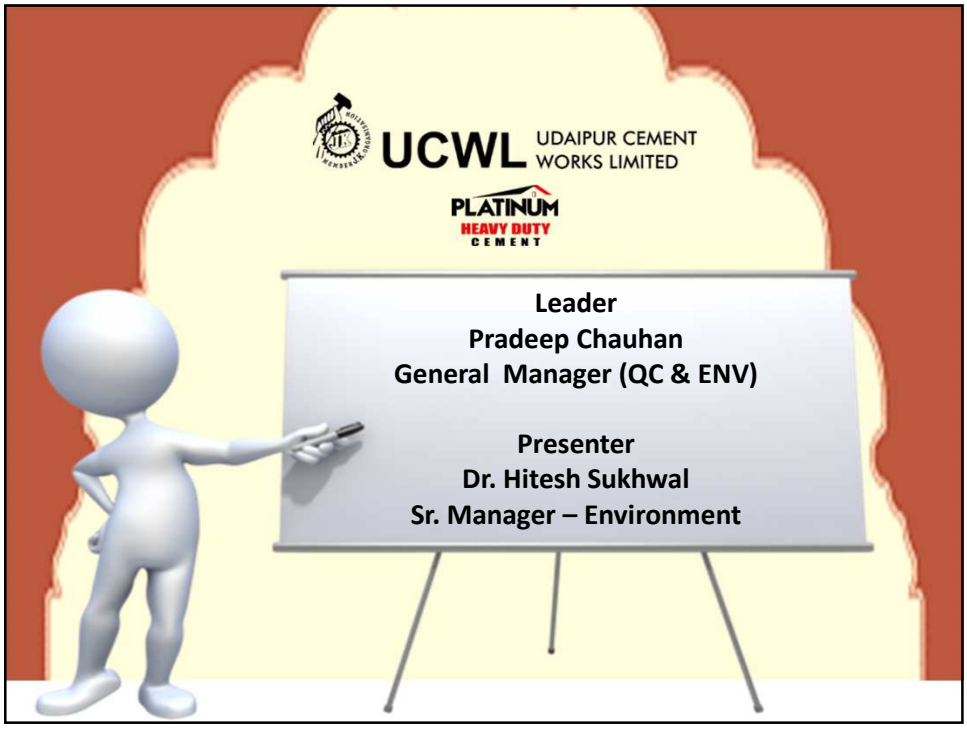
UCWL
UDAIPUR CEMENT
WORKS LIMITED
PLATINUM
HEAVY DUTY
CEMENT
Leader
Pradeep Chauhan
General Manager (QC & ENV)
Presenter
Dr. Hitesh Sukhwal
Sr. Manager – Environment

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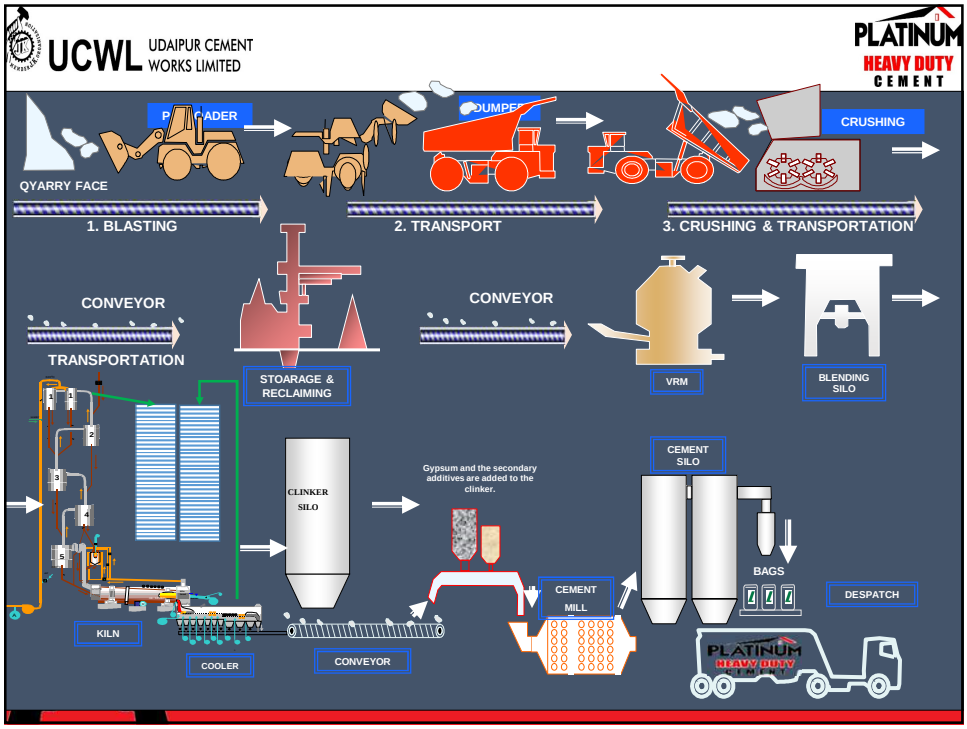

