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HYDRO TEST OF PIPE SECTION IN FIELD
GENERAL SOP

Prepared by:

Checked by:

Reviewed by:

Approved by:

CEPL(S&E), PHQ

HEAD (M&S), PHQ

GM (PLS), PHQ

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**A. JOB TITLE:**
Hydro test of Pipe section in Field

**B. APPLICABILITY AND SCOPE:**

**C. TOOLS & TACKLES REQUIRED:**
1. Shovels
2. Grub Hoe/ Digging Hoe
3. Welding machine
4. Lifting machine(Crane)
5. Required tools to carry out the prescribed job.

**D. PERSONAL PROTECTIVE EQUIPMENT (PPE) TO BE USED:**
For digging the trench, following safety gears are required.
(i) Safety shoes
(ii) Helmet.
Along with these, the following PPEs will be required for carrying out welding operations:
(i) Safety Goggles
(ii) Safety Gloves

**E. WORK TEAM:**
The work force will comprise of skilled workers employed by the Contractor for digging, welding and other operations and will be constantly monitored by the Site Engineer.

**F. HAZARD INVOLVED & RISK ANALYSIS:**
The subject job has the potential to expose workers to following common types of hazards:
— Slippery or uneven ground.
— Collapsing of trench.
— Object falling from height.
— Breakage of lifting belt of crane.
— Radiation from radiography testing for weld inspection.
— Leakage from welded joints or due to bursting of pipes.
— Inadequate space to work
— Trappings, entanglements and other hazards.
— Lack of communication or management control.

Group Risk Assessment for above hazards are detailed in sheet OIP 301 in Annexure-I.
Each work site has some individual hazard characteristics. These hazards are specifically taken care of by the operation team and addressed in Tool Box Meeting/ Pit Level Safety Meeting.

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G. STANDARD OPERATING PROCEDURE:

Tool Box Meeting:
1. Tool Box meeting (Pit level) should be held on regular basis.
2. Team members should be well conversant with the assigned job.
3. “Job safety analysis” should be done and discussed on day today basis in the tool box meetings & recorded the pertinent points.
4. Any ‘near miss’ to be discussed and recorded.
5. Shift in -charge should not allow his team members work without PPEs.
6. Competent person shall be competent enough to carry out the assigned job.
7. Workman/ contractor personnel shall be made well aware of the all risk involvement in the job.
8. All safety precautionary steps shall be discussed.
9. All the mobiles shall be deposited at designated place.
10. Work permit to be issued by competent person for carrying out the specified job.

H. SEQUENCE OF OPERATIONS FOR HYDRO TESTING OF A PIPE SECTION IN FIELD:

a) Trenching and making test pit:

1. Preliminary work and safety measures:
The steps to be followed for carrying out the preliminary work involved:
1. Study the stability of the Soil.
2. Study the area of excavation for any affect on adjoining buildings, structures or roadways.
3. Study the presence of underground pipes, cable conductors etc.
4. Use Caution board at convenient places

2. Excavation of Trench and related safety measures:
1. Excavate the trench with Trapezoidal cross section to the required length and depth.
2. Two (2) numbers of Escape routes on either side shall be made available.
3. Provide trench protection to prevent cave in as and when necessary.
4. Dump the excavated earth away from the Trench (More than the Depth of the trench or 1m whichever is greater from the edge of the trench).
5. Water should be pumped out, if water accumulates in the trench.
6. Steps to be used for ascending & descending to the trench.
7. Vehicles should not be operated/parked close to the excavated area(Maintain at least 2m distance from edge of excavation).
8. Barricade the excavated area with two entries.

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For Depth more than 1.5 m depth:- Safe angle of repose while excavating trenches exceeding 1.5 m depth unto 3.0 m should be maintained. Based on site conditions, proper slope usually 45 deg and suitable bench of 0.5 m width at every 1.5 m depth of excavation in all soils except hard rock are to be provided. Proper shoring and strutting to be also ensured to prevent cave-in or slides.

b) Fitting of header & end cap to pipe section:

1. Preliminary work and safety measures:
   1. The welder qualification is to be checked.
   2. Examining of the pipe for any rupture or damage.
   3. Ensure all fittings are of the same class.
   4. Presence of adequate number of fire extinguishers and positioning them strategically around the job site.
   5. First aid kit should be in readiness and shall be available at site.
   6. Check that the welding machine is grounded.
   7. Ensure safe distance of working machineries from the work site( To be placed on the windward direction if possible).

2. Fitting of header and related safety measures:
   1. The inside of the pipe to be cleaned thoroughly.
   2. The face of the pipe is to be prepared by grinding.
   3. Welding f end cap in one end & flange in the other end.
   4. Fitting of tested header with end cap and flange on either ends & necessary fittings.
   5. Radiography of all welding joints including header as per API 1104.
   6. Establish safe distance for radiography inspection and put warning sign board.

c) Placing of Pipe in ditch:

1. Preliminary work and safety measures:
   1. The lifting belt of the crane is to be properly examined to detect any tear, deformation and other defects.
   2. Caution sign board is to be displayed.
   3. Area to be cordoned off.

2. Placement of pipe in ditch:
   1. Place the pipe section fitted with end cap and header in the ditch with the help of crane.
   2. No manpower, machine, material within the swinging radius of pipe length.

d) Hydraulic testing of the new section:

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1. Preliminary work and safety measure:
   1. Place the test section in trench
   2. Anchor the pipe section and fill up the pipe with water.
   3. Area to be cordoned off and display caution sign board.
   4. Place pressure pump above trench at least 5m away from the pipe section being tested.
   5. Placement of Pump and operator should be at least 5m away from the flanged joint of header & pipe section and opposite side of header along the pipe axis.
   6. Use Calibrated pressure gauge (two numbers in line) and should be fitted in such a way so that it is easily visible from the location of pressurization pump. Check all fittings on pipe, flexible hoses of pressure pump. Flexible hoses shall be properly anchored.

2. Hydraulic testing procedure:
   1. Hydraulic Test pressure shall be determined for the intended purpose conforming to requirements of ANSI B 31.4 (latest edition).
   2. Vents should be provided to purge out air while the system is being filled with water.
   3. The pressurization shall be performed at a moderate and constant rate not exceeding 2 bar/min.
   4. Pressurization to 50% of test pressure, hold pressure for 1 hour and release pressure to 0(gauge).
   5. Pressurize to 75% of test pressure, hold pressure for 1 hour release pressure to 0(gauge).
   6. After desired test pressure is attained hold it for a period as per requirement.
   7. After completion of the testing period, release the pressure slowly by partially opening the filling valve.

Note : Detail Procedure :

General :

After the stinging & welding operation has been completed, hydrostatic test and gauging shall be performed on the entire length of the pipeline. Hydrostatic test shall commence only after completion of all mechanical works, i.e. after all welds have been accepted. After ensuring that all works are complete in all respect, obtain prior written approval from competent authority for hydrostatic testing. The pipeline shall be tested in accordance with the requirements of ANSI B31.4 (latest edition).

The test medium shall be neutral and fresh water arranged by the contractor. The water to be used shall not be contaminated and free from sand or silt and be filtered. The test water should be tested at laboratory. All temporary piping(s), which may be necessary to connect from source of water to its pumps and manifolds/tankages shall be arranged and installed.

Aluminium gauging plate having diameter equal to 95% of the internal diameter of the pipe to be arranged and install all temporary scraper launcher / receivers and other piping, materials and consumables required for the purpose.

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Before filling operation the pipeline shall be cleaned by air driven ‘pigs’ having spring loaded brushes to remove all mill scale rust/sand from inside of pipe sections. The finishing touch shall be executed with pigs provided with jet holes or nozzles for air to keep the internal dust in turbulence ahead of the pigs. The number of pig runs shall depend upon the cleaning results and shall be determined ‘in situ’ by the engineer in charge.

After cleaning the pipeline by using ‘air’ and accepted, the whole length of pipeline shall be filled with water. A pig fitted with aluminium gauging plate of approved design to prove the internal diameter of the pipe string shall be furnished and propelled through the line ahead of the water in order to purge out the air. Vents should be provided at desired points in the pipeline segment to purge out air while the system is being filled with water. When the line is completely filled & purged out of air, test pressure shall be applied which produces a hoop stress equal to 90% of the minimum yield strength at the section having thinner most wall thickness or as directed by the Engineer-in-charge.

The pressurization shall be performed in the presence of the Engineer-in-charge at a moderate and constant rate not exceeding 2 bar/min. Volume required to reach the test pressure shall be recorded periodically throughout the pressurization as follows:

- Each 5 bar increments up to 80% of test pressure as recorded by the dead weight tester;
- Each 2 bar increment between 80% of 90% of test pressure as recorded by the dead weight tester;
- Each 0.2 bar increments between 90% of the test pressure to full test pressure as recorded by the dead weight tester.

