

# “Produced Water Line Dropped 450mm Due to Pipe Support Failure” - 5 Why Incident Investigation

<b>MyOSH #</b>	003169	
<b>Incident</b>	Produced Water line dropped (450mm) due to failure of pipe support	
<b>Classification</b>	Near Miss	
	INJURY, COMMUNITY COMPLAINT, ENVIRONMENT, EQUIPMENT, NEAR MISS, PRODUCTION, SECURITY	
<b>Category</b>	<b>ACTUAL:</b> 2	<b>POTENTIAL:</b> 4
<b>Date Raised</b>	04/07/2019	
<b>Investigation lead</b>	[REDACTED]	
<b>Investigation team members</b>	[REDACTED]	
<b>Equipment / Plant Area</b>	Cargo Deck – STB Side	
<b>Description of event</b>	<p>During ongoing corrosion remediation HP blasting was being performed on the supporting columns for the central walkway (Orchard Rd Bridge). Water blasting was being performed on the 4<sup>th</sup> Stbd Column when the angle pipe support attached to the column failed, causing the pipe to shift downwards 450mm.</p> <p>At the time the operator was blasting the column just above where the pipe support is attached. The column had water in it which was identified by the operator from a small hole on the Fwd side of the column. Seeing this the operator focused the HP water jet at the corrosion around the hole to try make the water flow out of the column more freely. The pipe support is also attached to the fwd side of the column just below the hole / location where water was squirting out. (see photos)</p> <p>The pipe support is supporting the expansion bend section of the 300mm - super duplex produced water line from the degasser to slops tank. The line is currently out of service –valve &amp; positively isolated (see P&amp;ID).</p> <p>This is the only pipe support providing direct support to the expansion bend of the pipe.</p>	
<b>Facts and Timeline</b>	<p><b>2015</b></p> <p>– Last inspection of pipe supports in area. Follow up re-inspection recommended for 2021. (Details provided by MICE)</p> <p><b>1/7/19</b></p> <p>Email directive given to NE_MS by client advisor (NOGA) to commence blasting operations on Orchard Road bridge structures.</p> <p><b>3/7/2019</b></p> <p>Permit created – HW-64882 - UHP Blasting Orchard Road Bridge structure</p> <p><b>4/7/2019</b></p> <p>08:30 – Permit sign on.</p> <p>09:30 – Work commenced – started on Column 1 Stbd &amp; Column 1 Pt</p> <p>12:00 – Lunch</p>	

*13:15 – Operator blasting Stbd side of Column 4 Stbd – under Orchard Rd Bridge (Cargo Deck)*

- *Operator noticed water squirting out of Fwd side of the column just above the pipe support which was also attached to the forward side of the column.*
- *Operator focused HP jet at corrosion around point where water was squirting in order to expose the hole and allow water inside the column to flow out freely.*
- *Operator noticed a large section of rust dislodge from the underside of the pipe support and fall onto the deck. Operator was standing / blasting from the other side of the column (Stbd side) to where the rust fell (Port side). Size of piece of rust was approximately 300mm x 100mm x 10mm.*
- *When Operator saw piece of rust fall to the deck, he stopped blasting.*
- *Pipe support then started to bend and the pipe started to move/lower slowly.*
- *This was followed by a sudden jolt as the pipe support gave way and pipe shifted downwards, causing the pipe to bounce in position until it came to rest.*

*13:16 – Operator and other crew immediately vacated immediate vicinity and contacted CCR.*

**Contributing Factors**

*Pipe support heavily corroded*

*HP Blasting – water jet causing layered corrosion to split.*

*Vibration impact from HP Blasting*

**Impact**

*Pipe support failed causing line to drop approx..450mm*

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	Why did the above happen?	Verification
Why 1	LP Prod Water pipe support failed – line dropped 450mm	Photos, Witness Statements
Why 2	Pipe support / structural fixing impacted by HP Water Blasting operation.	Photos, Permit to Work, Witness Statement
Why 3	The vibration / high pressure water from jetting weakened the pipe support enough to cause support failure	Potential disruption of layered corrosion – See photos
Why 4	HP Jetting work scope being undertaken did not adequately consider the condition or likelihood of failure of the pipe support prior to task commencing.	Potential disruption of layered corrosion – See photos.
Why 5	Inspection guidance on the condition of existing structures and pipe supports was not conducted prior to the blasting operation – guidance on potential failures and work scope approval.	<p>Corrosion of pipe support – original support since vessel construction</p> <p>Facility PDO Register – does not capture failed support. Area re-inspection target date – 2021 as advised by MICE</p> <p>Identification and replacement of the corroded support prior to failure did not occur.</p> <p>The work scope for the Eftech blasting team – was initiated by client advisor (NOGA) – email directive.</p>

### Actions

Task	Owner	Scheduled date
Design, fabricate & Install a replacement pipe support in consultation with engineering team.	NEMS	10/07/2019
Conduct inspection of Prod Water pipework / welds impacted to verify pipe integrity.	NEMS	10/07/2019
Initiate follow up inspection survey of all PDO's on register	MICE	31/10/2019
Ensure future HP Blasting work on structural equipment is reviewed by on board inspector and potential for failure is identified and mitigated.	NE Prod Super	30/09/2019



### Category Definition Table

Consequence Severity (Rank)		Injury / Health Effect	Regulatory	Environment	Asset Production Loss	Business Reputation
<u>6</u>	Catastrophic	2 or more fatalities OR severe irreversible illness / disability to more than 10 persons.	Civil / criminal prosecution OR potential jail terms for directors or fines for company OR Loss of operating licenses.	Extremely severe environmental impact with significant recovery work over a few years or Global media interest.	Extreme > \$5M	Extreme adverse public, political or media outcry, resulting in international coverage. Critical impact on business reputation & future.
<u>5</u>	Severe	1 fatality OR serious irreversible illness / disability (>30%) to less than 10 persons.	Civil prosecution OR unfavourable tariff outcomes.	Major environmental impact with significant site impact and recovery work over a few months. Regional / national media interest	Severe \$ 2.5M to < \$5M	Major adverse national media /public / political attention.
<u>4</u>	Major	Serious permanent disability / illness (<30%) to 1 person.	Unfavourable policy outcomes OR systemic breaches (small and large). Enforceable undertakings.	Significant environmental impact with off-site impact and recovery work over a few weeks. Some local and regional media interest.	Major \$1M to < \$2.5M	Significant impact on business reputation and/or national media exposure.
<u>3</u>	Serious	Serious injury or serious health effects resulting in more than 5 days lost time OR more than 1 month alternate / restricted duties.	Systemic minor PIN or regulatory breaches OR 1 large breach OR no formal conviction.	Serious environmental impact with some on-site impact and recovery work over a few days. Some local media interest.	Serious \$300k to < \$1M	Serious, adverse local public or media attention or complaints.
<u>2</u>	Moderate	Injury / health effect to individual requiring medical treatment by a medically qualified person with less than 5 days lost time OR less than 1 month alternate / restricted duties.	Local investigation OR on the spot fine OR Prohibition Improvement Notice (PIN).	Minor environmental impact, slight or negligible impact, negligible remedial / recovery work.	Moderate \$30k to < \$300k	Minor impact. Public awareness, but no public concern.
<u>1</u>	Minor	Injury or illness requiring first aid (no lost time or alternate / restricted duties).	Minor regulatory breach OR compulsory reporting of incident.	Negligible environmental impact, effect contained locally.	\$0k to < \$30k	Negligible impact on reputation.

**Notes:** Not all consequences descriptions have to be met - the rule is one OR another etc