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DEVELOPMENT OF CHERNOBYL'S POWER PLANT CAPABILITY THROUGH PRISM OF PROJECT MANAGEMENT METHODOLOGY

With stopping at 2000 of power units of Chornobyl Nuclear Power Plant (ChNPP) problems of Chornobyl did not finished, they only had entered into a new no less responsible phase. Without experience in area of removal from exploitation of nuclear energy objects and building of objects similar to erected above an object " Shelter" to protective building, without the project of removal from exploitation of ChNPP, that under right had ratified 5years before the stop of the Plant, without the fund of financing of removal from exploitation of power units, ChNPP collective fulfills obligations taken by Ukraine before the world community on elimination of consequences of nuclear catastrophe of 1986. This activity demanded reorganization of organization, revision of basic functions and tasks, mastering of new, earlier not demanded on the ChNPP, fields of knowledge. The Project Management methodology became one of the bases of development capability for performance of the Ch NPP.

Key words: diversification, unique experience, management of knowledge, innovations, project-oriented business management, Project management methodology, benchmarking

Розглянуто моделі та методи розвитку проектного управління будівництвом нового безпечного Конфайменту ЧАЕС. Наведено історичну довідку щодо проекту, визначено етапи розвитку методології та формування організаційної компетентності з проектного управління.

Ключові слова: диверсифікація, унікальний досвід, управління знаннями, нововведення, проектно-орієнтоване управління бізнесом, методологія управління проектами, бенчмаркінг

Рассматриваются модели и методы развития проектного управления строительством нового безопасного Конфаймента ЧАЭС. Приведена историческая справка по проекту, определены этапы развития методологии и формирования организационной компетентности по проектному управлению.

Ключевые слова: диверсификация, уникальный опыт, управление знаниями, нововведения, проектно-ориентированное управление бизнесом, методология управления проектами, бенчмаркинг

Introductory

On June 12-14, 2013 on construction site of object "Shelter" of the ChNPP the next (second) lifting of east section of the New Safe Confinement (further NSC 1), Arch is executed, then its general height reached 85 meters. It is one of six planned operations of lifting of large metalwork of NSC (3 lifting on each of Arch sections: east and western).On April, 26, 2012 building of new shelter began above blasted 4th Power unit of the NPP. New protective building is the arched construction with a 257,4 meter flight, 108,4 meter high and 150 meter long.

[1] The new protective construction which except protection against environment, has to provide possibility of carrying out partial dismantle of accident and unsafe fragments of "Shelter" object got the name "New Safe Confinement" Author’s comment.

After 2-nd lift of eastern section on NSC Arch

An object is counted on 100 years of operation and will give the chance to carry out extraction of fuel- bearing materials and their conditioning[2] for the subsequent safe storage.

Less than 2 years ago on an assembly site of the Arch wasn't delivered any metal construction. For comparison, we will look at the photo of this site in November, 2011.

Financing of works on the international project (the plan of implementation of measures on "Shelter" object) is carried out at the expense of the donor countries of the international Chernobyl fund "Shelter" (ChFS).

For ensuring completion of works on NSC creation in April, 2011 the European bank of reconstruction and development (ERDB) provided the help to the government of Ukraine in the organization of the international conference on fund raising for a covering of missing financing of projects of Chernobyl fund "Shelter" and " Account of nuclear safety". As a whole, construction of an arch of a new sarcophagus on the ChNPP will cost about 1 billion euro.

A little bit of history

In 80th years of the XX century - Chernobyl NPP is the most powerful nuclear power plant in the USSR. According to strategic development plans of power industry of the Soviet Union, the ChNPP had to become the largest nuclear power plant in the world and consist of six power units with an electric power of 1000 MWt everyone (on 3200 MWt of thermal power correspondingly). During accident of 1986, construction of 2 new power units was stopped.