The pressurization ‘cycle’ shall follow the sequence as under:

- Pressurization to 50% of test pressure, hold pressure for 1 hour.
- Release pressure to 0(gauge).
- Pressurize to 75% of test pressure, hold pressure for 1 hour.
- Release pressure to 0(gauge).

In case, during the hold pressure periods indicated above, a decrease in pressure is observed, the above operations shall not be repeated more than twice after which the line shall not be considered capable of test, until the the cause for the lack of water tightness is isolated and eliminated.

Upon bringing a hydrostatic test section to the full specified test pressure, a stabilization period of 2 to 4 hours may be required before full stabilization. During the period, the pressure shall be maintained either by bleeding off or by adding water.
After stabilization, the test pressure shall be re-established and the line completely isolated for the 24 hours test. If pressure maintained during the stabilization period are acceptable to the Engineer-in-charge, the stabilization period may become part of the 24 hours test.

During the testing period the following measurements shall be recorded/reported;

- Every one hour pressure measurements from dead weight testers.
- Every two hours the ambient temperature and the pipe temperature at the thermocouples.

The hydrostatic test shall be considered as positive if pressure remains constant throughout the test duration except for change due to temperature effects.

The charts from the pressure recording instruments during the pressurization and testing operations shall be preserved as official records of the Test. The charts shall be properly identified and signed by the engineer & contractor (if execution by contract) as being true records of the test. All ‘failures’ shall be numerically and chronologically numbered and reported with appropriate description and date on proper ‘Test Failure Report’ forms. ‘Failures’ on the line resulting from loss of pressure shall be located and repaired. After leaks or failures have been repaired as disclosed by the pressure test. The test shall be repeated until the specified test pressure can be satisfactorily maintained.

During the period of hydrostatic testing, ‘Safety’ sign board in English & local language shall be displayed to ‘warn’ the people about the testing operation.

All pigs used shall embody an aluminium gauging plate of approved design having a diameter of 95% of internal diameter of the section having heaviest wall thickness in the section. Free passage of pigs must be ensured.

A responsible engineer/supervisor shall be nominated for execution of hydrostatic testing. He shall ensure that all personnel working on the hydrostatic testing spread are fully aware of their individual duties.

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HYDRO TEST OF PIPE SECTION IN PIPELINE MAINTENANCE YARD
GENERAL SOP

Prepared by:

Checked by:

Reviewed by:

Approved by:

CEPL(S&E), PHQ

HEAD (M&S), PHQ

GM (PLS), PHQ

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A. **JOB TITLE:**
Hydro test of Pipe section in Pipeline maintenance yard.

B. **APPLICABILITY AND SCOPE:**

C. **TOOLS & TACKLES REQUIRED:**
1. Shovels
2. Grub Hoe/ Digging Hoe
3. Welding machine
4. Lifting machine(Crane)
5. Required tools to carry out the prescribed job.

D. **PERSONAL PROTECTIVE EQUIPMENT (PPE) TO BE USED:**
For digging the trench, following safety gears are required.
1. Safety shoes
2. Helmet.
Along with these, the following PPEs will be required for carrying out welding operations:
1. Safety Goggles
2. Safety Gloves

E. **WORK TEAM:**
The work force will comprise of skilled workers employed by the Contractor for digging, welding and other operations and will be constantly monitored by the Site Engineer.

F. **HAZARD INVOLVED & RISK ANALYSIS:**
The subject job has the potential to expose workers to following common types of hazards:

- Slippery or uneven ground.
- Collapsing of trench.
- Object falling from height.
- Breakage of lifting belt of crane.
- Radiation from radiography testing for weld inspection.
- Leakage from welded joints or due to bursting of pipes.
- Inadequate space to work
- Trappings, entanglements and other hazards.
- Lack of communication or management control.

Group Risk Assessment for above hazards are detailed in sheet OIP 301 in Annexure-I. Each work site has some individual hazard characteristics. These hazards are specifically taken care of by the operation team and addressed in Tool Box Meeting/ Pit Level Safety Meeting.

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G. STANDARD OPERATING PROCEDURE:

Tool Box Meeting:

1. Tool Box meeting (Pit level) should be held on regular basis.
2. Team members should be well conversant with the assigned job.
3. “Job safety analysis” should be done and discussed on day today basis in the tool box meetings & recorded the pertinent points.
4. Any ‘near miss’ to be discussed and recorded.
5. Shift in -charge should not allow his team members work without PPEs.
6. Competent person shall be competent enough to carry out the assigned job.
7. Workman/contractor personnel shall be made well aware of the all risk involvement in the job.
8. All safety precautionary steps shall be discussed.
9. All the mobiles shall be deposited at designated place.
10. Work permit to be issued by competent person for carrying out the specified job.

H. SEQUENCE OF OPERATIONS FOR HYDRO TESTING OF A PIPE SECTION IN PIPELINE MAINTENANCE YARD:

a) Trenching and making test pit:

1. Preliminary work and safety measures:
   The steps to be followed for carrying out the preliminary work involved:
   1. Study the stability of the Soil.
   2. Study the area of excavation for any affect on adjoining buildings, structures or roadways.
   3. Study the presence of underground pipes, cable conductors etc.
   4. Use Caution board at convenient places

2. Excavation of Trench and related safety measures:
   1. Excavate the trench with Trapezoidal cross section to the required length and depth.
   2. Two (2) numbers of Escape routes on either side shall be made available.
   3. Provide trench protection to prevent cave in as and when necessary.
   4. Dump the excavated earth away from the Trench (More than the Depth of the trench or 1m whichever is greater from the edge of the trench).
   5. Water should be pumped out, if water accumulates in the trench.
   6. Steps to be used for ascending & descending to the trench.
   7. Vehicles should not be operated/parked close to the excavated area(Maintain at least 2m distance from edge of excavation).
   8. Barricade the excavated area with two entries.
For Depth more than 1.5 m depth: Safe angle of repose while excavating trenches exceeding 1.5 m depth unto 3.0 m should be maintained. Based on site conditions, proper slope usually 45 deg and suitable bench of 0.5 m width at every 1.5 m depth of excavation in all soils except hard rock are to be provided. Proper shoring and strutting to be also ensured to prevent cave-in or slides.

b) Fitting of header & end cap to pipe section:

1. Preliminary work and safety measures:
   1. The welder qualification is to be checked.
   2. Examining of the pipe for any rupture or damage.
   3. Ensure all fittings are of the same class.
   4. Presence of adequate number of fire extinguishers and positioning them strategically around the job site.
   5. First aid kit should be in readiness and shall be available at site.
   6. Check that the welding machine is grounded.
   7. Ensure safe distance of working machineries from the work site (To be placed on the windward direction if possible).

2. Fitting of header and related safety measures:
   1. The inside of the pipe to be cleaned thoroughly.
   2. The face of the pipe is to be prepared by grinding.
   3. Welding f end cap in one end & flange in the other end.
   4. Fitting of tested header with end cap and flange on either ends & necessary fittings.
   5. Radiography of all welding joints including header as per API 1104.
   6. Establish safe distance for radiography inspection and put warning sign board.

c) Placing of Pipe in ditch:

1. Preliminary work and safety measures:
   1. The lifting belt of the crane is to be properly examined to detect any tear, deformation and other defects.
   2. Caution sign board is to be displayed.
   3. Area to be cordoned off.

2. Placement of pipe in ditch:
   1. Place the pipe section fitted with end cap and header in the ditch with the help of crane.
   2. No manpower, machine, material within the swinging radius of pipe length.

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e) Hydraulic testing of the new section:

3. Preliminary work and safety measure:
   1. Place the test section in trench
   2. Anchor the pipe section and fill up the pipe with water.
   3. Area to be cordoned off and display caution sign board.
   4. Place pressure pump above trench at least 5m away from the pipe section being tested.
   5. Placement of Pump and operator should be at least 5m away from the flanged joint of header & pipe section and opposite side of header along the pipe axis.
   6. Use Calibrated pressure gauge (two numbers in line) and should be fitted in such a way so that it is easily visible from the location of pressurization pump. Check all fittings on pipe, flexible hoses of pressure pump. Flexible hoses shall be properly anchored.

4. Hydraulic testing procedure:
   1. Hydraulic Test pressure shall be determined for the intended purpose conforming to requirements of ANSI B 31.4 (latest edition).
   2. Vents should be provided to purge out air while the system is being filled with water. When the line is completely filled & purged out of air, test pressure shall be applied.
   3. The pressurization shall be performed at a moderate and constant rate not exceeding 2 bar/min.
   4. Volume required to reach the test pressure shall be recorded periodically throughout the pressurization.
   5. Pressurization to 50% of test pressure, hold pressure for 1 hour and release pressure to 0(gauge).
   6. Pressurize to 75% of test pressure, hold pressure for 1 hour release pressure to 0(gauge).
   7. In case, during the hold pressure periods indicated above, a decrease in pressure is observed, the above operations shall not be repeated more than twice after which the line shall not be considered capable of test, until isolated and eliminated the cause for the lack of water tightness.
   8. After desired test pressure is attained hold it for a period as per requirement.
   9. After completion of the testing period, release the pressure slowly by partially opening the filling valve.
   10. Site clearance after completion of testing.

