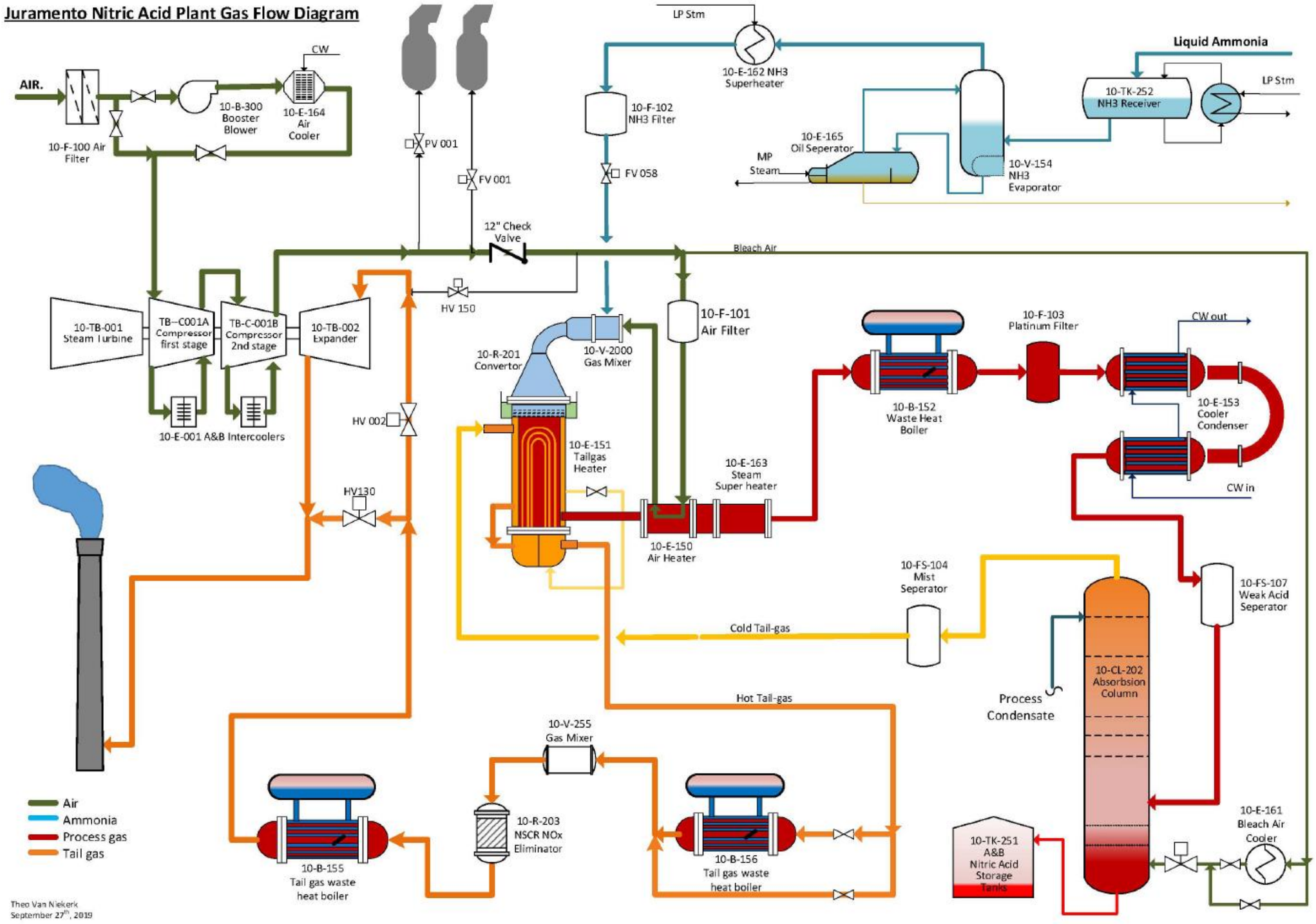
Change control: New document

1	**General plant information**	
1.1	Plant type (Dual Pressure/Mono-High/Mono-Medium/Mono-Low)	Mono-High
1.2	Reactor supplier (Grande Paroisse , Uhde , Wetherley , other)	Girdler
1.3	Year of start-up	First in the 60s and new Commissioning in mid-2018
1.4	Number of reactors	1
1.5	Reactor pressure (bar, abs)	9
1.6	Reactor internal diameter in mm (basket)	800 (Hexagonal)
1.7	Gauze temperature (°C)	910
1.8	Production rate, design (100% Metric Tons HNO_3 /day)	180
1.9	Production rate, real (100% Metric Tons HNO_3 /day)	160
1.10	HNO_3 concentration in the final product (%)	56
1.11	Normal duration of the productive campaign (months)	3
1.12	Operation time (days per year)	330
1.13a	Ammonia flow to reactor (kg/h)	2,000
1.13b	Ammonia flow to reactor (Nm3/h)	2,600
1.14	Primary air flow to ammonia reactor (Nm^3 /h)	24,000
1.15	Secondary air flow (Nm^3 /h)	1,550
1.16	Temperature of the gas mixture (air/NH_3) to the reactor (°C)	240
1.17	Conversion efficiency of the plant at the beginning of the campaign (% or kgNH_3/teHNO_3)	0.99
1.18	Plant conversion efficiency at the end of the campaign (% or kgNH_3 /teHNO_3)	0.88
2	**Pt gauze per reactor**	
2.1	Material (Pt% / Rh% / Pd%)	95/5
2.2	Diameter (mm)	800 (Hexagonal)
23	Number of gauze	42
2.4	Gauze supplier	Hereaus
3	**Change of Pt gauze per reactor**	
3.1	Average number of stops per campaign in the last three campaigns	14
3.2	Number of stops that were not planned	8
3.3	Date of next scheduled stoppage	Every 3 months for a mesh change and a general shutdown in July.