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Conservation of Natural Resources

Alternative to Natural Red Ocher = ZINC SLAG (waste derived- Smelters)

Alternative to Mineral Gypsum = JAROSITE (waste derived- metallurgical process)

- Red Ocher and Mineral Gypsum are finite natural resources
- Increasing demand would threaten their reserve and future availability.
- Mining of both the minerals is mostly manual- hence aspects like, Human Health issues , risk to loss of biodiversity, quality consistency, etc are concerning.
- **Alternative to Red ocher is Zinc Slag- Waste of smelting process.**
- **Alternative to Mineral Gypsum is Jarosite- Hazardous Waste of industrial metallurgical process.**

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PLATINUM HEAVY DUTY CEMENT

Conservation of Natural Resources

1. Alternative to Natural RED OCHER = ZINC SLAG (waste derived)

1. **Availability of Red Ocher** is confined to two districts only (Chittorgarh & Pratapgarh) in Rajasthan State.
2. **Red Ocher is widely used and key additive to design raw mix leading to its high demand.**
3. Since users are many, availability is confined and limited of natural resource, we were encouraged to explore ***alternative material instead of Natural resource Red Ocher.***
4. Keeping in mind with quality parameters of Red Ocher, our own (UCWL) quality standards and BIS specification, we found ***Zinc Slag (waste of zinc smelting process)*** an alternate resource.
5. Advantages include - **Cost Efficient**, **Alternative to natural resource**, **Sustainable solution to waste generator- reduced risk of environmental contamination.**

Win –Win situation for both waste generator as well as end user

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PLATINUM HEAVY DUTY CEMENT

Conservation of Natural Resources

2. Alternative to Marine & Mineral Gypsum = JAROSITE (waste derived):

1. Mineral Gypsum is one of the **main resource** for cement manufacturing as a set retarder for all kinds of cement to the tune of 5-10 %.
2. Rajasthan state is having richest source of mineral gypsum however, it is **limited resource** in view of increasing demand of cement industry as whole.
3. It is **also used for manufacturing of value-added Products like POP**. Cement Industry is also **looking for other alternatives** i.e. Chemical Gypsum, POP waste & Industrial waste.
4. ***We were exploring and we found JAROSITE (waste of smelting process***) as alternative to mineral Gypsum.
5. ***UCWL is the FIRST cement plant in India, which had done plant scale trial for utilization of Jarosite (HW) as a set retarder.***

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PLATINUM HEAVY DUTY CEMENT

JAROSITE- MOUNTAIN OF HAZARDOUS WASTE

ZINC SLAG- INDUSTRIAL WASTE

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PLATINUM HEAVY DUTY CEMENT

Particulars	Alternative to Red Ocher	Alternative to Mineral Gypsum
Trigger of the Project	Conceived at **Middle Management level**	Conceived at **Middle Management level**
Uniqueness of the Project	Use of Zinc Slag is not common in Cement Manufacturing.	Jarosite comes under hazardous category, however found suitable for partial replacement of Mineral Gypsum
Date of Commencement, Completion & Initial Planned date	Since Mar-18, trial of 15 days conducted, and regular uses started since 14th Oct-18	Plant scale trial was conducted from 15th to 19th Apr-2016. **Regular uses started since Jun-2020**
Major Milestone vis a vis Initial Mapping	**100 % Replaced Natural mineral Red Ocher**, which is as per initial mapping	**1.0 % mineral gypsum is replaced** as per BIS /directions guidelines, however initial mapping was to replace 3.0 %

