



Fresnillo District Site Visit September 2019

Corporate & Regional



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Saucito



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Geology Superintendent



Hector Estrada
Plant Superintendent

1 **Fresnillo District Overview**

2 **Operational Review**

2.1 **Regional Geology**

2.2 **Fresnillo Operation**

2.3 **Saucito Operation**

3 **Fresnillo To Its Full Potential (FFP)**

3.1 **Main Challenges**

3.2 **Projects to improve infrastructure**

3.3 **Projects to improve processes**

4 **Key Messages**

Location & developed infrastructure

Fresnillo
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Messages

Located in the mining region of Zacatecas

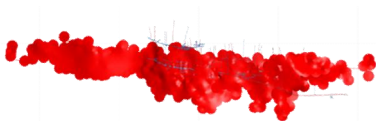
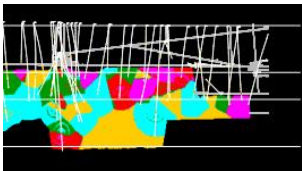
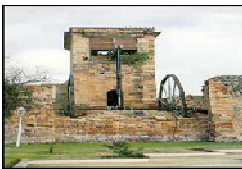
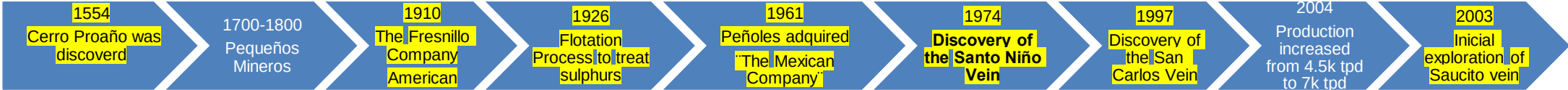
Key Facts

- Fresnillo, Saucito, and Juanicipio are **strategically located** in the Fresnillo district, Zacatecas.
 - Close to other important mining operations such as Peñasquito (Newmont Goldcorp), Madero (Peñoles) and others.
- **2 mining units:**
 - Fresnillo, an underground silver mine with lead, zinc and gold content.
 - Saucito, an underground silver mine with lead, zinc and gold content.
 - Both mining units are close to each other and are near to the Juanicipio Project, currently under development.
- Both mine operations have **concentration plants with 8k t/d production capacity.**
- Both operations have well developed infrastructure, including:
 - Shafts, pumping stations, Sub-stations, workshops, warehouses, tailings dams, water treatment plants, housing and administrative offices.