3.4	Planned changes to the composition of Pt gauze in the future?	NO
4	**Reactor Basket / Pressure Drop Data**	
4.1	Type of support system installed (basket with Raschig rings , others)	Mesh: Nickel / Chrome
4.2	Support system depth (mm)	120
4.3	Available depth for a secondary catalyst under gauze (mm)	260 Distance between the mesh and the top of the exchanger tubes
4.4	Pressure drop tolerance in combustion reactor of:	
	• Primary gauze (mbar)	-
	• Raschig ring bed (mbar)	-
	• Or full package (2 items above), (mbar)	-
5	**NSCR and tail gas information**	
5.1	NOx abatement unit installed (Yes / No)	Yeah
5.2	NOx abatement unit	Before expand
5.3	NOx reduction system type (SCR /NSCR)	NSCR
5.4	NSCR catalyst (precious metal, base metal, zeolite)	Pt-Rh-Pd Impregnating in ceramic base
5.5	NSCR Catalyst Supplier	ECS
5.6	Maximum temperature allowed in the NSCR reactor (°C)	732
5.7	NSCR catalyst age (years)	Lifespan: 3-4 years Last upload: April 2023
5.8	NOx regulation limit (ppm)	50
5.9	NOx content before the reactor (ppm)	5,500
5.10	NOx content after reactor (ppm)	< 50
5.11	Gas flow before NSCR (kg/h or Nm 3 / h)	25,000 kg/h
5.12	Gas flow after NSCR (kg/h or Nm^3/h)	25,200 kg/h
5.13	Tail gas temperature at the outlet of the absorption tower (°C)	25
5.14	Tail gas temperature (°C) before NSCR	478 - 480
5.15	Tail gas temperature (°C) after NSCR	710 - 730
5.16	SCR O2 content (% vol.)	1.3 – 1.5%
5.17	Tail gas temperature (°C) before expander	590 - 610
5.18	Tail gas temperature (°C) before expander (max. Allowable)	620
5.19	Tail gas temperature (°C) after turbine	270 - 280
5.20	Tail gas pressure at the outlet of the absorption tower (bar a)	7.97

5.21	Tail gas pressure at the absorption tower inlet (bar a)	7.97
5.22	Tail gas pressure (bar a) before turbine	6.4
5.23	Tail gas pressure (bar absolute) after turbine	~1
5.24	Tail gas flow (kg/h or Nm3 / h)	25,200 kg/h
	Reducing agents for NSCR:	
5.25	• Ammonia Plant Purge Gas Flow (kg/h) • Natural Gas flow	360 kg/h 200 kg/h
5.26	• Purge gas composition • Natural Gas Composition	68% H2 – 3%Ar – 26%N2 - 3%NH3 91% CH4 – 5.5% C2H2 – 0.5% C3H8 – 0.2% C4H10 – 2.8% others
6	**Chimney information**	
6.2	Distance from chimney to control room (m)	100
6.3	Distance from sampling location (possible/existing) at chimney to ground level	30
6.4	Sampling platform required (Yes/No)	No
6.5	Access to the sampling platform (stairs)	Through stairs
6.6	O_2 content in tail gases (% vol.)	1.3 – 1-5%
6.7	Maximum allowable additional pressure drop caused by the tertiary reduction system	0.2 kg/cm2g
7	**Steam generation with NSCR heat exchanger** The pre- and post-NSCR boilers are considered.	
7.1	Steam flow generated (kg/h)	1,700
7.2	Generated steam temperature (°C)	200
7.3	Generated steam pressure (bar)	15 – 15.5
7.4	Use of generated steam	Turbine


Juramento Nitric Acid Plant Gas Flow Diagram
AIR.
CW
10-F-100 Air Filter
10-B-300 Booster Blower
10-E-164 Air Cooler
PV 001
FV 001
LP Stm
10-E-162 NH3 Superheater
10-F-102 NH3 Filter
FV 058
10-E-165 Oil Seperator
MP Steam
10-V-154 NH3 Evaporator
Liquid Ammonia
10-TK-252 NH3 Receiver
LP Stm
12" Check Valve
Bleach Air
10-TB-001 Steam Turbine
TB--C001A Compressor first stage
TB-C-001B Compressor 2nd stage
10-TB-002 Expander
10-E-001 A&B Intercoolers
HV 150
HV 002
HV130
10-R-201 Convertor
10-V-2000 Gas Mixer
10-E-151 Tailgas Heater
10-E-163 Steam Super heater
10-E-150 Air Heater
10-F-101 Air Filter
10-B-152 Waste Heat Boiler
10-F-103 Platinum Filter
CW out
10-E-153 Cooler Condenser
CW in
10-FS-104 Mist Seperator
Cold Tail-gas
10-FS-107 Weak Acid Seperator
Hot Tail-gas
10-V-255 Gas Mixer
Process Condensate
10-CL-202 Absorbsion Column
10-R-203 NSCR NOx Eliminator
10-B-155 Tail gas waste heat boiler
10-B-156 Tail gas waste heat boiler
10-TK-251 A&B Nitric Acid Storage Tanks
10-E-161 Bleach Air Cooler
Air
Ammonia
Process gas
Tail gas
Theo Van Niekerk
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