Fermilab National Accelerator Laboratory

International Technical Safety Forum (ITSF) 2014

Abstracts book

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Monday ½ Day Risk Assessment Workshop

Primary authors: KENNY, Joe (SLAC National Accelerator Laboratory)
Presenter: KENNY, Joe (SLAC National Accelerator Laboratory)

Risk is central to the business of all ITSF attendees. Risk assessment methods are many, and since risk is definitively different to scientists, engineers, administrators, insurers, lawyers, and journalists, one must use care when speaking of risk to different audiences.

This workshop surveys risk assessment strategies through discussion and group exercises. Examples of good and bad outcomes of past risk assessments are reviewed. The analytical and presentational pitfalls of risk analysis are studied at length. Attendees will leave with a better understanding of the complexities of risk assessment preparation and submission.

Wednesday Colloquium Talk

Institutional Awareness: Safety and Risk Management - from Politics to Action

Primary authors: Mr. SCHERF, Christian, Director of the Administrative Division (DESY)
Presenter: Mr. SCHERF, Christian, Director of the Administrative Division (DESY)

All over the we see different safety cultures. Occupational safety is given a different priority in different working environments. Several aspects lead to a various ranking. An overview about the reality in Europe from the perspective of a German laboratory will be given.

Why do we have a comparably good track record without constant publicized awareness? What is the relation between government bodies, management and workers that makes the issue of occupational safety visible?

Longtime accident statistics of the German Federal Ministry for Labor and Social Affairs and of experiences in German national labs will be shown.

Risk Assessment

Seismic hazard studies related to the Nuclear Safety of the GANIL particles accelerator

Primary authors: Mr. ROYET, Pascal (GANIL)
Co-authors: Mr. RANNOU, Bertrand (GANIL)
Presenter: Mr. ROYET, Pascal (GANIL)
20 Minute

Every 10 years, the French nuclear safety authorities demand to each manager of a nuclear safety facility a complete evaluation of all safety aspects, including all kinds of hazards, internals or externals. The last evaluation realized at the GANIL, Caen, Normandy, from 2011 to 2014, has included for the first time the taking into account of seismic hazard, which was never considered before in the risk management. It has then required the definition of the reference earthquake, the modelization of the buildings, the finite elements calculations, the estimations of the consequences for the civil engineering, and the material modifications induced by the results.

Performance-based fire risk assessment of a 400 kV electrical substation at CERN

Primary authors: Dr. LA MENDOLA, Saverio (CERN)
Presenter: Dr. LA MENDOLA, Saverio (CERN)

The main 400 kV /66 kV / 18 kV substation of CERN, located in Prevessin (FR), is one of the two electrical power sources of the Organization. This station powers all the CERN while another substation, located in Switzerland, is maintained as a partial backup. Therefore, it is evident how this infrastructure is critical for the functioning of the Organization. This presentation reports a performance-based fire risk assessment that has been carried out in order to evaluate the need for the implementation of further safety features. In particular, the scope of the study included a fire and heat propagation assessment to buildings and other electrical equipment in case of an electrical transformer fire. The assessment has been conducted at first by defining a fire scenario under appropriate transformer failure assumptions; this fire scenario has been modelled through the software Fire Dynamics Simulator in order to calculate the heat loads acting on neighboring items.

The analysis also includes a structural fire resistance assessment for a building, a FEM thermal assessment for the glass insulators of the high tension lines arrival and a thermal assessment of a fire protecting wall as well as the effectiveness of some proposed compensatory measures. Finally, after the implementation of such measures, a further set of analysis was made to verify their effectiveness.

A possible approach to a risk assessment for an accelerator facility

Primary authors: MOHR, Sven (DESY)
Presenter: MOHR, Sven (DESY)

The European XFEL will be the first accelerator facility built and operated by DESY that won´t be owned by the institute.

The sections are gradually handed over to the European XFEL GmbH, a non-profit limited liability company under German law. In this case the facility as a whole becomes a product that is delivered to a second party. This has a big impact on the necessary legal framework. A well-documented risk assessment in accordance with legal requirements is mandatory. For a complex and technically branched machine like the accelerator this represents a major challenge. The talk will outline the balancing act between considering all significant systems (including sub-systems) as well as their connections and finding a reasonable, manageable process to master that challenge. DESY´s approach to find a proper tool will be presented.

Fermilab Accelerator Risk Assessment Process

Primary authors: ANDERSON JR., John (Fermilab)
Presenter: ANDERSON JR., John (Fermilab)

Fermilab has begun updating the Risk Assessment process and model for the accelerator complex. This talk will provide an overview of the planned Risk Assessment Process.

Risk Assessment - Just ask the question

Primary authors: Mr. JACKSON, Sam (UK Atomic Energy Authority (Culham Centre for Fusion Energy))
Presenter: Mr. JACKSON, Sam (UK Atomic Energy Authority (Culham Centre for Fusion Energy))

Risk assessments have historically been the territory of the safety professional with all manner of matrices, numerical calculations and signatures providing comfort to management that all is well. However, this complexity can defeat the main purpose of the risk assessment by failing to involve those actually presented to the risk. Do risk assessments need to be any more complex than asking a few simple questions?

Updates to the Fermilab Oxygen Deficiency Hazard Assessment

Primary authors: Mr. SCHMITT, Richard (Fermilab)
Presenter: Mr. SCHMITT, Richard (Fermilab)

Fermilab has used failure rate calculations to evaluate oxygen deficiency hazards for thirty years. During recent few years the equipment failure rates and calculation procedures have been updated. Revisions have included process equipment failure rates, ventilation failure rates, and improved calculation examples.

Risk management and safety coordination through interactive models for the construction sites of Xenon1T in the Gran Sasso National Laboratory

Primary authors: Dr. TOBIA, Marco (Gran Sasso National Laboratory - INFN)
Co-authors: Dr. PERRUZZA, Roberto (Gran Sasso National Laboratory - INFN) ; Dr. TARTAGLIA, Roberto (Gran Sasso National Laboratory - INFN)
Presenter: Dr. TOBIA, Marco (Gran Sasso National Laboratory - INFN)

Subject of this work is the presentation and description of the activities of construction and management of safety of building sites for the realization of the apparatus of the new experiment Xenon1T in hall B of the LNGS underground laboratories.

The XENON dark matter search experiment aims to detect dark matter in the form of Weakly interacting massive particles (WIMPs) by looking for rare interactions via nuclear recoils in a liquid xenon target. The detector consists of a dual phase Time projection chamber (TPC). It is suspended to a stainless steel support structure inside a vertical tank filled with ultrapure water as muon veto screen.

The work for the construction of the Water Tank started in 2013. It is a vertical cylindrical tank with a truncated conical roof, at atmospheric pressure and stainless steel, 11.6 meters high and 9.6 meters in diameter. At the same time, the works for the construction of the Service Building, a multi-story building in metal structural work for the housing of cryogenic plants, process and electronics took away. The two devices will be connected through process piping and cables, so their placement must comply with strict geometric constraints above all during the construction phase.

The design of the sites required careful analysis of regulatory constraints. In fact, the LNGS are a public research organization, belonging to the Ministry of Research, and therefore they are subject to Legislative Decree no. 163/2006 “Code of public contracts”. For this reason, the method of selection of the contracting companies must take place through public tenders.

