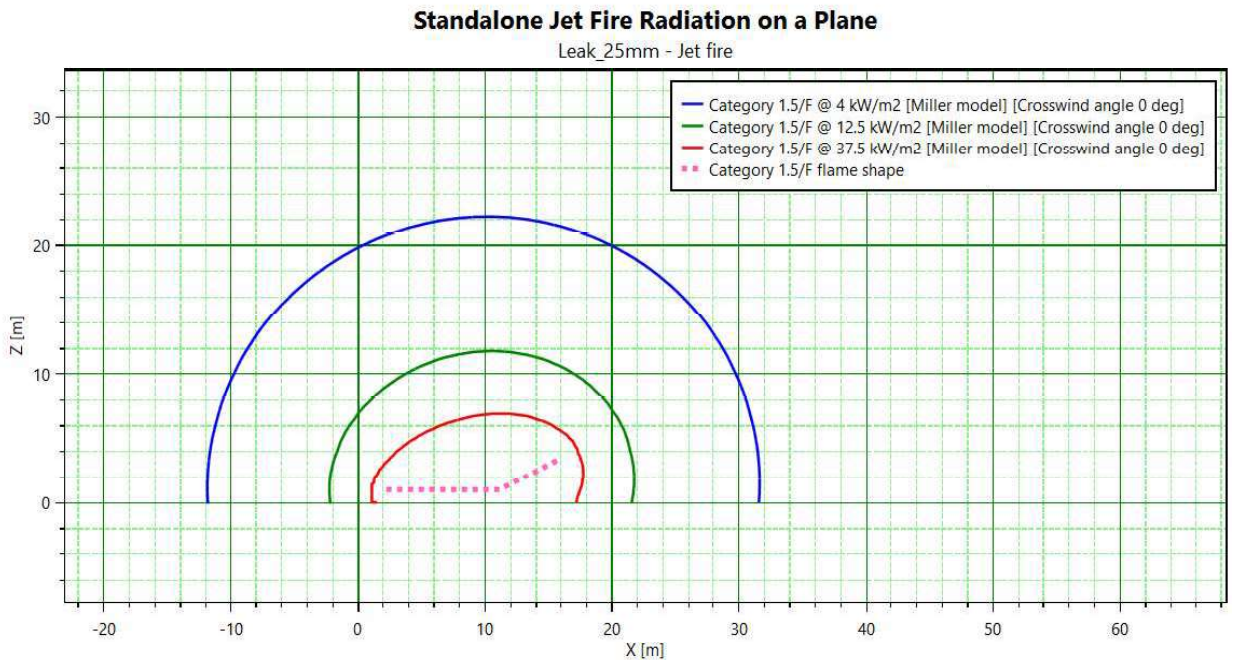


Figure 1.2 Jet Fire Heat Radiation Contour 1 m from the grade, Side View (Wind: 1.5/F)

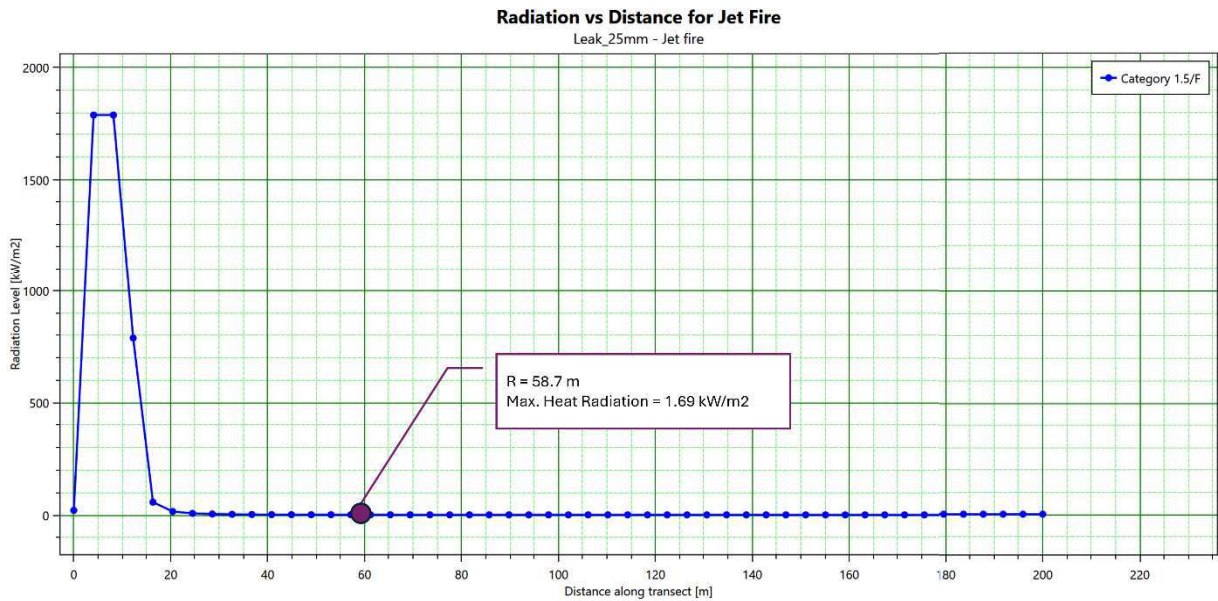


Figure 1.3 Radiation Level vs Distance (Wind: 1.5/F)

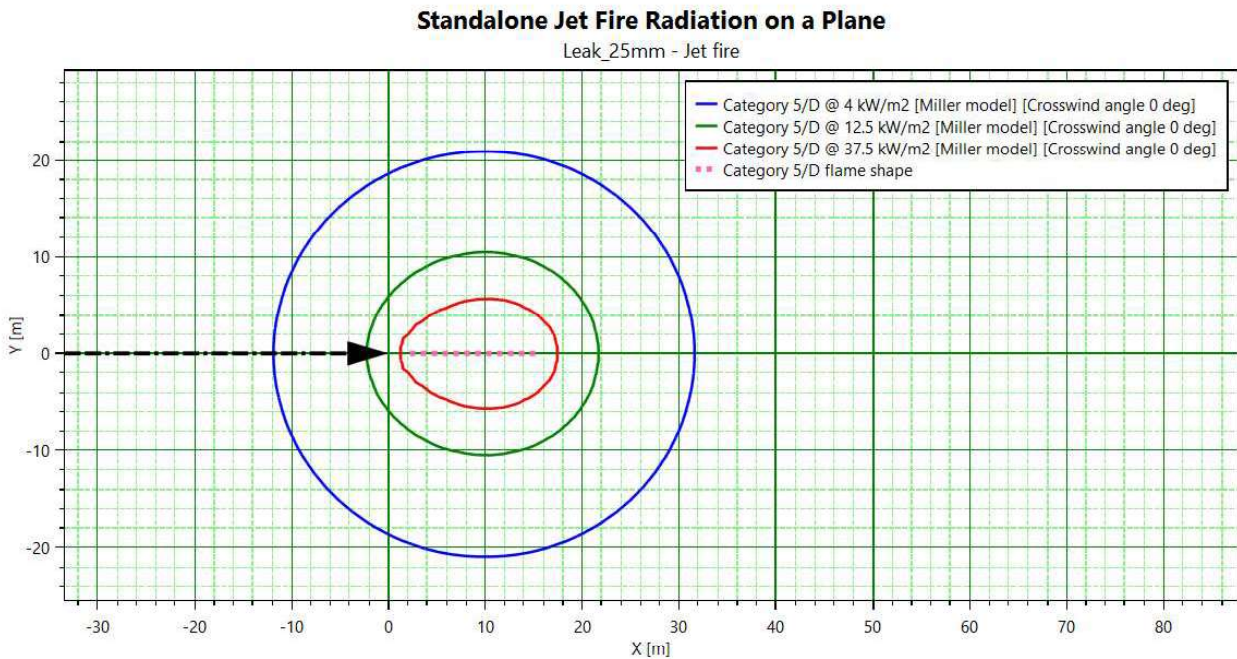


Figure 1.4 Jet Fire Heat Radiation Contour 1 m from the grade, Plan View (Wind: 5/D)

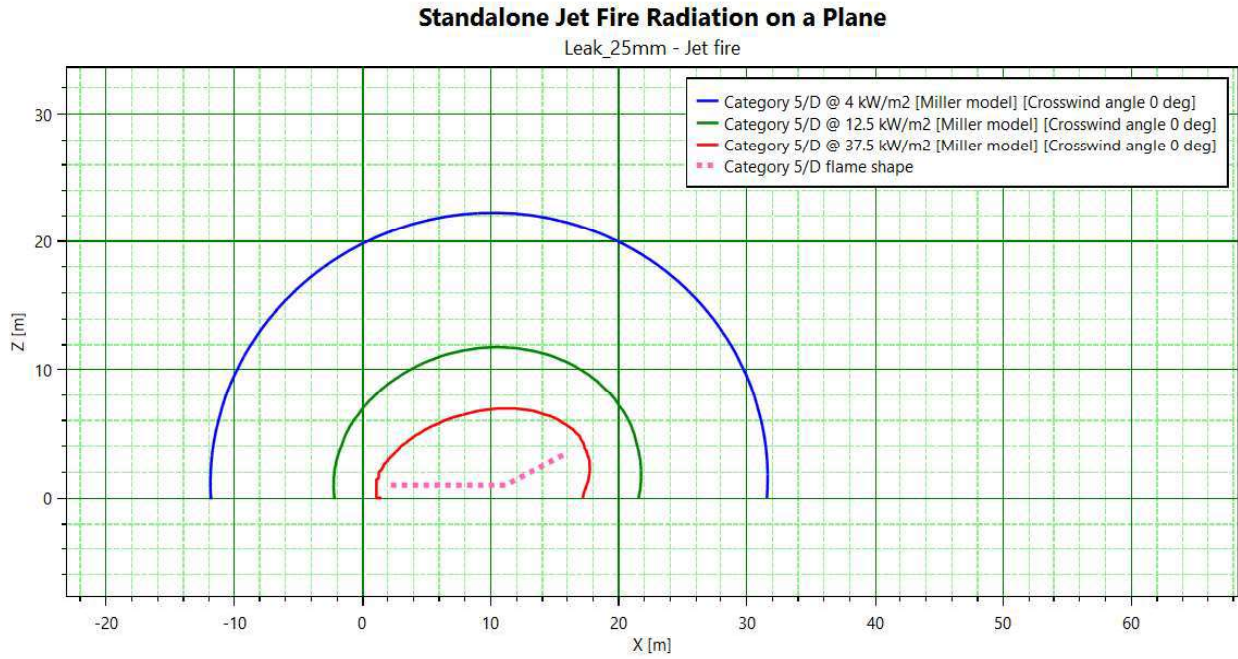


Figure 1.5 Jet Fire Heat Radiation Contour 1 m from the grade, Side View (Wind: 5/D)

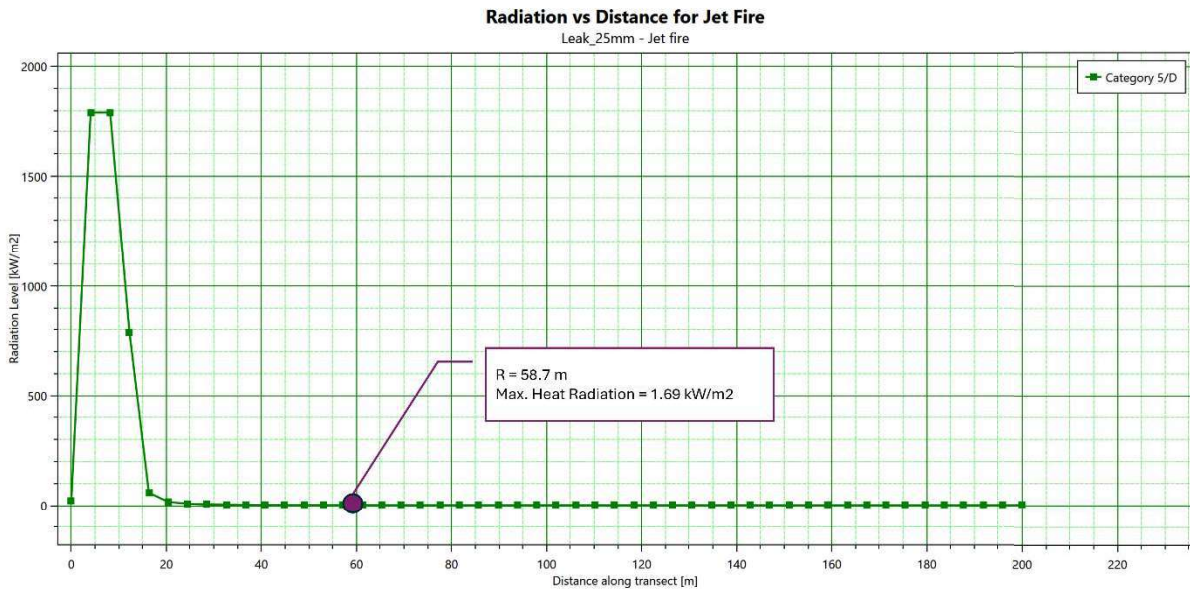


Figure 1.6 Radiation Level vs Distance (Wind: 5/D)

7.1.2 Case 1-2: Hydrogen Leak from the flange of Metering System

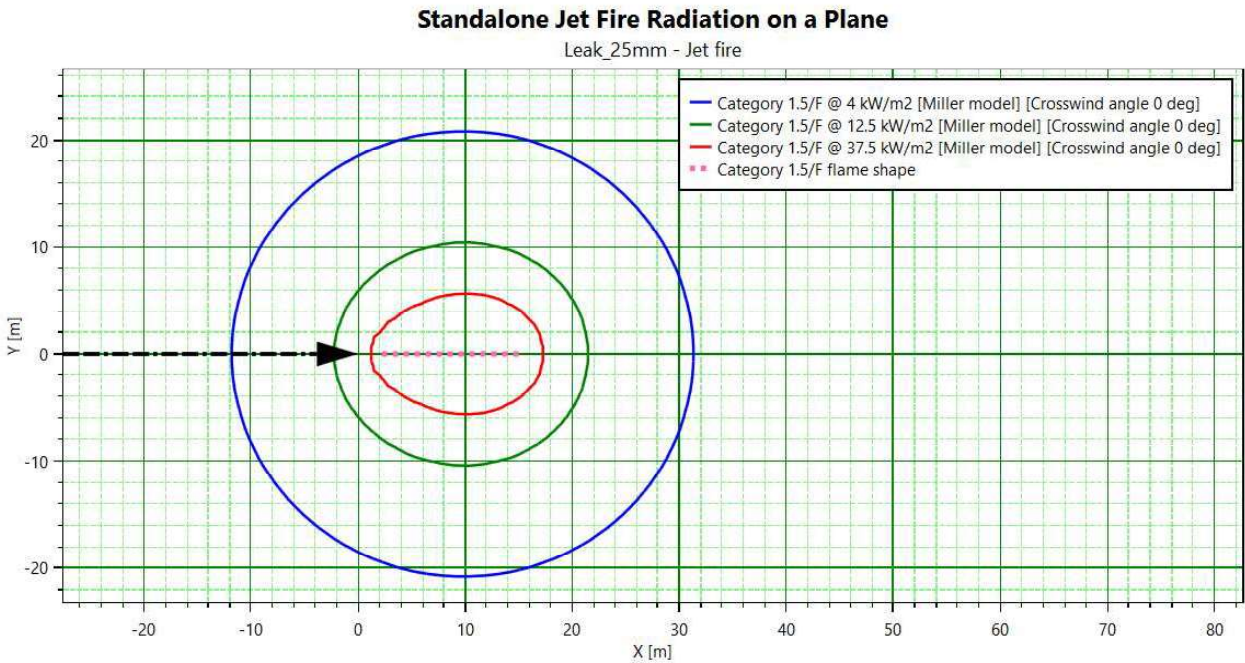


Figure 2.1 Jet Fire Heat Radiation Contour 1 m from the grade, Plan View (Wind: 1.5/F)

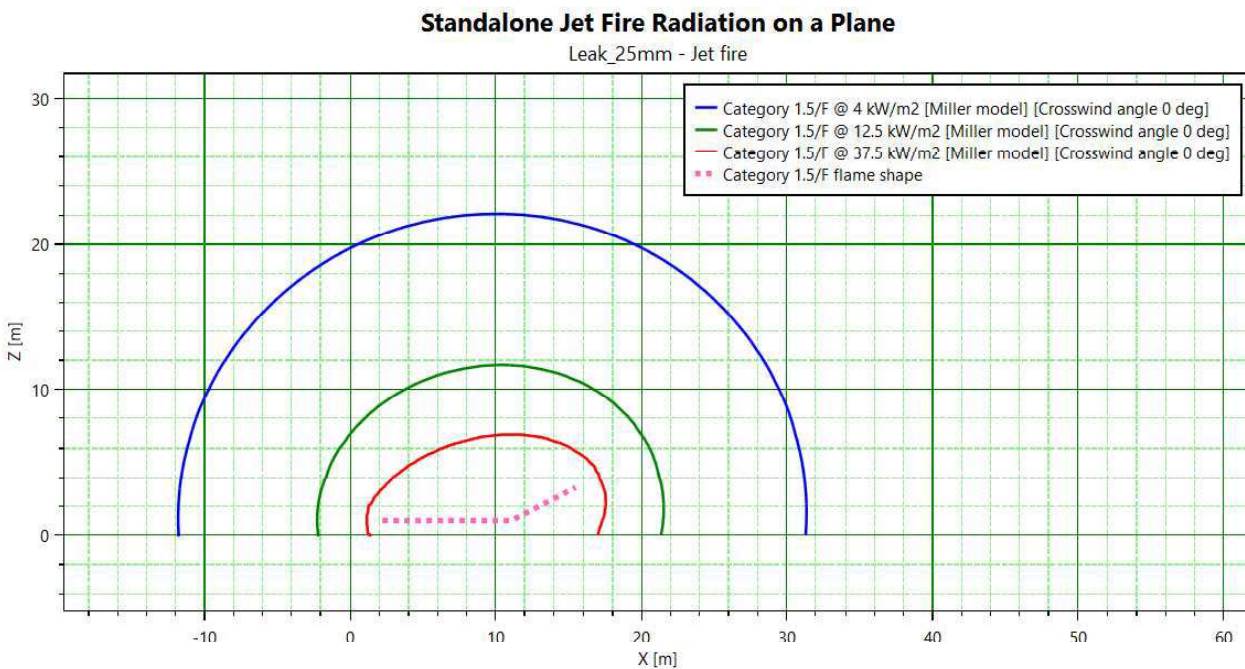


Figure 2.2 Jet Fire Heat Radiation Contour 1 m from the grade, Side View (Wind: 1.5/F)

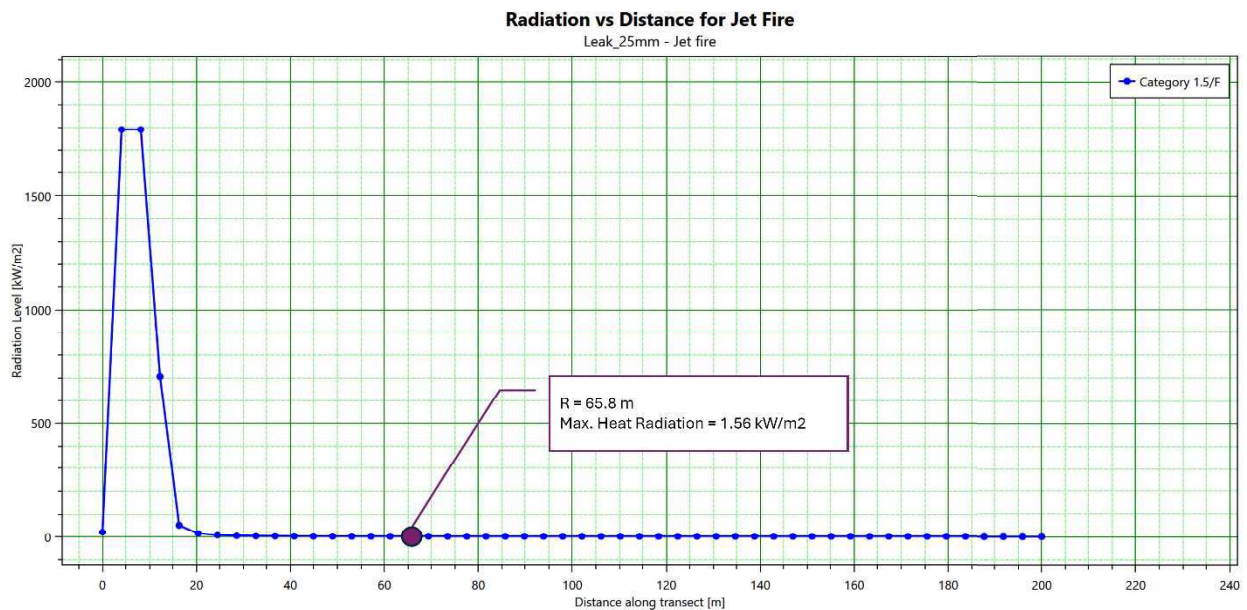


Figure 2.3 Radiation Level vs Distance (Wind: 1.5/F)

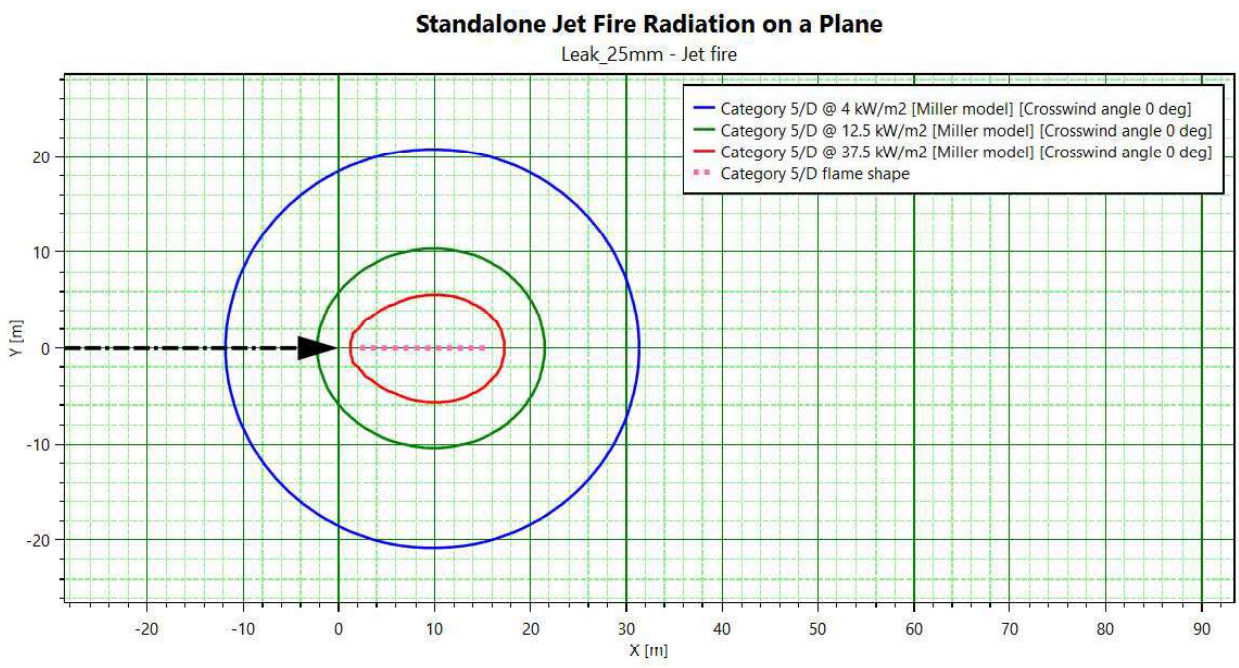


Figure 2.4 Jet Fire Heat Radiation Contour 1 m from the grade, Plan View (Wind: 5/D)

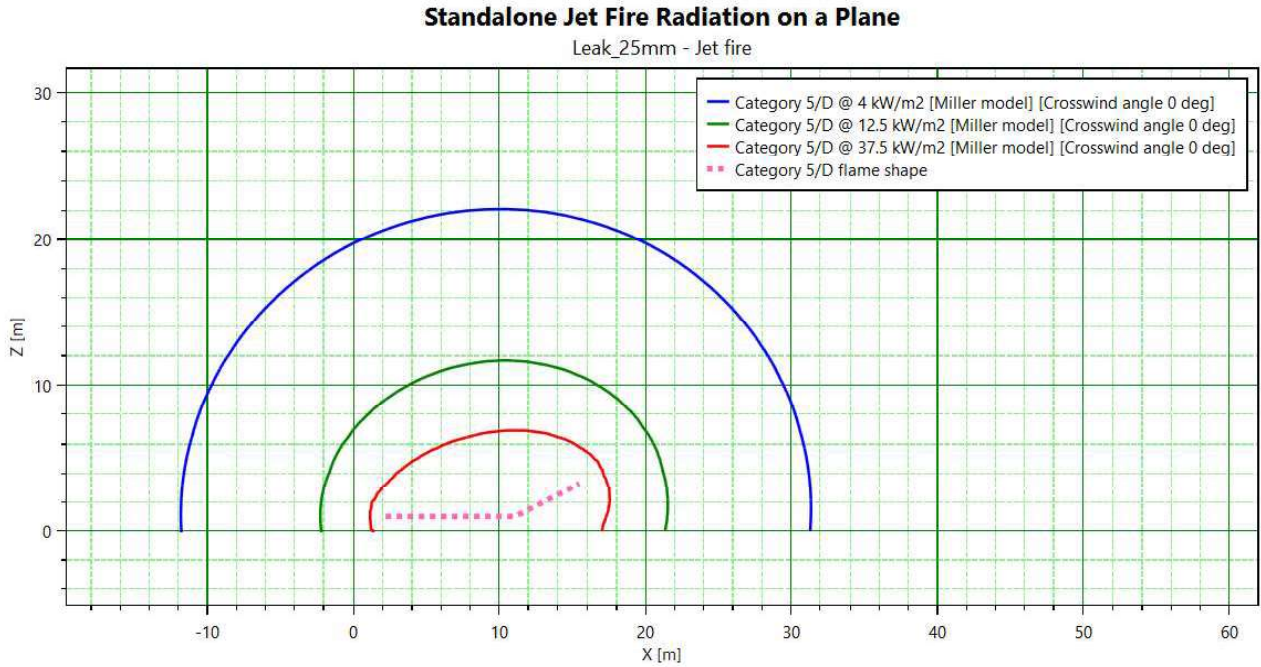


Figure 2.5 Jet Fire Heat Radiation Contour 1 m from the grade, Side View (Wind: 5/D)

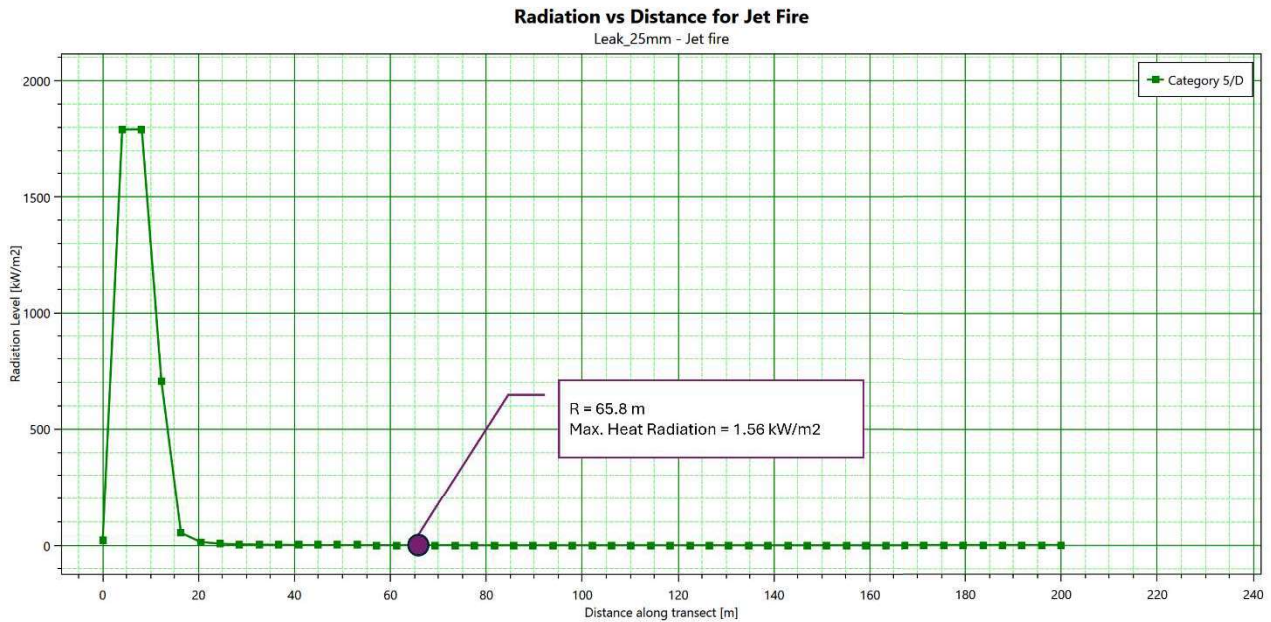


Figure 2.6 Radiation Level vs Distance (Wind: 5/D)

7.1.3 Case 1-3: Hydrogen Leak from the flange of Electrolyzer inside the container

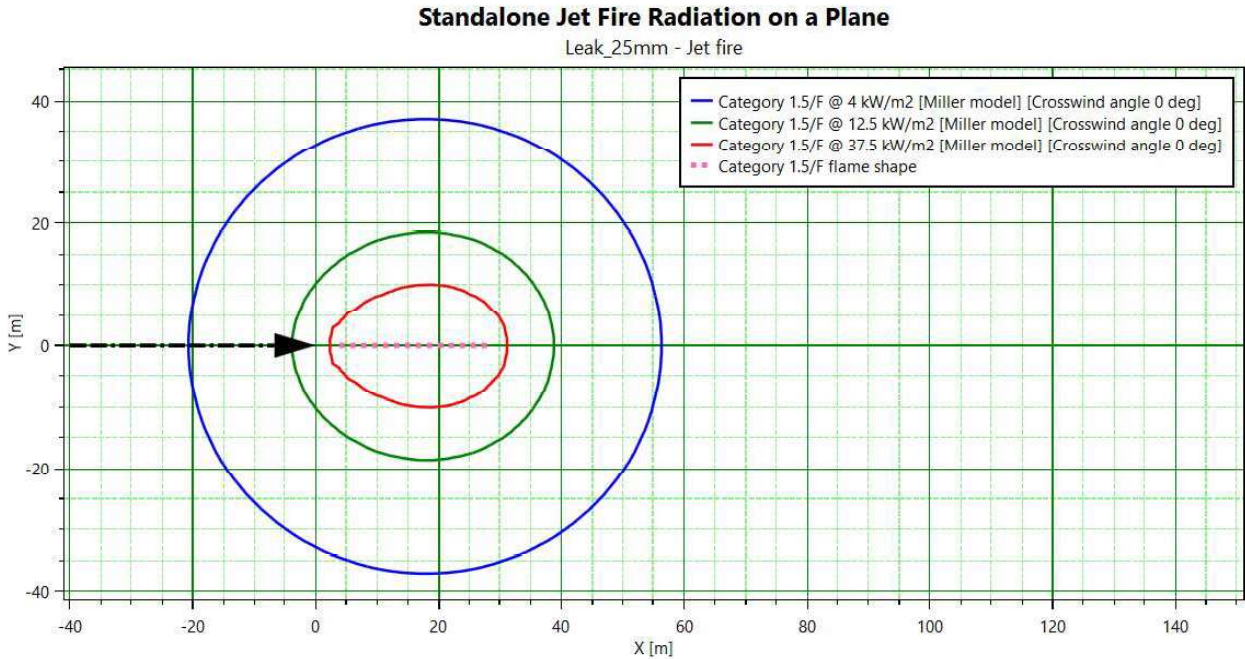


Figure 3.1 Jet Fire Heat Radiation Contour 1 m from the grade, Plan View (Wind: 1.5/F)

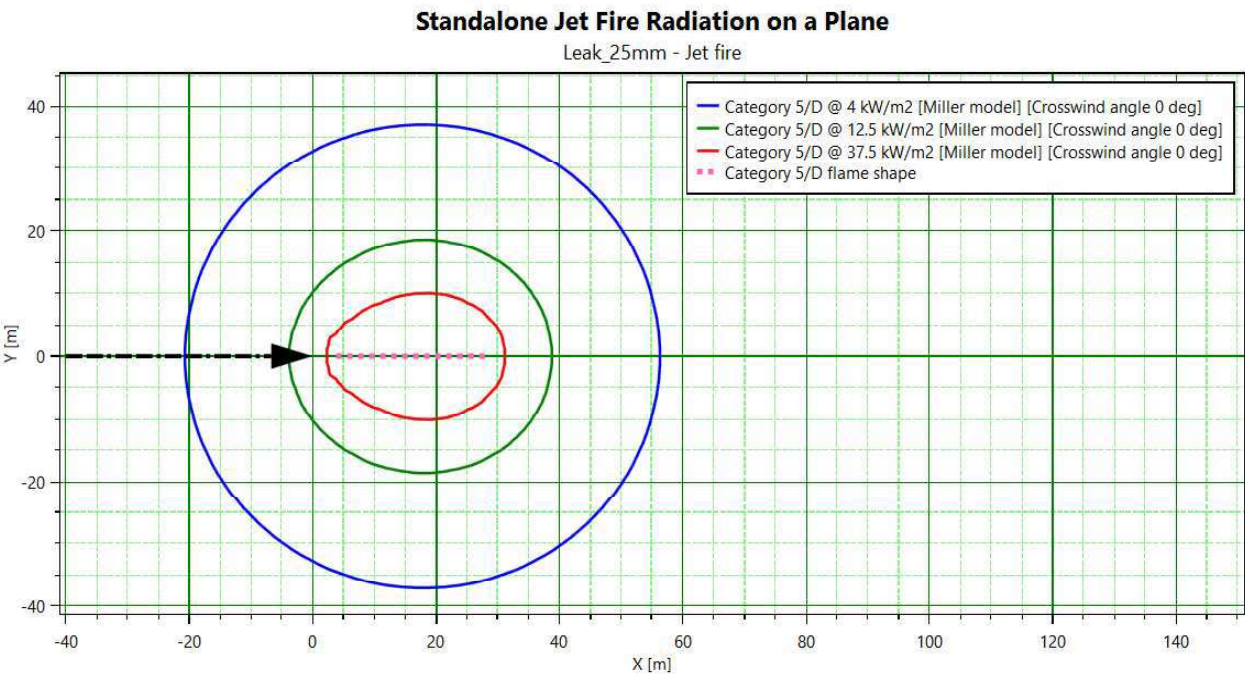


Figure 3.2 Jet Fire Heat Radiation Contour 1 m from the grade, Plan View (Wind: 5/D)

