ITSF 2017 – International Technical Safety Forum

Report of Contributions

https://indico.triumf.ca/e/7

Contribution ID: **0** Type: **Oral**

Methodological Approach to Safety Analysis at CERN

Tuesday, 19 September 2017 14:00 (25 minutes)

The main aim of the workplace risk analysis is to establish a safer and healthier workplace by implementing identification of hazards, evaluation of risks where required and reduction of risk levels by adding preventive measures or controls, as necessary.

Unlike industrial workplaces, at CERN the research activity is constantly changing and it is common that personnel shifts from a duty to another of a quite different kind. Workers move through the site in the course of the accomplishment of their tasks and they may endangered by co-activities performed by other teams. This paper aims at addressing this special situation with an eye to the efficient implementation of safety management and proposing a proactive methodology for performing risk analysis.

The starting point of the method is the identification of the work perimeter by taking into consideration both the working activities and the working groups. Then, for each perimeter, a detailed description of all activities is carried out. The identification and the estimation of the severity of hazard is done. A full risk assessment is proposed in case the estimation of a hazard is not sufficient, due to the peculiar source of harm or to an insufficient knowledge of a linked installation. In order to facilitate the implementation of the proposed methodology, a set of tools, such as checklists, classification of hazards and templates, has been produced. The completed safety analysis for a perimeter and the resulting action list for the safety performance improvement is submitted to the supervisor in charge of the safety of the installations and the activities.

The implementation of the proposed safety analysis brings a twofold benefit: i) safer and more hygienic conditions and ii) availability of documentation for informing and training the workers on safety matters.

The methodology is validated on the field and a practical example of risk analysis carried out at CERN is described.

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Track Classification: Technical risks and Risk assessment

Contribution ID: **1** Type: **Oral**

Oxygen Deficiency Hazard Cryogenic Assessment

Thursday, 21 September 2017 14:30 (25 minutes)

At CERN, many different types of installations, such as small laboratories, experimental halls and accelerator tunnels, require the use of cryogenic liquids and gases, typically stored in cylinders, gas tanks, or Dewar vessels. Since a liquid cryogen can expand, the uncontrolled release into an enclosed space can easily cause an Oxygen Deficiency Hazard (ODH). In this paper a methodological approach for the evaluation of ODH is presented.

The starting point of the method is a simple estimation of oxygen level in the working environment after the complete release of all cryogens, at room temperature and pressure. Then, in case the estimated oxygen level is less than 18 percent, a more detailed risk assessment is performed. The risk assessment includes credible release scenarios during normal operation (filling, steady-state) as well as during accidents/incidents (e.g. overpressure, mechanical impact, fire, etc.). The leakage rate of cryogens is estimated for the release scenarios, using advanced modelling tools. A predictive model is used to estimate the indoor oxygen level as a function of time and to evaluate the necessity of preventive and/or protective measures. In addition, the time estimate to evacuate the zone is computed for the worst scenarios.

The proposed method is developed in order to bring a more proactive approach to the oxygen deficiency risk management at CERN and it is validated from a practical point of view with the presentation of a case study.

Keywords: Oxygen Deficiency Hazard, Risk assessment, Predictive model, Cryogenic liquids

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Track Classification: Technical risks and Risk assessment

Contribution ID: **2** Type: **Oral**

Conformity approach for Pressure Equipment for the High Luminosity LHC Project

Wednesday, 20 September 2017 09:50 (20 minutes)

CERN as an intergovernmental organisation establishes its own safety rules as required for its proper functioning. In the domain of pressure equipment, including for cryogenic service, the baseline approach within the CERN Safety Rules is full conformity with the European Pressure Equipment Directive (PED), including the appropriate involvement of a notified body, together with CE marking.

However, due to the nature of some of the equipment used within CERN's facilities, as well as international collaborations with in-kind contributions from non-EU countries, full compliance with the PED may not always be readily achievable. This situation is foreseen in the CERN Safety Rules, and CERN's Occupational Health & Safety and Environmental Protection Unit will then define the safety requirements applicable to such equipment, as well as any eventual additional compensatory measures, to ensure a commensurate level of safety as that which full compliance to the PED intends.

For the High Luminosity LHC Project, an approach has been agreed for certain specific equipment items whereby the Occupational Health & Safety and Environmental Protection Unit will assume the equivalent responsibility and authority as a notified body in defining and assessing the conformity of the equipment to the applicable safety requirements. This approach will be presented here.

