

Khewra Salt Mines Project

by Iqbal Primavera Project

Submission date: 16-Jan-2020 09:28PM (UTC+0700)

Submission ID: 1242629997

File name: Final_Report_by_Iqbal.docx (2.55M)

Word count: 2569

Character count: 21649

Khewra Salt Mines Project

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SEMESTER: FALL 2019, MSPM-3(A)

PROGRAM: MS (PROJECT MANAGEMENT)



BAHRIA UNIVERSITY LAHORE CAMPUS

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SUBMISSION DATE:

21 January, 2020

Preface

As per the requirement criteria of MS Project Management degree program in Bahria University, I have learnt various PM tools and techniques and performed practically implementation. So, to record my efforts I am providing a comprehensive report consists of two segments.

My project is to study the Khewra Salt Mining and summarize a report on Salt mining project of 1 km using Primavera P6. A modern world software to implement the best PM Practices dictated by PMI. Primavera is the enterprise project management Tool for planning the projects. It has multiple features such as project management, product management, collaboration, and integrated with the other enterprise tools which are Oracle and SAP's ERP systems. Report involves the brief history and introduction of the project, context in which project was carried.

In this report various reports are generated during this project. The reports are graphically displayed with the help of Primavera.

Acknowledgment

We would like to express our appreciation and thanks to all those who gave us the opportunity to complete this project. We would like to thank the management of our university for arranging a pleasant study tour to Khewra Salt Mines due to which we are able to complete our project.

We are deeply obliged to our class teacher **Mr. Shehzad Ahmad** whose assistance, suggestions and encouragement helped us in all time of project making.

A special appreciation to the rest of Lab staff, that helped us in our project. The whole department really brought us together to appreciate the true sense of friendship and respect to each other.

Finally, we would like to express our deepest appreciation to our family who supported us in every step of life.

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Chapter No: 01

Khewra Salt Mine

PMDC (Pakistan Mineral Development Corporation)

Ministry of Petroleum & Natural Resources is administrating PMDC as a self-governed administration. PMDC was established to assist development of minerals in Pakistan in 1974 with an PKR 1000 million investment. It is assisting in expedition and expectation of mining, marketing, mineral deposits and techno-economic feasibility reports preparation.

In total four Coal Mines, four Salt Mines and silica sand Mines are operating under PMDC. About 17% of coal and 58% of total salt production in Pakistan is contributed by PMDC.

Khewra Salt Mines are ancient salt mines of sub-continent and are situated at foothills of Salt-Range. Salt is an anisotropic dome shaped structures which are further refined for cooking and other purposes.

With approximate thickness of 150 meters, about seven salt seams are present in Khewra Salt Mines. The salt purity is 99% at some places in mine. Salts are in reddish to beef-red, Light pink, white & transparent structures.

PMDC Projects

The PMD organization instituted the salt mine Inspection at khewra Institute in 1971. At the institute which operates evaluations of mine, arranges courses related to mining for the miners and do authenticated at the Model High School, Khewra and the Women College of Khewra. The miners in recent times gained a environmentally friendly case against the company of mining for uncontaminated water for drinking

Availability of clean water to the khewra inhabitants is affected due to the pollution of water by salt, coal and other adjacent extracting activities. This issue is entirely accepted as crucial factor regarding the association between civilization and the ecosystem.

In 2003, on one side, Pakistani Government was discussing methods to expand the country's planned storage of oil to be of about 90 days, while on other side. Pakistan mining Development Corporation put a request for proposal to start the utilization of mines at khewra to preserve the reserves of strategic oil.

The practicality of this proposal is confirmed by different scientific reports, but it was not considered further and turned down further.

PMDC OBS:



Khewra Salt Mine

The Mine of salt is situated at Distt Khewra, then in the north side of Tehsil Pind Dadan Khan. The area where mine located is the salt range, and the outer range of the mountains of Himalaya. From Indo-Gangetic Plain that mountains are rises. This mine is the largest salt mine of Pakistan and the 2nd largest mine of the world.

Geographical Location	160 kilometres away from Islamabad in south
Area which is Leased	3398.53 (Acres)
Salt Purity	98 Percent (Average)
Salt Colours	White colour, Light Pink & Reddish
Method of Mining	Pillar & Room
Total Resources	Roundabout 1 Billion
Production of Salt	382155 tons as per (2018-19)
Sales of Salt	395837 tons as per (2018-19)

It is a attraction place of tourist around the Pakistan & world. Approximately up to 0.25 million visitors came in mine in a year. If just go to recall the history this mine was discover by the troops of Alexander's in 320 BC.

The trading of salt was started in the era of Mughal. Dr. H. Warth was developed the main tunnel at ground level because in British rule 1872, he was a mining engineer.

After the partition, the PMDC took the charge of the mine. Which is still remains and providing to the Pakistan the largest source of salt. Mines production is more than 0.35 million tons per annual of about 99% purity. In an estimates the salt reserves can vary 82 million tons to almost 600 million tons in the mine.



Figure: 1 (Entrance of Salt Mine khewra)

Geology

In the base, thick layer of highly folded by excavated in mine faulted, and stretched layer of Ediacaran to early Cambrian evaporites of the Salt Range Formation. This geological formation consists of a basal layer of crystalline halite, which is intercalated with potash salts. This basal layer is overlain by gypsiferous marl, which is covered by interlayered beds of gypsum and dolomite with infrequent seams of oil shale.

These strata are overlain by 200 to 500 meters (660 to 1,640 ft) of Neoproterozoic to Eocene sedimentary rocks that have been uplifted and eroded along with the Salt Range Formation to create the Salt Range at the southern edge of the Pothohar Plateau.

The Salt Range is the southern edge of a well-described fold-and-thrust belt, which underlies the entire Pothohar Plateau and developed south of the Himalayas as a result of ongoing collision between India and Eurasia. Palynomorphs, organic microfossils, have been used to make inferences about the ages of the Salt Range Formation and its salt layers that are exposed within the Khewra Salt Mine.

For example, while working with Geological Survey of India in the 1930s and 1940s, Birbal Sahni reported finding evidence of angiosperms, gymnosperms and insects inside the mine which he regarded as originating from the Eocene period. However, on the basis of additional geologic data, later research has concluded that these palynomorphs were contaminants.

History

The Khewra Salt Mine is also known as Mayo Salt Mine, in honour of Lord Mayo, who visited it as Viceroy of India. The salt reserves at Khewra were discovered when Alexander the Great crossed the Jhelum and Mianwali region during his Indian campaign.

The mine was discovered, however, not by Alexander, nor by his allies, but by his army's horses, when they were found licking the stones. Ailing horses of his army also recovered after licking the rock salt stones.

During the Mughal era the salt was traded in various markets, as far away as Central Asia. The former controlled the Warcha mine, while the latter held Khewra. The salt quarried during Sikh rule was both eaten and used as a source of revenue.

In 1872, some time after they had taken over the Sikhs' territory, the British developed the mine further. They found the mining to have been inefficient, with irregular and narrow tunnels and entrances that made the movement of labourers difficult and dangerous. The supply of water inside the mine was poor, and there was no storage facility for the mined salt.

The only road to the mine was over difficult, rocky terrain. To address these problems the government levelled the road, built warehouses, provided a water supply, improved the entrances and tunnels, and introduced a better mechanism for excavation of salt. Penalties were introduced to control salt smuggling.



Figure: 2 (Salt Mine History)

Location

Khewra Salt Mine is located in Pind Dadan Khan which is the Tehsil of Distt Jehlum. It is away about 100 miles from the capital of Pakistan (Islamabad) & the capital of Punjab (Lahore), it is easy to access via M2 motorway.

Its away 20 miles from the Lilla interchange when you are moving towards tehsil Pind Dadan Khan. Salt mine is under the mountains, this area are the range of huge salt and the mountain system which are a mineral rich is started from the river of Jhelum to about 200km away at where the river of Jhelum joins the indus river in the south of Pothohar Plateau.

Khewra mine is about 288 meters (945 feet) above sea level and about 730 meters (2400 feet) into the mountain from the mine entrance. The underground mine covers an area of 110 km² (43 sq. miles).



Figure: 3 (Google Earth Snapshot)

Production

The estimated total mine reserves of the salt are approximately eighty two million tons to up to six hundred million tons. Salt which are producing from the mine, is known as salt of Himalayan. Which are in different shades such as reddish , light pink, off-white and transparent.

Output of salt mine production which was reported in the 2003, that is 0.385 million tons of salt per annual, this amount of salt is the half total production of salt in the Pakistan. By this production output the mine can produce salt for the next Three hundred & fifty years.

Temperature inside is about 18 to 20 °C in the mine and this temperature will remain all the year. Salt mine at Khewra has a narrow gauge which is approximately two feet and there is a railway track has laid in the era of British which was used to taken salt out on the rail cars for further processing.