In this case, the two different works have followed two different paths: the Water Tank has as its contracting authority and financier the Weizmann Institute of Science (Israel), an institution outside the EU, therefore it was possible to use the private law with the ability to directly choose the executing company; Service Building was instead commissioned by NFN, therefore, was required to resort to a public tender for the award of the contract. The presence of different clients, even working for the construction of works intended for the same experiment and in the same area (hall B), has requested the implementation of two different administrative processes, with the necessity to nominate two people for each role envisaged as the Director of Works and the Safety Coordinator for design phase and execution phase (CSP and CSE).

At the operational level, the author has proposed to its management team to appoint a single figure for the coordination of the construction of the two works, though with two separate procedures.

The LNGS are subject to the European Directive Seveso ter on the risk of major accidents and the technical standards for construction in seismic areas, the NTC2008. This complex regulatory framework required to prepare at LNGS management models that would allow the verification of compliance with the constraints imposed, as early as the design phase. These models were then applied in the construction sites by figures responsible, the Director of Works and the CSE.

The realization of the two building sites, in the same space at the same time, it required a considerable effort to the analysis, assessment and management of risks due to interferences, both between the two yards object of the article, both from other ongoing activities in hall B, such as the decommissioning of the experiments Icarus and WArP. In addition, the following specific risks have been analyzed: risk of work at height, fire risk from welding, risk of close and confined indoors, risk of generating an hypo oxygenate atmospheres. These activities were conducted by the CSE in close collaboration with the SPP LNGS.

The risk analysis and subsequent management has been defined through the elaboration of the document (PSC Safety & Coordination Plan) by the CSE. In fact, the PSC official are two, one for each site, but they were integrated at the operating level and "merged" into a single PSC, more efficient. For the preparation of the PSC, especially complex and dynamic, the CSE has used as an aid to a specific software for project management, Ce rtus®, edited by the Italian software house ACCA®. This tool has enabled risk management and coordination of the yards in a dynamic, efficient and interactive way.

Work started in August, 2013, have required an intensive monitoring and supervision by the CSE and its staff, through numerous surveys and especially the organization of regular meetings for coordination with the participation of the heads of executing companies, referents of other related activities and interfering with the construction of Xenon1T.

The article describes all models, dynamic and integrated, used by the CSE for safely manage the sites. Works, with a duration of one year, thanks to the approach presented, have recorded: zero accidents, the full respect of the scheduled timelines, a great satisfaction by workers at all levels actively involved and by Xenon people.

Finally, thanks to this approach, it was possible to give a correct implementation of all laws and regulations that contribute to the safety of the LNGS from Seveso to the Italian law about Safety and Health Unique Text of Workers in itself very complex and different.

CERN Large Hadron Collider evacuation assessment

Primary authors: Dr. LA MENDOLA, Saverio (CERN) ; Mr. GUERRÉ, Julien (CERN) ; Mr. VAN VEEN, Niels (CERN)
Presenter: Dr. LA MENDOLA, Saverio (CERN)

During some conditions of use, such as technical stops, a large number of people may have to access the LHC tunnel as well as its experiments. It is therefore necessary to define the maximum number of people allowed to be present in the facilities in order to guarantee the safety of their egress. For this purpose, taking into account the LHC safety features and the Long Shutdown 1 work schedule, a first simplified evaluation has been made with respect to the machine tunnel, also taking into account the fire intervention strategy for different scenarios. In addition, in order to assess the situation where one of the two (machine and experiment) access lift is not available, an agent-based evacuation model has been used in order to take into account the interference between the flows of people coming from both the machine tunnel and from the experiment. This model was also used to validate the simplified one that, under the same assumptions, provides fully representative results.

Incidents and Lessons Learned

Incidents and lessons learned at GANIL

Primary authors: Mr. RANNOU, Bertrand (GANIL)
Co-authors: Mr. ROYET, Pascal (GANIL)
Presenter: Mr. RANNOU, Bertrand (GANIL)

The GANIL laboratory (Caen, France) is a nuclear facility dedicated to the acceleration of heavy ion beams for nuclear physics, atomic physics, radiobiology and material irradiation.

The major events including various fields of activity (fire risk, explosion, security management, ...) that occur during last years in the GANIL facility will be presented and analyzed.

Lessons Learned from a Helium Gas Recovery System Incident

Primary authors: THEILACKER, Jay (Fermilab)
Presenter: THEILACKER, Jay (Fermilab)

A superconducting materials laboratory has been operational at Fermilab since August 2011. Test dewars were cooled using 500 liter liquid helium dewars. The boil-off helium was vented to atmosphere. In order to conserve helium, a long-term plan was established to install a recovery pipeline to an existing helium liquefier with adequate purification and storage capabilities. While the system was being engineered, a temporary helium gas recovery system was installed. The temporary system utilized a membrane gas bag, a high pressure compressor and a tube trailer. During early use of the temporary recovery system, the membrane gas bag was overinflated, resulting in a membrane puncture. A committee was formed to investigate the incident. The

investigation determined the root cause, error precursors and contributing factors leading up to and following the incident. Recommendations were made to and acted on by Laboratory management on how to prevent future incidents.

Lesson learned from chemical incident in 2012 and 2013 at the Paul Scherrer Institute

Primary authors: Mr. LOERTSCHER, Yves (Paul Scherrer Institute)
Presenter: Mr. LOERTSCHER, Yves (Paul Scherrer Institute)

The research topic at the PSI has change from a research institute in Physic at the beginning of the 90ties to a multi-disciplinary research institute now. With this evolution has also the use of chemical increase. In the 90ties was chemistry a well-known danger condensed in a few laboratories. Now chemical are not only used in chemical laboratories but also in technical department (for example the use of solvent to clean some compounds) or the purpose of some research in the facilities itself (beamlines) are the observing of chemical reaction.

In 2012 and 2013, the safety department has observed an increasing of incident without any injuries involving chemicals and decide in accordance with the direction to increase the resource from chemical safety officer and to perform a deep analysis of the chemical safety at the institute. The results of the analysis and the proposed suggestions for improvement will be presented to the directorate at the mid-2014.

Radioactivity Leak Accident at the Hadron Experimental Facility and the Reformation of the Safety Management System in J-PARC

Primary authors: Dr. ISHII, Tetsuro (J-PARC, Japan Atomic Energy Agency)
Presenter: Dr. ISHII, Tetsuro (J-PARC, Japan Atomic Energy Agency)

Radioactivity leak accident occurred at the Hadron Experimental Facility of J-PARC on May 23, 2013. Due to a malfunction of the slow extraction system of the 50 GeV synchrotron, proton beams with a short period of 5ms (in normal operation, over 2s) were delivered to the gold target in the Hadron Experimental Facility. The center of the target was heated over the melting point of the gold, and radioactivity was dispersed from the target and leaked into the beam line and the experimental hall, because the target container did not have airtightness. This accident caused the exposure of workers and the release of radioactivity outside of the controlled area.

This accident revealed serious problems on safety organization and emergency actions as well as problems on hardware. We have reviewed safety management system entirely and reformed it as follows.

