



CASE STUDY

OISD/CS/2026-27/PL/04

Dt.: 15/05/2026

Introduction

Title: Incident of piercing & leakage from LPG pipeline, while drilling for soil investigation survey for other pipeline in common ROU.

Location: LPG Pipeline in ROU.

Loss/ Outcome: Leakage from LPG pipeline.

Brief of Incident

On 18th March 2026 at around 0915 Hrs., an LPG leakage incident was reported in ROU of an LPG pipeline of a company (say M/s XYZ). It was informed that the incident had occurred during the soil investigation activities being carried out at said site by other company (say M/s ABC) in common ROU (LPG pipeline is laid in common ROU with liquid petroleum product pipeline of other company M/s ABC). The boring/drilling machine used for boring of soil had punctured and damaged LPG Pipeline.

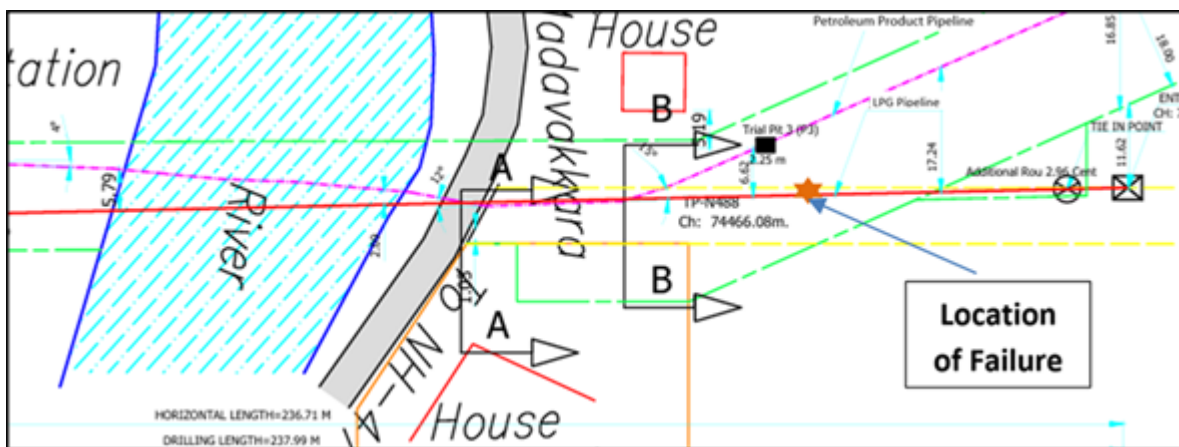
Observations/Lapses

Basis site visit, physical and virtual interaction with officials, contract staff and checking of documents, following observations were made:

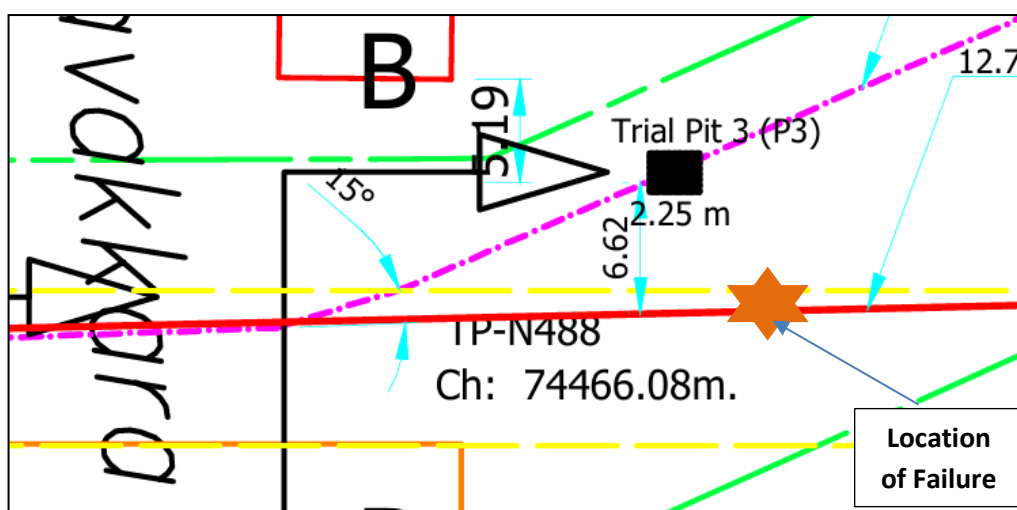
- LPG pipeline was laid in ROU of existing petroleum product pipeline of other company at an approximate distance of 5m. The total shared ROU is of approximately 105 Km. As per the pipeline alignment sheets/ HDD crossing drawing, petroleum product pipeline is mostly laid on the left side of ROU and LPG pipeline is laid on the right side of ROU in flow direction.
 - Although both the pipelines were laid in common ROU, no methodology was available regarding sharing/ communication of the maintenance/ activity being undertaken in the ROU by any one of the organizations.
 - A communication by official of petroleum product pipeline was made regarding the soil investigation work to be started from 23.2.2026 to LPG pipeline official. However, the work was actually started on 12.3.2026. No communication was made neither regarding change in work schedule, nor regular communication regarding the start/ stop of the said work.
- Petroleum product pipeline owner awarded the contract for “*Geotechnical investigation and topographical survey for the pipeline*”. Scope of work included the soil investigation on land with boring of 150mm dia upto 20/25m depth (below FGL), standard penetration tests etc. in common ROU. It was informed that the said work in this section is being carried out to change existing open cut river crossing of pipeline at different locations to HDD crossings.
- The location of the incident was downstream of a River crossing at petroleum product pipeline chainage 58.7 Km (LPG pipeline chainage 74.4). Petroleum product pipeline