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SOP No: PL.ML039.PLM.02.I
Approval date: Dec’2012
Rev. No: Initial.
PIPELINE MAINTENANCE SECTION

PIPELINE MAINTENANCE JOB ON RAILWAY BRIDGE

Prepared by:

Checked by:

Reviewed by:

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**A. JOB TITLE:**
Pipeline maintenance job on railway bridge.

**B. APPLICABILITY AND SCOPE:**

**C. TOOLS & TACKLES REQUIRED:**
1. Pipeline maintenance tool box
2. Coffing hoists
3. Required tools to carry out the prescribed job.

**D. PERSONAL PROTECTIVE EQUIPMENT (PPE) TO BE USED:**
For carrying out pipeline maintenance on railway bridge, following safety gears are required.
1. Safety shoes
2. Helmet
3. Safety Harness
4. Safety Goggles

**E. WORK TEAM:**
The work force will comprise of skilled workers employed by the Contractor for various pipeline maintenance jobs on railway bridge and will be constantly monitored by the Site Engineer.

**F. HAZARD INVOLVED & RISK ANALYSIS:**
The subject job has the potential to expose workers to following common types of hazards:
- Person may fall from bridge by slippage, vibration of train or due to failure of coffing hoist.
- Dismantled clamps or hand tools may hit the person on ground.
- Rust/foreign particle may fall on eye.
- Chances of skin injury due to contact with epoxy paint.
- Movement of train may lead to fatal accident.
- Slippery pipe surface due to moisture, train lube oil on the pipe surface.
- Inadequate space to work
- Trappings, entanglements and other hazards.
- Lack of communication or management control.

Group Risk Assessment for above hazards are detailed in sheet OIP 301 in Annexure-I.
Each work site has some individual hazard characteristics. These hazards are specifically taken care of by the operation team and addressed in Tool Box Meeting/ Pit Level Safety Meeting.

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<td>Dec’2012</td>
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G. STANDARD OPERATING PROCEDURE:

Tool Box Meeting:

1. Tool Box meeting (Pit level) should be held on regular basis.
2. Team members should be well conversant with the assigned job.
3. “Job safety analysis” should be done and discussed on day today basis in the tool box meetings & recorded the pertinent points.
4. Any ‘near miss’ to be discussed and recorded.
5. Shift in -charge should not allow his team members work without PPEs.
6. Competent person shall be competent enough to carry out the assigned job.
7. Workman/ contractor personnel shall be made well aware of the all risk involvement in the job.
8. All safety precautionary steps shall be discussed.
9. All the mobiles shall be deposited at designated place..
10. Work permit to be issued by competent person for carrying out the specified job.

H. SEQUENCE OF OPERATIONS FOR PIPELINE MAINTENANCE ON RAILWAY BRIDGE:

A) Preliminary survey work and safety measures:
Survey work and safety measures will comprise of the following steps:

1. Intimating the concerned Railway Authority.
2. Assessment of frequency of train movement on railway track
3. Take services of valve man for safety & signaling.
4. Deploy persons for signaling/ alerting train movement. No of persons 2-4 depending on bridge length.
5. Position of pipe/ hanger & other pipe fittings with respect to railway track
6. Type of bridge grader (High cross grader or low box type).
7. Existence of chequered plate (path way) between two railway rails.
8. Distance of standing platforms on bridge.
9. Active river channel width and approximate depth of water.
10. Ensure that the working person s in sound health without any vertigo.
11. Use of tested tools and tackles.

B) Maintenance of pipeline on Railway Bridge and related safety measures:
The maintenance job will include the following steps:

a) Opening of Railway girder cover: The Railway girder cover is to be opened carefully and under proper supervision.
### PIPELINE MAINTENANCE SECTION

b) **Fitting of coffing hoist:** While fitting the hoist, proper size and tested wire sling, D-shackle and tested coffing hoist needs to be used to reduce the possibility of failure.

c) **Opening of pipe clamp:** Don’t dismantle more than 2 numbers of clamps on either side of each coffings hoist and number of dismantled clamps shall not be more than 4 at a time.

d) **Cleaning of the pipe at clamp position:** The pipe surface is to be properly cleaned and made dry. The workers should take precaution that rust/foreign particles do not enter the eye.

e) **Painting:** A layer of epoxy coating is to be applied on the pipe surface. While painting precautionary measure needs to be taken so that there is no skin damage due to contact with the paint.

f) **Refitting of clamps:** While fitting the clamps proper size hand tools and proper extension bar needs to be used.

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TRENCHING OPERATION
GENERAL SOP

Prepared by:

Checked by:

Reviewed by:

Approved by:

CEPL(S&E), PHQ

HEAD (M&S), PHQ

GM (PLS), PHQ

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PIEPLINE MAINTENANCE SECTION

A. JOB TITLE:
Trenching operation in field or pipeline maintenance yard.

B. APPLICABILITY AND SCOPE:

C. TOOLS & TACKLES REQUIRED:
1. Shovels
2. Grub Hoe/ Digging Hoe
3. Required tools to carry out the prescribed job.

D. PERSONAL PROTECTIVE EQUIPMENT (PPE) TO BE USED:
For digging the trench, following safety gears are required.
1. Safety shoes
2. Helmet.

E. WORK TEAM:
The work force will comprise of skilled workers employed by the Contractor for digging operations and will be constantly monitored by the Site Engineer.

F. HAZARD INVOLVED & RISK ANALYSIS:
The subject job has the potential to expose workers to following common types of hazards:
— Slippery or uneven ground.
— Collapsing of trench.
— Damage to pipeline leading to oil leakage.
— Inadequate space to work.
— Trappings, entanglements and other hazards.
— Lack of communication or management control.

Group Risk Assessment for above hazards are detailed in sheet OIP 301 in Annexure-I.
Each work site has some individual hazard characteristics. These hazards are specifically taken care of by the operation team and addressed in Tool Box Meeting/ Pit Level Safety Meeting.

G. STANDARD OPERATING PROCEDURE:

Tool Box Meeting:
1. Tool Box meeting (Pit level) should be held on regular basis.
2. Team members should be well conversant with the assigned job.
3. “Job safety analysis” should be done and discussed on day today basis in the tool box meetings & recorded the pertinent points.
4. Any ‘near miss’ to be discussed and recorded.
5. Shift in -charge should not allow his team members work without PPEs.

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6. Competent person shall be competent enough to carry out the assigned job.
7. Workman/contractor personnel shall be made well aware of the all risk involvement in the job.
8. All safety precautionary steps shall be discussed.
9. All the mobiles shall be deposited at designated place.
10. Work permit to be issued by competent person for carrying out the specified job.

H. SEQUENCE OF OPERATIONS FOR TRENCHING OPERATIONS:

a) Trenching and making test pit:

1. Preliminary work and safety measures:
   The steps to be followed for carrying out the preliminary work involved:
   1. Study the stability of the Soil.
   2. Study the area of excavation for any affect on adjoining buildings, structures or roadways.
   3. Study the presence of underground pipes, cable conductors etc.
   4. Pipe alignment to be located and pegged.
   5. Cross trenching is to be done.
   6. Manual or machine excavation done as per site condition.
   7. Machine excavation should be done under strict supervision.
   8. Use Caution board at convenient places.

2. Excavation of Trench and related safety measures:
   1. Excavate the trench with Trapezoidal cross section to the required length and depth.
   2. Two (2) numbers of Escape routes on either side shall be made available.
   3. Provide trench protection to prevent cave in as and when necessary.
   4. Dump the excavated earth away from the Trench (More than the Depth of the trench or 1m whichever is greater from the edge of the trench).
   5. Water should be pumped out, if water accumulates in the trench.
   6. Steps to be used for ascending & descending to the trench.
   7. Vehicles should not be operated/parked close to the excavated area (Maintain at least 2m distance from edge of excavation).
   8. Barricade the excavated area with two entries.

   For Depth more then 1.5 m depth:- Safe angle of repose while excavating trenches exceeding 1.5 m depth unto 3.0 m should be maintained. Based on site conditions, proper slope usually 45 deg and suitable bench of 0.5 m width at every 1.5 m depth of excavation in all soils except hard rock are to be provided. Proper shoring and strutting to be also ensured to prevent cave-in or slides.

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PIPELINE MAINTENANCE SECTION

b) Backfilling:

Backfilling the trench/storage pit as directed. In case of trench containing pipe/cable, boulders/rock/metal/debris etc should not be back filled over them.

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SOP No: PL.ML041.PLML.04.I

Approval date: 12.03.2010

Rev. No: Initial.
PIPELINE MAINTENANCE SECTION

HOOK UP JOB FOR REPLACEMENT OF PIPE SECTION
GENERAL SOP

Prepared by:

Checked by:

Reviewed by:

Approved by:

CEPL(S&E), PHQ
HEAD (M&S), PHQ
GM (PLS), PHQ

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A. JOB TITLE:
Planned hook up job for replacement of crude oil pipe section.