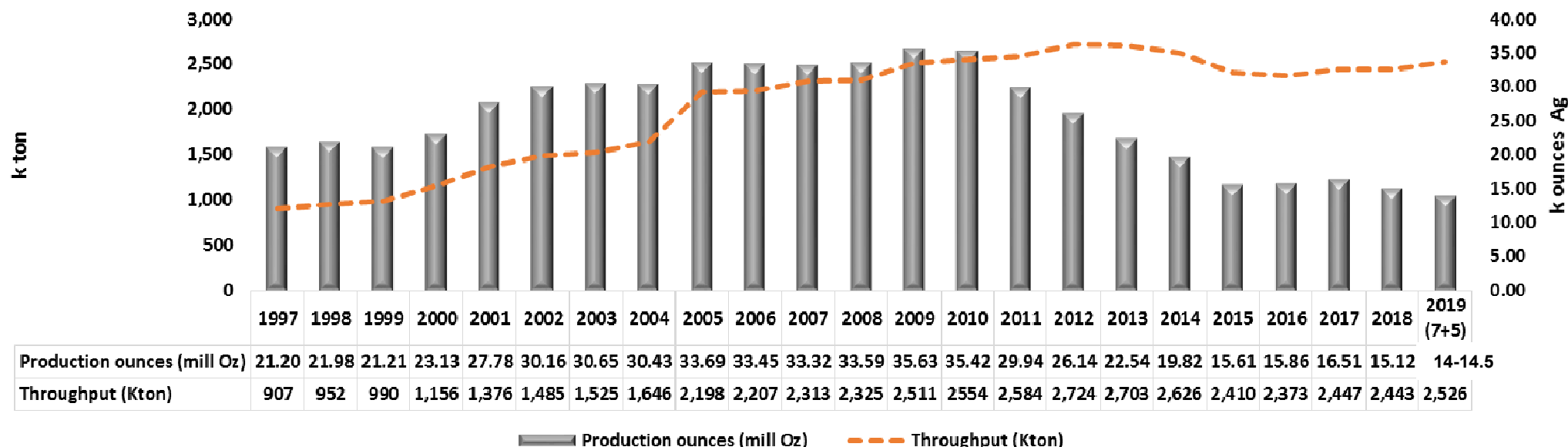
Geographical Location



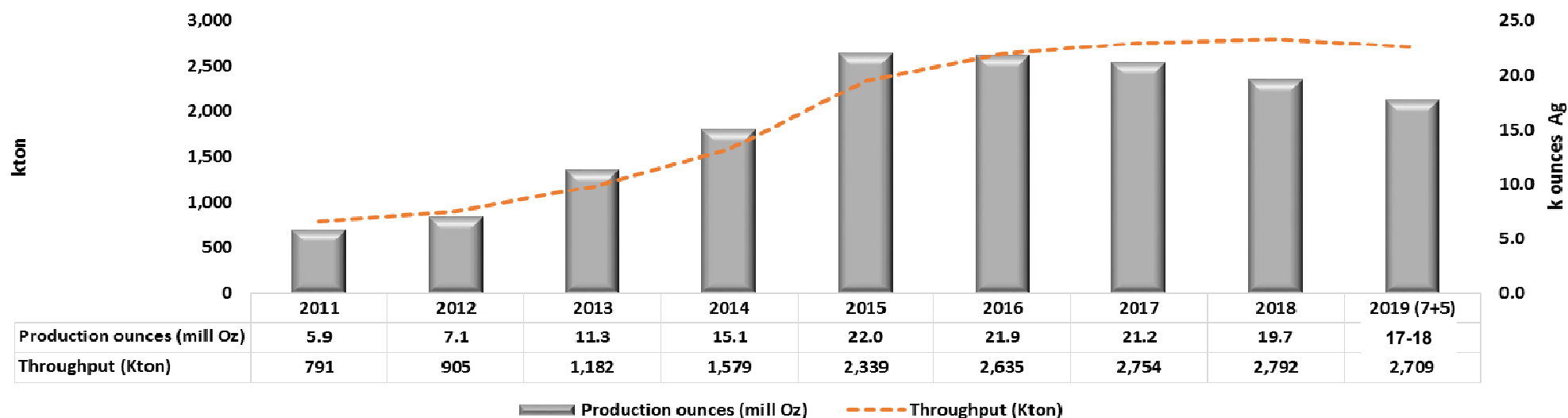
Fresnillo District Timeline

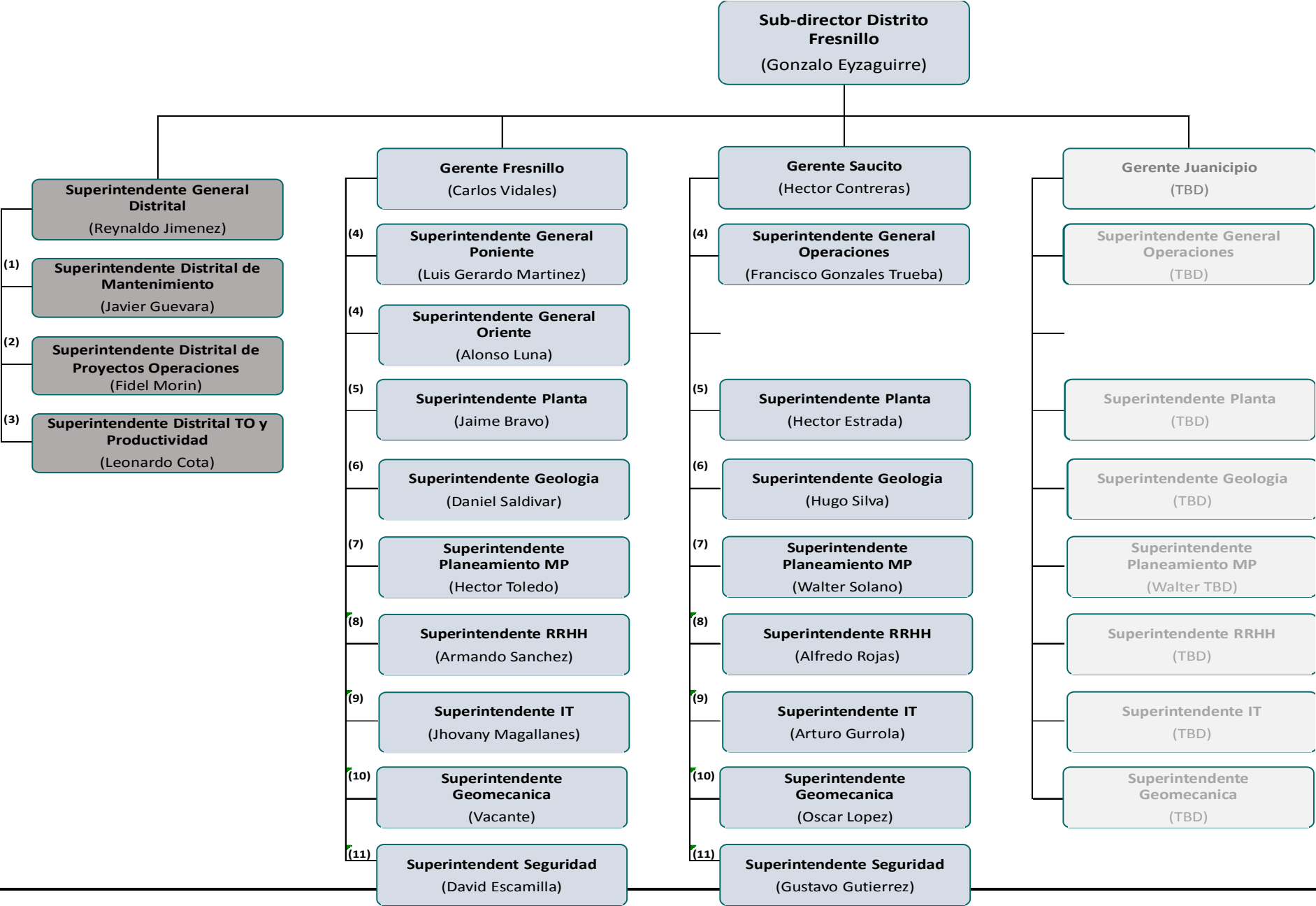


Throughput VS Silver ounces MINERA FRESNILLO



Throughput VS Silver ounces MINERA SAUCITO





Agenda

1 **Fresnillo District Overview**

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2.2 **Fresnillo Operation**

2.3 **Saucito Operation**

3 **Fresnillo To Its Full Potential (FFP)**

3.1 **Main Challenges**

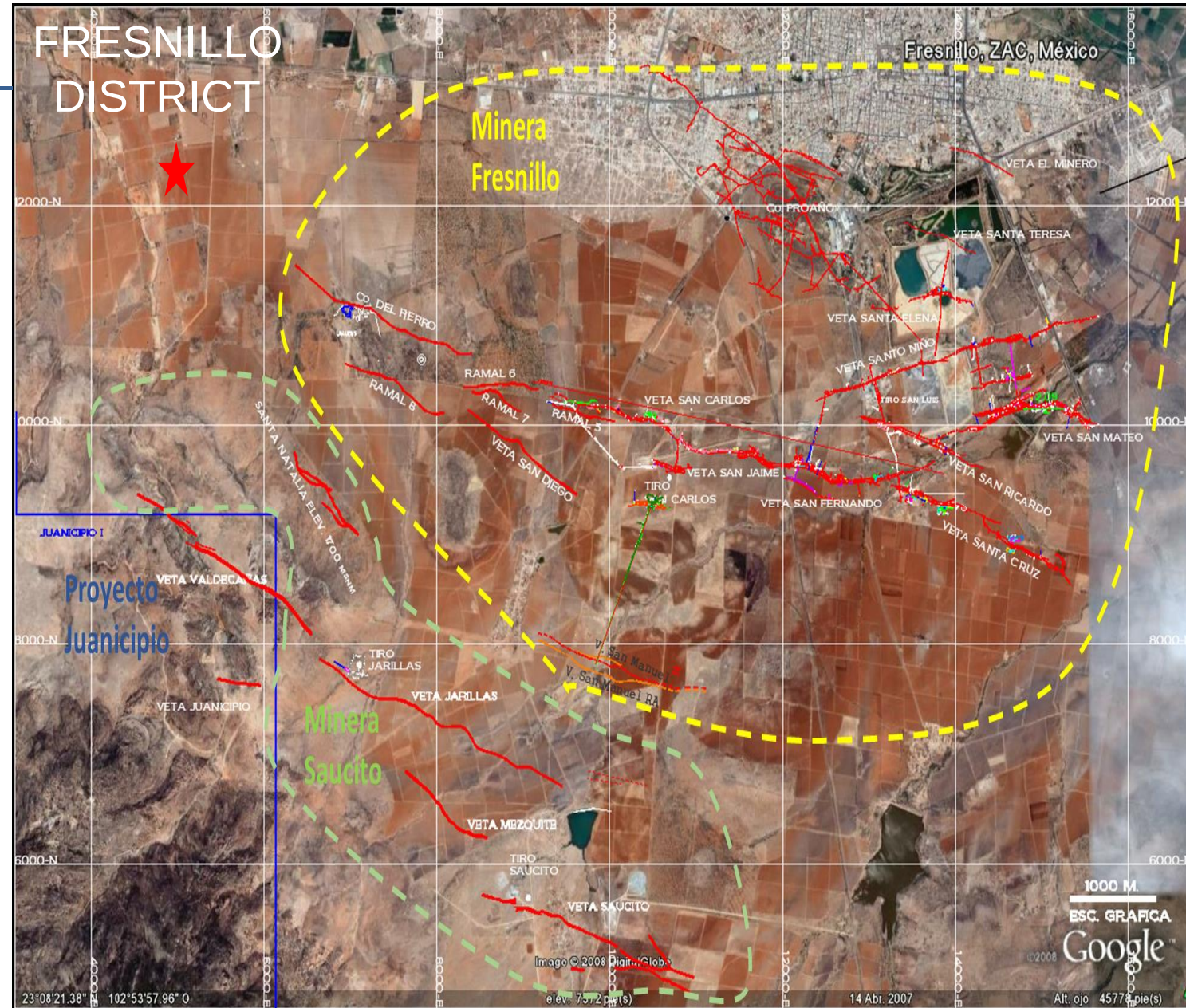
3.2 **Projects to improve infrastructure**

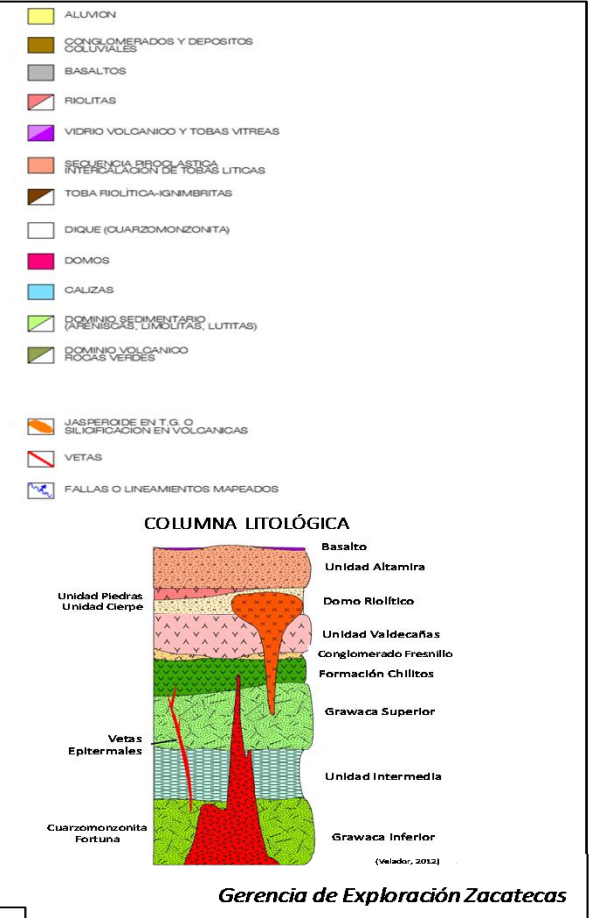
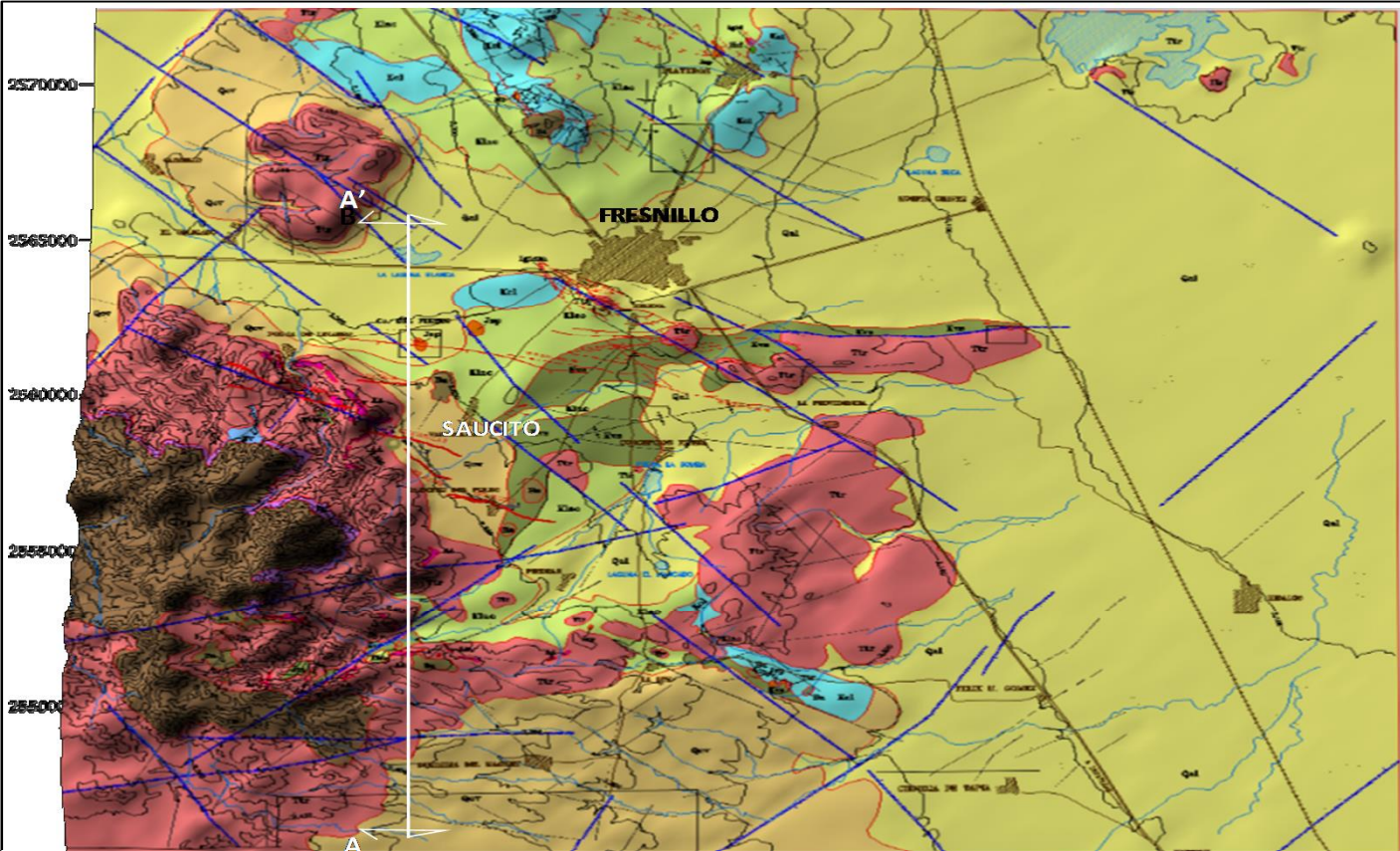
3.3 **Projects to improve processes**

4 **Key Messages**

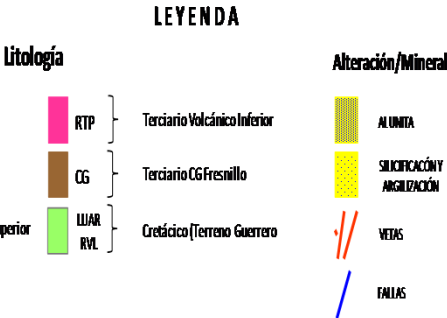
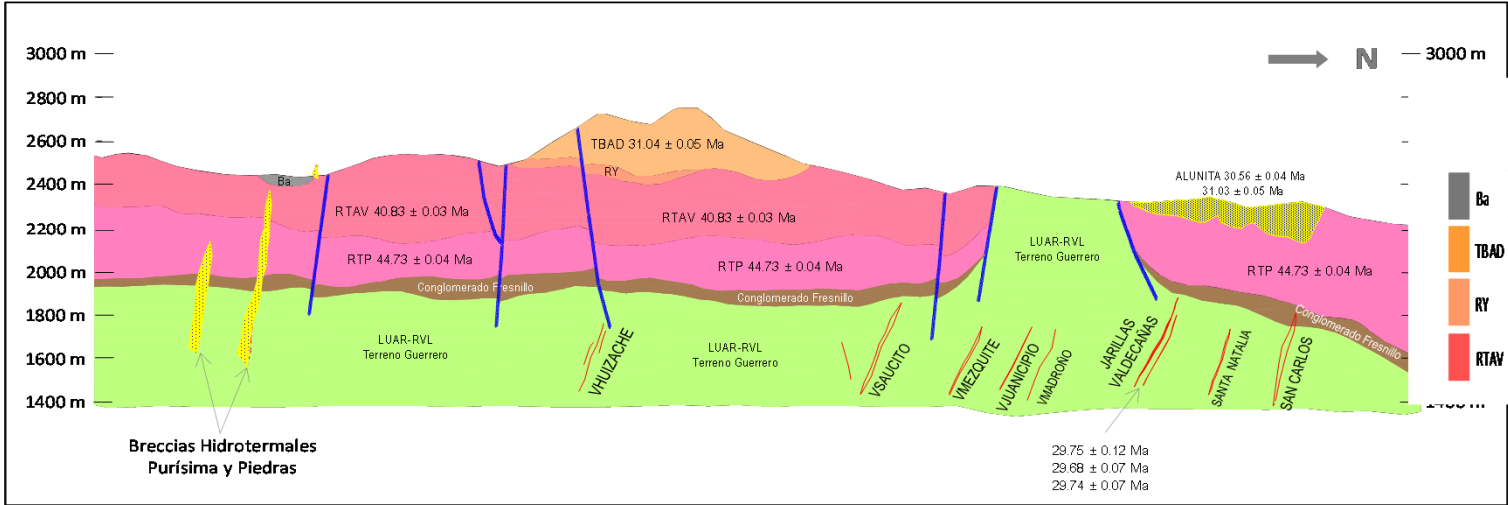
Key Facts