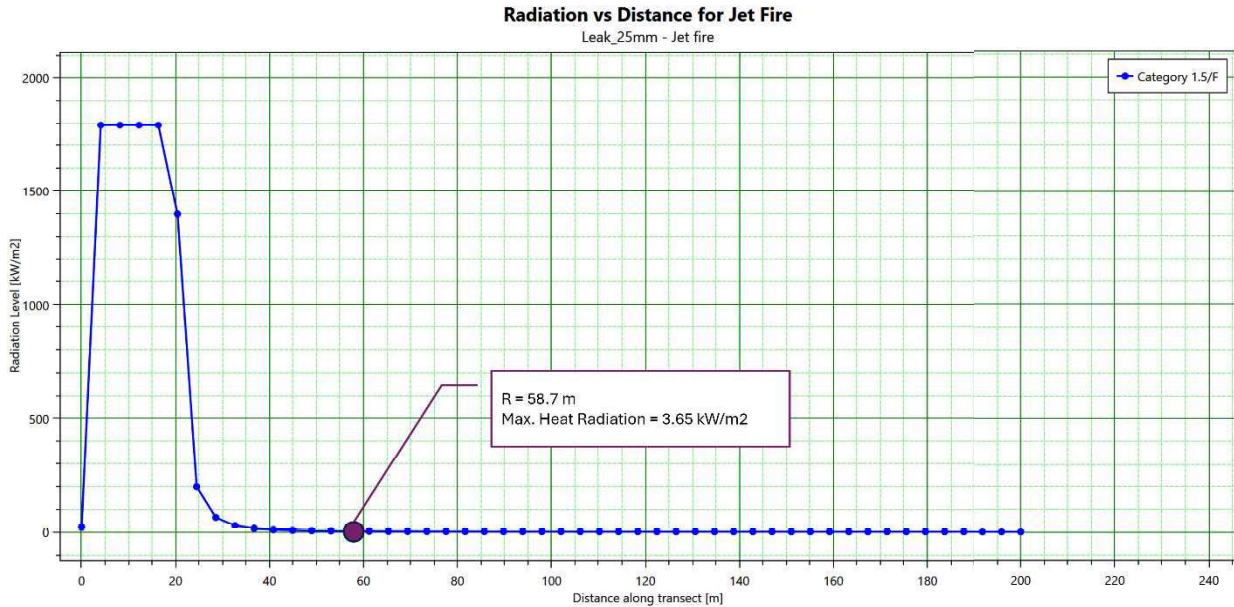


Figure 3.3 Radiation Level vs Distance (Wind: 1.5/F)

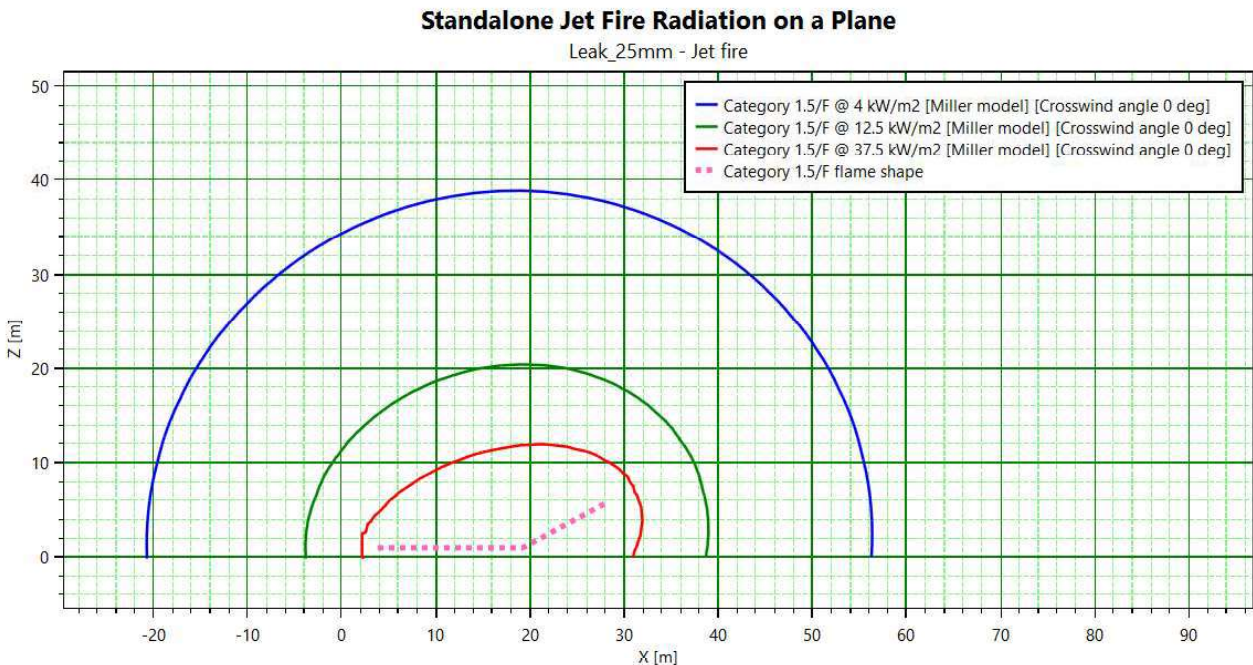


Figure 3.4 Jet Fire Heat Radiation Contour 1 m from the grade, Side View (Wind: 1.5/F)

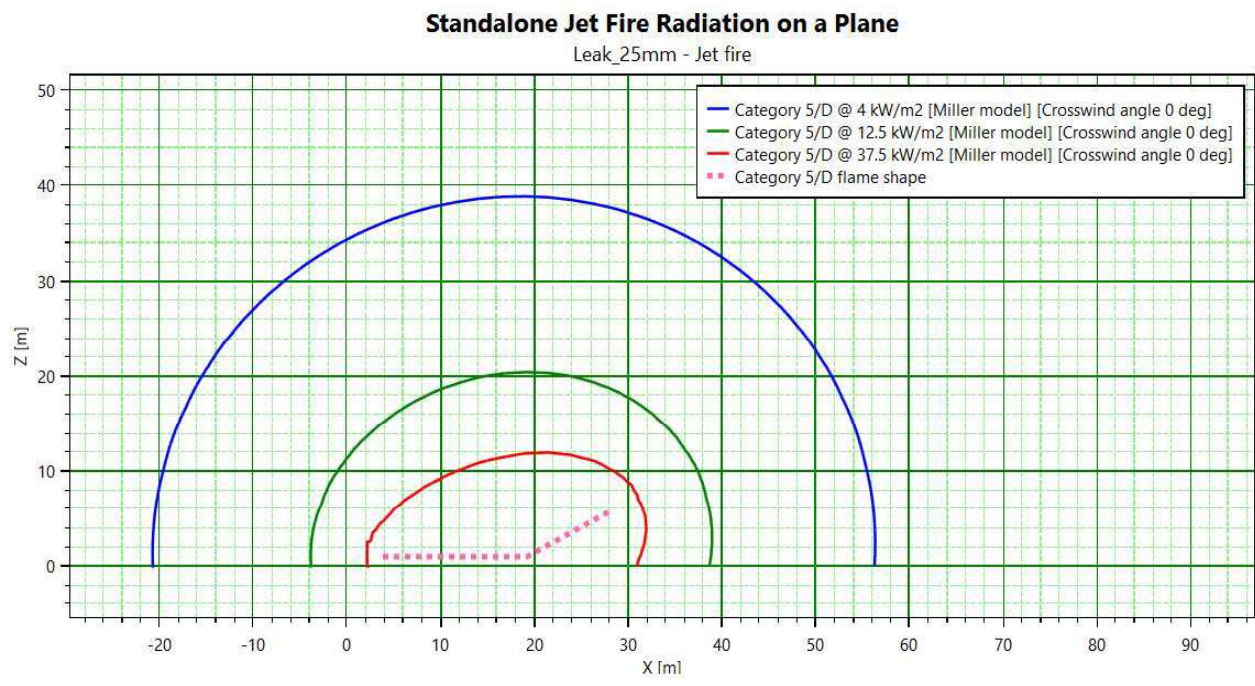


Figure 3.5 Jet Fire Heat Radiation Contour 1 m from the grade, Side View (Wind: 5/D)

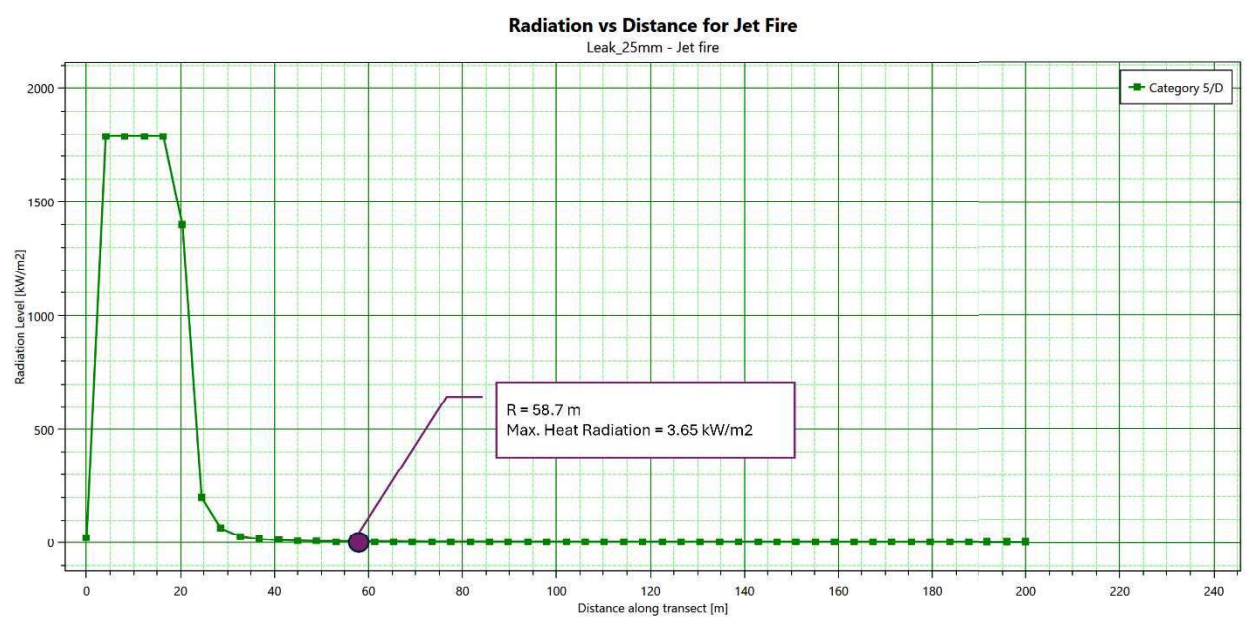


Figure 3.6 Radiation Level vs Distance (Wind: 5/D)

7.2 Vapor Cloud Explosion Scenario Results

The calculation results for Cases 2-1, 2-2, and 2-3 generated from the Explosion scenario are summarized in Table 7.2 below.

Table 7.2 Explosion Scenario Result Summary

	Over Pressure						Reference
	20.7 mbarg		69.0 mbarg		137.9 mbarg		
	1.5/F	5/D	1.5/F	5/D	1.5/F	5/D	
	m	m	m	m	m	m	
Case 2-1	117.4	117.4	39.9	39.9	22.8	22.8	Figures 4-1 to 4-4
Case 2-2	97.5	97.5	33.2	33.2	19.0	19.0	Figures 5-1 to 5-4
Case 2-3	117.4	117.4	39.9	39.9	22.8	22.8	Figures 6-1 to 6-4

As a result, the required distance is 117.4 m for person, and 39.9 m for buildings.

Reference figures are shown on the succeeding pages.

7.2.1 Case 2-1: Congested area inside Electrolyzer Container

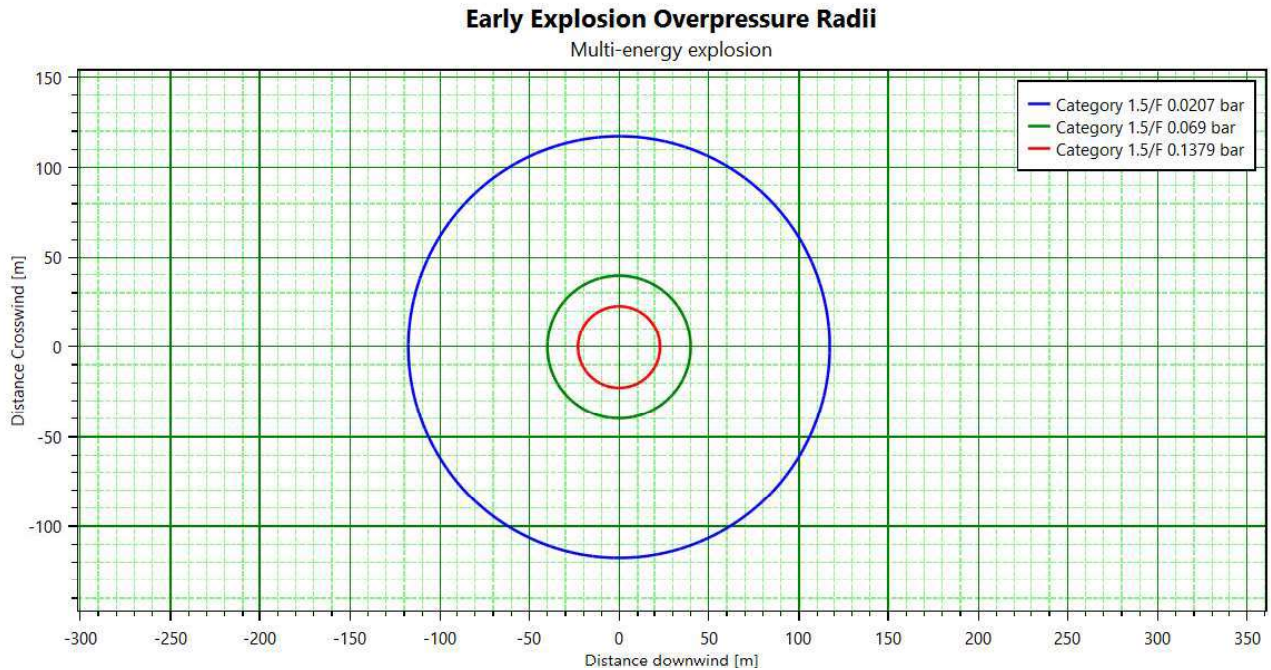


Figure 4.1 Explosion Overpressure Contour, Plan View (Wind: 1.5/F)

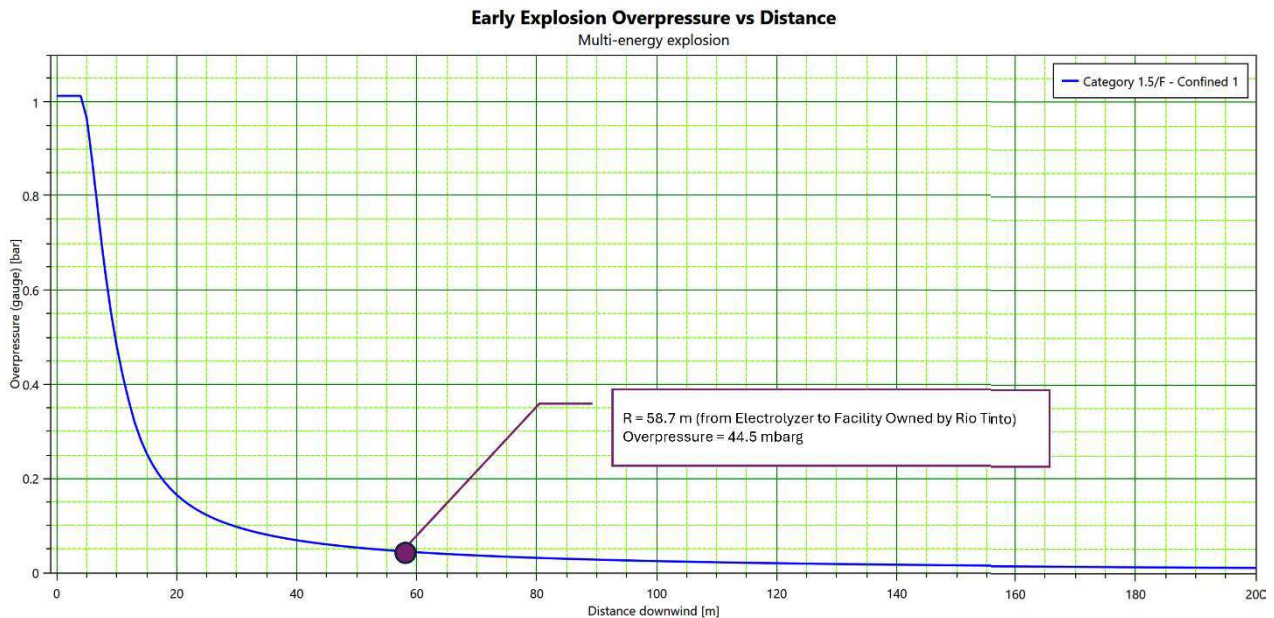


Figure 4.2 Explosion Overpressure vs Distance (Wind: 1.5/F)

Early Explosion Overpressure Radii

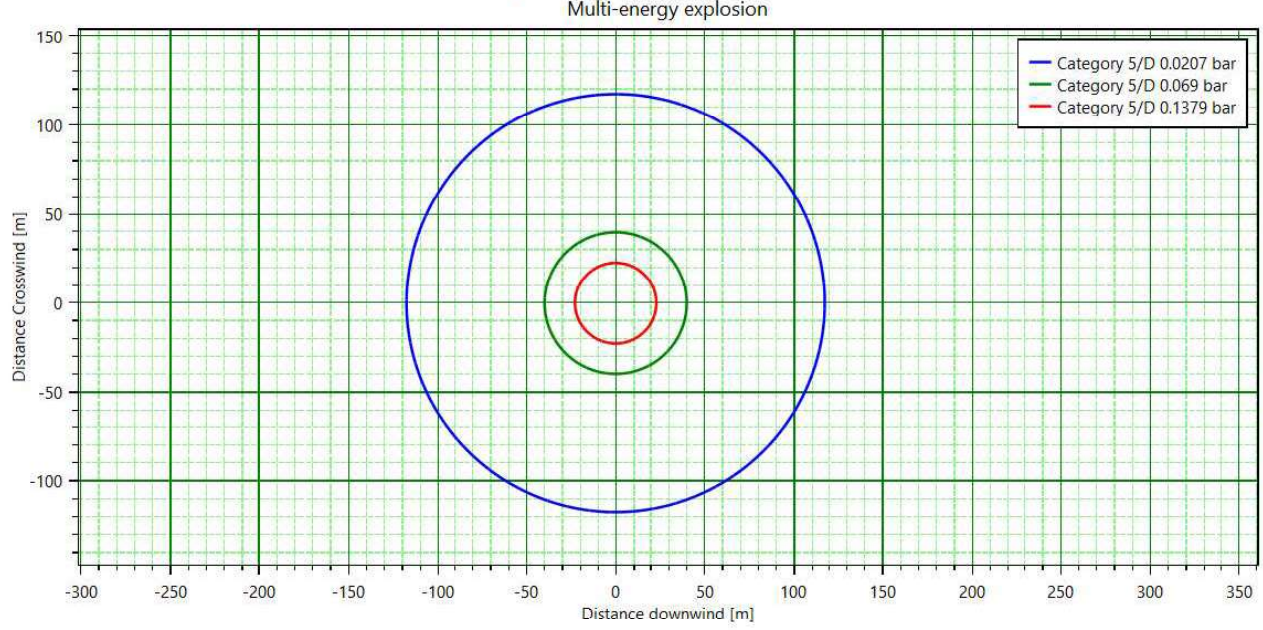


Figure 4.3 Explosion Overpressure Contour, Plan View (Wind: 5/D)

Early Explosion Overpressure vs Distance

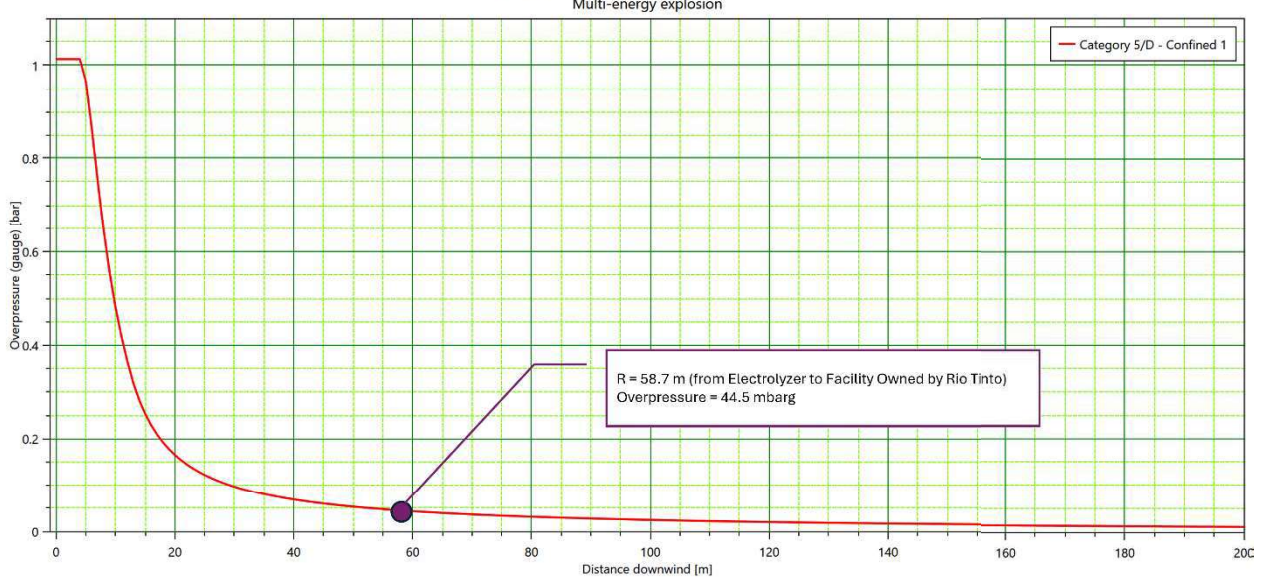


Figure 4.4 Explosion Overpressure vs Distance (Wind: 5/D)

7.2.2 Case 2-2: Congested area at shield surrounding Metering System

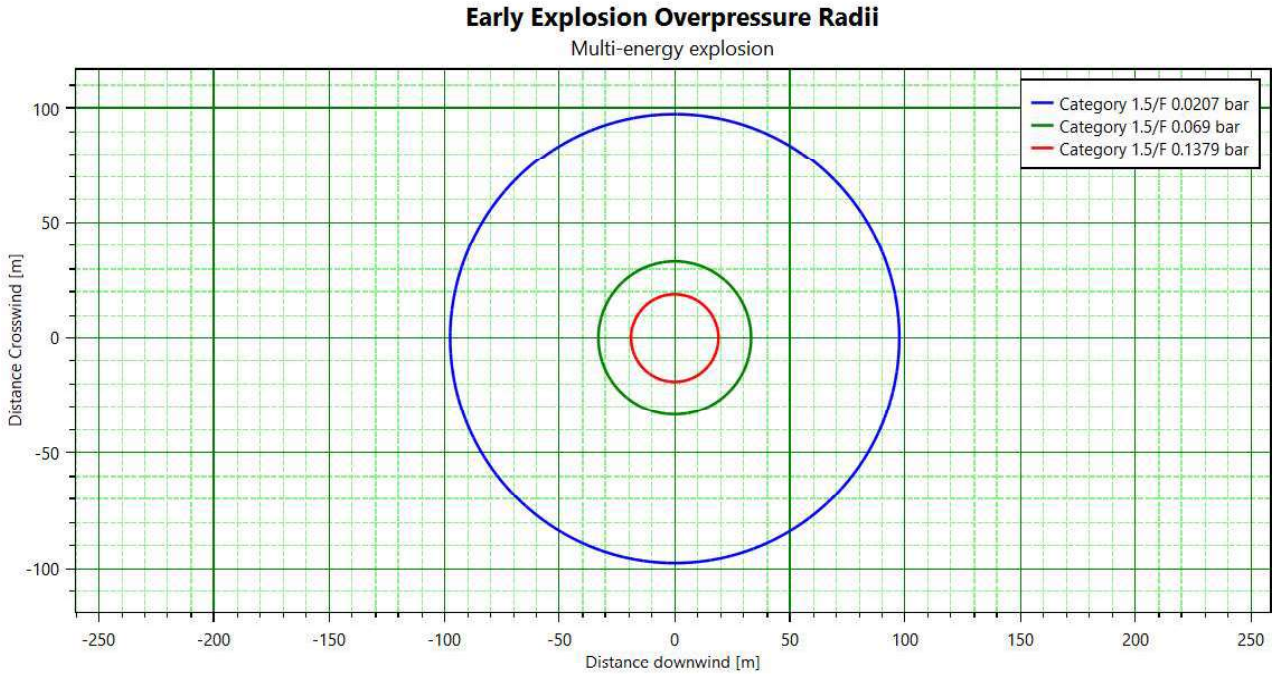


Figure 5.1 Explosion Overpressure Contour, Plan View (Wind: 1.5/F)

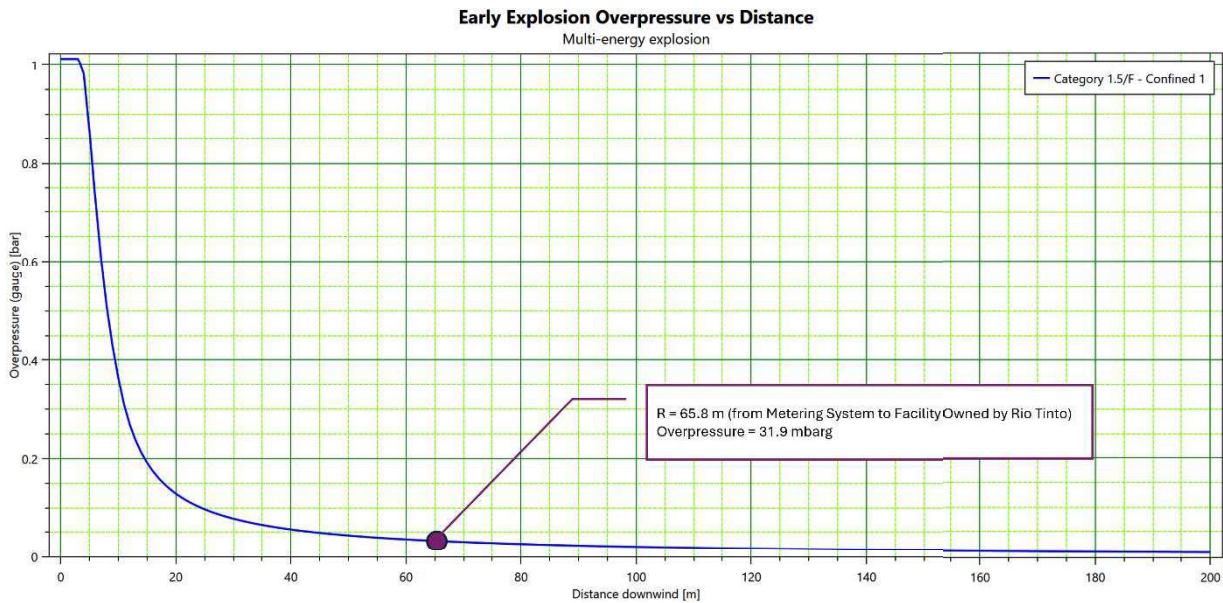


Figure 5.2 Explosion Overpressure downwind vs Distance (Wind: 1.5/F)

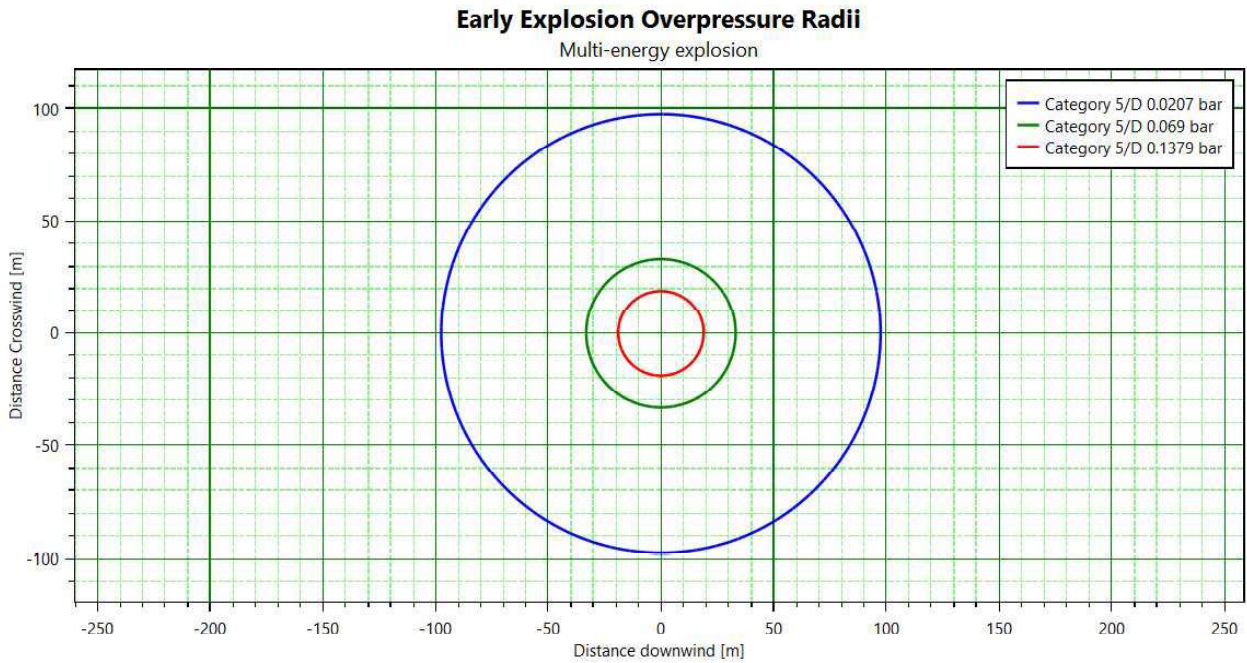


Figure 5.3 Explosion Overpressure Contour, Plan View (Wind: 5/D)

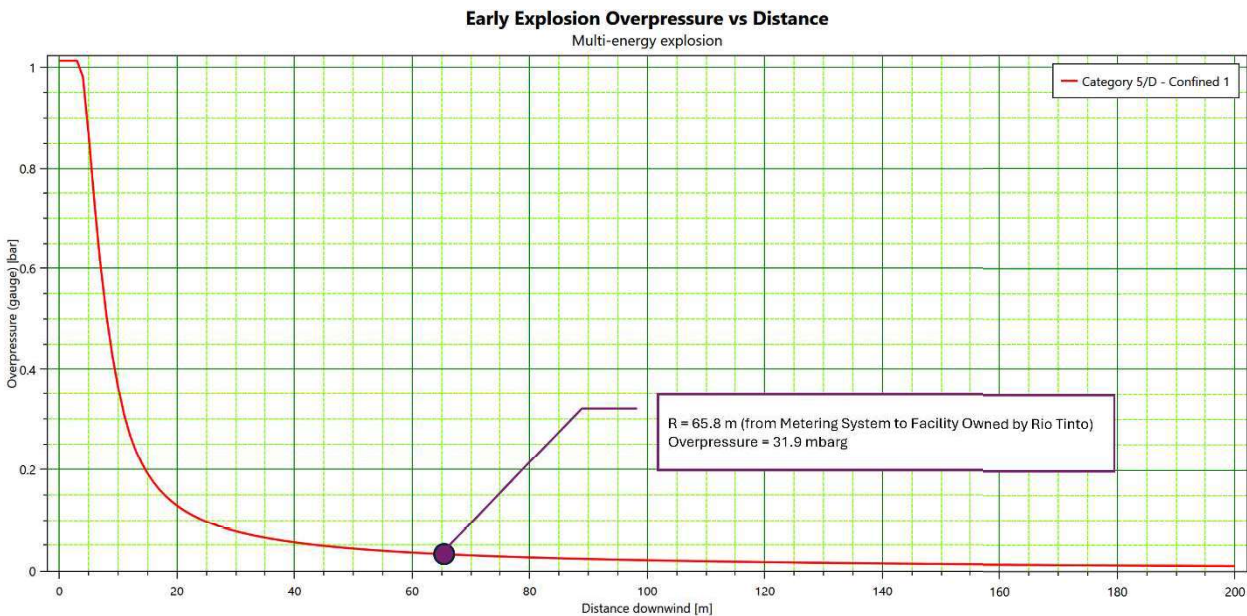


Figure 5.4 Explosion Overpressure vs Distance (Wind: 5/D)

7.2.3 Case 2-3: Congested area inside Electrolyzer Container

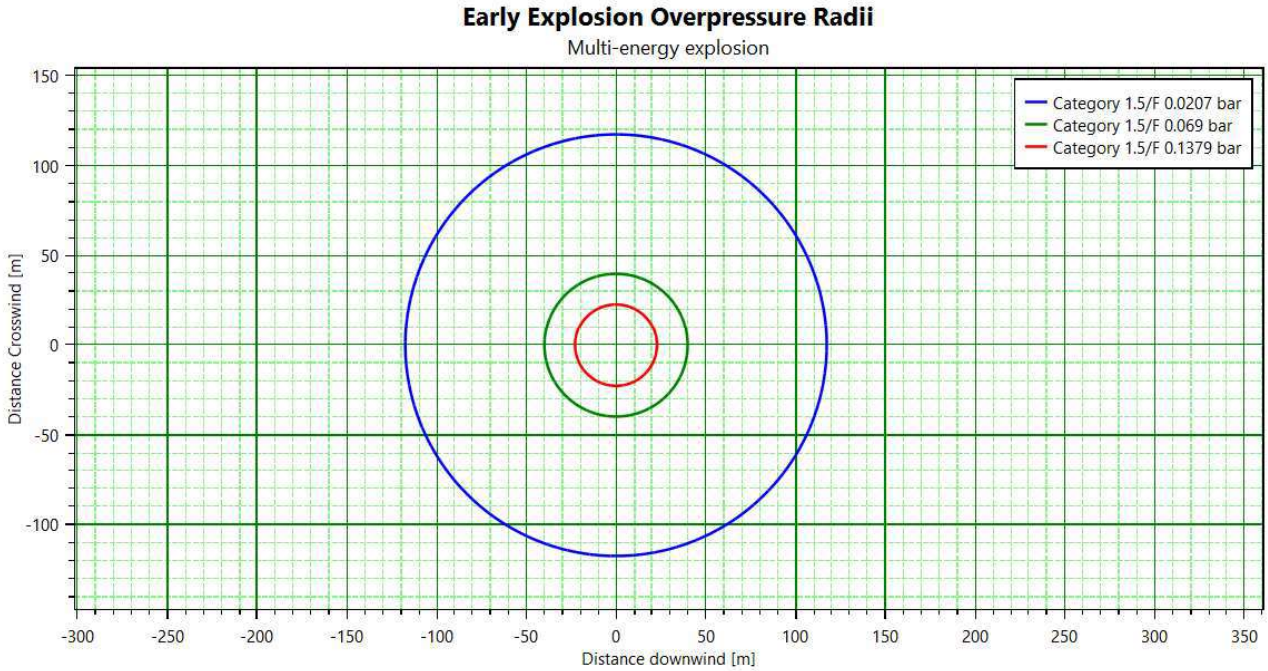


Figure 6.1 Explosion Overpressure Contour, Plan View (Wind: 1.5/F)

