

Explosion at a pyrolysis plant in Joensuu: investigation report abstract

Accident	Explosion at a pyrolysis plant
Date	Thu 27 March 2014, 2:05 pm
Location	Fortum Power and Heat Oy, Joensuu (Finland)
Summary of the accident and of the results of the investigation	<p>The accident occurred at a pyrolysis plant after the process had shut down automatically due to strong fluctuation of the liquid levels. In order to establish the cause of the fluctuation a service hatch of a process vessel located between the scrubber and the condenser was opened. Prior to the opening of the hatch nitrogen had been fed into the process in order to create an inert atmosphere. However, the high level of liquid inside the condenser had blocked the intended route of the nitrogen which instead flowed into the adjoining main power plant boiler. Inerting having thus failed reactive process gas was still present in the process and when the hatch was opened incoming oxygen and the process gas reacted leading to an explosion. Three people were injured.</p> <p>The plant is the first industrial scale pyrolysis oil producing plant in the world. At the time of the accident the plant was still at the commissioning phase so there was no experience of operating such a plant. The aim of the commissioning phase is to ensure the process runs as designed and to find appropriate operational and control parameters for the actual production phase. Typically a number of modifications need to be carried out during the commissioning phase. Thus, comprehensive hazard identification and risk assessment play a particularly important role in ensuring the safety of the plant. Close attention should be paid to measures ensuring safe work practices.</p> <p>The competent authority should ensure the characteristics of the commissioning phase are taken into account in the licence conditions.</p>
Measures proposed by the investigation team	<p>In order to prevent similar accidents, the investigation team recommends the following measures.</p> <p>Technical measures:</p> <ul style="list-style-type: none"> • Best possible expertise to be used for hazard identification and risk assessment. Assessment to be extended far enough to potential fault initiators. • Close attention to be paid to the planning and design of the inerting system, in particular to ensure that it can be confirmed that inerting has been successfully carried out. • Process to be designed to cope with varying process conditions (a resilient process). <p>Organisational measures:</p> <ul style="list-style-type: none"> • Permit to work to be used for infrequent, potentially hazardous tasks (e.g. installation, maintenance and repair). The permit to work system to be clearly defined. • Plan (including timetable) for the commissioning phase to be pre-

	<p>sented to the competent authority, preferably during the licence procedure.</p> <p>Measures for the competent authority:</p> <ul style="list-style-type: none">• The competent authority needs to consider specific licence conditions for the commissioning phase.
Date of report	12 August 2014
Signatures of the investigation team	Maarit Talvitie Matti Nissilä Sanna Pietikäinen