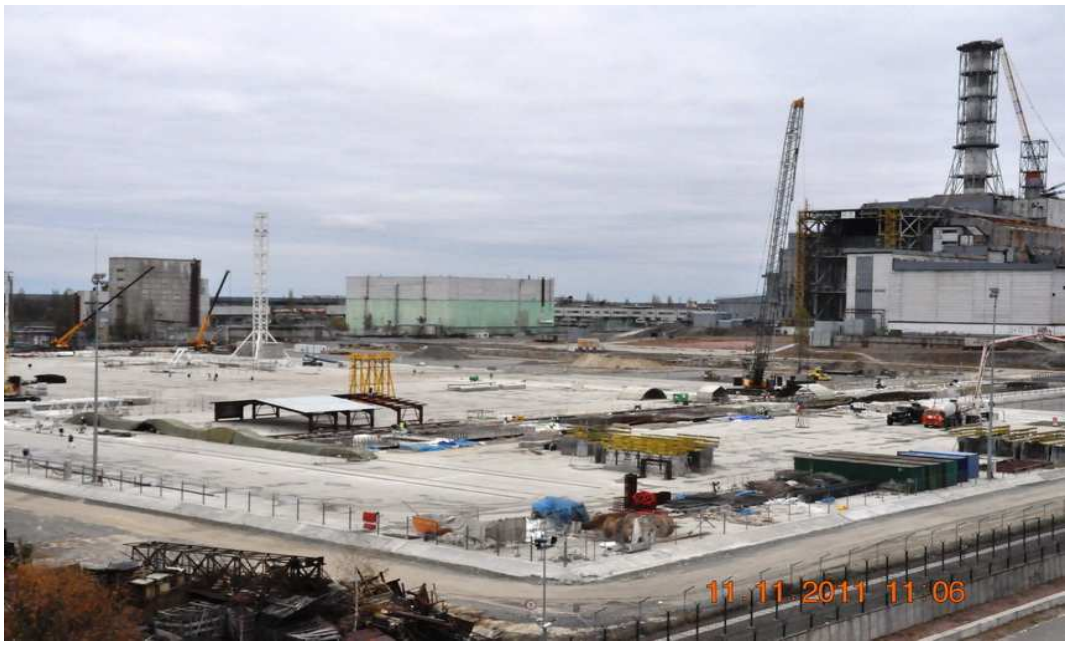
Reactor explosion on the 4th power unit of the Chernobyl NPP on April 26, 1986 made the correction in strategic plans of the Soviet energetics. As a result of accident there was an emission of a huge amount of radioactive materials in environment. About 600 thousand people participated in elimination of consequences of the largest accident in the history of nuclear power, 200 thousand people were evacuated and moved, health of 1,7 million people is undermined. The quantity of the death connected with Chernobyl accident, including died from cancer years later, in official sources of information is estimated at 125 thousand people.

In 1986 in only six months, in difficult radiation conditions, scientists and experts of the former Soviet Union designed and constructed a protective cover for the breakdown reactor, called later officially "Shelter" object and received the historical name – "Sarcophagus".

Implementation of design decisions during construction of "Shelter" object in a difficult radiation situation demanded performance of a complex of organizational and technical actions for ensuring radiation protection of the personnel. Practical realization of the fundamental principles of radiation safety when carrying out dangerous works was reliably supported with the most strict discipline and quickly developed and put into operation instructions and regulations of performance of all radiation-hazardous works.In 1994 the world community in the person of leaders of "the big seven" and the European Union addressed to Ukraine with the offer to stop an operating Chernobyl NPP. In 1995 the Memorandum of understanding in which Ukraine undertook to stop power units of the Chernobyl NPP in 2000 was signed.

On December 15, 2000 Ukraine fulfilled the obligations for the termination of operation of "Chernobyl" power units and finally stopped the last working 3rd power unit of the ChNPP. For this moment were absent – the project of removal from operation of ChNPP which according to norms had to be approved in 5 years before to station stop, and also Fund of removal from operation.

[2] Conditioning – process at which the steady firm form of the waste suitable for temporary storage and burial is created. Author's comment.



Platform for Arch assembly, November 2011

On June 15, 2001 – the State specialized enterprise "Chernobyl NPP" (SSE ChNPP) - the enterprise for removal from operation of power units of nuclear stations and to transformation of "Shelter" object into ecologically safe system was registered.