1) The responsibility of facility manager and command line was clearly defined.
2) Radiation safety review system was reinforced.
3) “Alert Status” between “Standard Status” and “Emergency Status” was introduced for gathering

of responsible personnel and integration and sharing information.
4) Criteria and procedures for actions in emergency and notification were clarified.

We have restarted the operation of J-PARC under the new safety management system. Promotion of safety culture in J-PARC is pursued.

Serious accident during transporting of a heavy pressure vessel

Primary authors: HOPPE, Andreas (DESY)
Presenter: HOPPE, Andreas (DESY)

On the Campus of DESY Research Centre 10 other Institutes are located and working together – in the same halls and experimental huts.

While transporting a heavy pressure vessel two engineers from two different Institutes were serious hurted by the falling pressure vessel. Analysis of the accident, especially under juristic and teamwork aspects.

Lessons learned at the ESRF since ITSF 2013

Primary authors: Mrs. LANDURÉ, Véronique (ESRF)
Co-authors: Dr. BERKVENS, Paul (ESRF) ; Mrs. RICOT, Stéphanie (ESRF)
Presenter: Mrs. LANDURÉ, Véronique (ESRF)

During the ITSF 2013 meeting, we presented the foreseen evacuation organisation of the existing experimental hall, as impacted by the construction of the two new experimental halls. An evacuation exercise of the experimental halls was organised in April 2014. The first part of the presentation will deal with this exercise and lessons learned from it.

The second part of the talk will deal with a few accidents related to electrical safety, lessons learned from them and actions taken.

Application and results of the Gran Sasso National Laboratory Safety Management System: A Near-accident Case Study

Primary authors: G. Bonfini (Gran Sasso National Laboratory), F. Gabriele (Gran Sasso National Laboratory), A. Giampaoli (Gran Sasso National Laboratory), A. Goretti (Princeton University), A. Ianni (Princeton University), R. Perruzza (Gran Sasso National Laboratory), R. Tartaglia (Gran Sasso National Laboratory), M. Tobia (Gran Sasso National Laboratory)
Presenter: GABRIELE, Federico (Gran Sasso National Laboratory)

Located 1400 meters under Gran Sasso Mountain, in the heart of the Appennini Mountain Chain, and also in the middle of Gran Sasso and Monti della Laga Italian National Park, the Gran Sasso National Laboratory (LNGS) of the National Institute of Nuclear Physics (INFN) is one the most important underground laboratories in the world, devoted to the study of astro-particle physics,

rare events, geo-physics, biology. The Gran Sasso underground laboratories are part of a complex system, a big infrastructure which comprehends both a double motorway tunnel (length of about 10km) and the drinkable water systems for the two counties of Teramo and L'Aquila. In fact, the Gran Sasso massive is a real big "water reservoir" and the two water network have a flow-rate of about 600 l/s on the L'Aquila site and more than 100 l/s on the Teramo one.

Due to the particular rock purity which constitutes the massive, the 1400m of rock layer are equivalent to 3300 m of water (wme) as shielding efficiency: for this reason the LNGS labs offer an environment with the essential and unique requirements for the Low-Background Experimental Apparatus. The forementioned characteristics make LNGS a fundamental benchmark for the International Scientific Community, and also a desirable location for the nuclear physics researchers from all over the world.

In addition to the outstanding experimental apparatus, LNGS represents a global example from the Safety point of view, particularly as regards Safety and Emergency Management that holds high safety standards.

Furthermore, due to the storage of substances classified as dangerous for the environment (according to the Seveso European Directive, 2003/105/EC) and also the presence and usage of cryogenic substances in an underground and confined space such as LNGS, a properly Safety Management System (SMS) has been achieved and kept up-to-dated in order to fulfil the constantly changing experimental apparatus requirements.

In our "case study", we are reporting an example of an application regarding the management of a near-accident. The event taken into account has been the accidental spillage of about 2 litres of an hydrocarbons, event which occurred soon after the end of the distillation phase regarding one of the above substances. The above event represents a perfect example in which all the procedures and operative instructions had been followed; at the same time, an unforeseen and unknown situation happened anyhow.

After the event, the Collaboration members involved people together with the Directorate and LNGS Prevention and Protection Service analyzed the event through proper tools, such as root analysis and risk assessment in order to really learn from it, recording everything according to the Safety Management System.

The aim of this work is to depict how the event has been managed in terms of personnel emergency reaction and adequacy of the for the procedure response, keeping in mind the complexity of the whole LNGS system, which involves safety crew, Collaboration members and LNGS Prevention and Protection Service. This reflects the ideal approach of the Management System: Plan-Do-Check-Act, (Deming Cycle).

Fire in the basement of the CERN computing centre: factual analysis and lessons learned

Primary authors: Dr. LA MENDOLA, Saverio (CERN) ; Mr. CENNINI, Enrico (CERN) ; Mr. CORSANEGO, Fabio (CERN)
Presenter: Dr. LA MENDOLA, Saverio (CERN)

The CERN Computing Centre, also known as the Data Centre and located in Building 513, houses servers and data storage systems not only for Tier-0 of the Worldwide LHC Computing Grid (WLCG) and for other physics analysis, but also for systems that are critical to the daily functioning of the Laboratory. It is therefore regarded as a critical infrastructure not only for the Organization, but also for all those involved in the WLCG.

In April 2013 a fire of the plastic lining of a water heater developed in the basement of Building 513. This presentation describes the follow-up activities carried out by the HSE unit after the fire. In particular, they included a first on-site assessment of the damages (fire and smoke propagation) and the reconstruction of the activation time of fire detectors, confirmed by a computer fire simulation. A map of the deposit of soot and chlorides after a sampling campaign is also shown together with the results of the electrical expertise carried out on the water heater. Finally the lessons learnt with respect to the different phases of the adverse event management process are discussed.

Notable Event at Jefferson Lab's Central Helium Liquefier, a Pressurized U-Tube Near- Miss

Primary authors: MANZLAK, Bert (JLab)
Presenter: MANZLAK, Bert (JLab)

At Jefferson Lab a task at the Central Helium Liquefier involving the pulling a cap (u-tube) on a cryogenic line, this after the retaining clamp was removed from the top flange sending the 25 pound, 3 inch diameter x 3.5 feet stainless steel pipe (u-tube) upwards approximately 20-25 feet into the air. There were no injuries. The task was performed at an operational pressure of 3 atmospheres, instead of the safe removal pressure of 1 to 2 atmospheres. The investigation, root cause, contributing causes and lessons learned.

