ESSAR STEEL INDIA LIMITED, PARADEEP

Welcome to the presentation on the transformer fire incident that took place on 25.10.2012 at PELLET PLANT

ABOUT AUTHOR(S)

Presented by

- Dr.K.K.Panda, Head-HSE , Odisha Assets and
- Sri Ashutosh Panda, Manager (E & I), Pellet Plant, Paradeep

INTRODUCTION

- Essar Steel India Ltd. got its 6MTPA Pellet Plant, Paradeep commissioned on 01.04,2012
- Power Requirement – 30 MW
- Power supply is from OPTCL , Paradeepgarh GRID
- It has 02 Nos. of 40/50MVA(ONAN/ONAF),220/11KV Step Down Transformers
- The Transformer contains 65000 Litres of Transformer Oil
- For protection against Fire, a CTR make Nitrogen Injection System is in place

CHRONOLOGY OF FIRE INCIDENT

- On 25.10.2012, the oil filled 40/50 MVA transformer no. 1 was operating with a load of 15 MW
- At 15:35 hrs, a sound was heard in switchyard with power failure.
- At around 15:38 hrs, smoke was seen coming out of Y Phase EHV bushing of the transformer followed by Fire
- At around 15:40 hrs, the long rod insulator above Y phase bushing caught fire and conductor got snapped.

CHRONOLOGY OF FIRE INCIDENT

- OPTCL was informed about the incident at 15:40 hrs and was requested for switching OFF the 220 KV power supply
- Clearance from OPTCL was received at 16:00 hrs
- The fire incident was communicated to the neighbouring industries like IFFCO, PPL, IOCL and Kujang fire station without any delay.
- The fire tender of IFFCO arrived at 16:00 hrs and subsequently fire tenders of PPL, Kujanga fire station and IOCL arrived at site.
- Fire was completely extinguished at 19:00 hrs

SOME PHOTOGRAPHS

SOME PHOTOGRAPHS

SOME PHOTOGRAPHS

SOME PHOTOGRAPHS

SOME PHOTOGRAPHS

CONSEQUENTIAL DAMAGES

ESSAR

- All the associated power and control cables
- Surge arresters – 03 Nos
- Bus Duct – 01 No.
- Neutral Grounding Resister (NGR)– 1 No.
- Snapping of Transformer Gantry Beam
- Long Rod Insulators(LRIs) – 03 Nos

N.B : due to the presence of Fire Walls between both the transformers and as well as between the transformer and ECR, extensive damage could be avoided.