- The district is composed mainly of structures striking NW 40 SE
- Inclination of the veins is around 65°
- The vein thickness are in a range of 0.5 mts to 20 mts
- The mineralogy is composed of silver sulphurs and sulpho-salts, electrum for gold and galena and sphalerite for lead and zinc





SECCIÓN A-A'N-S (Viendo al W)



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2.1 Regional Geology

2.2 Fresno Operation

2.3 Saucito Operation

3 Fresno To Its Full Potential (FFP)

3.1 Main Challenges

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3.3 Projects to improve processes

4 Key Messages

Resources

Category	Tonnes	Au Grade (gr/ton)	Ag Grade (gr/ton)	Pb Grade (%)	Zn Grade (%)
Measures	12'741,547	0.91	557	1.05	1.81
Indicated	24'713,485	0.86	362	1.53	3.22
Inferred	37'140,609	0.66	315	1.22	2.29
TOTAL	74'595,641	0.76	339	1.38	2.75

Value Cut Resources (Cut Off) 2018: 131 g/t Ag Eq

Reserve

Assumptions

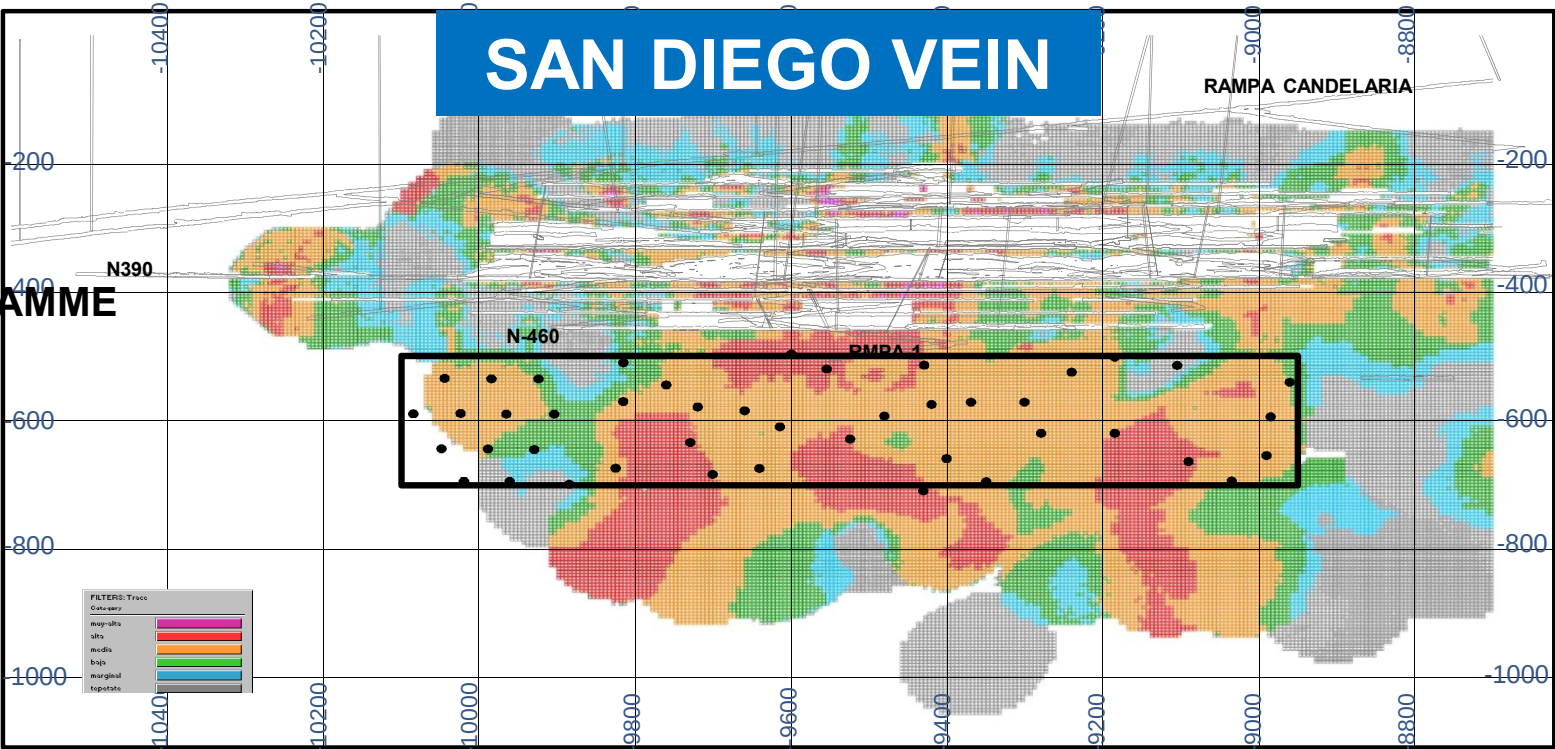
USD/oz Au	\$1,250
USD/oz Ag	\$17.00
USD/lb Pb	\$0.90
USD/lb Zn	\$1.10

Category	Tonnes	Au Grade (gr/ton)	Ag Grade (gr/ton)	Pb Grade (%)	Zn Grade (%)
Proven	4'898,954	0.66	320	0.76	1.31
Probable	17'673,106	0.81	222	1.80	3.91
TOTAL	22'572,060	0.78	243	1.57	3.35

Cut-off is calculated using
All Sustaining Cost

Value Cut Reserve (Cut Off) 2018: 212 g/t Ag Eq

● **INFILL PROGRAMME**
15,000 metres



AG>600
AG>360 AND AG<=600
AG>240 AND AG<=360
AG>120 AND AG<=240
AG>60 AND AG<=120
AG<=60

	2017	2018	2019	2020
KM	48	65	80	50

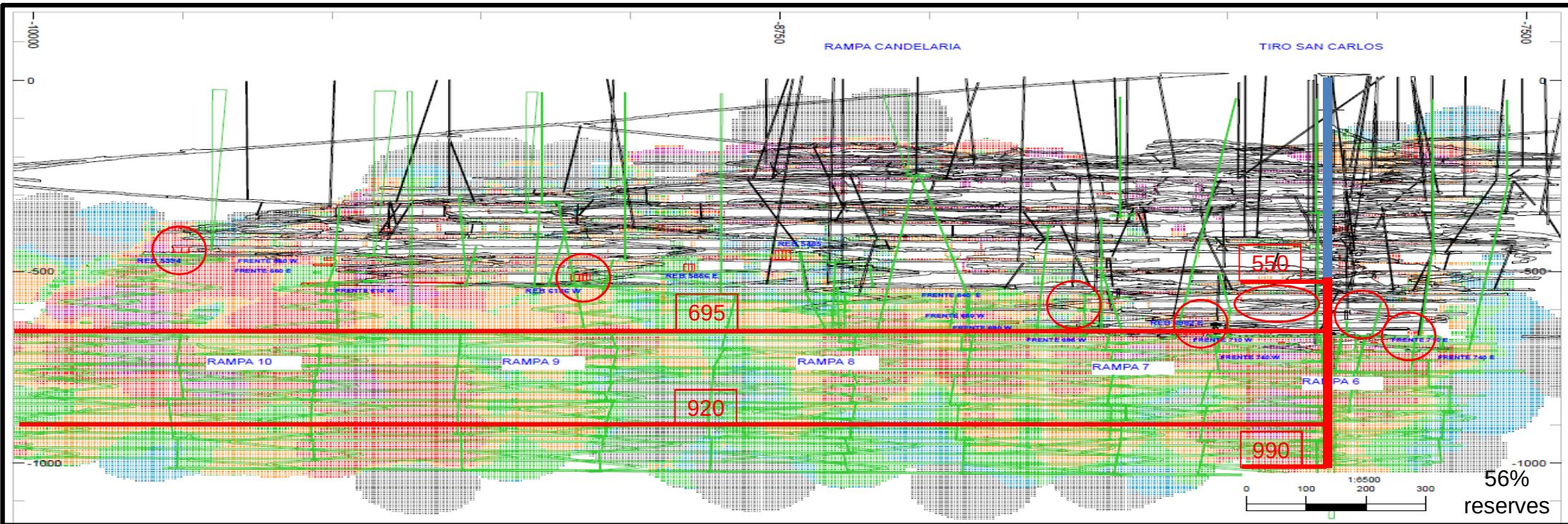
Fresnillo Operation – Underground Operations

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Area	% de Tonnes	# Veins
CANDELARIA	20.07%	2
SAN ALBERTO	30.28%	3
SAN CARLOS	20.68%	8
SAN CARLOS 695	7.91%	1
SAN MATEO	7.10%	8
SAN RICARDO	7.57%	2
SANTA ELENA	6.39%	2
TOTAL	100.00%	26

YEAR	Bench & Fill	Cut & Fill	Development
2018	50%	38%	12%
2019	50%	34%	16%

Vein Type	Vein Width (mts)
Wide (> 3 mts)	3.2
Medium (2-3 mts)	2.4
Narrow (< 2 mts)	1.5

Workshops:

- Å 250 (Candelaria)
- Å 300 (S Alberto)
- Å 530 (S Ricardo)
- Å 695 (S Carlos)
- Å 370 (S Mateo)
- Å 425 (S Carlos)

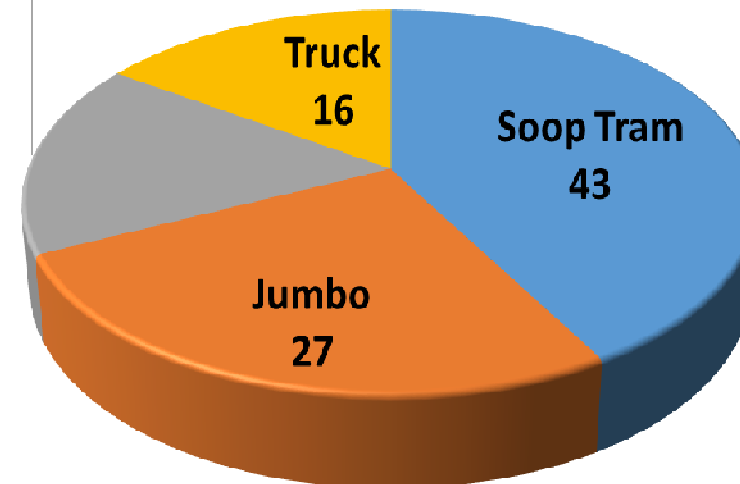
Pumping Stations

- Å Pump Station 425 ãFresh Water
- Å Pump Station 425 ãVentanilla
- Å Pump Station 695 ãContratiro
- Å Pump Station 710 ãOpen system pump
- Å Pump Station 710 ãClosed system pump
- Å Pump Station 425 ãSan Luis shaft
- Å Pump Station 695 ãSan Luis shaft

