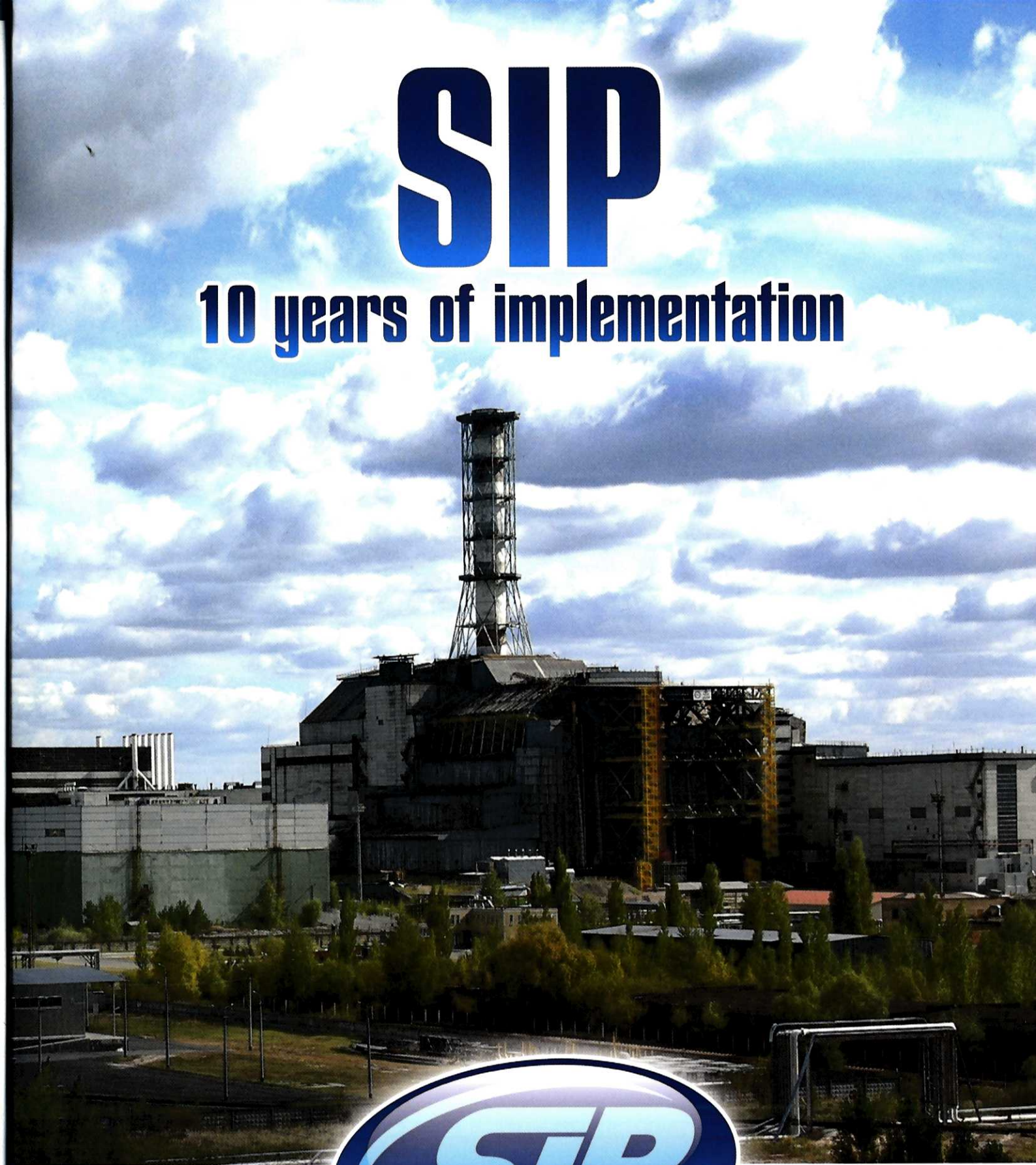
SIP

10 years of implementation



Accident at ChNPP Unit 4 and Construction of Object Shelter

On 26 April 1986 year, at 1.23.49 am Moscow time an accident occurred at the ChNPP Unit 4. The accident was the severest one in the entire history of the nuclear power industry. The reactor core and all safety barriers and systems wre completely destroyed and the majority of the core bearing structures were damaged.