Khewra producing the Pakistan best salt rocks which is also known as the salt of Himalayan. This salt is used fo cooking purpose, bath salt and as raw salt

It is used for the cooking, for the bath salt, for the brine and as a rocks of raw salt for the industries where raw salt is used for many purposes. It is used in a plant of soda ash which was develop by Akzo Nobel in the 1940.

Tourism

The Mine at khewra is the very attractive place for visit. Almost from all over the world and Pakistan overall 0.25 million visitors came in a year. The money by coming from visitors which is consider as a revenue/earning. Tourist can go into the mine on the rail cars and by walking. The pools with salty water are too many in mine.

About 50 years ago the Mosque known as Badshahi was built with the multi colours of bricks of salt in the mining tunnel. There is one more interesting thing is Minar-e-Pakistan which is also build by the help of salt bricks.

In the mine Salt bricks represent the Great Wall of China model and also model of Muree Mall road. PMDC invest nine million rupees on the development of tourist facilities in 2003.

There is a small medical ward including 20 treatment bed which is established in 2007 with the ten million cost. Which is very useful to treat the patients of asthma and provide medically first aid to any un circumstances.

The railways of Pakistan started operation of the special trains for the tourists for khewra mine originating stations are Lahore and Rawalpindi in February 2007.



Figure: 4 (Mosque in Khewra Salt mine



Figure: 5 (Salt Wall inside Khewra Salt Mine)



Figure: 6 (Minar-e-Pakistan inside Khewra Salt Mine)



Figure: 7 (Colourful Small Bridge inside Khewra Salt Mine)

Chapter No: 02

Review on BULC Trip to Salt Mine Khewra

Introduction:

Our university arranged a study tour to salt mine khewra on 7th December, 2019. The purpose of this trip aims to observe the Salt mining processes, Production, Crashing, Transportation and Packing. After observing submit a final report of Salt mines activities by using Primavera P6 software. The management team of salt mine arranged and provide us a guide to describe the different processes of Salt mine. Different processes and machinery which are using in this processes is summarized in this chapter.

Rock Salt Mining Method

Salt mine khewra uses the second oldest method of producing salt that is underground mining. This is probably the most dramatic method of gathering salt. Large machines travel through vast cavelike passageways performing various operations. Salt mines are among the safest of mines. They are also the most comfortable to work in.

While mine temperature varies with depth, the average temperature remains about 70° F year round. Salt may appear in veins, as does coal. Veins are the original bedded salt deposits.

Salt also may be found in domes, which were formed when Earth pressures forced salt up through cracks in the bedrock from depths as great as 30,000 or 40,000 feet; they resemble plugs of almost circular shape a few hundred yards to a mile across. Some domes occur close to the surface. Both domes and veins are mined in a similar way.



Processes:

1. Miners Landing

To enter a salt mine, miners go down a shaft from the Earth's surface to the salt bed. There are two shafts one for personnel and one to lower materials and equipment into the mine, as well as to hoist the mined rock salt to the surface. The shafts also are used to deliver a constant supply of fresh air to the miners while they work hundreds to thousands of feet below the surface. Most mine shafts are lined with a concrete wall called a shaft liner.

Salt is mined by the room and pillar method. It is removed in a checkerboard pattern to leave permanent, solid salt pillars for mine roof support. Usually 45 to 65 percent of the salt is removed. The room height may average 18 feet in a bedded deposit to 100 feet in a mine.

2. Salt Wall Cutting:

The cutting of Mountain wall by using heavy machines or cranes in the ten feet inside.

3. Drilling:

After cutting the solid wall ten feet inside the next step is drilling. In drilling small holes will be drilled inside the wall and after drilled the holes will loaded by the explosives for blasting.

4. Explosive:

After loaded the explosives material in the drilled holes then blast the explosive by electrically. After blasting the raw rocks of salt fall on the floor of mine in the hundred and thousand tons.

5. Salt Rocks Shifting:

After blasted, rocks of salt shifted to crushing area by using small trucks or Trolleys.

6. Size Breaking

After receiving salt rocks at crushing area the labors break into small rocks by using hammers and cutting machine.

7. Load and Hual

labors are used to load and haul the salt to machines that crush and feed th e salt onto a conveyor belt. The lumps are conveyed to a series of stations for crushing and additional sizing of the lumps.

8. Packing

The above ground processing of the rock salt consists of screening the mined salt into various marketable sizes by sorting through mechanically operated screens. After crushing salt converted in two sizes. First is in powder form and other is 2mm stone size. Then Salt stored into different packaging and send to the PMDC warehouses.

9. Ware Housing

Finish goods of salt which is stored in ware houses of PMDC for further Shipment purpose.

10. Shipment

Bulk salt load and send via railroad cars, trucks, river barges or lake boats for shipment to customers.

Chapter No: 03

Primavera P6 Introduction:

It is the tool which is own by Oracle and using for effective management of the projects. This tool is widely adopted and used in the construction Industry. By using this tool we can do planning of all types of projects it is supportive tool to manage the projects with complexity. This tool provides all feature that can help to manage the project throughout the life cycle. There are number of features of this tool such as Scheduling, Costing, resource assignments, Work break down Structure, Organisational breakdown Structure, Activities relationships and many more.

Below are the types of P6 versions:

- PPM
- EPPM

Both are used for planning of the projects but there is some difference between them. Below are the some details of both versions

Oracle Primavera P6 EPPM

Primavera is a Oracle product and it is an enterprise project portfolio management software. It includes project management, product management, collaboration and control capabilities, and integrates with other enterprise software such as Oracle and SAP's ERP systems.

It is a good idea to understand the difference between P6 PPM and P6 EPPM before to purchase one of them. Both of them are suitable for big and challenging projects.

Although many organizations prefer to use P6 PPM as standalone software, it can be used either as a standalone tool or an enterprise tool.

P6 EPPM includes many useful features that P6 PPM does not have. One of them is the Methodology Management tool which involves project templates for different kinds of projects. As of version 8, Methodology Management is removed from P6 PPM and it is now available only in P6 EPPM.

Another important difference is that the processing speed of P6 PPM is more than Primavera P6 EPPM. Because it is a standalone software and this ability enables to make changes faster. On the other hand, P6 EPPM requires a high-quality internet connection and if your connection speed is low, you cannot use the software efficiently.

The reporting feature of P6 EPPM is more advanced than P6 PPM. You can create more visual reports, graphs, tables in P6 EPPM. This is useful for demonstrating the project status at any level from the executive level to lowest levels.

Key Features of Primavera P6

Primavera P6 provides high-level project management solutions for your business. Many people think that Primavera P6 is created only for scheduling purposes.

It is not just a tool for creating Gantt Charts. It provides many solutions such as cost management, Earned Value Management, risk management, resource leveling, contract management, and reporting.

Below are the key features of Primavera P6:

Scheduling:

Primavera P6 involves advanced scheduling solutions. Activities can be created under WBS (Work Breakdown Structure) levels, relationships can be established between the activities and the critical path of the schedule can be calculated by the help of scheduling feature.

Resource & Cost Control Management:

Resources, unit prices, and expenses can be assigned to activities. Project budget can be tracked with the help of this feature. Project teams can easily compare the planned and the actual status of costs and analyze the performance of the project.

Risk Management:

It is possible to identify and prioritize risks with the help of this feature. Risks can be assigned to activities and risk analysis can be performed for each activity and project.

Contract Management:

Primavera P6 contract management feature provides advanced document control solutions. It is possible to track the Requests For Information Process, changes, issues, submittal and approvals and their impact on the schedule with this feature.

Report Making:

Professional or complex reports can be made on this tool by using a lot of features which is built-in.

Benefits of Primavera P6

Project teams use software tools to monitor and control their project's performance. It is difficult to complete a project on time and on budget without the help of project management software tools. Because today's projects involve thousands of activities and variables that must be controlled effectively.

An unexpected problem or delay in the critical path may cause overall project delay. Like other software tools (Microsoft Project), Oracle Primavera P6 helps to keep the projects on track.

Below are some of the benefits of P6

- Enables to manage complex projects
- Enables to manage project portfolios
- Increases visibility
- Helps to manage project risks
- Enables to perform resource and cost management
- Improves collaboration and decision making

Chapter No: 04

Project Planning of Salt Mining on Primavera P6:

In our visit to khewra salt mine we observe mining to finishing process of salt and get the knowledge about all steps of mining and finishing. Now, we are planning the mining to finishing of 1 km underground mining on Primavera P6 software.

Project Start Date: 07 January, 2020

Project End Date: 19 October, 2022

Project Budget: PKR 3.8507 Million

List of Activities:

We suppose the following activities according to Process group of Project Management which we will plan and schedule on Primavera P6 software.

