

FINAL REPORT

Summer school “Aspects of risk management and ensuring environmental safety in industrial enterprises”

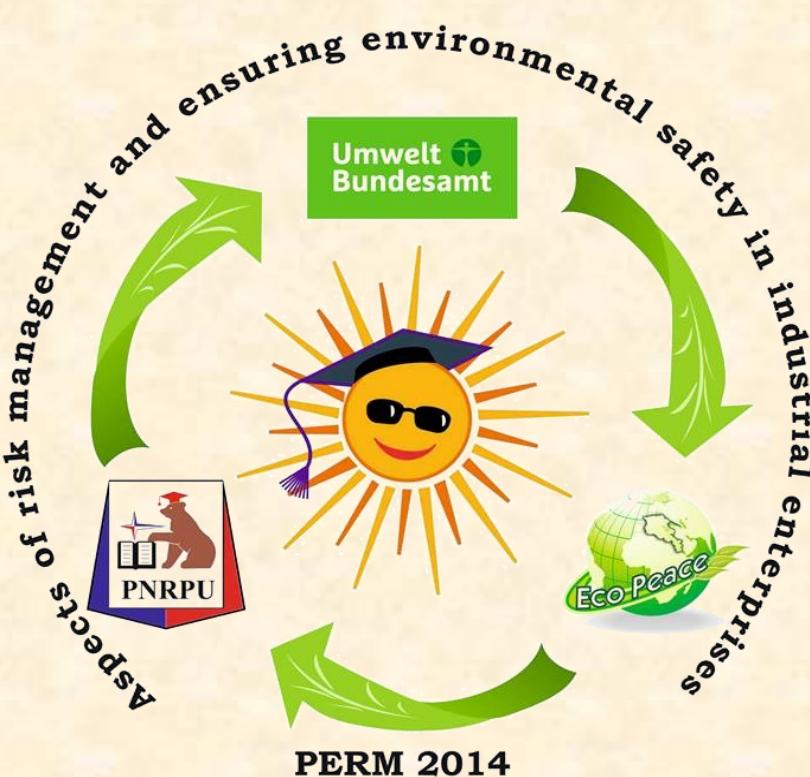


SUMMER SCHOOL



Armenia-Russia

On behalf of:
Federal Ministry
for the Environment, Nature Conservation,
Building and Nuclear Safety
of the Federal Republic of Germany



Prepared by

“Eco Peace” scientific, ecological NGO



Federal Environment Ministry's Advisory Assistance Programme in the Countries in Central and Eastern Europe, the Caucasus and Central Asia

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Summer school “Aspects of risk management and ensuring environmental safety in industrial enterprises”

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Abstract

Within the framework of the Federal Environment Ministry's Advisory Assistance Programme for Environmental Protection in the Countries in Central and Eastern Europe, the Caucasus and Central Asia and by the order of the Federal Environment Agency of Germany, an International Environmental summer school "Aspects of risk management and ensuring environmental safety in industrial enterprises" was held in the Perm region of the Russian Federation from 29 of September to 3 of October 2014, the practical part of which took place at industrial plants.

Participants of the event were students and lecturers from Armenia and Russia, as well as selected international experts from the EU and Eastern Europe.

The main goal of the project was to exchange the experience gained during the implementation of the project on "Assistance to raising knowledge on industrial safety at universities in Armenia" implemented in Armenia in 2012 to 2013.

The project implementing organization was "Eco Peace" scientific ecological NGO (Armenia) in cooperation with Perm National Research Polytechnic University (Russian Federation).

The UN television (UN TV) prepared a film on the summer school, the premiere of which was held on the UNECE General Assembly 8th plenary meeting (December 3-5, 2014) in Geneva.

Введение

В рамках Программы консультационной помощи по охране окружающей среды в странах Центральной и Восточной Европы, Кавказа и Центральной Азии с 29-ого сентября по 3-е октября 2014 года, по заказу Федерального ведомства по охране окружающей среды (Umweltbundesamt, UBA) Германии, в Пермском крае Российской Федерации была проведена международная экологическая летняя школа «Аспекты управления рисками и обеспечения экологической безопасности на промышленных предприятиях», практическая часть которой проходила на промышленных предприятиях.

Участниками данного мероприятия стали студенты и преподаватели из Армении и России, а также избранные международные эксперты из стран ЕС и Восточной Европы.

Основной целью проекта являлся обмен опытом, накопленный в ходе реализации проекта в Армении «Содействие повышению знаний в области промышленной безопасности в ВУЗ-ах», осуществленного с 2012 по 2013гг.

Исполнителем проекта была научно-экологическая организация НПО «Eco Peace» из Армении при сотрудничестве с Пермским национальным исследовательским политехническим университетом (Российская Федерация).

Со стороны телевидения ООН (UN TV) был снят фильм о летней школе, премьера которого состоялась на 8-ом пленарном заседании Генеральной ассамблеи ЕЭК ООН (3-5 декабря, 2014) в Женеве.



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Abbreviations

CLF	Central laboratories of facility
CMSA	Crises Management State Academy
CJSC	Clouse Joint Stock Company
EECCA	Eastern Europe, Caucasus and Central Asia
EU	European Union
HPP	Hydro power plant
IESS	International Ecological summer school
LLC	Limited liability company
NGO	Non-Governmental Organization
NUACA	National University of Architecture and Construction of Armenia
OJSC	Open Joint Stock Company
PNRPU	Perm National Research Polytechnic University
PSNRU	Perm State National Research University
PSAA	Perm State Agricultural Academy
RA	Republic of Armenia
RF	Russian Federation
SEUA	State Engineering University of Armenia
UN ECE	United Nations Economic Commission for Europe

Brief description of the project

In many countries of Central and Eastern Europe, Caucasus and Central Asia (EECCA) there are obsolete, as well as many modern industrial enterprises. It is important that they meet modern standards and are controlled on the basis thereof.

Especially the enterprises with high potential risk shall comply with the required standards of technical safety. However, the responsible / competent authorities and operators of industrial enterprises often lack the know-how and the necessary specialization. Continuous knowledge exchange is of great importance for improving the safety and risk management of hazardous industrial facilities.

Previous consulting projects in the field of industrial safety were focused on the development of skills and competences among the responsible agencies on the basis of the "Checklist methodology for verifying and assessing the level of risk of water protection systems of industrial enterprises" developed by the Federal Environment Agency.

This methodology provides the use of basic standards in the field of industrial safety allows checking water protection measures of specific industrial enterprises and assessing their risk for water resources on the basis of the presence of substances hazardous to water there, their quantities and carried out water conservation measures.

Examination of the individual projects of the sector has shown that there is a shortage of specialists to address these problems. The situation can be improved by the introduction of "Industrial safety" in certain university programs, which will be a good addition to engineering education, and will provide specialists for the sector.