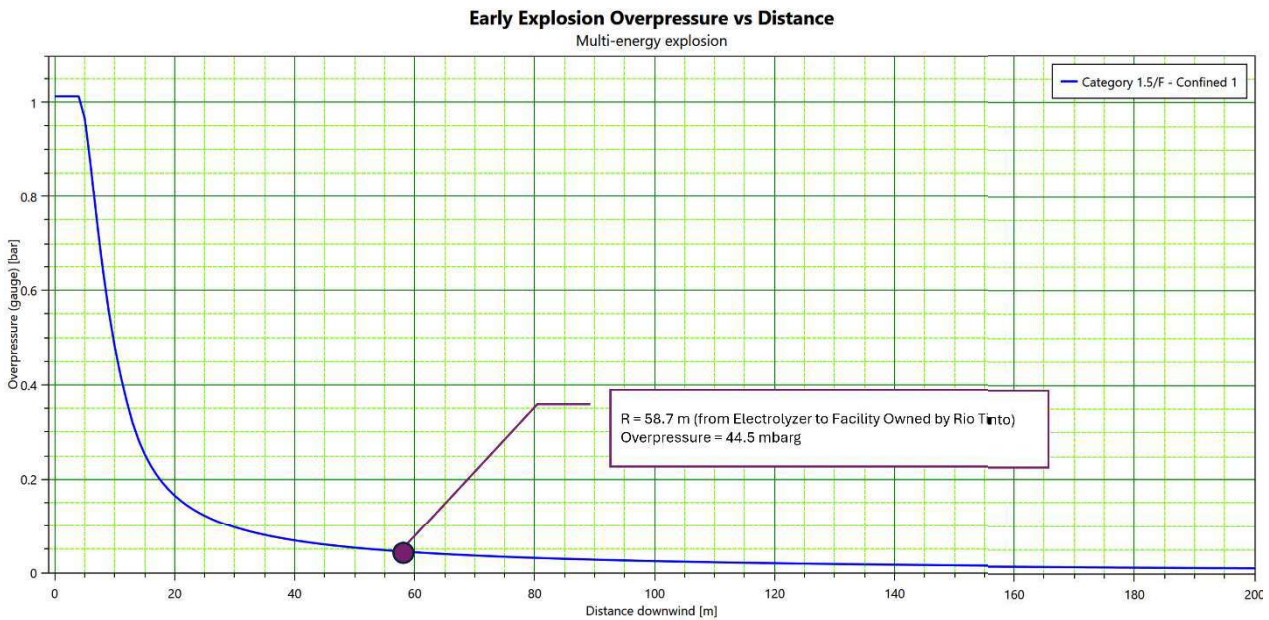


Figure 6.2 Explosion Overpressure vs Distance (Wind: 1.5/F)

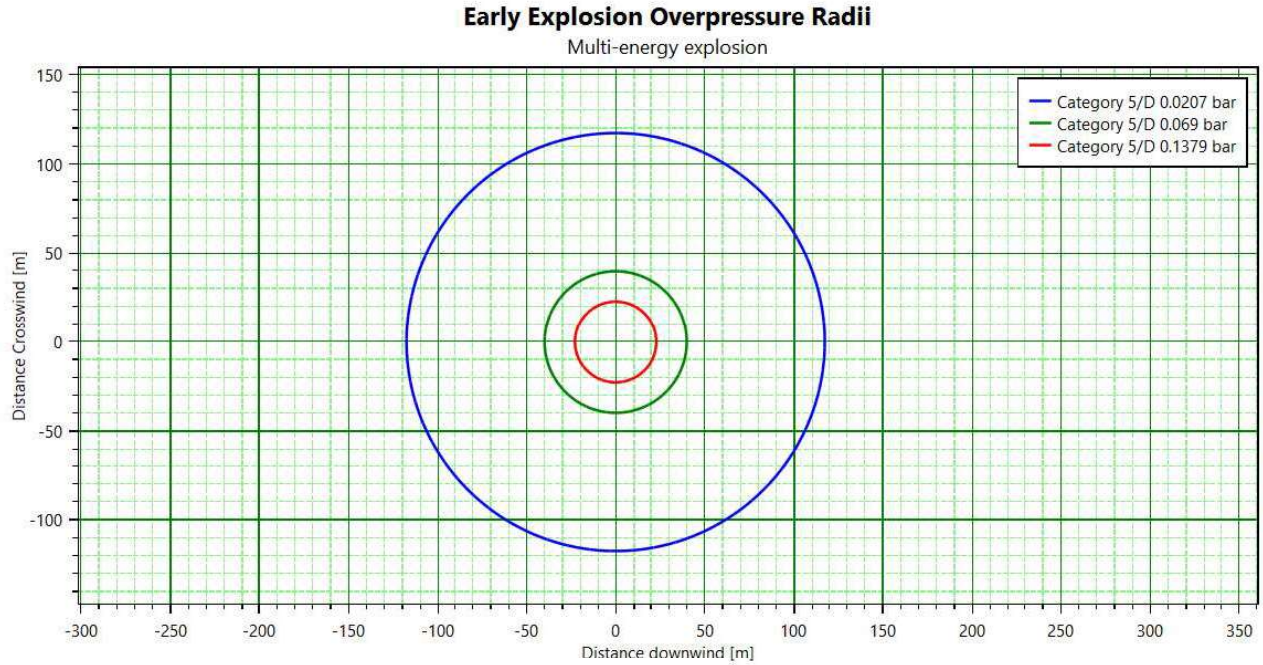


Figure 6.3 Explosion Overpressure Contour, Plan View (Wind: 5/D)

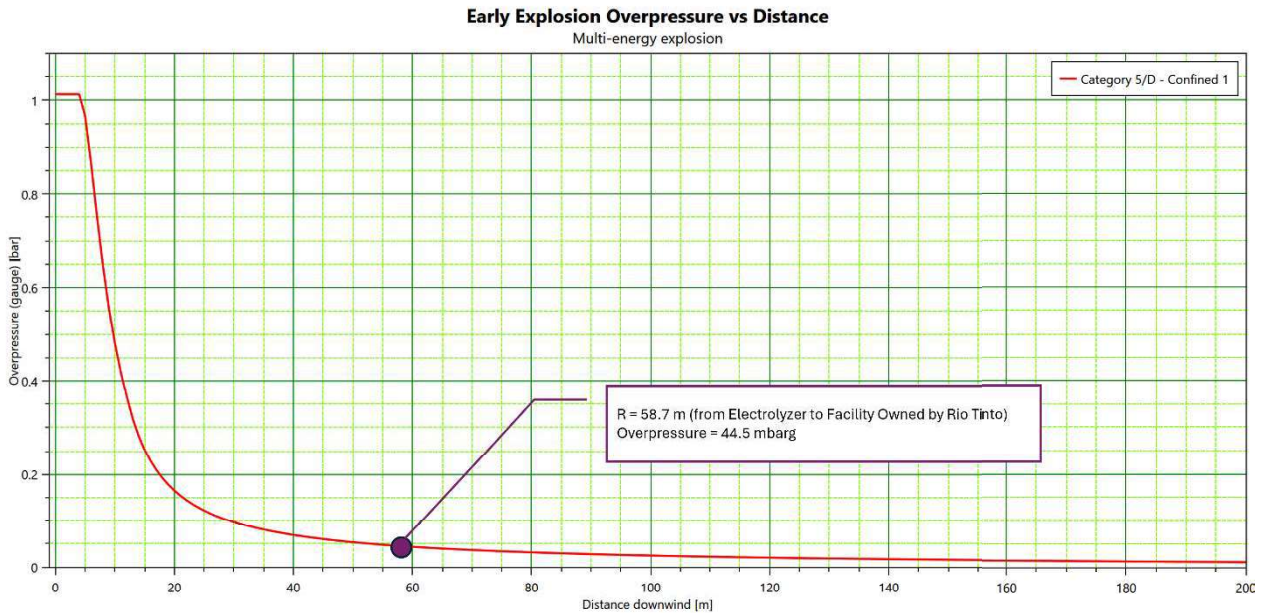


Figure 6.4 Explosion Overpressure vs Distance (Wind: 5/D)

7.3 Evaluation of Separation Distance

The summary results specified in Table 7.1 (Jet Fire Scenario) and Table 7.2 (Vapor Cloud Explosion Scenario) are evaluated to confirm safety of separation distance from control room, public road, and the facility owned by Rio Tinto.

7.3.1 Evaluation for Control Room and Public Road

Table 7.3 Evaluation for Control Room

	Heat Radiation		Overpressure	
	Distance to Object	Required Safety Distance to Object	Required Safety Distance to Object	Sufficient Safety Distance
	m	m	m	Y or N
Electrolyzer	43.1	38.6	39.9	Y
Metering System	44.5	21.3	33.2	Y

Table 7.4 Evaluation for Public Road

	Heat Radiation		Overpressure	
	Distance to Object	Required Safety Distance to Object	Required Safety Distance to Object	Sufficient Safety Distance
	m	m	m	Y or N
Electrolyzer	134.5	56.2	117.4	Y
Metering System	121.0	31.3	97.5	Y

7.3.2 Evaluation for the Facility Owned by Rio Tinto

Table 7.5 Evaluation for Warehouse in Rio Tinto

	Jet Fire		Explosion		Severity Level	Initial Acceptance	Reference Figures
	Distance to Object	Affected Maximum Heat Radiation	Affected Maximum Over Pressure				
	m	kW/m ²	mbarg	-			
Electrolyzer	58.7	3.65	44.5	1	Tolerable	Figure 1.3, 1.6, 3.3, 3.6 4.2, 4.4, 6.2 and 6.4	
Metering System	65.8	1.56	31.9	1	Tolerable	Figure 2.3, 2.6, 5.2 and 5.4	

Operating Unit

Severity level for operating unit will be "Severity Level 1" and Initial Acceptance will be

“Tolerable” because distance from Operating Unit to Electrolyzer and Metering System is longer than that from Warehouse to Electrolyzer and Metering System.

7.4 Atmospheric Vent Dispersion Study Results

Table 7.6 shows the calculation results generated from vent dispersion study for Hydrogen, Oxygen, and Nitrogen vents.

Table 7.6 Vent Dispersion Result Summary

	Type of Study	Flame Length		Dispersion Extents						Reference Figures
				Maximum Horizontal Distance		Maximum Vertical Distance (from grade)		Minimum Vertical Distance (from grade)		
		1.5/F	5/D	1.5/F	5/D	1.5/F	5/D	1.5/F	5/D	
		m	m	m	m	m	m	m	m	
Main Hydrogen Vent	Dispersion	-	-	3.72	6.90	10.18	8.55	7.51	7.42	Figure 7.1 and 7.2
	Radiation	4.00	1.78	3.29	3.11	11.67	9.61	6.86	5.36	Figure 8.1, 8.2, 8.3 and 8.4
Secondary Hydrogen Vent	Dispersion study is not required.									-
Main Oxygen Vent	Dispersion	-	-	2.65	2.89	7.48	6.76	5.86	5.87	Figure 9.1, 9.2
Secondary Oxygen Vent	Dispersion	-	-	0.85	0.54	4.79	4.66	4.63	4.63	Figure 9.3 and 9.4
Nitrogen Vents:										
Vent A (Nitrogen Generator)	Dispersion	-	-	1.12	0.86	3.04	3.02	2.95	2.98	Figure 10.1 and 10.2
Vent B (Electrolyzer Nitrogen Vent Stack)	Dispersion	-	-	1.06	0.70	3.05	3.02	2.96	2.98	Figure 10.3 and 10.4

7.4.1 Hydrogen Dispersion

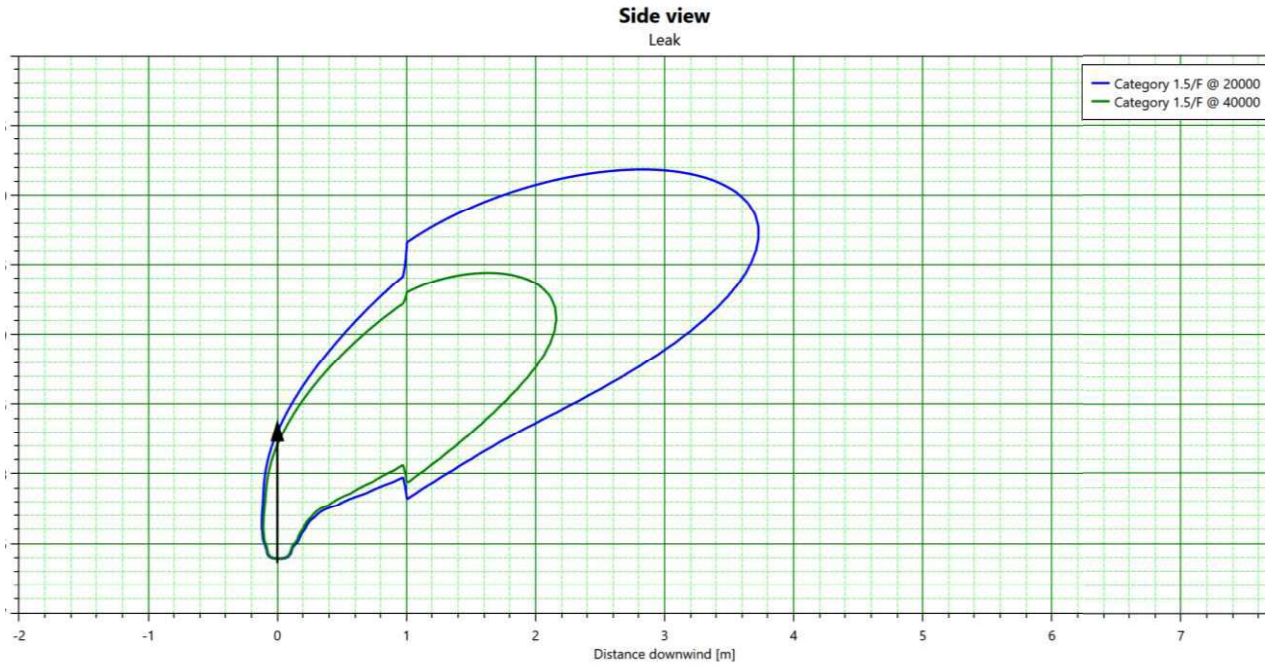


Figure 7.1 50% and 100% LFL Flammable Gas Dispersion Extent for H₂ Main Vent (Wind: 1.5/F)

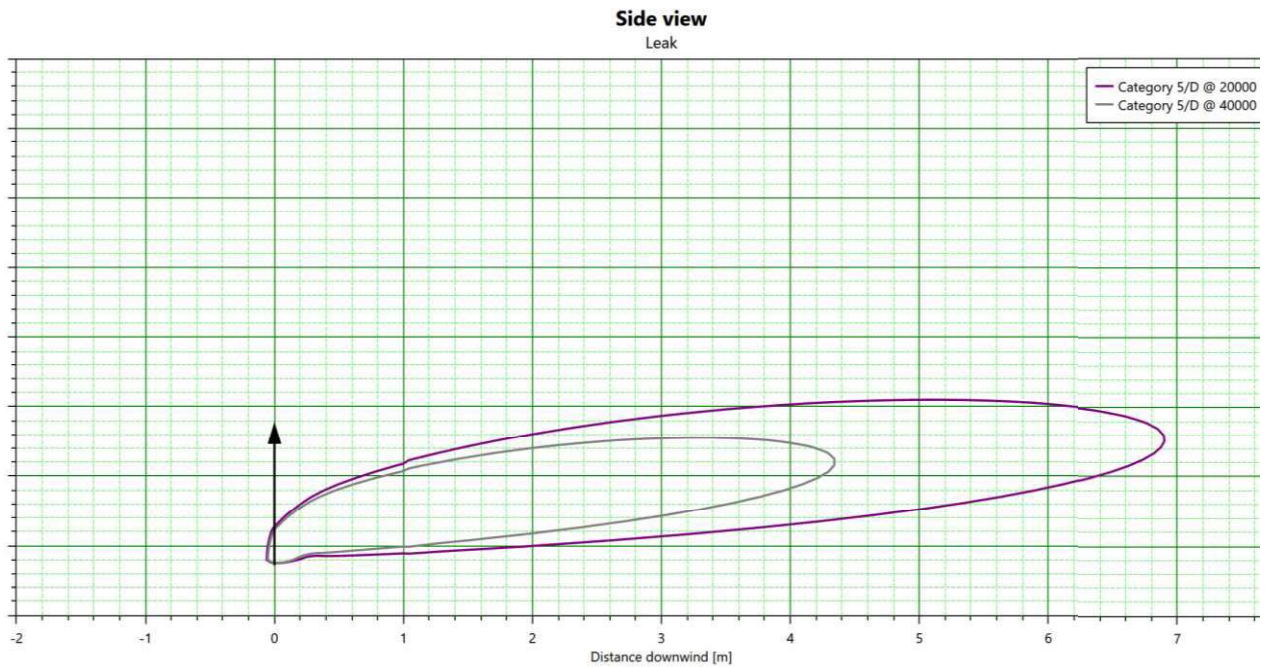


Figure 7.2 50% and 100% LFL Flammable Gas Dispersion Extent for H₂ Main Vent (Wind: 5/D)

7.4.2 Thermal Radiation Study of Ignited Dispersed H₂ Vent

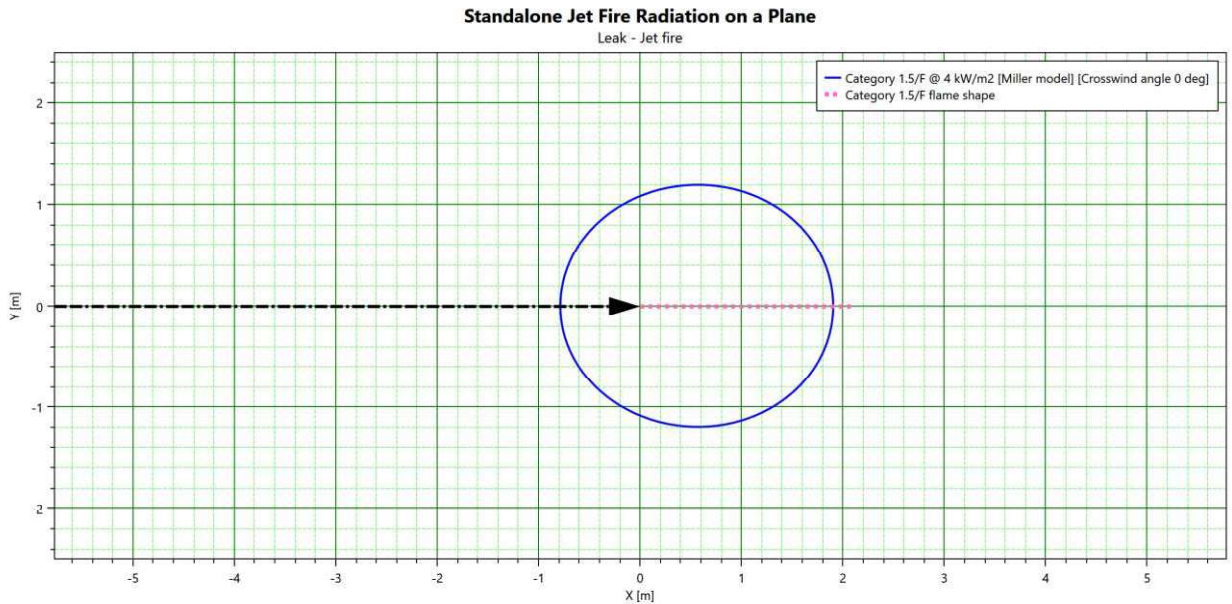


Figure 8.1 Jet Fire Heat Radiation Contour 7.36 m from the grade, Plan View (Wind: 1.5/F)

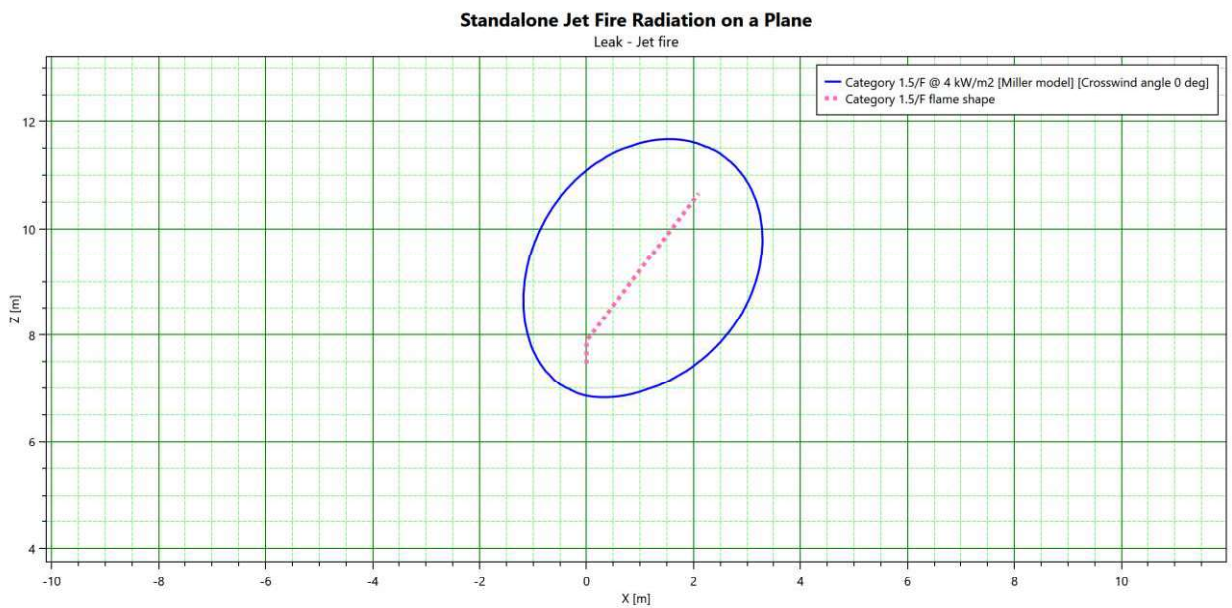


Figure 8.2 Jet Fire Heat Radiation Contour 7.36 m from the grade, Side View (Wind: 1.5/F)

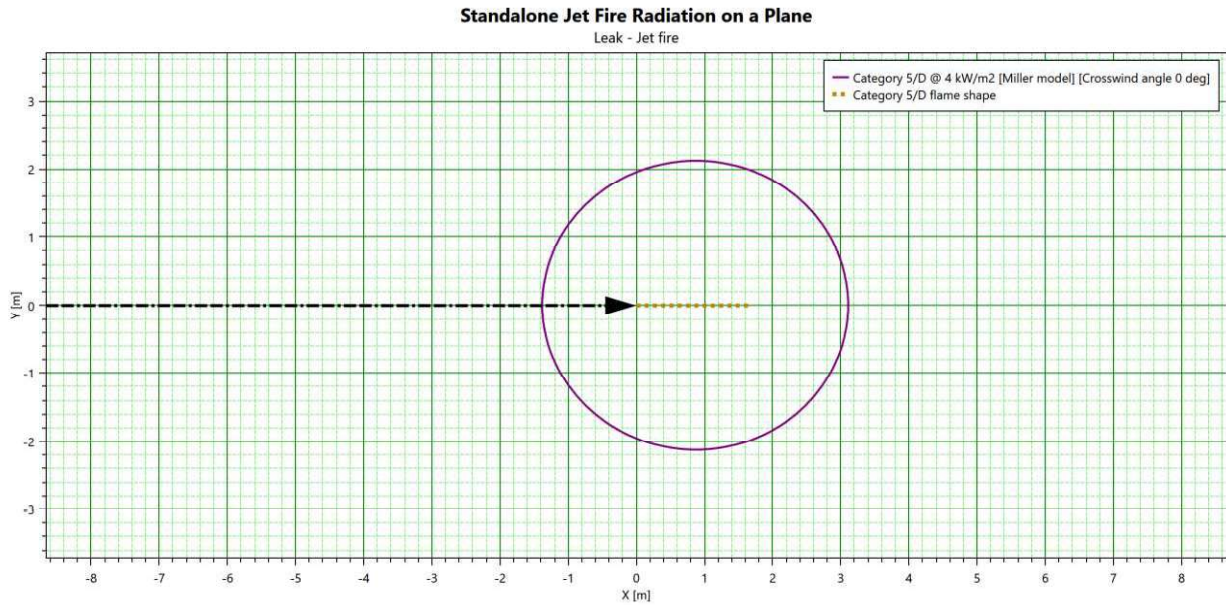


Figure 8.3 Jet Fire Heat Radiation Contour 7.36 m from the grade, Plan View (Wind: 5/D)

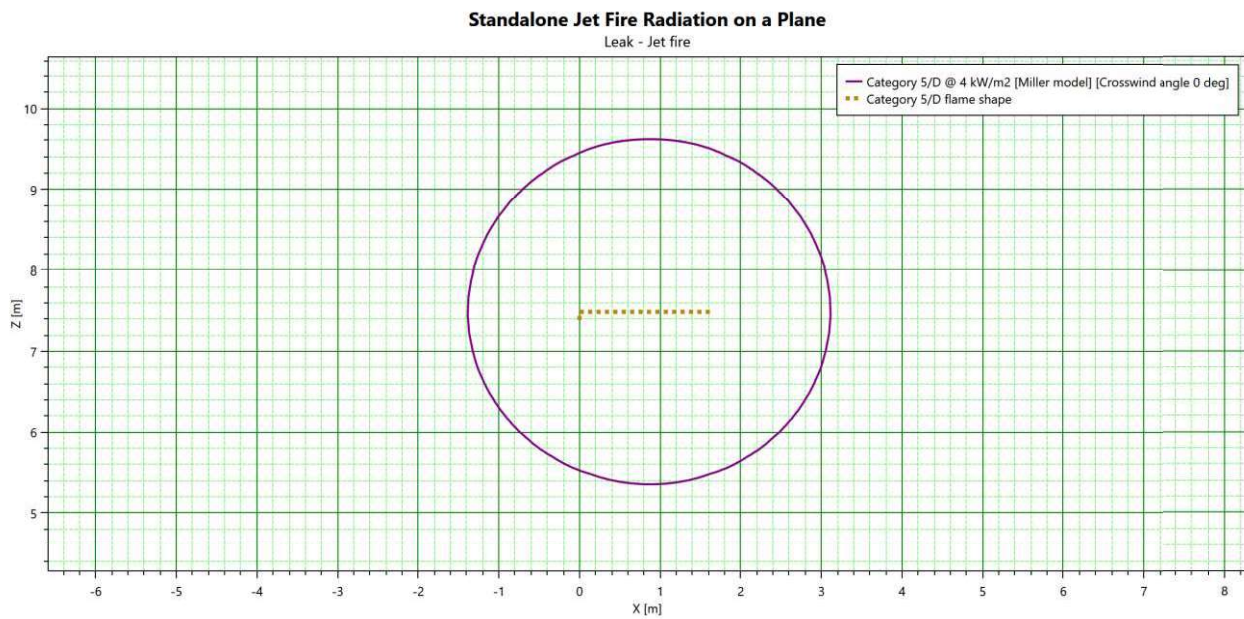


Figure 8.4 Jet Fire Heat Radiation Contour 7.36 m from the grade, Side View (Wind: 5/D)

7.4.3 Oxygen Dispersion

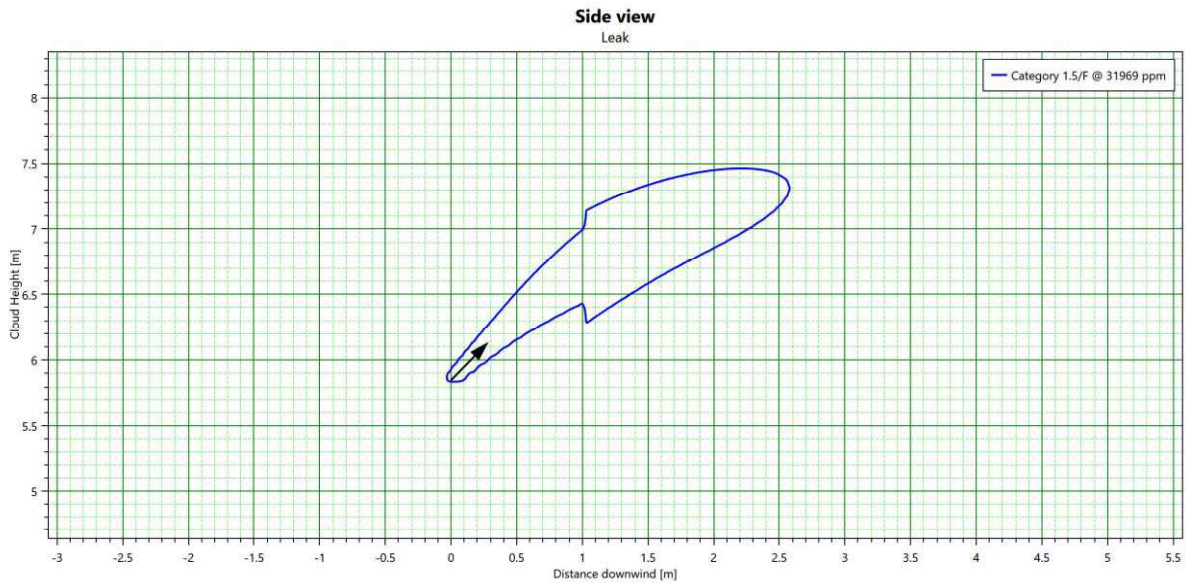


Figure 9.1 Gas Dispersion Result for O₂ Main Stack for O₂ Enrichment Criteria Limit (Wind: 1.5/F)

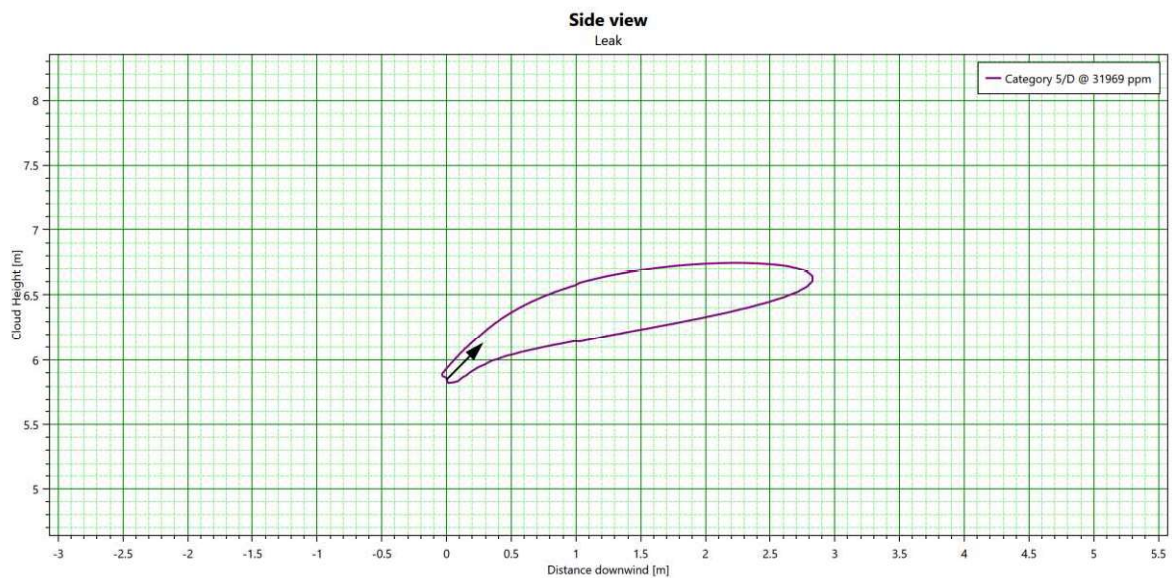


Figure 9.2 Gas Dispersion Result for O₂ Main Stack for O₂ Enrichment Criteria Limit (Wind: 5/D)

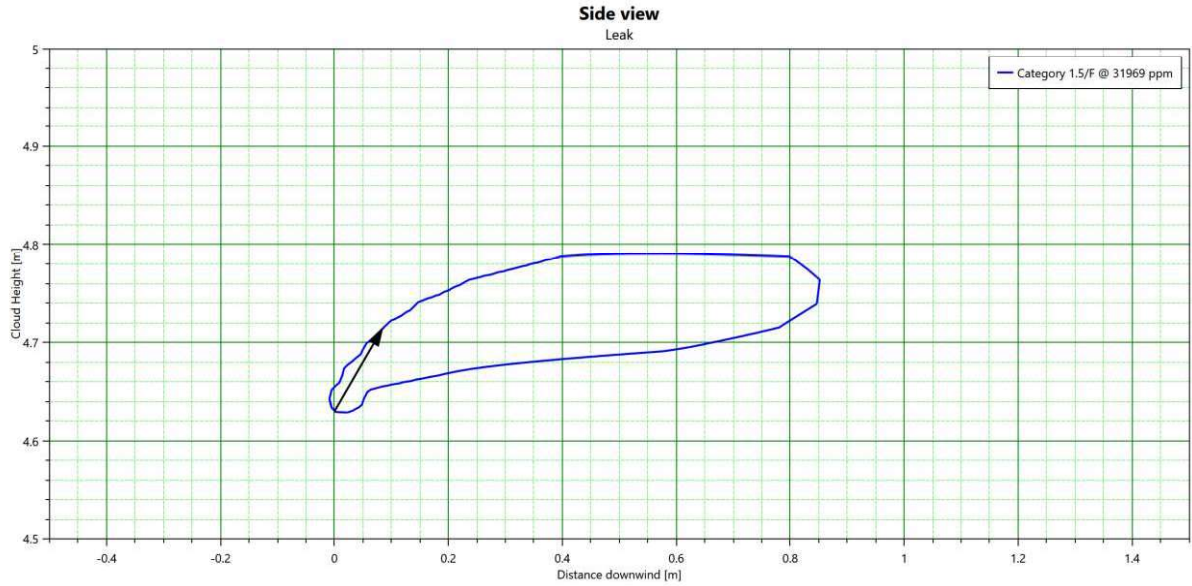


Figure 9.3 Gas Dispersion Result for O₂ Secondary Stack
for O₂ Enrichment Criteria Limit (Wind: 1.5/F)