B. APPLICABILITY AND SCOPE:

C. TOOLS & TACKLES REQUIRED:
1. Shovels
2. Grub hoe/ Digging hoe
3. Welding machine
4. Pneumatic Pipe Saw
5. Pneumatic Pump
6. Required tools to carry out the prescribed job.

D. PERSONAL PROTECTIVE EQUIPMENT (PPE) TO BE USED:
For carrying out the various operations associated with the hook up job, following safety gears are required.
(i) Safety shoes
(ii) Helmet
(iii) Safety Harness
(iv) Safety Goggles

E. WORK TEAM:
The work force will comprise of skilled workers employed by the Contractor for trenching of pit, cutting and welding of pipes and will be constantly monitored by the Site Engineer.

F. HAZARD INVOLVED & RISK ANALYSIS:
The subject job has the potential to expose workers to following common types of hazards:
— Physical injury due to collapse of trench
— Injury to eye due to grinding metal/ UV ray during welding.
— Damage in the wire or cable may result in electric shock.
— Constant touch with the welding activities may lead to inhalation problem due to fumes.
— Chances of fire during cutting/ welding/ grinding due to splinters falling on dry vegetation, oil, grease etc accumulated near the working area.
— Exposure to radiation may result in physical problems.
— Pipe burst may lead to physical injury due to jetting effect.

Group Risk Assessment for above hazards are detailed in sheet OIP 301 in Annexure-I.
Each work site has some individual hazard characteristics. These hazards are specifically taken care of by the operation team and addressed in Tool Box Meeting/ Pit Level Safety Meeting.

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PIPELINE MAINTENANCE SECTION

G. STANDARD OPERATING PROCEDURE:

**Tool Box Meeting:**

1. Tool Box meeting (Pit level) should be held on regular basis.
2. Team members should be well conversant with the assigned job.
3. “Job safety analysis” should be done and discussed on day today basis in the tool box meetings & recorded the pertinent points.
4. Any ‘near miss’ to be discussed and recorded.
5. Shift in -charge should not allow his team members work without PPEs.
6. Competent person shall be competent enough to carry out the assigned job.
7. Workman/ contractor personnel shall be made well aware of the all risk involvement in the job.
8. All safety precautionary steps shall be discussed.
9. All the mobiles shall be deposited at designated place..
10. Work permit to be issued by competent person for carrying out the specified job.

H. SEQUENCE OF OPERATIONS FOR HOOK- UP JOB FOR REPLACEMENT OF PIPELINE SECTION:

**A. Preliminary field work(Pre- hook up) and related safety measures:**

The steps to be followed for carrying out the preliminary work:

1. Survey of work site- Collect nearest Police station and Fire service station’s number.
2. Locating the pipeline and study of the elevation profile for estimating spillage of crude oil.
3. Excavate to open the pipe section to the required length and depth with proper escape route.
4. Trench protection as and where necessary to be provided to prevent cave-in of trench.
5. Make bell hole at drain point and hook up point.
6. Must have sufficient room for the welders to work freely at hook up point.
7. Pit for storing spilled oil as per estimate.
8. Check safe distance of the Pit from welding location or use Barricade during Hot job.

**B. Tapping operation:**

1. Tapping shall be done after depressurizing and isolation of the section.
2. Hot tapping by tapping machine at reduced pressure (< 10 kg/sq. cm at point of tapping).
3. Welding of 2” nipple with control valve is to be done after liaise with Oil Movement Control room for control of flow.

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4. Hot work permit is to be obtained before execution of the work.
5. Welding and hot tapping is to be done by competent/qualified person.

C. Isolation of section:
1. Pumping of oil is to be stopped completely.
2. The nearest D/S valve is to be closed.
3. Depressurize the pipeline section at U/S pump station.
4. The nearest U/S valve is to be closed.
6. Release the residual pressure of the isolated pipe section through tapping point.
7. Liaise with Oil Movement Control room for stopping of pumping operation.

D. Cutting of pipe (1st Cut i.e. Drain Point):
1. Check bonding of pipe section.
2. Mark both the first point i.e. Drain point and 2nd cut i.e. Tie in point.
3. Cut the pipe section by mechanical means using Pneumatic Pipe Saw.
4. During cutting operation continuous cooling by Lube oil/Water to be ensured.
5. Check depth of grinding not to exceed 1.2 mm.
6. Arrange adequate number of fire extinguishers and position them around the job site. Fire extinguishers shall be manned.
7. Ensure safe distance of machinery from the work place. To be placed on the windward side if possible.

E. Transfer of spilled oil:
1. Transfer spilled oil from trench to designated pit by pneumatic pump.
2. Check pipe fittings for leakage.
3. Remove the traces of oil from the trench and make ready for the welding operation.
4. Barricade around the pit and cover it suitably.
5. Wash the oil soaked area with soap.

F. Cutting of pipe section (2nd Cut i.e. Tie in Point):
Same procedure should be followed for the 2nd cut i.e. Tie in point after completion of removal of spilled crude oil from trench.

G. Welding Operation:
1. Clean the inside of pipe thoroughly and insert mud plug of adequate length. The mud plug shall be located at least 0.3 m inside the proposed weld.
2. Check the bell hole/ surrounding environment for presence of gas by gas meter. This operation is to be continued till the operation is complete.
3. Prepare the pipe face by grinding.
4. Align and position the new pipe section previously hydro tested.
5. Prior information to nearest fire station before starting welding operation.
6. Check hot work permit and ensure welding is done by qualified welders.
7. Check experienced employee is holding the life line during welding operation.
8. Welding machine is to be grounded.
9. Radiography of joint as per API 1104 and establish safe distance for radiography inspection and put warning sign board.
10. Pressure testing of the joints.
11. Normalize the flow

H. Site restoration

1. Coating and wrapping of pipe section.
2. Check bonding of coating as per AWWA 203.
4. Backfill the trench.

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SOP No:  

PL.ML042.PL.M05.I  

Approval date:  

02.03.2010  

Rev. No:  

Initial.
CTE COATING OF PIPELINE
GENERAL SOP

Prepared by:

Checked by:

Reviewed by:

Approved by:

CEPL(S&E), PHQ

HEAD (M&S), PHQ

GM (PLS), PHQ

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A. JOB TITLE:
Coating and Wrapping of pipe.

B. APPLICABILITY AND SCOPE:

C. TOOLS & TACKLES REQUIRED:
1. Sand Blasting Hopper
2. Air Compressor

D. PERSONAL PROTECTIVE EQUIPMENT (PPE) TO BE USED:
For CTE Coating and Wrapping operation, following safety gears are required.
1. Nose mask
2. Safety goggles
3. Hand gloves
4. Gum Boot

E. WORK TEAM:
The work force will comprise of skilled workers employed by the Contractor for CTE Coating and Wrapping and will be constantly monitored by the Site Engineer.

F. HAZARD INVOLVED & RISK ANALYSIS:
The subject job has the potential to expose workers to following common types of hazards:

- Slippery or uneven ground.
- Collapsing of trench.
- Damage to pipeline leading to oil leakage.
- Inadequate space to work.
- Trappings, entanglements and other hazards.
- Lack of communication or management control.

Group Risk Assessment for above hazards are detailed in sheet OIP 301 in Annexure-I.
Each work site has some individual hazard characteristics. These hazards are specifically taken care of by the operation team and addressed in Tool Box Meeting/ Pit Level Safety Meeting.

G. STANDARD OPERATING PROCEDURE:

Tool Box Meeting:
1. Tool Box meeting (Pit level) should be held on regular basis.
2. Team members should be well conversant with the assigned job.
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4. Any ‘near miss’ to be discussed and recorded.
5. Shift in charge should not allow his team members work without PPEs.
6. Competent person shall be competent enough to carry out the assigned job.
7. Workman/ contractor personnel shall be made well aware of the all risk involvement in the job.
8. All safety precautionary steps shall be discussed.
9. All the mobiles shall be deposited at designated place.
10. Work permit to be issued by competent person for carrying out the specified job.

H. SEQUENCE OF OPERATIONS FOR TRENCHING OPERATIONS:

a) Trenching and making test pit:

1. Preliminary work and safety measures:
The steps to be followed for carrying out the preliminary work involved:
   1. Study the stability of the Soil.
   2. Study the area of excavation for any affect on adjoining buildings, structures or roadways.
   3. Study the presence of underground pipes, cable conductors etc.
   4. Pipe alignment to be located and pegged.
   5. Cross trenching is to be done.
   6. Manual or machine excavation done as per site condition.
   7. Machine excavation should be done under strict supervision.
   8. Use Caution board at convenient places.