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Track Classification: New projects and challenges (in-kind contributions)

Contribution ID: **3** Type: **Oral**

Health and Safety Tools at ALBA Synchrotron facility

Thursday, 21 September 2017 09:30 (25 minutes)

ALBA is the Spanish synchrotron facility formed with 3GeV electron synchrotron accelerator generating bright beams of synchrotron radiation, located in Cerdanyola del Valles (near Barcelona city).

The electrons are accelerated in a 100 MeV linear accelerator (LINAC). Then, the electron beam enters in a synchrotron accelerator named Booster that increases the energy up to 3 GeV. Finally, the electron beam is stored in a synchrotron Storage Ring with a current up to 400 mA emitting synchrotron radiation (mainly in the X-ray range), tangentially to the electron trajectory. Around the Tunnel and outside the concrete shielding and tangentially to the Storage Ring, there are the experimental research laboratories; named beamlines (nowadays there are 8 installed and 2 under construction). At each beamline the scientists use the synchrotron light generated by the accelerator for a wide variety of experiments.

The aim of this work is to explain how we improve in safety terms, developing new safety tools in order to improve communication between different departments.

During 2016 and 2017 ALBA has been implementing two new software: Confluence and Health and Safety Service Desk (Jira).

Health and Safety Service Desk is one of the most important daily tools. This software allows to request for authorization, such a hazardous activity, an external company entrance or training; or to inform about a new event, such an accident, any situation that can imply an accident or a new working condition.

However, Confluence is a team collaboration software. It allows to public safety documents and to share them with others departments assuring that the safety information, such a procedure or an information sheet, arrives to all the employees.

In this work we will show the system's development, its usage and how it improves the communication channels between departments in order to foresee safety matters providing issue tracking and project management functions.

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Track Classification: Continuous improvement in HSE matters

Contribution ID: **4** Type: **Oral**

Safety at the Super-CDMS-SNOLAB

Friday, 22 September 2017 09:30 (25 minutes)

The Super Cryogenic Dark Matter Search at SNOLAB is a WIMP observatory slated for deployment in 2019. Built by SLAC, Fermilab, and a small number of sister institutions, Super-CDMS-SNOLAB will use germanium crystals cooled to millikelvin temperatures to simultaneously detect phonons and charged particles. Located in an active nickel mine, the experiment will present several arcane hazards. This presentation discusses the experiment as well as its milieu, pitfalls, and mitigations.

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Track Classification: New Projects

Contribution ID: **5** Type: **Oral**

Safety guidelines on liquid hydrogen target systems for particle and nuclear physics experiments at J-PARC

Thursday, 21 September 2017 15:30 (25 minutes)

Liquid hydrogen and liquid deuterium are widely used as targets for various particle and nuclear physics experiments. The safety guidelines for liquid hydrogen / deuterium target systems were drawn up at the Japan Proton Accelerator Research Complex (J-PARC). Requirements for the target systems and surrounding instruments are (1) method for pressure proof and airtight test, and design-strength verifying test for the target systems, (2) criteria for the areas where the preventive measures for explosion are necessary, (3) required measures against explosion, such as interlock for electric devices, *etc.* They also describe the method to evaluate the safety distance from the hydrogen instruments for various target systems.

The guidelines were examined in detail and decided by the expert working-group organized in the J-PARC Center. Liquid hydrogen/deuterium targets and similar apparatus in J-PARC are presently designed and developed according to the guidelines.

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Track Classification: Safety training, web-based-training

Contribution ID: **6** Type: **Oral**

Safety Challenges of Biological Applications at High Power Laser Accelerators

Tuesday, 19 September 2017 13:30 (25 minutes)

