

## EXTENDED ABSTRACT

### Identification and Management of Hexavalent Chromium Dust Exposure on Gas Turbines in the LNG Industry

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#### Objectives

Case study of the management of exposure to Hexavalent Chromium (CrIV) found in the combustion products deposited onto the "hot" sections of turbines used in the oil and gas industry for LNG production. The case study outlines how the issue was identified and managed on one LNG facility to minimise the risk of exposure to maintenance workers.

#### Methods

- Review of current industry information regarding the presence of Hexavalent Chromium on the combustion section of turbines used in the production of LNG.
- Review of maintenance records, specifically photos of turbine overhauls, to identify potential discolouration on the component over time.
- Wipe sampling
  - OSHA wipe sampling method [W4001](#)
  - Swab sampling for indicative presence of chromium i.e. "ChromateCheck™"
- Personal and area sampling using NIOSH sampling method [7605](#)

#### Results

- The presence of Hexavalent Chromium was confirmed through wipe samples collected, i.e. up to 83µg using OSHA W4001. Subsequent indicative swab sampling measures have been used to test for the presence of hexavalent chromium and importantly after cleaning processes to verify it has been effective.
- A Hygiene Risk Assessment (HRA) was developed for the maintenance task which outlined the controls for managing exposure (critically testing and PPE requirements for cleaning).
- Cleaning regime developed and updated into the maintenance procedures for turbines as critical hold points.
- Active sampling (NIOSH 7605) has confirmed the presence of airborne hexavalent chromium dust at approximately the workplace exposure standard when disturbed. Not enough samples were collected to be deemed statistically significant.

### **Conclusions and Recommendations**

Based on the review and sampling conducted, there is potential for exposure to hexavalent chromium during turbine maintenance activities in the oil and gas industry for LNG production. The contaminant is a product of combustion which deposits onto the “hot” section of the turbine

A controls-focused approach using a hygiene risk assessment has been successful onsite to raise awareness of the risks and the required controls. These resources have been instrumental to influence maintenance procedures that employees use at the work front and critically input hold points for swab sampling, PPE requirements, cleaning of surfaces (including verification surfaces are adequately clean) as well as waste disposal requirements.

Further quantification on the exposure potential is required, including:

- Air sampling to determine potential inhalation risks,
- Urinalysis to quantify skin absorption potential.

### **Key Words**

Hexavalent chromium, nickel oxide, turbines, product of combustion, LNG Industry, swab sampling, hygiene risk assessment