FIRE WALLS AROUND TRANSFORMERS

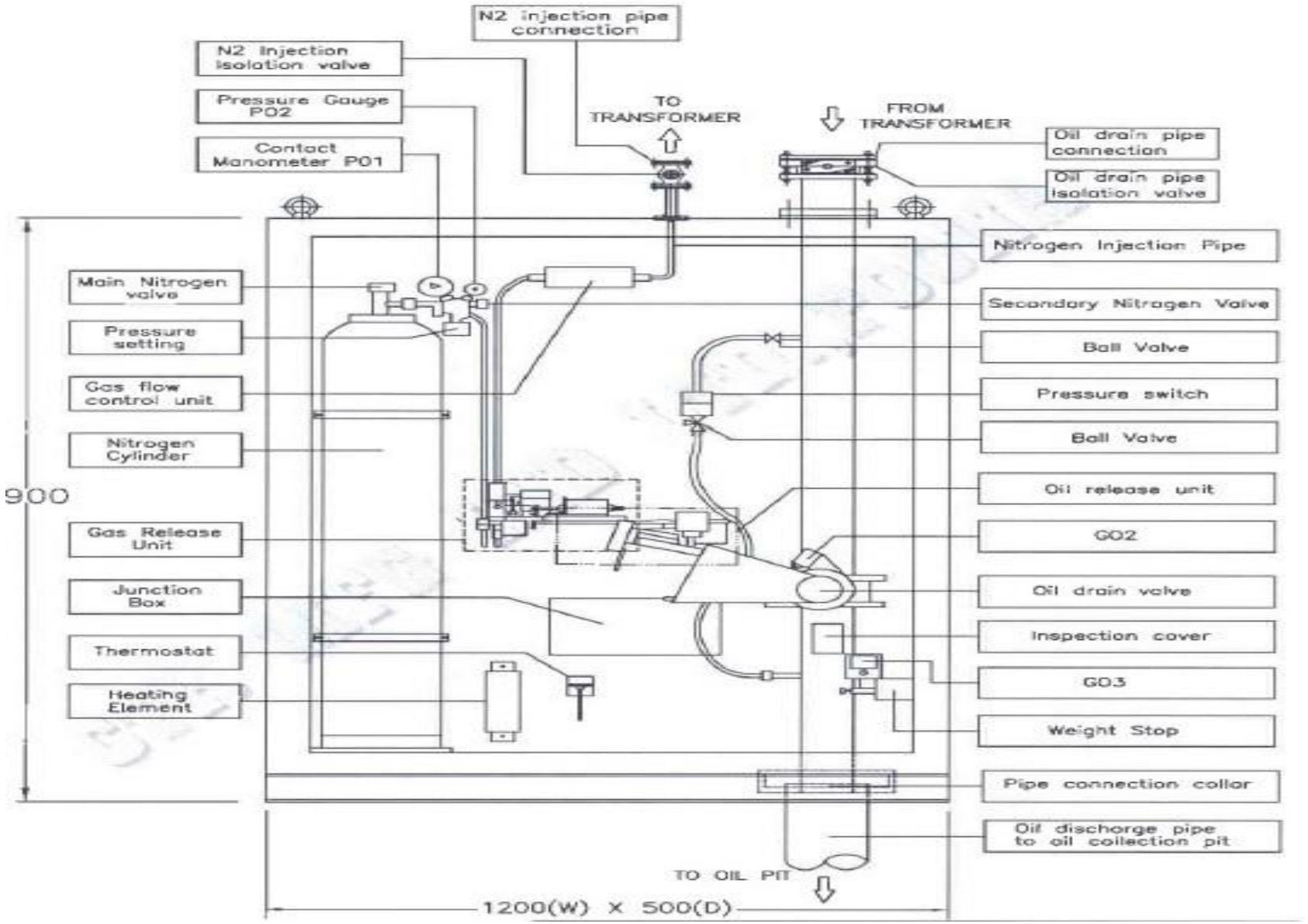
FIRE WALLS AROUND TRANSFORMERS

PROBABLE CAUSES OF FIRE

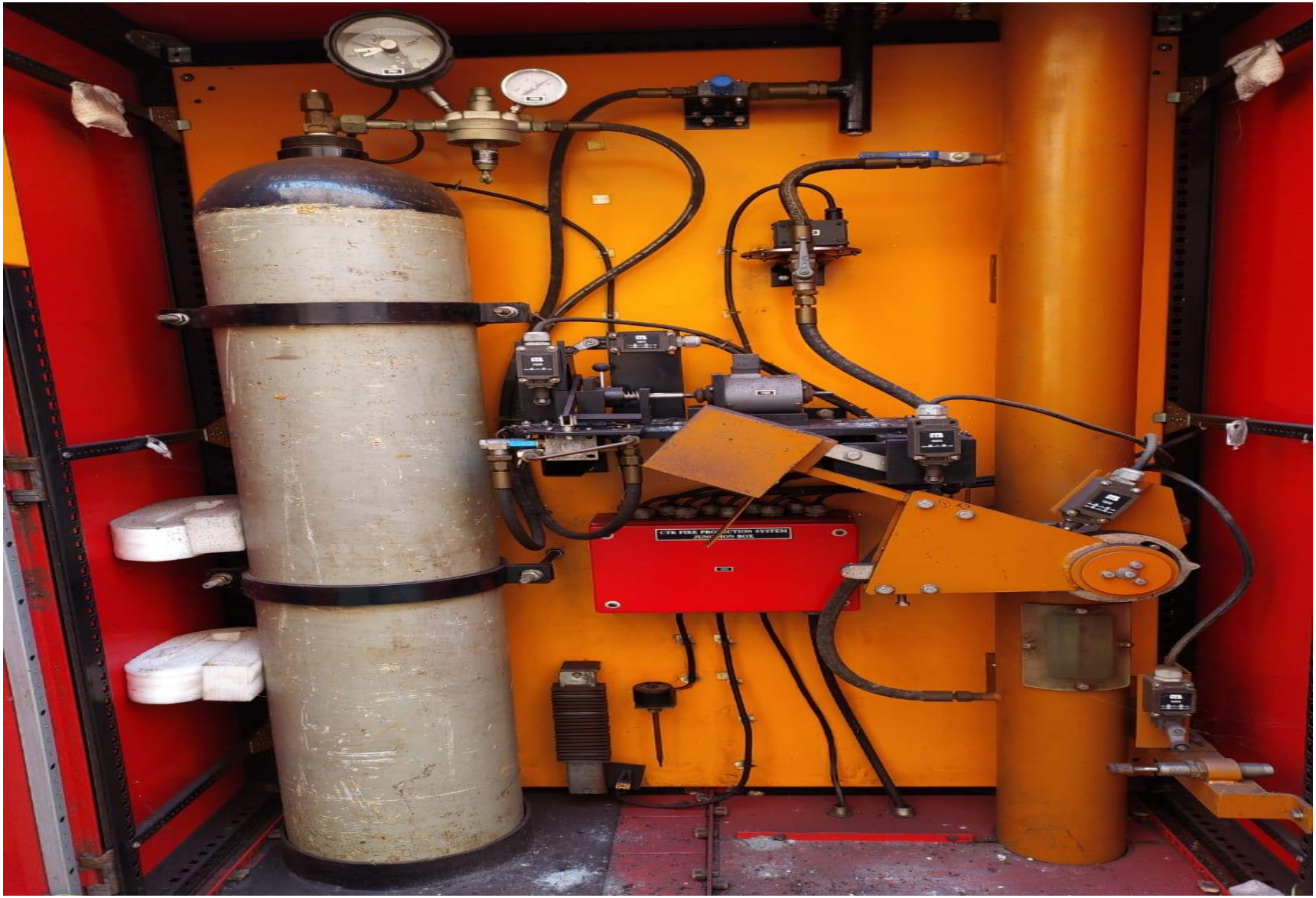
ESSAR

- The supply voltage from OPTCL's GRID at times was exceeding the rated voltage of 220KV by more than 10% (maximum voltage supplied by OPTCL was recorded to be 250KV)
- Failure of Y-phase EHV bushing of the transformer
- Pre-mature failure of winding of the transformer
- Failure of Nitrogen Injection System as it was in by-pass mode.