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was initially laid through open cut method across the river whereas LPG pipeline was laid through the HDD method. A road is also available in parallel to the river on the downstream side and the same is considered as a part of crossing along with river. The ROU width at the upstream side of the river was 15m whereas at downstream side it is 18 m (after the road). The section drawing of the location with respective pipeline crossing is as under:



River Crossing

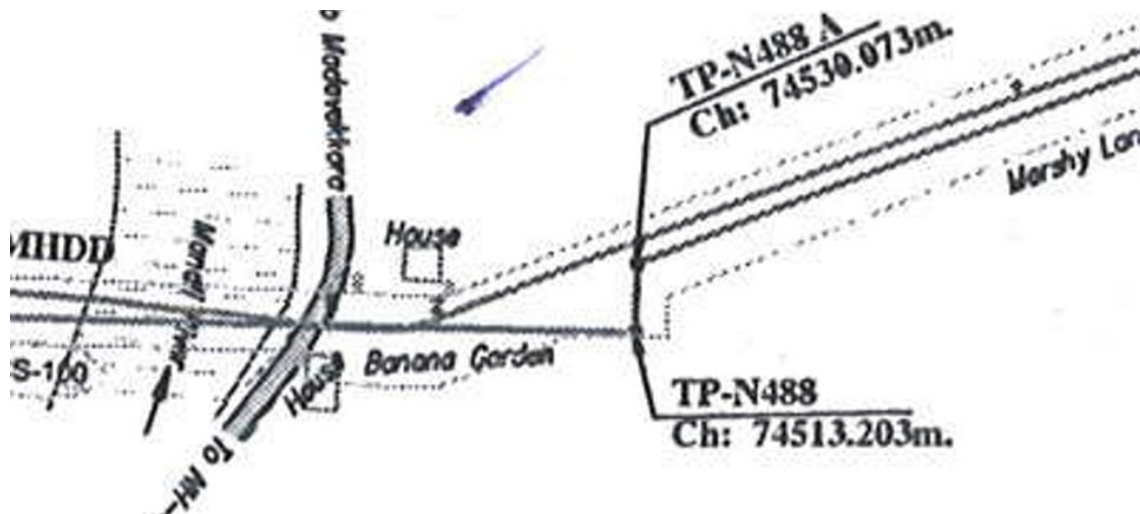


Location of failure

1. The "Issue for Approval" drawing for HDD Profile of river crossing of LPG pipeline was shared with the officials of petroleum product pipelines on 24.05.2021 during the construction stage and it is understood, that same was agreed by them with respect to the inter-distances, laying methodology and crossing orientation etc. The As-built drawing of the river could not be traced. However, it is to be noted that the available crossing drawing (issue for approval) was neither referred to by officials of petroleum product pipeline nor by the officials of the LPG pipeline before carrying out the soil investigation work.
2. The "As-Built" alignment sheets of LPG pipeline (including the drawing for the incident section) were also shared with the official of petroleum product pipeline vide email dated 22.05.2024. The alignment sheet also clearly indicated the similar pipeline alignment as indicated in the "issue for approval" HDD profile of river crossing. The alignment sheets were also not referred by officials of any of the company.

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3. As per alignment sheet, it is observed that after the HDD crossing, LPG pipeline is taking two turns to align with the ROU/ mainline of petroleum product pipeline. However, in the field/ROU, none of Turning Point markers were available (TP -N488 & TP-N488A as per alignment sheet).



Alignment of pipelines with location of Turning points markers

4. It was observed that Hot Work Permit (permit no. 4) was taken for the referred work by officials of petroleum product pipeline for work of soil investigation survey. However, following lapses/gaps were observed with the work permit implementation:
- As per the Work permit policy of the company, online work permit is to be obtained for all cases. Work permit policy of the pipeline also states that approval of *Regional Head Pipelines* is required for issuing offline permits. However, in this case, offline permit was issued without any approval of Regional Head Pipelines.
 - It was informed by the officials that offline permits are being used for mainline/ROU related work. As per the history checked from printed permit book available at control room, offline permit was last issued in July 2025 for some other work in mainline.
 - The referred permit no. 4 was signed by the contract personnel as supervisor, however, the name of the same person was not available in the list of manpower provided by the contractor. Thus, it indicates that the authorized supervisor was not involved in the work permit system.
 - It was also observed that same hot work permit (permit no. 4) was being used at different sites in mainline.
 - Job Safety Analysis pertaining to the Drilling/Soil investigation survey was not prepared and attached with the work permit. A plain document with subject "*JSP for Deep Excavation more than 1.2m deep*" without any reference, name, sign, etc. was attached with the work permit. The said JSA covered Hazards, likely consequences, preventive & corrective measures related to excavation work. The document was not related to actual work of drilling/soil investigation being undertaken at site. An additional document was also provided indicating few safety precautions & procedures for this specific job, which was prepared by ROU officer and approved by Location in-charge. However, the document did not cover stepwise potential hazards, hazard control measures and person responsible in line with sample JOB SAFETY ANALYSIS (JSA) Form provided in the company's work permit policy/ Annexure - VII of OISD-STD-105.

