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Integrity of Old steel pipes

Ankleshwar – Valia Pipeline, Bharuch District, Gujarat

2nd Knowledge Sharing Workshop for CGD entities

14th February 2022

Ankleshwar-Valia Steel Pipeline

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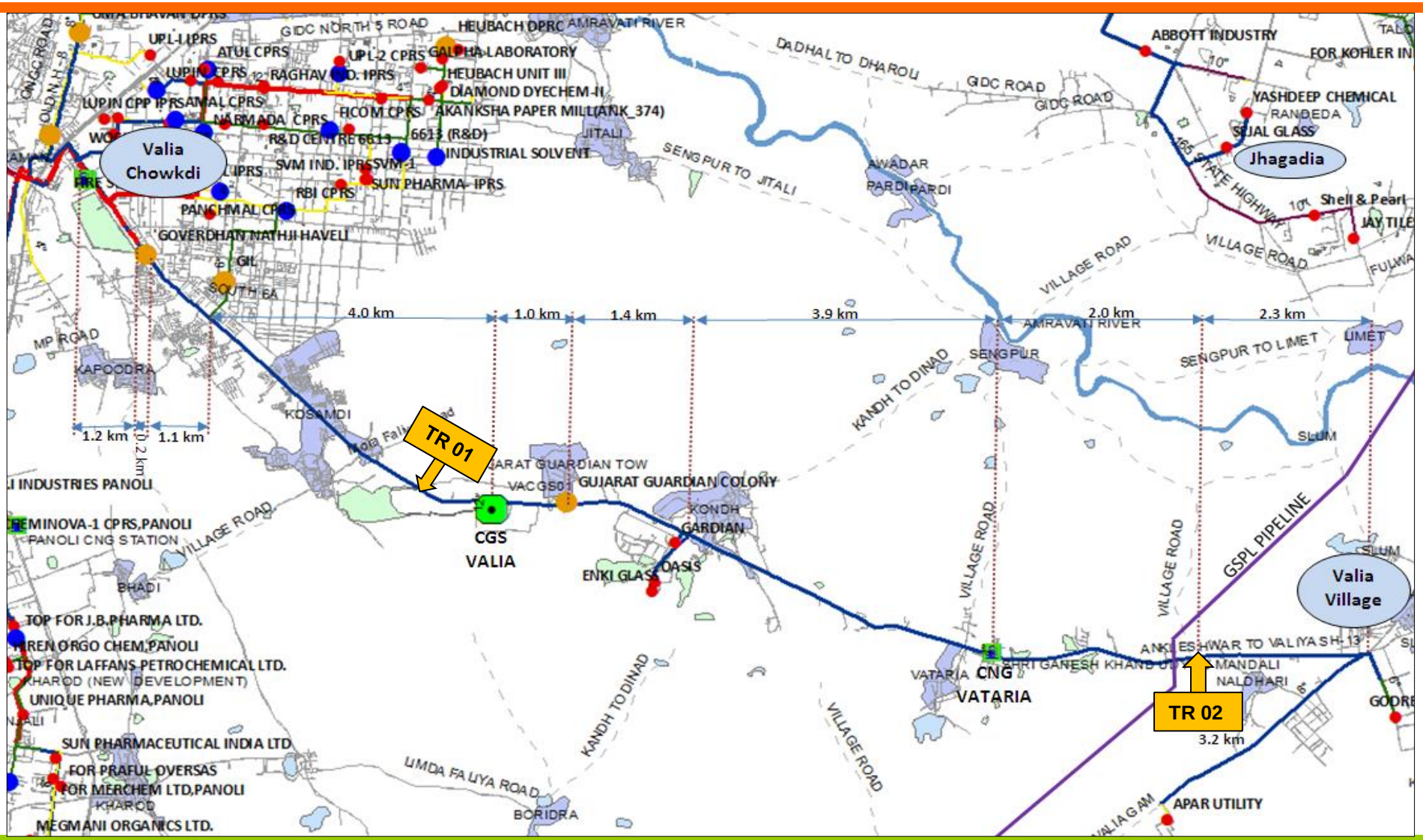

Ankleshwar-Valia Steel Pipeline

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Diameter, Length & Thickness	8.625” Diameter, 21200 meters long & 6.4 mm thick
Grade of Pipe of Pipeline	ERW, API 5L Gr. B
Type of External Coating	Field applied **coal tar coating**
Year of commissioning of pipeline	1991~1992
Product in the pipeline	Natural Gas
Operating pressure & temp	7 barg & 25 ^{O}C
Type of terrain	Black cotton soil, part of the pipeline has rocky terrain
Type of cathodic protection	ICCP comprises of two deep ground beds with 50V/50A TR units

Pipeline Assessment ageing 20 years

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CP monitoring reports and DCVG reports indicated degradation & disbondment of CTE coating at many locations along the pipeline. Thus, threat to the pipeline integrity and challenge for continuity of gas supply.