Positive results in this area were achieved through the project on "Assistance to raising knowledge on industrial safety at universities in Armenia" implemented by Armenian NGO "Eco Peace" (project number: FKZ 380 01 283). Along with the improvement of engineering education the project also proved beneficial to universities, government agencies, businesses and the public. The project results were highly appreciated at the UNECE General Assembly seventh plenary meeting, which recommended implementation of such pilot projects in other countries.

Based on this, with financial support of Federal Ministry for the Environment, Nature Conservation, Building and Nuclear safety of Germany, the "Eco Peace" scientific ecological NGO (Armenia) in cooperation with Perm National Research Polytechnic University (Russian Federation) implemented the project summer school on "Aspects of risk management and ensuring environmental safety in industrial enterprises".

The overall objective of this project was to advance sustainable development through innovative approaches in risk management and to enhance environmental safety in industrial enterprises as well as to promote the UNECE Convention on the Trans-boundary Effects of Industrial Accidents.

Implementation of the project was held in the format of the Armenian-Russian summer school in Perm, on the basis of the Perm National Research Polytechnic University (Perm, Russia) from 29th of September to 3rd of October 2014. The final selection of industrial enterprises was made during the preparatory stage of the summer school.

The main responsibility for conduction of the event was assumed by the Armenian students who transferred their respective expertise and knowledge gained during the project on “Assistance to raising knowledge on industrial safety at universities in Armenia” carried out in Armenia in 2012. Within the framework of this project, lecturers and students of 3 universities of Armenia mastered methodology of checklists, which had been developed in the course of consulting projects in the field of industrial safety in recent years. This methodology provides for the use of basic standards in the field of industrial safety, and allows verifying and assessing water protection measures at certain industrial enterprises.

In Perm the students from Armenia implemented a course on the use and the details of the checklist methodology for the Russian students and lecturers. Lecturers from Armenia and Russia presented their educational structure, at the same time drawing parallels between the issues of industrial safety and the presence or lack of this aspect in their educational modules. After the theoretical part, the students mastered the aspects of checklists in practice, by visiting two industrial enterprises in the Perm region.

Implementation of the project had been agreed with the UNECE Secretariat and the active involvement of the UNECE in all stages of the project was provided.

The summer school was given a special luster by international experts from the UNECE secretariats for “Industrial Accidents” and “Education for Sustainable Development”, experts from Germany, the Czech Republic, Romania and Ukraine. The international experts shared their knowledge and experience in the field of industrial safety measures with the participants.

The obtained summer school results were discussed and analyzed together with all the participants of the event - international experts, lecturers, students and enterprises.

The UN Television (UN TV) prepared a film on the summer school, the premiere of which will be held on the UNECE General Assembly 8th plenary meeting (December 3-5, 2014) in Geneva.

Implementation of this project contributed to the development of cooperation between students, experts, enterprises and universities of different countries, which in the future may be duplicated in other target countries. Therewith, a solid foundation was created for further exchange and transfer of current knowledge in the field of industrial safety in the UNECE region, which will contribute to the harmonization of the standards of industrial safety.

The project duration was 4 months.

1. Project Location

The city of Perm is located along the Kama River. Perm is the third largest city in the Russian Federation. The city's population is more than one million.

Perm National Research Polytechnic University (former Perm State Technical University) is one of the leading technical universities in Russia and the only technical university of the Perm Region and the largest educational, scientific and cultural center of the Western Urals.

For more than 50 years, the Perm National Research Polytechnic University has made a significant contribution to the development of education, science and culture of the Perm region, the Urals and Russia.

The Perm National Research Polytechnic University is a multidisciplinary institution of higher education, providing quality training and retraining of personnel in a wide range of technical, technological, scientific, economic-administrative, social and humanitarian specialties and areas of higher education.

In 2009, the university received the status of “National Research University” and was one of the 12 best Russian universities.

The following departments prepare students in 37 disciplines and 8 engineering specialties:

- Department of Aerospace;
- Mining and Petroleum Department;
- Mechanical Engineering Department;
- Department of Civil Engineering;
- Department of Chemical Technology;
- Department of Electrical Engineering;
- Department of Applied Mathematics and Mechanics;
- Department of Humanities;
- Road-transport Department.

One of the leading departments of the PNRPU, the Department of Environmental Protection was founded in 1978 as the first environmental department of technical universities in Russia.

Currently, at the Department of Environmental Protection bachelors and masters with a specialization in “Technosphere safety” (fields: emergency prevention, industrial safety, safety systems in construction, risk management, system analysis and modeling) are trained.



Fig. 1: Project venue

It should be noted that the Perm National Research Polytechnic University has extensive experience in organizing different schools, during which various lectures, seminars, round tables and dissemination of results is carried out. In particular:

- Organization and implementation of international environmental summer camps for children, students, graduate students in cooperation with the Office of the Environmental Protection of Perm region. Since 1996, 12 camps have been organized with the participation of undergraduate and graduate students of the city of Perm, high school students of Perm region and students from Germany, Austria, Denmark, Switzerland and Vietnam.
- Since 2008, in collaboration with the Union of Sport, nature and art in Germany (Fuers-tenau, Germany) PNRPU has annually participated in the organization of international school and student camps in Germany and Russia. In general 19 camps in Germany and 5 camps in Perm were organized.
- Participation in European projects of TEMPUS-TACIS:
 - 1997-2001: Joint project of PNRPU, Technical University of Vienna (Austria) and the Wiesbaden High Technical School (Germany) - "Introduction to Environmental Sciences in the field of engineering education in PNRPU".
 - 2003-2005: joint project of PNIPU and EPCEM (Holland, France, Hungary) "Preparation and opening of Master's program in "Environmental Management" in PNRPU.
- Organization of international projects, supported by the Association of Language and cultural exchange in Central, Eastern and South-Eastern Europe (MitOst), Germany:
 - 2010: The project "Academic education of cultural exchange through the environment";
 - 2011 The project "Focus: Culture in the bin".

The issues of the project implementation and the choice of venue for the summer school were based on the following factors:

- ✓ The idea of organizing a summer school came still during the final seminar of the project on "Assistance to raising knowledge on industrial safety at universities in Armenia" (2012-2013), during which the representative of PNRPU was also participating;
- ✓ PNRPU is one of the leading technical universities in Russia, where at the Department of Environmental Protection students are trained for bachelor's and master's degrees;
- ✓ City of Perm is a typical industrial city and the issues of industrial and environmental safety here are urgent;
- ✓ In the Perm region, there are a number of industrial enterprises, which could be the subject of study for participants of the international summer school.

