Internal audit of compliance with requirements of industrial safety, labor and environmental protection and its impact on safety of oil companies

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Abstract. The article is devoted to the study of the oil industry in Russia. In particular, the monitoring of the system for ensuring the industrial and environmental safety of oil enterprises is being studied in order to reduce the risks of accidents and unforeseen situations. Audit was selected as one of the monitoring tools. The audit process was considered at example of diesel hydrotreating unit of L-24-7 fuel located on the territory of the PJSC Bashneft Bashneft - UNPZ refinery. Based on the analysis, a block diagram of the audit process was compiled and an approximate form of the audit report at the diesel hydrotreatment plant was presented. Based on the results of the study conducted on system monitoring for compliance with the requirements of industrial safety, labor protection and the environment, it was concluded that it is necessary to conduct an audit of this plant in a timely and regular manner. This, in turn, will increase the likelihood of identifying weaknesses and corresponding risks in the early stages of the development of the problem.

Refineries today occupy one of the key positions in the Russian economy. At the same time, they begin a list of the most emergency industries, forming a constant increased fire or explosion hazard, along with a tense technological and environmental situation. The safety of the refinery's operations is now considered in many different aspects, and its improvement can be considered as one of the options for preventing a large number of man-made and environmental accidents.

In order to minimize the statistics of accidents and accidents, it is necessary to regularly monitor the safety system, since the life of people and the competitiveness of the refinery directly depend on this.

One of the monitoring tools is auditing. According to GOST R ISO 19011-2012: Audit - a systematic, independent and documented process of obtaining audit certificates and objective assessment of them in order to establish the degree of compliance with agreed audit criteria. The audit methodology involves each employee of the enterprise from worker to specialist. The method is based on risk - a focused approach aimed at preventing emergencies and unforeseen circumstances.

Let us consider the audit on the example of the unit for hydrotreating diesel fuel L-24-7, a branch of PJSC ANK Bashneft Bashneft - UNPZ.

The plant L-24-7 built according to the project of the Lengiproneftekhim Institute and put into operation in 1972.

The plant is designed to desulfurize the middle oil fractions by moderate hydrogenation, as a result of which organic compounds of sulfur, oxygen and nitrogen are converted into hydrocarbons with the release of hydrogen sulfide, water and ammonia, and olefins are converted into more stable
hydrocarbons of the paraffin series on an aluminicolcoblaltmolybdenum catalyst in a hydrogen atmosphere. The hydrotreating process is carried out at a relatively high temperature of 280 - 400 °C and pressure up to 60 kgf/cm².

The plant consists of two independent units, which allow to process different fractions of diesel fuel at different process parameters or to repair and regenerate the catalyst on one of the units during operation of the second one.

During operation, the plant introduced a number of technological measures that significantly improve the technical and economic performance of the plant, improve service safety, and reduce significant emissions of harmful gases.

Thus, more than 45 years have passed since the commissioning of the diesel hydrotreating plant L-24-7, therefore, it is necessary to monitor the operation of this plant in more detail, and develop preventive actions that will reduce the risk of unforeseen emergencies in the future.

Let's consider the scheme of audit at the unit of diesel fuel hydrotreatment L-24-7, below in figure 1.

Figure 1. Block - Audit Diagram for the Hydrotreatment of Diesel Fuel L-24-7 PJSC ANK Bashneft Bashneft - UNPZ
This audit is based on the interaction of the auditor and the employee (auditing and auditing party). At the end of the audit, the auditor shall draw up a report. An exemplary list of the data reported is presented in table 1 below.

**Table 1.** Approximate form of audit report at diesel fuel hydrotreatment unit L-24-7.

| №  | Place of audit | Number of employees audited at workplaces | Violations | Audit Actions (Corrective/Preventive Actions) |
|----|----------------|------------------------------------------|------------|-----------------------------------------------|
|    | site shop      |                                          | list of detected violations | classification of violations by severity | list of proposed activities | date of performance |
| 1. | - -            |                                          | -           | -                                             | -                            | -                  |
| 2. | - -            |                                          | -           | -                                             | -                            | -                  |
| 3. | - -            |                                          | -           | -                                             | -                            | -                  |
| 4. | - -            |                                          | -           | -                                             | -                            | -                  |
| 5. | - -            |                                          | -           | -                                             | -                            | -                  |
|    | Data from auditors |                                      | -           | -                                             | -                            | -                  |

Thus, based on table 1, it can be seen that the report presented in the table correlates with the audit flow chart shown in figure 1.

The more regular the audit of this installation, the more likely it is to identify weaknesses and corresponding violations in the early stages of the development of problems, and this in turn will reduce the possible occurrence of accidents and accidents. Accidents and injuries are the main indicators that determine the state of industrial safety of GCO. In accordance with the ФЗ-116, Art. 1 "an accident is the destruction of structures and (or) technical devices used at a hazardous production facility, uncontrolled explosion and (or) release of hazardous substances."

**Figure 2.** Dynamics of industrial injuries for 2014-2018 at the hazardous production facility of oil and gas processing, petrochemical industry and oil production facilities.
Conducting an analysis of the causes of accidents helps to identify weaknesses that should be noticed and, accordingly, prevent the occurrence of emergencies at facilities.

The dynamics of industrial injuries at hazardous production facilities of the petrochemical, oil and gas processing and oil production facilities for 2014-2018 is presented in figure 2, according to the report on the activities of the federal service for environmental, technological and nuclear supervision for 2018.

Currently, there is already a positive effect of the implementation of this procedure in the form of reducing industrial injuries, accidents and accidents at hazardous production facilities. Among other things, conducting an audit involves increasing awareness of personnel behavior while complying with safety requirements at the L-24-7 installation, as well as labor protection rules.

In conclusion, we can conclude that audit as one of the tools to ensure the safety of the L-24-7 installation is a relevant topic and requires special attention and additional analysis.

Thus, based on the results of the work done, it can be concluded that ensuring technical safety at petrochemical facilities is a relevant topic and requires special attention for further study.

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