Main tasks of SSE ChNPP were defined as:

– the safe operation of nuclear facilities, facilities for radioactive waste operation and other equipment of nuclear power plants;

– safe removal from operation of the first, second and third power units of the Chernobyl NPP and nuclear power plants of Ukraine;

– transformation of "Shelter" object to ecologically safe system;

– safety assurance due to the radioactive waste operation, which has been accumulated at an industrial site of this NPP and zone of alienation of the Chernobyl NPP, and also which are formed at removal from operation and during transformation of "Shelter" object to ecologically safe system;

– ensure the safe handling of spent nuclear fuel of the Chernobyl nuclear power plant;

– construction and operation of objects of the infrastructure necessary for removal of the Chernobyl NPP from operation and transformation of "Shelter" object into ecologically safe system;

– preparation and professional development of personnel;

– environmental monitoring of surrounding habitat in a zone of an arrangement of the Chernobyl NPP;

– development of technologies, accumulation and use of scientific and technical experience concerning removal of nuclear installations from operation, overcoming of consequences of beyond design basis accident, and also construction and use of storages for temporary and long-term storage of radioactive waste;

– organization, coordination and performance of scientific applied researches, introduction of scientific and technical and other development, establishment of communications with scientific institutions, including foreign;

– participation in coordinating of works and implementation of the international projects connected with removal from operation of the Chernobyl NPP and transformation of "Shelter" object into ecologically safe system.

In 2001-2003 transition from functions and structure of the Chernobyl nuclear power plant to the specialized enterprise for removal of power units of nuclear stations from operation and to transformation of "Shelter" object into ecologically safe system was carried out. It allowed to solve problems of increase of safety of the Chernobyl NPP more effectively.

On March 22, 2002 the State committee of nuclear regulation of Ukraine gave to SSE ChNPP the license for removal from operation of the Chernobyl NPP. Earlier, the license for "Shelter" object operation and its transformation to ecologically safe system on December 30, 2001 was obtained.

In parallel with problems of removal from operation of power units of the ChNPP works on increase of safety of "Shelter" object were performed.

Industrial site of the Chernobyl NPP, 2005.

Within the TACIS project "Chernobyl power unit 4. Short-term and long-term actions – Actions 2 + 4" in 1996 was developed "The recommended course of actions" in which offered to develop potential short-term and long-term actions and a complex of prime measures for transformation of "Shelter" object into ecologically safe system. According to this document approved by the decision of the Interdepartmental commission on the complex solution of problems of the Chernobyl NPP from March 12, 2001, transformation of "Shelter" object into ecologically safe system is reached by realization of three main stages:

Stage 1: stabilization of a condition of existing object, increase of operational reliability and durability of structures and systems which provide stabilization and control of indicators of safety of "Shelter".

The stage – is executed.

Stage 2: creation of the additional protective barriers, first of all a new safe confinement that will provide necessary conditions for technical activity at a stage 3 and safety of the personnel, the population and environment, the preparatory technical work directed on development of technologies of extraction from SO of fuel-bearing materials (FBM) at a stage 3, infrastructure creation for the operation with RAW "Shelter"object..

It is planned to finish a stage in 2015 (except readiness of infrastructure of the address with RAW of "Shelter"object).

3: extraction from OU of fuel-bearing materials and long existing RAW, their conditioning with the subsequent storage and burial in RAW storages according to existing standards, removal from operation of "Shelter"object.

Dismantling of unstable structures of the "Shelter" (almost all the major steel structures, except in places where localized fuel containing material (FCM) is planned to carry out till 2023.

However work activities for transformation of "Shelter" object doesn't come to the end with it, there is still a problem of extraction of FCM. It is a problem of higher level both of complexity, and of expenses as by estimates of experts in "Shelter" object is concentrated over 150 tons of fuel of the destroyed reactor, about 5,5 tons of fresh and 15 tons of spent fuel. A significant amount yet not revealed fuel can be in blockages of the central hall of the destroyed power unit. All of this makes process of extraction of fuel-bearing masses by the most dose costly type of works and demands joint efforts of experts in the field of nuclear safety and radiation protection of all developed countries for the solution of this problem.