2. Excavation of Trench and related safety measures:
   1. Excavate the trench with Trapezoidal cross section to the required length and depth.
   2. Two (2) numbers of Escape routes on either side shall be made available.
   3. Provide trench protection to prevent cave in as and when necessary.
   4. Dump the excavated earth away from the Trench (More than the Depth of the trench or 1m whichever is greater from the edge of the trench).
   5. Water should be pumped out, if water accumulates in the trench.
   6. Steps to be used for ascending & descending to the trench.
   7. Vehicles should not be operated/parked close to the excavated area (Maintain at least 2m distance from edge of excavation).
   8. Barricade the excavated area with two entries.

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b) Backfilling:

Backfilling the trench/storage pit as directed. In case of trench containing pipe/cable, boulders/rock/metal/debris etc should not be back filled over them

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Page | 32
HOT TAPPING IN OIL & GAS PIPELINES
GENERAL SOP

Prepared by:

Checked by:

Reviewed by:

Approved by:

CEPL(S&E), PHQ

HEAD (M&S), PHQ

GM (PLS), PHQ

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A. JOB TITLE:
Hot tapping in oil & gas pipelines.

B. APPLICABILITY AND SCOPE:
To make branch line in a live Oil & Gas Pipeline.

C. TOOLS & TACKLES REQUIRED:
1. Shovels
2. Grub hoe/ Digging hoe
3. Welding machine.
5. Pneumatic Pump
6. Required tools to carry out the prescribed job.

D. PERSONAL PROTECTIVE EQUIPMENT (PPE) TO BE USED:
For carrying out the various operations associated with the job, following safety gears are required.
1. Safety shoes
2. Helmet
3. Welding shield.
5. Hand gloves.

E. WORK TEAM:
The work force will comprise of skilled workers employed by the Contractor for trenching of pit & welding of pipe fitting and will be constantly monitored by the Site Engineer.

F. HAZARD INVOLVED & RISK ANALYSIS:
The subject job has the potential to expose workers to following common types of hazards:
— Physical injury due to collapse of trench
— Injury to eye due to grinding metal/ UV ray during welding.
— Damage in the wire or cable may result in electric shock.
— Constant touch with the welding activities may lead to inhalation problem due to fumes.
— Chances of fire during cutting/ welding/ grinding due to splinters falling on dry vegetation, oil, grease etc accumulated near the working area.

Group Risk Assessment for above hazards are detailed in sheet OIP 301 in Annexure-I.
Each work site has some individual hazard characteristics. These hazards are specifically taken care of by the operation team and addressed in Tool Box Meeting/ Pit Level Safety Meeting.
G. STANDARD OPERATING PROCEDURE:

**Tool Box Meeting:**

1. Tool Box meeting (Pit level) should be held on regular basis before commencement of the job.
2. Team members should be well conversant with the assigned job.
3. “Job safety analysis” should be done and discussed on day today basis in the tool box meetings & recorded the pertinent points.
4. Any ‘near miss’ to be discussed and recorded.
5. Site in -charge should not allow his team members work without PPEs.
6. Competent person shall be competent enough to carry out the assigned job.
7. Workman/ contractor personnel shall be made well aware of the all risk involvement in the job.
8. All safety precautionary steps shall be discussed.
9. All the mobiles shall be deposited at designated place.
10. Work permit to be issued by competent person for carrying out the specified job.

H. Preparatory Work

A. Selection of location :
   i. The spot should not be closer than 46cm to a flange or threaded connection or approximately 7.5cm to a welded seam.
   ii. A minimum base metal thickness of 6.4mm and there should not be any laminations or other defects.
   iii. The spot should not be upstream of any rotating equipment unless such equipment is protected from the cutting by means of filters or traps.

B. Selection of fittings :
   i. The branch-off connection should be as per code ANSI B 31.4 and designed compatible to hot tapping machine requirements.
   ii. Thickness & Grade of branch-off connection should be greater than or equal to that of parent pipe.
   iii. Selection of through conduit Valve, Flange(s), Gasket(s) / Ring(s), nuts & bolts and adaptor etc as per design pressure of the pipe. Selected valve should be hydro-tested to corresponding pressure rating prior to installation.

C. Selection of Hot tapping Machine
   i. Selected as per fluid temperature & pressure, pipe size, size of tapping.

---

**SOP No:** PL.ML044.PLM.07.I  **Approval date:** 07.07.2009  **Rev. No:** Initial.
PIPELINE MAINTENANCE SECTION

I. General Requirements:

Before preceding with the hot tap, the following conditions should be satisfied:

i. A qualified company representative should be present during the hot tap operation.
ii. The area to which a connection is to be made is identified, physically marked and the metal thickness measured.
iii. A hot work permit is secured and all necessary gas tests done to ensure a safe environment.
iv. Suitable fire extinguishers (preferably dry chemical or pressurized fire hose) to be provided and a fire watch established.

J. Welding:

i. Qualified welder as per API 1104 to be deployed for welding of fittings.
ii. Ensure flow in lines as per API2201 (0.40m/sec to 1.22m/sec for liquid & minimum 0.40m/sec for gas)
iii. Exercise care to see that the fitting is properly positioned before welding so that misalignment of the hot tap machine will not occur.
iv. If the metal temperature is less than 10°C(50°F), preheating of the weld area prior to welding should be considered.
v. When the metal temperatures are below the atmospheric dew point, preheating or other steps may be desirable to reduce the moisture content in the weld area. Moisture inclusion could result in weld porosity and under bead cracking.
v. To minimize the possibility of burn-through, the first weld pass should be made with a 2.4mm diameter welding electrode and the remaining passes should be made with electrode not to exceed 3.2mm diameter if actual metal thickness does not exceed 12.8mm.

K. Testing the weld:

i. Check tightness of bolts, packing, packing nuts and bypass line, if required to avoid possible leakage.
ii. A hydrostatic test should be conducted in accordance with the applicable code or air test with soap solution may be conducted to ascertain weld leak.
iii. Additional testing, such as dye penetrant, may be carried out, particularly on the first pass and final weld to check for under bead cracking. Care must be exercised to thoroughly clean the weld area of any foreign material or residues if these tests are used after the first pass.

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</table>
I. Cutting Operation:

Before hot tapping is attempted, the machine, cutter and pilot bit should be carefully inspected to ensure that they are in satisfactory condition.

1. Ensure that the valve is a full bore through conduit, centered on the flange and free of dirt.
2. Run the boring bar through the main valve opening several times to be sure the cutter does not jam or drag.
3. Calculate the travel of the cutter with respect to pipe size, bore size and pipe wall thickness.
4. Check that the bleed-off valve will hold pressure and is not plugged.
5. Follow the instructions of the manufacturer of hot tapping machine for cutting operation
6. Reduce pressure of the fluid prior to cutting operation.
7. Ensure that the boring bar is fully retracted before closing the main valve.
8. After closing the main valve, open the bleeder valve and bleed off entrapped pressure from the hot tap machine before removing the machine from the flange.

H. Site restoration

1. Coating and wrapping of pipe section.
2. Switch on U/s & D/s Cathodic Transformer.
3. Clean the area of any spilled oil.
4. Backfill the trench.

REFERENCE:

1. API2201 & ANSI 31.4B.

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SOP No: PL.ML044.PLM.07.I

Approval date: 07.07.2009

Rev. No: Initial.
### Check List for Hot Tapping

<table>
<thead>
<tr>
<th>SI No</th>
<th>Activity</th>
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<tbody>
<tr>
<td><strong>Before starting Hot Tap</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Whether properly approved work permit been obtained?</td>
</tr>
<tr>
<td>2</td>
<td>Whether the hot work permit been obtained?</td>
</tr>
<tr>
<td>3</td>
<td>Does the tapping machine have a suitable pressure and temperature rating for this job?</td>
</tr>
<tr>
<td>4</td>
<td>Has the exact location of the hot tap on the line or vessel been identified and marked?</td>
</tr>
<tr>
<td>5</td>
<td>Has the area to be welded been inspected for thickness and freedom from lamination?</td>
</tr>
<tr>
<td>6</td>
<td>Has the need for stress relieving the welded area been considered?</td>
</tr>
<tr>
<td>7</td>
<td>Do the flanges, bolts, gasket, pipe and valve to be installed meet the piping code for the line or vessel to be hot tapped?</td>
</tr>
<tr>
<td>8</td>
<td>Is there is sufficient clearance to accommodate the operation of the hot tap machine and is there is sufficient clearance to retract the cutter through the valve?</td>
</tr>
<tr>
<td>9</td>
<td>Is the hot tap fitting of the proper length to accommodate operation of the hot tap machine?</td>
</tr>
<tr>
<td>10</td>
<td>Have combustable and / or toxic gas tests been conducted in the area of hot tapping?</td>
</tr>
<tr>
<td>11</td>
<td>Has fire fighting equipment been provided?</td>
</tr>
<tr>
<td>12</td>
<td>Has suitable protective equipment been provided to all exposed personnel in the hot tapping area?</td>
</tr>
<tr>
<td>13</td>
<td>Is the area to be hot tapped located below the liquid level of a tank or on a line or piece of equipment in which fluid flow has been established?</td>
</tr>
<tr>
<td><strong>Before starting Weld</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Is a preheat of the weld area required?</td>
</tr>
<tr>
<td>2</td>
<td>Is the fitting properly positioned so misalignment of the hot tap machine will not occur?</td>
</tr>
<tr>
<td><strong>Before starting Cutting</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Has the weld been tested?</td>
</tr>
<tr>
<td>2</td>
<td>Have the hot tap valve, gasket and bolts been checked for possible leakage?</td>
</tr>
<tr>
<td>3</td>
<td>Has the packing on hot tap machine been checked?</td>
</tr>
<tr>
<td>4</td>
<td>Has the bleed-off valve been checked to be sure it will hold and is not stopped up?</td>
</tr>
<tr>
<td>5</td>
<td>Are all bolts on the cutter and pilot bit tight, and is the coupen catcher on pilot bit?</td>
</tr>
<tr>
<td>6</td>
<td>Is the valve centered on flange?</td>
</tr>
<tr>
<td>7</td>
<td>Has the cutting depth been calculated to avoid cutting the opposite side of pipe?</td>
</tr>
<tr>
<td>8</td>
<td>Has the boring bar been run through the valve several times to ensure free passage?</td>
</tr>
<tr>
<td>9</td>
<td>Has the pressure and temperature of the contained material been reduced as much as the process operations will allow?</td>
</tr>
<tr>
<td>10</td>
<td>Is there liquid or flowing gas in contact with the area to be hot tapped?</td>
</tr>
<tr>
<td><strong>Before removing hot tap Machine</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Follow the manufacture’s instructions to be sure the boring bar is fully retracted before closing the main valve.</td>
</tr>
<tr>
<td>2</td>
<td>Close the main valve.</td>
</tr>
<tr>
<td>3</td>
<td>Open the bleeder valve and be sure all pressure is off the hot tap machine before removing bolts from the flange. If the flow or pressure persists, the main valve is probably leaking.</td>
</tr>
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Oil evacuation and pipe retrieval jobs of 254mm pipeline at river Tista

Prepared by:

Checked by:

Reviewed by:

Approved by:

CEPL(S&E), PHQ

HEAD (M&S), PHQ

GM (PLS), PHQ

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1.0 The job will be carried out under strict supervision of OIL personnel and adherence to requisite safety norms in job execution will be ensured. Prior to start of job, necessary work permit shall be obtained.

2.0 Activity details are as follows:

A. Preliminary Job

1. Safety training to Contractor personnel
2. Medical check-up including Vertigo Test for Contractor personnel.
3. Placement of earth filled gunny bags on embankment slope near Rly bridge on either bank for creating safe working area/platform.
4. Making of earthen pit with polyethylene sheet for temporary storage of oil
5. Tapping of 2 nos of 2” hole on 10” pipe near the embankment on either bank of the river.

B. Evacuation of residual oil from 10” pipe

1. Close valve V1 & V2 of 16” pipeline.
2. Open inlet valve at RT, NSPL, Siliguri.
3. Open valve V3 of 10” line for evacuation of oil because of elevation difference.

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</table>
### PIPELINE MAINTENANCE SECTION

4. Disconnect flange connection of 10” pipe from valve V4 and drain oil in pit / container.
5. Cut pipe near location A.
6. Insert a long flexible PVC pipe inside the 10” pipe and pump out oil from the pipe by air driven pump.
7. Loosen pipe hanger chains of bridge (4 to 5 nos) from the cutting end.
8. Cut pipe at the bend B.
9. Insert a BiDi pig in the pipe and weld a header.
10. Carry out pigging by air to flush out remaining oil from the pipe completely.
11. After complete evacuation close valve V3.

Once complete evacuation of oil from 10” pipe is ensured and area is cleared off oil, pipe retrieval job will be taken up.

### C. Retrieval of 10” Pipe.

1. Cut pipe at both ends near the bridge approach. (B & C)
2. Loosen the pipe clamps and pull pipe towards embankment with the help of roller and cut into pieces with the help of hacksaw.
3. Shift the pipe pieces for loading on trailers for onward dispatch.

**Note:** The above jobs will be carried out by experienced persons / riggers who has undergone necessary medical check-up. Movement of machineries, heavy equipment, pipes shall not be done over the railway track.

### REFERENCE:

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SOP No: **PL.ML045.PL.M08.I**  
Approval date: **2015**  
Rev. No: **Initial.**
REPAIRING A ‘PILFERAGE POINT’
GENERAL SOP

Prepared by:

Checked by:

Reviewed by:

Approved by:

CEPL(S&E), PHQ      HEAD (M&S), PHQ
GM (PLS), PHQ
FUNCTIONS AND SCOPE: This Standard operating procedure for repairing of pilferage point intends to encircle all the procedural steps in a sequence which is to be carried out in a manner which is safe for working personnel, safe for the pipeline, safe for the environment as well and also comply with HSE policy, Mines regulation and OISD guidelines. The Operations Manual (Yellow Book) must be consulted for detailed Pipeline Maintenance Procedure (Section A-5 and A-6). OISD standards, OISD-105 for work permit and OISD-192/section 6.1 for trenching is to be also consulted for the related activities.

The SOP consists of following:

Annexure-I: Standardisation of procedural steps involved.

Annexure-II: List of Equipments & Machineries and other items required – As per Appendix-1 and Appendix-2 of SOP as in case of pipeline leak or as per actual site requirement.

Annexure-III: Risk Analysis Sheet

Annexure-IV: Critical Task Analysis Sheet

Annexure-V: Field Level Checklist

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SOP FOR PILFERAGE POINT REPAIRING JOB ON CRUDE OIL PIPELINE

1. PREPARATORY WORK

WORKING, CHECKING & CONTROL ACTIVITY LIST IN ORDER OF PRACTICAL APPLICATION

1. Locate the leak/pilferage point, survey the Work Site and access the approachability for the vehicles up to the working site (collect maximum information in case of out station locations).

2. Inform the concerned Installation Manager/Station Engineer (upstream and downstream) pump stations about the repairing work to be undertaken.

3. Equipments and consumables to be checked and loaded in truck/crane as per emergency items/equipments list for leak repair job (refer Annexure-II).

4. Work to be carried out under the supervision of a designated Site Engineer from Pipeline Maintenance Section.

5. Repairing team should consist of at least one Junior Engineer (alternate: Asst. Tech (fitting), two Tradesman (at least one Tradesman) and one Qualified Welder.

6. At the site, barricade the required activity zone around the leak/Pilferage point with a warning Tape.

7. Check the security (police) arrangements arranged/provided by the concerned Station-in-Charge to control the crowd for safe working.

8. Area Information: Collect the contact numbers of local administration, police station and fire Station.

9. Study the elevation profile for estimating spillage of crude oil in case of leakage and get it confirmed by Duty Dispatcher.

10. Make advance arrangement with Station-in-charge (Ops) for evacuation of crude oil to nearest Pump Station in case of leakage.

11. Camp setting at a safe distance and demarcation of vehicle parking area and stores keeping area.

12. Check Fire fighting support team (at least 2 no) from local Pump Station to handle the portable fire extinguishers in case of fire.

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13. Carry out Tool box Meeting with contractor/ working team including contractor’s men and the safety supervisor(s) as named in Contract document by the contractor.

14. Ensure that the Use of PPE is in order.

15. Setting-up of equipment and machinery such as Welding Machine, Generator, Water pump, electric cables with extension cords & Switch Boards etc. Distance not less than 20mtr from welding point.

16. If needed, make a pit for storing spilled oil at a safe distance from welding point (beyond 20 mtr).

17. Check the fire fighting arrangement for placement. Ensure availability of sufficient number of portable fire extinguishers along with authorized trained personnel from concerned Pump Station.

18. Check and confirm with Electrical Section about the site lighting (at least 2 no. flame proof lights) to continue the work after dusk if needed.

19. Check that Dn-stream/Up -stream TR units are switched-off.

20. All Mobile phones to be switched-off in the working area.

21. Hot Work Permit (As per OISD-105) to be issued to J.E. (or Asst. Tech-Fitting) by the Engineer-in-Charge for the excavation of trench/pit and to insure that all safety procedures are in order to carry out the grinding, cutting and welding job on the live crude oil line(in depressurised condition).

22. Excavate to open the pipe section to the required length, breadth and depth (As per guide lines OISD-192) with proper escape route and stepping steps at least on one side or at one corner. Trench protection as and where necessary to be provided to prevent cave-in of trench. The space in the trench and around the pipe must have sufficient room to carry out welding job comfortably.

23. Keep on opening and removing the external fittings (valves and piping) leaving the last valve and welded nipple intact to avoid any leakage as well as difficulty while trenching or as applicable at site.