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PC1

Slide 8

PC1 PK Chouhan, 7/19/2021

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Challenges faced and Brief on Countering

PLATINUM HEAVY DUTY CEMENT

Particulars	1. Alternative to Natural RED OCHER = ZINC SLAG	Counter measures / Solutions
(A)Technical Presence of Metals	Since it is a slag from Zinc, presence of metal i.e Pb, Zn, Mn it was anticipated that may affect burning of clinker	As presence of metals in traces only , no impact on burning observed. Sp.Heat consumption was remained same.
b) Administrative	Taking higher management in confidence	Lab Scale trials conducted, and results shared with higher management
C) Maintenance related	Impact on the wear rate on grinding mill internals	Pilot mill testing in the lab – and no negative impact was observed

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Challenges faced and Brief on Countering

PLATINUM HEAVY DUTY CEMENT

Particulars	2. Alternative to Marine & Mineral Gypsum = JAROSITE	Counter measures / Solutions
(A) Technical Hazardous Category	**To obtain Trial run permission from CPCB** and then Authorization from state pollution control board. Storage challenge	Conducted trial run after CPCB approval. As per guideline of CPCB Leachability test found OK. Provided storage facility with impervious concrete layering under shed.
b) Administrative	**Permission required** from BIS to use in Cement.	BIS was approached to give permission, BIS restricted the use @ 1.0 %
C) Maintenance related	Since Jarosite contains moisture to the tune of 25 to 30 %, need to be dried before use.	We are sun drying the material by spreading in thin layer to bring down moisture at the level to 15 %.

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Tangible Benefits

PLATINUM HEAVY DUTY CEMENT

1. Alternative to Natural RED OCHER = ZINC SLAG				
S.No.	Parameter		Mix with Red Ocher	Raw mix with Zinc slag
1	Lime Stone ROM	%	90.0	90.0
2	Al.clay	%	6.0	5.5
3	Red Ocher	%	4.0	0.0
4	Zinc Slag	%	-	4.50
5	Total additive Consp.	%	10.0	10.0
6	Mix Cost	Rs/MT	505.4	496.8
7	Gain/~~Loss~~ on Material	Rs/MT		8.6
8	Saving per annum	For 14.8 Lakh Tons Clinker production		Rs. 1.27 Crores
	Raw mix Parameters			
	SiO2	%	13.9	13.9
	Al2O3	%	3.5	3.5
	Fe2O3	%	2.5	2.5
	CaO	%	41.5	41.6

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Tangible Benefits

PLATINUM HEAVY DUTY CEMENT

2. Alternative to Marine & Mineral Gypsum = JAROSITE						
S.no.	Material	Rs/MT	Existing Mix with Mineral Gypsum (%)	Per Mt contribution cost	Mix with Min Gyp + Jarosite (%)	Per Mt contribution cost
1.	Clinker	1900	69	1311	69	1311
2.	Mineral Gypsum	1543	6	93	5	77
3.	Jarosite	94	0	0	1	1
4.	Dry Fly ash	1174	25	294	25	294
5.	Product mix cost			1697		1683
6.	Gain	Rs/MT				14.0
		Rs / Day	Cement production @ 3500 TPD			49000
		Savings Rs/Annum			1.79 Crores	
Product CaO			44.8		44.7	
Product SO3			2.33		2.2	

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Intangible Benefits

PLATINUM HEAVY DUTY CEMENT

Particulars	Alternative to Natural Red Ocher & Mineral Gypsum
People / Society Benefit	Avoids Land fill- prevents soil, land and groundwater
Moral / Motivation	Enhanced confidence to explore and use industrial waste in effective manner
Skill Upgradation	Lab scale trial and Plant scale trial provided opportunity to learn compliances of Pollution norms, BIS norms and all team members benefited.
Attitude Shift / Development	**Since Jarosite was a Hazardous material and industry generally avoids the use of such materials. We changed this perception and we set the benchmark for other industry to follow the same.** Further we are looking for replacement of other natural resources by industrial waste for Co-processing or to use in Cement.