ELI-Beamlines is the Czech Republic based pillar of the Extreme Light Infrastructure, a European Research Infrastructure Consortia, which exploits the next generation of high energy and high intensity lasers. Among others, it aims at the development of high-brightness sources of X-rays to be used for various research and practical applications such as biological and biomedical.
One of the most promising projects hosted by ELI Beamlines is ELIBIO that explores new frontiers in light and optics to create breakthrough science in biology, chemistry and physics. The main goal is to utilize laser driven X-Ray sources to investigate biological and biochemical processes, especially to observe them in the real time. This goal constitutes considerable technological and scientific challenges, and last but not least specific safety demands. The combination of laser, ionizing radiation, and biological hazards imposes requirements on building, installed technology, and operational safety. Dedicated laboratory facilities enabling to control the hazards and conduct the research efficiently and in a safe manner.
Design of the experimental laboratories providing beams of ionizing radiation to the users has to comply with the principles of the biosafety management and keep the operation efficient. ELI Beamlines already operates a bio-laboratory and aims to enhance its capabilities by implementation of biocontainment facilities enabling to control combined hazards, such as laser or ionizing radiation.
Additionally, utilizing lasers and X-Rays for biological experiments results in further challenges, such as adopting suitable cleaning and disinfection procedures that would be careful to sensitive optics (minimize its destruction) while preventing biological contamination and avoiding cross-contamination of the research.
This contribution introduces safety approaches taken to support this ambitious project and to enable its further upgrades.

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Track Classification: Technical risks and Risk assessment

Contribution ID: **7** Type: **Oral**

Safety and Environmental Diagnosis Approach in beam facilities

Tuesday, 19 September 2017 11:00 (25 minutes)

In the framework of the renovation projects of the beam facilities at CERN, we have to define efficiently how to best allocate the resources in order to improve the safety level of the facility and to limit its impact on the environment.
The Project Leader needs relevant information about the various systems and processes involved in the beam facility. He shall prepare a Safety File containing all safety relevant description, risk analysis, safety measures and operational procedures. The EN Safety Office developed a concept of Safety Diagnosis for the early stage of the project. It gives a synthetic picture of the current safety status of each systems and processes. It is based on return of experience and statistics from the existing facility. The Safety Diagnosis follows the following criteria:
- The history of the events, which happened on the system or process. (incident, accident, near miss)
- The potential severity of the system or of the process regarding safety and environment (i.e. fatality potential, major water pollution)
- The current level of control of the system or process. Is there already technical barrier, organizational measure in place?
Each criteria is given a score and the combination of the tree criteria gives a reliability rate of the current system or process.
More than 40 systems and/or process must to be considered in the renovation project of a beam facility. With the Safety Diagnosis approach, the Project Leader and the stake holders can easily identify the priorities and make better use of the resources of the project, while improving the global safety and environmental performances.
The Safety Diagnosis approach combines data analysis, risk assessment methodology and a management tool for resources optimization.

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Track Classification: Incident investigation and Lessons learned

Contribution ID: **8** Type: **Oral**

Improvement of emergency evacuation from underground at RIBF accelerator facility

Tuesday, 19 September 2017 09:00 (25 minutes)

Radioactive Isotope beam factory (RIBF) operate five cyclotrons sequentially. The floor is down to B3F which depth is about 20 m. The structure of the buildings are complicated as a maze. For emergency case like fire and earthquake, there are several escape routes. But unfamiliar users for accelerator experiments are usually stay in the facility, therefore, it is important to prepare against the risks as fire drill and exit guide etc., in advance. So far, some emergency drill has been performed and evacuations from underground has been practiced. At September 2015, a fire alarm went on suddenly caused by a software error of radioactivity from which a faraday cup of the accelerator. The self-fire brigade of RIBF was not work well at that time.

The staff of the self-fire brigade was assigned by the administration division of the all RIKEN institute, which contain other chemicals and biological fields, etc. Thus, the administration division did not know detail of personnel organization of RIBF nuclear physics department. The fire bridge stuff of RIBF and the scenario at the fire drill were not optimized.

Another issue was emergency broadcasting system. It automatically start at fire alert but it had not been used at the fire drill for some reasons. RIBF stuff did not know this broadcasting system. Therefore, the brigade organization was not operated together with the emergency equipment. These factors and improvements are reported.

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Track Classification: Incident investigation and Lessons learned

Contribution ID: **10** Type: **Oral**

Two institutes –one access control system

Wednesday, 20 September 2017 11:00 (25 minutes)

The DESY access control system DACHS is in use since 2008 and covers all accelerators, experimental areas and a huge range of laboratories at different sites of DESY including the new European XFEL accelerator. This accelerator is operated by DESY while the European XFEL GmbH - the owner of the accelerator - will obtain the responsibility for the radiation protection. There will be two independent dosimetry databases for the employees of DESY and the European XFEL GmbH and an additional direct-reading electronical one. Technical, organizational and legal aspects including data protection are regarded.