Long Hole Drilling

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Fresnillo Equipment



- Soop Tram
- Jumbo
- Long Hole Drilling
- Truck

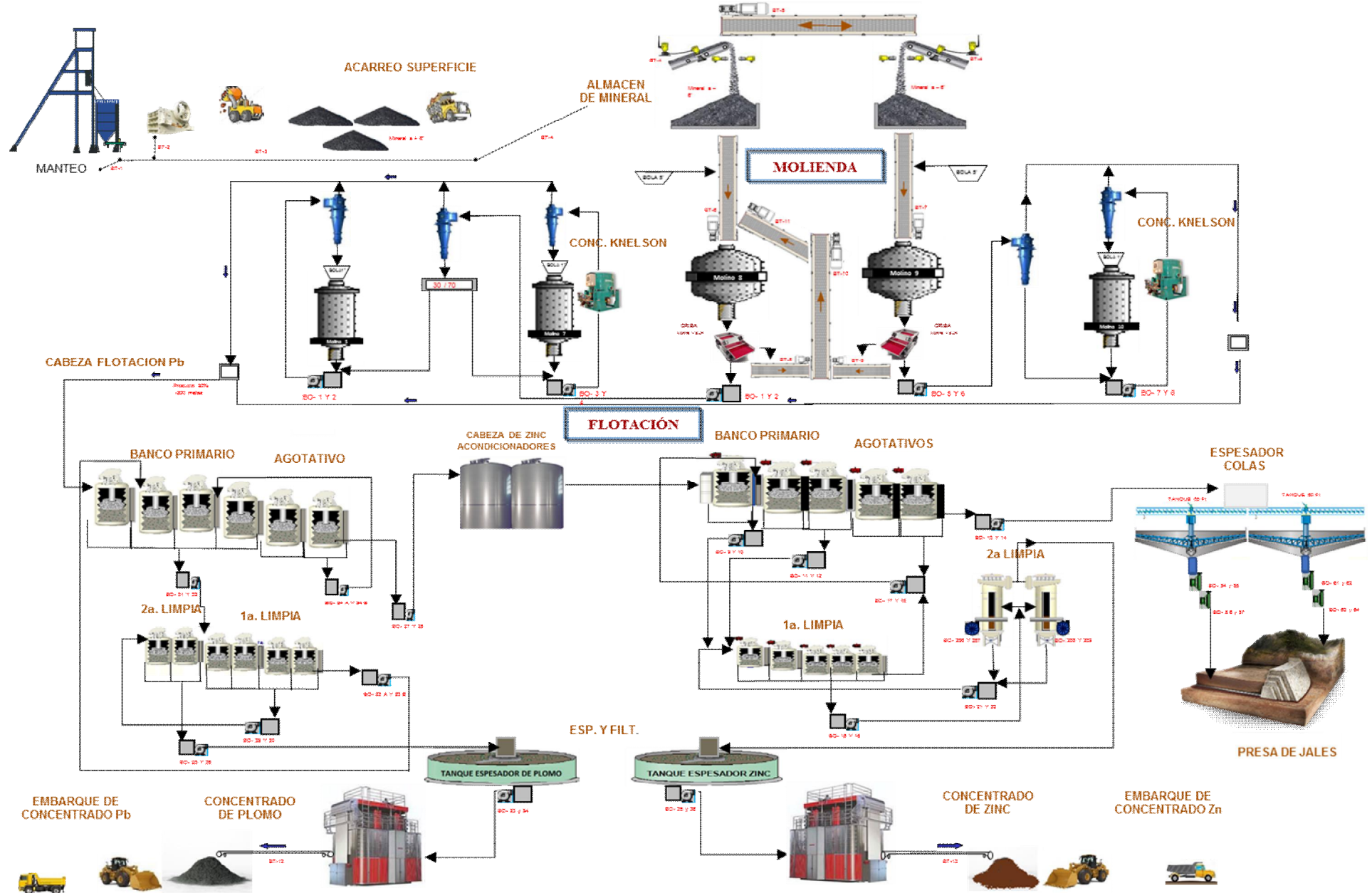
Fresnillo Operation – Process Plant Flow Chart

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Å **Silver Grade FY19 = 190–200 g/t**

(Original guidance at the beginning of the year 210–220 g/t).

Å **Gold grade FY19 = ~0.85 g/t**

(Original guidance at the beginning of the year 0.60-0.65 g/t).

Å **Lead grade FY19 = 0.85%**

(Original guidance at the beginning of the year 1.15%-1.25%).

Å **Zinc grade FY19 = 1.45%**

(Original guidance at the beginning of the year 2.35%-2.40%).

Å **Production of ~14.0 - 14.5 moz Ag in 2019 and to remain flat in 2020.**

Å **Sustaining Capex of US\$126m in 2019**

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Resources

Category	Tonnes	Au Grade (gr/ton)	Ag Grade (gr/ton)	Pb Grade (%)	Zn Grade (%)
Measured	6,936,647	2.31	366	1.36	2.23
Indicated	14,382,694	1.58	265	1.54	2.83
Inferred	27,755,412	0.71	251	1.11	1.97
TOTAL	49,074,753	1.19	271	1.27	2.26

Value Cut Resources (Cut Off) 2018: 141 g/t Ag Eq

Reserves

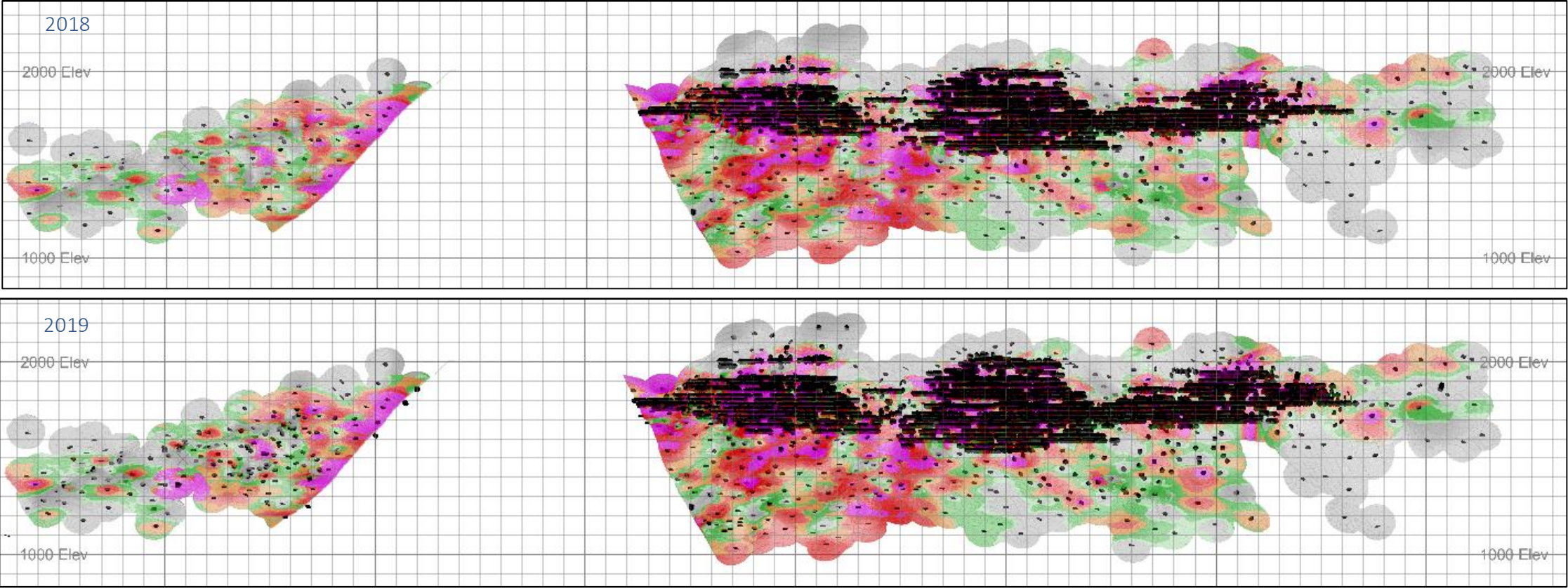
Category	Tones	Au Grade (gr/ton)	Ag Grade (gr/ton)	Pb Grade (%)	Zn Grade (%)
Proven	3,901,616	1.63	307	1.05	1.72
Probable	11,010,229	1.34	259	1.37	2.42
TOTAL	14,910,578	1.42	272	1.29	2.24

Value Cut Reserve (Cut Off) 2018: 210 g/t Ag Eq

Assumptions

USD/oz Au	\$1,250
USD/oz Ag	\$17.00
USD/lb Pb	\$0.90
USD/lb Zn	\$1.10

Infill



	INFILL			
	2017	2018	2019	2020
Meters	45,691.00	96,693.55	80,000.00	50,000.00
%	35%	59%	67%	45%

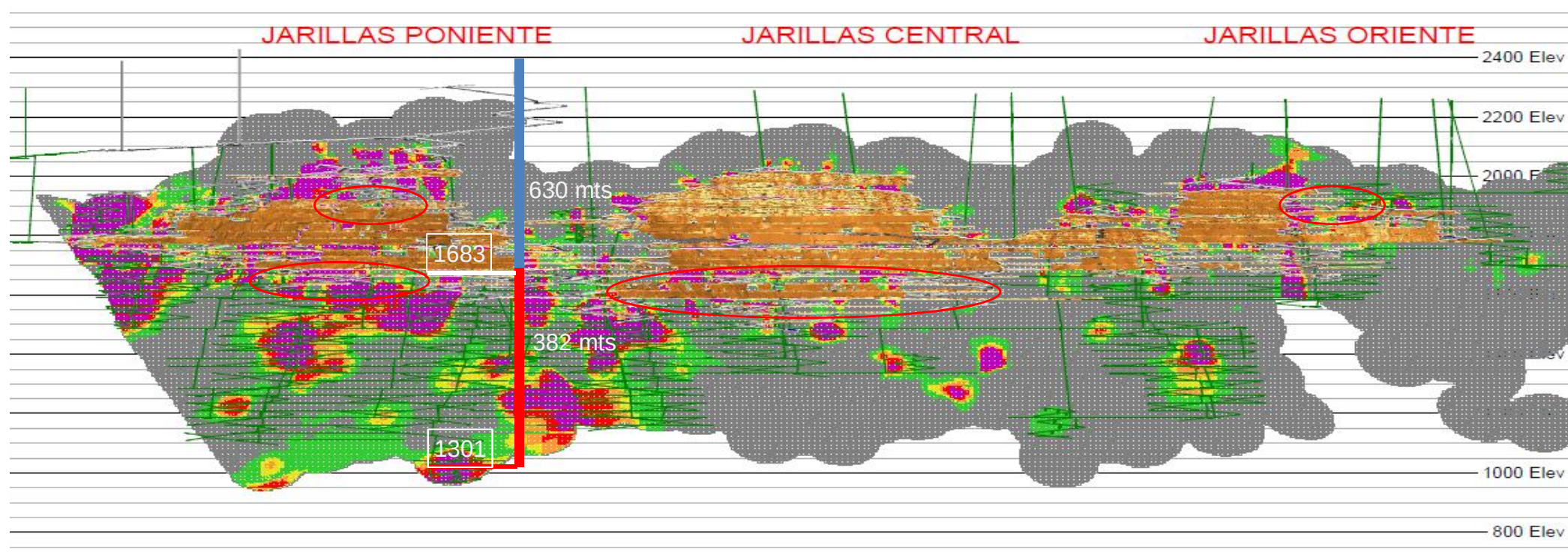
Saucito Operation – Underground Operations

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Zone	% de Tonnes
SAUCITO	14.83 %
DESPRENDIDO	1.21%
MEZQUITE	6.58%
JARILLAS	65.35%
ALAMITO	5.51%
NATALIAS	6.52%
	100.00%

