

RAPPORTO PRELIMINARE DI SICUREZZA - ottobre 2015

Allegato I.5: Risultanze analisi degli eventi incidentali

ALBERI DEGLI EVENTI

IMPIANTO POT									
Top	Descrizione	Diametro di efflusso	Portata di rilascio [kg/s]	Frequenza Top [occ./anno]	Frequenze scenari incidentali [occasioni/anno]				
					Dispersione	Pool fire	Jet fire	Flash fire	VCE
H01	Liquido al compressore COMP.01	¼"	0.28	1.06E-05	1.06E-05	1.62E-08		5.58E-09	1.67E-09
H02	Danneggiamento COMP.01 per mancanza lubrificazione	¼"	0.28	3.63E-06	3.62E-06	5.54E-09		1.91E-09	5.74E-10
H03	Danneggiamento COMP.01 per alta temperatura olio	¼"	0.28	4.89E-05	4.88E-05	7.47E-08		2.58E-08	7.73E-09
R01	Perdita da compressore COMP.01	¼"	0.28	2.00E-04	2.00E-04	3.05E-07		1.05E-07	3.16E-08
R02	Perdita da separatore ammoniac	1"	0.51	2.00E-05	1.99E-05	7.25E-08		5.25E-08	3.94E-09

IMPIANTO GREEN JET A VALLE INTERVENTI MIGLIORATIVI PROPOSTI									
Top	Descrizione	Diametro di efflusso	Portata di rilascio [kg/s]	Frequenza Top [occ./anno]	Frequenze scenari incidentali [occasioni/anno]				
					Dispersione	Pool fire	Jet fire	Flash fire	VCE
R01	Perdita da P1A/B	¼"	0.08	1.20E-03	2.96E-04	---	9.04E-04	3.82E-06	9.45E-10
R02	Perdita da P2A/B	¼"	0.55	1.20E-03	1.20E-03	1.84E-06		6.43E-07	1.45E-07
R03	Perdita da P3A/B	¼"	0.64	1.20E-03	1.20E-03	1.83E-06	---	6.34E-07	4.77E-08
R04	Rilascio ricircolo colonna C71 uscita forno	1"	0.40	1.04E-06	1.56E-07	---	8.84E-07	1.04E-07	2.58E-11
R05	Rilascio da linea testa colonna C71	1"	0.25	9.50E-06	8.54E-06	---	9.63E-07	9.53E-07	---
R06	Rilascio linea Green Jet a stoccaggio (prima di E4)	2"	1.67	3.90E-05	3.89E-05	9.25E-08	---	5.53E-08	1.40E-08
R07	Rilascio linea Green Diesel a stoccaggio (prima di E74)	1"	8.56	2.60E-05	2.60E-05	4.67E-08	---	2.07E-08	3.11E-09