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Track Classification: New Projects

Contribution ID: **11** Type: **Oral**

New projects and challenges in the DESY campus

Wednesday, 20 September 2017 15:30 (25 minutes)

Each year more than 2000 scientists from all over the world come to DESY to use the photon sources for their research. The PETRA III Extension project with two new experimental halls and the upgrade to the Free-Electron Laser FLASH with a second FEL source are offering a wide range of opportunities to the user communities. These new facilities will have user laboratories for chemistry, nanotechnology and laser operation.
The Center for Free-Electron Laser Science (CFEL) and new the Centre for Structural Systems Biology (CSSB) are also having access to the research infrastructure from DESY campus. With PETRA IV project, DESY aims to build a unique light source to enable groundbreaking studies in a multitude
of disciplines. Therefore, the PETRA storage ring will be convert into an ultralow emittance synchrotron radiation source, able to provide beams of hard X-rays with unprecedented coherence properties that can be focused to dimensions in the nanometer-regime.

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Track Classification: New Projects

Contribution ID: **12** Type: **Oral**

Lessons learned in chemistry laboratories or how to get users to avoid and report spillages?

Tuesday, 19 September 2017 09:30 (25 minutes)

Some minor incidents in the user chemistry laboratories led to improvements and suggestions in the process of user registration, on-site support and to new procedures to be applied in case of spillages.

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Track Classification: Incident investigation and Lessons learned

Contribution ID: **13** Type: **Oral**

Pre-defined safety measures for helium leakages – theory meets reality

Thursday, 21 September 2017 16:00 (25 minutes)

In the early planning stages of the European XFEL facility possible measures for helium leakages within the cooled down accelerator tunnel have been discussed. Finally some of them found their way into safety concepts that 2005 became relevant for approval, even before the incident @CERN in 2008 shifted the issue into the centre of attention.
But as the project advanced to more detailed planning and construction phases it became obvious that the pre-defined measures would reach their limits with regard to capability and technical feasibility real fast. A new strategy including interim solutions had to be found.

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Track Classification: Safety training, web-based-training

Contribution ID: **14** Type: **Oral**

Regulatory framework for construction and operation of the European XFEL facility

Wednesday, 20 September 2017 14:00 (25 minutes)

Large-scale projects like the European XFEL need a lot of preparation and planning in advance. A large number of legal requirements must be met. The supervisory authorities have to be informed and their needs satisfied to make the longstanding process as transparent as possible for them. The German legislation brings with it both challenges but also opportunities to handle construction projects of these dimensions. It will be shown what you need to build and finally operate a free-electron laser in Germany and what tools and strategies can be used to manage the flood of legislation.

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Track Classification: New Projects

Contribution ID: **15** Type: **Oral**

Safety measures for massive helium leakage

Thursday, 21 September 2017 16:30 (25 minutes)

Nowadays almost every particle accelerator is working with superconducting components. To cool down these components a cryogenic medium is needed. Helium is the choice. But what to do if there is a leakage in the liquid helium supply inside the accelerator facility? How to deal with the overpressure generated by the abrupt evaporating helium? How to detect the leak before it can harm people and cause major damage to the installation and structure? Often these questions are asked too late. In fact DESY is dealing with these questions at a pretty late stage of the commissioning of the XFEL accelerator facility. What is DESYs solution to handle the issue?

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Track Classification: Safety training, web-based-training

Contribution ID: **16** Type: **Oral**

Issues with extinguishing water piping systems at XFEL

Tuesday, 19 September 2017 10:00 (25 minutes)

DESY experienced issues with corroding extinguishing water piping systems recently installed for the European XFEL accelerator facility. These corrosions occurred just a couple of weeks after commissioning. Water and material samples were taken, analyses were made. Different measures to solve the issues were considered. What is the current status? How could a solution look like? What are the problems to deal with and the options to repair the piping while European XFEL is close to user operation?

