



## INVESTIGATION REPORT

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**INCIDENT  
NOTICE NO.**  
**19-13**

**INVESTIGATION  
REPORT NO.**  
**896**

**1. DATE AND TIME OF INCIDENT (When?):**

Tuesday, 27<sup>th</sup> February 2018 at 10:10 am

**2. INCIDENT LOCATION (Where?):**

- a. Company name:** EXSA S.A.
- b. Company facility:** PETN Plant, Lurín, Lima, Perú
- c. Process outline:**

PETN continuous production plant has a nominal capacity of 200 Kg/h (441 lb/h) of PETN. The PETN plant is operated from a Centralized Digital Control System where process parameters are supervised, controlled and modified according to the results of the analysis performed to the product.

The process consists of: Nitration, Dissolution and Re-crystallization. After the nitration stage where PETN is produced, the PETN/spent acid suspension flows onto the first vacuum filter in order to separate the nitric acid from PETN. The PETN is then discharged into a vessel by a scraper.

On the vessel PETN is continuously stirred and mixed with a controlled amount of water in order to obtain a suspension of PETN crystals in water. This suspension is pumped to a second vacuum filter. The ratio between PETN and water inside the pipe is such that ensures a safe operation.

After that, PETN is dissolved in acetone and neutralized with ammonia. Finally, PETN is recrystallized by the addition of water to the PETN/acetone solution and its progressive cooling in order to achieve PETN crystallization.

**3. DESCRIPTION OF INCIDENT (What happened?):**

A radial displacement of the second filter scraper was observed on CCTV record. Due to this displacement, steel/steel friction occurred between the filter scraper and the inner edge of the filter ring. Stainless steel shavings were produced for a time span of 10 minutes and this material remained on the filter's surface.

**4. IMPACT OF INCIDENT (What effect?):**

Acidic Water Filter pieces were damaged and PETN production contaminated with steel shavings.

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## **5. LIKELY CAUSE OF INCIDENT (Why did it happen?):**

- a) Inappropriate design of filter polypropylene pieces (disks stacked on a central axis), which produced friction between the disks generating heat and therefore dilatation. Four (04) disks were found that serve to regulate the height of the scraper. However, design plane delivered by Biazzi only indicated one (01) disk.
- b) The scraper base stuck with the filter hub because of excessive adjustment, causing the scraper to displace radially and into contact with the inner edge of the filter ring. When disassembling the filter, the drag pin was found out of place and embedded between the hub disks.
- c) The displacement of the scraper with the consequent production of shavings occurred prior to the sending of PETN to the filter. But plant personnel didn't inspect the F-201 filter prior to the start of PETN pumping from the nitration room.
- d) There was a lack of awareness of the personnel, who only had 8 months of experience, about the risk of the process. Supervision, on the other hand, did not take time to evaluate the findings because of the need to return to control room.

## **6. ACTIONS TO PREVENT RECURRENCE (How to prevent it?):**

Since this incident, the following actions have been executed:

- Change the plastic material of the filter hub with a more resistant material (UHMWPE).
- Redesign of the filter hub and scraper fixation by a system that is independent of the rotation of the filter.
- Raise awareness among plant personnel to report any unusual situation or deviation related to the process such as foreign bodies, unusual noise or other situations that may arise.
- Carry out the reinforcement to the supervisors in the SAFESTAR course.

## **7. LEARNING POINTS (What can we learn from this incident?):**

The incident was valuable as it evidenced the existing vulnerabilities in the process. Thanks to this, we could take actions that allow us to have a safer process by improvement our risk controls and raising awareness among personnel involved.

Likewise, it allowed us to reinforce our culture to report any event that occurs, to refuse to perform an insecure job and to act on the conditions reported by the staff.

## **8. OFFICIAL REPORT (Will there be an Official Report to follow?):** An Official Report follows a formal inquiry which the company or regulatory authorities may initiate.

No

## **9. ORIGINATOR (Who submitted this report?):**

**a. Name: Omar Portugal Apaza**

**b. Position in the Company:** Productor Manager

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