IMPIANTO STEAM REFORMER A VALLE INTERVENTI MIGLIORATIVI PROPOSTI									
Top	Descrizione	Diametro di efflusso	Portata di rilascio [kg/s]	Frequenza Top [occ./anno]	Frequenze scenari incidentali [occasioni/anno]				
					Dispersione	Pool fire	Jet fire	Flash fire	VCE
H04	Danneggiamento R003 e tubi catalitici	Ingenti danni economici ma non immediate conseguenze incidentali							
H06	Collasso termico E010	1	0.719	3.19E-05	7.69E-06¹	---	2.39E-05	1.30E-08	6.44E-12
H09	Collasso termico E006	Ingenti danni economici ma non immediate conseguenze incidentali							
R01	Rilascio da linea ingresso gas naturale	1	2.443	3.92E-04	3.75E-04	---	2.16E-06	1.79E-06	1.17E-07
R02	Rilascio da linea in ingresso idrogeno	2	0.015	3.23E-04	2.42E-04	---	8.12E-05	4.03E-07	2.01E-09
R03	Rilascio da linea uscita E001	1	1.602	2.96E-05	2.85E-05	---	1.02E-06	9.94E-07	7.52E-08
R04	Rilascio da linea ingresso R001	1	1.226	2.46E-05	2.36E-05	---	1.02E-06	9.92E-07	7.58E-08
R05	Rilascio da linea uscita R002B	1	1.215	2.76E-05	2.66E-05	---	1.02E-06	9.93E-07	7.62E-08
R06	Rilascio da linea ingresso R003	1	1.109	6.90E-06	6.20E-06	---	6.97E-07	6.90E-07	2.58E-08
R07	Rilascio da linea ingresso F001	1	0.956	9.85E-06	1.48E-06	---	8.37E-06	9.86E-07	1.22E-10
R08	Rilascio da linea uscita F001	1	0.719	1.06E-05	1.98E-06¹	---	8.58E-06	6.62E-07	8.34E-11
R09	Rilascio da linea uscita E010	1	0.882	3.30E-06	2.47E-06	---	8.26E-07	1.35E-09	4.04E-10
R10	Rilascio da linea uscita R004	1	0.816	2.64E-06	1.98E-06²	---	6.61E-07	1.08E-09	2.42E-10
R11	Rilascio da linea uscita E012	1	0.978	6.56E-06	4.92E-06²	---	1.64E-06	2.68E-09	6.02E-10
R12	Rilascio da linea uscita R005	1	0.926	8.20E-06	6.15E-06³	---	2.05E-06	3.46E-10	5.64E-11
R13	Rilascio da linea ingresso V006	1	1.048	4.93E-06	3.69E-06	---	1.23E-06	1.26E-09	3.31E-10
R14	Rilascio da linea ingresso PSA	1	0.524	1.58E-05	1.09E-05	---	4.84E-06	8.98E-07	2.69E-07
R15	Rilascio da linea idrogeno ad utenze	1	0.439	1.86E-04	9.76E-05	---	3.51E-05	1.93E-06	4.89E-07
R16	Rilascio da linea uscita tail gas da PSA	1	0.079	9.24E-06	8.57E-06	---	6.71E-07	6.62E-07	2.48E-08
R17	Rilascio da linea fuel gas a V004	1	0.201	3.16E-05	2.34E-05	---	8.20E-06	3.06E-07	4.24E-08
R18	Rilascio da V004	1	0.201	2.00E-05	1.30E-05	---	7.00E-06	2.00E-06	3.00E-07
R19	Rilascio da V005	1	0.985	2.00E-05	1.50E-05	---	5.00E-06	4.93E-09	7.40E-10

¹ Il presente evento di dispersione senza innesco è evidenziato poiché può venire rilasciato un stream contenente CO al 10.5% (vol/vol).

² Il presente evento di dispersione senza innesco è evidenziato poiché può venire rilasciato un stream contenente CO al 3.6% (vol/vol).

³ Il presente evento di dispersione senza innesco è evidenziato poiché, per trascinamento dalle apparecchiature a monte, può venire rilasciato un stream contenente CO al 3.6% (vol/vol).

IMPIANTO STEAM REFORMER A VALLE INTERVENTI MIGLIORATIVI PROPOSTI									
Top	Descrizione	Diametro di efflusso	Portata di rilascio [kg/s]	Frequenza Top [occ./anno]	Frequenze scenari incidentali [occasioni/anno]				
					Dispersione	Pool fire	Jet fire	Flash fire	VCE
R20	Rilascio da V006	1	1.048	2.00E-05	1.50E-05	---	5.01E-06	5.12E-09	1.34E-09
R21	Rilascio da R001	1	1.226	6.00E-05	5.99E-05	---	8.44E-08	2.44E-08	5.49E-08
R22	Rilascio da R002	1	1.215	6.00E-05	5.99E-05	---	8.44E-08	2.44E-08	3.66E-09
R23	Rilascio da R003	1	1.109	6.00E-05	5.99E-05⁴	---	8.44E-08	2.44E-08	9.15E-10
R24	Rilascio da R004	1	0.816	6.00E-05	4.50E-05⁵	---	1.50E-05	2.45E-08	5.51E-09
R25	Rilascio da R005	1	0.926	6.00E-05	4.50E-05⁶	---	1.50E-05	2.48E-09	9.30E-11

⁴ Il presente evento di dispersione senza innesco è evidenziato poiché, per reverse-flow, può venire rilasciato un stream contenente CO al 10.5% (vol/vol).

⁵ Il presente evento di dispersione senza innesco è evidenziato poiché può venire rilasciato un stream contenente CO al 3.6% (vol/vol).

⁶ Il presente evento di dispersione senza innesco è evidenziato poiché, per trascinamento dalle apparecchiature a monte, può venire rilasciato un stream contenente CO al 3.6% (vol/vol).