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Track Classification: Incident investigation and Lessons learned

Contribution ID: **17** Type: **Oral**

Using probabilistic fire response models to benchmark fire service interventions and fire protection strategies - Case study: the FRPAM model for CERN Future Circular Collider

Tuesday, 19 September 2017 11:30 (25 minutes)

When designing a complex facility, project decision makers must cope with the problem of choosing among multiple fire protection packages and emergency response service models to guarantee the compliance to the safety goals and objectives. Passive and active fire protection measures can be costly thus requiring a thorough and solid justification.
Deterministic assessments, although widely used for these purposes, are limited due to the uncertainties tied to the cross-related parameters playing a role in the fire safety outcome. Fire Response Probabilistic Analysis Model (FRPAM) concerns a combination of probabilistic models spanning from the fire detection to the fire extinguishment encompassing sub-models for alarm notification, travel time, access configuration, compartmentalisation scheme, automatic fire suppression approach, fire ventilation strategy and the firefighting extinguishing time.
With the FRPAM model, different trial designs proposing alternative fire protection measures and emergency response deployments can be analysed looking at the time needed to extinguish the fire, the probable property loss or the total energy release. Probabilistic fire response models provide the cumulative distribution functions for these variables making it possible to draw sound conclusions on the suitability of different designs based on their performance. To illustrate the overall system, a case study based on the CERN Future Circular Collider is presented.

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Track Classification: Incident investigation and Lessons learned

Contribution ID: **18** Type: **Oral**

Explosion Analysis and Assessment of Capacitor Banks in Technical Buildings

Tuesday, 19 September 2017 14:30 (25 minutes)

Internal arcing faults in oil insulated electrical components can lead to a severe accident scenario escalation. When dielectric breakdown occurs in this kind of component, the consequent electric arc decomposes the surrounding oil into a saturated gaseous hydrocarbon mixture by means of a pyrolysis reaction, leading to a sudden pressure build-up into the component enclosure. For severe faults, this can induce the structural failure of the enclosure itself (primary explosion scenario): a hydrocarbon mixture is violently released through the enclosure breaches, together with liquid oil and oil mist. Such an explosive atmosphere may result in a very strong explosion when ignited (secondary explosion scenario). The consequences of a secondary explosion in a confined facility may be crucial if pressure venting is not suitably managed and optimised. Moreover, a domino effect on subsequent fire scenarios can be catastrophic.
Several events contribute to establishing a secondary explosion scenario, dealing with electrical, chemical, physical and mechanical aspects; a comprehensive, multidisciplinary methodological approach is required in order to properly estimate the potential of such scenario.
The case of a capacitor bank is considered in this presentation. The first task of the case study consists in the characterisation of the electrical behaviour of the component. The effects of a secondary explosion consequent to the identified worst-case conditions, are then studied in a subsequent task. Finally, structural assessment of the concrete bay forming the basement is carried out, by means of Finite Element (FE) dynamic transient analyses with ABAQUS code, based on the pressure transient obtained from the explosion analyses.

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Track Classification: Technical risks and Risk assessment

Contribution ID: **19** Type: **Oral**

From LHC to HL-LHC –overview of the major environmental issues during civil-engineering and operation

Wednesday, 20 September 2017 13:30 (25 minutes)

The High Luminosity LHC Project will enable the LHC to increase the total number of collisions by a factor of 10. Numerous innovative technologies are explored and will be implemented and large civil-engineering works will take place in Switzerland and in France on two existing LHC sites.

The HSE Unit follows-up the progress of the project and ensures that the environmental requirements of the Host States are taken into account. Particular attention is given to the foreseen large civil-engineering worksites, especially regarding water and soil protection, noise and waste management. Also, the design and operation of the industrial facilities that will be added to the existing infrastructure, such as cooling towers, power supply equipment and gas compressors for cryogenics are carefully checked to ensure a limited impact on the environment.

The presentation will give an overview of the local environmental constraints that have to be considered in the framework of the project, how the impact of the civil-engineering worksites is prevented and will be monitored and finally, how the operation of the future infrastructure will affect the environment compared to the present situation.

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Track Classification: New Projects

Contribution ID: **20** Type: **Oral**

Accident and Incident Management at CERN: present and future

Monday, 18 September 2017 16:30 (25 minutes)

CERN has a variety of rules regarding the reporting and follow-up of incidents, including accidents and near misses.
Pushed by both the management and external authorities CERNs HSE unit has recently conducted a critical review of its current incident management system and is in the now working on a new set of more consistent rules and procedures as well as the related processes and tools.

The presentation will take a critical look at the current system regarding incident management at CERN before outlining the ideas for the future as well as related challenges and questions.