1. Initiation:

Feasibility Study

- Project Charter
- Identification of Stakeholders

2. Planning:

Design of Excavation

- Shafts
- Crosscuts
- Horizontal & Inclined

Design of Electrical Supply

- Poles
- Transmission Lines
- Transformer
- Generator
- Wires
- Energy Meters

Design of Water Supply

- Tanks
- Water pipelines

Design of labour Accommodation

- Area Allocation
- Boundary Wall
- Security Gate

Design of Dispensary

- Patient Treatment Room
- Staff Room
- Medical Store

Design of Food Court

- Kitchen
- Dining Room
- Grocery Room

3. Execution

Procurement of Miners Equipment

- Miners costume & Safety equipment
- Tendering Process
- Bidding Process
- Award Contract
- Inspection of Material
- Site store stacking

Procurement of Electrical & Mechanical Equipment

- Specification of Generator with all associated equipment
- Electrical Appliances
- Excavator
- Drilling Equipment
- Crusher
- Tendering Process
- Bidding Process
- Award Contract
- Inspection Material
- Site Store Stacking

Procurement of Explosive Material

- Explosive Bombs for Blasting
- Tendering Process
- Bidding Process
- Award Contract
- Inspection Material
- Site Store Stacking

Procurement of Dispensary Equipment

- Treatment Beds
- Oxygen Cylinders
- Surgical Items
- Medicines
- Tendering Process
- Bidding Process
- Award Contract
- Inspection Material
- Site for Medicine store

Procurement of labour Accommodation Material

- Shelters
- Matrices
- Tendering Process
- Bidding Process
- Award Contract
- Inspection Material
- Site Store Stacking

Procurement of Services

- Consultancy Services
- Finish Salt Packing Agency
- Finish Salt Shipment Agency

4. Monitoring & Controlling

Inspection of Equipment

- Quality Assurance

Site supervision & Handling

- Task Assign
- Conflict Handling

Execution of Work

- Plans Implementation

5. Closing

Completion and Closure

- Work complete taking over Certificates
- Defect Liability period completion

Activities:

Below are the Activities which has been implement on Primavera tool

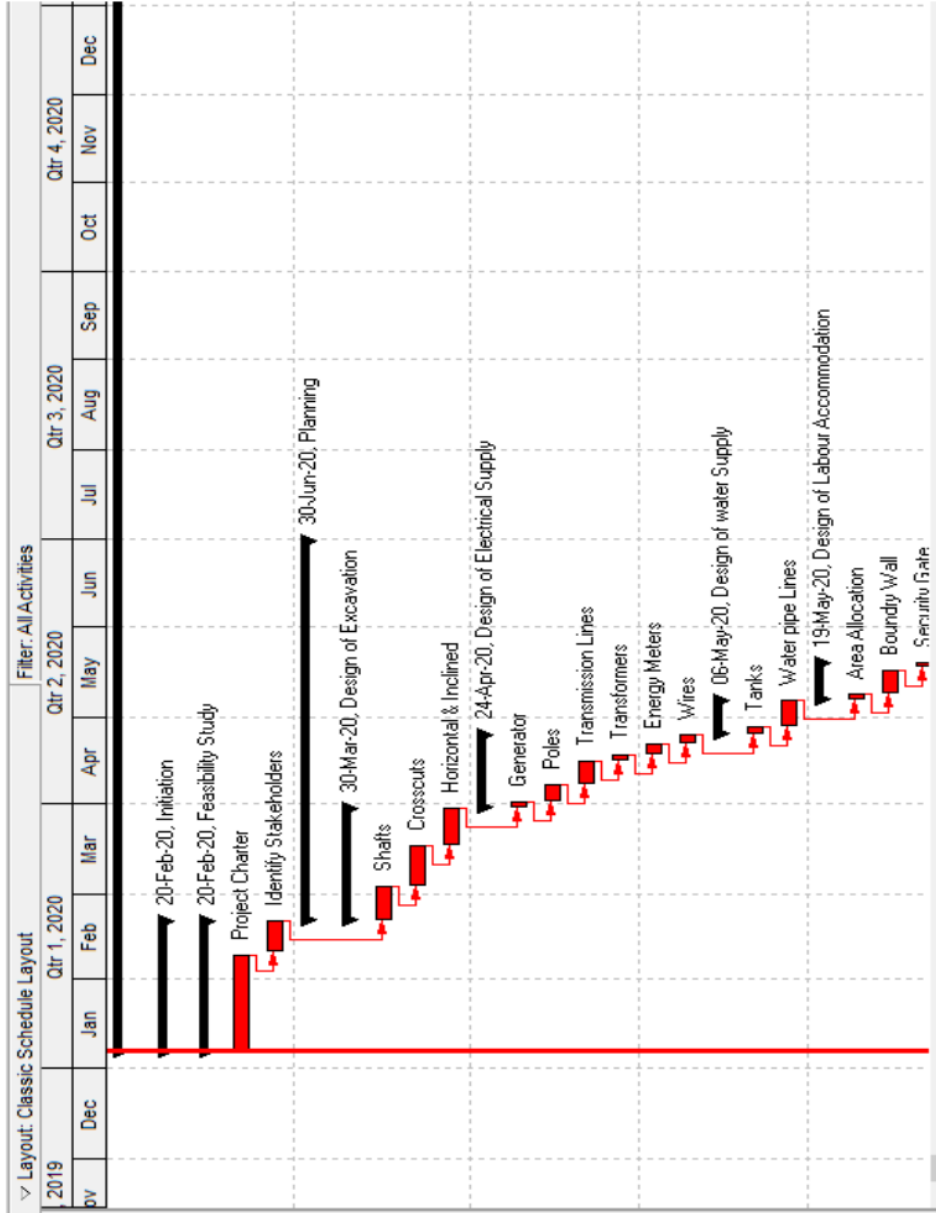
Salt Mining Project of 1 KM		Classic Schedule Layout			14-Jan-20 08:54	
Activity ID	Activity Name	Original Duration	Start	Finish	Resources	Budgeted Total Cost
Salt Mining Project of 1 KM						
Initiation		372d	07-Jan-20	19-Oct-22		PKR3,650,700.00
█ A1120	Feasibility Study	40d	07-Jan-20	20-Feb-20		PKR420,000.00
█ A1130	Project Charter	30d	07-Jan-20	08-Feb-20	Project Sponsor, Project Man	PKR315,000.00
█ A1140	Identify Stakeholders	10d	10-Feb-20	20-Feb-20	Project Sponsor, Project Man	PKR105,000.00
Planning		112d	21-Feb-20	30-Jun-20		PKR438,300.00
█ A1150	Design of Excavation	30d	21-Feb-20	30-Mar-20		PKR174,900.00
█ A1160	Shifts	10d	21-Feb-20	03-Mar-20	Monitoring Team, Electrical E	PKR53,000.00
█ A1170	Crosscuts	12d	04-Mar-20	17-Mar-20	Monitoring Team, Mechanical	PKR60,800.00
█ A1180	Horizontal & Inclined	11d	18-Mar-20	30-Mar-20	Mechanical Engineer, Excav	PKR58,300.00
█ A1190	Design of Electrical Supply	22d	31-Mar-20	24-Apr-20		PKR79,600.00
█ A1200	Generator	2c	31-Mar-20	01-Apr-20	Electrical Engineer, Procurar	PKR11,800.00
█ A1210	Poles	5c	02-Apr-20	07-Apr-20	Electrical Engineer, Crane, L	PKR28,500.00
█ A1220	Transmission Lines	7c	08-Apr-20	15-Apr-20	Electrical Engineer, Labor	PKR16,100.00
█ A1230	Transformers	2c	18-Apr-20	17-Apr-20	Electrical Engineer, Labor, C	PKR14,800.00
█ A1240	Energy Meters	3c	18-Apr-20	21-Apr-20	Electrical Engineer	PKR5,400.00
█ A1250	Wires	3c	22-Apr-20	24-Apr-20	Electrical Engineer	PKR5,400.00
█ A1260	Design of water Supply	10d	25-Apr-20	05-May-20		PKR60,000.00
█ A1270	Tanks	2c	25-Apr-20	27-Apr-20	Water Van	PKR20,000.00
█ A1280	Water pipe Lines	8c	28-Apr-20	06-May-20	Civil Work Team, Monitoring	PKR38,000.00
█ A1290	Design of Labour Accommodation	11d	07-May-20	19-May-20		PKR40,000.00
█ A1300	Area Allocation	2c	07-May-20	08-May-20	Civil Work Team, Contab	PKR12,000.00
█ A1310	Boundary Wall	7c	08-May-20	15-May-20	Civil Work Team	PKR21,000.00
█ A1320	Security Gate	2c	18-May-20	19-May-20	Security Team	PKR7,000.00
█ A1330	Design of Dispensary	26d	20-May-20	15-Jun-20		PKR71,600.00
█ A1340	Patent Treatment Room	8c	20-May-20	28-May-20	Nursing Doctor	PKR28,000.00
█ A1350	Staff Room	6c	28-May-20	04-Jun-20	Doctor, Nursing	PKR21,000.00
█ A1360	Medical Store	9c	05-Jun-20	15-Jun-20	Medical Store Operator, Mon	PKR22,500.00
█ A1370	Design of Food court	13d	18-Jun-20	30-Jun-20		PKR18,300.00
█ A1380	Kitchen	4c	18-Jun-20	19-Jun-20	Cook	PKR4,000.00
█ A1390	Dining Room	6c	20-Jun-20	26-Jun-20	Waiter	PKR4,800.00
█ A1400	Grocery Store Room	3c	27-Jun-20	30-Jun-20	Cook, Monitoring Team	PKR7,500.00
Execution		511d	01-Jul-20	16-Feb-22		PKR2,196,900.00