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5. As per discussion with various personnel available at site, contradiction was observed in the statements regarding the site marking/clearance by the contract personal of LPG pipeline. As per statement of contract personnel of LPG pipeline, he could not locate the pipeline and did not advise to go ahead with drilling work. However, as per the security supervisor and contract personnel of petroleum product pipeline, the LPG pipeline was marked, and clearance was given for the drilling work. It may be noted that during these discussions/ activities, none of the officials from either of the company were involved and all the discussion/communication was between contractual representatives.
6. Physical pipeline marker at riverbank & hook-up/tie-in point for the river crossing were not installed either for LPG Pipeline or for petroleum product pipeline in-line with the “*Guidelines for preventing Pipeline Failure due to heavy rainfall/ floods*” dated 15.10.2025 circulated by OISD. These markers would have helped identifying the pipeline location clearly, as the location of failure was quite close to the hook-up/tie-in point of the HDD section of LPG pipeline. During discussion, it was transpired that officials of LPG pipeline were not aware about any such guidelines, as the same were not communicated to them.
7. Pipeline intrusion detection system (PIDS) was not installed for LPG pipeline. However, PIDS is installed for petroleum product pipeline and alarm for the digging/ mechanized digging appeared in the PIDS system for the drilling activity.

Root Causes

Based on investigation, team has identified the following root causes of incident:

- a) Non-availability of communication/ monitoring mechanism between both the companies for carrying out mainline maintenance activities in common ROU.
- b) Failure in adherence to Work permit system (non-preparation of suitable Job Safety Analysis).
- c) Not referring to As-built drawing (mainline alignment sheet) during any work inside common ROU.
- d) Non-availability of suitable pipeline markers (Turning point) at required locations in common ROU.
- e) Non-adherence to the OISD issued guidelines.

Recommendations

1. A suitable communication/ monitoring mechanism shall be developed for carrying out maintenance activities wherever multiple pipelines of different operators are laid in common ROU. Joint meeting with location-in-charges and concerned officials of both the pipelines shall be carried out before any critical activities in common ROU along with written down guidelines and methodologies for execution (including the work permit & Job Safety Analysis) of the work.
2. Implementation of Work Permit system inline with OISD-STD-105 and internal work permit policy to be ensured, not limited to the following:
 - a. Job and location specific Job Safety Analysis to be developed and implemented covering the following in line with OISD-STD-105:
 - Description of a job.
 - Breaking the job down into a sequence of steps to accomplish the task.

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- Identifying the hazards, potential consequences, and risks associated with each of these steps.
 - Determining the control measures (as per the hierarchy of controls/ risk-reducing measures) to overcome these hazards.
 - Defining person responsible for implementing the control measures.
- b. Authorized receiver of the work permit system should be available at site for monitoring of the work inline with OISD-STD-105.
 - c. Only company personnel/ authorized contract supervisor is engaged in the work and work permit system.
 - d. Work permit system (Online/ Offline) to be followed/ implemented as per the internal work permit policy and deviations to be suitably approved as defined in the policy.
3. As-built drawing to be referred before initiating any work at site along with identifying the pipeline using the pipeline locator inside common ROU.
 4. Further, technological advancements are also to be used to the extent possible for identification of the pipelines with GIS mapping. For example, common KMZ (google earth) file may be prepared indicating all the pipelines in ROU (in this case both petroleum product & LPG pipeline), which can be accessed through 'Smart phone' for identification & verification of pipelines in the field along with pipeline locator to avoid any false reading.
 5. Turning/ Direction markers are to be installed indicating the direction of turning for all the pipelines in line with the OISD-STD-141/214. One direction marker shall be installed at each turning point and in addition two more direction markers shall be installed along the pipeline alignment, one on both side of turning point at a distance of 200 meters from the turning point. Lat, long data for such markers shall be recorded and preserved. Further, regular monitoring of the requisite pipeline markers in the ROU to be carried out.
 6. Guidelines/ case studies issued by the OISD are to be referred and implemented. Industry to regularly refer to the OISD website for case studies, safety alerts etc. for implementation.
 7. All the Case studies/ safety alert are generally circulated through Principal Panelists (PP) and uploaded on the OISD portal, which are to be referred for implementation by the industry members. In case of Subsidiary/ Joint venture company, which are not the direct members of Safety Council/ Steering committee, PP of the parent company should also communicate the OISD guidelines/ case studies/ safety alerts etc. to the subsidiary/JV companies.

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