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Track Classification: Incident investigation and Lessons learned

Contribution ID: **21** Type: **Oral**

Laser safety at TRIUMF

Friday, 22 September 2017 10:00 (25 minutes)

Many years ago the use of lasers at research facilities was almost entirely the preserve of dedicated teams of highly specialised scientists. Whilst these types of activities are still very much a part of many institutions research programmes the availability, cost and portability of small laser modules mean that they
are now common place throughout many facilities. Common uses range from (supposedly) low power pointers and alignment tools through to high power cutting and welding machines. The ease of availability combined with a non-specialist user, who often perceives the apparent lack of physical size to a lack of hazard, leads to a requirement for a practical and workable laser safety programme to be in place. The purpose of such a programme is not only to ensure that the relevant regulations are complied with but also to educate the users to the potential hazards in order to instill and maintain best working practises.

This talk will outline the laser safety practises at \textsc{Triumf} along with some of the challenges faced and methods used to overcome them.

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Track Classification: Safety training, web-based-training

Contribution ID: **22** Type: **Oral**

ESS –a greenfield site

Wednesday, 20 September 2017 11:30 (25 minutes)

Being a 'greenfield', single purpose site not having host laboratory support, requires a particular effort to get all ES&H services in place and to stimulate an ESS safety culture.
The very first safety activities started with the licensing process in 2011, first laboratories were set-up around 2013, site civil engineering began summer 20014 and a first RF test stand was started last fall. Very first site installations activities for the accelerator cryogenic system took place last year, followed by a RF test stand preparation in the klystron gallery this summer and first commissioning activities are planned for early 2018. This talk will provide an 'ESS newcomer'reflection to this particular large scale challenge.

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Track Classification: New Projects

Contribution ID: **23** Type: **Oral**

ESS –Emergency Preparedness & Rescue Service

Wednesday, 20 September 2017 14:30 (25 minutes)

The ESS facility is today a construction site with specific issues and procedures concerning Emergency Preparedness and Rescue Service. Design and planning for these issues for the future facility has been on-going for many years. The actual transition between construction site via installation and commissioning to the final operation of the facility concerning emergency preparedness and rescue service is for the moment being looked at. This talk will deal with the challenges for a green-field facility going from design, construction, installation to actual operation.

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Track Classification: New Projects

Contribution ID: **24** Type: **Oral**

Resource Succession Planning at Fermilab

Thursday, 21 September 2017 11:30 (25 minutes)

1967 marked the birth of Fermilab. With the laboratory approaching 50 years of operation, the laboratory was facing a large number of its staff approaching retirement age. Succession planning for these retirements became a priority to ensure sustainable continuity of operations.

In 2015 and 2016, the laboratory undertook a series of initiative to address succession planning for the Environmental, Safety, Health, and Quality (ESH&Q) staff. The initiative centralized ESH&Q staff and utilized both vertical and horizontal rotations of staff to address succession planning concerns and provide fresh perspectives. The presentation will provide an overview of Fermilab' s ESH&Q Organization, how the organization evolved, the goals and expected outcome from the initiative, and conclude with where we are today.

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Fermi National Accelerator Laboratory is Managed by Fermi Research Alliance, LLC for the U.S. Department of Energy Office of Science

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Track Classification: Continuous improvement in HSE matters

Contribution ID: **25** Type: **Oral**

Training, TapRooT and Continual Improvement

Thursday, 21 September 2017 13:30 (25 minutes)

TRIUMF uses the Systematic Approach to Training (SAT) in the analysis, design, development, implementation and evaluation of training programs. In addition, TRIUMF uses the TapRooTreg; system for root cause investigations. This session will discuss how these two systems integrate as part of the continual improvement cycle for training programs. The presentation will briefly review the processes, procedures, document templates and other tools TRIUMF has put in place to facilitate the continual improvement of it's training programs.

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Track Classification: Safety training, web-based-training

Contribution ID: **26** Type: **Oral**

In-kind Contributions to the European XFEL Facility –management and controls of IKCs

Wednesday, 20 September 2017 09:25 (20 minutes)

In this presentation the management and the controls are presented as well as difficulties encountered when dealing with IKCs during the construction phase of the European XFEL facility.