2. The preparatory stage

During the preparatory stage of the project for organization of the international environmental summer school (IESS) the following main activities were carried out:

- Information on the event was disseminated among all interested member countries (Armenia, Russia) - especially among the different universities in Perm, relevant environmental bodies, local authorities region (Appendix 1) and industrial enterprises in the Perm region (Appendix 2), as well as among the UNECE secretariats for "Industrial accidents" and "Education for Sustainable Development."
- For the purpose of presentation of the project meetings were organized at universities in Armenia and Russia and appropriate agreements of the management of the universities were obtained to implement further work.
- Groups were formed in the participating countries, consisting of students and teachers / lecturers.
- All the necessary teaching materials were prepared for the event.
- In coordination with the Federal Environment Agency of Germany (UBA) and the UNECE secretariat international experts were selected to conduct training within the framework of the IESS.
- Preliminary agreements with the management of several industrial enterprises of the Perm region were received and preliminary visits were made to the enterprises for the purpose of their final choice for practical works of the summer school.
- Based on the consent of the enterprises the final agreements were achieved related to the visits by the school participants, as well as to the possibility to make photo and video recording in the enterprises.

2.1. Formation of student groups, choice of participants of the IESS

2.1.1. Formation of student group in Russian Federation

After sending the official letters about the details of the summer school to the corresponding departments of several universities in Perm, the choice of Russian students was made by online registration.

The interested participants completed the registration form at <http://ecoschool.timepad.ru/events/> indicating their personal data, the level of knowledge of foreign languages, training course, specialty, group name, as well as the reasons of participation. This allowed the selection of participants not only from PNRPU, but also from other universities of Perm.

The registration was open until 10.09.2014, during which about 50 profiles of potential participants were accepted.

All profiles were analyzed, of which 22 participants were selected - 3rd-4th year students of baccalaureate, 1-2 year students of graduate courses and post-graduate students from the following largest universities of Perm:

- Perm State National Research University (PSNRU) - 5 participants;
- Perm National Research Polytechnic University (PNRPU) - 18 participants;
- Perm State Agricultural Academy (PSAA) - 2 participants.

The IESS participants from Russia represented the following educational-professional areas:

- Technosphere safety;
- Disposal and recycling of man-made waste;
- Sustainable development of urban areas;
- Chemistry and Biotechnology;
- Mine surveying, geodesy and geographic information systems;
- Foreign languages and public relations.

Fig. 2: Application form for participation in the IESS

Fig. 3: Registration Form for potential participants of the IESS

At the end of the formation of the list of participants an organizational meeting was held, during which the participants got acquainted with each other. The project manager presented the objectives, format and themes of the summer school. The participants asked their questions and received homework tasks on the subject of the UN Convention on industrial safety and risk management to get prepared for the introductory lectures.

From 15 to 22 of September 2014 three introductory lectures were held for the formed group in the PNRPU, which represented: the basic provisions of the UNECE Convention on Industrial Safety, standards of the Russian Federation in the field of industrial safety, the theory of risk management in enterprises, the basics of the checklist methodology.



Fig. 4: Introductory lectures in PNRPU

2.1.2. Formation of student group in Armenia

In Armenia, to participate in the IESS, the students and lecturers who participated in the project on “Assistance to raising knowledge on industrial safety at universities in Armenia” carried out in 2012-2013 in Armenia were chosen to transfer their experience and knowledge gained during the mentioned project to the Russian participants of the project. The Armenian group consisted of 12 participants, who represented the following universities and organizations:



Fig. 5: Students-participants from Armenia

- National University of Architecture and Construction of Armenia - 3 students, 1 lecturer;
- State Engineering University of Armenia - 2 students, 2 lecturers;
- Crisis Management State Academy under RA MES - 3 students;
- Aarhus Centre - Coordinator of Aarhus Center in Armenia.

The IESS participants from Armenia represented the following departments of the participating universities:

- Geo-ecology and life support;
- Biotechnology and environmental protection;

- Mineral resources and environmental protection;
- Crisis management in emergencies.



Fig. 6: Armenian Universities-participants in the IESS (NUACA, SEUA, CMSA)

When selecting the students from Armenia, their knowledge and activity during the previous project, as well as the level of knowledge of Russian and English languages were taken into account.

2.2. Selection of international experts for participation in the event

During the preparatory stage of the project, with the purpose to organize 1-1.5-day international training within the summer school on “Risk management”, international experts were selected in coordination with the Federal Environment Agency of Germany (UBA) and the UNECE secretariat, to carry out this event.

The training should cover the following aspects:

- International experience and policy in the field of the risk management and environmental safety in industrial plants;
- Innovation and best practice in the field of risk management and environmental safety in industrial plants;
- The role of risk management or environmental safety as a component of sustainable development during the preparation of relevant professionals in the given sector.
- The choice of experts was based on their experience in the field of risk management, industrial safety, risk assessment, etc. They represented technical universities or organizations from the EU and Eastern Europe in particular:
 1. UNECE - Secretariat of the Convention on Industrial Accidents;
 2. UNECE - Secretariat for Education for Sustainable Development;
 3. VSB Technical University of Ostrava (Ostrava), Czech Republic;
 4. Babes Bolyai University (Cluj-Napoca) Romania;
 5. National Mining University (Dnepropetrovsk), Ukraine;
 6. The State Office of Environment, Health and Consumer Protection (LUGV), Germany;
 7. Innovation Center “Ecosystem” (Kiev), Ukraine.

All selected experts received official invitation letters from the Russian side (PNRPU).

2.3. Solving of technical and organizational issues and preparation of training materials

Prior to the beginning of the summer school (7-12.09.2014) the project manager from Armenia visited the city of Perm for the final solution of some technical-organizational problems:



Fig.7: Visit of the project manager of Armenian party in Perm

- The choice of accommodation for participants;
- Venue of the summer school;
- Equipment of the event;
- Visit to the industrial enterprise to discuss all the nuances and getting their consent.

For the theoretical and practical workshops of the summer school the participants from Armenia compiled training materials in English and Russian languages on the basis of the checklist methodology (the updated version of the methodology - as a result of the previous project in Armenia).



Fig. 8: Preparatory works in Armenia during the summer heat period

The primary responsibility for conduction of the event was assumed by the Armenian students - to conduct training courses on the use of the checklist methodology that allows verifying and evaluation of water protection measures of specific industrial enterprises. As a result of regular meetings the Armenian group, discussed in detail all the questions about the event.

The topics of appropriate reports of the Armenian students and lecturers were selected and assigned; besides, the demonstration materials were prepared in Power Point format in Russian and English languages. All the materials used during the summer school, were agreed with the Federal Environment Agency (UBA).

2.4. Preliminary agreements with industrial enterprises of Perm region

For implementation of practical training courses using the checklist methodology in industrial enterprises, as well as for obtaining a permit for making photo and video shooting in the enterprises during the summer school, prior agreements were made (official letters, phone calls, visits to the enterprises) with the following industrial enterprises, the details and results of which are provided below.