The reactor immediately started releasing radiation to the environment and the adjoing territory was contaminated by active core fragments consisting of pieces of fuel rods, graphite, and contaminated structural elements. Extremely high levels of radiation releases, several million curies per day, occurred from the time of the accident until 06 May 1986. Releases then decreased greatly, by a factor of several thousand.

The first dose values measured around the destroyed Unit and throughout the ChNPP territory were startling. Close to the Unit the gamma-exposure rate, primarily a result of direct exposue from the reactor, reached 2000 R/hour. Dose rates in the reactor exceeded 5000 R/hour.

The nature of the processes going on during the destruction of Unit 4 and the severity of the accident consequences resulted in the accident being characterized as a beyond- design-basis accident, and was referred to as a level 7 (severe accident) by INES rating - international scale of nuclear events.

In the middle of May 1986 a Governmental Commission made a decision for long-term mothballing of the destroyed Unit 4. The implementation of this task was complicated by the extremely high gamma-radiation fields, the absence of reliable information about the degree of destruction of Unit 4, and the absence of international experience for the elimination of such accidents.

The design of a protective sarcophagus ("Shelter") was started on 20 May 1986. The construction of the sarcophagus began in June and continued for 206 days through November 1986. Partitions and walls were constructed to separate the destroyed Unit 4 from Unit 3. Along the Unit 4 perimeter the reinforced concrete walls, called "pioneer walls," were constructed first. These served as the original biological shielding and facilitated the subsequent construction and installation activities for Object Shelter erection

The Northern Buttress Wall was made of concrete in the form of cascades up to 12 meters in height. The cascade scaffolding was made of steel shields. Each subsequent cascade was made as close as possible to the destroyed Unit. The cascades were filled with worn and damaged metal structures and also with containers filled with high-level waste. The undamaged western wall was shielded from the outside by a wall with counterforces up to 50 meters heigh. The Central Hall was covered by 27 pipes of 1220mm diameter.

Simultaneously with the "Shelter" construction a huge scope of works on decontamination of the area around the facility and on the roof was implemented in order to greatly decrease the exposure dose rate (EDR) outside Object Shelter rooms

The number of construction workers directly involved into the construction of the Sheltr was about 90 thousand. During 1986 -1987, when the radiation exposure was the highest, the total number of people working in the Chernobyl region was about 200 thousand..

On 30 November 1986 the State Acceptance Commission accepted the mothballed Unit 4 of Chernobyl NPP for maintenance.

First days after the accident

"Sarcophagus" construction

Current state of the Object "Shelter"

In the more than 20 years since the accident no more than 60 percent of the Object "Shelter" rooms have been surveyed. The residuary premises cannot be entered because of either high radiation fields or impenetrable obstructions. The obstructions are the result of structural collapses and the generation of lava-like fuel containing materials (FCM). In addition, some rooms were filled with concrete durng the "Shelter" construction.

Thus, a significant portion of the Object "Shelter" has not been surveyed. The resultant lack of knowledge of large portions of the "Shelter" contributes to some of the most serious risks today.

It is estimated that the Object "Shelter" still contains about 95% of the fuel, which had been in the reactor before the accident. At present, the total activity is about 16 million curies. The irradiated nuclear fuel inside the Shelter is in the following forms:

- Reactor core fragments (RCF),
- Lava-like fuel containing materials (LFCM),
- Fine-dispersed fuel (dust) and hot fuel particles,
- Secondary uranium minerals generated out of the FCM compounds in the form of new crystal formations.