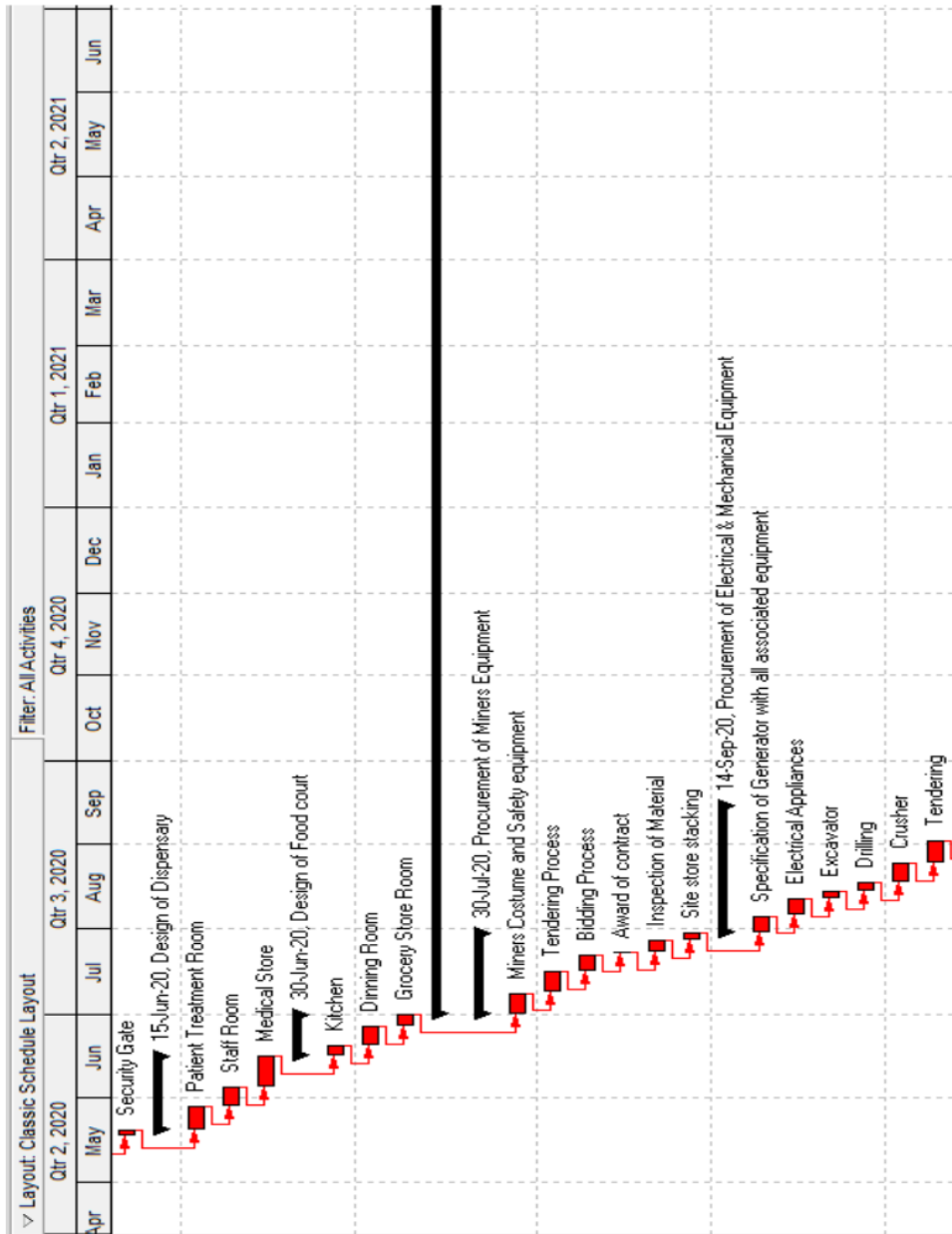
Salt Mining Project of 1 KM		Classic Schedule Layout			14-Jan-20 08:55	
Activity ID	Activity Name	Original Duration	Start	Finish	Resources	Budgeted Total Cost
Procurement of Miners Equipment						
A1060	Miners Costume and Safety	26d	01-Jul-20	30-Jul-20	Excavation Team, Procurem	PKR134,000.00
A1070	Tendering Process	7c	01-Jul-20	08-Jul-20	Project Manager	PKR73,500.00
A1080	Bidding Process	5c	08-Jul-20	13-Jul-20	Project Manager, Procureme	PKR21,000.00
A1090	Award of contract	1c	23-Jul-20	23-Jul-20	Project Manager	PKR3,000.00
A1100	Inspection of Material	3c	24-Jul-20	27-Jul-20	Monitoring Team	PKR4,500.00
A1110	Site store stacking	3c	28-Jul-20	30-Jul-20	Store Incharge	PKR4,500.00
Procurement of Electrical & Mechanical Equipment						
A1330	Specification of Generator w/it	36d	31-Jul-20	14-Sep-20	Electrical Engineer, Procure	PKR174,500.00
A1340	Electrical Appliances	5c	31-Jul-20	05-Aug-20	Electrical Engineer, Procure	PKR21,500.00
A1350	Excavator	5c	06-Aug-20	11-Aug-20	Electrical Engineer, Procure	PKR21,500.00
A1360	Drilling	3c	12-Aug-20	14-Aug-20	Mechanical Engineer, Procure	PKR33,900.00
A1370	Crusher	2c	15-Aug-20	17-Aug-20	Excavation Team, Procurem	PKR17,000.00
A1380	Tendering	6c	18-Aug-20	24-Aug-20	Procurement Consultant	PKR15,000.00
A1390	Bidding	7c	25-Aug-20	01-Sep-20	Project Manager, Procureme	PKR38,500.00
A1400	Award Contract	5c	08-Sep-20	07-Sep-20	Project Manager	PKR15,000.00
A1410	Inspection of Material	1c	08-Sep-20	08-Sep-20	Project Manager	PKR5,000.00
A1420	Site Store stacking	1c	08-Sep-20	08-Sep-20	Monitoring Team	PKR1,500.00
Procurement of Explosive Material						
A1430	Explosive Bombs	4c	10-Sep-20	14-Sep-20	Store Incharge	PKR6,000.00
A1440	Tendering	31d	15-Sep-20	20-Oct-20	Procurement Consultant	PKR76,000.00
A1450	Bidding	12d	15-Sep-20	28-Sep-20	Procurement Consultant	PKR30,000.00
A1460	Award Contract	7c	29-Sep-20	06-Oct-20	Project Manager	PKR21,000.00
A1470	Inspection of Material	5c	07-Oct-20	12-Oct-20	Project Manager	PKR15,000.00
A1480	Site Store stacking	1c	13-Oct-20	13-Oct-20	Project Manager	PKR3,000.00
Procurement of Dispensary Equipment						
A1490	Treatment Beds	1c	14-Oct-20	14-Oct-20	Monitoring Team	PKR1,500.00
A1500	Oxygen Cylinders	5c	15-Oct-20	20-Oct-20	Store Incharge	PKR7,500.00
A1510	Surgical Items	88d	21-Oct-20	01-Feb-21	Procurement Consultant, C.c	PKR319,500.00
A1520	Medicines	13d	21-Oct-20	04-Nov-20	Procurement Consultant, C.c	PKR56,500.00
A1530	Tendering	15d	06-Nov-20	21-Nov-20	Procurement Consultant, C.c	PKR67,500.00
A1540	Bidding	21d	23-Nov-20	16-Dec-20	Contractor Team, Procureme	PKR54,500.00
A1550	Award Contract	14d	17-Dec-20	01-Jan-21	Medical Store Operatr, Doc	PKR42,000.00
A1560	Inspection of Material	7c	03-Jan-21	09-Jan-21	Project Manager	PKR21,000.00
A1570	Site Store stacking	5c	11-Jan-21	15-Jan-21	Project Manager	PKR15,000.00
A1580	Site Store stacking	1c	16-Jan-21	16-Jan-21	Project Manager	PKR3,000.00
A1590	Site Store stacking	10d	19-Jan-21	28-Jan-21	Monitoring Team	PKR15,000.00