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PLATINUM HEAVY DUTY CEMENT

Replication Potential of Project Within Sector

- ❑ **Use of Jarosite is started at our group company (JKLC - Sirohi Plant) and other companies of sector has also started use of Jarosite.**
- ❑ **Plant scale trial run was shared with the Group companies in various Technical Seminars.**
- ❑ **Generator Hindustan Zinc also conducted a workshop with Cement sector companies & demonstrated the use of Jarosite at Cement Plant.**
- ❑ **HZL, Jarosite generator also carried out complete study on the use of Jarosite in Cement as set Retarder at National Council of Cement & Building Materials.**

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PLATINUM HEAVY DUTY CEMENT

Achieving National Benchmarks/ Standard

- Meeting- Avg. National Benchmark for use of Gypsum consumption i.e 6.0 % per ton of Cement.
- Replacement of 1.0 % mineral gypsum by Jarosite will conserve at least 1.0 % Mineral gypsum which is depleting very fast.
- Use of Zinc Slag in the tune of 4- 4.5 %, will avoid land fill and help to improve the environment.

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PLATINUM HEAVY DUTY CEMENT

Priority Plan

- Zinc Slag & Jarosite are presently used for the replacement / part replacement of existing material ie. Red Ocher and Mineral Gypsum
- We have already started using the Zinc Slag since Oct-18 and Jarosite started since Jun-20.

We further look forward to explore more waste derived alternative materials to be used safely in our process/product.

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PLATINUM HEAVY DUTY CEMENT

SWOT : Major Learning From Project Implementation

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- Existing Adequate Process facility to directly use in trial
- Installed High Efficiency Pollution control equipment
- Existing Lab facilities to do the analysis and trials

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- Utilization in process is limited- due BIS restrictions- 1% Jarosite
- Suitable Cost-effective technology for moisture removal

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- Undergoing trials for use of Zinc Slag in Cement grinding
- Value Added construction material products with zinc slag like, paver blocks, etc
- Increasing utilization of Zinc Slag and Jarosite
- Sustainable business growth

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- Reduced market acceptance of cement due to lighter colour on increasing jarosite content in cement.
- Jarosite being acidic in nature, it may affect the cement setting properties
- Less utilization of waste like Jarosite and Zinc Slag to landfills will increase risks to Envt. pollution

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Environment Performance Evaluation

PLATINUM HEAVY DUTY

Particulars	Unit	2018-19	2019-20	2020-21
1. Management Performance Indicator of the Plant				
Environment Budget	Rs in Lakh	73.6	78.4	80.0
Environmental Performance Figure / Index	SPM (mg/Nm3)	15.11	13.78	9.71
	SO2(mg/Nm3)	14.0	13.14	12.3
	NOX (mg/Nm3)	414	518.14	395.06
	Water Positivity Index	1.47	2.11	1.70
	Use of Renewable Energy (% of total elect. energy)	37	40	47

2. Operational Performance Indicator

	Raw material used Kg/ MT	Power Consumption	Emission of Pollutants CO2/ year	Wastewater Discharge
Red Ocher	Before : 40 kg /MT After : 0 kg/MT	No Impact	Reduced by 1135 ton CO2/year (GHG Emission reduction due to transport & eliminate use of red ocher)	NIL - ZLD (No Impact)
Mineral Gypsum	Before : 60 kg /MT After : 50 kg/MT	No Impact	Reduced by 36.7 ton CO2/year (Due to transport)	NIL - ZLD (No Impact)

3. Environment Condition Indicator

By sustainable utilization of 10% of total jarosite waste generated from Hindustan Zinc Ltd., Udaipur unit, we have been able to reduce the environmental pollution load to the tune of 35-40 tons/day. Which was otherwise disposed at landfill.

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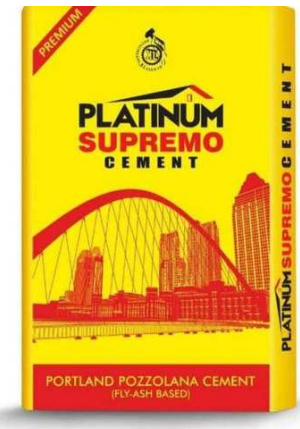
PLATINUM HEAVY DUTY CEMENT



THANK YOU

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