YEAR	Bench & Fill	Cut & Fill	Development
2018	34%	59%	7%
2019	41%	49%	10%

Vein Type	Vein Width (mts)
Wide (>2.5 mts)	4.2
Medium (1.5-2.5 mts)	1.9
Narrow (< 1.5 mts)	1.1

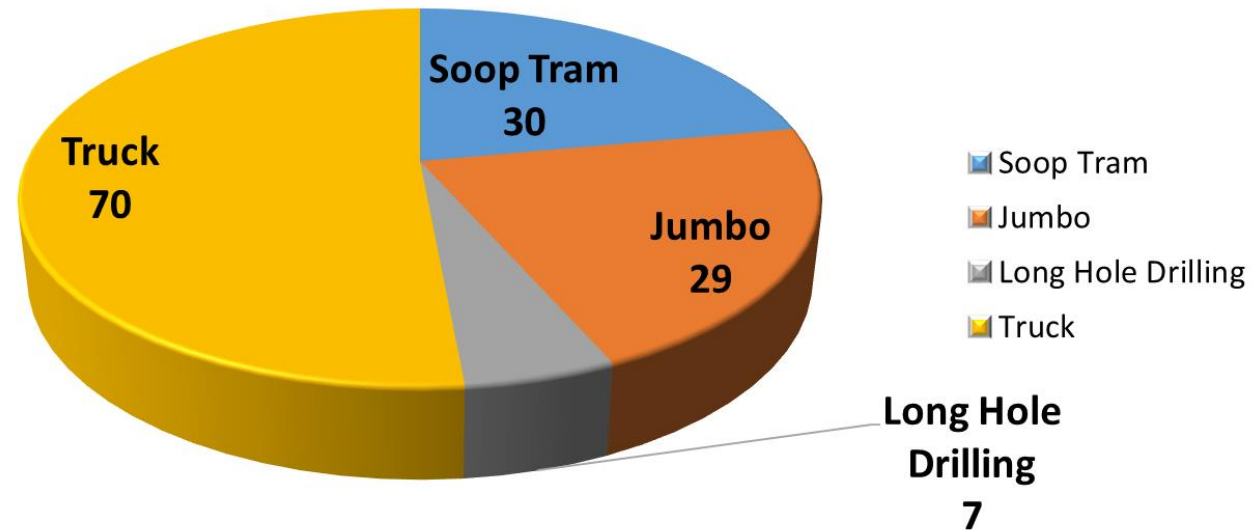
Workshop:

- Å 1767 (Jarillas)
- Å 1680 (Jarillas)
- Å 1772 (Saucito)

Pump Station

- Å Natalias 1767
- Å Saucito1767
- Å Natalias 1767
- Å Jarillas (1680)

Saucito Equipment



Saucito Operation – Process Plant Flow Chart

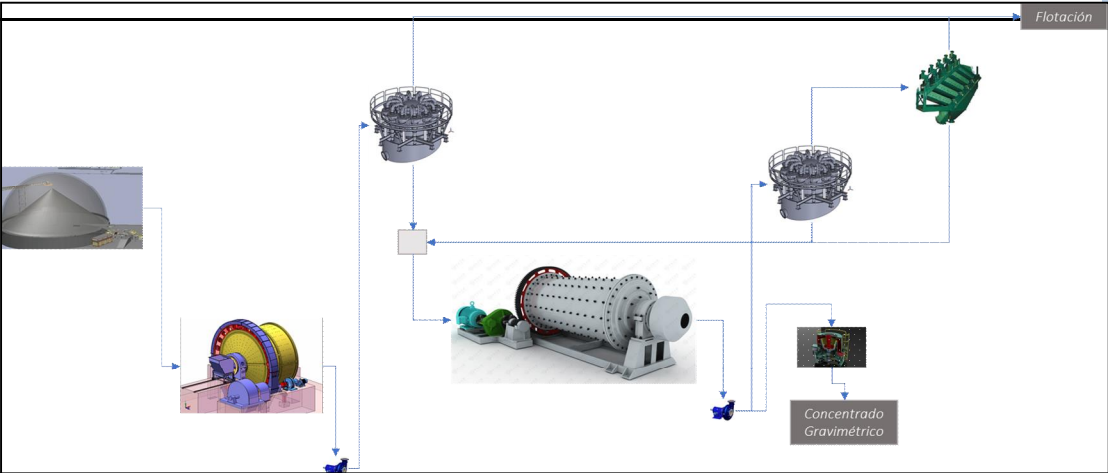
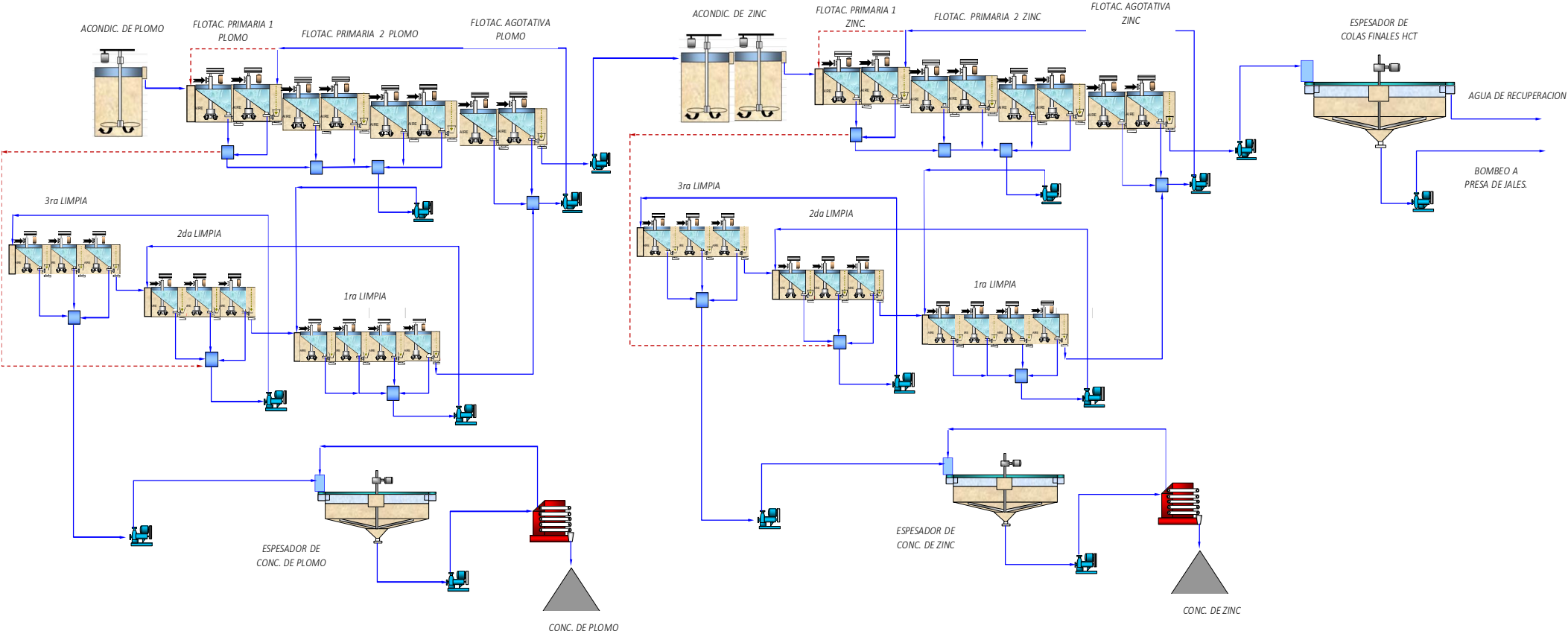


Diagrama de Flujo Esquemático.
Flotación plomo y zinc.



Saucito Operation – Pyrites Plant Flow Chart

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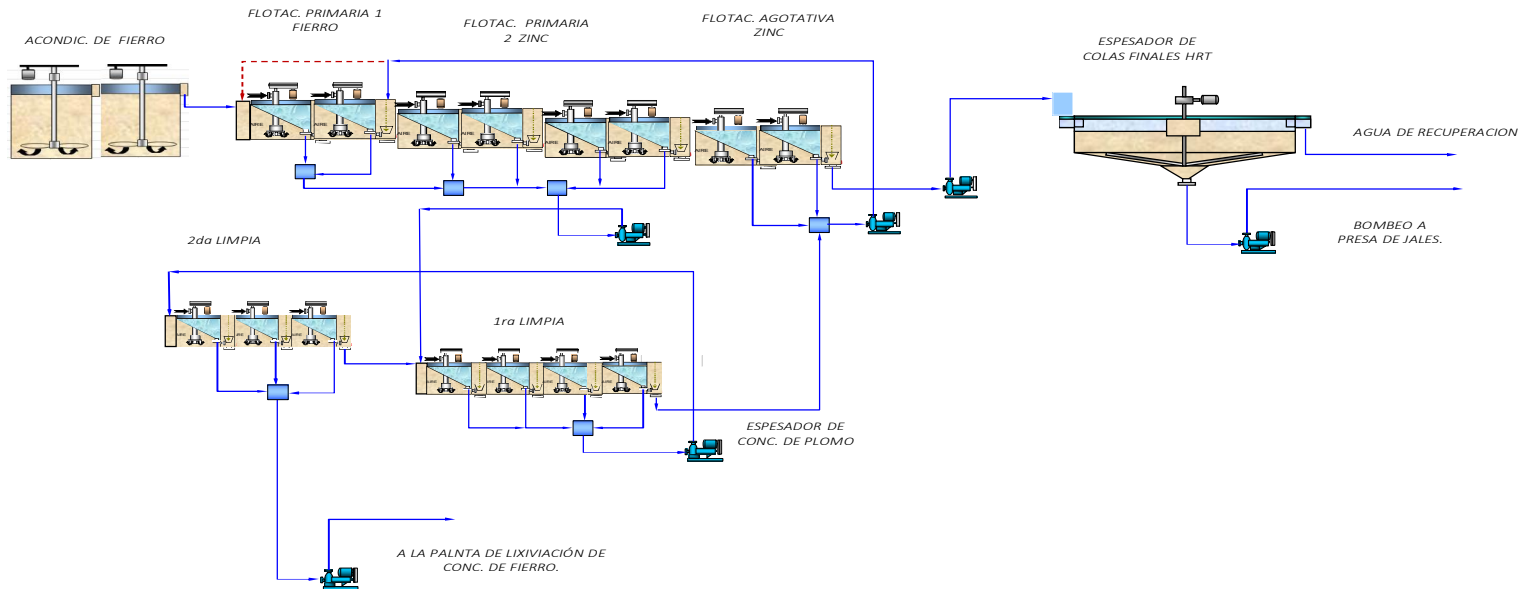
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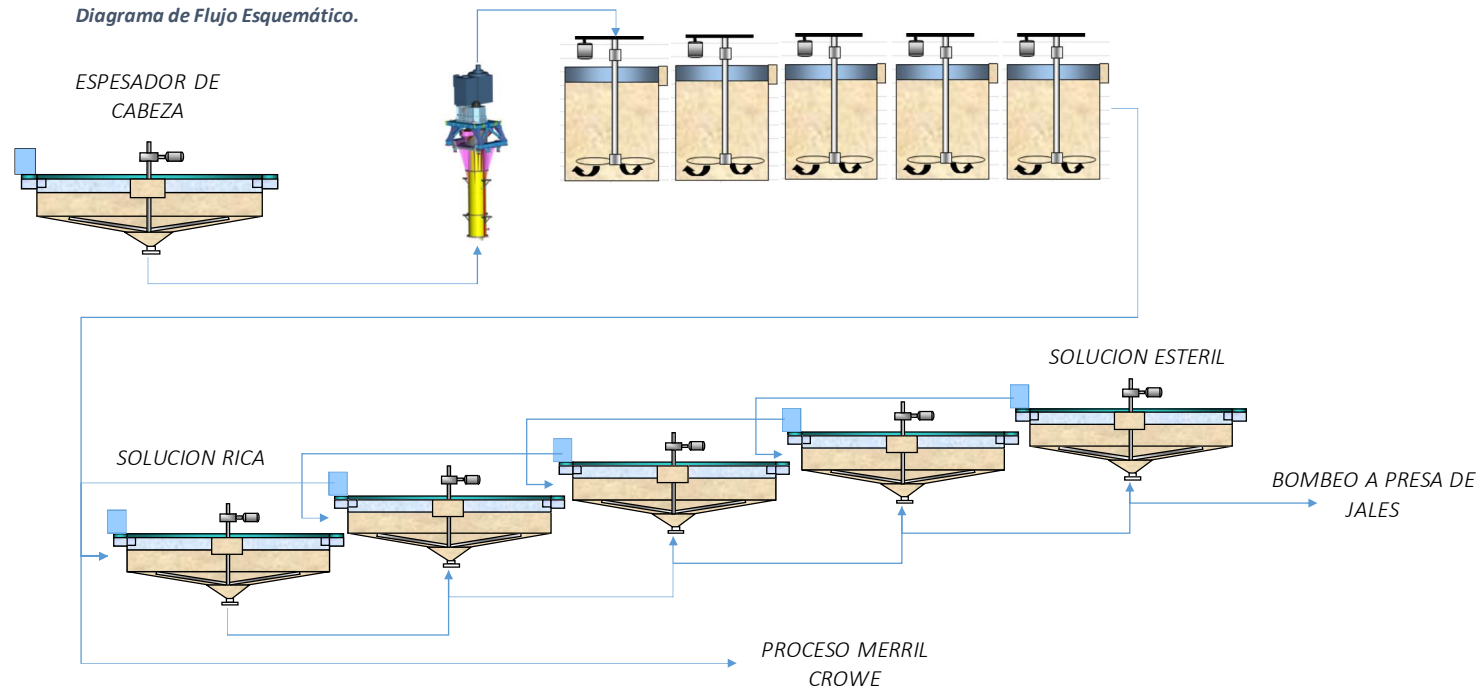
Flotación Fe Saucito.