Fire Safety

ESS Fire & Explosion Safety Program - Risk Analysis – Fire Tests

Primary authors: Mr. JÖRUD, Fredrik (ESS AB)
Presenter: Mr. JÖRUD, Fredrik (ESS AB)

1. FIRE & EXPLOSION SAFETY PROGRAM IN PROGRESS
2. RISK ANALYSIS HAZARDOUS OPERATIONS
3. FIRE TESTS OF COMBUSTIBLE SHIELDING

Summary:

1. FIRE & EXPLOSION SAFETY PROGRAM IN PROGRESS

A number of Swedish acts and ordinances give the basic requirements for ESS. None of these are tailored for ESS, hence interpretation for reasonable application is performed. In ESS pre-construction work, the most important acts for the Fire & Explosion Program are:

Planning and Building Act (2010:900)
Radiation Protection Act (1988:220)
Civil Protection Act (2003:778)
The Work Environment Act (1977:1160)
Flammable and Explosives Act (2010:1011)

Case Study:

The ESS site is located in the outskirts of Lund. The municipal water supply grid will only come with a limited capacity. Hence increased capacity with pump and tank is necessary. In autumn 2014 the fire water supply pipe will be put in the ground. Applying conventional standards and norms give guidance to put a 160 mm plastic pipe. ESS threshold is 5 mSv to public for a H3 event (Postulated initiating event in the range of E-2 – E-4 times/yr). A fire in e.g. the instrument or waste storage building, potentially exceed 5 mSv to public, if not mitigated and contained. The presentation will present the procedure to determine appropriate dimension of the pipe, frost-free depth, seismic requirements etc.

2. RISK ANALYSIS HAZARDOUS OPERATIONS

The local county board determine if the ESS will get classified as a hazardous operation facility. While waiting for their decision, ESS has performed a risk analysis as if classified as a hazardous operation. The primary use of the analysis is to provide sufficient information to the municipal fire brigade of what to expect as worse cases when arriving on accident scene. The secondary use is to provide information on where ESS have to enhance safety, both hardware and how to build up reasonable emergency response organization. The third use of the analysis will be to expand the

scope to sufficient level for describing impact from adjacent activities and operations with potential to effect safety related structures, functions and components. Risk matrixes for impact on public, environment and staff will be presented.

3. FIRE TESTS OF COMBUSTIBLE SHIELDING

The purpose is to determine fire properties for borated paraffin and borated polyethylene in order to design appropriate defense in depth strategy on fire protection. Both materials will come in use for radiation shielding. The initial evaluation has been done using single cone calorimeter and flammability tests to obtain data for analysis of fire properties of the selected material. Tested materials are base paraffin, borated paraffin (4,5 % boron), polyethylene and borated polyethylene (3% and 5% boron). The objective was to evaluate the borated versions but it was of interest to compare it with the base material as a reference. The conclusion is that the borated material has fire retardant properties. These retardant properties vary depending on the fire scenario.

Figure 1 Cone calorimeter test to identify fire properties
Figure 2 Ad-hoc test vertical position of test samples
Figure 3 Parallel panel test Borotron UH050 1,3 x 0,68 x 0,03 m, approximately 1 MW.

Life Safety and Fire Protection Challenges in Underground Spaces as found in accelerators, experiential spaces or labs located in working and non-working mines

Primary authors: Dr. PRIEST, James (Fermi National Accelerator Laboratory)
Presenter: Dr. PRIEST, James (Fermi National Accelerator Laboratory)

Why NFPA 520 “Standard on Subterranean Spaces” written around retail, commercial, or storage use does not address most DOE underground facilities and most scientific experimental uses underground. DOE is trying to address these issues with a Working Group for Subterranean Spaces recently renamed Underground Spaces to established guidelines for these types of spaces and facilities.

GANIL Facility Safety Review

Primary authors: Mr. RANNOU, Bertrand (GANIL)
Co-authors: Mr. ROYET, Pascal (GANIL)
Presenter: Mr. RANNOU, Bertrand (GANIL)

The GANIL facility (Caen, France) is dedicated to the acceleration of heavy ion beams for nuclear physics, atomic physics, radiobiology and material irradiation since 30 years. According to the French law, a complete analysis of the safety has been realized during the period 2011-2014 under the control of the French Nuclear Safety Authority. All risks have been analyzed and compared to the best standards including examination of the real state of the facility and lessons learned from passed events. An upgrade program is defined to improve the safety level of the facility.

A special focus will be presented on the fire risk analysis and on the security access control system.

An application of a stationary hifog extinguishing system at the new XFEL accelerator at DESY

Primary authors: SARETZKI, Fabian (DESY)
Presenter: SARETZKI, Fabian (DESY)

The new XFEL accelerator at DESY adds new challenges in fire prevention requirements. The main accelerator is installed in the 2000 meters long tunnel section “XTL” with no additional exit possibilities on its full length. To make sure everyone working in the tunnel is able to escape in case of a fire DESY decided to protect the 25 pulse transformers installed in the tunnel, which pose the biggest fire load inside of it, with a stationary hifog extinguishing system. It also divides the tunnel into four approximately 500 meters long fire compartments. Those systems are an approved method to protect engine rooms in ships, working with a pressure of up to 120 bar, using especially for this kind of applications created nozzles to produce clouds of water mist with less than 1 mm in drop diameter. 1 litre of water gets a surface of 200 square meters and obtains very high heat resorbtion ability. The mist is also able to suppress smoke which is its main task in building the fire compartments. Also worth mentioning is that the nozzles to protect the pulse transformers are directed away from them to absorb most of the heat radiation may be caused by a nearby fire. The system is separated into 28 areas, 25 for pulse transformers and 3 for the fire compartments.

Fire Suppression for the NoVa Far, Near Surface and Near Underground Detectors

Primary authors: Dr. PRIEST, James (Fermi National Accelerator Laboratory)
Presenter: Dr. PRIEST, James (Fermi National Accelerator Laboratory)

Fire Suppression for the NoVa Far, Near Surface and Near Underground Detectors using Water Mist, Line and Fiber Optic Type Heat Detection, VESDA early warning Detection and CCTV. We will explore the methods and issues of protecting these large volumes of combustible liquid detectors and lessons learned in the processes.

Sustainability

ESS - A Sustainable Research Facility

Primary authors: Mr. JAKOBSSON, Peter (Head of Environment, Safety & Health)
Presenter: Mr. JAKOBSSON, Peter (Head of Environment, Safety & Health)

The European Spallation Source, ESS is one of the largest research infrastructure project that is ongoing today. When it is finished, it will be one of the largest and brightest neutron source ever built. The construction will start during 2014 and the first instruments is planned to be

commissioned late 2019. Sustainability has from the very start of the project been at focus for ESS. The four key words; Responsible - Renewable - Recyclable - Reliable will affect the whole project, from the design to operation and finally decommissioning.

This paper/talk will give an overview of how ESS work with different sustainability questions like energy recycling and environmental policy. It will give insights to the management process as well as the legal environmental aspects of building ESS in Sweden. Discussions will be made on practical aspects of how to build a green research facility in the 21st century.

Handling hazardous and greenhouse gases at ALBA Synchrotron facility

Primary authors: Mrs. MARMOL, Maria Del Carmen (ALBA CELLS); Dr. QUERALT, Javier (ALBA CELLS); Mr. AGUILAR, Jose Angel (ALBA CELLS)
Presenter: Mrs. MARMOL, Maria Del Carmen (ALBA CELLS)

ALBA is the Spanish synchrotron facility formed with a 3GeV electron synchrotron accelerator generating bright beams of synchrotron radiation, located in Cerdanyola del Vallès (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 3GeV. 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 e- 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 7 installed). 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 face the presence of hazardous and greenhouse gases reaching the minimum risk level to the personnel and to the environment at ALBA.

The mentioned ALBA LINAC has three oxygen free high conductivity (OFHC) copper waveguides which deliver 3 GHz radiofrequency from two klystrons, placed in Service Area, to the LINAC cavities.