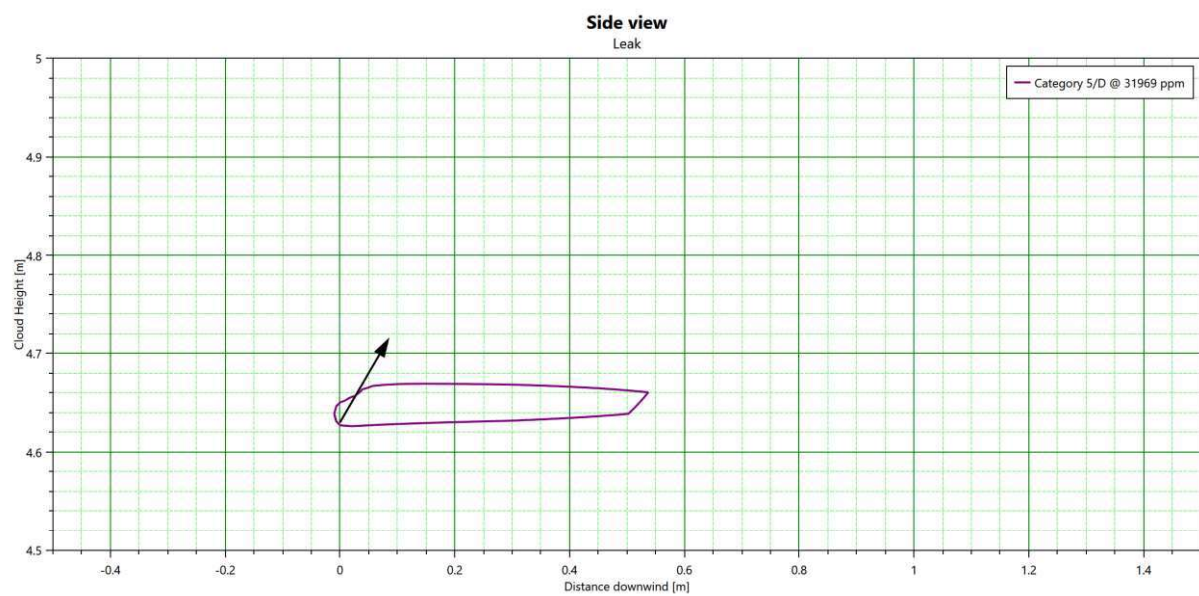


Figure 9.4 Gas Dispersion Result for O₂ Secondary Stack
for O₂ Enrichment Criteria Limit (Wind: 5/D)

7.4.4 Nitrogen Dispersion

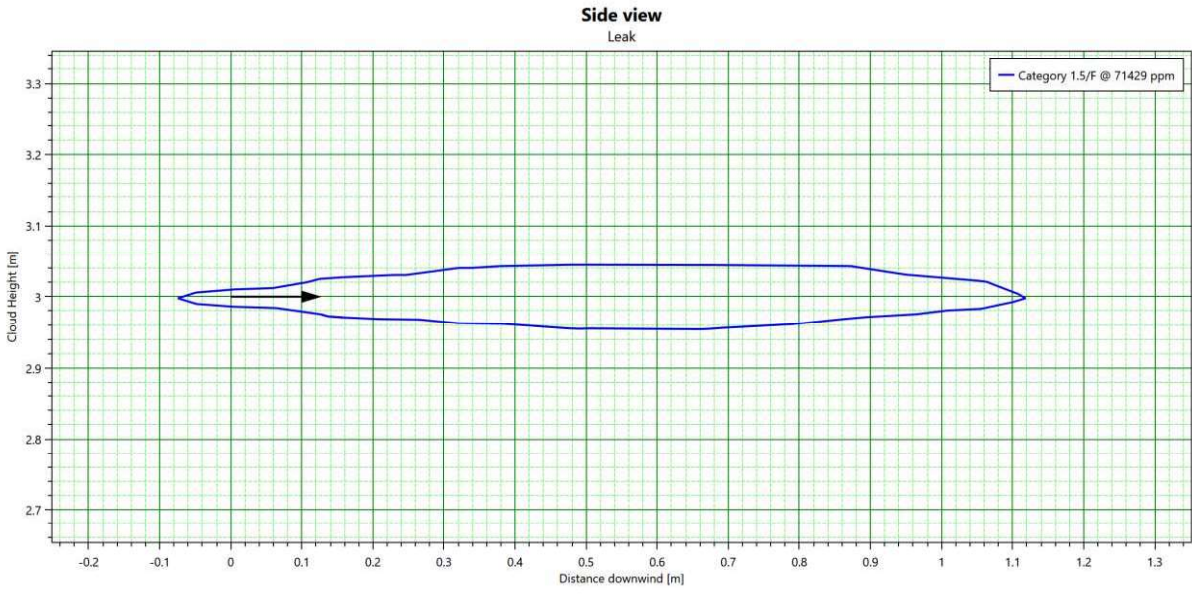


Figure 10.1 Gas Dispersion Result for Vent A for Asphyxiation Criteria Limit (Wind: 1.5/F)

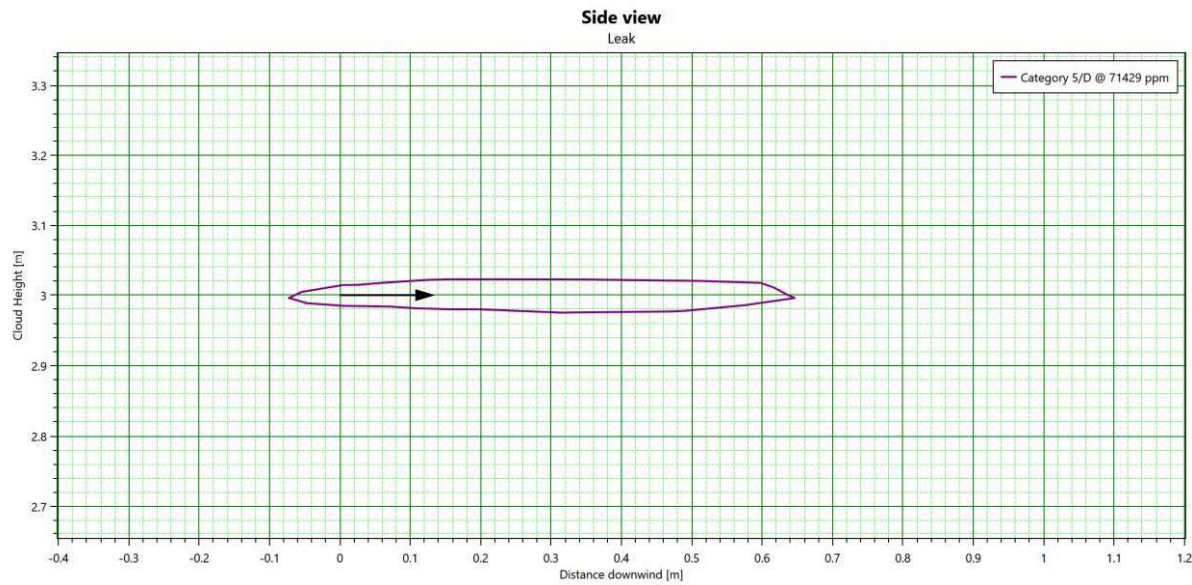


Figure 10.2 Gas Dispersion Result for Vent A for Asphyxiation Criteria Limit (Wind: 5/D)

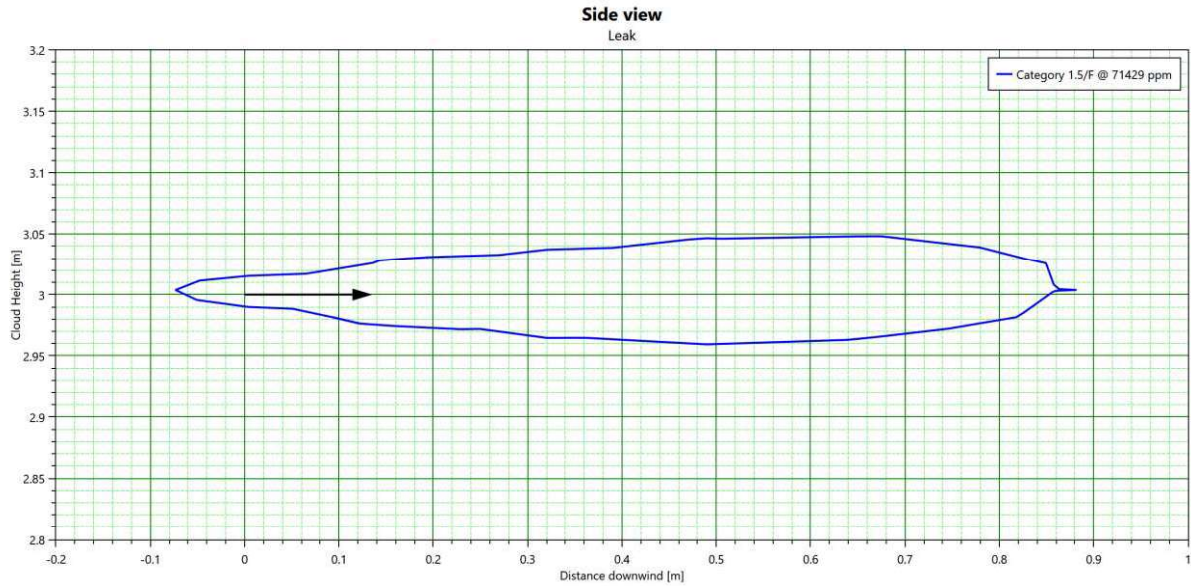


Figure 10.3 Gas Dispersion Result for Vent B for Asphyxiation Criteria Limit (Wind: 1.5/F)

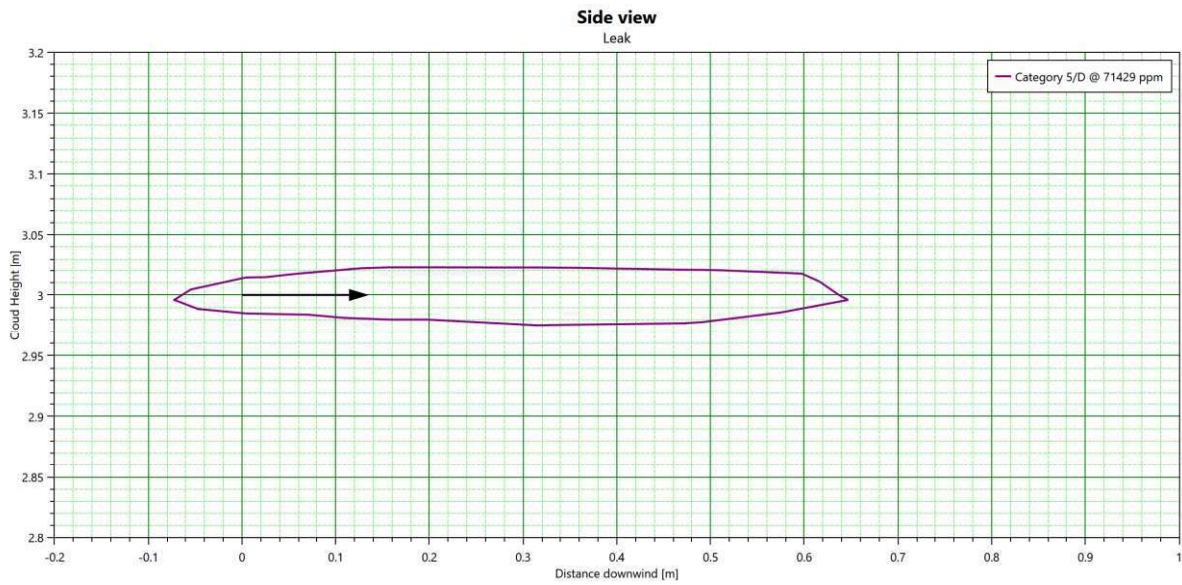


Figure 10.4 Gas Dispersion Result for Vent B for Asphyxiation Criteria Limit (Wind: 5/D)

8 CONCLUSION

FEA and ATM Vent Dispersion Studies are conducted in this report, which then conclude the following:

All concern areas, buildings, and facilities have enough separation distance from Electrolyzer Container and Metering System as per the criteria provided.

Based on the Jet Fire and Vapor Cloud Explosion results shown in Tables 7.1 and 7.2, respectively, it is confirmed that the control room and public road have adequate separation distances from the identified hazards as listed in Section 4.

In addition, the warehouse and facilities owned by Rio Tinto were given an evaluation of Severity Level 1, which is categorized tolerable as per RTA STD, GNMS0304 Mitigating process safety hazards on occupied buildings.

Furthermore, the calculation results from the atmospheric vent dispersion study provide the following conclusion:

- The main H₂ vent can be installed 7.36 m above grade. It is recommended to avoid installation of ignition sources (i.e., equipment or building) within 6.9 m radius from the current location of vent and 7.36 m above the grade.
- For the secondary H₂ vent, the released hydrogen gas was only minimal and considered insignificant. Thus, dispersion study is not required as hazardous atmosphere is not expected to happen.
- The main O₂ vent can be installed 5.9 m above grade. It is prohibited to allow any access to operators within 2.9 m radius from the vent and 5.9 m ~ 7.5 m above grade.
- The secondary O₂ vent can be installed 4.63 m above grade. It is prohibited to allow any access to operators within 0.9 m radius from the vent and 4.6 m ~ 4.7 m above grade.
- The nitrogen vents from Nitrogen Electrolyzer (Vent A) and Electrolyzer Package (Vent B) shall be installed at least 3 m above the working platform to ensure safety location criteria is applied and operator is not exposed to less than 19.5% O₂ atmosphere.

In general, the current location and height of all the vents listed in Table 7.6 are acceptable.

ATTACHMENT-1: VENDOR INFORMATION FOR VOLUME OF CONTAINER

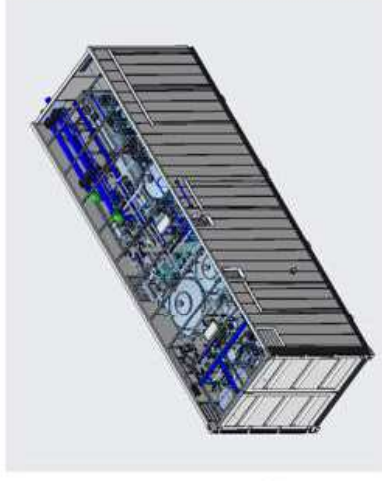
Information from Cummins

Rev. :
Job No. :
Doc. No. :

0
0-9120-20
T-00-1242-003
SHEET 43 OF 63

Volume of container (Considering inner room dimension)

- Length – 8302.10 mm
- Width- 2252.80 mm
- Height- 2639 mm
- Volume of container (Room) –
- $L \times B \times H = 49,35,71,40,152.32 \text{ mm}^3$
- $= 49.357 \text{ m}^3$
- Volume of component (Equipment's, piping, etc.)
- $V_{\text{components}} = 11.039 \text{ m}^3$



Total occupation ratio in given space : $(11.039 / 49.357) \times 100 = 22.36 \%$
Total vacant ratio in given space : $100 \% - 22.36 \% = 77.64 \%$

J-DMS
10-Nov-2024
UNCONTROLLED
UNCONTROLLED

Cummins

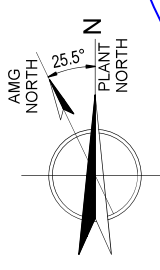
▪ Cummins restricted confidential

ATTACHMENT-2: REV. 2 PLOT PLAN

ATTACHMENT-3: PLOT CONTOURS

ATTACHMENT: 3-1: JET FIRE SCENARIO

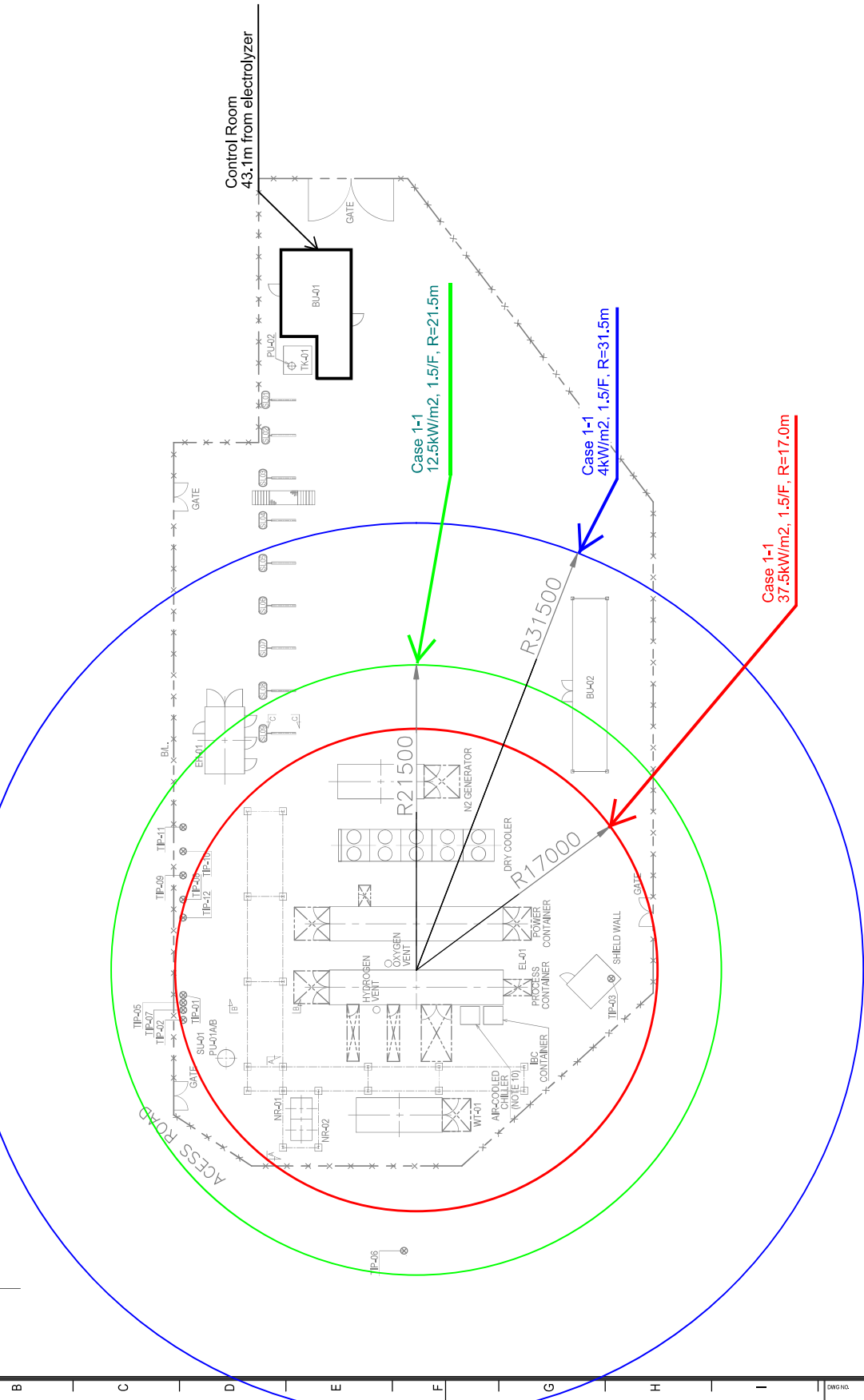
Jet Fire Scenario



Criteria for the effect of heat radiation

4 kW/m ²	: For People
12.5 kW/m ²	: For Wood / Plastic (Building)
37.5 kW/m ²	: For Equipment

Case 1-1	Flame Length		Heat Radiation	
	1.5/F	1.5/F	4 kW/m ²	12.5 kW/m ²
	m	m	m	m
	16.2	31.5	21.5	17.0



- NOTES:**
- BASED ON THE FIRE RISK ASSESSION CONDUCTED BY THE CLIENT FOR THE FACILITY.
 - 4 METERS SAFETY DISTANCE BETWEEN ELECTRICAL ZONES THROUGHOUT THE PLANT AND OPERATOR ROOM (OCCURRED BUILDING) SHALL BE REQUIRED.
 - TELEPHONE LEGIBLE.

TPA01	POTABLE WATER
TPA02	RO REJECTED WATER
TPA03	HYDROGEN
TPA04	RAW WATER
TPA05	SANITARY WASTE WATER
TPA06	FIRE WATER
TPA07	POWER (6.6KV AC 3P 50HZ)
TPA08	CONTROL
TPA09	TELECOMMUNICATIONS
TPA10	ELECTRICAL SIGNAL
TPA11	EARTHING CABLE
TPA12	EARTHING CABLE

THIS RAW WATER WILL BE UTILIZED FOR CONSTRUCTION AND MAINTENANCE PURPOSE ONLY.

THIS SANITARY WASTE WATER IS LOCATED NEAR THE PLANT FENCE LINE.

ALL TELECOMMUNICATIONS ARE INDICATING ONLY.

3. THE PLANT DATUM COORDINATES:

- AMS SYSTEM** E: 684.588 N: 283.573
- DELETED.
 - ALL COORDINATES ARE IN METERS.
 - ALL DIMENSIONS ARE IN MILLIMETERS (MM) UNLESS OTHERWISE SPECIFIED.
 - EXISTING GROUND ELEVATION IS EL+1400 ABOVE SEA LEVEL.
 - OPEN TOP RIGHT CONTAINER.
 - PROCESS CONTAINER, POWER CONTAINER, DRY COOLER, N2 GENERATOR, AIR-COOLED CHILLER, AND IBC CONTAINER ARE PART OF ELECTROLYZER PACKAGE (EL-01).

- GENERAL NOTES:**
- SIZE, LOCATION AND MAINTENANCE ZONE OF ALL EQUIPMENT PACKAGES AND BUILDING TO BE FINALIZED LATER.
 - DELETED.
 - DELETED.
 - DELETED.
 - DELETED.
 - DELETED.

REV	DATE	BY	CHKD	DESCRIPTION
1				ISSUED FOR APPROVAL
2				ISSUED FOR APPROVAL
3				ISSUED FOR APPROVAL
4				ISSUED FOR APPROVAL
5				ISSUED FOR APPROVAL
6				ISSUED FOR APPROVAL
7				ISSUED FOR APPROVAL
8				ISSUED FOR APPROVAL
9				ISSUED FOR APPROVAL
10				ISSUED FOR APPROVAL
11				ISSUED FOR APPROVAL
12				ISSUED FOR APPROVAL
13				ISSUED FOR APPROVAL
14				ISSUED FOR APPROVAL
15				ISSUED FOR APPROVAL
16				ISSUED FOR APPROVAL
17				ISSUED FOR APPROVAL
18				ISSUED FOR APPROVAL
19				ISSUED FOR APPROVAL
20				ISSUED FOR APPROVAL

PROJECT INFORMATION

PROJECT: SUMMIT HYDROGEN GLADSTONE PTY LTD

DATE: 08-MAY-2023

PROJECT NO: 0-9120-20-0000

ISSUE NO: D-00-1225-001

REVISIONS

REV	DATE	ISSUE PURPOSE	PREP'D	CHK'D	APPR'D
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

PROJECT INFORMATION

PROJECT: SUMMIT HYDROGEN GLADSTONE PTY LTD

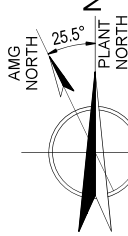
DATE: 08-MAY-2023

PROJECT NO: 0-9120-20-0000

ISSUE NO: D-00-1225-001

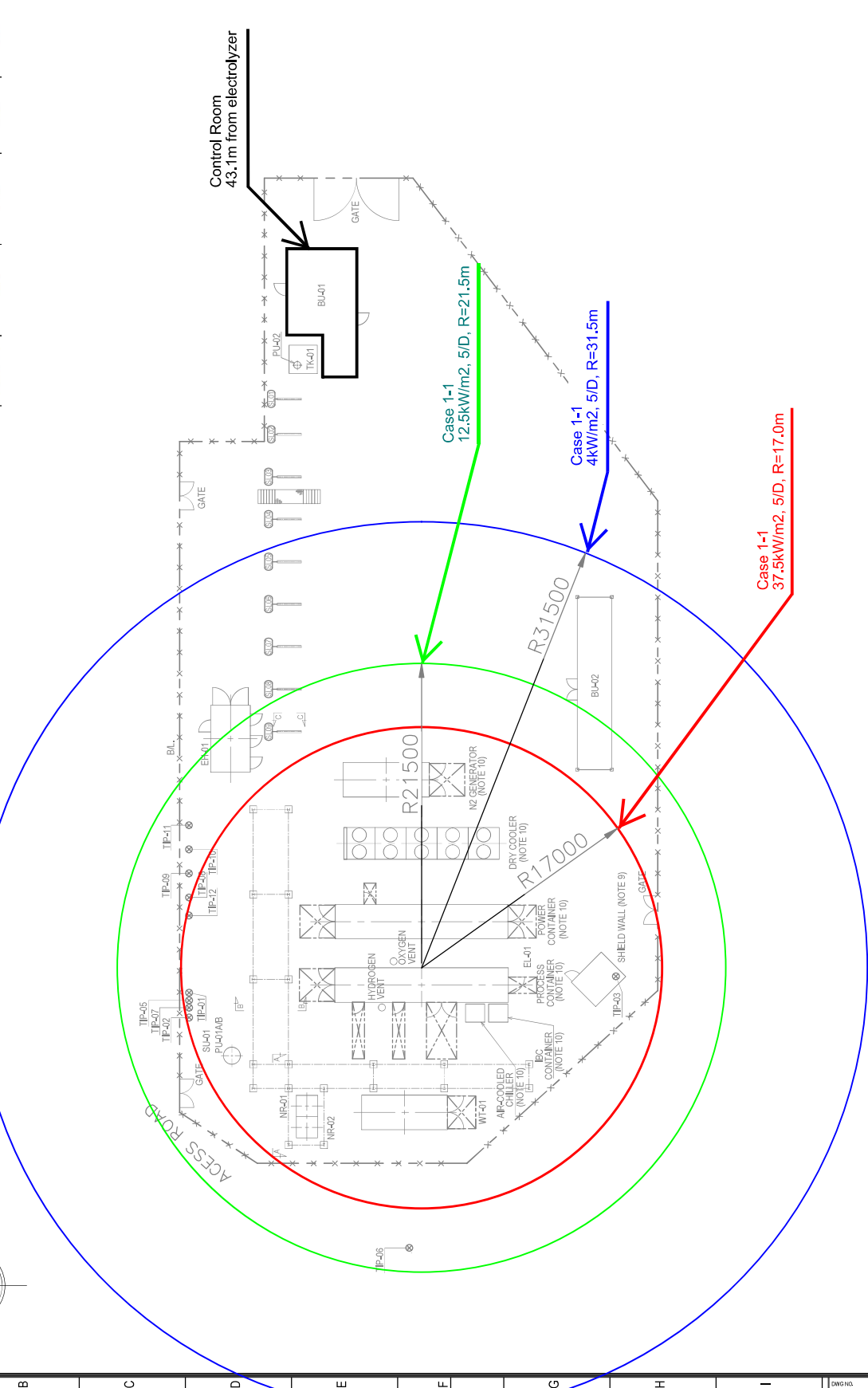
NOT TO BE USED FOR CONSTRUCTION AND BE THE PROPERTY OF JOG AND SUMMIT HYDROGEN GLADSTONE PTY LTD AND SHALL NOT BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM. WITHOUT THE WRITTEN PERMISSION OF JOG AND SUMMIT HYDROGEN GLADSTONE PTY LTD.

Jet Fire Scenario



Criteria for the effect of heat radiation
4 kW/m² : For People
12.5 kW/m² : For Wood / Plastic (Building)
37.5 kW/m² : For Equipment

Flame Length		Heat Radiation	
4 kW/m ²	12.5 kW/m ²	37.5 kW/m ²	
5/D	5/D	5/D	
m	m	m	m
16.2	31.5	21.5	17.0
Case 1-1			



ITEM	DESCRIPTION
1	POTABLE WATER
2	RO REJECTED WATER
3	HYDROGEN
4	RAW WATER
5	SANITARY WASTE WATER
6	FIRE WATER
7	POWER (6.6KV AC 3P 3W 4W)
8	CENTRAL
9	TELECOMMUNICATIONS
10	ELECTRICAL SIGNAL
11	EARTHING CABLE

THIS RAW WATER WILL BE UTILIZED FOR CONSTRUCTION AND MAINTENANCE PURPOSES ONLY.

THIS SANITARY WASTE WATER IS LOCATED NEAR THE PLANT FENCE LINE.

THE PLANT DIMENSIONS ARE INDICATIVE ONLY.

ALL ITEM LOCATIONS ARE INDICATIVE ONLY.

(AMS SYSTEM E: 654538 N: 283473)

4. DELETED.

5. ALL COORDINATES ARE IN METERS.

6. ALL DIMENSIONS ARE IN MILLIMETERS (MM) UNLESS OTHERWISE SPECIFIED.

7. EXISTING GRADE ELEVATION IS EL+1400 ABOVE SEA LEVEL.

8. OPEN TOP REFT CONTAINER.

9. PROCESS CONTAINER, POWER CONTAINER, DRY COOLER, N2 GENERATOR, AIR-COOLED CHILLER, AND IBC CONTAINER ARE PART OF ELECTROLYZER PACKAGE (ELU).

GENERAL NOTES

1. SEE LOCATION AND MAINTENANCE ZONE OF ALL EQUIPMENT PACKAGES AND BUILDING TO BE FINALIZED LATER.
2. DELETED.
3. DELETED.
4. DELETED.
5. DELETED.
6. DELETED.

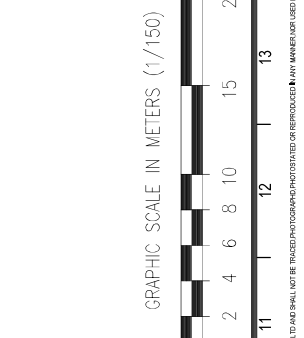
REV	DESCRIPTION	DATE	BY
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2	ISSUED FOR APPROVAL		
3	ISSUED FOR APPROVAL		
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6	ISSUED FOR APPROVAL		
7	ISSUED FOR APPROVAL		
8	ISSUED FOR APPROVAL		
9	ISSUED FOR APPROVAL		
10	ISSUED FOR APPROVAL		
11	ISSUED FOR APPROVAL		
12	ISSUED FOR APPROVAL		
13	ISSUED FOR APPROVAL		
14	ISSUED FOR APPROVAL		
15	ISSUED FOR APPROVAL		
16	ISSUED FOR APPROVAL		
17	ISSUED FOR APPROVAL		
18	ISSUED FOR APPROVAL		
19	ISSUED FOR APPROVAL		
20	ISSUED FOR APPROVAL		

Summit Hydrogen Gladstone Pty Ltd

DATE: 08-MAY-2023
PROJECT: VARGAS
SHEET: 01 of 01
SCALE: 1:150
SUB CODE: C-9120-20-000
DRAWING NO: D-00-1225-001

REV	DATE	ISSUE PURPOSE	PREP'D	CHK'D	APP'D

REVISIONS



Jet Fire Scenario

Criteria for the effect of heat radiation
 4 kW/m² : For People
 12.5 kW/m² : For Wood / Plastic (Building)
 37.5 kW/m² : For Equipment

Flame Length	Heat Radiation
1.5/F	4 kW/m ²
1.5/F	12.5 kW/m ²
1.5/F	37.5 kW/m ²
Case 1-2	
16.0 m	31.3 m
16.9 m	21.3 m
16.9 m	16.9 m

TI-01	POTABLE WATER
TI-02	DECONTAMINATED WATER
TI-03	HYDROGEN
TI-04	RAW WATER
TI-05	SEWAGE WASTE WATER
TI-06	TRIC WATER
TI-07	POWER (50V AC 3P 50Hz)
TI-08	CONTROL
TI-09	TELECOMMUNICATIONS
TI-10	ELECTRICAL SIGNAL
TI-11	ELECTRICAL SIGNAL
TI-12	EARTHING CABLE

NOTES:
 1. BASED ON THE BLEND AND EXHAUSTION CONSEQUENCE ANALYSIS T-00-1225-003
 4.1 METER SAFETY OBSTACLE BETWEEN ELECTRICAL ZERODROGERS THEM AND THE TOWER LEGS.
 2. THE TOWER LEGS:

TI-05 RAW WATER WILL BE UTILIZED FOR CONSTRUCTION AND MAINTENANCE PURPOSES.
 THIS SANITARY WASTE WATER IS COLLECTED NEAR THE PLANT FENCE LINE, QUEENSLAND PUBLIC SEWER SYSTEM.
 THIS SANITARY SEWER HEADER IS CONNECTED WITH THE PLANT FENCE LINE.
 3. THE PLANT FENCE LINE IS 10 METERS ONLY.
 4. AMG SYSTEM E: 164339 | N: 286373

4. DELETED.
 5. ALL DIMENSIONS ARE IN METERS.
 6. ALL DIMENSIONS ARE IN MILLIMETERS (UNLESS OTHERWISE SPECIFIED).
 7. EXISTING GRADE ELEVATION IS 6.100 ABOVE SEA LEVEL.
 8. DELETED.
 9. DELETED.
 10. PROCESS CONTAINER, POWER CONTAINER, DRY COOLER, NO GENERATOR AIR-COOLED CHILLER, AND IBC CONTAINER ARE PART OF ELECTRICAL PACKAGE (EL-01).

GENERAL HOLDS:
 1. BUILDING FOOTING AND MAINTENANCE ZONE OF ALL EQUIPMENT PACKAGES AND BUILDINGS TO BE FINISHED UNDER.
 2. DELETED.
 3. DELETED.
 4. DELETED.
 5. DELETED.
 6. DELETED.