Diagrama de Flujo Esquemático.



Lixiviación Fe Saucito.

Diagrama de Flujo Esquemático.



Å **Silver Grade FY19 = 230-240 g/t**

(original guidance at the beginning of the year 210 to 220 g/t).

Å **Gold grade FY19 = ~1.10 g/t**

Å **Production of ~17.0 – 18.0 moz Ag in 2019 (includes Pyrites Plant)**

Å **Plan to increase development rates from 2,825 metres in 2018 to 3,600 metres by the end of 2019.**

Å **Sustaining Capex of US\$126m in 2019.**

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Key Messages

Structural Challenges

Deeper and larger mining operation

Narrower veins

Greater ore variability

Management Challenges

Delayed development and preparation

Delayed infrastructure

Efficiency and productivity

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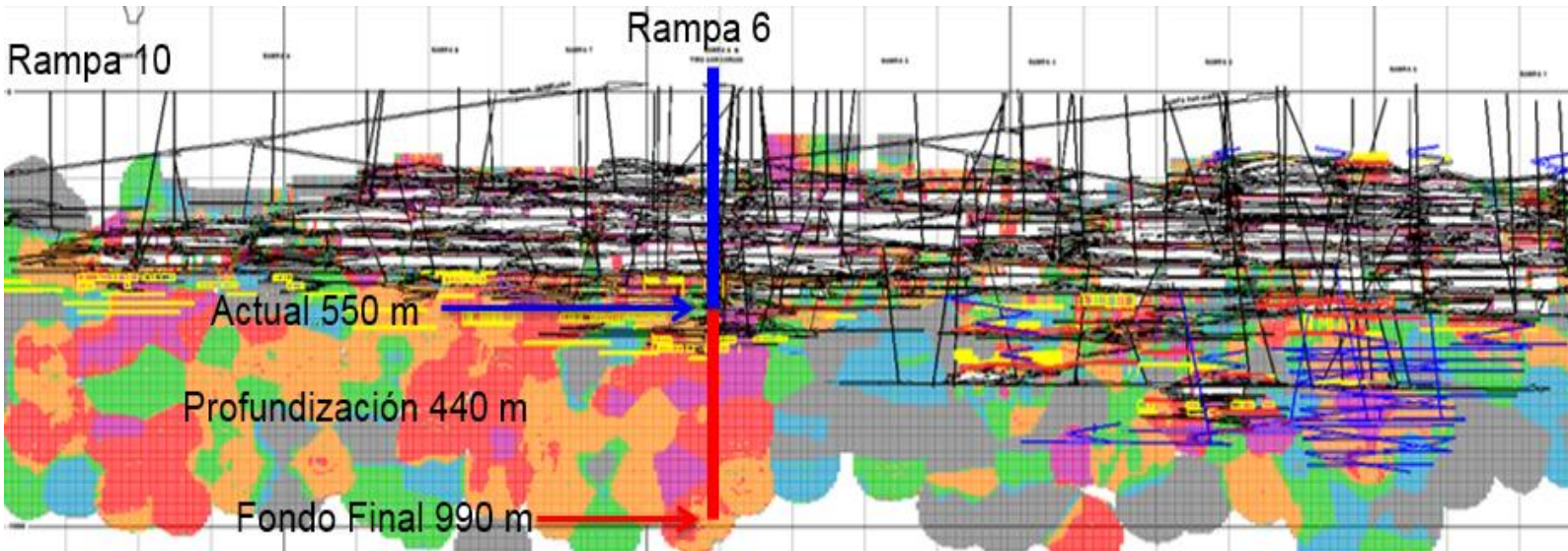
Fresnillo – San Carlos Shaft Sinking

Fresnillo
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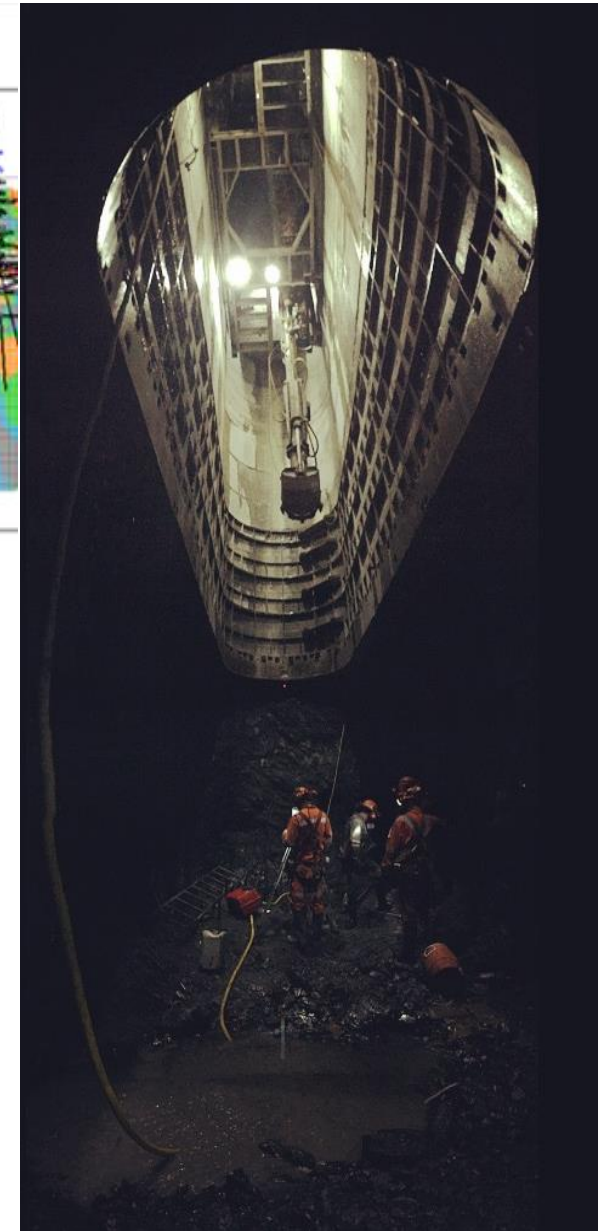
Operational
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- Å **Capex: US\$ 35 million**
- Å **Length: 440 meters (level 550 to 990)**
- Å **Start date: June 2016**
- Å **Estimated Finish date: Q4 2020**
- Å **Developed: 59%**
- Å **Spent: 63%**
- Å **Access to 56% of the reserves**