CONSEGUENZE INCIDENTALI – DISTANZE DI DANNO

IMPIANTO POT																		
Top	Descrizione	W	Conseguenze incidentali - distanze di danno [m]														Tossico	
			Flash Fire		Jet Fire				Pool Fire				VCE					
			LFL	½ LFL	12,5 kW/m ²	7 kW/m ²	5 kW/m ²	3 kW/m ²	12,5 kW/m ²	7 kW/m ²	5 kW/m ²	3 kW/m ²	0,3 bar	0,14 bar	0,07 bar	0,03 bar	LC50	IDLH
H01	Liquido al compressore COMP.01	2E	-	-	-	-	-	-	-	-	-	-	-	-	-	12	51	
		3D	-	-	-	-	-	-	-	-	-	-	-	-	-	10	43	
H02	Danneggiamento COMP.01 per mancanza lubrificazione	2E	-	-	-	-	-	-	-	-	-	-	-	-	-	12	51	
		3D	-	-	-	-	-	-	-	-	-	-	-	-	-	10	43	
H03	Danneggiamento COMP.01 per alta temperatura olio	2E	-	-	-	-	-	-	-	-	-	-	-	-	-	12	51	
		3D	-	-	-	-	-	-	-	-	-	-	-	-	-	10	43	
R01	Perdita da compressore COMP.01	2E	-	-	-	-	-	-	-	-	-	-	-	-	-	12	51	
		3D	-	-	-	-	-	-	-	-	-	-	-	-	-	10	43	
R02	Perdita da separatore ammoniacca	2E	-	-	-	-	-	-	-	-	-	-	-	-	-	46	67	
		3D	-	-	-	-	-	-	-	-	-	-	-	-	-	43	64	

IMPIANTO GREEN JET A VALLE DEGLI INTERVENTI MIGLIORATIVI PROPOSTI																		
Top	Descrizione	W	Conseguenze incidentali - distanze di danno [m]														Tossico	
			Flash Fire		Jet Fire				Pool Fire				VCE					
			LFL	½ LFL	12,5 kW/m ²	7 kW/m ²	5 kW/m ²	3 kW/m ²	12,5 kW/m ²	7 kW/m ²	5 kW/m ²	3 kW/m ²	0,3 bar	0,14 bar	0,07 bar	0,03 bar	LC50	IDLH
R01	Perdita da P1A/B	2E	< 5	< 5	n.r.	n.r.	n.r.	< 5	-	-	-	-	-	-	-	-	-	
		3D	< 5	< 5	n.r.	n.r.	n.r.	< 5	-	-	-	-	-	-	-	-	-	
R02	Perdita da P2A/B	2E	-	-	16	18	20	23	8	10	12	14	-	-	-	-	-	
		3D	-	-	15	18	19	22	9	10	12	14	-	-	-	-	-	
R03	Perdita da P3A/B	2E	-	-	-	-	-	-	5	6	7	8	-	-	-	-	-	
		3D	-	-	-	-	-	-	5	6	7	8	-	-	-	-	-	

IMPIANTO STEAM REFORMER A VALLE INTERVENTI MIGLIORATIVI PROPOSTI																		
Top	Descrizione	W	Conseguenze incidentali - distanze di danno [m]															
			Flash Fire		Jet Fire				Pool Fire				VCE				Tossico	
			LFL	½ LFL	12,5 kW/m²	7 kW/m²	5 kW/m²	3 kW/m²	12,5 kW/m²	7 kW/m²	5 kW/m²	3 kW/m²	0,3 bar	0,14 bar	0,07 bar	0,03 bar	LC50	IDLH
H06	Collasso termico E010	2E	---	---	n.r.	10	11	12	---	---	---	---	---	---	---	---	< 5	< 10
		3D	---	---	n.r.	10	11	12	---	---	---	---	---	---	---	---	---	< 5
R01	Rilascio da linea in ingresso gas naturale sezione G	2E	14	34	22	24	26	29	---	---	---	---	---	---	---	---	---	---
		3D	13	32	22	25	26	29	---	---	---	---	---	---	---	---	---	---
R02	Rilascio da linea in ingresso idrogeno	2E	---	---	n.r.	n.r.	n.r.	n.r.	---	---	---	---	---	---	---	---	---	---
		3D	---	---	n.r.	n.r.	n.r.	n.r.	---	---	---	---	---	---	---	---	---	---
R03	Rilascio da linea uscita E001	2E	---	---	17	20	21	23	---	---	---	---	---	---	---	---	---	---
		3D	---	---	18	20	21	23	---	---	---	---	---	---	---	---	---	---
R04	Rilascio da linea ingresso R001	2E	---	---	15	17	18	20	---	---	---	---	---	---	---	---	---	---
		3D	---	---	15	17	18	20	---	---	---	---	---	---	---	---	---	---
R05	Rilascio da linea uscita R002B	2E	---	---	15	17	18	20	---	---	---	---	---	---	---	---	---	---
		3D	---	---	15	17	18	20	---	---	---	---	---	---	---	---	---	---
R07	Rilascio da linea ingresso F001	2E	---	---	n.r.	11	12	13	---	---	---	---	---	---	---	---	---	---
		3D	---	---	n.r.	11	12	13	---	---	---	---	---	---	---	---	---	---
R08	Rilascio da linea uscita F001	2E	---	---	n.r.	10	11	12	---	---	---	---	---	---	---	---	< 5	< 10
		3D	---	---	n.r.	10	11	12	---	---	---	---	---	---	---	---	< 5	< 10
R10	Rilascio da linea uscita R004	2E	---	---	---	---	---	---	---	---	---	---	---	---	---	---	< 5	< 10
		3D	---	---	---	---	---	---	---	---	---	---	---	---	---	---	< 5	< 10
R11	Rilascio da linea uscita E012	2E	---	---	n.r.	12	12	14	---	---	---	---	---	---	---	---	< 5	< 10
		3D	---	---	n.r.	12	13	14	---	---	---	---	---	---	---	---	< 5	< 10
R12	Rilascio da linea uscita R005	2E	---	---	n.r.	11	12	14	---	---	---	---	---	---	---	---	< 5	< 10
		3D	---	---	n.r.	12	12	14	---	---	---	---	---	---	---	---	< 5	< 10
R13	Rilascio da linea ingresso V006	2E	---	---	12	13	15	16	---	---	---	---	---	---	---	---	---	---
		3D	---	---	12	14	15	16	---	---	---	---	---	---	---	---	---	---
R14	Rilascio da linea ingresso PSA	2E	---	---	14	16	17	19	---	---	---	---	---	---	---	---	---	---
		3D	---	---	14	17	18	20	---	---	---	---	---	---	---	---	---	---