LINAC uses sulphur hexafluoride (SF6) as an electrical isolation in their klystrons in order to be able to connect properly the klystrons and the radiofrequency cavities. In case of a reparation or maintenance, an automatic system recovers the greenhouse gas and storage it in an empty bottle. Then, this bottle is sent out to the external company as a waste.

In this work we will show the system development, its usage and how we avoid the emissions to the atmosphere. The equipment and the process to develop this recovering will be also explained.

Referring to the beamlines at ALBA, one of the seven beamlines is dedicated to Core Level Absorption & Emission Spectroscopies (CLÆSS). This beamline uses hazardous gases from 20 bars to

50 bars to develop chemical and catalytical experiments. In order to reduce as much as possible the exposition to any toxic, flammable or corrosive gases, like CO, H2 or H2S, a new set-up is prepared. This is formed by safety cabinets, fixed gas detectors, electrovalves and an exhaust system.

We will also explain how the gas flow is handled from the consumption point to the cell in a safe manner.

Energy Efficiency Reinvestment at Argonne National Laboratory

Primary authors: KOSKY, Karen (Argonne National Laboratory)
Co-authors: RISTIC, Dejan (Argonne National Laboratory)
Presenter: KOSKY, Karen (Argonne National Laboratory)

In FY 2008 Argonne created an in-house Energy Savings Reinvestment Program initiative to complement the Energy Savings Performance Contracts for energy efficiency project funding. Under this initiative, the Laboratory's maintenance foremen and building engineers team identify, evaluate, and prioritize energy and water conservation projects. Project savings are calculated and reported to Argonne's budgeting office which then provides recurring funding equivalent to the amount of utility cost savings for the duration of the project's payback period. This funding is then reinvested in additional energy savings projects, and has reached a level of funding that is self-sustaining. This presentation will highlight performance over the program's 5 years, and will discuss lessons learned.

Energetic Evaluation of Buildings at Research Infrastructures

Primary authors: LEISTER, Eva (DESY)
Presenter: LEISTER, Eva (DESY)

DESY was founded more than 50 years ago. In this time more and more buildings were built on the area. Now there are approximately 90 buildings, which are in different conditions, and the number will increase in the next years. An analysis of the energetic consumption of DESY shows, that the buildings need much of energy. The rising energy costs and the energy turnaround make it necessary to look after the whole energy budget. And there is a need for an evaluation of the building to decide whether it is better to build a new building or is it possible to modernize it efficiently. For this requirement there was tested a tool at DESY that generates specific energy values for different zones in a building.

Sustainability issues at the ESRF

Primary authors: Dr. BERKVENS, Paul (ESRF)
Co-authors: Mrs. LANDURÉ, Véronique (ESRF) ; Mrs. RICOT, Stéphanie (ESRF)
Presenter: Dr. BERKVENS, Paul (ESRF)

The presentation describes issues related to environmental sustainability and protection at the ESRF. In particular, the presentation will cover the specific legal requirements the ESRF is subject to

in terms of environmental protection and how ESRF responds to these requirements. As required by French law, ESRF must establish every three years an official carbon footprint document. The presentation will present this carbon footprint, how the corresponding internal and external communication is made, as well as the associated action plan.

Energy Strategy - Low carbon research for a low carbon future

Primary authors: Mr. JACKSON, Sam (UK Atomic Energy Authority (Culham Centre for Fusion Energy))
Presenter: Mr. JACKSON, Sam (UK Atomic Energy Authority (Culham Centre for Fusion Energy))

Culham Centre for Fusion Energy is a world leader into fusion energy research, a future source of clean energy. In contrast to the ultimate aim CCFE has a significant carbon footprint primarily from electricity usage and fugitive emissions. To tackle this an energy strategy has been developed with short and long term objectives. This presentation will provide an overview of this strategy.

CERN on the way to sustainable development

Primary authors: Mrs. KLEINER, Sonja (CERN) ; Ms. RIO, Dora (CERN) ; Mr. CENNINI, Enrico (CERN)
Presenter: Mrs. KLEINER, Sonja (CERN) ; Ms. RIO, Dora (CERN) ; Mr. CENNINI, Enrico (CERN)

Environmental reporting is a well-established practice within organizations. Nowadays, it is commonly included under the scope of sustainable development. At CERN, sustainability issues presently addressed are Human and Social Responsibility, Procurement and Environmental Responsibility. The Human, Social Responsibility and Procurement are covered by the CERN Code of conduct, diversity and training programs and procurement policy. A focus is given to Environmental Responsibility that is ensured through annual environmental objectives fixed by the Director General, follow-up of indicators set up for relevant environmental domains, environmental monitoring programs and definition of environmental requirements for new projects and activities. The Organization strives to adopt a more structured approach to act and report in the sense of sustainable development.

Heat Recovery at Cryogenic Plant

Primary authors: LEISTER, Eva (DESY)
Presenter: LEISTER, Eva (DESY)

Big research facilities like DESY have considerable power consumption. More than 90 % of the power consumption is electricity. The produced waste heat is often blown directly into the atmosphere. The rising energy costs and the energy turnaround make it necessary to look after the whole energy budget.

A big energy consumer at DESY is the cryogenic plant with 16 % of the whole electricity consumption. The liquefaction of helium needs a lot of energy, especially for the compression of the helium. The oil for the high pressure screw compressor get a temperature of about 70 degrees and

is cooled down at oil cooler. A simulation in MATLAB/Simulink shows that there is a big potential for using this waste heat for the DESY heating network.

Energy management at Fermilab

Primary authors: KRSTULOVICH, Steve (Fermilab)
Presenter: KRSTULOVICH, Steve (Fermilab)

Since the accession by CERN to the world's highest energy particle physics research, Fermilab has shifted focus to other areas driving science with new projects in the coming decades that depend on high beam intensities. So Fermilab is once again pioneering the development of new technologies, like high Q Superconducting RF cavities and higher efficiency RF sources, which are also applicable at other sites as well to help offset power needs. Operational strategies to compliment this include energy management, facility consolidations, alternative financing, and a portfolio approach to sustainably to support these new initiatives.

Sustainability Writ Large: Managing at the Landscape Level

Primary authors: WALTON, Rod (Fermilab)
Presenter: WALTON, Rod (Fermilab)

Fermilab is a relatively large site of approximately 6800 acres (2750 Hectares), but less than 15% of the surface area is built out. In some ways, the site's land use reflects that historically prevalent in northeastern Illinois. Industrial areas are interspersed with prairie, forest, wetlands and even agriculture. The openness of the site contrasts sharply with the intense growth over the last 40 years of residential and commercial development that surrounds us. That makes Fermilab an ideal site to sustain, develop and study many elements of a natural ecosystem that would otherwise be lost. Starting in 1975, with a small trial plot in the center of the Main Ring, the extent of reconstructed tall grass prairie grew to over 1000 acres by 2005. Land management is a cooperative affair that is planned and executed by laboratory personnel, volunteers, growers, and independent not-for-profit organizations. There are several implications for sustainability that will be discussed, including fostering biodiversity, carbon sequestration, and enrichment of human communities.