In 1997, with the assistance of the European Commission, the United States, Ukraine, and a group of international experts at the meeting of the countries of the Big seven the Plan of implementation of actions for transformation of "Shelter" object into ecologically safe system (further SIP).

On September 17, 2007 the contract between SSE CHNPP and consortium NOVARKA formed by the leading French companies (VINCI Construction Grands Projets – 50% / Bouygues Travaux Publics – 50%) as "the turnkey project" which includes "Design, construction and NSC commissioning" is signed.

Development of Project Management Methodology on CHNPP site

One of the important problem which the Chernobyl NPP management has faced, there was an absence of personnel experience of removal from operation including, design activity management which affected on success of projects implementation on the Chernobyl NPP platform. This argument sounded more than once in the analysis of temporary failures during construction of objects of infrastructure of removal from operation.

Results of implementation of projects on a platform of the Chernobyl NPP more and more define success of performance of a complex of works on removal of power units of the ChNPP from operation and to transformation of "Shelter" object into ecologically safe system.

Introduction and development according to the international standards of Project and Program Management Methodology on the Chernobyl NPP, and specifically in Project Management Unit[3] (further SIP-PMU), allows to operate projects realized on a platform of the Chernobyl NPP more effectively, including the project on creation of the New safe confinement.

In recent years the management of the State specialized enterprise "Chernobyl NPP" with support of the Ukrainian association of management by the Ukrnet projects (further UPMA) made big efforts for the professional development of the personnel of the ChNPP which taking direct part in implementation of projects on a site.

Below is a far from complete list of training and master classes on which were trained, both the personnel of SIP-PMU, and the personnel of the Customer (SSE CHNPP) is provided:

- Seminar on the organization of documentation management in the NSC project.
- Project management master class of the professor, PhD Bushuyev S. D.
- Seminar on Construction project management.
- Certification passing on competence of area of management of projects according to the international requirements of IPMA [4].
- Development and implementation of process approach in project quality management.
- Master class: «Organizational development of Engineering and Innovation projects and Programs based on Japanese companies experience», by professors Bushuyev S. D. and H. Tanaka (Japan) and others.

Training of specialists of the ChNPP in a Master program in the Kiev National University of Construction and Architecture on Project Management chair is organized. Only since 2009 more than 100 specialists of the ChNPP received second higher education – the master in the field of project and program management.

The certificate by results of the taken course based on experience of Japanese companies is handed over. From left to right: Hiroshi Tanaka's (Japan) professor, General director of SSE CHNPP Gramotkin I.I., professor Bushuyev S. D.

During this time more than 30 experts of the Chernobyl NPP were certified by system of the International Project Management Association IPMA , two experts are certified by Japanese Project Management Association PMAJ.

Now for the Chernobyl Nuclear Power Station works:

3 certified consultants in the field of project management (IPMA® PMC);

5 certified top project managers (IPMA® Level B).

A noticeable step forward in increase of level of professional project management on site of the Chernobyl NPP was carrying out of certification procedures by the UPMA, Kiev with delivery on December 16, 2008 to the Chernobyl NPP of the certificate No. K.01.0018.2008 about assignment to SSE CHNPP of 1 level of a technological maturity in the field of professional project management. It is necessary to specify also that the contract organizations participating in implementation of projects on "Shelter" object, also developing in areas of professional project management (so JSC Yuzhteploenergomontazh (YuTEM) in 2008 was certified on the 3rd level of a technological maturity in the field of project management).

As a result of further development of methodology and procedure of national approach to certification

[3] Project Management Unit of SIP, structural department of SSE CHNPP (SIP-PMU). Author comment.

[4] International Project Management Association (IPMA). Author comment.

of the companies in the field of project management, in 2008-2009, this approach was adapted by UPMA (in close cooperation with IPMA) under the international requirements and now is realized as the IPMA 4 LC standard within International Project Management Association (IPMA) which, certainly, raised level and practical value of participation in this procedure of the enterprises and the organizations practicing application of project and program management methodology in the activity.