IMPIANTO STEAM REFORMER A VALLE INTERVENTI MIGLIORATIVI PROPOSTI																		
Top	Descrizione	W	Conseguenze incidentali - distanze di danno [m]															
			Flash Fire		Jet Fire				Pool Fire				VCE				Tossico	
			LFL	½ LFL	12,5 kW/m²	7 kW/m²	5 kW/m²	3 kW/m²	12,5 kW/m²	7 kW/m²	5 kW/m²	3 kW/m²	0,3 bar	0,14 bar	0,07 bar	0,03 bar	LC50	IDLH
R15	Rilascio da linea idrogeno ad utenze: sezione B	2E	19	27	14	16	18	20	---	---	---	---	---	---	---	---	---	---
		3D	18	25	15	17	18	20	---	---	---	---	---	---	---	---	---	---
	Rilascio da linea idrogeno ad utenze: sezione D	2E	---	---	n.r.	13	15	18	---	---	---	---	---	---	---	---	---	---
		3D	---	---	n.r.	12	14	18	---	---	---	---	---	---	---	---	---	---
	Rilascio da linea idrogeno ad utenze: sezioni E-F-G	2E	---	---	14	16	18	20	---	---	---	---	---	---	---	---	---	---
		3D	---	---	15	17	18	20	---	---	---	---	---	---	---	---	---	---
R17	Rilascio da linea fuel gas a V004	2E	---	---	5	6	6	7	---	---	---	---	---	---	---	---	---	
		3D	---	---	4	5	6	7	---	---	---	---	---	---	---	---	---	
R18	Rilascio da V004	2E	5	8	5	6	6	7	---	---	---	---	---	---	---	---	---	
		3D	4	7	4	5	6	7	---	---	---	---	---	---	---	---	---	
R19	Rilascio da V005	2E	---	---	n.r.	12	13	15	---	---	---	---	---	---	---	---	---	
		3D	---	---	n.r.	12	13	15	---	---	---	---	---	---	---	---	---	
R20	Rilascio da V006	2E	---	---	12	13	15	16	---	---	---	---	---	---	---	---	---	
		3D	---	---	12	14	15	16	---	---	---	---	---	---	---	---	---	
R23	Rilascio da R003	2E	---	---	---	---	---	---	---	---	---	---	---	---	---	---	< 5	< 10
		3D	---	---	---	---	---	---	---	---	---	---	---	---	---	---	< 5	< 10
R24	Rilascio da R004	2E	---	---	n.r.	11	12	13	---	---	---	---	---	---	---	---	< 5	< 10
		3D	---	---	n.r.	11	12	13	---	---	---	---	---	---	---	---	< 5	< 10
R25	Rilascio da R005	2E	---	---	n.r.	11	12	14	---	---	---	---	---	---	---	---	< 5	< 10
		3D	---	---	n.r.	12	12	14	---	---	---	---	---	---	---	---	< 5	< 10