24. If there is seepage of sub soil water in the trench, water recovery pump to be used for pumping out the water to create the favourable working condition for repairing.

25. Keep updating the Duty Dispatcher about the progress of the job.

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2. ISOLATION AND DEPRESSURISATION OF PIPELINE SECTION
(“Ready to Work” condition)

WORKING, CHECKING & CONTROL ACTIVITY LIST IN ORDER OF PRACTICAL APPLICATION

1. Liaise and confirm with Oil Movement Control Room for stopping the pumping operation and isolation of the affected Pipeline section.

2. If pilferage point is leaky, all efforts to be put in place for stopping the leakage and making the working area free from any oil or oil vapour up to a safe distance. Confirm it by gas detector before any operational activity.

3. Inform and brief to CEPL(PLM) about the site before starting the job.

4. Co-ordinate with Despatch Control and Station Engineer for closing of the block valve (line v/v) on the higher elevation side of the repairing location.

5. Valve operations, depressurisation of pipe section at Pump Station and isolation of the required pipeline Section is to be done by concerned Pump Station Engineer s as guided by the Despatch Engineer (OM) in consultation with Site Engineer.

6. All valve operations will be done under the supervision and in presence of an Engineer.

7. Release of residual pressure at site to be done in presence of the Site Engineer.

8. If required, utilise the same tapping point/pilferage point to Release the residual pressure of the isolated section.

9. Remove leaked & drained out oil from the operational area.

10. Collect information from the duty Dispatcher about the line pressure in the section, isolation valve condition and also convey in advance the approximate time and flow requirement during welding work.

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3. CUTTING OF EXTERNAL FITTING AND “PEGGING”

WORKING, CHECKING & CONTROL ACTIVITY LIST IN ORDER OF PRACTICAL APPLICATION

1. Working point to be checked and inspected again before starting the job.

2. Remove the coating material and clean the surrounding area of pipe near the fitting as per operational requirement.

3. Slowly open the end valve of the fitting to see the line pressure.

4. If line pressure is nil due to depressurisation and no oil is coming out proceed for pegging operation.

5. Put a wooden peg in the pilferage point hole through the valve, fix it firmly by hammering and wash inside space of the valve and nipple thoroughly with water to remove the oil and finally fill it with water. See the surface of water for any trace of oil leakage.

6. Clean the working area thoroughly for any trace of oil. Check the bottom of the pit also for any trace of oil. If needed, clean again before starting the job.

7. Check again PPE, safe distance of equipments, connections of generator & welding machine etc.

8. Check that adequate numbers of fire extinguishers are positioned around the working pit along the wind direction with trained personnel.

9. Check with an explosive meter for presence of any inflammable gas in the working pit and in the surrounding area.

10. Cut the saddle/nipple welded to the pipeline by using grinder and hacksaw under continuous manual water cooling arrangement.

11. Check and confirm that there is no leakage of oil or oil vapour from the pilferage point hole during the grinding/cutting operation.

12. In case of any trace of oil, coming out from the valve due to improper washing/cleaning of valve or due to leakage- stop the grinding/cutting work.

13. Rework valve washing and peg fixing as needed before re-starting the operation.

14. Once saddle is cut and fitting is removed by keeping the peg intact in the hole over the pipe, clean and prepare the surrounding pipe by way of grinding/ filing the pipe surface very carefully.

SOP No: PL.ML046.PL.09.I
Approval date: 2011
Rev. No: Initial.
15. Check the pipe clamps are o.k. and ready with all fittings.

16. Mark the centre lines of the saddle/sleeve to centre it over the leak point in the pipe.

17. Check, that the approved saddle/sleeve is ready, fixed & dried with neoprene rubber sheet at the middle inside surface having marked with the centre lines at the outside surface.

18. Arrange placement of pipe clamps, cut the standing peg in the hole by hacksaw, put little filing and place the saddle/sleeve matching the centre line. Fix and tighten it as required.

### 4. WELDING OF THE SADDLE OR SLEEVE

**WORKING, CHECKING & CONTROL ACTIVITY LIST IN ORDER OF PRACTICAL APPLICATION**

1. Re-check the bell hole for safe working condition.

2. Carry out routine check-up by the competent person that the welding machine and the connections of cables are OK, the machine is at a safe distance.

3. Check that the welding machine is properly grounded.

4. Check that the welder and the competent person inside the trench have been provided with life line ropes tied to their safety belts worn by them.

5. Check, adequate number of Fire fighting equipments are in place and properly manned.

6. If all OK, start the welding machine.

7. Let the qualified welder, test the welding arrangement and set the welding current and voltage as per requirement.

8. Let the welder go for saddle welding by first tagging the earthing cable to the piping system and then to start root welding.

9. After the root welding is complete, the line/station valves are to be normalised in co-ordination with despatch control and the concerned Station Engineers.

10. After completion of root welding, the clamps are to be removed.

11. Check with Despatch Control, if the minimum flow resumed as requested by the Site Engineer before starting the hot pass, which is to be continued with filler and capping also.
12. The remaining welding passes to be carried out in presence of minimum flow of the oil (the calculated pressure at the point of welding should not be more than 10 kg/cm²)

### 5. PRESSURE TESTING
(CLEARING THE LINE FOR NORMAL PUMPING)

**WORKING, CHECKING & CONTROL ACTIVITY LIST IN ORDER OF PRACTICAL APPLICATION**

1. Confirm Despatch Control after welding job is completed.

2. After completion of welding, the Dispatcher will arrange pressure testing of the line at a predefined pressure - Dynamic pressure testing or Static pressure testing for a certain period of time (usually 15 minutes) as per guidelines from Chief Engineer (OM).


4. Inspect the weld joint carefully for any sweating or leakage, if all OK during the specified time, confirm to Despatch control.

5. Pipeline is cleared now at the test pressure for normal pumping.

6. After successful testing brief about the completion of the job to CEPL(PLM).

### 1. SITE RESTORATION AND NORMALISATION

**WORKING, CHECKING & CONTROL ACTIVITY LIST IN ORDER OF PRACTICAL APPLICATION**

1. Manual Coating and wrapping of pipe section to be done as per procedure (SOP).

2. Check if the coal tar melting arrangement is at a safe distance.

3. Clear the site from all the undesirable materials.

4. Check bonding of coating.

5. Switch on U/s and D/s TR unit switch.

6. Arrange - Backfilling and restoration.

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## PIPELINE MAINTENANCE SECTION

### Appendix N0-2

**Details of Equipment Tools and Other Items Required for Pipeline Leak / Damage Repair**

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<tr>
<td>01. Oil Recovery Items</td>
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<tr>
<td>(a) Empty barrels</td>
<td>50 Nos.</td>
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</tr>
<tr>
<td>(b) Large funnels</td>
<td>2 Nos.</td>
<td></td>
</tr>
<tr>
<td>02. Dewatering Arrangements – When Required</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Gorman Rupp/ Iron Maxflow Pumps with suction and delivery hoses</td>
<td>2 Nos.</td>
<td></td>
</tr>
<tr>
<td>(b) Pegson Marlow/ Kirloskar Pumps with Suction and delivery hoses</td>
<td>2 Nos.</td>
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</tr>
<tr>
<td>03. Welding machine(s) with cables and other accessories</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Skid mounted- 2 nos., Portable- 1 No.)</td>
<td>3 Nos.</td>
<td></td>
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<tr>
<td>04. Oxygen and Acetylene gas cylinders, hoses and cutting set</td>
<td>2 Sets.</td>
<td></td>
</tr>
<tr>
<td>05. CO₂ fire extinguishers</td>
<td>2-4 Nos.</td>
<td></td>
</tr>
<tr>
<td>06. Wooden skids and planks</td>
<td>20-30 Nos.</td>
<td></td>
</tr>
<tr>
<td>07. 44 cms/60 cms Hacksaw frames with blades</td>
<td>2 Nos.</td>
<td></td>
</tr>
<tr>
<td>08. Explosometer(s)</td>
<td>1-2 Nos.</td>
<td></td>
</tr>
<tr>
<td>09. Pneumatic pipe cutting saw</td>
<td>1 No.</td>
<td></td>
</tr>
<tr>
<td>10. Coffing hoists</td>
<td>6 Nos.</td>
<td></td>
</tr>
<tr>
<td>11. Trifor winches</td>
<td>6 Nos.</td>
<td></td>
</tr>
<tr>
<td>12. Pipeline maintenance Tool box</td>
<td>2 Nos.</td>
<td></td>
</tr>
<tr>
<td>13. 20 cms dia pipe about 6 metres long</td>
<td>3-4 Nos.</td>
<td></td>
</tr>
<tr>
<td>14. Petrol / H.S.D / Lubricants</td>
<td>As required</td>
<td></td>
</tr>
<tr>
<td>15. 50 mm (2&quot;) Nipples, pipe welding/bolting saddles, weld plus ends, leak clamps, tapping/stoppling machines, pipe ground clamps, etc.</td>
<td>As required</td>
<td></td>
</tr>
<tr>
<td>16. Pipe lengths and pipe fittings</td>
<td>As required</td>
<td></td>
</tr>
<tr>
<td>17. Additional tents and other camping facilities</td>
<td>As required</td>
<td></td>
</tr>
<tr>
<td>18. Heavy equipment and other machines</td>
<td>As required</td>
<td></td>
</tr>
</tbody>
</table>

(Exact requirement of equipment, pipes/fittings and specialized tools, etc will be worked out after damage has been assessed and methods of repair have been decided.)