ASE 1	Issue	Date
ASE 1	Issue	Date
ASE 2	Issue	Date
ASE 3	Issue	Date
ASE 4	Issue	Date
ASE 5	Issue	Date
ASE 6	Issue	Date
ASE 7	Issue	Date
ASE 8	Issue	Date
ASE 9	Issue	Date
ASE 10	Issue	Date
ASE 11	Issue	Date
ASE 12	Issue	Date
ASE 13	Issue	Date
ASE 14	Issue	Date
ASE 15	Issue	Date
ASE 16	Issue	Date
ASE 17	Issue	Date
ASE 18	Issue	Date
ASE 19	Issue	Date
ASE 20	Issue	Date

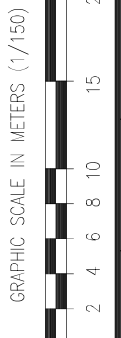
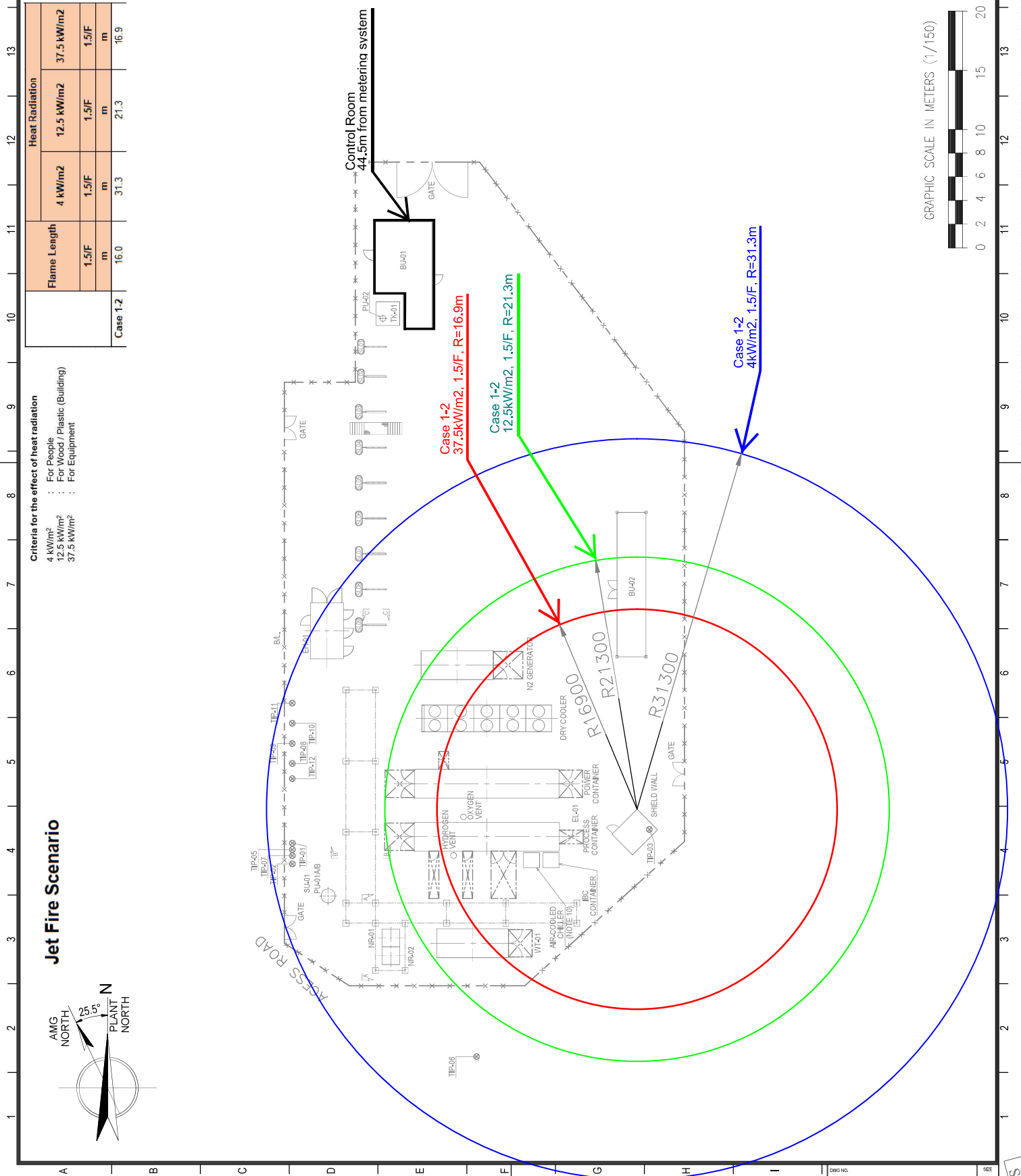
Rev	Date	Issue Purpose	Prep'd	Chkd	App'd
1	04/11/2023	ISSUED FOR APPROVAL	JM	AP	AA
2	04/11/2023	ISSUED FOR APPROVAL	JM	RJ	AA
0	04/11/2023	ISSUED FOR APPROVAL	JM	RJ	AA

DWG NO.	TITLE
D-00-1225-001	FOUNDATION DRAWINGS
D-00-1225-002	FOUNDATION DRAWINGS
D-00-1225-003	FOUNDATION DRAWINGS
D-00-1225-004	FOUNDATION DRAWINGS
D-00-1225-005	FOUNDATION DRAWINGS
D-00-1225-006	FOUNDATION DRAWINGS
D-00-1225-007	FOUNDATION DRAWINGS
D-00-1225-008	FOUNDATION DRAWINGS
D-00-1225-009	FOUNDATION DRAWINGS
D-00-1225-010	FOUNDATION DRAWINGS
D-00-1225-011	FOUNDATION DRAWINGS
D-00-1225-012	FOUNDATION DRAWINGS
D-00-1225-013	FOUNDATION DRAWINGS
D-00-1225-014	FOUNDATION DRAWINGS
D-00-1225-015	FOUNDATION DRAWINGS
D-00-1225-016	FOUNDATION DRAWINGS
D-00-1225-017	FOUNDATION DRAWINGS
D-00-1225-018	FOUNDATION DRAWINGS
D-00-1225-019	FOUNDATION DRAWINGS
D-00-1225-020	FOUNDATION DRAWINGS
D-00-1225-021	FOUNDATION DRAWINGS
D-00-1225-022	FOUNDATION DRAWINGS
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D-00-1225-024	FOUNDATION DRAWINGS
D-00-1225-025	FOUNDATION DRAWINGS
D-00-1225-026	FOUNDATION DRAWINGS
D-00-1225-027	FOUNDATION DRAWINGS
D-00-1225-028	FOUNDATION DRAWINGS
D-00-1225-029	FOUNDATION DRAWINGS
D-00-1225-030	FOUNDATION DRAWINGS
D-00-1225-031	FOUNDATION DRAWINGS
D-00-1225-032	FOUNDATION DRAWINGS
D-00-1225-033	FOUNDATION DRAWINGS
D-00-1225-034	FOUNDATION DRAWINGS
D-00-1225-035	FOUNDATION DRAWINGS
D-00-1225-036	FOUNDATION DRAWINGS
D-00-1225-037	FOUNDATION DRAWINGS
D-00-1225-038	FOUNDATION DRAWINGS
D-00-1225-039	FOUNDATION DRAWINGS
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D-00-1225-042	FOUNDATION DRAWINGS
D-00-1225-043	FOUNDATION DRAWINGS
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D-00-1225-047	FOUNDATION DRAWINGS
D-00-1225-048	FOUNDATION DRAWINGS
D-00-1225-049	FOUNDATION DRAWINGS
D-00-1225-050	FOUNDATION DRAWINGS

Rev	Date	Issue Purpose	Prep'd	Chkd	App'd
1	04/11/2023	ISSUED FOR APPROVAL	JM	AP	AA
2	04/11/2023	ISSUED FOR APPROVAL	JM	RJ	AA
0	04/11/2023	ISSUED FOR APPROVAL	JM	RJ	AA

Summit Hydrogen Gladstone Pty Ltd
 16/01/2024
 0-9120-20-000
 D-00-1225-001

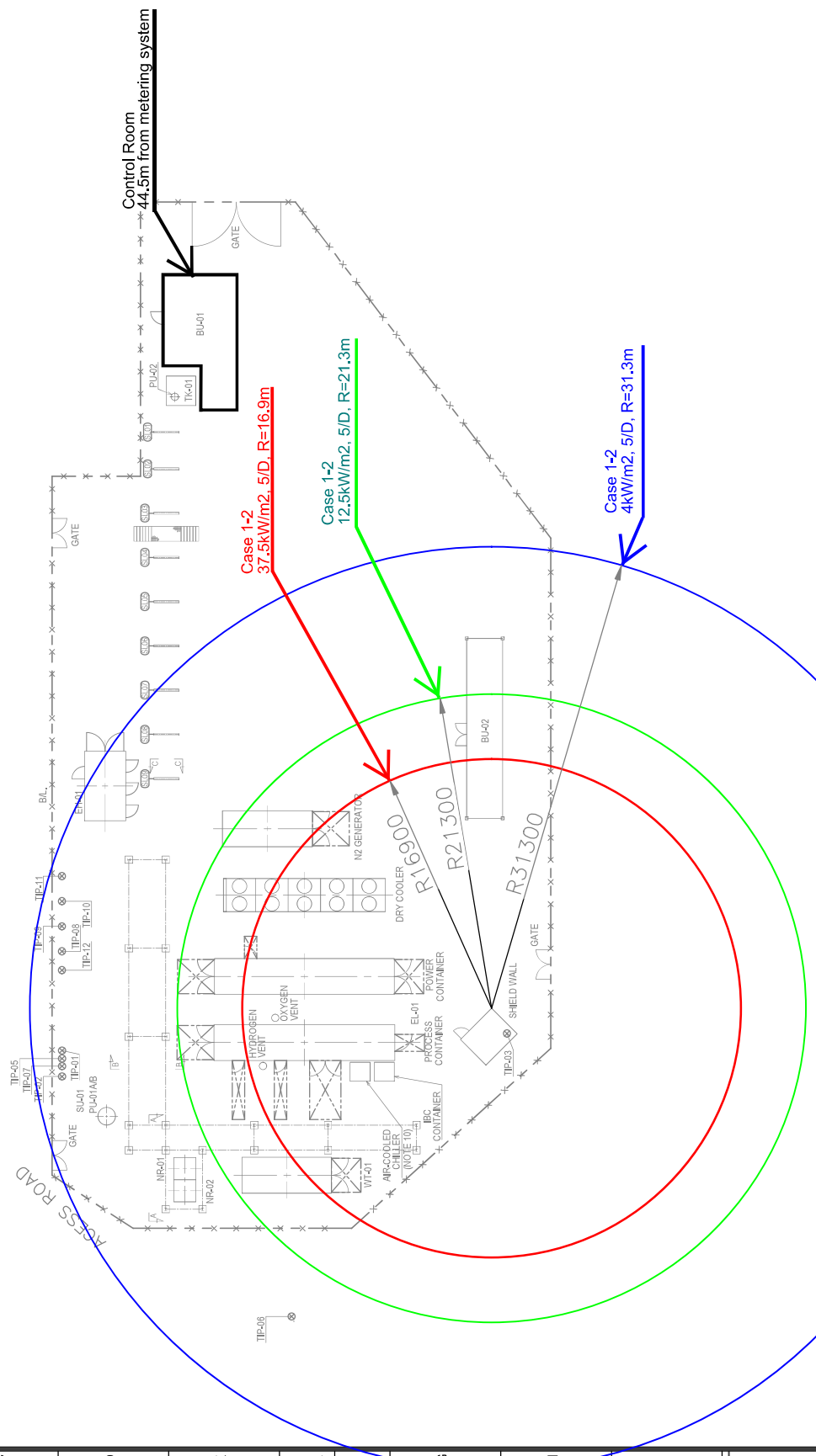
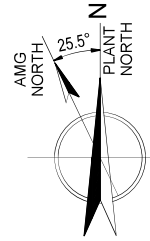
Sheet	Scale	Sheet No.	Total Sheets
01 of 01	1:150	1	1



Jet Fire Scenario

Criteria for the effect of heat radiation
 4 kW/m² : For People
 12.5 kW/m² : For Wood / Plastic (Building)
 37.5 kW/m² : For Equipment

Flame Length		Heat Radiation	
4 kW/m ²	12.5 kW/m ²	37.5 kW/m ²	37.5 kW/m ²
5/D	5/D	5/D	5/D
m	m	m	m
15.0	31.3	21.3	15.9
Case 1-2			



GRAPHIC SCALE IN METERS (1/150)

0 2 4 6 8 10 12 14 16 18 20

NOTES:
 1. BASED ON THE BLEND AND EXHAUSTION CONSEQUENCE ANALYSIS T-04-024-003
 41 METER SAFETY DISTANCE BETWEEN ELECTRICAL ZEHRA DROGHER TERN AND
 THE NEAREST OCCUPIED BUILDING SHALL BE MAINTAINED.
 2. THE TERN LEGEND:

TP-01	POTABLE WATER
TP-02	REJECTED WATER
TP-03	HYDROGEN
TP-04	RAW WATER
TP-05	SECONDARY WASTE WATER
TP-06	TRIC WATER
TP-07	TRIC WATER
TP-08	POWER (50W AC 3P 50Hz)
TP-09	CONTROL
TP-10	TELECOMMUNICATIONS
TP-11	ELECTRICAL SIGNAL
TP-12	EARTHING CABLE

TP-05 RAW WATER WILL BE UTILIZED FOR CONSTRUCTION AND MAINTENANCE
 PURPOSES ONLY.
 THIS SANITARY WASTE WATER IS COLLECTED NEAR THE PLANT FENCE LINE,
 QUEENSLAND PUBLIC SEWER SYSTEM.
 3. THE PLANT TERN LEGENDS ONLY.

AMG SYSTEM | E: 0643308 | T: 2863373

- DELETED.
- DELETED.
- DELETED.
- DELETED.
- DELETED.
- DELETED.
- EXISTING GRADE ELEVATIONS IS +0.0 ABOVE SEA LEVEL.
- DELETED.
- DELETED.
- DELETED.
- PROCESS CONTAINER, POWER CONTAINER, DRY COOLER, N2 GENERATOR,
 AIR-COOLED CHILLER, AND IBC CONTAINER ARE PART OF ELECTRICAL
 PACKAGE (EL-01).

GENERAL NOTES:

- MAINTAIN 10 METER MINIMUM CLEARANCE ZONE OF ALL EQUIPMENT PACKAGES AND
 BUILDINGS TO THE UNPAVED TERN.
- DELETED.
- DELETED.
- DELETED.
- DELETED.
- DELETED.

GENERAL HOLIDAYS:

- MAINTAIN 10 METER MINIMUM CLEARANCE ZONE OF ALL EQUIPMENT PACKAGES AND
 BUILDINGS TO THE UNPAVED TERN.
- DELETED.
- DELETED.
- DELETED.
- DELETED.
- DELETED.

ASE 1	Issue No.	Date	Description	By	Checked By
ASE 1	001	01/01/2023	Issue for approval	J. VARGAS	A. ALBERCA
ASE 2	002	01/01/2023	Issue for approval	J. VARGAS	A. ALBERCA
ASE 3	003	01/01/2023	Issue for approval	J. VARGAS	A. ALBERCA
ASE 4	004	01/01/2023	Issue for approval	J. VARGAS	A. ALBERCA

Rev	Date	Issue Purpose	Prep'd	Chkd	App'd
0	01/01/2023	ISSUED FOR APPROVAL	J. VARGAS	A. ALBERCA	
1	01/01/2023	ISSUED FOR APPROVAL	J. VARGAS	A. ALBERCA	
2	01/01/2023	ISSUED FOR APPROVAL	J. VARGAS	A. ALBERCA	

DWG NO.	TITLE
D-00-1225-001	FIRE PROTECTION EQUIPMENT LAYOUT DRAWING
D-00-1300-001	PIPING PLAN DRAWING
D-00-1375-001	INSTRUMENT CABLE ROUTE LAYOUT
D-00-1392-001	ELECTRICAL CABLE ROUTE LAYOUT
D-00-1395-001	TELECOMMUNICATION CABLE ROUTE LAYOUT
D-00-1398-001	FOUNDATION DRAWINGS
D-00-1401-001	FOUNDATION DRAWINGS

Rev	Date	Issue Purpose	Prep'd	Chkd	App'd
0	01/01/2023	ISSUED FOR APPROVAL	J. VARGAS	A. ALBERCA	
1	01/01/2023	ISSUED FOR APPROVAL	J. VARGAS	A. ALBERCA	
2	01/01/2023	ISSUED FOR APPROVAL	J. VARGAS	A. ALBERCA	

Scale: 1:150

Scale: 1:150

Scale: 1:150

Scale: 1:150

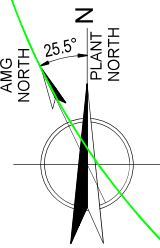
Scale: 1:150

DWG NO. D-00-1225-001

SEE A1

Criteria for the effect of heat radiation
 4 kW/m² : For People
 12.5 kW/m² : For Wood / Plastic (Building)
 37.5 kW/m² : For Equipment

Jet Fire Scenario



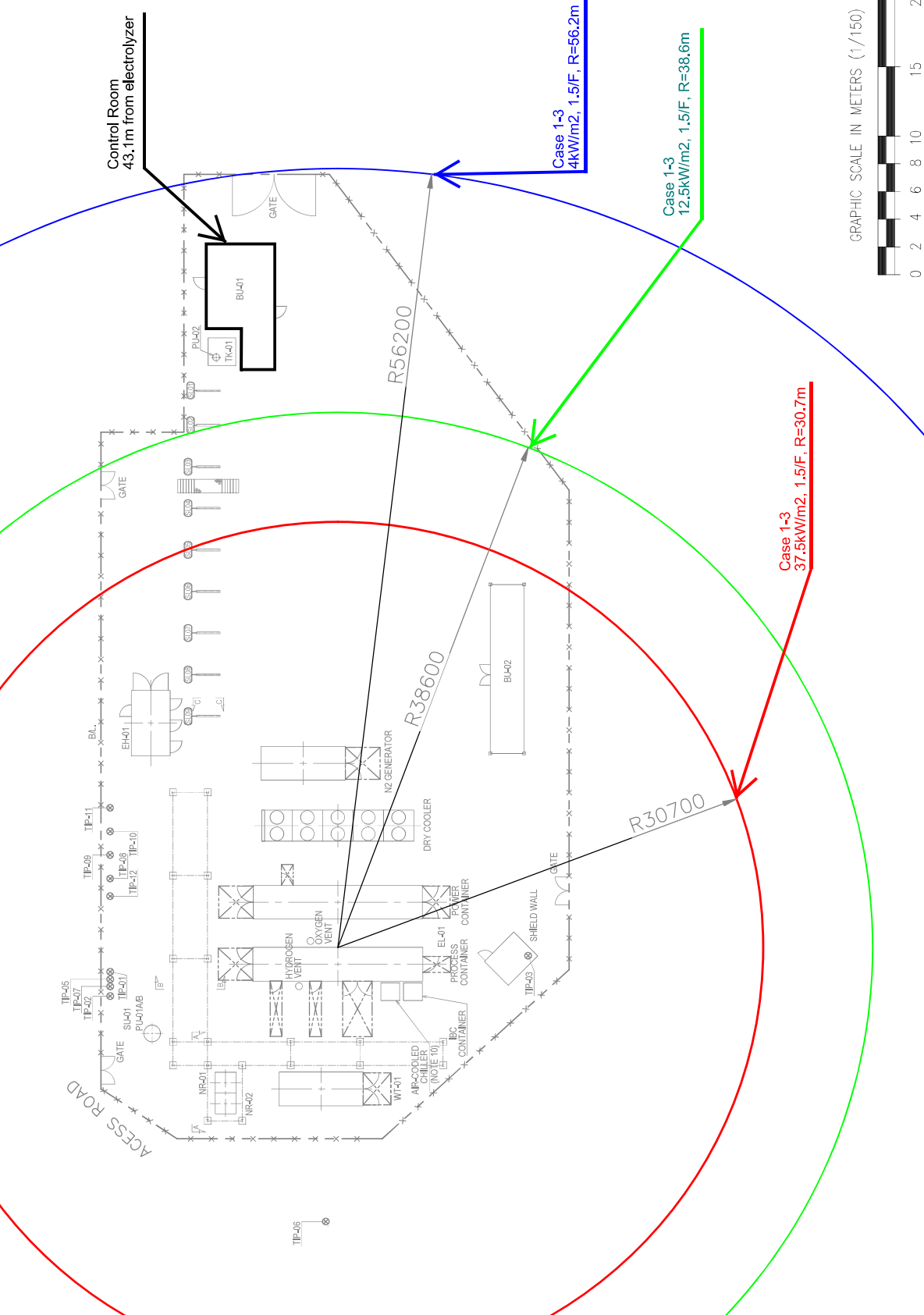
Flame Length	Heat Radiation
1.5F	4 kW/m ²
1.5F	12.5 kW/m ²
56.2	37.5 kW/m ²

TIPO1	POTABLE WATER
TIPO2	RO REJECTED WATER
TIPO3	HYDROGEN
TIPO4	RAW WATER
TIPO5	SANITARY WASTE WATER
TIPO6	FIRE WATER
TIPO7	POWER (6.0V AC/3P/50HZ)
TIPO8	CONTROL
TIPO9	TELECOMMUNICATIONS
TIPO10	ELECTRICAL SIGNAL
TIPO11	EARTHING CABLE

TIPO8 RAW WATER WILL BE UTILIZED FOR CONSTRUCTION AND MAINTENANCE PURPOSE ONLY.
 TIPO6 SANITARY WASTE WATER IS LOCATED NEAR THE PLANT FENCE LINE.
 TIPO5 SANITARY SEWER HEADER IS CONNECTED WITH THE PLANT FENCE LINE.
 ALL TIPO LOCATIONS ARE INDICATING ONLY.
 3. THE PLANT DATUM COORDINATES:
 (AMS SYSTEM) E: 684.589 N: 263.673

1. BASED ON THE FIRE AND GAS ASSESSMENT CONDUCTED BY AMEC, THE PACKAGES OPERA ROOM OCCURRED BETWEEN ELECTROLYZER THROUGH TERN AND 2. TERN POINT LEGION.
1. ALL COORDINATES ARE IN METERS.
2. ALL DIMENSIONS ARE IN MILLIMETERS (MM) UNLESS OTHERWISE SPECIFIED.
3. EXISTING GRADE ELEVATION IS EL+1400 ABOVE SEA LEVEL.
4. OPEN TOP TERN CONTAINER.
5. PROCESS CONTAINER, POWER CONTAINER, DRY COOLER, N2 GENERATOR, AIR-COOLED CHILLER, AND IBC CONTAINER ARE PART OF ELECTROLYZER PACKAGE (EL-01).
6. GENERAL LIQUIDS.
7. SITE LOCATION AND MAINTENANCE ZONE OF ALL EQUIPMENT PACKAGES AND BUILDING TO BE FINALIZED LATER.
8. DELETED.
9. DELETED.
10. DELETED.
11. DELETED.
12. DELETED.

REV	DATE	DESCRIPTION	BY	CHKD
1	08-MAY-2023	ISSUED FOR APPROVAL	SW	AP
2	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
3	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
4	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
5	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
6	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
7	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
8	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
9	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
10	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
11	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
12	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
13	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
14	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
15	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
16	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
17	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
18	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
19	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
20	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV



GRAPHIC SCALE IN METERS (1/150)



REV	DATE	ISSUED FOR APPROVAL	BY	CHKD
1	08-MAY-2023	ISSUED FOR APPROVAL	SW	AP
2	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
3	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
4	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
5	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
6	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
7	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
8	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
9	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
10	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
11	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
12	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
13	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
14	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
15	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
16	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
17	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
18	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
19	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
20	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV

REV	DATE	ISSUED FOR APPROVAL	BY	CHKD
1	08-MAY-2023	ISSUED FOR APPROVAL	SW	AP
2	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
3	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
4	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
5	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
6	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
7	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
8	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
9	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
10	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
11	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
12	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
13	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
14	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
15	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
16	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
17	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
18	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
19	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
20	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV

REV	DATE	ISSUED FOR APPROVAL	BY	CHKD
1	08-MAY-2023	ISSUED FOR APPROVAL	SW	AP
2	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
3	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
4	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
5	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
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19	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
20	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV

REV	DATE	ISSUED FOR APPROVAL	BY	CHKD
1	08-MAY-2023	ISSUED FOR APPROVAL	SW	AP
2	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
3	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
4	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
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18	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
19	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV
20	08-MAY-2023	ISSUED FOR APPROVAL	SW	RV

1. FIRE PROTECTION EQUIPMENT LAYOUT DRAWING
 2. FIRING PLAN DRAWING
 3. INSTRUMENT CABLE ROUTE LAYOUT
 4. ELECTRICAL CABLE ROUTE LAYOUT
 5. TELECOMMUNICATION CABLE ROUTE LAYOUT
 6. FOUNDATION DRAWINGS

1. Approved without comment
 2. Issued for approval
 3. Issued for approval
 4. Issued for approval
 5. Issued for approval
 6. Issued for approval
 7. Issued for approval
 8. Issued for approval
 9. Issued for approval
 10. Issued for approval
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 13. Issued for approval
 14. Issued for approval
 15. Issued for approval
 16. Issued for approval
 17. Issued for approval
 18. Issued for approval
 19. Issued for approval
 20. Issued for approval

Public Road(HANSON ROAD)
134.5m from electrolyzer

Jet Fire Scenario

Flame Length	Heat Radiation	
	4 kW/m ²	5/D
5/D	m	m
Case 1-1	16.2	31.5
Case 1-2	16.0	31.3
Case 1-3	29.5	56.2

(refer to 6.2 for the meaning of "5/D")

Criteria for the effect of heat radiation

- 4 kW/m² for People
 - 12.5 kW/m² for Wood / Plastic (Building)
 - 37.5 kW/m² for Equipment
- (refer to table 6.6 in 6.7.1.1)

Warehouse
58.7m from electrolyzer

Case 1-2
4kW/m², 5/D, R=31.3m

Case 1-1
4kW/m², 5/D, R=31.5m

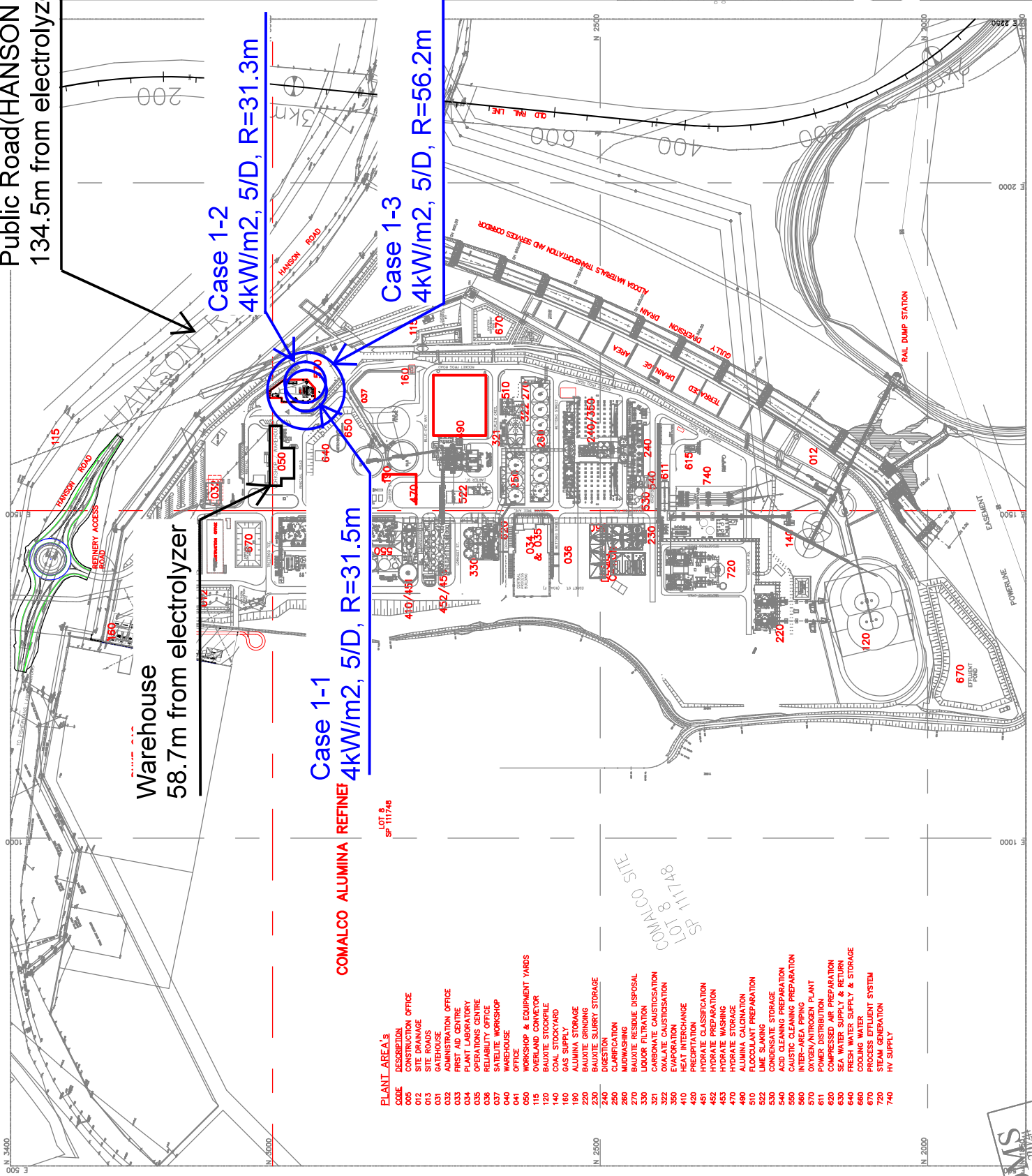
Case 1-3
4kW/m², 5/D, R=56.2m

COMALCO ALUMINA REFINERY

LOT 8
SP 111748

PLANT AREA'S

005	CONSTRUCTION OFFICE
012	SITE DRAINAGE
013	SITE ROADS
031	GATEHOUSE
032	ADMINISTRATION OFFICE
033	FIRST AID CENTRE
034	OPERATIONS OFFICE
035	OPERATIONS CONTROL
036	RELIABILITY OFFICE
037	SATELLITE WORKSHOP
040	WAREHOUSE
041	OFFICE
044	WORKSHOP & EQUIPMENT YARDS
050	OVERLAND CONVEYOR
115	BAUXITE STOCKPILE
120	BAUXITE STOCKPILE
180	BAUXITE STOCKPILE
180	GAS SUPPLY YARD
180	ALUMINA STORAGE
220	BAUXITE GRINDING
230	BAUXITE SLURRY STORAGE
240	DIGESTION
250	CLARIFICATION
250	MUDWASHING
270	BAUXITE RESIDUE DISPOSAL
300	HYDRATE PREPARATION
300	CARBONATE CAUSTICATION
302	CARBONATE CAUSTICATION
350	EVAPORATION
410	HEAT INTERCHANGE
420	PRECIPITATION
451	HYDRATE CLASSIFICATION
452	HYDRATE PREPARATION
453	HYDRATE WASHING
480	ALUMINA CALCINATION
480	ALUMINA CALCINATION
510	FLOCCULANT PREPARATION
522	LIME SLAKING
530	CONDENSATE STORAGE
540	ACID CLEANING PREPARATION
550	CAUSTIC CLEANING PREPARATION
560	INTER-AREA PIPING
570	OXYGEN/NITROGEN PLANT
600	COMPRESSED AIR PREPARATION
630	FRESH WATER SUPPLY & RETURN
640	SEA WATER SUPPLY & STORAGE
660	COOLING WATER
670	PROCESS EFFLUENT SYSTEM
720	STEAM GENERATION
740	HW SUPPLY



COMALCO ALUMINA REFINERY - STAGES 1, 2 & 3 GENERAL ARRANGEMENT

DATE: 17/10/2009
DRAWN BY: [Name]
CHECKED BY: [Name]
SCALE: 1:2000

BECHTEL AUSTRALIA PTY LTD
A.C.N. 006 338 595
COMPETENTIAL BUSINESS INFORMATION
OF COMALCO

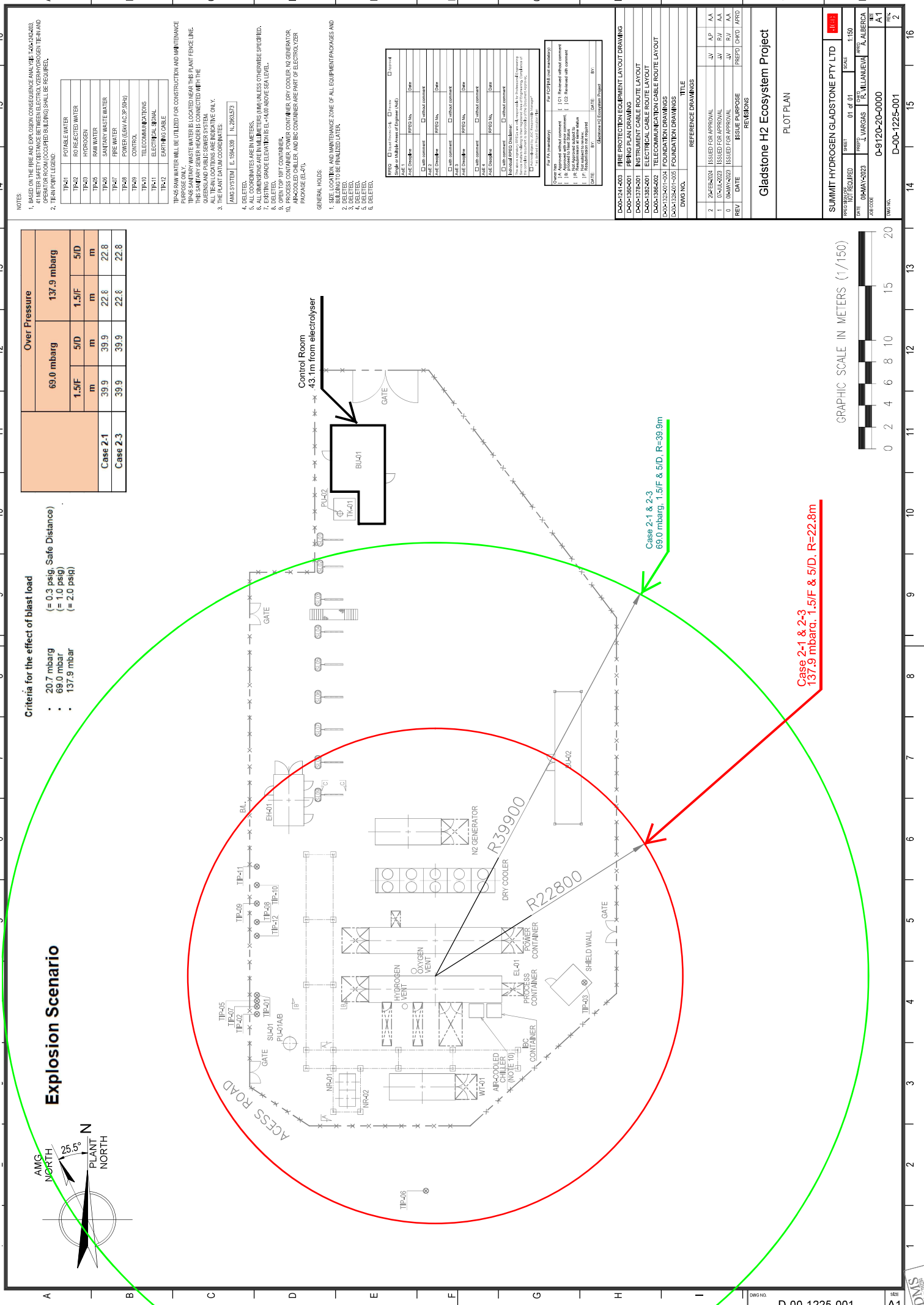
COMALCO ALUMINA REFINERY

REFINERY SITE
STAGE 1
PLOT PLAN

AREA: 000
SCALE: X
DRAWING NO: 000X(2D)10002
DATE: 17/10/2009

J-DIMS
10-MAY-2010
98% COLLATED AND RECHECKED

ATTACHMENT: 3-2: EXPLOSION SCENARIO

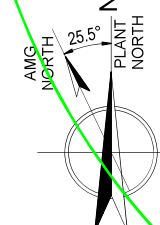


Criteria for the effect of blast load

- 20.7 mbarg (= 0.3 psig, Safe Distance)
- 69.0 mbar (= 1.0 psig)
- 137.9 mbar (= 2.0 psig)

Over Pressure		137.9 mbarg
Case 2-1	5/D	5/D
Case 2-3	1.5/F	1.5/F
	m	m
	39.9	39.9
	22.8	22.8
	39.9	22.8
	22.8	22.8

Explosion Scenario

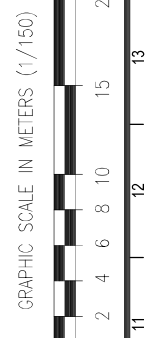


TIPO#	DESCRIPTION
TIPO1	POTABLE WATER
TIPO2	RO REJECTED WATER
TIPO3	HYDROGEN
TIPO4	RAW WATER
TIPO5	SANITARY WASTE WATER
TIPO6	FIRE WATER
TIPO7	POWER (6.6KV AC 3P 3W4)
TIPO8	CONTROL
TIPO9	TELECOMMUNICATIONS
TIPO10	ELECTRICAL SIGNAL
TIPO11	EARTHING CABLE

TIPO8 RAW WATER WILL BE UTILIZED FOR CONSTRUCTION AND MAINTENANCE PURPOSE ONLY.
 TIPO6 SANITARY WASTE WATER IS LOCATED NEAR THE PLANT FENCE LINE.
 THIS SANITARY SEWER HEADER IS CONNECTED WITH THE PLANT FENCE LINE.
 ALL TIE-IN LOCATIONS ARE INDICATING ONLY.
 3. THE PLANT DATUM COORDINATES:
 (AMS SYSTEM) E: 684589 N: 268373
 4. DELETED.
 5. ALL COORDINATES ARE IN METERS.
 6. ALL DIMENSIONS ARE IN MILLIMETERS (MM) UNLESS OTHERWISE SPECIFIED.
 7. EXISTING GROUND ELEVATION IS EL+1400 ABOVE SEA LEVEL.
 8. OPEN TOP TANK CONTAINER.
 9. PROCESS CONTAINER, POWER CONTAINER, DRY COOLER, N2 GENERATOR, AIR-COOLED CHILLER, AND IBC CONTAINER ARE PART OF ELECTROLYZER PACKAGE (EL41).
 GENERAL NOTES:
 1. SIZE, LOCATION AND MAINTENANCE ZONE OF ALL EQUIPMENT PACKAGES AND BUILDING TO BE FINALIZED LATER.
 2. DELETED.
 3. DELETED.
 4. DELETED.
 5. DELETED.
 6. DELETED.