The Commuter "Last Mile Problem" Linking Fermilab to Chicagoland's Commuter Trains

Primary authors: MIELAND, Eric (Fermilab)
Presenter: MIELAND, Eric (Fermilab)

Fermilab is situated less than eight miles from two commuter rail lines serving Chicago and the western suburbs. The laboratory's demographics suggest and a recent survey confirmed that a large number of employees and researchers could use the train to get to Fermilab. The challenge for commuters is to bridge the distance from the train stations to Fermilab in the absence of a connecting system. This dilemma is often referred to as the commuter last mile problem. This

presentation will cover the path Fermilab is undertaking to address this challenge and the resulting significant benefits to the laboratory, commuters and the environment.

Continuous Improvement in Health Safety and Environmental Matters

Performance Based Peer Review

Primary authors: Mr. MAY, Robert (JSA Jefferson Lab)
Presenter: Mr. MAY, Robert (JSA Jefferson Lab)

Subsequent to long maintenance downs, upgrades, or significant repair that affects equipment with safety significance, accelerator facilities often use external peer reviews to assist in determining readiness to (re)start commissioning or operations. In some cases, a funding and/or regulatory organization may require one or more external peer reviews prior to and during commissioning or before starting or restarting operations. Peer based readiness reviews are used in the US DOE and NNSA domains and are incorporated into directives that govern these accelerator facilities. Several DOE laboratories are in the process of conducting or have recently completed similar peer based readiness reviews. The outcome of recent reviews have certain common features that favorably position the facility for a successful review. These include but are not limited to good resource integration into carefully designed commissioning and restart plans, analysis and implementation of both internal and (inter)national lessons learned, careful review sequencing that places peer reviewers with facility subject matter experts in settings that lend themselves to a performance-based review.

Summary:

This talk will discuss recent experience in US accelerator facilities that use peer review(s) as an important element of a review to determine readiness to commission or operate.

Taking Safety Implementation to the Next Level at a Medium-Sized Laboratory

Primary authors: Dr. TRUDEL, Anne (TRIUMF)
Presenter: Dr. TRUDEL, Anne (TRIUMF)

At a medium-sized laboratory, because the ability to add staff dedicated to a particular function is limited, we have opted to add function to particular roles in order to dedicate the resources needed to meet regulatory requirements for safety programs. This added functional responsibility has also been shared amongst staff in all divisions. This approach has the added benefit of facilitating site-wide integration of safety programs while also tailoring and optimizing the safety program to suit the activities of the organization. TRIUMF was successful in taking this approach when a Quality Management System was implemented in the last decade and opted more recently to use the same approach to address development for our Training Program. Likewise functional responsibility was

added to individual roles across divisions for carrying out Incident Investigations, a component of our Nonconformity Reporting and Resolution process. This talk will use specific examples to highlight tools and templates developed to facilitate implementation of these programs site-wide, and look to provide a measure of the operational performance for both our Training and Nonconformity Reporting and Resolution Programs.

Safety analysis procedure for experiments at the large-scale research facilities at the Paul Scherrer Institute: from theory to praxis

Primary authors: Mr. LOERTSCHER, Yves (Paul Scherrer Institute)
Presenter: Mr. LOERTSCHER, Yves (Paul Scherrer Institute)

The Paul Scherrer Institute operates large-scale facilities for research purposes. These facilities are also made available to external users. The aim of the procedure is to ensure that experimenters at the large-scale SINQ, SLS and SmuS facilities at the Paul Scherrer Institute adhere to Swiss statutory requirements, as well as the safety regulations.

The User Office is the central office at the PSI available to all users of the three large research facilities (SLS, SINQ and SmuS). The User Office runs the “DUO” proposal-submission system, which ensures that all processes are coordinated, from the time the proposal for the experiment is submitted until the experiment is carried out. The User Office controls the administrative processing of the proposal. Proposals can only be submitted electronically through the DUO system. The Main Proposer must register with DUO in order to make the submission. Registration is by personal authorization. Compulsory safety-relevant inputs are requested from the Main Proposer while the submission is being made. During submission, Main Proposers are asked to confirm the accuracy of the details provided, as well as their acknowledgement of receipt of the PSI’s directives relating to safety, and their willingness to adhere to them. The directives are made available to the Main Proposer in electronic form. Main Proposers are responsible for instructing all their staff. The Proposal is only released for evaluation by the Research Committee and the Subject Specialists for Safety after all the compulsory details have been completed. Main Proposers receive confirmation of their entries by e-mail.

PSI will decide upon execution of the experiments on the basis of the recommendation from the scientific committee, also taking the technical and safety aspects into account. Where there is any doubt, the decision will be made by the Director in consultation with the Safety Delegate, the Safety Officer and the Subject Specialists. The whole approval procedure will be handled and documented electronically by the “DUO” system.

After a test period in 2013 by 3 beamlines in the SLS facility, the PSI decided to implement definitively the procedure for the three large research facilities (SLS, SINQ und SmuS).

Seismic reliability of shielding walls and structures

Primary authors: Mrs. COLLOCA, Cristiana (CERN)
Presenter: Mrs. COLLOCA, Cristiana (CERN)

Shielding of experimental zones to protect workers and public against ionizing radiations is often made at CERN by constructions of piled concrete or steel blocks covered, or not, by heavy roofs. This type of constructions is very particular since blocs are not connected each other and to the ground, to ease modifications and facilitate removals operations. Seismic safety represents a major issue and verifications are particularly challenging: calculations fall in the field of non-linear models and simulations are very different case by case. A dedicated collaboration has been set between CERN and the EPFL in Lausanne (CH) to carry out the study using an ad-hoc modelling software developed by the Université de Montpellier (FR).

Safety in Projects and Experiments at CERN

Primary authors: Mr. GODRY, Rémi (CERN)
Co-authors: Mrs. COLLOCA, Cristiana (CERN) ; Mr. HENRIQUES, Andre (CERN)
Presenter: Mr. GODRY, Rémi (CERN)

To assist Projects (including Experiments) managers in the integration of all Safety aspects in projects, CERN HSE Unit has set up a dedicated activity of Safety support. From the early stage of every project, a Safety follow-up structure is internally defined: a unique Safety Correspondent is appointed to be the preferred contact person during the whole project duration for the Project Leader on any question related to Safety matters. Share, harmonizing and disseminating best practices is only one of the major outcomes.

Helium release tests in the LHC tunnel

Primary authors: Mr. LINDELL, Gunnar Karl (CERN); Dr. TRANT, Ralf (CERN)
Presenter: Dr. TRANT, Ralf (CERN)

The LHC machine contains big quantities of liquid helium. Over the last 15 years, several studies have been done to understand how helium would propagate in the event of a release and what the consequences would be for people. A specific spill test was done in February 2014 where 1000 liters of liquid helium was released in the LHC tunnel. Sensors were installed up to 100 m upstream and 200 meters downstream the ventilation direction. Oxygen levels, temperatures, helium mass flow, wind speed together with the footage from 6 cameras were registered. In parallel, a Computational

Fluid Dynamics (CFD) study using Open Foam, was set up to model the helium release. The aim is to have a calibrated tool so that modifications of parameters can be simulated without having to re-do a full scale helium release test.