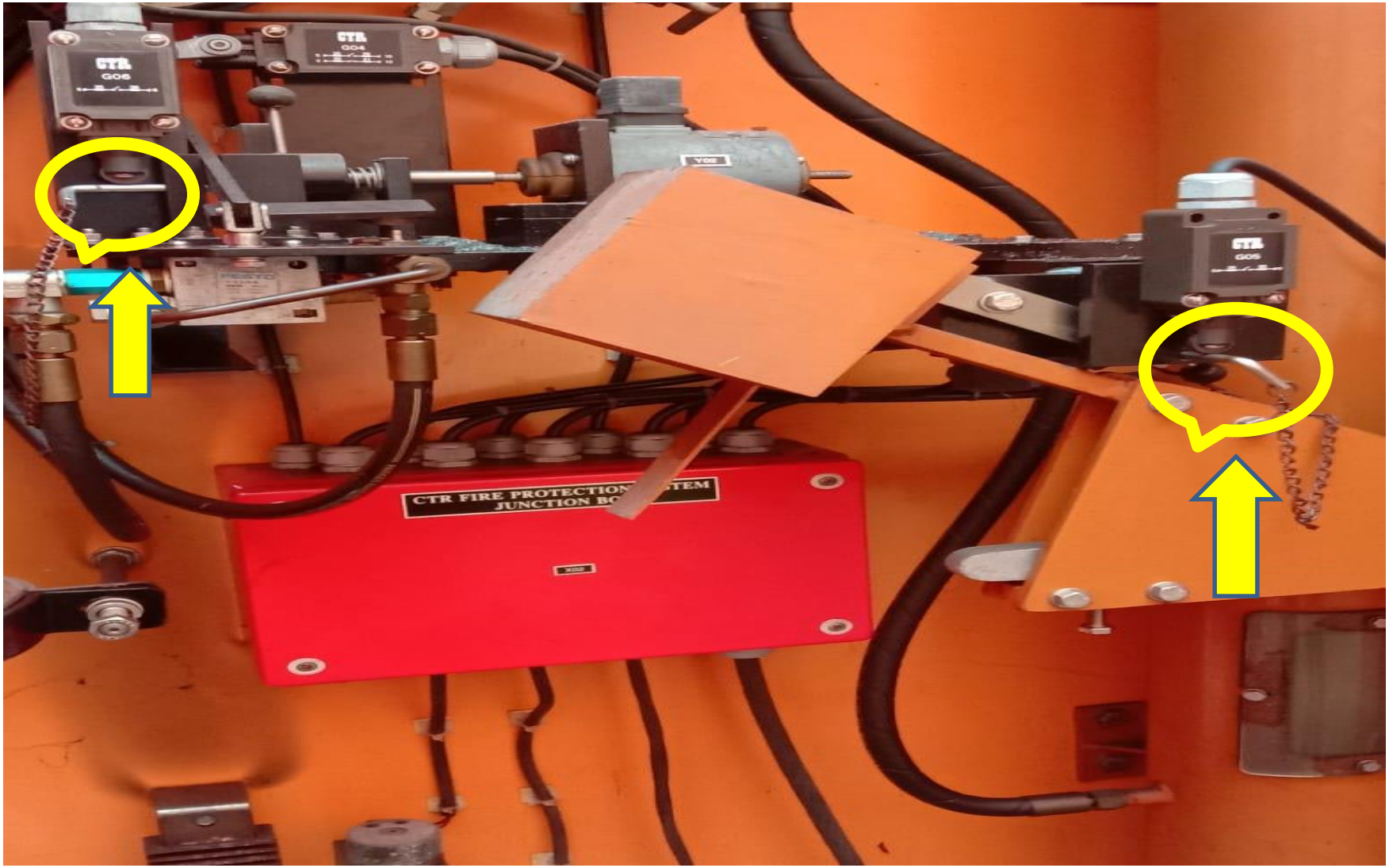
NITROGEN INJECTION SYSTEM



NITROGEN INJECTION SYSTEM



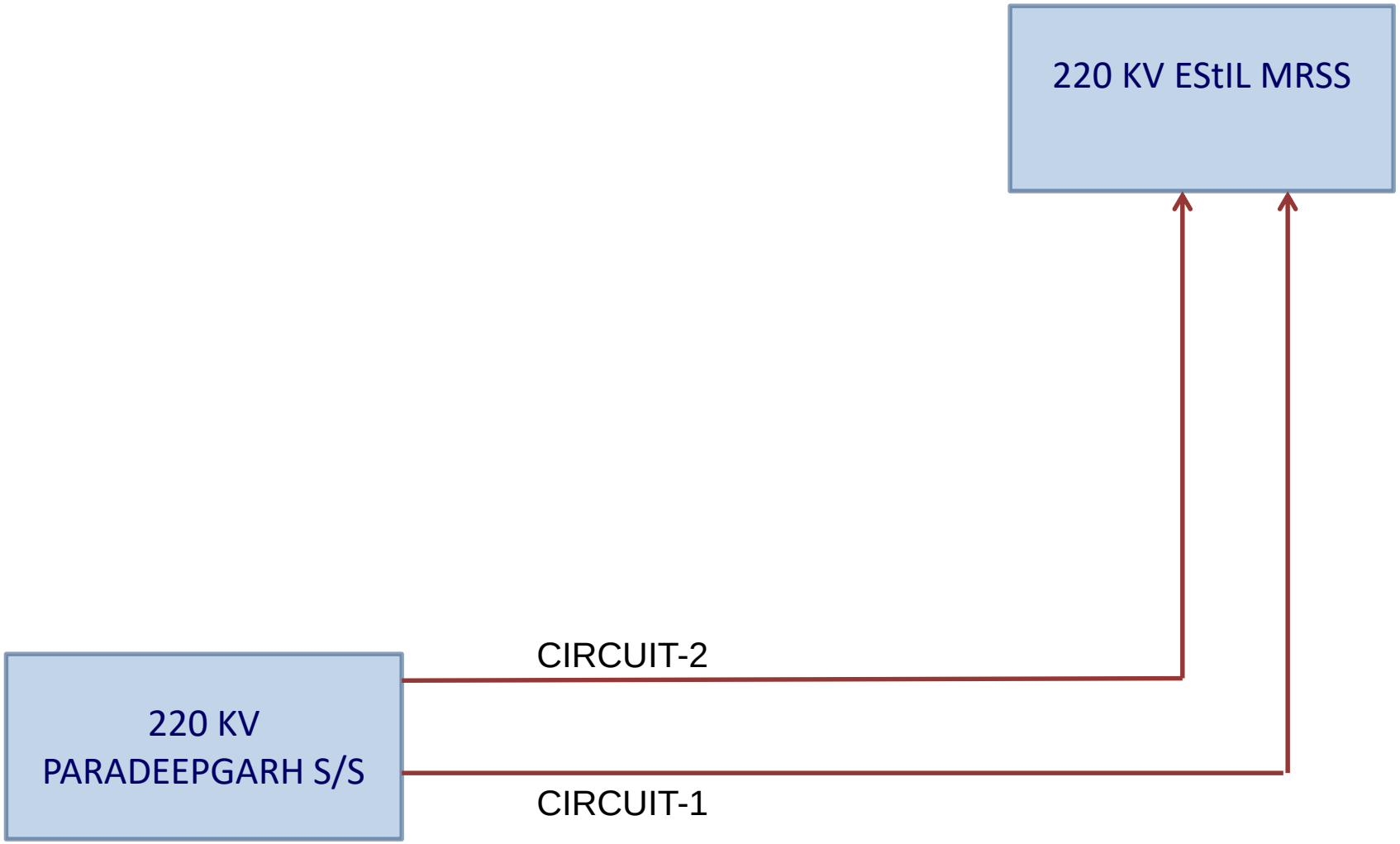
LOCKING PINS OF NITROGEN INJECTION AND OIL