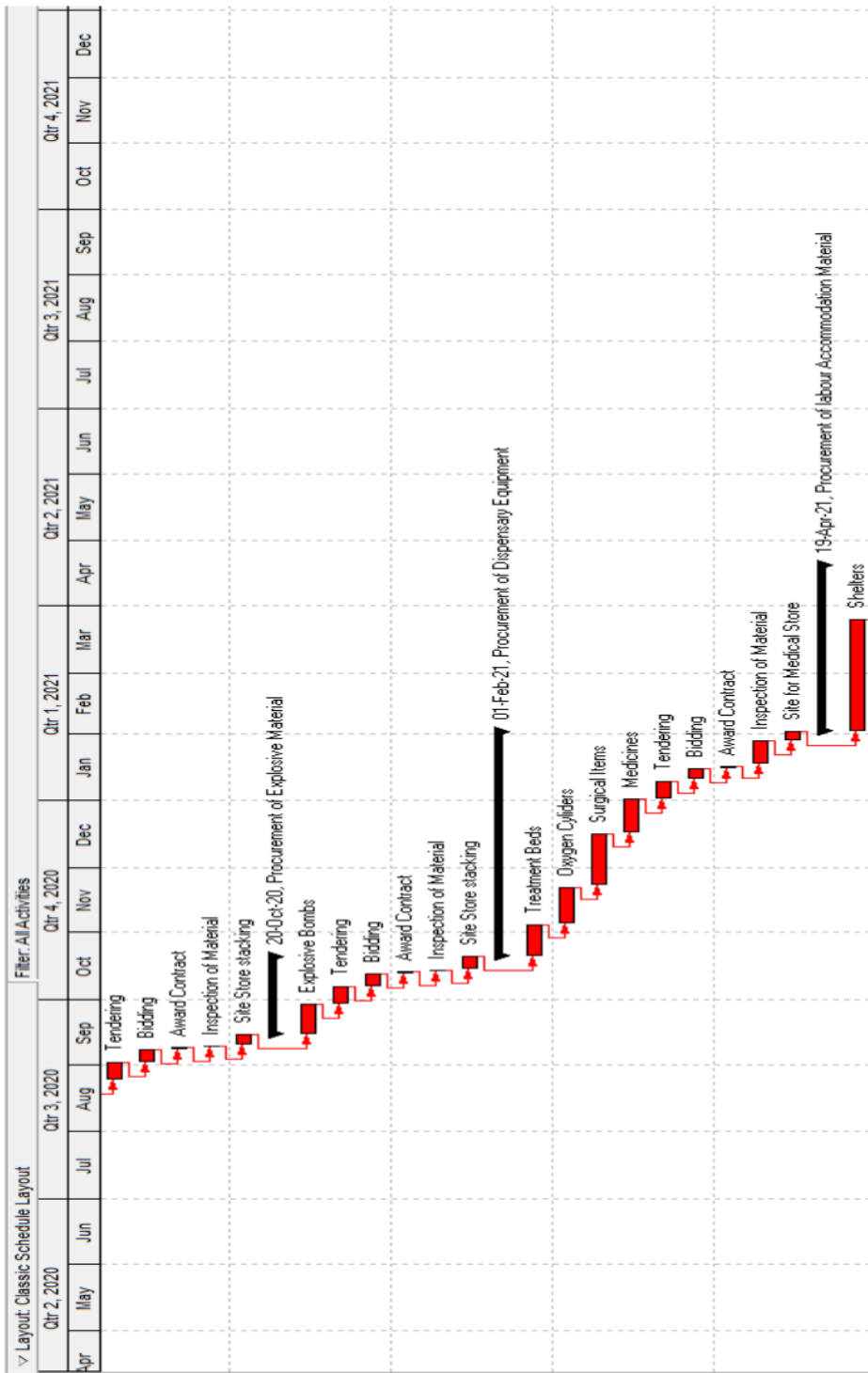
Salt Mining Project of 1 KM		Classic Schedule Layout			14-Jan-20 08:55	
Activity ID	Activity Name	Original Duration	Start	Finish	Resources	Budgeted Total Cost
A1570	Site for Marical Store	3c	25-Jan-21	01-Feb-21	Medical Store Operabr	PKR3,000.00
A1580	Procurement of labour Accommodation Material	66d	02-Feb-21	19-Apr-21		PKR166,500.00
A1590	Shellers	46d	02-Feb-21	25-Mar-21	Procurement Consultant	PKR112,500.00
A1610	Matrices	2c	25-Mar-21	27-Mar-21	Procurement Consultant	PKR5,000.00
A1620	Tandring	7c	25-Mar-21	05-Apr-21	Project Manager	PKR21,000.00
A1630	Bidding	5c	05-Apr-21	10-Apr-21	Project Manager	PKR15,000.00
A1640	Award Contract	1c	12-Apr-21	12-Apr-21	Project Manager	PKR3,000.00
A1650	Inspection of Material	1c	13-Apr-21	13-Apr-21	Monitoring Team	PKR1,500.00
A1660	Site store stacking	5c	14-Apr-21	19-Apr-21	Store Indranga	PKR7,500.00
A1670	Procurement of Services	200c	20-Apr-21	18-Feb-22		PKR1,325,000.00
A1680	Consultancy Services	115d	20-Apr-21	31-Aug-21	Procurement Consultant	PKR287,500.00
A1690	Finishing Salt Packing	80d	01-Sep-21	02-Dec-21	Procurement Consultant Pa	PKR680,000.00
A1880	Finishing Salt Shipment	66d	03-Dec-21	16-Feb-22	Procurement Consultant, Lo:	PKR367,500.00
Monitoring & Controlling						
A1690	Inspection of Equipment	166d	17-Feb-22	06-Oct-22		PKR730,500.00
A1650	Quality Assurance	70d	17-Feb-22	08-May-22		PKR315,000.00
A1700	Site Supervision and Handling	100c	10-May-22	14-Sep-22	Monitoring Team, Project Ma	PKR330,000.00
A1720	Task Assign	100d	10-May-22	02-Sep-22	Project Manager	PKR300,000.00
A1710	Conflict Handling	10d	03-Sep-22	14-Sep-22	Project Manager	PKR30,000.00
A1710	Plans Implementation	19d	15-Sep-22	06-Oct-22	Project Manager, Monitoring	PKR5,500.00
Closing						
A1730	Completion and Closure	10d	07-Oct-22	19-Oct-22		PKR65,000.00
A1740	Work complete taking over C	5c	07-Oct-22	12-Oct-22	Project Manager, Project Sp	PKR32,500.00
A1750	Defect Liability period compl	5c	13-Oct-22	18-Oct-22	Project Manager, Project Sp	PKR32,500.00
A1750	Project End	0c	19-Oct-22	19-Oct-22		PKR0.00

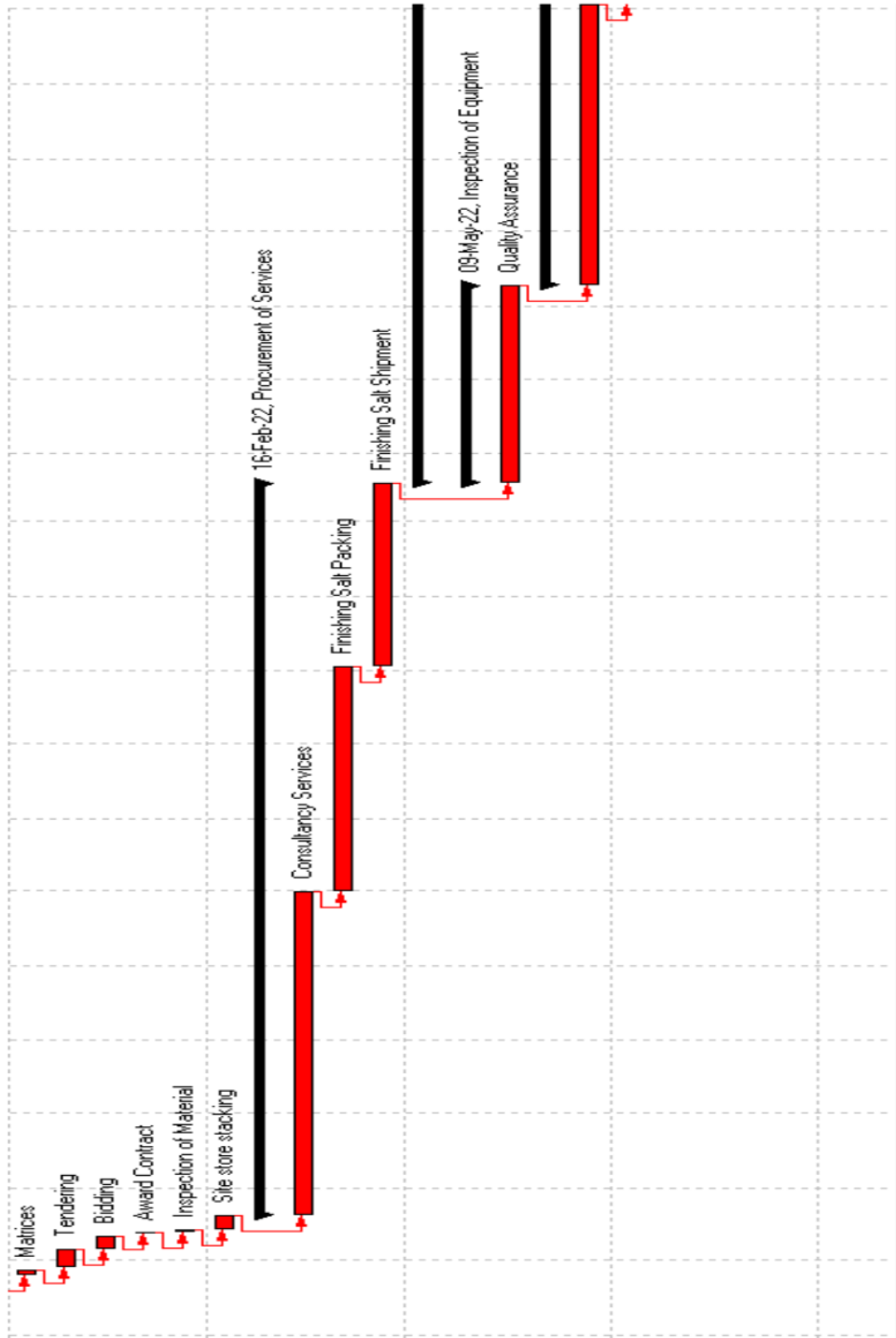
Gantt Chart:

Below are the Gantt chart of activities









Resources:

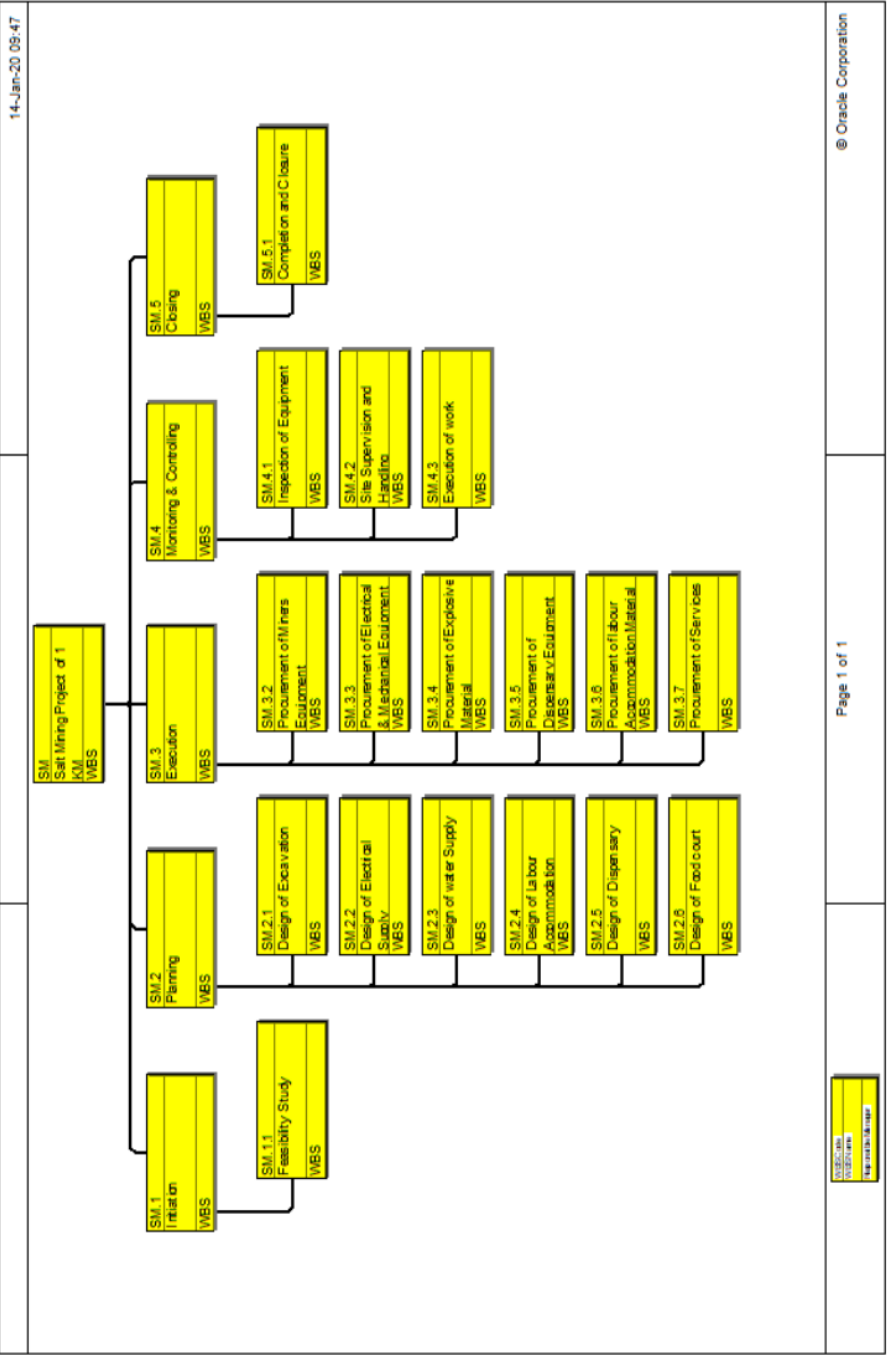
Below are the resources list of the mining project.

Salt Mining Project of 1 KM		Current Project's Resources			14-Jan-20 09:40
Resource ID	Resource Name	Resource Type	Unit of Measure	Primary Role	Default Units / Time
M1	Water/Van	Material	Liters		&id
M2	Excavator	Material	Meters		&id
L2	Electrical Engineer	Labor			&id
L3	Mechanical Engineer	Labor			&id
L4	Doctor	Labor			&id
L5	Nursing	Labor			&id
L6	Medical Store Operator	Labor			&id
R-6	Welder	Labor			&id
L7	Procurement Consultant	Labor			&id
L8	Contractor Team	Labor			&id
R-3	Civil Work Team	Labor			&id
R-7	Store Incharge	Labor			&id
R-4	Security Team	Labor			&id
R-5	Cook	Labor			&id
L9	Monitoring Team	Labor			&id
R	Excavation Team	Labor			&id
L10	Project Sponsor	Labor			&id
R-9	Packing Team	Labor			&id
L11	Project Manager	Labor			&id
R-1	Chief Engineer	Labor			&id
R-2	Lavalar and Unloader	Labor			&id
NL1	Labior	Nonlabor			&id
NL3	Crane	Nonlabor			&id
R-8	Percussion rock drill	Nonlabor			&id

WBS (Work Break down Structure):

The WBS of the mining project is below

Layout: WBS		
WBS Code	WBS Name	Total Activities
SM	Salt Mining Project of 1 KM	70
SM.1	Initiation	2
SM.1.1	Feasibility Study	2
SM.2	Planning	20
SM.2.1	Design of Excavation	3
SM.2.2	Design of Electrical Supply	6
SM.2.3	Design of water Supply	2
SM.2.4	Design of Labour Accommodation	3
SM.2.5	Design of Dispensary	3
SM.2.6	Design of Food court	3
SM.3	Execution	41
SM.3.2	Procurement of Miners Equipment	6
SM.3.3	Procurement of Electrical & Mechanical Equipment	10
SM.3.4	Procurement of Explosive Material	6
SM.3.5	Procurement of Dispensary Equipment	9
SM.3.6	Procurement of labour Accommodation Material	7
SM.3.7	Procurement of Services	3
SM.4	Monitoring & Controlling	4
SM.4.1	Inspection of Equipment	1
SM.4.2	Site Supervision and Handling	2
SM.4.3	Execution of work	1
SM.5	Closing	3
SM.5.1	Completion and Closure	3



Resource Assignment:

Layout: Activity Resource Assignments				
Activity ID	Activity Name	Resource ID Name	Start	Finish
Water Van				
A1220	Tanks	M1.Water Van	25-Apr-20	27-Apr-20
Excavator				
A1350	Excavator	M2.Excavator	12-Aug-20	14-Aug-20
Electrical Engineer				
A1140	Shafts	L2.Electrical Engineer	21-Feb-20	11-Aug-20
A1169	Generator	L2.Electrical Engineer	31-Mar-20	1-Apr-20
A1170	Poles	L2.Electrical Engineer	2-Apr-20	7-Apr-20
A1180	Transmission Lines	L2.Electrical Engineer	8-Apr-20	15-Apr-20
A1190	Transformers	L2.Electrical Engineer	16-Apr-20	17-Apr-20
A1200	Energy Meters	L2.Electrical Engineer	18-Apr-20	21-Apr-20
A1210	Wires	L2.Electrical Engineer	22-Apr-20	24-Apr-20
A1330	Specification of Generator with all	L2.Electrical Engineer	31-Jul-20	5-Aug-20
A1340	Electrical Appliances	L2.Electrical Engineer	6-Aug-20	11-Aug-20
Mechanical Engineer				
A1150	Crosscuts	L3.Mechanical Engineer	4-Mar-20	14-Aug-20
A1160	Horizontal & Inclined	L3.Mechanical Engineer	4-Mar-20	17-Mar-20
A1350	Excavator	L3.Mechanical Engineer	18-Mar-20	30-Mar-20
Doctor				
A1270	Patient Treatment Room	L4.Doctor	20-May-20	1-Jan-21
A1280	Staff Room	L4.Doctor	20-May-20	28-May-20
A1520	Medicines	L4.Doctor	29-May-20	4-Jun-20
Nursing				
A1270	Patient Treatment Room	L5.Nursing	17-Dec-20	1-Jan-21
A1280	Staff Room	L5.Nursing	20-May-20	4-Jun-20
A1280	Staff Room	L5.Nursing	20-May-20	28-May-20
A1280	Staff Room	L5.Nursing	29-May-20	4-Jun-20
Layout: Activity Resource Assignments				
Activity ID	Activity Name	Resource ID Name	Start	Finish
Medical Store Operator				
A1290	Medical Store	L6.Medical Store Operator	5-Jun-20	1-Feb-21
A1520	Medicines	L6.Medical Store Operator	5-Jun-20	15-Jun-20
A1570	Site for Medical Store	L6.Medical Store Operator	17-Dec-20	1-Jan-21
A1570	Site for Medical Store	L6.Medical Store Operator	29-Jan-21	1-Feb-21
Waiter				
A1310	Dinning Room	R-6.Waiter	20-Jun-20	26-Jun-20
A1310	Dinning Room	R-6.Waiter	20-Jun-20	26-Jun-20
Procurement Consultant				
A1169	Generator	L7.Procurement Consultant	31-Mar-20	16-Feb-22
A1060	Miners Costume and Safety equip	L7.Procurement Consultant	31-Mar-20	1-Apr-20
A1080	Bidding Process	L7.Procurement Consultant	1-Jul-20	8-Jul-20
A1330	Specification of Generator with all	L7.Procurement Consultant	17-Jul-20	22-Jul-20
A1340	Electrical Appliances	L7.Procurement Consultant	31-Jul-20	5-Aug-20
A1350	Excavator	L7.Procurement Consultant	6-Aug-20	11-Aug-20
A1360	Drilling	L7.Procurement Consultant	12-Aug-20	14-Aug-20
A1370	Crusher	L7.Procurement Consultant	15-Aug-20	17-Aug-20
A1380	Tendering	L7.Procurement Consultant	18-Aug-20	24-Aug-20
A1430	Explosive Bombs	L7.Procurement Consultant	25-Aug-20	1-Sep-20
A1490	Treatment Beds	L7.Procurement Consultant	15-Sep-20	28-Sep-20
A1500	Oxygen Cylinders	L7.Procurement Consultant	21-Oct-20	4-Nov-20
A1510	Surgical Items	L7.Procurement Consultant	5-Nov-20	21-Nov-20
A1580	Shelters	L7.Procurement Consultant	23-Nov-20	16-Dec-20
A1590	Matrices	L7.Procurement Consultant	2-Feb-21	25-Mar-21
A1660	Consultancy Services	L7.Procurement Consultant	26-Mar-21	27-Mar-21
A1670	Finishing Salt Packing	L7.Procurement Consultant	20-Apr-21	31-Aug-21
A1680	Finishing Salt Shipment	L7.Procurement Consultant	1-Sep-21	2-Dec-21
A1680	Finishing Salt Shipment	L7.Procurement Consultant	3-Dec-21	16-Feb-22

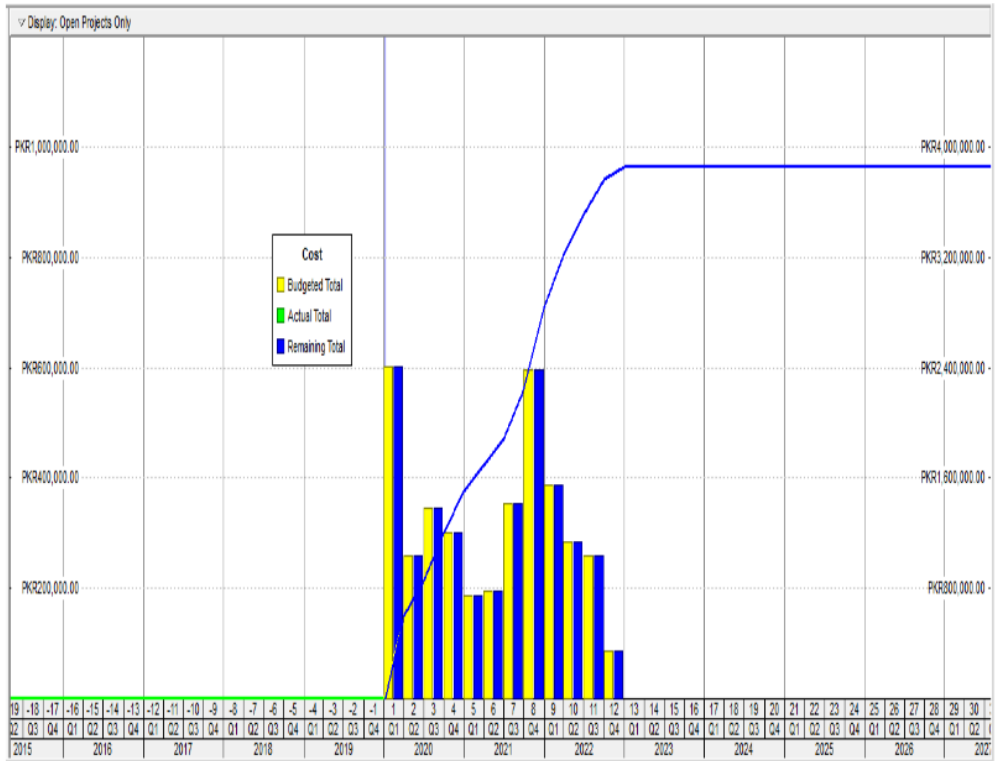
Layout: Activity Resource Assignments				
Activity ID	Activity Name	Resource ID Name	Start	Finish
Contractor Team				
A1240	Area Allocation	L8.Contractor Team	7-May-20	16-Dec-20
A1490	Treatment Beds	L8.Contractor Team	21-Oct-20	4-Nov-20
A1500	Oxygen Cylinders	L8.Contractor Team	5-Nov-20	21-Nov-20
A1510	Surgical Items	L8.Contractor Team	23-Nov-20	16-Dec-20
Civil Work Team				
A1230	Water pipe Lines	R-3.Civil Work Team	28-Apr-20	6-May-20
A1240	Area Allocation	R-3.Civil Work Team	7-May-20	8-May-20
A1250	Boundry Wall	R-3.Civil Work Team	9-May-20	16-May-20
A1060	Miners Costume and Safety equip	R-3.Civil Work Team	1-Jul-20	8-Jul-20
Store Incharge				
A1110	Site store stacking	R-7.Store Incharge	28-Jul-20	19-Apr-21
A1420	Site Store stacking	R-7.Store Incharge	10-Sep-20	14-Sep-20
A1480	Site Store stacking	R-7.Store Incharge	15-Oct-20	20-Oct-20
A1650	Site store stacking	R-7.Store Incharge	14-Apr-21	19-Apr-21
Security Team				
A1260	Security Gate	R-4.Security Team	18-May-20	19-May-20
Cook				
A1300	Kitchen	R-5.Cook	16-Jun-20	30-Jun-20
A1320	Grocery Store Room	R-5.Cook	27-Jun-20	30-Jun-20
Monitoring Team				
A1140	Shafts	L9.Monitoring Team	21-Feb-20	6-Oct-22
A1150	Crosscuts	L9.Monitoring Team	4-Mar-20	17-Mar-20
A1160	Horizontal & Inclined	L9.Monitoring Team	18-Mar-20	30-Mar-20
A1230	Water pipe Lines	L9.Monitoring Team	28-Apr-20	6-May-20

Layout: Activity Resource Assignments				
Activity ID	Activity Name	Resource ID Name	Start	Finish
A1169	Generator	L9.Monitoring Team	31-Mar-20	1-Apr-20
A1320	Grocery Store Room	L9.Monitoring Team	27-Jun-20	30-Jun-20
A1290	Medical Store	L9.Monitoring Team	5-Jun-20	15-Jun-20
A1100	Inspection of Material	L9.Monitoring Team	24-Jul-20	27-Jul-20
A1410	Inspection of Material	L9.Monitoring Team	9-Sep-20	9-Sep-20
A1470	Inspection of Material	L9.Monitoring Team	14-Oct-20	14-Oct-20
A1560	Inspection of Material	L9.Monitoring Team	18-Jan-21	28-Jan-21
A1640	Inspection of Material	L9.Monitoring Team	13-Apr-21	13-Apr-21
A1690	Quality Assurance	L9.Monitoring Team	17-Feb-22	9-May-22
A1710	Plans Implementation	L9.Monitoring Team	15-Sep-22	6-Oct-22
Excavation Team				
A1140	Shafts	R.Excavation Team	21-Feb-20	17-Aug-20
A1150	Crosscuts	R.Excavation Team	4-Mar-20	17-Mar-20
A1160	Horizontal & Inclined	R.Excavation Team	18-Mar-20	30-Mar-20
A1060	Miners Costume and Safety equip	R.Excavation Team	1-Jul-20	8-Jul-20
A1350	Excavator	R.Excavation Team	12-Aug-20	14-Aug-20
A1360	Drilling	R.Excavation Team	15-Aug-20	17-Aug-20
Project Sponsor				
A1120	Project Charter	L10.Project Sponsor	7-Jan-20	18-Oct-22
A1130	Identify Stakeholders	L10.Project Sponsor	10-Feb-20	20-Feb-20
A1730	Work complete taking over Certifi	L10.Project Sponsor	7-Oct-22	12-Oct-22
A1740	Defect Liability period completion	L10.Project Sponsor	13-Oct-22	18-Oct-22
Packing Team				
A1670	Finishing Salt Packing	R-9.Packing Team	1-Sep-21	2-Dec-21
Project Manager				
A1120	Project Charter	L11.Project Manager	7-Jan-20	18-Oct-22