➤ **OJSC "Mineral fertilizers"** (branch of "URALCHEM", Perm, Russia) - a reply to the official letter from PNRPU was received from the Deputy Director for Public Relations I. Skrypniuchenko, who confirmed the possibility to visit some of the facilities of the enterprise.

Although the meeting for discussion of all the nuances was appointed in early September, it did not take place due to the information received from the representatives of the plant that they had rescheduled the full repair, and therefore the company would not be able to receive a group for the tour in the period from September 29 to October 3, 2014.

➤ **CJSC "Sibur-Khimprom"** (Perm) - an official letter was sent from PNRPU, to which a reply was received from the head of corporate communications of "Sibur-Khimprom" CJSC A.V. Molchanov. He confirmed the preliminary possibility to visit some of the facilities of the enterprise. To discuss all the nuances of the visit, including the issues related to the accompanying of the group and filming, a meeting was scheduled on 8 September 2014. The coordination group of the project (Russia, Armenia), visited the enterprise at the appointed time. They discussed all the details of the event, provided the lists of foreign and Russian participants of the school, represented the goals, objectives of the practical work and selected the industrial facilities to check them on the basis of the checklist methodology.

Afterwards, complete information about the composition of the filmmakers (names, passport data), as well as the composition of the film-making equipment was provided to the enterprise; besides, permission for the filming of the summer school at the plant was also obtained. The visit of the IEES participants to the "Sibur-Khimprom" CJSC was scheduled on October 01, 2014.

However, the day before the summer school (26 Sep-



Fig.9: Visit to CJSC "Sibur-Khimprom"

tember, 2014) a phone call and an e-mail message was received notifying that implementation of the event on the territory of "Sibur-Khimprom" CJSC was rejected. The reason for the refusal was an unplanned visit of Moscow delegation of experts to the enterprise from 01 to 02 of October 2014.

➤ **Pulpmill group PTsBK (Perm)** - an official letter was sent from PNRPU, to which a reply was received from the head of the Environmental protection department, V.S. Posmashnoy, who confirmed the possibility of a visit to the enterprise. The meeting for discussion of all issues was scheduled for 11 September 2014. During the meeting all the nuances were discussed, the full lists of foreign and Russian participants of the school were provided, and the appropriate industrial facilities to visit were selected.

The visit of the school participants to the PTsBK group was scheduled for 1 October 2014. However, on September 15, 2014 their refusal was received, because of the provision of the trade secret of "PTsBK".

➤ **OJSC "RusHydro" - "Kama HPP"** - an official letter was sent from PNRPU, to which a reply was received from the Director V.G. Alekseev, who confirmed the possibility to visit some of the facilities of the enterprise. All the details were discussed by telephone and via correspondence by e-mail.

The organizational meeting on the territory of the Kama hydropower plant did not take place due to the difficulties related to the high level of secrecy of the enterprise and impossibility to receive a group of more than 7 people.

➤ **OJSC "Sorbent" (Perm)** - the request by the PNRPU was answered by the Head of the Personnel Management Department N.V. Zhenikhov. Discussion of all the details of the visit and photo- and video- shooting took place by telephone and e-mail correspondence. The tour for the participants of the school to "Sorbent" OJSC was scheduled for 1 October 2014. The official representative of the enterprise drawn up a preliminary program for the visit, including the visits to industrial facilities and the laboratory building, as well as accompanying in the territory of the enterprise. Because of the special regime for access to the enterprise by foreign experts and foreign students' access to industrial facilities, as well as video shooting in its territory was denied. The participants of the tour were only the representatives of the Russian side (14 people).



Fig. 10: Visit to PTsBK

➤ **“Perm Chemical Company” LLC** (facilities of "Iodobrom" OJSC Perm) - to the request from PNRPU about the possibility of visiting the enterprise, the response was received from the Chief Engineer (Ilchenko A.D.). The discussion of all the details was done by phone and through e-mail correspondence, as well as during the visit of the employee of the Department of Environmental Protection PNRPU to the enterprise (09.17.2014) for the preliminary examination and negotiation.

After giving full information on the composition of the film making group, as well as the composition of filming equipment, permission was received for the filming of the summer school in the area of the closed enterprise. The tour was scheduled for October 2, but only for a small group consisting of 4 people (representative of PNRPU, one international expert and film making group of 2 people).

Limiting of the number of the tour group was associated with extreme secrecy of the enterprise, as well as the lack of specialized staff for excursions. Chief engineer was appointed as the accompanying person.

➤ **OJSC “Metafrax” (Gubakha, Perm)** - an answer to the official letter from “Eco Peace” NGO (Armenia) and PNRPU was received from M.V. Konovalov (Advisor to the Chairman of the Board of Directors of “Metafrax” OJSC for Public relations, assistant to the deputy of the Legislative Assembly of Perm Region Garslyan A.G.), who confirmed the possibility of visiting their industrial facilities. Discussion of all the details concerning the visit, photo and video shooting was made by phone and through e-mail correspondence.

The list of all the participants, as well as complete information about the film making group (full name, passport data) and the composition of shooting equipment was presented to the company. Permission was granted for film making on the summer school in the enterprise.

A visit to the “Metafrax” was appointed on October 1, 2014. The official representative of the company developed the preliminary schedule of the visit, including a visit to the museum “Metafrax”, visit to industrial facilities, interviews with the companies' staff in the territory of the enterprise.

The participants of the tour were foreign and Russian experts, students, professionals (29 people).

Thus, during the preparatory work for the organization of the IESS official agreements were gained with the following industrial enterprises:

1. “Metafrax”, Gubakha, Perm (01/10/2014);
2. “Sorbent” OJSC, Perm (01/10/2014);
3. “Perm Chemical Company”, facilities of the closed company of “Iodobrom”, Perm (10/02/2014).

Appendix 2 provides the official letters that were sent to the industrial enterprises.

3. Holding of the International summer school in the city of Perm

3.1. Opening of the IESS and Implementation of theoretical training for the participants

The International Environmental School was held from September 29 to October 3. As its venue the resort "Ust-Kachka" was chosen, located at 35 km from the city of Perm. The resort "Ust-Kachka" is a town located in a pine forest on the banks of the Kama River. The total area of the resort is 182 hectares, of which the park covers 80 hectares.

During the whole event the school participants (students and trainers from Russia and Armenia, international experts) had the opportunity to enjoy the natural beauty of the resort, which in turn disposed to the environmental issues.

Opening of the international environmental summer school was held on 29.9.2014. Throughout the event the necessary technical means and the English - Russian, Russian-English simultaneous translation were provided.