DRAINAGE ARE IN ENGAGED CONDITION



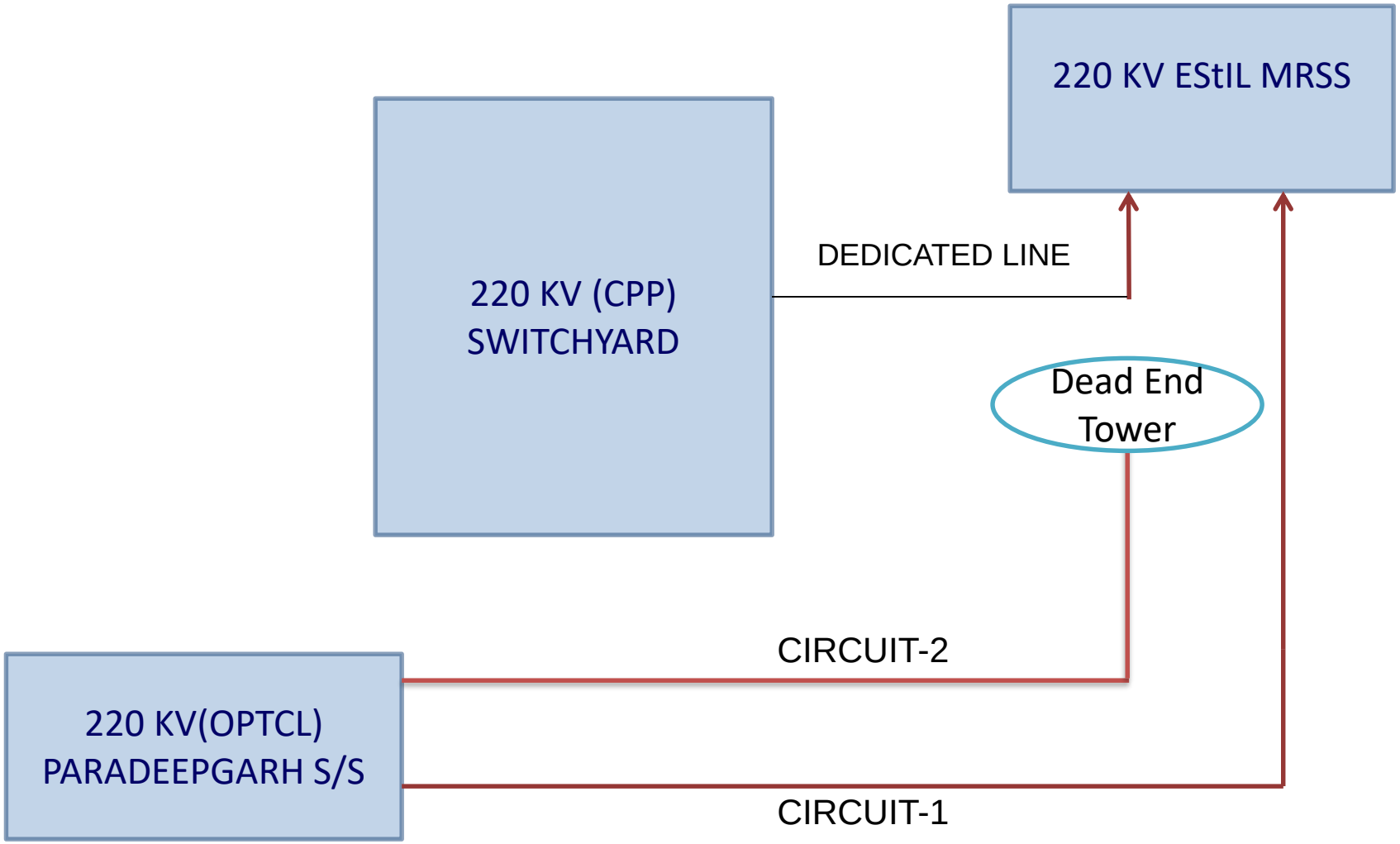
CORRECTIVE ACTION TAKEN

- Isolating power dips and supply of excess voltage by tripping the OPTCL line breaker and running the plant in islanding mode with our 2x30 MW Captive Power Plant located adjacent to our Plant
- Putting the Nitrogen Injection System in Active Mode and not in by-pass mode.