Indirect Assessment	
DCVG Survey	Various coating defects were identified
	Current Range was High of 50~40V/25~30 Amps.
	ON/OFF PSP was ranging -1.30v /**-0.70v**
Direct Assessment	
Bell Hole Inspection – (Digging)	CTE coating found brittle
	Hollow sound from CTE Coating
	Disbondment from bare steel pipe surface

Photographs of Pipeline coating defects

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 # Coaltar enamel coating was visually examined and was found to be brittle cum disbonded from Pipe Surface

Options for mitigations

Options evaluated	
Option 1	Complete rehabilitation – Recoating /Repair of total pipeline
Option 2	Replacement of total pipeline
Option 3	Partial replacement of the pipeline and partial recoating and repair of the pipeline
Option selected for implementation	
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Option 3 selected for implementation

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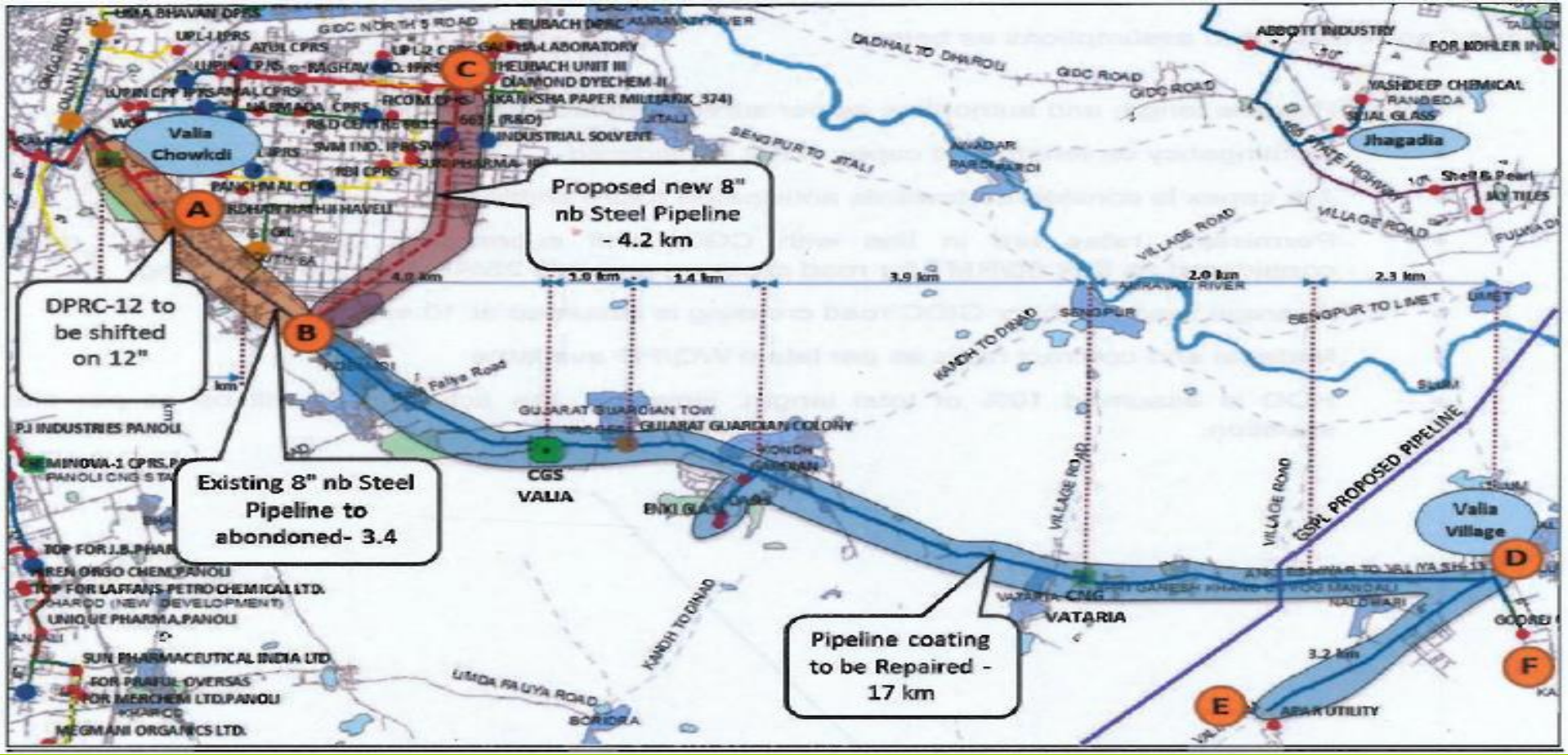
Option 3 i.e. Partial replacement of pipeline and partial coating refurbishment (8" Pipe Coating Refurbishment ~17 km (80%) and 8" Pipe section replacement ~4.20 km (20%))



Photos of Coating Refurbishment

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CP Protection of Pipeline - Before and After