Welcoming remarks were made by:

- Representative of the PNRPU, Professor of Vaisman Yakov Iosifovich, who welcomed all the participants and briefly represented the international activities of the department;
- Representative of the Department of Ecology and Nature Use of Administration of Perm Tretyakov L.B., who stressed the importance of such events for future professionals of the sector;
- Representative of the Federal Environment Agency of Germany Gerhard Winkelmann-Oei, who briefly presented the goals and objectives of the project and wished fruitful work;
- President of "Eco Peace" NGO Kristine Sahakyan spoke about the foreseen work, as well as the importance and value of this event for the development of international coopera-



Fig. 11: Resort "Ust-Kachka", located on the bank of the Kama River



Fig. 12: Opening of the Summer School

tion, the transfer of theoretical and practical experience in the management of industrial risks.

The opening session of the event was devoted to the presentation of the participating universities and the review of the education system in Russia and Armenia. In this session the representatives of PNRPU, State Engineering University of Armenia (SEUA), Crisis Management State Academy (CMSA) at the Ministry of Emergency Situations of Armenia made speeches.

The Russian side presented the main activities of the PNRPU, the priorities for the development of the University, the achieved target indicators, as well as the development of innovation and entrepreneurship.



Fig. 13: Presentation of the universities participating in the event

The Armenian side made a presentation on the results of educational reforms, implementation of the Bologna process in the educational system of the country (including issues of industrial safety), practical training of students of the CMSA relevant to emergency scenarios.

The industrial sector of the Republic and the main problems of the sector were presented. Particular attention was paid to the mining industry, as it is now leading in Armenia.

The second part of the workshop with duration of 1.5 days, was devoted to the checklist methodology designed for studying and assessment of the condition of industrial enterprises. The session was opened by the representative of Federal Environment Agency of Germany Gerhard Winkelmann-Oei. He presented the fundamentals of risk management, the German experience in this sector, the implemented projects, as well as the activities of international river commissions.

The representative of the scientific-ecological NGO "Eco Peace" Kristine Sahakyan presented the results of the project implemented in Armenia in 2012-2013 aimed at



Fig. 14: Introduction to the checklist methodology

improving knowledge in the field of industrial safety in the universities of Armenia, the results of which were the impetus for this project.

The main responsibility of the summer school was assumed by the Armenian students from 3 universities in Armenia (participants of the previous project). During the theoretical part of the event, each of them presented 2 reports on the checklist methodology. In their reports, the Armenian students presented the details and instructions on using the methodology requirements for individual functional units of industrial facilities (warehouses, pipelines, tanks, overfill sites, wastewater flows, fire safety, etc.), the method of determining the actual and potential risks. Details of the calculations for determining of the real risk were provided using the example of the results of investigations in industrial enterprises of Armenia.



Fig. 15: Presentations of Armenian students

Afterwards, the students were assigned small practical tasks in two separate groups. The groups were asked to assess:

1. The fire safety for storage of explosive liquids;
2. Storage facility for the storage of solids (reservoirs and tanks with containments).

During the assignment advice to the student groups was provided by experts from Armenia (Kristine Sahakyan, Aida Aleksanyan, Inna Avanesova).

The correct solution of the tasks required 20 minutes from the student groups. The participants made appropriate recommendations that showed that the theoretical training of the checklist methodology had been successfully mastered.



Fig. 16: Solving practical tasks by student groups

As part of the summer school, the Armenian students carried out a quiz, the purpose of which was to identify the awareness of the Russian students about the UNECE Convention on Industrial Accidents.

Coordinator of Yerevan Aarhus Center made a presentation on “Industrial safety and public awareness raising”, which presented the legal framework for public access to environmental information. Particular attention was paid to the fact that for industrial safety, it was also necessary that public authorities establish a system that would ensure the proper flow of information from industry to public authorities.



Fig. 17: Participation of Yerevan Aarhus Center Coordinator

3.2. The practical training for student groups

The theoretical knowledge of the students was strengthened during the practical training sessions, which were held at 2 industrial enterprises of Perm region:

- OJSC “Metafrax”, which is one of the fastest growing chemical companies in Russia, the largest producer of methanol and its derivatives.
- OJSC “Sorbent”, the main product of which is activated carbons for various purposes and composition.



Fig. 18: Practical training of student groups

3.2.1. Visit of the participants to the “Metafrax” OJSC

The company was visited by specialists and students from technical universities of Perm and Armenia, international experts (01/10/2014). The program of the visit included:

- introductory presentation of the company, including information about the company's history, directions of its activity and safety training;

- visit to the interactive museum, where the participants got acquainted with the modern enterprise and saw the dynamically lit layout of the enterprise and its products, learned about the history of its establishment and sectors of application. The unique holographic screen of the interactive museum allowed the participants seeing the activity of virtual “chemical laboratory” in space;
- sightseeing bus tour to the industrial facilities of the company, during which the main workshops of the enterprise (methanol production plant, plant for the production of pentaerythritol and hexamine, a workshop for production of formalin and others.) were presented;
- visit to the training center of the enterprise, where the specialists are trained in the field of industrial safety. The participants had the opportunity to ask questions to the head of the department and the environmental specialist E.N. Chistyakov on ensuring industrial, fire, environmental safety at the enterprise;
- visit to the workshop for production of methanol; work of students with checklists;
- Video shooting for making a film about the summer school, which was carried out in the following facilities: the interactive museum; the workshop for the production of methanol; at industrial sites using checklists to assess safety by student groups. Besides, interviews with the head of the workshop for production of methanol, the environmental specialist and the advisor to the chairman of the board of directors for public relations were also filmed.



Fig. 19: Overview of the visit of participants to “Metafrax” company



3.2.1.1. General information on the enterprise

“Metafrax” is one of the fastest growing chemical companies in Russia, the largest producer of methanol and its derivatives. The structure of commercial products of the enterprise includes:

- methanol;
- formalin;
- pentaerythritol;
- methenamine;
- urea-formaldehyde concentrate, polyamide;
- sodium formate;
- technical pentaerythritol filtrate.

Products and raw materials produced in "Metafrax" are used for the production of plastics, paints, resins and adhesives, insulating materials, disinfecting means and medicines, acetic acid, as well as organic syntheses.

The main workshops are:

- workshop for the production of methanol;
- workshop for production of formalin;
- workshop for the production of pentaerythritol;
- workshop for the production of polyamide.

In addition to the main workshops there are also auxiliary workshops (instruments and meters, wastewater treatment department, etc.).

Environmental policy of “Metafrax” OJSC provides for the following main directions in the field of industrial safety:

- continuous reduction of industrial risks and improving occupational safety level and health of workers;
- ensuring the reliability of hazardous production facilities;
- ensuring the unconditional compliance of workers with the requirements in the field of occupational health and safety.

The plant is the “first aider” of Kosva River; in its biological wastewater treatment plants it treats all household wastewater and the most part of industrial wastewater of Gubakha city, more than 8 mln. cubic meters per year.