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## PIPELINE MAINTENANCE SECTION

### DETAILS OF CAMPING AND OTHER ITEMS WHICH WILL BE IMMEDIATELY REQUIRED IN THE EVENT OF PIPELINE LEAK/DAMAGE

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tents complete</td>
<td>6 Nos.</td>
</tr>
<tr>
<td>Portable generating set</td>
<td>1 No.</td>
</tr>
<tr>
<td>Flame Proof flood light &amp; wires</td>
<td>4 Nos.</td>
</tr>
<tr>
<td>Camp cots</td>
<td>8 Nos.</td>
</tr>
<tr>
<td>Kudalis</td>
<td>12 Nos.</td>
</tr>
<tr>
<td>Shovels</td>
<td>12 Nos.</td>
</tr>
<tr>
<td>Baskets</td>
<td>12 Nos.</td>
</tr>
<tr>
<td>Buckets</td>
<td>12 Nos.</td>
</tr>
<tr>
<td>Drums for water storage</td>
<td>2 Nos.</td>
</tr>
<tr>
<td>Cooking utensils</td>
<td>1 Set.</td>
</tr>
<tr>
<td>Gum boots</td>
<td>6 Pairs.</td>
</tr>
<tr>
<td>Flame-Proof Torches</td>
<td>4 Nos.</td>
</tr>
<tr>
<td>Hurricane lamps/Petromax/ Solar lamp/ Gas light</td>
<td>6 Nos</td>
</tr>
<tr>
<td>Tool box (General purpose)</td>
<td>1 No.</td>
</tr>
<tr>
<td>H.S.D. Oil</td>
<td>50 Litres</td>
</tr>
<tr>
<td>Kerosene Oil</td>
<td>50 Litres</td>
</tr>
<tr>
<td>CP2 Sump Pumps with delivery hoses</td>
<td>2 Nos.</td>
</tr>
<tr>
<td>Air Compressor with hoses</td>
<td>1 No.</td>
</tr>
<tr>
<td>Empty barrels</td>
<td>5 Nos.</td>
</tr>
<tr>
<td>Funnel</td>
<td>2 Nos.</td>
</tr>
<tr>
<td>Piling sheet</td>
<td>4 Nos.</td>
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**FIELD LEVEL CHECKLIST for PILFERAGE POINT REPAIRING ON OIL PIPELINE**

**PL KM:**

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<tr>
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<tbody>
<tr>
<td><strong>1.</strong> Have you informed the concerned Installation Manager/Station Engineer (U/S and D/S) pump stations about the repairing work to be undertaken?</td>
<td></td>
</tr>
<tr>
<td><strong>2.</strong> Security arrangements are OK for safe working.</td>
<td></td>
</tr>
<tr>
<td><strong>3.</strong> Tool box meeting held and every aspect of the work and safety is clear to the working team including contractual work person.</td>
<td></td>
</tr>
<tr>
<td><strong>4.</strong> Use of PPE is in order.</td>
<td></td>
</tr>
<tr>
<td><strong>5.</strong> Hot Work Permit issued to the competent person by the Engineer-in-Charge for the job.</td>
<td></td>
</tr>
<tr>
<td><strong>6.</strong> Check safe distance (20mtr) of oil storage pit from welding point.</td>
<td></td>
</tr>
<tr>
<td><strong>7.</strong> Check that adequate numbers of fire extinguishers are positioned around the working pit along the wind direction with trained personnel (50 litre foam- 2no, 10 litre foam-4no, 10 kg DCP-2no, and CO2 bottles-2no. of adequate capacity).</td>
<td></td>
</tr>
<tr>
<td><strong>8.</strong> Check Mobile phones are switched-off in the working area.</td>
<td></td>
</tr>
<tr>
<td><strong>9.</strong> Check that Dn-stream/Up-stream TR units are switched-off.</td>
<td></td>
</tr>
<tr>
<td><strong>10.</strong> Check and confirm with Electrical Section about the flameproof lighting of the site to continue the work after dusk if needed.</td>
<td></td>
</tr>
<tr>
<td><strong>11.</strong> Check and confirm with Despatch Control if pumping is stopped and affected Pipeline section is isolated.</td>
<td></td>
</tr>
<tr>
<td><strong>12.</strong> Check with explosive meter for presence of any inflammable gas in the working pit and in the surrounding area up to safe distance.</td>
<td></td>
</tr>
<tr>
<td><strong>13.</strong> Check, valve status and depressurisation of the pipeline section are okay as per requirement.</td>
<td></td>
</tr>
<tr>
<td><strong>14.</strong> Check the residual pressure in the line.</td>
<td></td>
</tr>
<tr>
<td><strong>15.</strong> Check the bottom of the pit for any trace of oil. If needed, clean thoroughly before starting the job.</td>
<td></td>
</tr>
<tr>
<td><strong>16.</strong> Check that there is no leakage of oil or oil vapour from the pilferage point during the grinding/cutting operation.</td>
<td></td>
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</table>
17. Check, the pipe clamps, saddle are o.k. and ready with all fittings.

18. Check that the welding machine and the connections of cables are OK, safe distance of equipments, connections of generator & welding machine etc.

19. Check that the welding machine is properly grounded.

20. Check that the welder and the competent person inside the trench have been provided with life line ropes tied to their safety belts worn by them.

21. Check with Despatch Control, if the minimum flow resumed as requested by the Site Engineer before starting hot pass which will continue with filler and capping also.

22. Inspect the welding before confirmation to Despatch control.

23. Check if the coal tar melting arrangement is at a safe distance.

Remarks if any:

Signature
Engineer-in-charge
Date:

Signature
Competent Person
Date:

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PIPELINE  MAINTENANCE SECTION

MINIMUM FIRE FIGHTING ARRANGEMENT REQUIRED AT PIPELINE HOOK-UP JOB

1. FOAM QUANTITY REQUIREMENT FOR SPILL FIRE AS PER OISD STD - 117:
   A. DATA:
      i) Surface area of the Trench will be of approx. 30 mtr x 1.5 mtr size.
      ii) Surface area of the stand-by Pit to contain the crude oil recovered from
          Pipeline will be of approx. 15 mtr x 4 mtr size (2 Nos).
      iii) As per OISD STD-117, 2007 edition, the rate of application is 5 LPM/M²
           (Clause 4.4.8) AND the duration of the discharge is 30 minutes for spill
           fire protection (Clause 4.4.9 (ii)).
   B. QUANTITY OF FOAM COMPOUND, REQUIRED:
      i) For spill fire at the Trench:
         Surface Area of the Trench = 30 x 1.5 M² = 45 M²
         The Quantity of 3% AFF Foam Concentrate
         required for 30 minutes @ 5 LPM/M²
         = 45 x 5 x 30 x 3/100 Liters
         = 202.5 Liters
         ie. 7 Nos. Jerry Can of 30 Liters Capacity
      ii) For spill fire at the stand-by Pit:
         Surface Area of the stand-by Pit, 2 Nos
         = 2 x (15 x 4 M²) = 120 M²
         The Quantity of 3% AFF Foam Concentrate
         required for 30 minutes @ 5 LPMM²
         = 120 x 5 x 30 x 3/100 Ltrs.
         = 540 Liters
         ie. 16 Nos. Jerry Can of 30 Liters Capacity

Out of the above mentioned two cases, consider the largest quantity (18 Nos. Jerry Can of
30 Liters Capacity) of the foam compound to be stored at the site of Pipeline Hook-up job.

2. QUANTITY OF WATER REQUIRED FOR FOAM MAKING:
   The Quantity of water required for
   Foam making for 30 minutes
   = 120 x 5 x 30 x 97/100 Ltrs.
   = 17450 Liters

3. First-aid Fire Fighting Equipment:
   Following Fire Extinguishers will be available at site
   i) Trolley mounted Fire Extinguishers: 2 Nos. DCP Type of 75 Kg. Capacity.
   ii) Portable Fire Extinguishers: 10 Nos. DCP Type of 10 Kg. Capacity.
   iii) Trolley mounted Fire Extinguishers: 4 Nos. CO₂ Type of 6.8 Kg. Capacity.

4. Nearest Fire Station of State Fire Service shall be requested to provide the Fire Tender
   for requirement of water. Oil India Ltd. (OIL) shall provide required quantity of Foam
   compound.

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## PIPELINE MAINTENANCE SECTION

### REVISION RECORD:

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