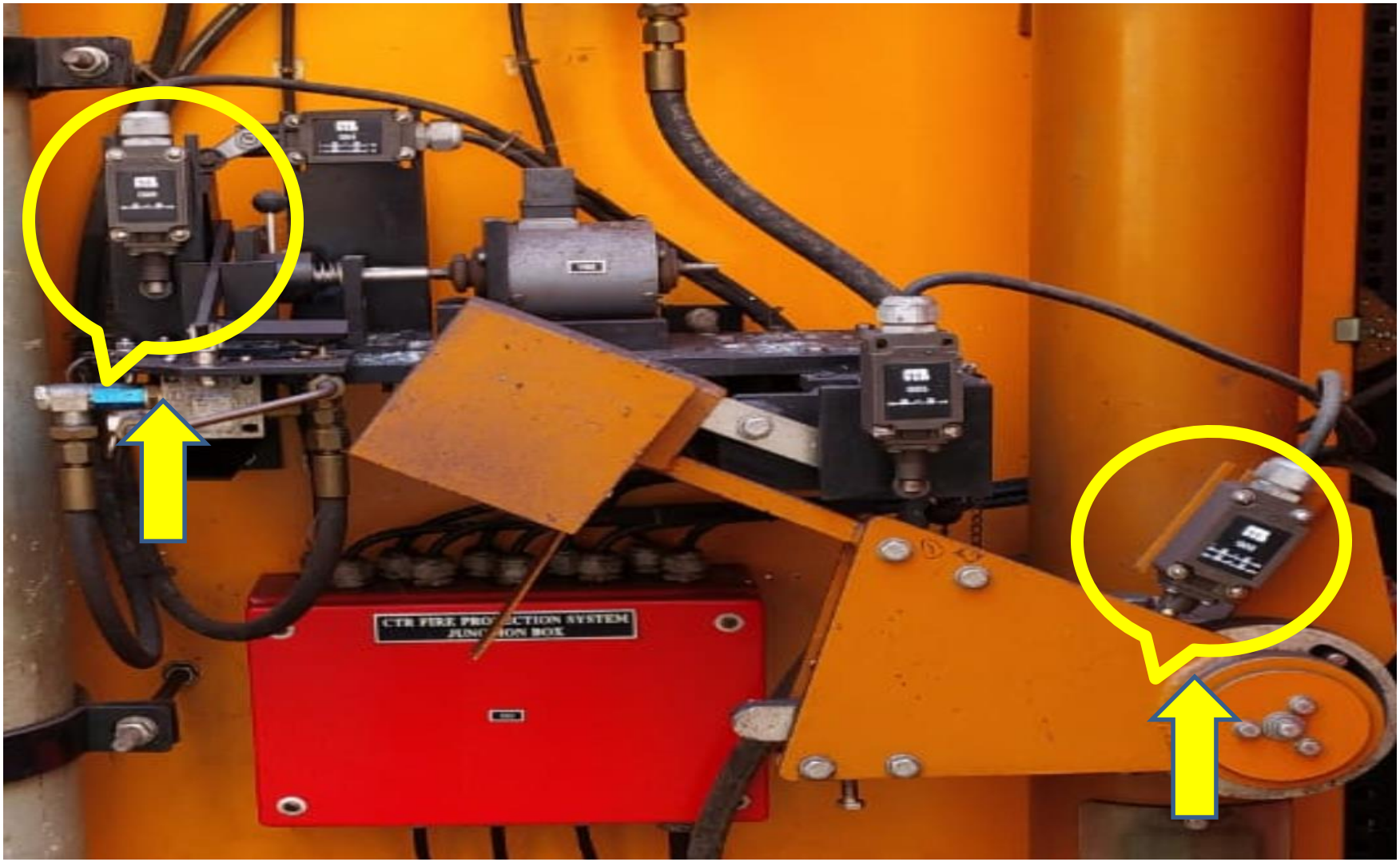
OLD SCENARIO WITHOUT ISLANDING SCHEME



PRESENT SCENARIO WITH ISLANDING SCHEME



NITROGEN INJECTION SYSTEM IN ACTIVE MODE



LEARNING FROM FAILURE

ESSAR

- Checking of Nitrogen Injection System as per the OEM's instructions on a daily basis
- Testing of all parameters of a Power Transformer as per the OEM's operating manual

OTHER ACTIONS TAKEN

- As a means of passive fire protection, Stanvac make fire barrier/stops have been provided at MRSS Cable Cellar and also in the Cable Cellar of Balling Building in order to contain the fire if any to MRSS and Balling Building only and not spreading beyond.
- Conducting of both internal as well as external Electrical Safety Audit(M/s RAM Safety Consultants of Hyderabad conducted external safety audit in 2015 and recommendations thereof have been complied with)
- Periodic inspection of transformer HV bushings through Thermal Imaging Camera (FLIR Make)
- Procurement of a large Foam cum Water Type Fire Tender
- Commissioning of Fire Detection System at MRSS's Electrical Control Room as well as Cable Cellar by M/s Honeywell.

FIRE BARRIER AT MRSS ECR CABLE CELLAR EXIT POINT

FIRE BARRIER AT BALLING BUILDING ECR CABLE CELLAR EXIT POINT

LARGE FIRE TENDER

Way Forward

- Whenever locking pin is engaged then an alarm will be displayed in the Control Panel
- Fire Barriers will be installed in other ECR

THANKS FOR THE PATIENT HEARING