SAFETY FEEDBACK NOTICE
CONDENSATE LEAK

DGEP / HSE	Ref: 5 - 2005	Issued: 24/3/05

THINK SAFETY FIRST

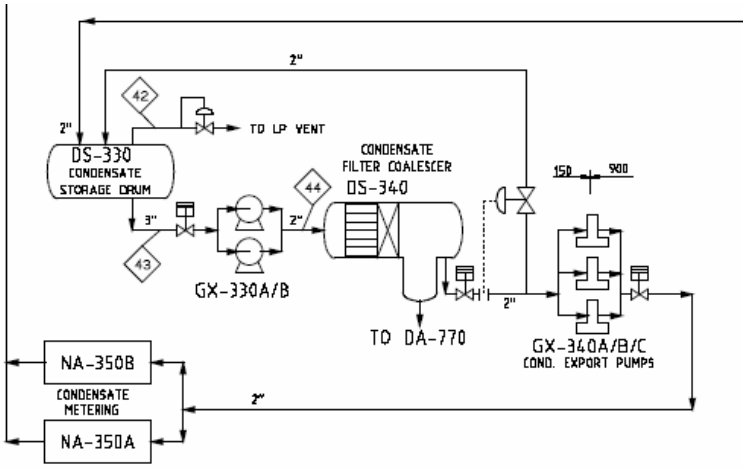
Introduction

A large condensate leak occurred in December 2004 on a platform operated by Total E&P in the North Sea. No ignition occurred but if it had the consequences could have been very serious. Control of major risks – including hydrocarbon releases – is a main theme for E&P.

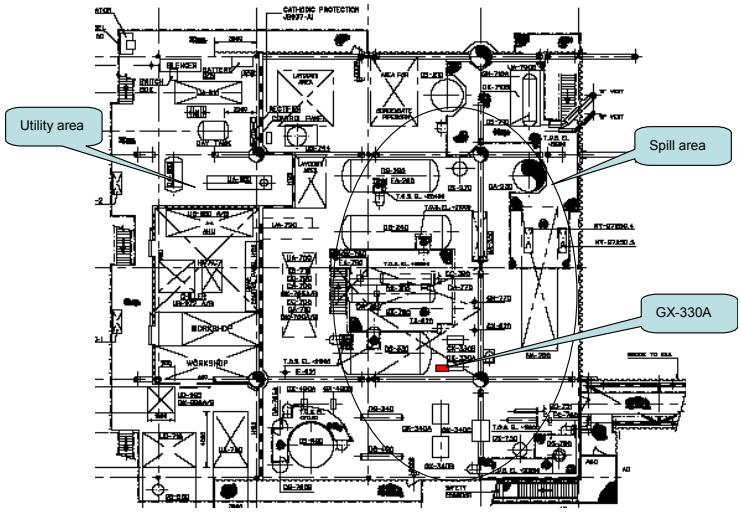
Incident Description

Two condensate booster pumps GX330 A/B supply condensate from a flash drum to a coalescer.

The pumps (positive displacement type) are situated on the cellar deck of a process platform. The deck is plated with drains connecting to a Skimovex unit. The deck is largely enclosed by firewalls and weather cladding.



At 0705 a.m. the Skimovex high level alarm activated in the Control Room. Investigation showed a large leak of condensate in spray form from pump GX330A. The pump was stopped from the Control Room. The leak began to stop. Vapourised condensate then activated the fixed gas detection system. Personnel were mustered. Cellar deck ventilation was maximized and clean-up operations started. The emergency was handled in a satisfactory manner.



Leaking condensate covered approximately 65% of the deck area of 644m^2. The condensate release quantity has been estimated as being between 350 and 500 kg.

Simulation has shown that less than 2% of the condensate vapourised, resulting in a gas cloud of 2 to 4 Nm^3.

Incident Causes

The immediate cause of the leak was equipment failure:

- The aft bearing of the output shaft of the gear box was found damaged (to be investigated further). The damaged bearing caused play on the output shaft, to which the pump drive shaft is connected. Out of centre rotation of the pump drive shaft caused the single mechanical seal to be destroyed allowing a leak to occur.

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The underlying causes of the leak related to management of change and high work load:

- The booster pumps had shown a high maintenance requirement. Concerns were raised and investigations made in the summer of 2004. The solution identified was a modification to install a pulsation damper to reduce pressure variations on the pumps. However, this modification was not progressed due to a high backlog of modification requests. Although modifications were prioritized, the back-log jeopardized the functionality of this program. A quick response to breakdowns was achieved, but preventive modifications progressed at a different, slower, pace.
- Despite high maintenance requirements, the pump inspection regime was not reviewed or amended.
- A modification had previously been made to install leak monitoring (delta flow measurement) on the booster pumps. However, due to vibration problems this system had been removed, so the intention to provide leak detection was not achieved.
- Analysis of pump control data showed a problem of oscillating pressure control. Previously an annual review of control loops was performed by a third party. Due to severe bed space restrictions offshore and an improved DCS this review was stopped. But the DCS functionality for monitoring and evaluating control loops has not been used to full advantage. Thus hidden oscillating controls that can indicate a more fundamental problem were not identified.

Recommendations

General

- A Hydrocarbon Release Reduction Initiative was launched jointly between DGEP/HSE, TDO/EXP and TDO/FP in September 2004. Affiliates must ensure they have acted on this and provided immediate feedback on action plans to Headquarters.
- Affiliates must have robust management of change (modification) procedures in place. Backlogs of modifications must be periodically reviewed by senior management and necessary resources allocated to priority items.

Technical (based on Affiliate recommendations)

- Upgrade or change the pumps. Improvements being studied are: upgrade the gearbox; provide a double seal arrangement with accumulator and leak detection (verify API guidance); install a pulsation damper as originally proposed in 2004.
- Review leak detection based on gas detection above the booster pumps and liquid level detection in the pump drip pan.
- Perform a survey to establish an integrity matrix for condensate and other sensitive systems, including pump type, seals, fluid, controls, flanges, vibration monitoring, means of detection etc. Then make a gap analysis to establish monitoring protocols/improvements.
- Review pump histories and amend inspection programs as required.
- Establish a control monitoring team to regularly check control systems for irregular behaviour in a structured way using DCS functionality.
- During technical evaluations of equipment tenders, due attention must be paid to design deficiencies to ensure a safe design.
- Recognise that condensate can contain potentially harmful components (eg benzene) and leaks may expose personnel. Raise health hazard awareness of this issue.