Basis of certified processes according to the IPMA 4 LC standard is "benchmarking" procedure (transfer of the best experience). In separate coordination with IPMA in December, 2009 on the Chernobyl NPP the Europe's first pilot certification of the enterprise according to IPMA requirements is carried out. At declared by SSE CHNPP 2nd class, by results of the carried-out certification the decision by assessors on delivery to SIP-PMU, of SSE CHNPP of the certificate of 3 class of a technological maturity in the field of professional project management in accordance to criteria of IPMA was made.


UPMA-Cert
Certification body

Certificate

SIP-PMU Chernobyl NPP

Standardised
IPMA Class 3

On March 28, 2010 SIP-PMU was given out to the first in Europe IPMA certificate

Results of this certification will be considered as "standard" for carrying out procedures of similar certifications at other enterprises of Ukraine and Europe.

Modern reality

Now at an industrial site of the Chernobyl NPP active work of creation of infrastructure of removal from operation and transformation of "Shelter" object is carried out, which in many aspects has innovative character.

For a past after final stops of power units of the ChNPP time are carried out basic changes of functions and personnel structure, a financial and economic and production activity, fixed assets of the enterprise.

It is necessary to consider also that after accident of 1986 the collective of the Chernobyl NPP was considerably updated. More and more skilled experts leave from the Chernobyl NPP on age or on a state of health. Less workers, direct participants of creation of the Sarcophagus ("Shelter" object) work at the Chernobyl NPP. The extensive experience for which it is paid by health and lives of liquidators of accident is lost.

At the time of a final stop of power units at the Chernobyl NPP worked 9051 persons (in 1996 – 1997 number was about 12000 people). In April, 2013 the number of employees of the ChNPP is 2764 persons.

Typical for the majority of construction projects the tendency on "extension" of the schedule of the project, wasn't an exception and for the objects erected on a platform of the Chernobyl NPP. So, at construction of "dry" Storage of the Fulfilled Nuclear Fuel (HOYaT-2) which is one of important objects of infrastructure of removal from operation of ChNPP, postponement is:

- 2003 – 2005 – 2013 – 2016.

Similar picture and with New Safe Confinement (NSC) commissioning:

- 1998 – 2005 – 2010 – 2012 – 2015.

However now there is a confidence that the situation with the NSC project is absolutely changed, the project passed to a "visible" final stage.

This also was noted during visit of the Chernobyl NPP on June 4, 2013 by representatives of the investor countries of the Account of nuclear safety and Chernobyl fund "Shelter", and also technical advisers of Board of directors and representatives of Department of nuclear safety of the European bank of reconstruction and development. Guests visited directly a site of assembly of the Arch. According to the head of Assembly of the donor countries of ChFU Hans Bliks, this grandiose construction, and, the main thing, the shortest terms in which its assembly is made, made on him indelible impression. "I wasn't on site for two years and I am struck by how much was completed in so short time! " – Mr. Bliks noted.

Uniqueness of work performance

Let's consider the main problems which are solved now by the personnel of the Chernobyl NPP.

In the Statute of the Chernobyl NPP one of the purposes of creation of the State specialized enterprise is defined as task realization of a problem of removal from operation of the Chernobyl NPP and other nuclear stations of Ukraine. The ChNPP – the first nuclear station which is laid off in Ukraine, and considering the volume (at the same time removal from operation is carried out on three RBMK-1000 power units) and work conditions (existence on a platform of 1986 of the fourth power unit destroyed by beyond design basis failure), experiment on the organization of carrying out these works is demanded for power industry of Ukraine

and other countries where RBMK reactors (Russia, Lithuania) are operated or laid off.

Since 1986, activity on a site of the Chernobyl NPP is under close attention of world science and the public. Numerous international scientific and public forums and conferences are held. On "Chernobyl subjects" a large number of theses is protected and many scientific works are written. It is removed a lot of art, documentary and educational films. Numerous excursions in the Chernobyl zone of alienation and on the Chernobyl NPP are annually organized.

In 2000 Ukraine declared an innovative way of development. There were developed national programs and infrastructure which had to support innovations. It is obvious that realization of strategy of innovative development demands transfer of the best experience of the leading countries in this field. Regarding to this experience of Japanese companies is seems to be interesting. So, in accordance to developed by Japanese project management association (PMAJ) system of knowledge of P2M for management of innovative projects and programs, two of five components of strategy of new economic recovery of the organizations, enterprises and the country as a whole are defined as "intellectual potential (technologies and intellectual property)" and "knowledge (ability of management creatively to use various resources)".

