

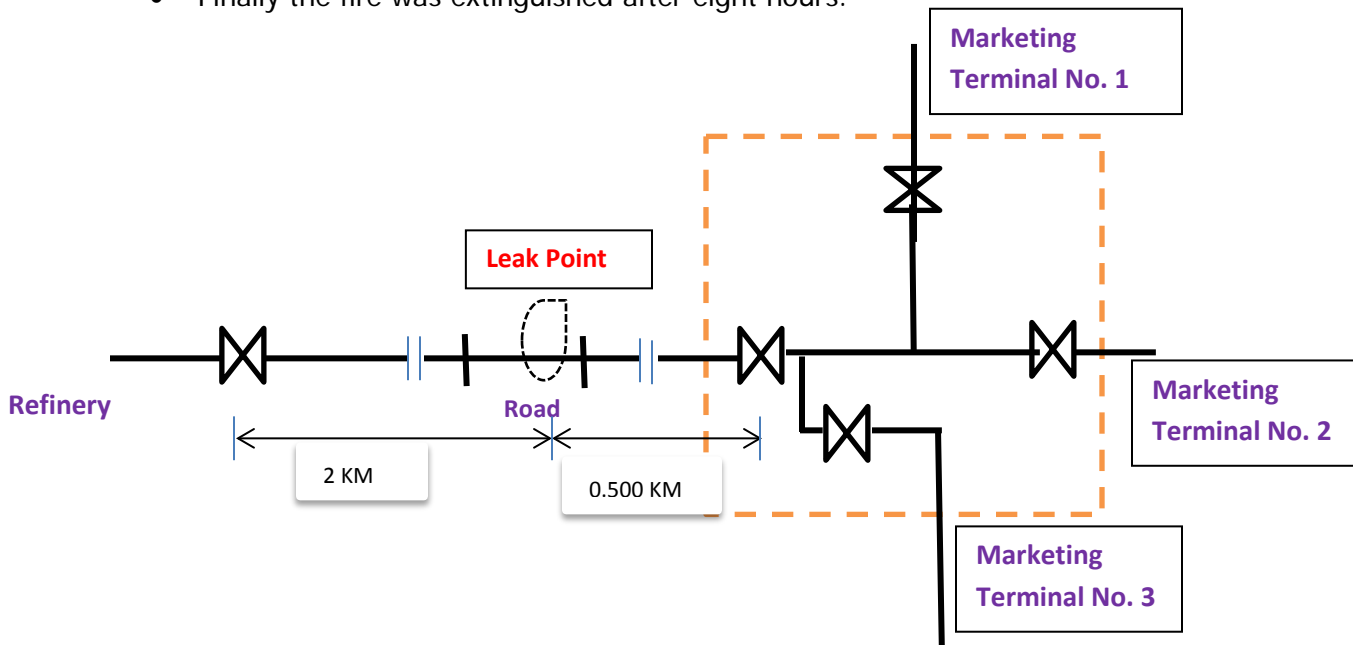
## CASE STUDY- MAJOR FIRE IN A MS PIPELINE AT A PORT LOCATION

### INTRODUCTION:

It was late afternoon on a week end when the news of a big fire from a jetty pipeline area made people rush to the site. The leak in the pipeline at the jetty area was noted during the morning while MS was being transferred from one of the refinery to its marketing terminal. The pumping was stopped in the morning and preparatory work for repairing the line i.e. flushing of the line was in progress. The fire-fighters put the fire under control & finally extinguished the same, though it took time to do so, since the spilled MS got mixed with the water in the creek & was carried away to nearby areas during the tide.

### OBSERVATIONS:

- The leak in the 14" OD line caused substantial spillage of MS; the spilled oil got mixed with the water in the adjacent creek & spread to nearby areas due to tidal effect.
- Gully sucker & other firefighting accessories etc. were mobilized to recover the oil from the creek,
- Flushing of the associated lines was started to undertake the repair of the line. After sometime when it was observed that the leakage of product increased substantially the flushing operation was stopped,
- A major fire took place at about 100 M away from the leak spot; fire tenders were put into service to fight the fire,
- Fire was put under control but kept on re-occurring intermittently,
- Finally the fire was extinguished after eight hours.