Fresnillo – Tunnel Boring Machine

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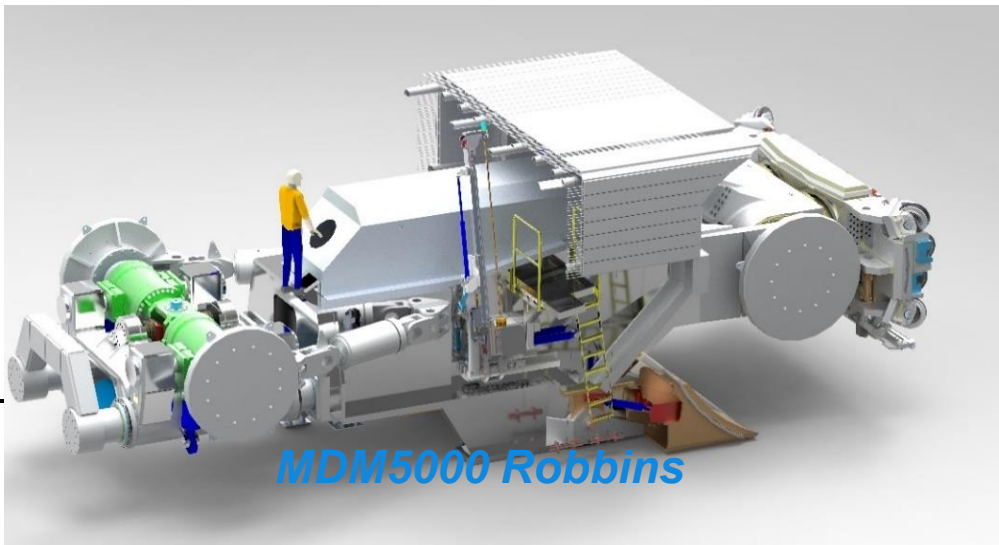
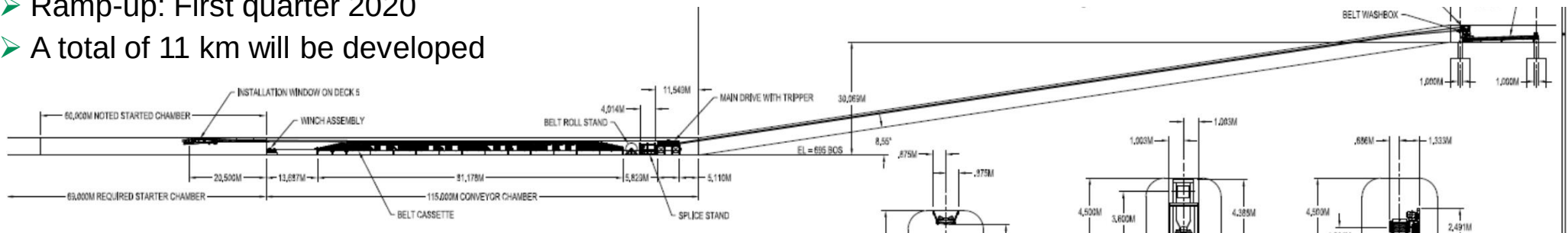
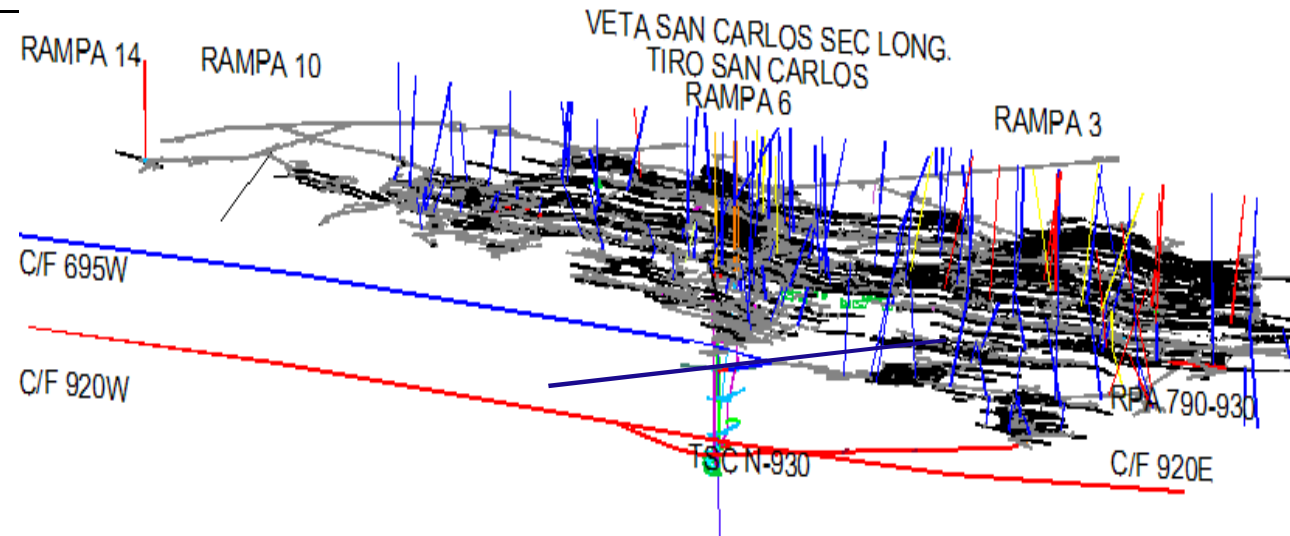
FFP

Key
Messages

- Start date: December 2016
- Commissioning: *November 2019*
- Capex: US\$22,700,000
- Completion: 95%
- Spent: 50%

PERFORMANCE

- 300 mts/month
- Ramp-up: First quarter 2020
- A total of 11 km will be developed



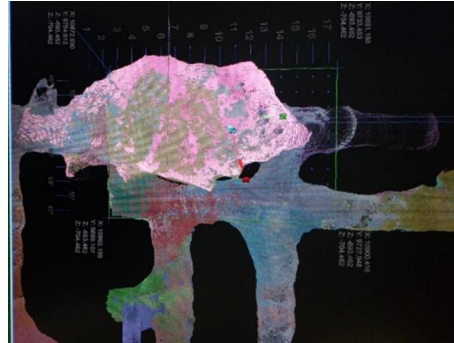
Vertical conveyor belt

- CAPEX US\$12.7 Million
- Reduce haulage and fleet cost, improve safety and ventilation conditions at the Candelaria section
- In operation since Q4 2017



San Alberto General pump station

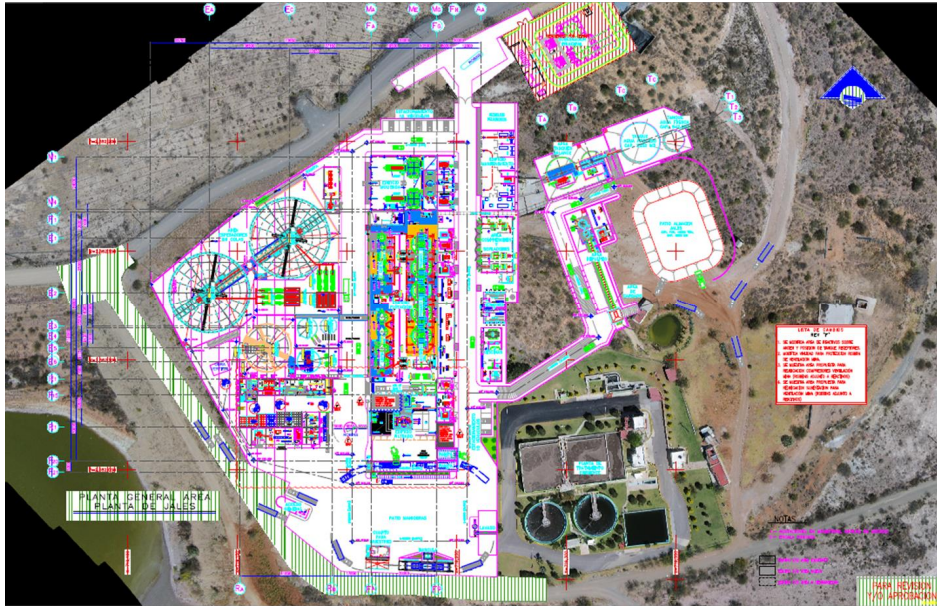
- CAPEX US\$11.0 Million
- Located at level 720
- To drain service ramps and production areas at the 695 level
- Q4 2020



Alimak elevator

- CAPEX US\$4.5 Million
- Reduce personnel travel time to U/G by 1 hour
- San Alberto Mine
- Q3 2020





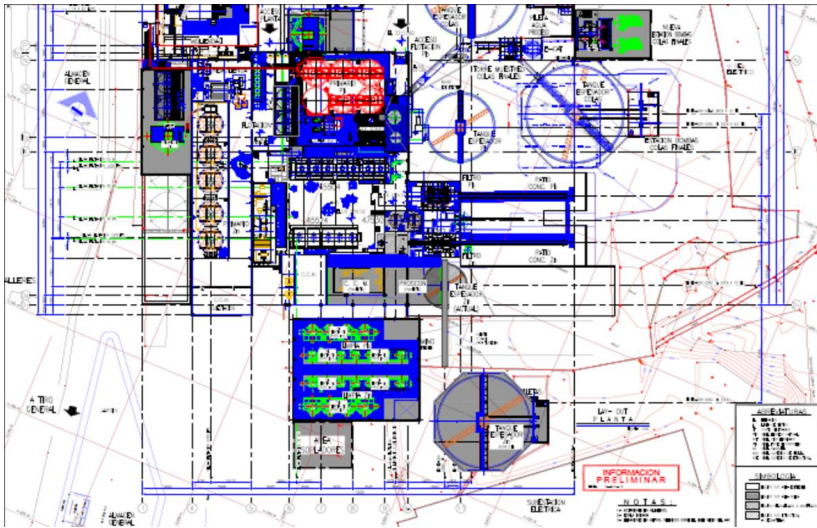
**Pyrites Plant
Construction**

Pyrites Plant project

- **DESCRIPTION:** The project will increase the Au and Ag recovery from the current and historical tailings from the flotation plants at the Fresnillo and Saucito Mines, based on metallurgical research and lots of evidence. The pyrite concentrates will be leached in a Dynamic Leaching Plant and will then pass to a Merrill Crowe plant producing Au and Ag precipitate.
- **CAPEX** US \$155 Million
- **SCOPE:** Process 14,000 ton per day (9,000 ton Flotation Process and 5,000 ton Old Tailings)
- **Benefit:** Increase silver and gold recoveries from pyrites concentrates and old tailings
- **Estimated anual production:** 13.0 koz Au and 3.5 moz Ag.
- **To be completed** 2H 2020
- **% of Completion:** 47.8 %
- **IRR:** 29.3 %

Tickener Zone

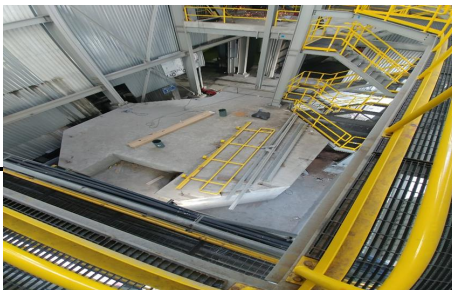




Plant Conditioning Project

- **DESCRIPTION:** Following the higher grades of Pb and Zn in recent years, it has been necessary to make adjustments to the current Flotation plant, including the installation of additional flotation cells which will result in a better recovery of Au, Ag, Pb and Zn.
- In the Pb Circuit, 1 primary flotation cell of 300 m³ will be added as well as 12 cleaning flotation cells, each 50 m³. In the Zn circuit, 1 primary 300 m³ flotation cell was added and 13 50 m³ flotation cells were added. Pumping systems were modified and conduction lines improved.
- CAPEX US \$35 Million
- **SCOPE:** First Stage: Focused on the civil works, detailed engineering and construction of the steel infrastructure for the plant.
- Second Stage: Preparation and installing of additional flotation cells
- Third Stage: Installation of the vibrating screens to increase the plant capacity to 9,000 ton/day (once the mine is able to sustainably maintain the higher throughput).
- Stage two to be completed Q4 2020
- % of Completion: 48.1 %

Pb Flotation cell (300 m³)



Zn Flotation cell (300 m³)



Saucito – Jarillas Shaft Sinking

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- Å Capacity: 8,200 ton/day
- Å Actual depth : 630m
- Å Final depth: 1,000m
- Å Diameter: 6.5m

JARILLAS SHAFT

Jarillas' shaft sinking project

- CAPEX US\$ 69.9 Million
- Improve hoisting capacity of the Jarillas vein at depth where 42% of the current reserves are located for this unit
- To be completed 1Q 2024