There have been no claims from the part of environmental authorities to “Metafrax” since 1984.

3.2.1.2. The results of the implemented works

The subject of study at the company by the checklist methodology, were containers for the storage of the finished product of the workshop, which produced technical methanol. During the visit the group was accompanied by the foreman of the workshop. The technological scheme of production of methanol, as well as the branch engaged in providing safety for the production of methanol was presented to the participants.

The technological process of preparation of methanol is based on catalytic conversion of hydrocarbons of the natural gas with steam. The resulting chemical raw material is used in the manufacture of plastics, paints, adhesives and synthetic resins, tannins, insulation materials, disinfectants and medicinal agents, etc.

Among the list of substances (checklist №1), representing a risk at the facility under study was only methanol, which is a substance of Class 1 hazard to water ("low hazard to water" according to the corresponding catalogue).

Given the available quantities in all reservoirs, the total amount of methanol was 70,000 kg, on the basis of which equivalent-3 Water Hazard Class was calculated: $EQ3 = (70,000 \times 10^{-2}) = 700$ kg.

The study used the following checklists:

- № 1 "Substances";
- № 2 "Overfill Safety Systems";
- № 3, "In-plant Pipeline Safety";
- № 5 "Sealing systems";
- № 8 "Fire protection strategy";
- № 9 "Plant monitoring";
- № 10 "Internal alarm and hazard control planning";
- № 14 "Equipment of tanks".

The following shortcomings were identified in the facility under study:

Overfill Safety Systems (ARC= 5.9)

- The overfill safety system does not automatically interrupt the filling process and does not provide audio or light signal.



Fig. 20: Study facilities at the company

Pipeline Safety (ARC=2,3)

- On some pipeline segments there are damages, there is no labeling, there is a need to renovate the pipeline surface with anti-corrosion agents.

Table 1 shows the results of calculations.

Table 1: Calculation of the real risk for the tanks for storage of methanol

Risk assessment			Number of used checklists		ARP
Total ARC	13,2	:	7	=	1,8
WRC-3	$\Sigma \text{EQ3} = 700$				
WRI = 2,8	$\text{WRI} = \log 700 = 2,8$				
RRP = 3,1	$\log (1,8 \times 700) = \log 45628 = 3,1$				
RRP - WRI = 0,3	$3,1 - 2,8 = 0,3$ (low hazard level)				

According to the results of the study by checklist method a number of measures was proposed (short, medium and long-term) to reduce the likelihood of industrial risks associated with the storage of methanol in tanks and pipeline safety (Table 2).

Table 2: Proposed activities for “Metafrax” OJSC

Name of checklist	Short-term activities	Medium-term activities	Long-term activities
Overfill safety systems	-	-	Installation of an automatic device for fixing the overfilling of liquid (with audio alarm)
Pipeline safety	Determine the rate of corrosive wear with ultrasonic wall thickness measurement at certain times in various characteristic points of the pipeline. Calculation of the possibility of occurrence of inadmissible statistic weakening due to corrosive wear	Periodic inspection of corrosion on some representative points of the piping. Marking of pipelines to the extent required by the regulations based on the physicochemical properties and the direction of flow with color coding (complete or partial coloring, colored rings);	-

These activities are aimed at increasing levels of industrial safety and allow improving the conditions at one of the key facilities of the enterprise.

Any violations and deviations were not detected in the company for the rest of checklists.

3.2.2. Visit of participants to the “Sorbent” OJSC enterprise

The second group of the summer school participants visited “Sorbent” OJSC (01/10/2014), the main product of which is activated carbons of different purpose and composition. Due to the high level of secrecy of the enterprise only citizens of the Russian Federation were allowed to enter its territory, so the group was composed of Permian students and the head (15 people).

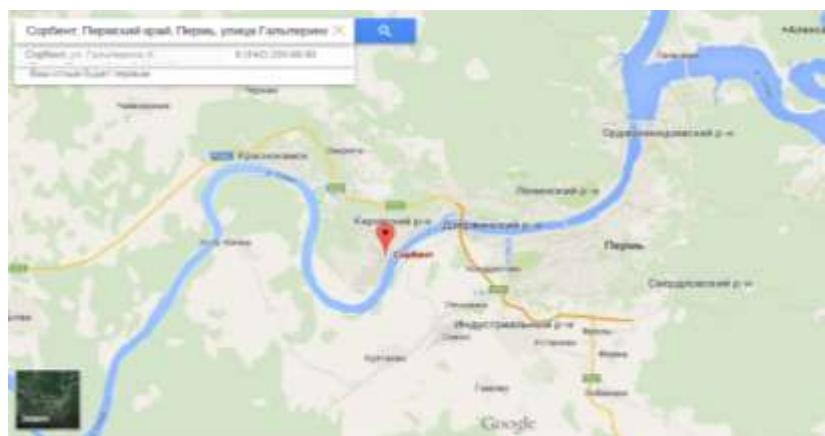


Fig. 21: Location of the enterprise of "Sorbent" OJSC

Any shooting (photos, video) was also prohibited at the plant. Due to the ongoing repair works the company's management did not show the main production, therefore the student group was able to visit only the central laboratory of the plant, which had not been notified in advance.

The group was accompanied by the Personnel Management Department Head N.V. Zhenikhov. The students got acquainted with the history of the enterprise, with its main products. The group visited the enterprise museum that contained samples and unique products.

The students were shown the laboratory complex of the plant, in which the analysis of raw materials, intermediate products and finished products was done for their compliance with the standards. The laboratory complex (analytical, chemical, testing) was equipped with powerful technical facilities.

During the visit the students expressed interest in the system of industrial safety at the plant, asked questions for the selection of appropriate checklists for analysis of industrial risks. Despite the fact that in the base of the checklist methodology there was not a special section devoted to the assessment of the industrial risks of the central laboratories of facility (CLF), the participants tried to consider the laboratory as an industrial facility having industrial hazard to water bodies.

The participants were interested in compliance with the requirements of fire safety, conditions of storage of hazardous substances, the presence of pipelines in the enterprise, conditions of operating of storage facilities, generation and treatment of wastewater in the laboratories and the laboratory staff awareness about the necessary actions in the event of any emergency. The staff, including the chief environmentalist of the enterprise, answered in detail all the questions of the group.

In the conference hall of the enterprise a film was shown about the activities and main projects of “Sorbent” OJSC. All materials were transferred to the students in an electronic format.

During the visit the group of students had time for discussion and selection of appropriate checklists for analysis of industrial risks posed by CLF. Certain difficulties arose related to the fact that the methodology was not designed for laboratories. However, the students were able to make a list of checklists to analyze and discuss and represent the results.