***SCHMATIC SKETCH OF THE PIPELINE & LEAKAGE POINT***

## ANALYSIS:

- Health check-up such as thickness survey of the subject pipeline or hydro test of the pipeline was not reported be carried out since commissioning of the line.
- Proper maintenance of the pipeline was not undertaken; no evidence of preventive maintenance of the pipeline was found.
- Cathodic protection which is a usual practice to prevent external corrosion was not provided in the subject pipeline for the underground sections.
- The thinning of the pipeline, as may be seen from the attached pic, indicates uniform external & internal corrosion, across the longitudinal section of the pipeline, was taking place for prolonged period of time.
- Further, external coating was not provided in the underground pipeline which aggravated the external corrosion.
- The practice of flushing the lines with sea water is detrimental to the health of the pipeline.
- During earlier incidences of leakages, the leak was rectified by clamps and S-wraps, which are temporary measures & not a good engineering practice.
- Normally road crossings are provided with casing pipes/ sleeves to take the additional load; in the instant case the same was not provided.
- The philosophy of replacement of pipe segment, as & when required, without proper Maintenance & Inspection cannot ensure integrity of the pipeline.



**A VIEW OF SEVERELY CORRODED PIPE**

## **ROOT CAUSE:**

- The uniform paper like thinning of the pipe indicates corrosion for a prolonged period of time. The corrosion in the pipeline is attributed to both internal & external corrosion; not providing cathodic protection system coupled with no external coating on the line made it vulnerable against external environment. It may be pertinent to note that nearer to the sea location indicate that the soil resistivity is low which enhances the rate of corrosion. The internal corrosion in the line is attributed to use of saline (sea) water as flushing media. Further in absence of periodic planned M&I activity such as direct corrosion assessment tests (hydro test, thickness measurement etc.,) the extent of damage in the line could not be assessed till the same failed.
- Since there was no external coating in the underground pipeline, it caused severe external corrosion of the pipe.

## **SOURCE OF IGNITION:**

After the failure of the pipeline, the leaked product, MS got mixed with the water in the adjacent creek. It was raining heavily and due to the tidal effect MS got spread up and flowed to nearby mangroves field, which was already flooded with water. It was reported that a passer-by lighted a bidi, which provided the ignition.

## **LEARNINGS:**

- Regular health & integrity assessment of the pipeline shall be carried out by carrying out thickness measurement of the pipes, hydro testing etc.,
- Maintenance schedule must be prepared for carrying out regular maintenance of all the associated accessories like valves including the maintenance activities like partial stroking, stem greasing, drain flushing, seat sealant injection etc.,
- Proper painting of above ground pipes shall be carried out at regular intervals; the saline environment hastens up the external corrosion & application of suitable paint would reduce external corrosion.
- Underground pipes shall be provided with suitable external coating such as 2-ply/ 3-ply cold tape, PU coating, High Build Liquid Epoxy etc.,
- Sleeves shall be provided in all the road crossings after putting a corrosion resistant paint for strengthening the pipe. This would prevent cyclic load on the pipe segment while vehicles pass over the crossings.
- Corrosion probes/ corrosion coupons shall be provided for monitoring the rate of internal corrosion. Corrosion inhibitors may be used in the pipeline, if the internal corrosion rate exceeds 1 mpy.

- Flushing of pipeline with sea water must be dispensed with. In the event line flushing is absolutely necessary, must be done with fresh water or ideally kept with product fill; in the later case, necessary accounting must be done.



**THE FIRE AFFECTED AREA**

- Considering, the fact that there was cluster of product tanks near this pipeline, risk analysis shall be carried out for product transfer/receipt lines and necessary remedial measures may be taken.
- Periodic mock drills must be conducted for effective handling & preparedness of emergency situations.

**Narration:**  
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