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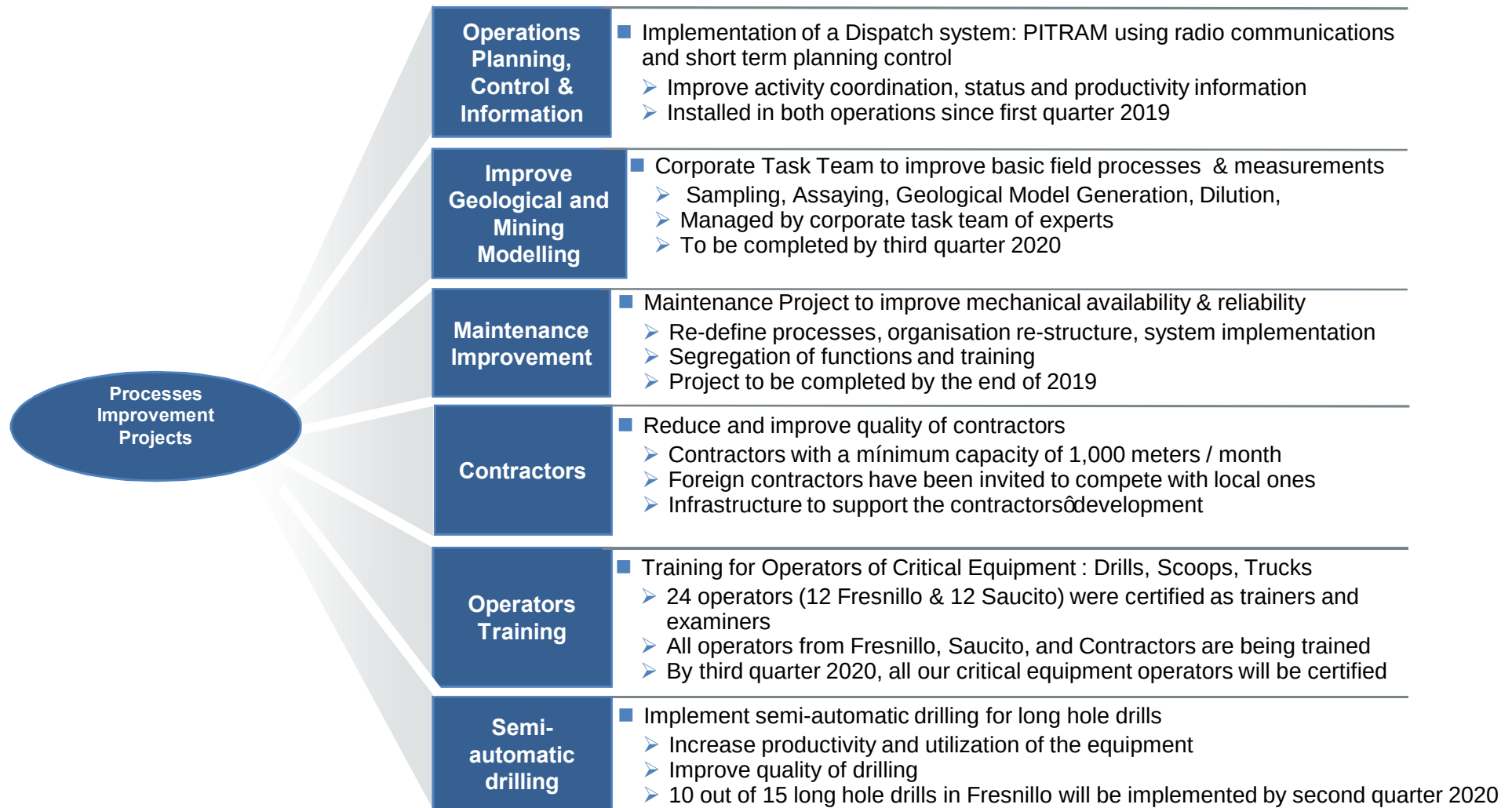
Projects to improve infrastructure

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Projects to improve processes

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Key Messages



Weekly Planning

Programming

Control

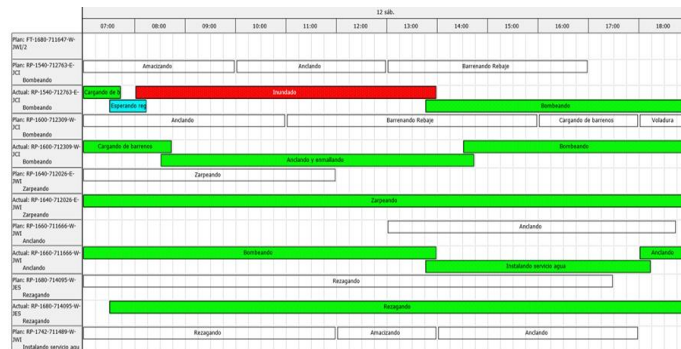
Analysis

- Align with the monthly production forecasts
- Includes the weekly maintenance programme
- Includes the infrastructure and services programmes
- The integrated programme is loaded in the 'Objectives' module in Pitram

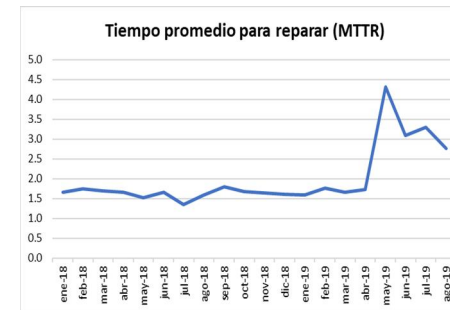
- Daily programming of activities is displayed in the 'Shift Planner' Module
- Information collected directly from the field is received and then used to update the programme
- Generate clear work orders to all areas

- Control the execution of the programme in real time using the 'Shift Planner' module
- Make changes during the shift thereby avoiding lost time at the end of shift

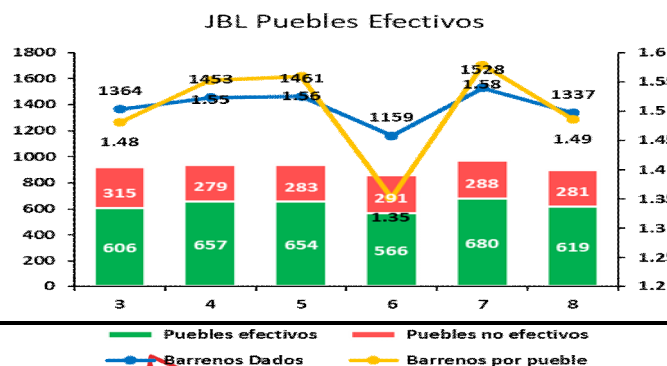
- Generates detailed information on production, equipment availability and utilization, as well as performance
- Only one system used to measure the results of operations, maintenance, services, contractors.
- Actions focused on statistics showing repetitive problems



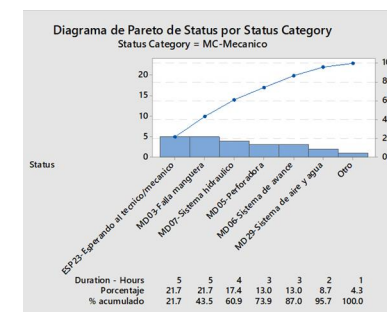
Shift-planner



Time to repair trend line



Programed vs Effective blasts



Operations and maintenance failures statistics

■ OBJECTIVE

Review and strengthen the current geological & mining modelling processes to generate better models and ensure best industry practices

■ TASK TEAM

Structure: (4) internal teams coordinated by senior corporate technical specialists (operation & exploration) supported & reviewed directly by the executive team

SAMPLING & GEOLOGICAL MAPPING

- Å sampling procedure review, additional qa/qc steps introduced
- Å introducing high resolution 3d scan technology for mapping
- Å exploring methods to improve sample collection

QUALITY ASSURANCE / QUALITY CONTROL & LABORATORIES

- Å improved sample preparation procedure
- Å stricter qa/qc procedures & exploration service agreement
- Å hiring additional technical staff to increase focus on qa/qc

GEOLOGICAL & RESOURCE MODELLING

- Å improved geological modelling procedure, standards aligned
- Å reviewing resource modelling procedure, focus on validation

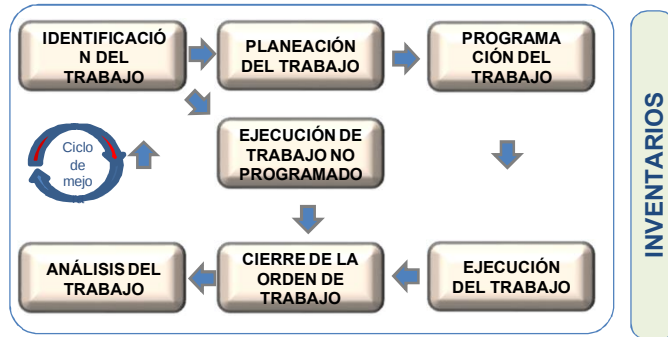
DILUTION CONTROL

- Å implementing full 3d cavity monitoring system scanning, 51% advance to date, mostly longhole stopeing
- Å adding equipment and staff to cover all mining methods
- Å enforcing stronger operation control procedures

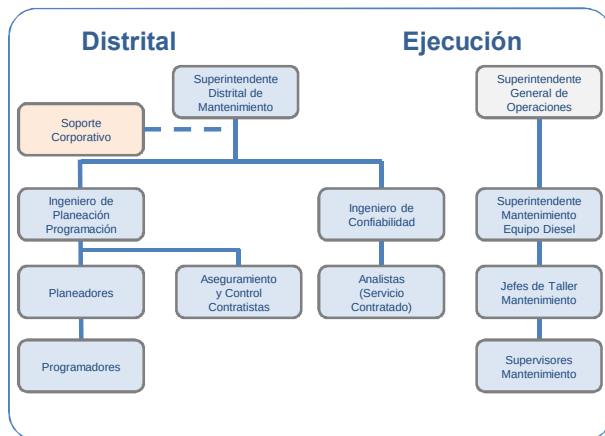
Objetivos:

- ∆ Increase the availability and reliability of the critical equipment
- ∆ Improve the reliability thereby increasing production capacity
- ∆ Introduce the best practices of the industry

1. Re-define and Improve Processes



2. Organizational Structure, Roles & Responsibilities

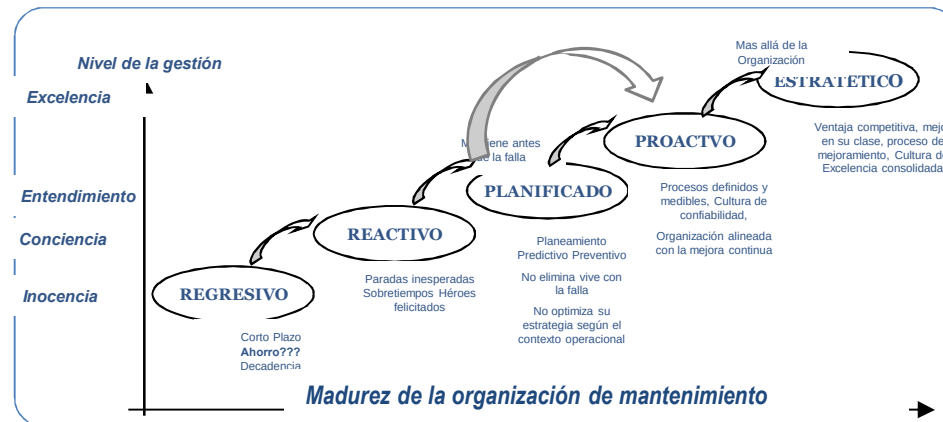


3. Reliability , Root Cause Analysis and Deviations



4. Reliable capacity to produce targets

	DF	MTBF	MTTR
Actual	76.3	6.5	3.6
Esperado	82.9	9.0	3.0



1 Fresnillo District Overview

2 Operational Review

2.1 Regional Geology

2.2 Fresnillo Operation

2.3 Saucito Operation

3 Fresnillo To Its Full Potential (FFP)

3.1 Main Challenges

3.2 Projects to improve infrastructure

3.3 Projects to improve processes

4 Key Messages

- ❖ Fresnillo and Saucito are world class assets with a high potential.
- ❖ The structural conditions of our operations have changed, having deeper and larger operations with narrower veins, and higher ore variability.
- ❖ The lack of adaptation to these structural conditions has caused lower grades, higher variability, and delays in infrastructure.
- ❖ We are implementing important infrastructure, processes improvement, and productivity and efficiency projects to take Fresnillo To Its Full Potential.
- ❖ The projects to take “Fresnillo to Its Full Potential” are ongoing and will be delivering results progressively during the following months.
- ❖ All these projects are estimated to be completed by the end of 2020.