

## Incident Summary (Reference 5574511)

|                        |                                 |        |   |   |
|------------------------|---------------------------------|--------|---|---|
| SUPPORTING INFORMATION | Incident Date                   |        | February 2, 2016 @ 0115 hrs   |   |
|                        | Location                        |        | Prince George   |   |
|                        | Regulated industry sector       |        | Boilers, PV and Refrigeration   |   |
|                        | Impact                          | Injury | Qty Injuries  | No injuries                                       |
|                        |                                 |        | Injury description  | N/A   |
|                        |                                 |        | Injury rating   | N/A   |
|                        | Damage                          |        | Damage description  | 2 boiler tube sections were damaged and replaced. |
|                        |                                 |        | Damage rating   | Insignificant                                     |
| Incident rating        |                                 | Major  |   |   |
| DESCRIPTION            | Incident overview               |        | A leak was identified in the lower furnace of a Recovery Boiler. The tube leak discharged directly into the smelt bed. An emergency shut down of Recovery Boiler was employed. The potential for a smelt water explosion was created.   |   |
|                        | Site, system and components     |        | This industrial site utilizes the KRAFT Pulp manufacturing process. The “Recovery Boiler” is a high pressure steam boiler used in the KRAFT process. The intense heat in the boiler furnace fuses the inorganic elements of black liquor (mainly sodium carbonate and sodium sulphide) to form what is known as smelt. One of the main hazards in operation of recovery boilers is the smelt-water explosion. This can happen if even a small amount of water is mixed with the solids in high temperature. This incident resulted in water coming in contact with the smelt. |   |
| CONCLUSIONS            | Failure scenario(s)             |        | The failure occurred at the junction of an opening in the boiler wall, which is comprised of a series of vertical tubes welded to one another. The crack was located at the convergence of 2 tubes in a wall opening, it propagated from the connecting membrane into the wall of a boiler tube.<br>The operating conditions, age of the equipment and design of the boiler contributed to development of a crack.  |   |
|                        | Facts and Evidence              |        | This failure has previously occurred at this site as well as with other boilers of a similar construction. It has been recognized by owners operators and the manufacturer that the inherent design of the tube wall openings contribute to the likelihood of failures. During operation the area is also exposed to high temperatures and a method of cleaning and maintenance known as “port rodding”, which contributes to corrosion/erosion.  |   |
|                        | Causes and Contributing Factors |        | It is probable that the operating conditions, age of the equipment and design of the boiler contributed to this failure.  |   |

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