REV	DATE	DESCRIPTION	BY	CHKD
1		ISSUED FOR APPROVAL	SW	AP
2		ISSUED FOR APPROVAL	SW	AP
3		ISSUED FOR APPROVAL	SW	AP
4		ISSUED FOR APPROVAL	SW	AP
5		ISSUED FOR APPROVAL	SW	AP
6		ISSUED FOR APPROVAL	SW	AP
7		ISSUED FOR APPROVAL	SW	AP
8		ISSUED FOR APPROVAL	SW	AP
9		ISSUED FOR APPROVAL	SW	AP
10		ISSUED FOR APPROVAL	SW	AP
11		ISSUED FOR APPROVAL	SW	AP
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14		ISSUED FOR APPROVAL	SW	AP
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16		ISSUED FOR APPROVAL	SW	AP
17		ISSUED FOR APPROVAL	SW	AP
18		ISSUED FOR APPROVAL	SW	AP
19		ISSUED FOR APPROVAL	SW	AP
20		ISSUED FOR APPROVAL	SW	AP

DWG NO.	TITLE
D-00-1225-001	FOUNDATION DRAWINGS
D-00-1225-002	FOUNDATION DRAWINGS
D-00-1225-003	FOUNDATION DRAWINGS
D-00-1225-004	FOUNDATION DRAWINGS
D-00-1225-005	FOUNDATION DRAWINGS
D-00-1225-006	FOUNDATION DRAWINGS
D-00-1225-007	FOUNDATION DRAWINGS
D-00-1225-008	FOUNDATION DRAWINGS
D-00-1225-009	FOUNDATION DRAWINGS
D-00-1225-010	FOUNDATION DRAWINGS
D-00-1225-011	FOUNDATION DRAWINGS
D-00-1225-012	FOUNDATION DRAWINGS
D-00-1225-013	FOUNDATION DRAWINGS
D-00-1225-014	FOUNDATION DRAWINGS
D-00-1225-015	FOUNDATION DRAWINGS
D-00-1225-016	FOUNDATION DRAWINGS
D-00-1225-017	FOUNDATION DRAWINGS
D-00-1225-018	FOUNDATION DRAWINGS
D-00-1225-019	FOUNDATION DRAWINGS
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D-00-1225-021	FOUNDATION DRAWINGS
D-00-1225-022	FOUNDATION DRAWINGS
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D-00-1225-027	FOUNDATION DRAWINGS
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D-00-1225-031	FOUNDATION DRAWINGS
D-00-1225-032	FOUNDATION DRAWINGS
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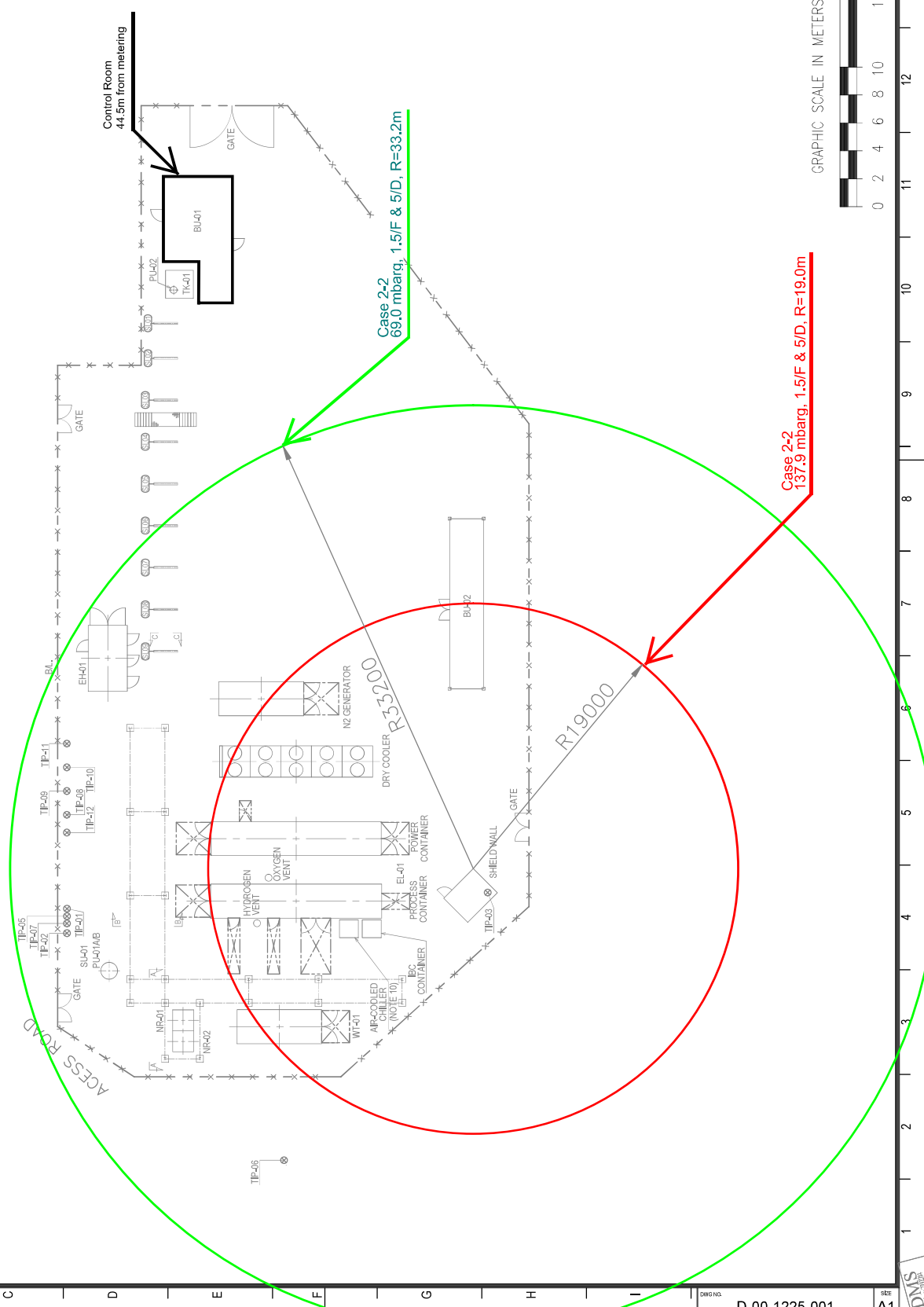
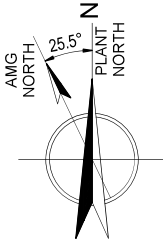


NOTE: THIS DRAWING IS THE PROPERTY OF SUMMIT HYDROGEN GLADSTONE PTY LTD AND SHALL NOT BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF SUMMIT HYDROGEN GLADSTONE PTY LTD. © 2023

Explosion Scenario

- Criteria for the effect of blast load**
- 20.7 mbarg (= 0.3 psig, Safe Distance)
 - 69.0 mbarg (= 1.0 psig)
 - 137.9 mbarg (= 2.0 psig)

Case 2-2	Over Pressure	
	69.0 mbarg	137.9 mbarg
1.5/F	5/D	1.5/F 5/D
m	m	m
33.2	33.2	19.0
		19.0



Case 2-2
137.9 mbarg, 1.5/F & 5/D, R=19.0m

Case 2-2
69.0 mbarg, 1.5/F & 5/D, R=33.2m

GRAPHIC SCALE IN METERS (1/150)



- NOTES:**
- BASED ON THE FIRE AND EXPLOSION CONSEQUENCE ANALYSIS FOR PACKAGES 41 METERS SAFETY DISTANCE BETWEEN ELECTRICAL ZONES THROUGHOUT THE PLANT AND OPERATOR ROOM (OCCURRED BUILDING) SHALL BE REQUIRED.
 - TECHNICAL LEGEND:

- TECHNICAL LEGEND:**
- | | |
|--------|------------------------|
| TPA-01 | POTABLE WATER |
| TPA-02 | RO REJECTED WATER |
| TPA-03 | HYDROGEN |
| TPA-04 | RAW WATER |
| TPA-05 | SANITARY WASTE WATER |
| TPA-06 | FIRE WATER |
| TPA-07 | POWER (6.6KV / 4.16KV) |
| TPA-08 | CONTROL |
| TPA-09 | TELECOMMUNICATIONS |
| TPA-10 | ELECTRICAL SIGNAL |
| TPA-11 | ELECTRICAL CABLE |
| TPA-12 | EARTHING CABLE |

- TECHNICAL LEGEND (continued):**
- TRASH CAN WATER WILL BE UTILIZED FOR CONSTRUCTION AND MAINTENANCE PURPOSE ONLY.
- TPA-05 SANITARY WASTE WATER IS LOCATED NEAR THE PLANT FENCE LINE. THIS SANITARY SEWER HEADER IS CONNECTED WITH THE PLANT FENCE LINE. ALL TELEM LOCATIONS ARE INDICATING ONLY.
3. THE PLANT DATUM COORDINATES:
- (AMS SYSTEM) E: 684.589 N: 283.573
4. DELETED.
 5. ALL COORDINATES ARE IN METERS.
 6. ALL DIMENSIONS ARE IN MILLIMETERS (UNLESS OTHERWISE SPECIFIED).
 7. EXISTING GRADE ELEVATION IS EL+1400 ABOVE SEA LEVEL.
 8. OPEN TOP TANK CONTAINER.
 9. PROCESS CONTAINER, POWER CONTAINER, DRY COOLER, N2 GENERATOR, AIR-COOLED CHILLER, AND IBC CONTAINER ARE PART OF ELECTRICAL PACKAGE (ELN).

- GENERAL NOTES:**
1. SITE LOCATION AND MAINTENANCE ZONE OF ALL EQUIPMENT PACKAGES AND BUILDINGS TO BE FINALIZED LATER.
 2. DELETED.
 3. DELETED.
 4. DELETED.
 5. DELETED.
 6. DELETED.

REVISIONS

NO.	DESCRIPTION	DATE	BY	CHKD.
1	ISSUED FOR APPROVAL			
2	ISSUED FOR APPROVAL			
3	ISSUED FOR APPROVAL			
4	ISSUED FOR APPROVAL			
5	ISSUED FOR APPROVAL			
6	ISSUED FOR APPROVAL			
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9	ISSUED FOR APPROVAL			
10	ISSUED FOR APPROVAL			

FOR EPCM CONTRACT

NO.	DESCRIPTION	DATE	BY	CHKD.
1	ISSUED FOR APPROVAL			
2	ISSUED FOR APPROVAL			
3	ISSUED FOR APPROVAL			
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REFERENCE DRAWINGS

NO.	DESCRIPTION	DATE	BY	CHKD.
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8	ISSUED FOR APPROVAL			
9	ISSUED FOR APPROVAL			
10	ISSUED FOR APPROVAL			

PROJECT INFORMATION

PROJECT NO.	08-AMV-2023
PROJECT NAME	GLADSTONE H2 ECOSYSTEM PROJECT
CLIENT	01 OF 01
SCALE	1:150
DATE	08-MAY-2023
PROJECT MANAGER	M. VARGAS
PROJECT ENGINEER	M. VILLANUEVA
PROJECT LOCATION	ALBERCA
PROJECT CODE	0-9120-20-0000
PROJECT TITLE	D-00-1225-001
PROJECT NO.	

PROJECT INFORMATION (continued)

PROJECT NO.	08-AMV-2023
PROJECT NAME	GLADSTONE H2 ECOSYSTEM PROJECT
CLIENT	01 OF 01
SCALE	1:150
DATE	08-MAY-2023
PROJECT MANAGER	M. VARGAS
PROJECT ENGINEER	M. VILLANUEVA
PROJECT LOCATION	ALBERCA
PROJECT CODE	0-9120-20-0000
PROJECT TITLE	D-00-1225-001
PROJECT NO.	



Public Road(HANSON ROAD)
134.5m from electrolyzer

Explosion Scenario

	Over Pressure			
	20.7 mbarg	69.0 mbarg	1.5/F	5/D
Case 2-1	117.4	117.4	38.9	38.9
Case 2-2	97.5	97.5	33.2	33.2
Case 2-3	117.4	117.4	38.9	38.9

(refer to 6.2 for the meaning of "1.5/F" and "5/D")
Criteria for the effect of blast load

- 20.7 mbarg (= 0.3 psig, Safe Distance)
 - 69.0 mbarg (= 1.0 psig)
 - 137.9 mbarg (= 2.0 psig)
- (refer to table 6.7 in 6.7.1.2)

Warehouse
58.7m from electrolyzer

COMALCO Case 2-1 & 2-3

69.0 mbarg, 1.5/F & 5/D, R=39.9m

Case 2-2
69.0 mbarg, 1.5/F & 5/D, R=33.2m

Case 2-2

01: 20.7 mbarg, 1.5/F & 5/D, R=97.5m

Case 2-1 & 2-3

20.7 mbarg, 1.5/F & 5/D, R=117.4m

PLANT AREA'S

CODE	DESCRIPTION
005	CONSTRUCTION OFFICE
012	SITE DRAINAGE
013	SITE ROADS
031	GATEHOUSE
032	ADMINISTRATION OFFICE
033	FIRST AID CENTRE
034	LABORATORY
035	OPERATIONS OFFICE
036	RELIABILITY OFFICE
037	SATELLITE WORKSHOP
040	WAREHOUSE
044	OFFICE
050	WORKSHOP & EQUIPMENT YARDS
115	OVERLAND CONVEYOR
120	BAUXITE STOCKPILE
180	BAUXITE WHARF
180	GAS SUPPLY YARD
180	ALUMINA STORAGE
220	BAUXITE GRINDING
230	BAUXITE SLURRY STORAGE
240	DIGESTION
250	CLARIFICATION
260	MUDWASHING
270	BAUXITE RESIDUE DISPOSAL
300	HYDRATE PREPARATION
320	CARBONATE CAUSTICATION
322	OxALATE CAUSTICATION
350	EVAPORATION
410	HEAT INTERCHANGE
420	PRECIPITATION
451	HYDRATE CLASSIFICATION
452	HYDRATE PREPARATION
453	HYDRATE WASHING
480	ALUMINA CALCINATION
490	ALUMINA CALCINATION
510	FLOCCULANT PREPARATION
522	LIME SLAKING
530	CONDENSATE STORAGE
540	ACID CLEANING PREPARATION
550	CAUSTIC CLEANING PREPARATION
560	INTER-AREA PIPING
570	OXYGEN/NITROGEN PLANT
600	COMPRESSED AIR PREPARATION
630	FRESH WATER SUPPLY & RETURN
640	SEA WATER SUPPLY & STORAGE
660	COOLING WATER
670	PROCESS EFFLUENT SYSTEM
720	STEAM GENERATION
740	HW SUPPLY

BECHTEL AUSTRALIA PTY LTD
A.C.N. 006 338 595
CONFIDENTIAL BUSINESS INFORMATION
OF COMALCO

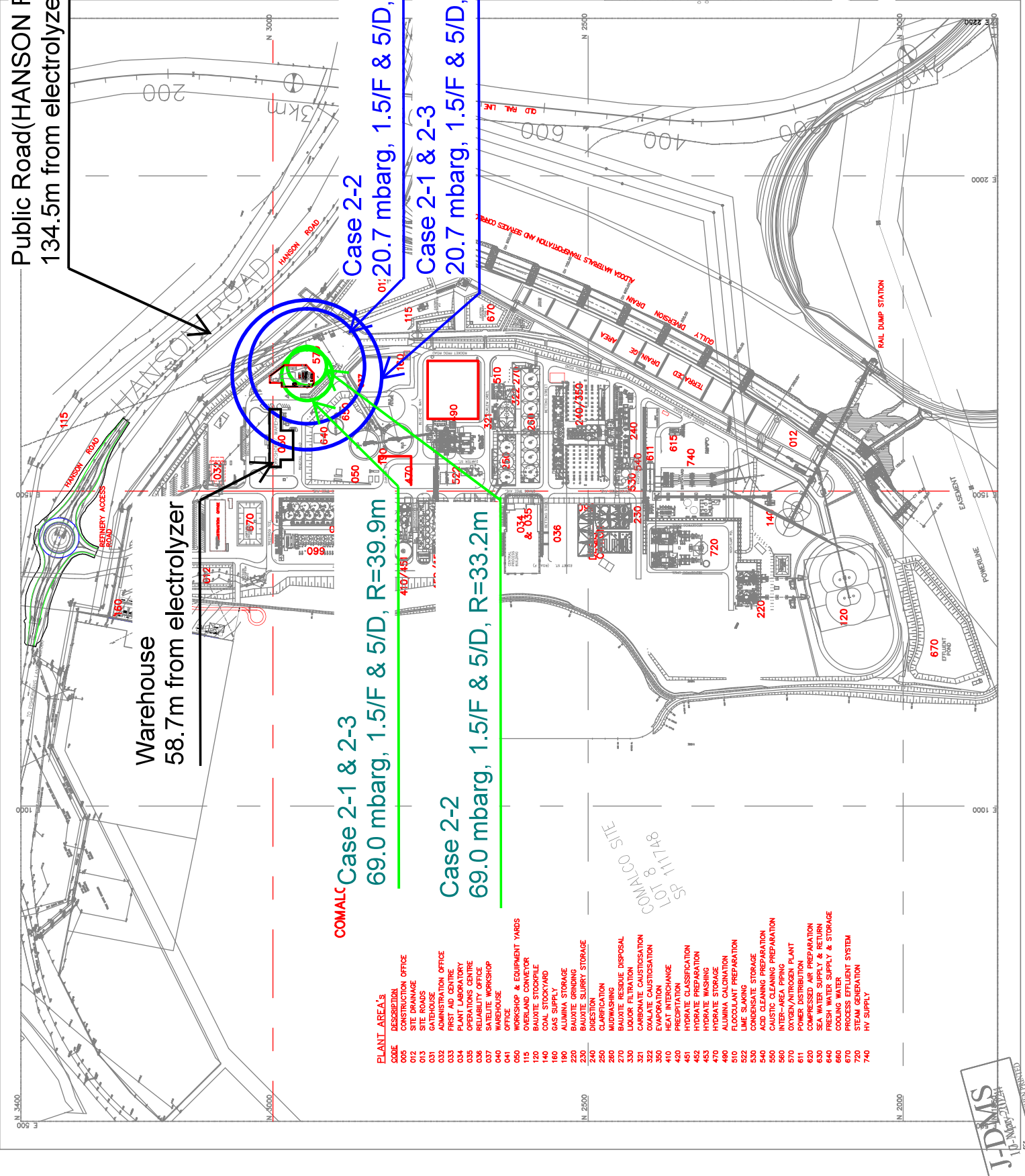
COMALCO ALUMINA REFINERY

REFINERY SITE
STAGE 1
PLOT PLAN

DATE: 07/05/2009
DRAWN BY: AALB
CHECKED BY: AALB
SCALE: 1 : 2000

AREA: 000 X
SCALE: 000X(2D)10002
DATE: 17/10/2009

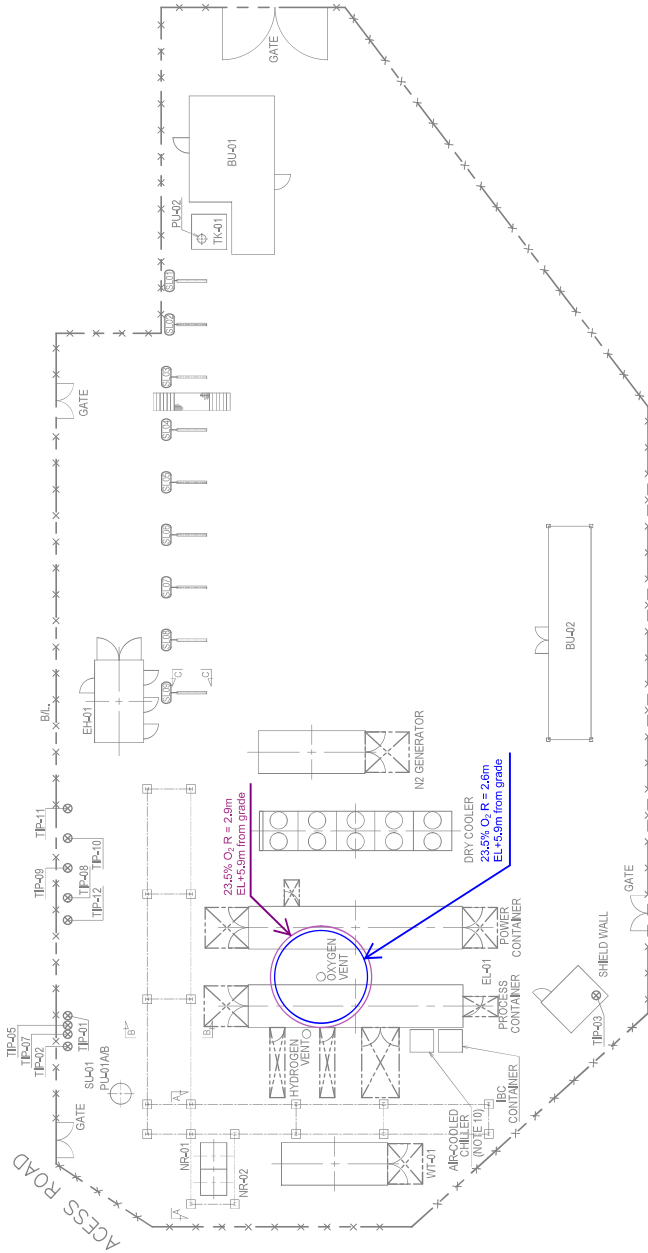
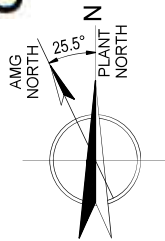
DATE: 17/10/2009
SCALE: 1 : 2000



J-DIMS
10-MAY-2009
NOT FOR CONSTRUCTION

Oxygen Main Vent Stack

Category 1.5/F @ 31969 ppm
 Category 5/D @ 31969 ppm



NOTES

- BASED ON THE FIRE AND EXPLOSION CONSEQUENCE ANALYSIS (FAC-PA003). 4 METER SAFETY DISTANCE BETWEEN ELECTRICAL ZEROTHYDROGEN TERN AND TERN SIGN LEGEND.
 - POTABLE WATER
 - REFLECTED WATER
 - HYDROGEN
 - RAW WATER
 - SANITARY WASTE WATER
 - FIRE WATER
 - POWER (RAW AC 3P 50Hz)
 - CONTROL
 - TELECOMMUNICATIONS
 - ELECTRICAL SIGNAL
 - EXHAUSTING CABLE
- THIS SANITARY WASTE WATER BE LOCATED NEAR THE PLANT FENCE LINE. THIS SANITARY WASTE WATER BE CONNECTED WITH THE QUEBEC AND PUBLIC SEWER SYSTEM. THE SANITARY WASTE WATER BE LIMITED TO ONE TERN. THE SANITARY WASTE WATER BE LIMITED TO ONE TERN.

AMS SYSTEM | E: 694.639 | N: 298.573

- DELETED.
- ALL DIMENSIONS ARE IN METERS.
- ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
- EXISTING GRADE ELEVATION IS EL +4.00 ABOVE SEA LEVEL.
- DELETED.
- NOT CONTAINING.
- PROCESS CONTAINER, POWER CONTAINER, DRY COOLER, N2 GENERATOR, AIR-COOLED CHILLER AND IBC CONTAINER ARE PART OF ELECTRICAL ZER PACKAGE (EL-01).

GENERAL NOTES

- SAFE ZONE AND MAINTENANCE ZONE OF ALL EQUIPMENT PACKAGES AND IBC CONTAINER ARE TO BE MAINTAINED.
- DELETED.
- DELETED.
- DELETED.
- DELETED.
- DELETED.

REV	DATE	DESCRIPTION	BY	CHKD
ASB 1		ISSUED FOR PERMIT (See Note 1)		
ASB 2		ISSUED FOR PERMIT (See Note 1)		
ASB 3		ISSUED FOR PERMIT (See Note 1)		
ASB 4		ISSUED FOR PERMIT (See Note 1)		
ASB 5		ISSUED FOR PERMIT (See Note 1)		
ASB 6		ISSUED FOR PERMIT (See Note 1)		
ASB 7		ISSUED FOR PERMIT (See Note 1)		
ASB 8		ISSUED FOR PERMIT (See Note 1)		
ASB 9		ISSUED FOR PERMIT (See Note 1)		
ASB 10		ISSUED FOR PERMIT (See Note 1)		

REV	DATE	DESCRIPTION	BY	CHKD
ASB 1		ISSUED FOR PERMIT (See Note 1)		
ASB 2		ISSUED FOR PERMIT (See Note 1)		
ASB 3		ISSUED FOR PERMIT (See Note 1)		
ASB 4		ISSUED FOR PERMIT (See Note 1)		
ASB 5		ISSUED FOR PERMIT (See Note 1)		
ASB 6		ISSUED FOR PERMIT (See Note 1)		
ASB 7		ISSUED FOR PERMIT (See Note 1)		
ASB 8		ISSUED FOR PERMIT (See Note 1)		
ASB 9		ISSUED FOR PERMIT (See Note 1)		
ASB 10		ISSUED FOR PERMIT (See Note 1)		

NO.	DATE	DESCRIPTION	BY	CHKD
1		ISSUED FOR PERMIT (See Note 1)		
2		ISSUED FOR PERMIT (See Note 1)		
3		ISSUED FOR PERMIT (See Note 1)		
4		ISSUED FOR PERMIT (See Note 1)		
5		ISSUED FOR PERMIT (See Note 1)		
6		ISSUED FOR PERMIT (See Note 1)		
7		ISSUED FOR PERMIT (See Note 1)		
8		ISSUED FOR PERMIT (See Note 1)		
9		ISSUED FOR PERMIT (See Note 1)		
10		ISSUED FOR PERMIT (See Note 1)		

NO.	DATE	DESCRIPTION	BY	CHKD
1		ISSUED FOR PERMIT (See Note 1)		
2		ISSUED FOR PERMIT (See Note 1)		
3		ISSUED FOR PERMIT (See Note 1)		
4		ISSUED FOR PERMIT (See Note 1)		
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9		ISSUED FOR PERMIT (See Note 1)		
10		ISSUED FOR PERMIT (See Note 1)		

NO.	DATE	DESCRIPTION	BY	CHKD
1		ISSUED FOR PERMIT (See Note 1)		
2		ISSUED FOR PERMIT (See Note 1)		
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7		ISSUED FOR PERMIT (See Note 1)		
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10		ISSUED FOR PERMIT (See Note 1)		

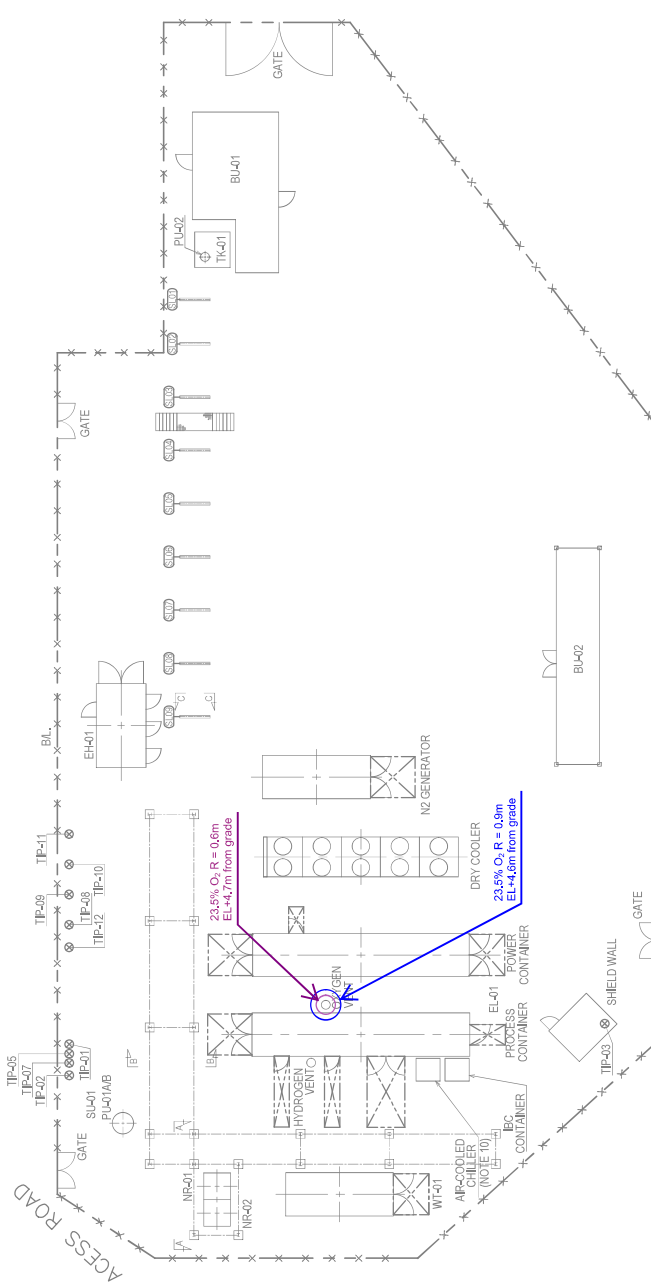
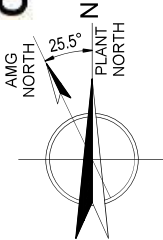
NO.	DATE	DESCRIPTION	BY	CHKD
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2		ISSUED FOR PERMIT (See Note 1)		
3		ISSUED FOR PERMIT (See Note 1)		
4		ISSUED FOR PERMIT (See Note 1)		
5		ISSUED FOR PERMIT (See Note 1)		
6		ISSUED FOR PERMIT (See Note 1)		
7		ISSUED FOR PERMIT (See Note 1)		
8		ISSUED FOR PERMIT (See Note 1)		
9		ISSUED FOR PERMIT (See Note 1)		
10		ISSUED FOR PERMIT (See Note 1)		

GRAPHIC SCALE IN METERS (1/150)



Oxygen Secondary Vent Stack

Category 1.5/F @ 31969 ppm
 Category 5/D @ 31969 ppm



NOTES:

- BASED ON THE RISK AND CONSEQUENCE ANALYSIS FOR CATEGORY 1.5/F AND CATEGORY 5/D OCCURRED BUILDING SHALL BE REQUIRED.
- TECHNICAL LEGEND:

TPA01	POTABLE WATER
TPA02	RO REJECTED WATER
TPA03	HYDROGEN
TPA04	RAW WATER
TPA05	SANITARY WASTE WATER
TPA06	RAW WATER
TPA07	FIRE WATER
TPA08	POWER (6.6KV AC 3P 50HZ)
TPA09	CONTROL
TPA10	TELECOMMUNICATIONS
TPA11	ELECTRICAL SIGNAL
TPA12	EARTHING CABLE

THIS RAW WATER WILL BE UTILIZED FOR CONSTRUCTION AND MAINTENANCE PURPOSE ONLY.