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Track Classification: New projects and challenges (in-kind contributions)

Contribution ID: **27** Type: **Oral**

Cryogenic Safety Procedures at TRIUMF –present state and the future

Thursday, 21 September 2017 09:00 (25 minutes)

TRIUMF has a well-established safety record when it comes to the safety associated with use of cryogens. Nevertheless with the Lab evolving and new research facilities brought on line there is an increasing number of cryogenic installations across the Laboratory as well as an increasing number of personnel and users exposed to or dealing with cryogens who have limited previous experience or training.
Typically the use of cryogenic liquids is associated with various safety hazards such as oxygen depletion, materials embrittlement, possible overpressure, etc. to name a few. In addition one has to distinguish personnel protection from equipment and machine protection considerations.
In order to deal with this complex hazard systematically it was decided to create a cryogenic safety task force at TRIUMF under the guidance of Environment, Health & Safety (EH&S) and including representatives from Cryogenics Group, Engineering and Physical Science Divisions. The mission of this task force is to review the current state of cryogenic system design and cryogenic safety at the laboratory, and draw on experience and best practices from leading laboratories and industry in order to develop and implement a lab-wide framework including a cryogenic safety policy and procedures to ensure consistent assessment of cryogenic hazards. The task force will also develop the requirements for training personnel working with cryogens and cryogenic systems.

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Track Classification: Continuous improvement in HSE matters

Contribution ID: **28** Type: **Oral**

Procedures to complement Safety Instrumented Systems, and mitigate the human factors, around CERN beam facilities

Thursday, 21 September 2017 10:00 (25 minutes)

The main Safety Instrumented System (SIS) around particle accelerators at CERN is the Personnel Protection System (PPS), but not all of the hazards can be mitigated by the PPS itself. Several dedicated safety systems are also in use, such as fire detection and fire fighting, gas detection, laser protection, access control, etc.
The PPS is designed to address and mitigates the main risks identified during the risk analysis. These are usually ionizing radiation (from beam and from accelerating devices), non-ionizing radiation (RF field and class 4 lasers), electrical (from any powered equipment of which insulation does not correspond to standards), and mechanical (remote-controlled movement of robots or heavy equipment). The basic principles of a PPS are: 1) If risk is present nobody can be present or access (alarms and access safety system) and 2) If someone is present (including by intrusion), the hazards must be turned-off (interlocks).
The factors influencing the functionality of a SIS can be classified in 4 classes: engineering, maintenance, operation and environment. Human factors are present in these 4 classes and must be mitigated by procedures. Example concerning the PPS are: maintenance procedures for each equipment groups responsible of sub-systems integrated in the safety systems, management of functions by-passing and the corresponding compensatory measures, operation procedures, training of any intervening personnel, emergency procedures. In case of the PPS at CERN, procedures include the validation by an independent safety officer (known as the "DSO tests at CERN). Moreover, one must guaranty that degraded modes are (automatically) detected, and that compensatory measures are applied whenever any SIS is in degraded mode.
In addition, not all of the risks can be covered by SIS, and operational procedures to mitigate these risks are multiple: radiation-protection sweep before access, patrolling hazardous areas before closing, safety inspections, flammable gas management, check lists ("safety permits") prior to some operations.

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Track Classification: Continuous improvement in HSE matters

Contribution ID: **29** Type: **Oral**

Safety Considerations associated with International Collaboration

Wednesday, 20 September 2017 09:00 (20 minutes)

International collaboration is essential for the long-term growth and health of High Energy Physics. Fermilab's flagship Project, the Deep Underground Neutrino Experiment (DUNE) demonstrates how the global neutrino physics community is developing a leading-edge, dual-site experiment for neutrino science. The facility required for this experiment, the Long-Baseline Neutrino Facility (LBNF), is an internationally designed, coordinated and funded program. Once it is completed, it will comprise the world's highest-intensity neutrino beam, at Fermilab, and the infrastructure necessary to support massive, cryogenic far detectors installed deep underground at the Sanford Underground Research Facility (SURF) in Lead, South Dakota.
As a contractor to DOE, Fermilab faces several challenges in safety around such a global Project. The panel discussion will focus specifically on the mechanisms used to accept in- kind contributions designed and constructed to non-U.S. standards and the successes and continuing challenges associated with International Users working on the site in Batavia, Illinois and eventually in Lead, South Dakota.