Fermilab Human Performance Improvement Initiative

Primary authors: Ms. MICHELS, Martha (ESH&Q - Fermilab)
Presenter: Ms. MICHELS, Martha (ESH&Q - Fermilab)

Fermilab began implementing Human Performance Improvement (HPI) Initiatives as a way to reduce undesired events. This talk will outline the HPI process, the challenges with implementing the program, lessons learned from the program, and successes seen from the program implementation.

Lessons Learned from Human Errors

Primary authors: TAVLET, Marc (CERN-BE)
Presenter: TAVLET, Marc (CERN-BE)

The presentation will review some possible techniques to analyse undesirable events and identify possible ways to learn lessons. At first glance, causes of incidents and mishaps are sometimes identified as “human errors”.

Ex: ignoring warning signs to reach the workplace, taking a roundabout in the wrong way, wrong manipulation of electrical probes, tripping in the stairs while carrying large card boxes.

Defining preventive measures to avoid human errors may lead to trapping safety into rules, setting too many restricting procedures.

Humans need to learn by experience, which means sometimes by mistakes. Humans are often capable, if not keen, to correct their mistakes, and this may lead to an improvement of the whole system. In order to make as many as possible to profit from common experience, deviation reporting tool and system are necessary.

Incident/Accident Management

Internal Emergency Plan of the GANIL

Primary authors: Mr. ROYET, Pascal (GANIL)
Co-authors: Mr. RANNOU, Bertrand (GANIL)
Presenter: Mr. ROYET, Pascal (GANIL)

As a manager of a nuclear facility, the GANIL had to implement an Internal Emergency Plan which aim is to be able to face all the unwanted events that should affect its facility. This plan involved to identify the whole incidents or accidents that had to be taken into account, in agreement with the technical support of the Safety authority. It needed to set an internal organization able to deal with those events, 24 hours a day, and able to manage external interventions of a fire brigade.

The whole organization is verified each year by common exercises realized with the city firemen.

The presentation will provide a feedback of the last 5 years experimentation of this plan.

Fire Down Below: 2014 Truck Fire and Transuranics Release at the Waste Isolation Pilot Plant

Primary authors: KENNY, Joe (SLAC National Accelerator Laboratory)
Presenter: KENNY, Joe (SLAC National Accelerator Laboratory)

In early 2014, the U.S. DOE's Waste Isolation Pilot Plant, a mine hosting both a radioactive waste repository and Stanford University's Enriched Xenon Observatory (EXO-200), endured two untoward underground events: the complete destruction by fire of a salt-loading truck, and the release of transuranic waste from an interred waste container. These twin catastrophes left the experiment in peril.

Summary:

The causes of the accidents, WIPP's response to them, and EXO's battle to save its experiment are discussed.

Communications

Emergency management & emergency plan of Gran Sasso National Laboratories: organization and results of the emergency drill for the Underground Laboratories

Primary authors: Dr. PERRUZZA, Roberto (Laboratori Nazionali del Gran Sasso - INFN)
Co-authors: Dr. TOBIA, Marco (Gran Sasso National Laboratory - INFN) ; Dr. TARTAGLIA, Roberto (Laboratori Nazionali del Gran Sasso - INFN)) ; Dr. GIAMPAOLI, Antonio (Laboratori Nazionali del Gran Sasso - INFN) ; Dr. GABRIELE, Federico (Laboratori Nazionali del Gran Sasso - INFN)
Presenter: Dr. PERRUZZA, Roberto (Laboratori Nazionali del Gran Sasso - INFN); Dr. TARTAGLIA, Roberto (Laboratori Nazionali del Gran Sasso - INFN)

The Gran Sasso National Laboratories (LNGS) of the National Institute for Nuclear Physics (INFN) fall within the definition of “major accident hazard plant” because of the use of substances classified as dangerous for the environment according to the European Directive 2003/105/EC (Seveso Directive). These classified substances are used in two Experiments underground. This element is made more critical by the Gran Sasso complex system in which the underground laboratories are located: a rock layer 1400m thick in the area of the National Park of Gran Sasso and Monti della Laga; a huge water reservoir in the Gran Sasso massive; two highway tunnels managed by the “Strada dei Parchi SpA” Company.

LNGS have studied, discussed and adopted an Internal Emergency Plan (PEI), which takes into account the possible accident scenarios and describes the preventive and protective actions and the

procedures to follow in order to avoid the harmful effects and consequences resulting from major accidents in the underground laboratory.

Object of the presentation is an emergency drill, performed in order to test the PEI of LNGS. These tests are important for screening and evaluating the complex dynamics in terms of organization, infrastructure and psychology that determine the validity of an emergency plan and the guidelines to be followed in emergency management.

The test has been carried out on August 2013: the event scenario simulated a liquid release involving one of the classified substances in an experimental apparatus hosted in the Hall C of the underground laboratory.

The presentation focuses on the organization and on the results of the emergency drill, gathering information about the response both of LNGS emergency teams and labs' users. In this way, the Directorate and the Safety Management (Prevention and Protection Service) have got the chance to compare the results of the training test both with the past drills and with the foreseen PEI's expected behavior of emergency teams and users.

These evaluations give clear basis to carefully analyze and study the validity and effectiveness of the emergency plan, of the emergency procedures and of the training of emergency teams and LNGS users. The pragmatic approach and the idea and attitude to perform these drills in an unbiased way and according to a scheduled calendar are the necessary precondition to pursue the high safety standards and continuous improvement in matter of safety that Gran Sasso National Laboratories have to guarantee both for users and experimental activities.

Equipment Certification

Equivalency Process for Pressure Systems not Certified to Industry Standards

Primary authors: Mr. GAFFNEY, Michael (Brookhaven National Laboratory)
Presenter: Mr. GAFFNEY, Michael (Brookhaven National Laboratory)

US Federal Law (10CFR851) requires Dept. of Energy Laboratories to provide for worker safety by using pressurized systems built to American Society of Mechanical Engineers (ASME) codes and standards. However, in many cases, components are not available that meet these requirements. Brookhaven National Laboratory has established processes to provide for an equivalent level of safety when industry standards cannot be met. The presentation will discuss typical types of issues that require the use of the process and solutions.

Experience with Equipment from outside the European Economic Community (ECC) under Safety aspects

Primary authors: HOPPE, Andreas (DESY)
Presenter: HOPPE, Andreas (DESY)

For new collider with international cooperation new equipment will be delivered as a normal buying or as in-kind contribution. What must be considered under safety and legal aspects from contractors outside of the ECC – and what can happened. Some examples as “lessons learned” will be presented.

Equipment certification at the ESRF

Primary authors: Mrs. RICOT, Stéphanie (ESRF)
Co-authors: Dr. BERKVENS, Paul (ESRF) ; Mrs. LANDURÉ, Véronique (ESRF)
Presenter: Mrs. RICOT, Stéphanie (ESRF)

In the context of the phase I of the upgrade program, an important number of new X-ray beamlines are being installed at the ESRF. These new beamlines imply the development, installation and commissioning of a number of specific instruments. The certification of these instruments, partly developed in industry and partly developed in-house is a real challenge. This presentation illustrates the equipment certification for some representative cases and describes, on a more general basis, the equipment certification process put in place at the ESRF.