THIS SANITARY WASTE WATER IS LOCATED NEAR THE PLANT FENCE LINE. THIS SANITARY SEWER HEADER IS CONNECTED WITH THE PLANT FENCE LINE. ALL TELEM LOCATIONS ARE INDICATING ONLY.

3. THE PLANT DATUM COORDINATES:

AMS SYSTEM	E: 684.588	N: 263.573
------------	------------	------------

- DELETED.
- ALL COORDINATES ARE IN METERS.
- ALL DIMENSIONS ARE IN MILLIMETERS (UNLESS OTHERWISE SPECIFIED).
- EXISTING GROOVE ELEVATION IS EL+1400 ABOVE SEA LEVEL.
- OPEN TOP TANK CONTAINER.
- PROCESS CONTAINER, POWER CONTAINER, DRY COOLER, N2 GENERATOR, AIR-COOLED CHILLER, AND IBC CONTAINER ARE PART OF ELECTROLYZER PACKAGE (ELV).

GENERAL LISTS

GENERAL LIQUIDS

- SITE LOCATION AND MAINTENANCE ZONE OF ALL EQUIPMENT PACKAGES AND BUILDING TO BE FINALIZED LATER.
- DELETED.
- DELETED.
- DELETED.
- DELETED.
- DELETED.

REV	DATE	BY	CHKD	APPD
1	08-MAY-2023	AL VARGAS	AL VILLANUEVA	AL ALBERCA
2	08-MAY-2023	AL VARGAS	AL VILLANUEVA	AL ALBERCA

REVISIONS

NO.	DATE	ISSUE PURPOSE	PREP'D	CHK'D	APP'D
1	08-MAY-2023	ISSUED FOR APPROVAL	AL VARGAS	AL VILLANUEVA	AL ALBERCA
2	08-MAY-2023	ISSUED FOR APPROVAL	AL VARGAS	AL VILLANUEVA	AL ALBERCA
3	08-MAY-2023	ISSUED FOR APPROVAL	AL VARGAS	AL VILLANUEVA	AL ALBERCA
4	08-MAY-2023	ISSUED FOR APPROVAL	AL VARGAS	AL VILLANUEVA	AL ALBERCA

REFERENCE DRAWINGS

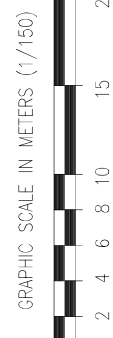
DWG NO.	TITLE
D-00-1225-001	FIRE PROTECTION EQUIPMENT LAYOUT DRAWING
D-00-1300-001	PIPING PLAN DRAWING
D-00-1375-001	INSTRUMENT CABLE ROUTE LAYOUT
D-00-1382-001	ELECTRICAL CABLE ROUTE LAYOUT
D-00-1386-002	TELECOMMUNICATION CABLE ROUTE LAYOUT
D-00-1329-001-004	FOUNDATION DRAWINGS
D-00-1328-001-005	FOUNDATION DRAWINGS

FOR PL. mandatory:

1	Approved without comment	1	Reviewed without comment
2	Approved with comment	2	Reviewed with comment
3	Not for construction	3	Not for construction
4	Revised for better clarity	4	Revised for better clarity
5	Revised for better clarity	5	Revised for better clarity
6	Revised for better clarity	6	Revised for better clarity

FOR EPCM FOR mandatory:

1	Approved without comment	1	Reviewed without comment
2	Approved with comment	2	Reviewed with comment
3	Not for construction	3	Not for construction
4	Revised for better clarity	4	Revised for better clarity
5	Revised for better clarity	5	Revised for better clarity
6	Revised for better clarity	6	Revised for better clarity



VENT A Nitrogen Release Vent_N2 Generator

Category 1.5/F @ 71429 ppm
Category 5/D @ 71429 ppm

- NOTES:
- BASED ON THE FIRE AND ORIGIN CONSEQUENCE ANALYSIS FOR PACKAGES 41 METERS SHEET DISTANCE BETWEEN ELECTRICAL OVERSIGHTS (E.O.) AND OPERATOR ROOM (MANNED B.L.) SHALL BE REQUIRED.
 - TECHNICAL LEGEND:

TP-01	POTABLE WATER
TP-02	RO REJECTED WATER
TP-03	HYDROGEN
TP-04	RAW WATER
TP-05	SANITARY WASTE WATER
TP-06	FIRE WATER
TP-07	POWER (GVA/AC/3P/50HZ)
TP-08	CONTROL
TP-09	TELECOMMUNICATIONS
TP-10	ELECTRICAL SIGNAL
TP-11	EARTHING CABLE

THE RAW WATER WILL BE USED FOR CONSTRUCTION AND MAINTENANCE PURPOSE ONLY.
THE SANITARY WASTE WATER IS LOCATED NEAR THE PLANT FENCE LINE.
THE SANITARY SEWER HEADER IS CONNECTED WITH THE
SANITARY SEWER MAINS WHICH ARE FOR THE USE ONLY.
ALL THE LOCATIONS ARE INDICATING ONLY.
3. THE PLANT DATUM COORDINATES:

(AMS SYSTEM) E: 894.589 N: 263.570

- DELTEO.
- ALL COORDINATES ARE IN METERS.
- ALL DIMENSIONS ARE IN METERS (UNLESS OTHERWISE SPECIFIED).
- EXISTING GROUND ELEVATION IS EL+140 ABOVE SEA LEVEL.
- OPEN TOP REFT CONTAINER.
- PROCESS CONTAINER, POWER CONTAINER, DRY COOLER, N2 GENERATOR, AIR-COOLED CHILLER, AND IBC CONTAINER ARE PART OF ELECTRICALZ PACKAGE (EL-1).

GENERAL NOTES:
1. LABEL LOCATION AND MAINTENANCE ZONE OF ALL EQUIPMENT/PACKAGES AND B.L. IS TO BE INDICATED LATER.

- DELTEO.
- DELTEO.
- DELTEO.
- DELTEO.

REV	DATE	BY	CHKD	DESCRIPTION
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3	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
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5	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
6	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
7	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
8	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
9	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
10	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
11	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
12	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
13	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
14	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
15	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
16	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
17	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
18	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
19	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
20	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL

NO.	DATE	BY	CHKD	DESCRIPTION
1	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
2	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
3	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
4	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
5	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
6	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
7	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
8	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
9	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
10	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
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15	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
16	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
17	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
18	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
19	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
20	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL

GENERAL NOTES:
1. LABEL LOCATION AND MAINTENANCE ZONE OF ALL EQUIPMENT/PACKAGES AND B.L. IS TO BE INDICATED LATER.

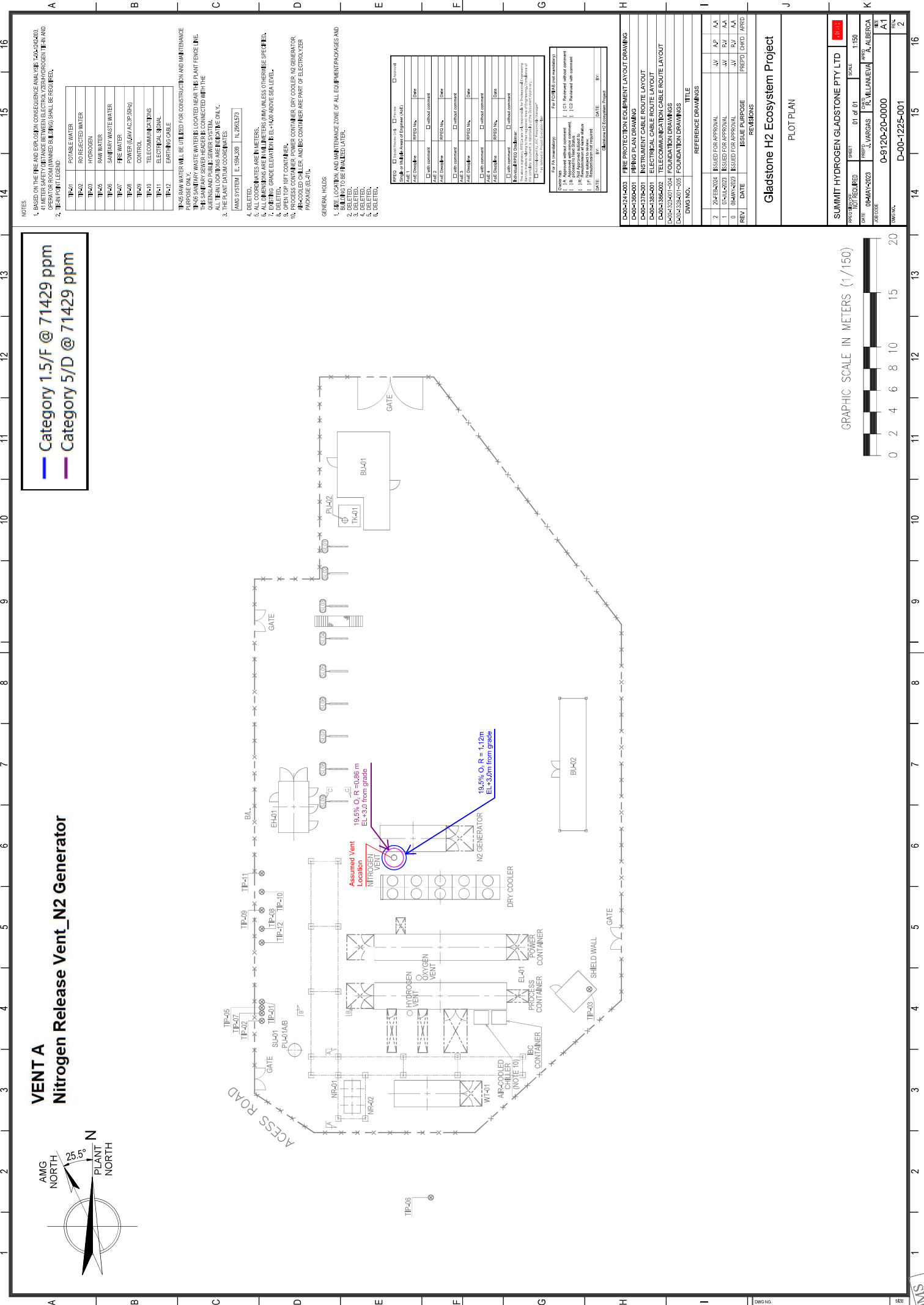
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NO.	DATE	BY	CHKD	DESCRIPTION
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3	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
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17	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
18	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
19	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
20	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL

GENERAL NOTES:
1. LABEL LOCATION AND MAINTENANCE ZONE OF ALL EQUIPMENT/PACKAGES AND B.L. IS TO BE INDICATED LATER.

- DELTEO.
- DELTEO.
- DELTEO.
- DELTEO.

NO.	DATE	BY	CHKD	DESCRIPTION
1	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
2	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
3	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
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7	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
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9	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
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17	08-MAY-2023	SV	AP	ISSUED FOR APPROVAL
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GRAPHIC SCALE IN METERS (1/150)

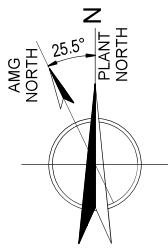


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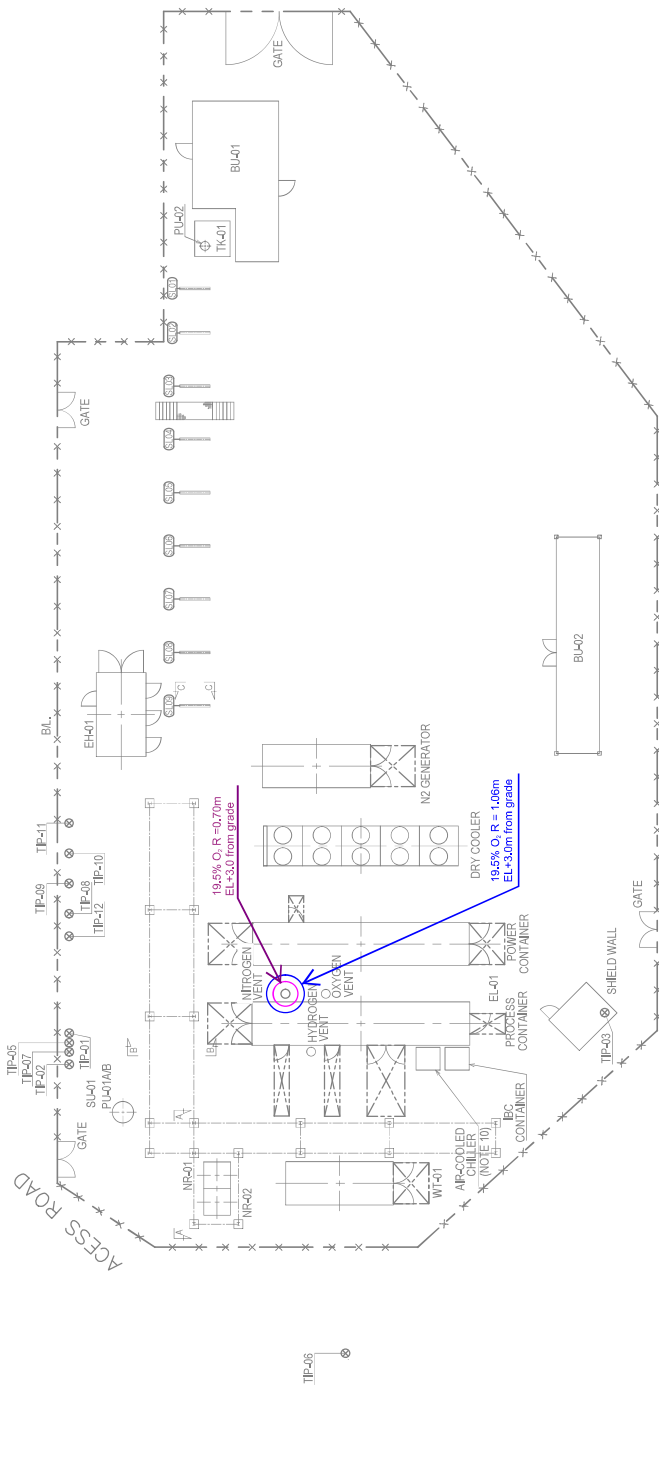
A1



VENT B Nitrogen Release Vent_Electrolyzer



Category 1.5/F @ 71429 ppm
Category 5/D @ 71429 ppm



TI01	POTABLE WATER
TI02	RO REJECTED WATER
TI03	HYDROGEN
TI04	RAW WATER
TI05	SANITARY WASTE WATER
TI06	FIRE WATER
TI07	POWER (6.6KV AC 3P 3W4)
TI08	CENTRAL
TI09	TELECOMMUNICATIONS
TI10	ELECTRICAL SIGNAL
TI11	EARTHING CABLE

THIS RAW WATER WILL BE UTILIZED FOR CONSTRUCTION AND MAINTENANCE PURPOSE ONLY.
THIS SANITARY WASTE WATER IS LOCATED NEAR THE PLANT FENCE LINE.
THIS SANITARY SEWER HEADER IS CONNECTED WITH THE
ALL TANK LOCATIONS ARE INDICATING ONLY.
3. THE PLANT DATUM COORDINATES:

- AMS SYSTEM E: 694.589 N: 263.573
4. DELETED.
 5. ALL COORDINATES ARE IN METERS.
 6. ALL DIMENSIONS ARE IN MILLIMETERS (UNLESS OTHERWISE SPECIFIED).
 7. EXISTING GROVE ELEVATION IS EL+140 ABOVE SEA LEVEL.
 8. OPEN TOP TANK CONTAINER.
 9. PROCESS CONTAINER, POWER CONTAINER, DRY COOLER, N2 GENERATOR, AIR-COOLED CHILLER, AND IBC CONTAINER ARE PART OF ELECTROLYZER PACKAGE (EL-1).

GENERAL NOTES

1. SITE LOCATION AND MAINTENANCE ZONE OF ALL EQUIPMENT PACKAGES AND BUILDING TO BE FINALIZED LATER.
2. DELETED.
3. DELETED.
4. DELETED.
5. DELETED.
6. DELETED.

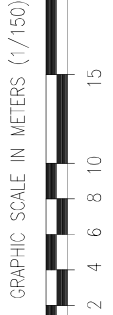
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2	19/05/2023	AM	FOR EPC/CM FOR MAINTENANCE
3	19/05/2023	AM	FOR EPC/CM FOR MAINTENANCE
4	19/05/2023	AM	FOR EPC/CM FOR MAINTENANCE
5	19/05/2023	AM	FOR EPC/CM FOR MAINTENANCE
6	19/05/2023	AM	FOR EPC/CM FOR MAINTENANCE
7	19/05/2023	AM	FOR EPC/CM FOR MAINTENANCE
8	19/05/2023	AM	FOR EPC/CM FOR MAINTENANCE
9	19/05/2023	AM	FOR EPC/CM FOR MAINTENANCE
10	19/05/2023	AM	FOR EPC/CM FOR MAINTENANCE

NO.	DATE	ISSUED FOR APPROVAL	BY	APP'D	AA
1	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA
2	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA
3	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA
4	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA
5	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA
6	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA
7	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA
8	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA
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10	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA

NO.	DATE	ISSUED FOR APPROVAL	BY	APP'D	AA
1	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA
2	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA
3	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA
4	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA
5	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA
6	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA
7	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA
8	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA
9	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA
10	19/05/2023	ISSUED FOR APPROVAL	AM	RJ	AA

Gladstone H2 Ecosystem Project
PLOT PLAN

PROJECT NO.	08-AMV-2023	SHEET	01 of 01	SCALE	1:150
DATE	08-AMV-2023	PROJECT	GLADSTONE H2 ECOSYSTEM PROJECT	CLIENT	SUMMIT HYDROGEN GLADSTONE PTY LTD
JOB CODE	0-9120-20-0000	PROJECT	GLADSTONE H2 ECOSYSTEM PROJECT	CLIENT	SUMMIT HYDROGEN GLADSTONE PTY LTD
DWG NO.	D-00-1225-001	PROJECT	GLADSTONE H2 ECOSYSTEM PROJECT	CLIENT	SUMMIT HYDROGEN GLADSTONE PTY LTD



APPENDIX D CLOSE-OUT OF MHFU RECOMMENDATION GLADSTONE H2 ECOSYSTEM PROJECT

Close-out of MHFU Recommendation

Gladstone H2 Ecosystem Project



A. MHFU Recommendation #1

- ▶ ***“Explosions in unvented containers, which have resulted in very high-pressure explosions and shrapnel damage. MHFU recommended installed of explosion (blast) vents to control pressures.”***

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Gladstone H2 Ecosystem Project

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B. Response

Understanding the hazard

1. Hazard Identification

No.	Guide word/Hazard	Cause	Consequence	Safeguard	Risk Category			Recommendation
					People	Asset	Env.	
H-	Release of inventory	Hydrogen leak (Inside container)	Explosion/Fire	<ul style="list-style-type: none"> - Fire & Gas Detector - Air ventilation by HVAC - Emergency shut off in case of HVAC shut-down - Hazardous Area Classification and suitable selection for instrumentation and electrical items 	High	High	Low	<ul style="list-style-type: none"> - Check the necessity of explosion-proof for electrical equipment in accordance with Rio Tinto's specification. - Evaluate enough separation distance between PEM Container and occupied buildings/area such as existing control room, maintenance workshop, parking - Study the impact of fire and explosion on this scenario to the surrounding area especially for public road. - Protection against hydrogen permeations to be considered e.g. material selection of instrumentation

Understanding the hazard

2. Consequence Evaluation – Explosion Scenario

Explosion scenario

(Case 2-1) HAZID No. H-1: Release of inventory, Hydrogen leak (Inside container)

- Congested area inside Electrolyzer Container

(Case 2-2) HAZID No. H-2: Release of inventory, Hydrogen leak (Outside container)

- Congested area at shield wall surrounding Metering System

(Case 2-3) HAZID No. H-8: Overpressure, Increased hydrogen operating pressure due to process control deviation

- Congested area inside Electrolyzer Container

*For Explosion scenario, the HVAC ventilation in Electrolyzer Container is not considered in the modeling and calculation to evaluate the consequence conservatively according to GNMS0304 Mitigating process safety hazards on occupied buildings.

Understanding the hazard

2. Consequence Evaluation – Input Parameters

Vapor Cloud Explosion (Multi Energy Model) Condition

The end-point criteria for Vapor Cloud Explosion Scenario are summarized below for Case 2-1/2-3 and 2-2, respectively.

Applicable for Case 2-1 and 2-3:

Explosion Strength	: 7
H ₂ Mass Inventory	: 3.3 kg
Process Room Volume	: 49.4 m ³
Process Room Vacancy Ratio	: 77.6 %
Flammable Gas Volume	: 38.3 m ³ (49.4 m ³ x 77.6%)
Mass Inventory in Stoichiometric Ratio with Air	: 0.97 kg

Inventory of flammable atmosphere in this pilot plant is relatively low compared to other industrial facilities with potential for explosion

Understanding the hazard

2. Consequence Evaluation – Explosion Criteria

Table 6.7 Damage Effects associated with Explosion Overpressures

Pressure (psig)	Level of Damage
0.02	Annoying noise (137 dB), if of low frequency (10-15 Hz)
0.03	Occasional breaking of large glass windows already under strain
0.04	Loud noise (143 dB). Sonic boom glass failure
0.1	Breakage of small windows under strain
0.15	Typical pressure for glass breakage
0.3	“Safe distance” (probability of 0.95 no serious damage beyond this value) Missile limit Some damage to house ceilings; 10% window glass broken
0.4	Limited minor structural damage
0.5-1.0	Large and small windows usually shattered
0.7	Minor damage to house structures
1.0	Partial demolition of houses, made uninhabitable
1-2	Corrugated asbestos shattered Corrugated steel or aluminum panels, fastenings fail, followed by buckling Wood panels (standard housing) fastening fail, panels blown in
1.3	Steel frame of clad building slightly distorted
2.0	Partial collapse of walls and roofs of houses
2-3	Concrete or cinder block walls, not reinforced, shattered
2.3	Lower limit of serious structural damage
2.5	50% destruction of brickwork of houses

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*Diagnostic Features of Explosion Damage, 6th International Meeting on Forensic; CCPS (1994)

Understanding the hazard

2. Consequence Evaluation – Explosion Criteria

Severity Criteria are defined in Rio Tinto Standard, GNMS0304 Mitigating process safety hazards on occupied buildings, as below.

Table 6.8 Severity criteria

Severity Level	Overpressure	Thermal Radiation	Hypoxia [O ₂ concentration]	Toxin Concentration ¹⁶	Engulfment ¹⁷
1	2kPa to 7kPa	2.5kW/m ² to 5 kW/m ²	14% to 17%	Between AEGL1 and AEGL2	Below 150mm
2	7kPa to 15kPa	5 kW/m ² to 13 kW/m ²	12% to 14%		150mm to 250mm
3 *	15kPa to 20kPa	13 kW/m ² to 23 kW/m ²	10% to 12%	Between AEGL2 and AEGL3	Above 250mm
4 *	20kPa to 35kPa	23 kW/m ² to 35 kW/m ²			
5 *	35kPa to 70 kPa	Above 35 kW/m ²	10%	Above AEGL3	
6 *	Above 70kPa				

(0.3 to 1 psi)

(1 to 2 psi)

*GNMS0304 Mitigating process safety hazards on occupied buildings

Table 6.9 Initial Acceptance Criteria - Consequence based analysis

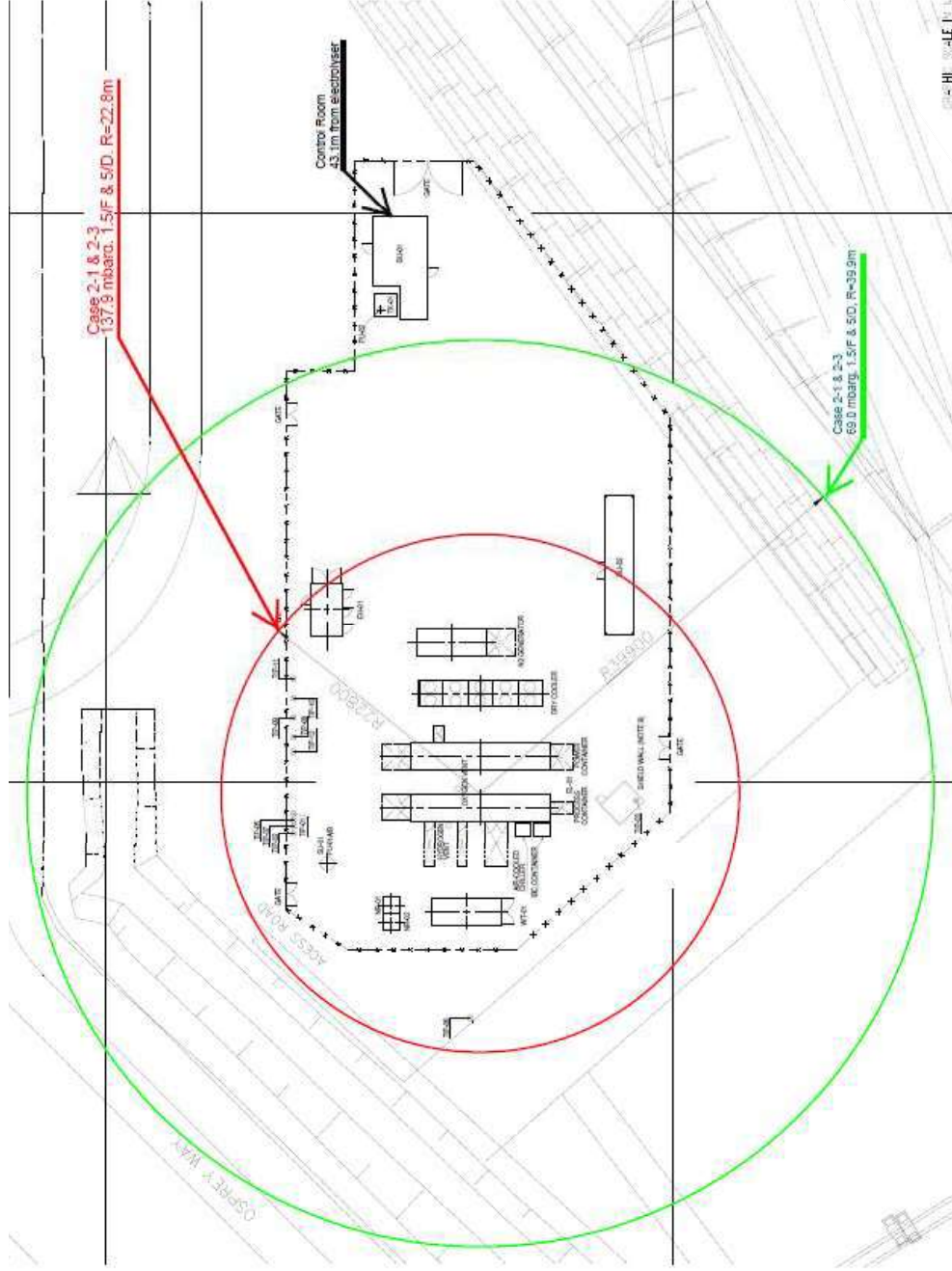
Severity Level	Operations Building	Service Building, including Temporary / Portable Accommodation ¹	Administration Building and at the Site Boundary
1	Tolerable	Tolerable if risk management measures implemented to a level commensurate for green zone.	Tolerable if risk management measures implemented to a level commensurate for yellow zone.
2	Tolerable if risk management measures implemented to a level commensurate for green zone.	Tolerable if risk management measures implemented to a level commensurate for yellow zone.	Detailed analysis required or treated as not tolerable
3	Tolerable if risk management measures implemented to a level commensurate for yellow zone	Detailed analysis required or treated as not tolerable (Not tolerable for temporary / portable buildings)	Detailed analysis required or treated as not tolerable
4	Detailed analysis required or treated as not tolerable	Detailed analysis required or treated as not tolerable	Detailed analysis required or treated as not tolerable
5	Detailed analysis required or treated as not tolerable	Detailed analysis required or treated as not tolerable	Not Tolerable
6	Detailed analysis required or treated as not tolerable	Not Tolerable	Not Tolerable

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* GNMS0304 Mitigating process safety hazards on occupied buildings

Understanding the hazard

2. Consequence Evaluation – Result

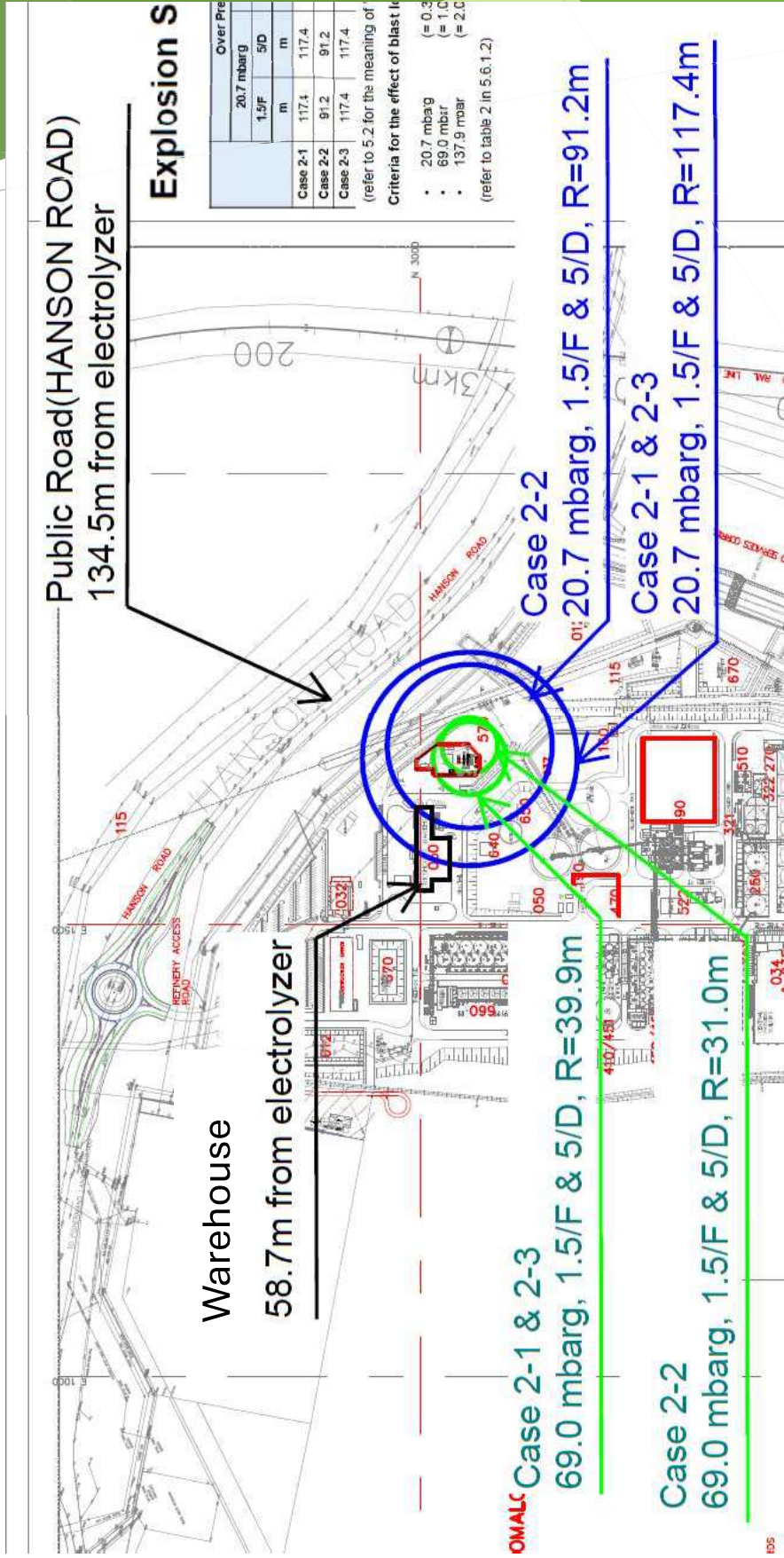


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Understanding the hazard

2. Consequence Evaluation – Result



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The pilot plant is located in an industrial facility and sufficiently far from critical public facilities such as churches, schools and commercial establishments.

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Understanding the hazard

2. Consequence Evaluation – Summary of Results

All concern areas, buildings, and facilities have enough separation distance from Electrolyzer Container and Metering System as per the criteria provided.

Based on the Jet Fire and Vapor Cloud Explosion results shown in Tables 7.1 and 7.2, respectively, it is confirmed that the control room and public road have adequate separation distances from the identified hazards as listed in Section 4.

In addition, the warehouse and facilities owned by Rio Tinto were given an evaluation of Severity Level 1, which is categorized tolerable as per RTA STD, GNMS0304 Mitigating process safety hazards on occupied buildings.

Based on the above evaluation, risk associated to explosion of process container is in **Tolerable level**.