3.2.2.1. General information about the enterprise

OJSC "Sorbent" is the Russian leader in the production of activated carbon. The company has unique equipment, allowing to obtain products that meet international standards and produces more than 35 brands of activated carbon - from complex catalysts for the gas-protection technology to sorbents designed for oil spill response and improvement of soil fertility. In addition the company's products include personal respiratory protection devices and water treatment devices both mobile and stationary.

In order to control the properties of the incoming raw materials and finished products as well as for the analysis of air, water and soil samples, the Environmental Protection Department of the company has a separate building of factory laboratories that are equipped with the unique equipment and are used by highly qualified personnel.

The company has been working on the instructions of the Ministry of Health and Social Development of RF, Ministry of Emergency Situations, Ministry of Defense, etc. Works for the development and improvement of sorbents are coordinated by the Scientific Council on adsorption of the Russian Academy of Sciences.

3.2.2.2. The results of the carried out works



Fig. 22: Visit of participants to "Sorbent" OJSC

The aim of the study was quantitative assessment of the level of industrial safety of the laboratory of the enterprise "Sorbent" using the principles of the checklist methodology.

Due to the fact that the methodology did not contain a principle taking into account laboratory activities, the studied facility was attributed to a "test and research facilities" of the enterprise. The following substances represented in the laboratory were ranked to one of the most dangerous substances: sulfuric acid, sodium hydroxide, benzene, hexane, potassium dichromate, ammonium, phosphates, nitrates, chlorides, aluminum, zinc and others. Based on the data on the volume of storage of these substances in the laboratory the risk index for water was estimated $WRI = 0.667$. According to the calculation re-

results, the laboratory had a "low potential risk" for water bodies.

Afterwards, the laboratory was considered under the following checklists:

- Substances
- Joint storage;
- Fire protection strategy;
- Internal alarm and hazard control plan;

Table 3 shows the results of calculations.

Table 3: Proposed activities for “Sorbent” OJSC

Name of checklist	Identified shortcomings	Short-term activities	Medium-term activities	Long-term activities
Fire protection plan	Lack of awareness of staff	training and instruction of personnel	-	regular control of fire safety knowledge
Production planning for the prevention of emergency hazards	Lack of plans for emergency response	provision of publicly available plans for staff	-	-

3.3. Implementation of international seminar with the participation of experts from the EU and the Eastern Europe

On October 2, within the framework of IESS an international seminar on “Risk Management” was organized, which was conducted by international experts in the field of industrial safety and risk management. In their reports and training modules the experts presented different methods of risk management in enterprises, the results of the activities using examples of different projects.

The seminar was opened by Claudia Kamke (UNECE expert), who presented in detail the basic ideas, provisions and concepts of the Convention on the Trans-boundary Effects of Industrial Accidents, drawing attention to the need to develop the cooperation between countries for joint risk management and safety.

In his report on the role of risk management, UNECE expert Reiner Mather (Secretariat of "Education for Sustainable Development"), reflected a wide range of contemporary global issues (climate change, soil degradation, resource depletion), which can lead to irreversible consequences. As a tool to combat these, he suggested the use of risk management, namely the “Cradle-to-Cradle” concept, which would allow minimizing the negative impact on the climate and environment.

Professor of the VSB Technical University of Ostrava (Czech Republic) Pavel Danihelka introduced risk management as a multi-level system consisting of numerous subsystems, requiring

detailed development and control to ensure industrial safety, and urged the participants to develop and create new ideas and projects in this area in the future.

Associate Professor of Romanian Babes Bolyai University Török Zoltán introduced an innovative approach to risk management - a systematic procedure for chemical risk assessment by the example of the manufacturing industry.

Head of the Department of Civil Service of Consumer Protection of State Office of Environment, Health and Consumer Protection, Germany Kerstin Tschiedel mentioned the required procedures and mechanisms of interaction between an enterprise, the supervisory authorities and the government to ensure enterprise safety control.

Representatives of Ukraine (Head of the Department of Hydrology of the National Mining University of Ukraine, city of Dnepropetrovsk - Dmitrov Rudakov and leading auditor of Innovation Center "Ecosystem" LLC - Irina Nikolaieva) presented the results of a project on development and use of checklists for assessment of the risk of tailing facilities.

The presentations and reports of international experts were informative and educational for the students participating in the IESS, as they demonstrated the practical application of the methodology, as well as introduced the fundamentals of risk management.



Fig. 23: International experts in the field of industrial safety

3.4. Closing of IESS

Closing of the IESS took place on 10/03/2014. At the beginning of the event the students presented the results of the carried out studies and calculations done during the survey of 2 enterprises in the Perm region. In their presentations, the participants described in detail and stage by stage the work algorithm, the list of selected checklists for analysis, as well as the evaluation process for the selected checklists. The presentations made by both groups on the enterprises "Metafrax" OJSC and "Sorbent" OJSC, were quite informative, and analysis was carried out methodically correctly.

During the summing up of the results, the participants noted the coordinated work of the team of students, expressed their comments and suggestions on carrying out the study expressed their gratitude to the participants, highly appreciating their efforts. Recommendations for the organization of such events in the future, as well as recommendations to expand the use of checklists were provided. The students also actively expressed their opinions, showing that they had become more competent in the assessment of industrial safety by checklists.

The event ended with the closing ceremony of the summer school with the award of certificates, commemorative statues with the emblem of the summer school and a joint photo.



Fig. 24: Presentation of the results of practical training



Fig. 25: Awarding of certificates and closing of the international environmental summer school

Appendix 3 shows the Agenda and the list of participants of the summer school.

All the participants expressed their desire to expand the geography of the implementation of this project, one of the outcomes of which was not only rapprochement of different peoples, but also solution of the most important problems of our time - careful attitude and protection of nature around us.

4. Results and sustainability of the project; presentation of the performed work

4.1. Results and sustainability of the project

Summing up, it should be noted that the project implementation is of innovative nature and it creates sustainable prerequisites for ensuring continuity of the process after the completion of the project.

The results of the summer school became the impetus for the creation of a generalized educational module based on the checklist methodology for the whole UNECE region.