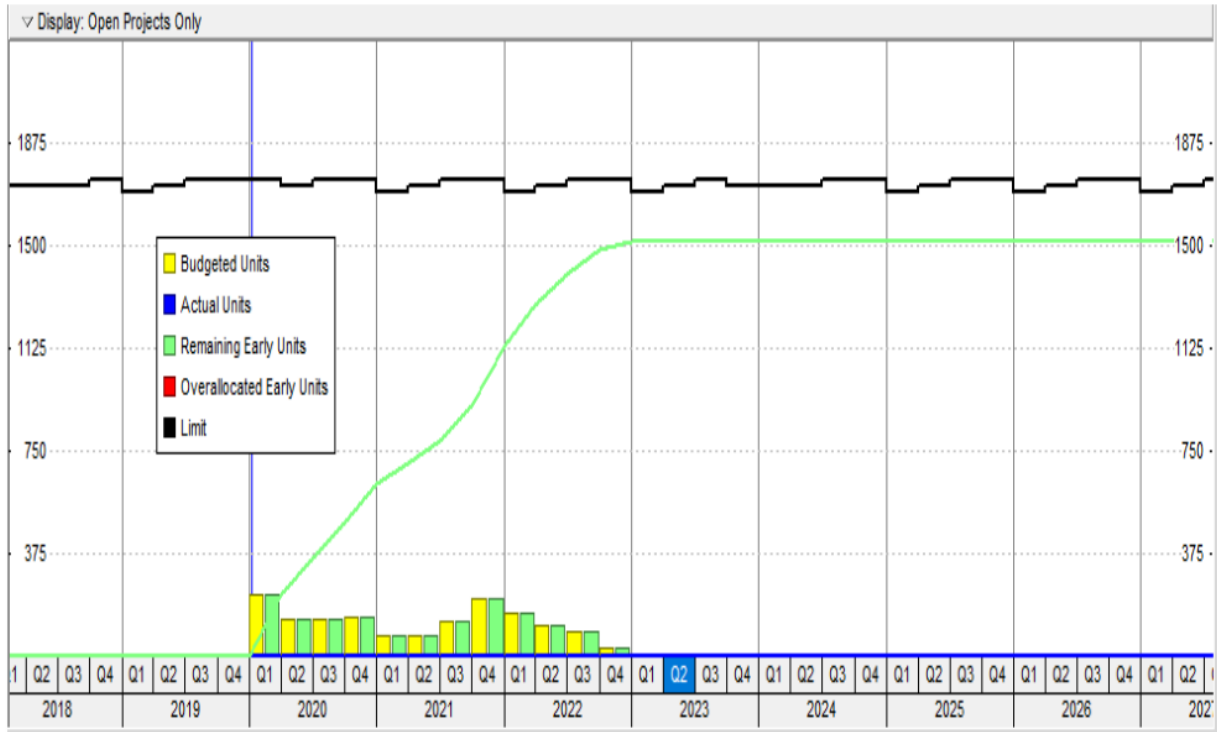
Layout: Activity Resource Assignments				
Activity ID	Activity Name	Resource ID Name	Start	Finish
Project Manager		L11.Project Manager	7-Jan-20	18-Oct-22
A1120	Project Charter	L11.Project Manager	7-Jan-20	8-Feb-20
A1130	Identify Stakeholders	L11.Project Manager	10-Feb-20	20-Feb-20
A1060	Miners Costume and Safety equip	L11.Project Manager	1-Jul-20	8-Jul-20
A1070	Tendering Process	L11.Project Manager	9-Jul-20	16-Jul-20
A1080	Bidding Process	L11.Project Manager	17-Jul-20	22-Jul-20
A1090	Award of contract	L11.Project Manager	23-Jul-20	23-Jul-20
A1380	Tendering	L11.Project Manager	25-Aug-20	1-Sep-20
A1390	Bidding	L11.Project Manager	2-Sep-20	7-Sep-20
A1400	Award Contract	L11.Project Manager	8-Sep-20	8-Sep-20
A1440	Tendering	L11.Project Manager	29-Sep-20	6-Oct-20
A1450	Bidding	L11.Project Manager	7-Oct-20	12-Oct-20
A1460	Award Contract	L11.Project Manager	13-Oct-20	13-Oct-20
A1530	Tendering	L11.Project Manager	2-Jan-21	9-Jan-21
A1540	Bidding	L11.Project Manager	11-Jan-21	15-Jan-21
A1550	Award Contract	L11.Project Manager	16-Jan-21	16-Jan-21
A1610	Tendering	L11.Project Manager	29-Mar-21	5-Apr-21
A1620	Bidding	L11.Project Manager	6-Apr-21	10-Apr-21
A1630	Award Contract	L11.Project Manager	12-Apr-21	12-Apr-21
A1690	Quality Assurance	L11.Project Manager	17-Feb-22	9-May-22
A1700	Task Assign	L11.Project Manager	10-May-22	2-Sep-22
A1720	Conflict Handling	L11.Project Manager	3-Sep-22	14-Sep-22
A1710	Plans Implementation	L11.Project Manager	15-Sep-22	6-Oct-22
A1730	Work complete taking over Certifi	L11.Project Manager	7-Oct-22	12-Oct-22
A1740	Defect Liability period completion	L11.Project Manager	13-Oct-22	18-Oct-22

Layout: Activity Resource Assignments				
Activity ID	Activity Name	Resource ID Name	Start	Finish
A1550	Award Contract	L11.Project Manager	16-Jan-21	16-Jan-21
A1610	Tendering	L11.Project Manager	29-Mar-21	5-Apr-21
A1620	Bidding	L11.Project Manager	6-Apr-21	10-Apr-21
A1630	Award Contract	L11.Project Manager	12-Apr-21	12-Apr-21
A1690	Quality Assurance	L11.Project Manager	17-Feb-22	9-May-22
A1700	Task Assign	L11.Project Manager	10-May-22	2-Sep-22
A1720	Conflict Handling	L11.Project Manager	3-Sep-22	14-Sep-22
A1710	Plans Implementation	L11.Project Manager	15-Sep-22	6-Oct-22
A1730	Work complete taking over Certifi	L11.Project Manager	7-Oct-22	12-Oct-22
A1740	Defect Liability period completion	L11.Project Manager	13-Oct-22	18-Oct-22
Chief Engineer		R-1.Chief Engineer	7-Jan-20	20-Feb-20
A1120	Project Charter	R-1.Chief Engineer	7-Jan-20	8-Feb-20
A1130	Identify Stakeholders	R-1.Chief Engineer	10-Feb-20	20-Feb-20
Loader and Unloader		R-2.Loader and Unloader	1-Sep-21	16-Feb-22
A1680	Finishing Salt Shipment	R-2.Loader and Unloader	3-Dec-21	16-Feb-22
A1670	Finishing Salt Packing	R-2.Loader and Unloader	1-Sep-21	2-Dec-21
Ladder		NL1.Ladder	2-Apr-20	17-Apr-20
A1170	Poles	NL1.Ladder	2-Apr-20	7-Apr-20
A1180	Transmission Lines	NL1.Ladder	8-Apr-20	15-Apr-20
A1190	Transformers	NL1.Ladder	16-Apr-20	17-Apr-20
Crane		NL3.Crane	2-Apr-20	17-Apr-20
A1170	Poles	NL3.Crane	2-Apr-20	7-Apr-20
A1190	Transformers	NL3.Crane	16-Apr-20	17-Apr-20
Percussion rock drill		R-8.Percussion rock drill	15-Aug-20	17-Aug-20
A1360	Drilling	R-8.Percussion rock drill	15-Aug-20	17-Aug-20

Histogram:



S-Curve:



References:

https://en.wikipedia.org/wiki/Khewra_Salt_Mine

<https://www.projectcubicle.com/what-is-primavera-p6>

<http://www.pmdc.gov.pk/?p=Organogram>

Khewra Salt Mines Project

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