Due Diligence

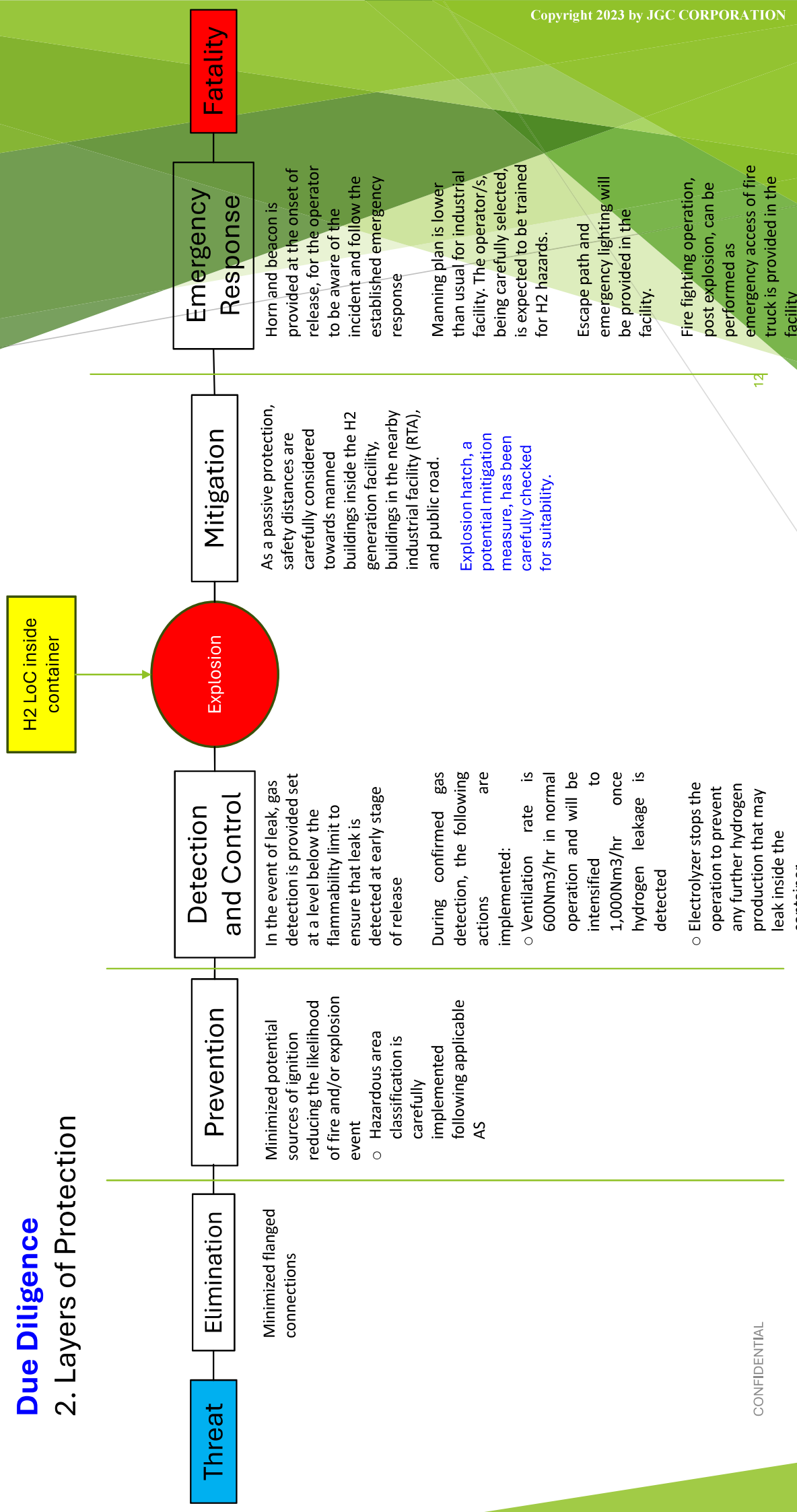
1. Defining SFAIRP

SFAIRP is a framework aiming to ensure that all “reasonably practicable” precautions are put in place to manage safety. It is threshold test for safety risk management in safety legislation in many jurisdictions.

A key aspect of SFAIRP is that there is no lower limit of risk that is automatically considered tolerable. Risk is considered tolerable if, and only if, there are no further practicable risk reduction measures available for implementation.

Due Diligence

2. Layers of Protection



Due Diligence

2. Layers of Protection – Evaluation of Explosion Hatch

- ▶ Explosion hatch is considered as a passive, mitigation control, for an explosion scenario, that can prevent catastrophic damage and loss of life
- ▶ Explosion hatch, however, does not extinguish the flame and may lead to post-explosion fires. This requires exclusion zones in the vicinity of the vent portal to protect personnel. There must be no other equipment or people in the zone during normal operation of the system.
- ▶ Specific to the project, explosion hatch will be mainly for the protection of apparatus (reducing the damage to the Electrolyzer itself) rather than operator protection as it was demonstrated that safety distances has been properly implemented in the design of the facility. The container may remain intact due to the provision of explosion hatch but equipment inside are still expected to be damaged by the explosion.
- ▶ Explosion relief panels are economical solution but unfortunately, they are often used incorrectly and thus become a danger to the process plant and the personnel operating it.
- ▶ If explosion hatch will be installed at the top of the container (which is most likely to eliminate the hazard of direct impact to nearby equipment), maintenance of the explosion hatch will pose additional hazard which is working at height.

Due Diligence

2. Layers of Protection - Summary

- ▶ Flammable material inventory in the pilot plant is relatively low compared to other industrial facility with potential for explosion event
- ▶ Given the robust emergency ventilation rate (2x5000 m³/h), the most frequent leakages within the container and their associated hydrogen release rates can be effectively diluted below the deflagration concentration level. It's worth noting that, according to NFPA 2, leaks less than 0.1 percent of the component flow areas represent 95 percent of the leakage frequency.
- ▶ The considered normal and emergency ventilation system, ignition controls – zone rated equipment (a prevention measure causing a significant reduction in ignition probability), gas detection, emergency shutdown/depressurization, and HVAC ramp-up collectively ensure that the risk of explosion is primarily prevented, rather than relying on an approach to mitigate the severity of explosion consequences.
- ▶ Explosion hatch might be able to prevent catastrophic damage and loss of life but there are concerns on mis-use and potential additional hazards posed by the maintenance of this control measure.
- ▶ Pilot plant is located in an industrial facility and sufficiently far from critical public facilities such as churches, schools and commercial establishments.

Due Diligence

3. Conclusion

Considering that the hazard has been evaluated to be properly addressed by active control measures (i.e., preventing the explosion from happening) and if explosion happens, sufficient safety distance (passive control) is provided to critical facilities, it is considered that the risk is tolerable.

And although explosion hatches, a potential additional passive protection may be employed as an additional mitigation measure, considering the low inventory of flammable material and the remote and controlled location of the pilot plant which is sufficiently far from critical public places, it is considered that this passive protection is not warranted for the scenario and the risk associated to the event is considered tolerable, so far as is reasonably practicable (SFAIRP).

C. MHFU Recommendation #2

- ▶ ***“Cold hydrogen vents igniting due to static electricity. Consider static electricity sources in detailed design including site electrical facilities and thunderstorms associated with tropical storms and cyclones.”***

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Gladstone H2 Ecosystem Project

D. Response

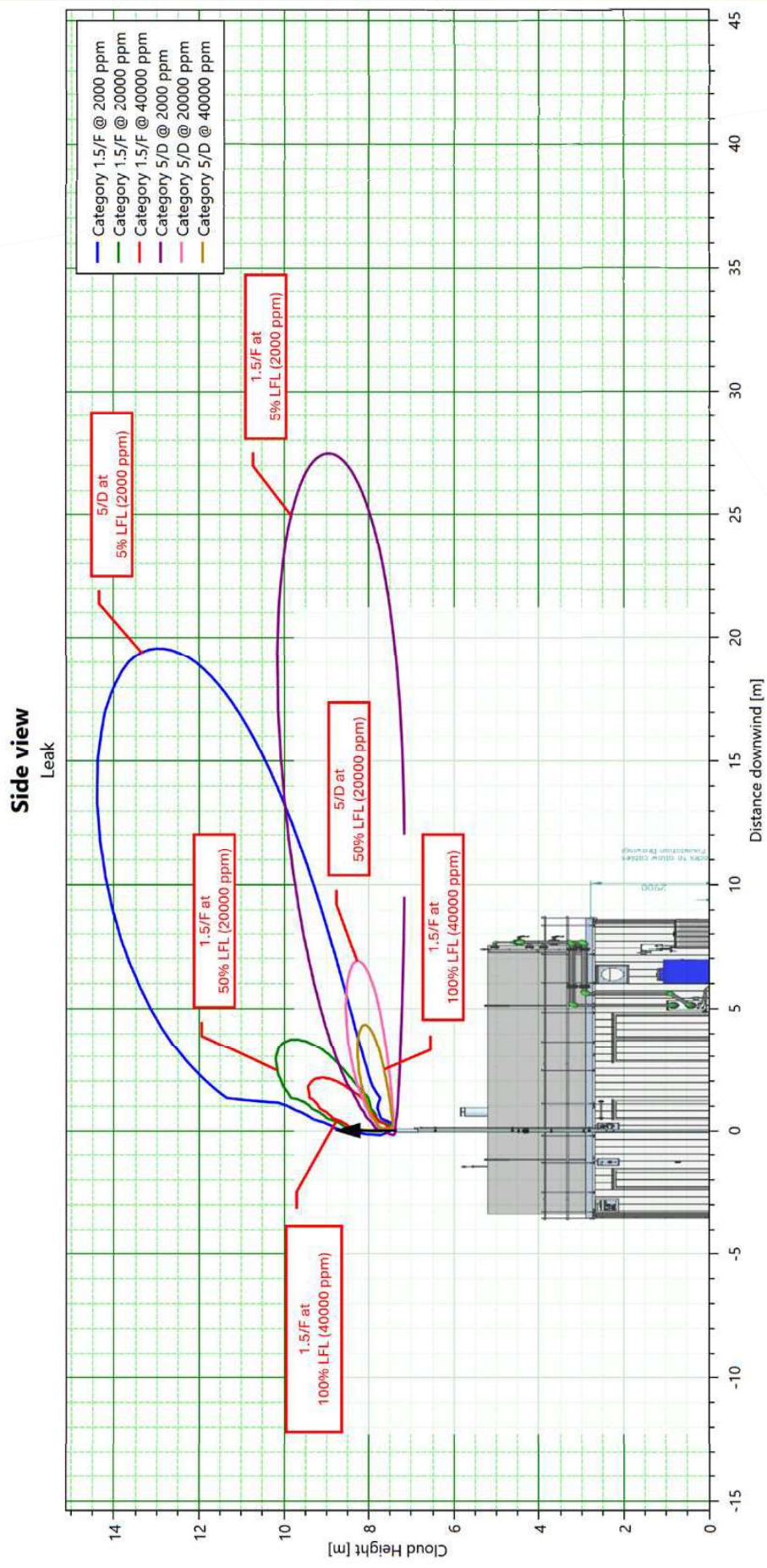
- Earthing and bonding controls have been incorporated into the design in accordance with applicable law, regulation and Australian Standard
- No equipment or personnel access will be allowed within the 50% LFL contour of the H2 release vent
MHFU commented, during preliminary discussion, that safe design considers 5% LFL for hydrogen release

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Gladstone H2 Ecosystem Project

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□ Provided below is the LFL, 1/2 LFL and 5% LFL contours from hydrogen release in the H2 vent



Due Diligence

Conclusion

It has been demonstrated, through the simulation of H2 release from the vent, that the gas cloud at 5% LFL, is not touching any platform or area that is accessible to the operators.

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APPENDIX E SDA APPROVAL CONDITIONS

SDA approval – conditions

Condition 1 - approved plans and documents		Timing
1.1	Carry out the approved development generally in accordance with the approved plans and documents as referenced in Table 1 (including any amendments marked in red), except insofar as modified by any of the conditions of this approval.	To be maintained at all times

Table 1 – approved plans and documents

Title	Prepared By	Document No	Date
Japan Nus Co. Ltd Sumitomo Hydrogen Project Site	Tetra Tech Coffey	Figure 2	10 February 2022
Japan Nus Co. Ltd Sumitomo Hydrogen Project Plant Model	Tetra Tech Coffey	Figure 4	20 January 2022
Japan Nus Co. Ltd Sumitomo Hydrogen Project Site Layout	Tetra Tech Coffey	Figure 6	20 January 2022
Japan Nus Co. Ltd Sumitomo Hydrogen Project Process flow diagram	Tetra Tech Coffey	Figure 7	20 January 2022
Japan Nus Co. Ltd Sumitomo Hydrogen Project System flow diagram	Tetra Tech Coffey	Figure 8	20 January 2022
Japan Nus Co. Ltd Sumitomo Hydrogen Project Access route to the site during the construction and operation	Tetra Tech Coffey	Figure 9	11 February 2022
Japan Nus Co. Ltd Sumitomo Hydrogen Project Hydrogen release vent dispersion model	Tetra Tech Coffey	Figure 14	20 January 2022
Japan Nus Co. Ltd Sumitomo Hydrogen Project Oxygen release vent dispersion model	Tetra Tech Coffey	Figure 15	20 January 2022
HAZID study	JGC Corporation	T-00-1242-001	13 August 2021
Fire and explosion assessment (Fire and explosion consequence based analysis)	JGC Corporation	T-001242-003	27 August 2021
Atmospheric vent dispersion study	JGC Corporation	Attachment E in planning report and Attachment-1)	Not dated
Environmental Risk Assessment	Tetra Tech Coffey	Appendix F in planning report	Not dated

Condition 2 - commencement of the development / use		Timing
2.1	Notify the Coordinator-General in writing of the date of commencement of construction.	<i>Within 10 days of commencement of construction</i>
2.2	Notify the Coordinator-General in writing of the date of commencement of use.	<i>Within 10 days after the commencement of use</i>

Condition 3 – ‘As constructed’ plans		Timing
3.1	<p>Prepare and submit to the Coordinator-General, ‘As constructed’ plans certified by RPEQ or other independent suitably qualified person.</p> <p>The plans must show that the development has been constructed generally in accordance with the plans referenced in Table 1 of Condition 1.</p> <p>Plans must be submitted in electronic pdf and shape files.</p>	<i>Prior to commencement of use</i>

Condition 4 - auditing		Timing
4.1	<p>Prepare and submit audit reports to the Coordinator-General within 30 business days after commencement of construction and within 30 business days after commencement of use.</p> <p>The audit report must be prepared by an independent suitably qualified person to determine whether the conditions of this approval have been complied with.</p> <p>An audit report will contain detail consistent with the information provided in Enclosure 1.</p>	<i>As indicated</i>

Condition 5 – inspection		Timing
5.1	<p>Permit the Coordinator-General, or any person authorised by the Coordinator-General, to inspect any aspect of the development.</p>	<i>At all times</i>

Condition 6 – risk management		Timing
6.1	<p>The mitigation measures recommended in the Fire and explosion assessment and the atmospheric vent dispersion study listed in Table 1 of condition 1 must be implemented.</p> <p><i>Note: If the mitigation measures and/or recommendations listed above change, the updated report/study and/or mitigation measures prepared by a suitability qualified person must be submitted to the Coordinator-General.</i></p>	<i>At all times</i>

Condition 7 – hazardous materials		Timing
7.1	<p>All flammable and combustible liquids (including hazardous waste materials) must be contained within an on-site containment system, controlled in a manner that prevents environmental harm and must be maintained in accordance with the current edition of <i>AS1940—Storage and Handling of Flammable and Combustible Liquids</i>.</p>	<i>At all times</i>
7.2	<p>All containers must be secured to prevent movement during a flood event.</p>	<i>At all times</i>
7.3	<p>Install adequate signage to warn the public of operations and safety hazards.</p>	<i>Prior to commencement of development and to be maintained during the use</i>

Condition 8 – disaster / emergency management		Timing
8.1	Prepare an emergency plan (EP) by a suitably qualified expert to ensure the safety and well-being of facility operators and the public. The EP must be prepared in accordance with Safe Work Australia guidelines and in consultation with the Queensland Police Service, Queensland Rural Fire Service, State Emergency Service and Queensland Ambulance Service. The EP must provide details on the following: <ul style="list-style-type: none"> (a) potential natural and man-made hazards and emergency events (b) strategies for the protection of life and property including design features (c) workforce numbers (including general breakdown of site access arrangements both construction and operation) (d) response procedures to incidents or events, including: injuries, medical evacuations, spills, fire, cyclones (e) evacuation procedures (f) the on-site resources and equipment available for initial response to an incident or event. 	<i>As indicated</i>
8.2	Plans and/or documents required by this approval are to be submitted as an electronic pdf file.	<i>Prior to commencement of use</i>
8.3	Implement and undertake the works, procedures and processes as required in the EP.	<i>As indicated</i>

Condition 9 – complaints		Timing
9.1	Record all complaints received relating to the development in a register that includes, as a minimum: <ul style="list-style-type: none"> (a) date and time when complaint was received; (b) complainant’s details including name and contact information; (c) reasons for the complaint; (d) investigations undertaken and conclusions formed; (e) actions taken to resolve this complaint, including the time taken to implement these actions; (f) include a notation in the register as to the satisfaction (or dissatisfaction) of the complainant with the outcome. 	<i>At all times</i>
9.2	Provide written acknowledgement of the complaint to the complainant within 48 hours and prepare and provide a response to the complainant within seven (7) business days of receipt of the complaint.	<i>As indicated</i>
9.3	Provide an up-to-date copy of the register if requested by the Coordinator-General.	<i>As indicated</i>

Condition 10 – vehicular access and vehicle parking		Timing
10.1	Vehicular ingress and egress to Lot 8 on SP218634 must be maintained from Gladstone–Mount Larcom Road (also known as Hanson Road) at approximate Chainage 11.778km (Lat: - 23.823094; Long: 151.155937) in accordance with Figure 9 listed in Table 1 Condition 1.	<i>At all times</i>
10.2	Direct access is not permitted between Gladstone–Mount Larcom Road (also known as Hanson Road), the State-controlled road and the subject site (Lot 8 on SP218634) at any	<i>At all times</i>

	other location other than the permitted road access location described in Figure 9 in Table 1 Condition 1.	
10.3	All car parking is to occur on site in accordance with Figure 9 in Table 1 Condition 1.	<i>At all times</i>

Condition 11 – decommissioning and rehabilitation		Timing
11.1	<p>Prepare a decommissioning plan (by a suitably qualified person in accordance with current best practise) that includes the following:</p> <ul style="list-style-type: none"> (a) plans showing full or partial decommissioning; (b) plans showing “make safe” decommissioning to leave a structure/s in place for use by others (to be named); (c) timeframe required for decommissioning project including operating hours of work; (d) management of noise and dust generated from the site during decommissioning work hours; (e) site clearance and remediation plans detailing the proposed works and timing to restore the site; (f) a monitoring program to identify issues of non-compliance, actions for correcting any non-compliance and who is responsible for undertaking those actions; (g) a timetable and process for review of the decommissioning plan to assess its effectiveness and to implement amendments as required. 	<i>Submit six (6) months prior to the commencement date of all decommissioning activities</i>
11.2	Undertake all works generally in accordance with the decommissioning plan which must be current and available on site during the decommissioning period.	<i>At all times</i>
11.3	Provide notification and photographic evidence to the Coordinator-General that the facility site has been decommissioned and the site rehabilitated in accordance with the decommissioning plan.	<i>Within 30 business days of the completion of all decommissioning activities</i>

Advice

Currency period

This SDA approval is valid until the end of the currency period, four years after the date of approval, unless the approval states a different period. For the SDA approval to remain valid the proponent must have, before the end of the currency period:

- substantially started the development; or
- made an application to the Coordinator-General to extend the currency period.

Other approvals

This approval relates solely to the material change of use for a medium impact industry (hydrogen production pilot plant) within the Gladstone State Development Area. All other approvals and/or permits required under local, State and/or Commonwealth legislation must be obtained prior to the commencement of the use.

Gladstone Regional Council

Advice

Further Approvals

Building Works

The Applicant is required to obtain a Development Permit and Building Final for Building Works in accordance with the *Planning Act 2016*. Construction is to comply with the *Building Act 1975*, the National Construction Code and the requirements of other relevant authorities.

Any construction of a two metre or higher fence will require a Development Application for Building Works.

Plumbing and Drainage Works

The Applicant is required to obtain a Development Permit for Plumbing and Drainage Works and Plumbing and Drainage Final in accordance with the *Planning Act 2016*. Construction is to comply with the *Plumbing and Drainage Act 2018* and the requirements of other relevant authorities.

Resources Safety and Health Queensland

The facility will likely be an Operating Plant under the *Petroleum and Gas (Production and Safety) Act 2004*. Please note there are requirements within this legislation for an operating plant, including notice of commissioning at least 20 business days prior to commissioning.

Office of Industrial Relations - Major Hazards Facilities Unit

The project will be a manifest quantity workplace and will need to comply with the *Work Health and Safety Act 2011* and Work Health and Safety Regulation 2011, in particular Chapter 7 for hazardous chemicals. The project will also need to submit hazardous chemical notifications as per:

<https://www.worksafe.qld.gov.au/safety-and-prevention/incidents-and-notifications/hazardous-chemical-notifications>.

Cultural heritage – duty of care

Where items of archaeological importance are identified during construction of the project, the proponent must comply with its duty of care under the *Aboriginal Cultural Heritage Act 2003* and the Department of Environment and Heritage Protection 2014 guideline: archaeological investigations. All work must cease, and the relevant State agency must be notified. Work can resume only after State agency clearance is obtained.

Enclosure 1

The following information will be required in an audit report:

- Details of the development approval, including the SDA approval number, the date of approval and a summary of the audit reporting requirements. This should include a schedule of the dates by which audit reporting is to be provided to the Coordinator-General.
- Details of the independent, suitably qualified person(s) (see Schedule 1 in the Gladstone SDA Development Scheme November 2015) (the auditor) responsible for preparing the audit report, including the auditor(s):
 - name, position, company and contact details
 - qualifications and experience
 - proof that the auditor is an independent third party unaffiliated with the proponent.
- Details of any external suitably qualified person(s) used to supplement reports/plans outside of the auditor's expertise.
- An audit evaluation matrix including but not limited to:
 - each condition of the SDA approval, and the status of the condition at the end of the relevant audit period
 - where a condition is current or complete, (to be activated, activated, complete), whether compliance has been achieved (compliant, non-compliant or not applicable), how compliance has been achieved (description of works, tasks or actions undertaken) and how the evaluation of the audit has been undertaken
 - a full description of the relevant standards, practices etc. against which works have been assessed together with evidence (reports, site photographs, certification documentation) to support the evaluation of the works against the compliance standards
 - the title, date, location and holder of any documentation referred to in the compliance evaluation matrix but not provided with the audit to allow the Coordinator-General to call upon these documents as required
 - details of any non-compliances identified by any party during the current audit period and a methodology specifying how compliance has been/will be achieved and by when it will be achieved, and
 - details of previous audit reports (if relevant) with an update on any non-compliance, corrective actions and revised practices (as relevant) undertaken and the current status of any corrective actions.
- Additional evidence to support the compliance evaluation, including the date and locations of any site inspection/s conducted during the preparation of the audit report and details of any employees of the proponent interviewed for the audit.
- The auditor's declaration whereby the auditor:
 - certifies the conditions contained in the SDA approval have been satisfactorily complied with, subject to any qualifications which the author has outlined in the audit report
 - certifies that to the best of the auditor's knowledge, all information provided in the audit report is true, correct and complete, and

- acknowledges it is an offence under section 157O of the *State Development and Public Works Organisation Act 1971*, to give the Coordinator-General a document containing information the auditor knows is false or misleading in any material particular.
- Any further attachments the auditor considers relevant to the audit report.

An audit report guideline has been prepared to provide guidance to proponents and auditors in compiling audit reports. The guideline is available on the Department of State Development, Infrastructure, Local Government and Planning website at <https://www.statedevelopment.qld.gov.au/coordinator-general/state-development-areas/development-schemes-applications-and-requests> or by contacting the Planning and Services Division on 1800 001 048 or via sdainfo@coordinatorgeneral.qld.gov.au.

APPENDIX F ENVIRONMENTAL AUTHORITY P-EA-100235984

Permit

Environmental Protection Act 1994

Environmental authority P-EA-100235984

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Environmental authority number: P-EA-100235984

Environmental authority takes effect on 1 June 2023. This is the take effect date.

The first annual fee is payable within 20 business days of the take effect date.

The anniversary date of this environmental authority is the same day each year as the take effect date. The payment of the annual fee will be due each year on this day.

Environmental authority holder(s)

Name(s)	Registered address
SUMMIT HYDROGEN GLADSTONE PTY LTD	Level 19, 123 Eagle St BRISBANE CITY QLD 4000

Environmentally relevant activity and location details

Environmentally relevant activity/activities	Location(s)
ERA 07 - Chemical manufacturing - 6(a) - Manufacturing, in a year, the following quantities of inorganic chemicals, other than inorganic chemicals to which items 1 to 4 apply - 200t to 1000t	8/SP218634

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority (EA) is issued is a restatement of the ERA as defined by legislation at the time the EA is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an EA as to the scale, intensity or manner of carrying out an ERA, the conditions prevail to the extent of the inconsistency.

An EA authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the EA specifically authorises environmental harm.

A person carrying out an ERA must also be a registered suitable operator under the *Environmental Protection Act 1994* (EP Act).

Contaminated land

It is a requirement of the EP Act that an owner or occupier of contaminated land give written notice to the administering authority if they become aware of the following:

- the happening of an event involving a hazardous contaminant on the contaminated land (notice must be given within 24 hours); or
- a change in the condition of the contaminated land (notice must be given within 24 hours); or
- a notifiable activity (as defined in Schedule 3) having been carried out, or is being carried out, on the contaminated land (notice must be given within 20 business days)

that is causing, or is reasonably likely to cause, serious or material environmental harm.

For further information, including the form for giving written notice, refer to the Queensland Government website www.qld.gov.au, using the search term 'duty to notify'.

Take effect

Please note that, in accordance with section 200 of the EP Act, an EA has effect:

- a) if the authority is for a prescribed ERA and it states that it takes effect on the day nominated by the holder of the authority in a written notice given to the administering authority - on the nominated day; or
- b) if the authority states a day or an event for it to take effect-on the stated day or when the stated event happens; or
- c) otherwise on the day the authority is issued.

However, if the EA is authorising an activity that requires an additional authorisation (a relevant tenure for a resource activity, a development permit under the *Planning Act 2016* or an SDA Approval under the *State Development and Public Works Organisation Act 1971*), this EA will not take effect until the additional authorisation has taken effect.

If this EA takes effect when the additional authorisation takes effect, you must provide the administering authority written notice within 5 business days of receiving notification of the related additional authorisation taking effect.

The anniversary day of this environmental authority is the same day each year as the original take effect date unless you apply to change the anniversary day. The payment of the annual fee will be due each year on this day. An annual return will be due each year on 01 April.

If you have incorrectly claimed that an additional authorisation is not required, carrying out the ERA without the additional authorisation is not legal and could result in your prosecution for providing false or misleading information or operating without a valid environmental authority.



Signature

6 July 2022

Date

Daniel Spelchan
Department of Environment and Science
Delegate of the administering authority
Environmental Protection Act 1994

Enquiries:

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Privacy statement

Pursuant to section 540 of the EP Act, the Department is required to maintain a register of certain documents and information authorised under the EP Act. A copy of this document will be kept on the public register. The register is available for inspection by members of the public who are able take extracts, or copies of the documents from the register. Documents that are required to be kept on the register are published in their entirety, unless alteration is required by the EP Act. There is no general discretion allowing the Department to withhold documents or information required to be kept on the public register. For more information on the Department's public register, search 'public register' at www.qld.gov.au. For queries about privacy matters please email privacy@des.qld.gov.au or telephone 13 74 68.

Obligations under the *Environmental Protection Act 1994*

In addition to the requirements found in the conditions of this environmental authority, the holder must also meet their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319)
- duty to notify environmental harm (section 320-320G)
- offence of causing serious or material environmental harm (sections 437-439)
- offence of causing environmental nuisance (section 440)
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG)
- offence to place contaminant where environmental harm or nuisance may be caused (section 443)

Other permits required

This permit only provides an approval under the *Environmental Protection Act 1994*. In order to lawfully operate you may also require permits / approvals from your local government authority, other business units within the department and other State Government agencies prior to commencing any activity at the site. For example, this may include permits / approvals with your local Council (for planning approval), the Department of Transport and Main Roads (to access state controlled roads), the Department of Resources (to clear vegetation), and the Department of Agriculture and Fisheries (to clear marine plants or to obtain a quarry material allocation).

Obligations under the *Mining and Quarrying Safety and Health Act 1999*

If you are operating a quarry, other than a sand and gravel quarry where there is no crushing capability, you will be required to comply with the *Mining and Quarrying Safety and Health Act 1999*. For more information on your obligations under this legislation contact Mine Safety and Health at <https://www.rshq.qld.gov.au/>, or phone 13 QGOV (13 74 68) or your local Mines Inspectorate Office.

Development Approval

This permit is not a development approval under the *Planning Act 2016*. The conditions of this environmental authority are separate, and in addition to, any conditions that may be on the development approval. If a copy of this environmental authority is attached to a development approval, it is for information only, and may not be current. If you are unsure that you have the most current version of the environmental authority relating to this site please visit <https://apps.des.qld.gov.au/env-authorities/> to access all environmental authorities currently approved.

Conditions of environmental authority

Agency interest: General	
Condition number	Condition
G1	<p>Activities under this environmental authority must be conducted in accordance with the following limitations:</p> <ol style="list-style-type: none"> 1. The amount of chemicals manufactured per year must not exceed 1000 tonnes per annum; 2. The only chemicals authorised for manufacturing is hydrogen; 3. Activities under this environmental authority are authorised only within the site boundary as identified in Appendix A – Site Boundary.
G2	All reasonable and practicable measures must be taken to prevent or minimise environmental harm caused by the activities.
G3	Any breach of a condition of this environmental authority must be reported to the administering authority as soon as practicable within 24 hours of becoming aware of the breach. Records must be kept including full details of the breach and any subsequent actions taken.
G4	Other than as permitted by this environmental authority, the release of a contaminant into the environment must not occur.
G5	Environmental monitoring results must be kept until surrender of this environmental authority. All other information and records that are required by the conditions of this environmental authority must be kept for a minimum of five (5) years. All information and records required by the conditions of this environmental authority must be provided to the administering authority, or nominated delegate upon request, within the required timeframe and in the specified format.
G6	An appropriately qualified person(s) must monitor, record and interpret all parameters that are required to be monitored by this environmental authority and in the manner specified by this environmental authority.
G7	All analyses required under this environmental authority must be carried out by a laboratory that has National Association of Testing Authorities (NATA) certification, or an equivalent certification, for such analyses.
G8	When required by the administering authority, monitoring must be undertaken in the manner prescribed by the administering authority, to investigate a complaint of environmental nuisance arising from the activity. The monitoring results must be provided within 10 business days to the administering authority upon its request.
G9	<p>The activity must be undertaken in accordance with written procedures that:</p> <ol style="list-style-type: none"> 1. identify potential risks to the environment from the activity during routine operations, closure and an emergency 2. establish and maintain control measures that minimise the potential for environmental harm

	<ol style="list-style-type: none"> 3. ensure plant, equipment and measures are maintained in a proper and effective condition 4. ensure plant, equipment and measures are operated in a proper and effective manner 5. ensure that staff are trained and aware of their obligations under the <i>Environmental Protection Act 1994</i> 6. ensure that reviews of environmental performance are undertaken at least annually.
G10	Chemicals and fuels in containers of greater than 15 litres must be stored within a secondary containment system.
Agency interest: Waste	
Condition number	Condition
W1	All waste generated in carrying out the activity must be reused, recycled or removed to a facility that can lawfully accept the waste.
W2	Incompatible wastes must not be mixed in the same container or waste storage area.
Agency interest: Air	
Condition number	Condition
A1	Odours or airborne contaminants must not cause environmental nuisance to any sensitive place or commercial place.
Agency interest: Land	
Condition number	Condition
L1	Contaminants must not be released to land.
L2	Before applying to surrender this environmental authority, the site must be rehabilitated to achieve a safe, stable, non-polluting landform.
Agency interest: Acoustic	
Condition number	Condition
N1	Noise generated by the activity must not cause environmental nuisance to any sensitive place or commercial place.

Agency interest: Water	
Condition number	Condition
WA1	Other than as permitted within this environmental authority, contaminants must not be released to any waters.
WA2	Stormwater is authorised to be released to the stormwater system within catchment W2 under environmental authority EPPR00926513, consistent with a third-party agreement with RTA Yarwun Pty Ltd.
WA3	The release of stormwater permitted under WA2 must not contain any properties at a concentration capable of causing environmental harm.
WA4	The release of stormwater permitted under WA2 must not produce any slick or other visible evidence of oil or grease, scum, litter or other visually objectionable matter.

Definitions

Key terms and/or phrases used in this document are defined in this section. Where a term is not defined, the definition in the *Environmental Protection Act 1994*, its regulations or environmental protection policies must be used. If a word remains undefined it has its ordinary meaning.

Activity means the environmentally relevant activities, whether resource activities or prescribed activities, to which the environmental authority relates.

Administering authority means the Department of Environment and Science or its successor or predecessors.

Appropriately qualified person(s) means a person or persons who has professional qualifications, training, skills or experience relevant to the EA requirement and can give authoritative assessment, advice and analysis in relation to the EA requirements using the relevant protocols, standards, methods or literature.

Commercial place means a place used as a workplace, an office or for business or commercial purposes and includes a place within the curtilage of such a place reasonably used by persons at that place.

Environmental nuisance as defined in Chapter 1 of the *Environmental Protection Act 1994*.

Groundwater means water that occurs naturally in, or is introduced artificially into, an aquifer.

Incompatible waste means waste that may chemically react when:

1. placed in proximity to other wastes; and/or
2. mixed with other wastes

Land means any land, whether above or below the ordinary high-water mark at spring tides (i.e. includes tidal land).

Measures has the broadest interpretation and includes:

- Procedural measures such as standard operating procedures for environmental risk assessment, management actions, departmental direction and competency expectations under relevant guidelines
- Physical measures such as plant, equipment and physical objects (such as bunding, containment systems etc.).

NATA means National Association of Testing Authorities.

Nominated delegate means another government agency that provides services to the administering authority.

Records include breach notifications, written procedures, analysis results, monitoring reports and monitoring programs required under a condition of this authority.

Release of a contaminant into the environment means to:

1. deposit, discharge, emit or disturb the contaminant
2. cause or allow the contaminant to be deposited, discharged, emitted or disturbed
3. fail to prevent the contaminant from being deposited, discharged emitted or disturbed
4. allow the contaminant to escape
5. fail to prevent the contaminant from escaping.

Secondary containment system means a system designed, installed and operated to prevent any release of contaminants from the system, or containers within the system, to land, groundwater, or surface waters.

Sensitive place includes the following and includes a place within the curtilage of such a place reasonably used by persons at that place:

1. a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or
2. a motel, hotel or hostel; or

3. a kindergarten, school, university or other educational institution; or
4. a medical centre or hospital; or
5. a protected area under the *Nature Conservation Act 1992*, the *Marine Parks Act 2004* or a World Heritage Area; or
6. a public park or garden; or
7. for noise, a place defined as a sensitive receptor for the purposes of the Environmental Protection (Noise) Policy 2019.

Waters includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water, natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater and any part thereof.

You means the holder of the environmental authority.

END OF ENVIRONMENTAL AUTHORITY