Let's define assets which the personnel of the Chernobyl NPP, the people of Ukraine, the world community by results of activity on a platform of the Chernobyl NPP have:

1. Brand known for the whole world – "Chernobyl NPP". It isn't required to spend considerable money for its advertising. It is necessary to give to it new sounding, not "a source of the largest in the world of a technogenic catastrophe", but "a source of advanced technologies, the rich saved up experience and skilled competent staff".

2. On a site of the ChNPP unique for the whole world works on implementation of the Plan of implementation of actions on "Shelter" object are performed.

3. On a site of the Chernobyl Nuclear Power Station are carried out unique for power industry of Ukraine (Russia, Lithuania) works on simultaneous removal from operation of three channel reactors of big power.

Perspectives

In the middle of May, 2008 NNGC "Energoatom" declared plans to construct in Ukraine till 2030 of 11 new nuclear power units (one million kW everyone). Ukraine till 2030 has to increase production of atomic energy to 219 billion kWh. It is impossible to forget that "removal from operation" is an obligatory last operational phase of any nuclear installation and tens power units of the nuclear power plant will be taken around the world out of service because of exhaustion established by the service life project from second decade of the XXI century. Experience of Chernobyl in removal from operation of objects of nuclear power will be demanded as many countries will face a similar problem of a mass conclusion of the nuclear power plant from operation soon.

Major radiation accident on a Japanese Fukushima plant 1 once again confirmed on March 11, 2011 to us that experience of the Chernobyl NPP in elimination of consequences of nuclear catastrophes also is very important and can be demanded in nuclear power area. The exchange of experience between liquidators of accidents on the Ukrainian and Japanese nuclear power plant actively develops. Part of Japanese experts was trained in the Chernobyl Nuclear Power Station Educational and training center.

In the explanatory note to the draft of the resolution of the government of the Russian Federation about modification of the federal target program "Overcoming of Consequences of Radiation Accidents for the Period till 2015" approved by the resolution of the government of the Russian Federation of 29.06.2011 No. 523, it is told: "… it is entrusted to work out questions taking into account use of experience of minimization of consequences of the Chernobyl accident when planning and carrying out actions for protection of the population and environment in the territory of the Far East region of the Russian Federation from possible influence of a radiation factor as a result of accident on the Japanese nuclear power plant "Fukushima – 1".

Conclusion

In summary it should be noted that the State enterprise the ChNPP (further CNPP GSP) stands at a boundary of radical reorganization when along with existing standard organizational structure of business management, project-oriented business management is implementing. Activity on a platform of the Chernobyl NPP in many aspects is innovative and it has to be considered at the organization of works. The experience which has been saved up at implementation of projects on the Chernobyl NPP, shouldn't be lost for the Chernobyl NPP, Ukraine, the world community.

Taking into account innovative nature of works performed on a ChNPP site, realization of strategy of innovative development demands transfer of the best experience of the leading countries in this field. One of striking examples of methodology directed on definition and realization of an innovative component of projects and programs is the system of knowledge of P2M[5]

[5] P2M – «A Guidebook of Project and Program Management for Enterprise Innovation» – Project Management standard,

developed in Japan which is the standard of application of innovative approach to development of product value of projects and the organizations.

The facts given above say that the activity which is carried out on a platform of the Chernobyl NPP, in many aspects is innovative and at creation on the Chernobyl NPP of an effective Knowledge Management System of project implementation experience, this knowledge can be applied as to professional development of acting project managers of the ChNPP (for example, to development of target courses), and to transfer of the accumulated experience (through realization of the benchmarking mechanism) to external costumers.

The weighed system approach to Knowledge management according to Methodology of project management can not only render invaluable service to system of preparation of the personnel of the NPP, but also promote definition of possible ways of collecting, storage and commercial realization of intangible assets of the company.

based on Japan experience from 1999, which allowed to visualize projects with a bigger value added and innovative programs. Author comment.

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