The main results of the project are:

- Enrichment of the Armenian and Russian students' knowledge in the field of risk management and environmental safety at industrial facilities focusing on the UNECE Convention on the Transboundary Effects of Industrial Accidents, using the checklist methodology for studying and evaluation of industrial facilities;
- Improving the competence of trainers and students involved in the field of sustainable development aimed at:
 - focusing the role of risk management and provision of environmental safety for sustainable development and green economy;
 - development of technical training of universities on environmental education;
- ensuring regular international communication between students and trainers of Armenia and Russia, joint activities in the field of environmental safety with involvement of students (joint publication of scientific and practical results);
- availability of training module based on the checklist methodology (Appendix 4 - the checklists are available also at the <http://www.uba.de/en/advisory-assistance-programme>) that can be integrated into the already available on-line modules, making a significant contribution to the implementation of the relevant provisions of the Convention,
- focusing of the Russian party on:
 - introducing this methodology in domestic enterprises (especially of the Perm Region) to identify and assess the risks of their industrial activity, the results of which can be used in the future for the development of projects to ensure the safety in production process;
 - using of a new conceptual approach from the part of environmental specialists of the Perm Region in the development of regional programs in the field of industrial safety (use of the acquired skills and knowledge in the performance of contract work on related topics);

- application of the checklist methodology during the educational process in Russian universities and attracting young people to the problems of industrial and environmental safety;
- organization and carrying out of similar schools in other cities in Russia (for example, in the cities of the East-Siberian region: Novosibirsk, Irkutsk and others);
- availability of promotional video on the Convention on the Trans-boundary Effects of Industrial Accidents, including a film about the results of the summer school for dissemination in the local and international media.

During the project implementation, the international experts, lecturers and students from the participating countries exchanged ideas on future activities in this sector. On the part of the students several proposals were made to improve the checklist methodology in the future:

- as the checklists are sufficiently structured, easy to use, as well as applicable to a wide range of enterprises, it is desirable to extend the methodology for risk assessment of atmosphere air and waste (including mining waste);
- to develop a separate checklist for monitoring of industrial safety of chemical laboratories, which are located in the industrial enterprise.
- to devote more time (several days) to the future practical trainings on using the checklist methodology for better data collection at the enterprise;

The lecturers and experts also made some suggestions about the prospects of such events in the future:

- the possibility of such training in the future with the development of modules on various aspects (provisions) of the Convention with a broad scope of application;
- organization of regular international summer schools in the future on risk management and environmental security and expanding the scope and geography (with other technical universities in the EU and EECCA);
- holding of such events with the participation of students from Armenia, Russia, as well as from other EECCA countries in the territory of Germany, as the founder of the checklist methodology.



Fig. 26: Film making during the event

It should be noted also, that the lessons learnt from the course of the project implementation show that to ensure a successful implementation of a follow up project, the following has to be taken into account:

1. The written and full commitment of the industrial enterprise management / operator;
2. The Integration of local, regional and/or national authorities;
3. The written and full commitment of the experts taking part in the project.

The organizational and technical aspects of the summer school were evaluated by the participants using an appropriate form of assessment, analysis of which showed that the following was particularly highly appreciated:

- practical training in the workplace;
- participation and experience of international experts;
- almost all participants wished continuation of such activities in the future with the expansion of the scope and geography.

4.2. Dissemination of information about the activities of the project

At all stages of the project implementation, a special attention was paid to the presentation of the works under the project. Information about the organization, conduction and results of the summer school has been posted on the websites of universities in Russia (PNRPU) and Armenia (NUACA, SEUA, CMSA).

In Armenia, information on the current activities of the project was also disseminated through the Internet network of REC Caucasus and the Aarhus Center, through which information about the summer school was available at both the national and regional levels (Armenia, Georgia, Azerbaijan).

Based on the results of studies of the practical work of students at the two industrial facilities of the Perm Region two articles were prepared and published in the proceedings of the XII Pan-Russian scientific-practical conference of students, graduate students and young scientists on “Ecology and scientific and technical progress. Urbanism“ (PNRPU, Perm, Russia, 2014):

1. Aytzhanova U., Tashkinova I., Sahakyan K., Baghdasaryan T., Asaduryan A. “Assessment of industrial accident risks of methanol storage tanks based on the checklist methodology“;
2. Cheremukhina O., Abbazova J., Tashkinova I., Slyusar N., Alexanyan A. “Application of the checklist methodology for the audit of industrial safety of the OJSC “Sorbent“ plant laboratory“.

Based on the submitted articles, presentations were also made at the XII Pan-Russian scientific-practical conference (11/21/2014).

During different periods of the project implementation (preparatory stage, the main stage) information leaflets in the participating countries were distributed in 3 languages (Russian, Armenian, English). For the dissemination of information in Armenia, university newspapers were also used ("Engineer", "Polytechnic" and "Crisis manager"). The results of the summer school were also published in the journal on "Miner & Metallurgist". The event was presented also in the newsletter of PNRPU (Appendix 5).



Fig. 27: Dissemination of information about the summer school

The information leaflets prepared during the project implementation, as well as the newspapers containing information on the results of the summer school (one copy) are attached to this report.

Information about the summer school (with the appropriate agenda) was available at the UN-ECE website.

Complete information about the activities carried out at different stages of the project are available in several languages at the following web sites:

ENG	<ul style="list-style-type: none"> ➤ http://www.unece.org/index.php?id=36441#/ ➤ http://www.utimenews.org/en/page/115752 ➤ http://aarhus.am/?page_id=7169&lang=en ➤ http://www.ysuac.am/?goto=news&lang=en
RUS	<ul style="list-style-type: none"> ➤ http://pstu.ru/anons/2014/09/15/3154 ➤ http://www.utimenews.org/ru/page/115652 ➤ http://pstu.ru/news/2014/10/08/3248/ ➤ http://www.ysuac.am/?goto=news&id=160
ARM	<ul style="list-style-type: none"> ➤ http://aarhus.am/?page_id=7124 ➤ http://www.seua.am/?module=news&utility=show_news_item&news_id=746&category_id=1&lang=am ➤ http://www.ysuac.am/?goto=news&id=362
FR	<ul style="list-style-type: none"> ➤ http://www.ysuac.am/?goto=news&id=59

Details of the project will be placed on web pages of the Federal Environment Agency of Germany (<http://www.umweltbundesamt.de>).

4.3. Presentation of project results during international meeting

The [project results](#) were presented by the representative of “Eco Peace” NGO (Armenia) at the UNECE General Assembly 8th meeting of the Conference of the Parties to the Industrial Accidents Convention held on 3 to 5 of December 2014 in Switzerland (Geneva).

The [participants](#) highly appreciated the idea of the project and the implementation of measures within the framework of the project. The representatives of the participating countries emphasized the innovative nature of the project and the importance in terms of the exchange of experience in this area for future similar events with involvement of other UN EEC countries.

As a result of this meeting, the Presidium of the Conference of the Parties to the Convention on the Transboundary Effects of Industrial Accidents, in collaboration with the Secretariat of the Convention prepared a document outlining the proposed activities under the Convention for the period of 2015-2016 ([the work plan](#)). The work plan for the implementation of long-term strategy for the Convention included also the implementation of awareness-raising activities on industrial safety at the university level (follow-up measures to the pilot project in the Perm summer school. The Russian Federation, possibly in cooperation with the ECE Strategy for Education for Sustainable Development), mentioning the appropriate financial resources.



Fig. 28: Presentation of project results during 8th meeting of the Conference of the Parties, Geneva