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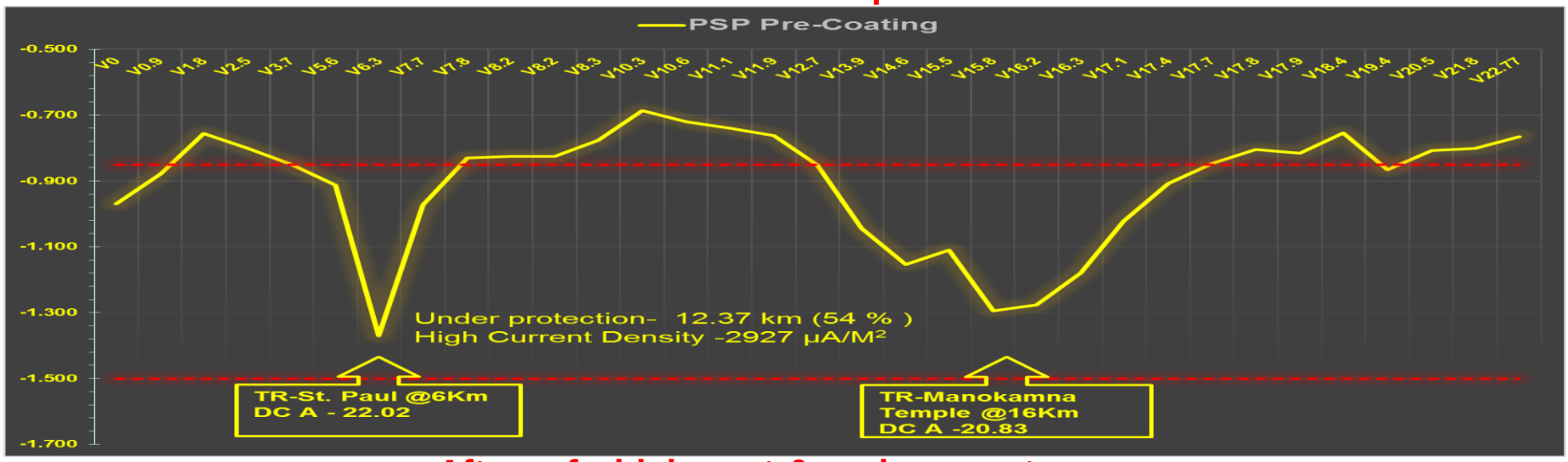
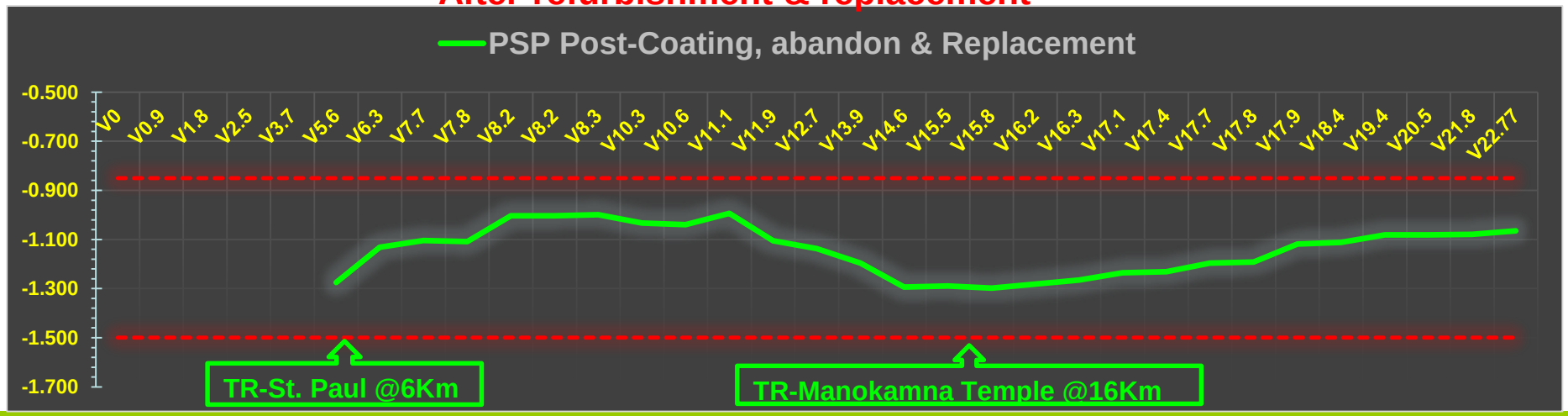
Before refurbishment & replacement



After refurbishment & replacement



CP protection achieved for 100% length

Probable causes for the Coating failure

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- CTE coating –Field applied considered during construction in early ‘90s
- Soil Conductivity- Black cotton soil, part of the pipeline has rocky terrain Coating capability of avoiding damage during the wet/dry cycling of black cotton clay soil.
- Industrial Chemical zone – polymers exposure may not shield the pipe from cathodic protection.
- Coating ageing- Life cycle ending

Way forward

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- Monitoring of CP adequacy according to design life cycle
- Implement CP Survey frequency based on reports – increase frequency near coating life cycle
- Adhere to Technological advancement in corrosion protection and monitoring
- Analyze the PSP monitoring reports with utmost care and immediate action to be taken in case of any abnormal readings

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Thanks....