Laser Safety

Eye protection unit for High Power Lasers and Broadband OPCPA systems

Primary authors: TEMME, Marc (DESY)
Presenter: TEMME, Marc (DESY)

A protective laser beam viewing system or device including a camera selectively sensitive to laser light wavelengths and a viewing screen receiving images from the laser sensitive camera. The camera is worn on the head of the user or incorporated into a goggle-type viewing display so that it is always aimed at the area of viewing interest to the user and the viewing screen is incorporated into a video display worn as goggles over the eyes of the user.

Summary:

High power lasers in use today produce intensities that can cause severe eye damage or even blindness. As a consequence, users of such lasers are required to wear eye protection in the form of protective goggles. Standard protective goggles for such use are typically made of materials which absorb at the wavelength of the laser light but permit other wavelengths of light to pass so that the user can observe his surroundings and perform work in a relatively normal manner. In our case

there was no type of safety googles available for the pump of our Opcpa System (14 kilowatt burst average power from 2-stage cascaded Yb:YAG thin-disk multipass amplifier running 100kHz intraburst 140mJ Burst energy (published: FTu4A.2.pdf Frontiers in Optics 2013/Laser Science XXIX © OSA 2013)).

For This type of Laser you would need googles with OD 16/17 which is not available

Interaction of radiation and laser safety at an user facility

Primary authors: Mr. BOYD, Eric (European XFEL)
Co-authors: Dr. KOZIELSKI, Sigrid (European XFEL)
Presenter: Mr. BOYD, Eric (European XFEL)

When the European XFEL begins its operational phase, its experimental hall will house nine radiation shielded and interlocked experimental hutches. Eight of these nine hutches will also contain class IV lasers that will interact with the XFEL beam, but can also be operated independently. This requires careful coordination and planning to ensure all appropriate safety measures are in place for the giving operating conditions without hindering or confusing the user.

We will report on our efforts to develop a safety concept that includes the appropriate interaction of its interlocks, emergency off concept, and administrative controls to accommodate both laser safety and radiation protection over multiple areas. The report will include the development of a laser chicane that allows for the transport of optical lasers between laser hutches and radiation hutches without having to establish further controlled areas.

An overview of Fermlab's Laser Safety Program

Primary authors: BAIRD, David (Fermilab) ; QUINN, Matt (Fermilab)
Presenter: BAIRD, David (Fermilab) ; QUINN, Matt (Fermilab)

Class 3B and 4 lasers are used in a number of different applications at Fermilab. Because of the hazards posed, these diverse systems require a strongly integrated laser safety program. In the United States laser safety programs are governed by ANSI Z136 standards. We will discuss some different laser applications, their associated hazards and the controls implemented at Fermilab.

Commissioning of the ASTA Photo-Injector Drive Laser System

Primary authors: SANTUCCI, Jamie (FNAL)
Presenter: SANTUCCI, Jamie (FNAL)

Currently an advanced superconducting test accelerator (ASTA) is being built at Fermilab. The accelerator will consist of a FLASH-type photo electron gun, ILC-type cryomodules, and multiple downstream beam lines for testing cryomodules and carrying advanced accelerator researches. In this talk we will report on the commissioning of the ASTA drive-laser system, its control system, and its safety system.

Damaged laser shutter

Primary authors: TEMME, Marc (DESY)
Presenter: TEMME, Marc (DESY)

Recently we had an incident at our facility with a laser shutter. The beam dump within the shutter was melted over time. This happened due to the fact that the datasheet provided with the shutter was not giving the exact information about the energy density.

The total power of the laser was within the specifications of the shutter, but the density of energy was too high so the shield was melted over time. Luckily this was discovered and nobody was harmed.

Recent developments in high power lasers make things even more complicated to choose the right shutter. For short pulses less than 1ns pulse length the problem is not heating. It´s ablation the material is vaporized.

Resultant from this experience you have to keep in mind for choosing the right shutter :

• total power which has to be blocked

• energy density

• pulselength

New Projects and Challenges

Development of Safety Concepts for the Operation phase at the European XFEL Research Campus in Schenefeld

Primary authors: KOZIELSKI, Sigrid (European XFEL Research Campus)
Co-authors: BOYD, Eric (European XFEL Research Campus)
Presenter: KOZIELSKI, Sigrid (European XFEL Research Campus) ; BOYD, Eric (European XFEL Research Campus)

The European XFEL is an international X-ray free Electron Laser facility currently under construction. The underground tunnel system starts in Hamburg Bahrenfeld with a 17.5 GeV superconducting linac followed by more than 3 km of electron beam transport that generate XFEL flashes used at 5 experimental end stations planned so far. The experimental hall is located 14 metres deep underground. The headquarters which are situated on top of the experimental hall will have on the ground floor research facilities comprising of workshops, laser laboratories, chemical and biological laboratories on a surface of about 4500 m2. An overview of the work of the safety group and the status of the safety concepts including fire protection, access control, user management for the Schenefeld Campus Site will be presented.

Anatomy of a new Jefferson Lab Cryotarget and its Hazard Analysis Review

Primary authors: MANZLAK, Bert (JLab)
Presenter: MANZLAK, Bert (JLab)

A general description of the Hall D cryogenic target and a hazard analysis for its operations, including the aspects: magnetic field, power failure, vacuum, pressure system safety (target cell), flammable gases (hydrogen or deuterium), and cryogenic. And a bit about the emergency and interlock response procedures and inspection and maintenance schedule for the target.

European XFEL – installation progress

Primary authors: MOHR, Sven (DESY)
Presenter: MOHR, Sven (DESY)

Since the last ITSF the XFEL project reached an advanced stage. Meanwhile the machine installation phase has begun in most parts of the facility. The talk will give a short overview on what happened on the construction sites in the last 12 months.

FCC – an opportunity for developing new solutions for accelerator facilities

Primary authors: Dr. TRANT, Ralf (CERN) ; Dr. LA MENDOLA, Saverio (CERN) ; Mr. HENRIQUES, André (CERN)
Presenter: Dr. TRANT, Ralf (CERN)

Prior to the request from the European Strategy for Particle Physics, CERN should undertake design studies for accelerator projects in a global context, with emphasis on proton-proton and electron-positron high-energy frontier machines. The starting point of these design studies consist in a five-year international design study called “Future Circular Collider” (FCC) with emphasis on a hadron collider with a center-of-mass energy of the order of 100 TeV in a new 80-100 km tunnel as a long-term goal.

These design studies for new machines in a infrastructure offers the opportunity to study new concepts based on lessons learned from former or present facilities. Basic concepts for the separation of hazard/escape/service zones, for radiation protection (e.g. material selection or remote handling) or the air management system will be addressed.

Chemistry laboratory organization

Primary authors: Mrs. LESSMANN-BASSEN, Sabine (DESY)
Presenter: Mrs. LESSMANN-BASSEN, Sabine (DESY)

DESY Photon Science offers a number of different chemistry laboratories to the users of the photon sources and to DESY staff. The laboratories are used by user groups during beamtime and by long-

term DESY groups. An increasing number of long-term users led to an update of organizational measures. These measures will also apply for the further user laboratories to come with the PETRA III Extension and FLASH II beamlines now under construction.

Summary:

Chemistry laboratory organization and an update on construction work on DESY campus.