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Track Classification: New projects and challenges (in-kind contributions)

Contribution ID: **30** Type: **Oral**

Safety Training at CERN - From Registry Office to Learning Service

Thursday, 21 September 2017 14:00 (25 minutes)

Over the last years, the non-formal safety learning at CERN has changed significantly in a number of areas, like administration, course design and collaboration with different stakeholders. The reasons for having implemented these changes are manifold. The volume of learners has increased and varies considerably depending on CERN's activities such as beam operation, technical stops, etc. Also, a lot of classroom and online courses are mandatory for external industrial support and users of experiments working and doing research on CERN's premises.
To meet the numerous challenges CERN's Safety Training Centre was further developed, the activity 'Safety Training' became a separate organisational unit with a central key role and multiple responsibilities.
The presentation describes in detail the various requirements and constraints for an efficient safety training at CERN, the ideas and solutions developed and put into practice as well as the experience gained.

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Track Classification: Safety training, web-based-training

Contribution ID: **31** Type: **Oral**

Increased Rigour and Discipline in TRIUMF's Controlled Work Process

Thursday, 21 September 2017 11:00 (25 minutes)

Examination of root causes associated with lack of compliaince with our procedures and regulatory requirements for the controlled work process led TRIUMF to make a significant paradigm shift in order to effectively address these deficiencies. The problem was owned at all levels of the organization and a new path was adopted, where doing the work correctly and safely is more important than getting it done quickly. This presentation will describe the steps taken to bring more rigour and discipline to the controlled work process.

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Track Classification: Continuous improvement in HSE matters

Contribution ID: **33** Type: **Oral**

Electrical Incident at DESY

Monday, 18 September 2017 16:00 (25 minutes)

Electrical incident at DESY

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Track Classification: Incident investigation and Lessons learned

Contribution ID: **34** Type: **not specified**

Site Introductions

Contribution ID: **35** Type: **not specified**

Welcome - TRIUMF Director

Contribution ID: **36** Type: **not specified**

Workshop - Part 1 - Eight Factors Overview

Eight Factors Overview

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Track Classification: Other

Contribution ID: **37** Type: **not specified**

Workshop - Part 2 - Small group breakout session

Small group breakout session

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Track Classification: Other

Contribution ID: **38** Type: **not specified**

Workshop - Part 3 - Building theories and action planning

Building theories and action planning

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Track Classification: Other

Contribution ID: **39** Type: **not specified**

An Update – Safety bringing experiments using a Tritium target to Jefferson Lab

Friday, 22 September 2017 09:00 (25 minutes)

A tritium target is foreseen to execute four approved nuclear science experiments in Hall A at Thomas Jefferson National Accelerator Facility. One experiment (E12-14-009) aims to measure the ratio of elastic scattering of 3H and 3He and improve on the radius of 3H as compared to the radius of 3He. The aim is to reduce this uncertainty by a factor of five. This can then be compared with state-of-the-art nuclear science calculations. An experiment of quasi-elastic knockout of protons from 3H and 3He (E12-14-011) is a quantitative measure of the pairing mechanisms in the nucleus. The measured ratio can again be compared with state-of-the-art nuclear science calculations. A similar measurement of the ratios of quasi-elastic electron scattering off 2H, 3H, 3He, and 4He (E12-11-112) gives a count of the amount of short-range paired nucleons. The comparison of 3H and 3He will test the isospin character of this pairing. Last but certainly not least, a measurement of deep-inelastic scattering off 3H and 3He (E12-06-118) will map the ratio of proton to neutron structure functions with minimal nuclear uncertainty and will then constrain the ratio of down to up quarks in nucleons. In the kinematic limit of quark momentum fraction $x \longrightarrow 1$ there are definite QCD predictions for this ratio.

The laboratory experimental review process requires all experimental apparatus including a tritium target for these experiments to undergo several readiness reviews. To date the reviews have resulted in the collaborators conscientiously following up on numerous recommendations which have resulted in an intelligent design carefully folding in safety considerations to minimize risk and having layers of containment both for beam operations and shipping. There was a final review last year and it concentrated on documentation and operational procedures. At this time with the experimental apparatus being staged in the experimental hall, technical reviewers are confirming readiness for safe operations for the first of these experiments scheduled later this year.

The presentation will provide some of the concerns and details for safely running tritium experiments at Thomas Jefferson National Accelerator Facility.

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Track Classification: Technical risks and Risk assessment