Potential dust generation from irradiated fuel and LFCM represents the main hazard today. Dust is generated on the surface of the irradiated fuel and released outside the Shelter by its ventilation system. By conservative estimates, there is approximately 4 tons of radioactive dust in the "Shelter."

A substantial amount of radioactive agents are located on the site near the Shelter. They are not isolated from the hydro-geological environment as they are located under a layer of earth, sand and concrete.

The Object "Shelter" was designed and constructed under extremely hazardous radiation conditions. Works were implemented remotely and the steel structures were installed without proper inspection as is normally required by the Construction Codes and Regulations. Because of the impossibility to inspect the damaged structures used as supporting elements, the precise assessment of their actual bearing capacity and, consequently, durability is not known. However,, the structures are exposed to atmospheirc impacts (temperatures, humidity, etc) and there is high humidity in the 'Shelter." Reinforced concrete structures are in contact with water corrosion is causing their progressive destruction.

"Shelter" object today

Fuel Containing Masses inside the "Shelter" object

Reliable quantitative assessments of various risks inside the Shelter is impossible because of the inaccessibility to many areas and because of high radiation levels.

It is also impossible to ensure the complete monitoring of Object Shelter state, including the status of nuclear and radioactive materials. The "Shelter" monitoring system doesn't include standard structural monitoring capabilities, There is no fire safety system although there are about 2000 tons of combustible materials inside the "Shelter" including graphite, cables, elastron and wooden structures.

In spite of all the mitigating efforts exerted during the entire period of OS operation, the Object Shelter safety state is gradually eroding from the following ongoing phenomena:

- Degradation of structures,
- Degradation of equipment and systems, which are in need of replacement or major upgrading,
- Destruction of FCM from the effects of microclimatic conditions, resulting in an increase of radioactive dust quantities,
- Moisture and water effects caused by the ingress of precipitation, water condensation and its travel inside the Shelter).

Resultant risks include the potential for:

- Collapse of individual structures, which could result in the significant radioactive contamination of the ChNPP Industrial Site and adjacent territory and in personnel exposure,
- Radioactive discharges causing contamination of the adjacent territory and surface and ground water,
- Possible initiation of a self-sustained chain reaction,

Workplace of a dose controller at the "Shelter" object

Status of building constructions

The creation of the SIP was a culmination of efforts over the last ten years of the 20th century by experts in Ukraine and the international community to develop an acceptable economical and ecological approach to resolve the problems of ChNPP Unit 4 "Shelter".

Year of 1992

The announcement of an international tender for projects and technical decisions to convert the Object "Shelter" into an environmentally safe system became the first step to international cooperation. On 17 June 1993, based on the results of this tender, the Jury accepted the Concept for a stepwise conversion of Object "Shelter" into an environmentally safe system.

Year of 1994

The EU Commission announced a tender for development of a Feasibility Study (FS) for the first stage of the Concept for the Object "Shelter" conversion into an environmentally safe system. This included measures for the stabilization of the existing Object "Shelter" and for construction of "Shelter-2". The Consortium "Alliance" led by the French company "Campenon Bernard SGE" was determined as the successful bidder under this tender.

Year of 1995

The Feasiability Study for the Object conversion was completed and the Consortium "Alliance" submitted their report, which is still up-to-date. Its basic conclusions are as follows:

- The existing "Shelter" is not stable and not seismic-resistant. Urgent measures are required; the option "to avoid any measures and do nothing is inadmissible";
- Because of high radiation and actual state of the existing structures the long-term stabilization of the "Shelter" is considered to be unachievable. The existing "Shelter" structures do not allow removal of radioactive waste which have a life time exceeding dozens of thousands years;
- It is necessary to construct a new protective envelope to allow Unit 4 deconstruction;
- The task of "Shelter-2" design and construction is a complicated, multi-level problem, which is to cover both initial cleaning of the site and the removal of radioactive waste. Before the " construction of"Shelter-2 it is necessary to arrange for waste processing and disposal;
- Ukraine independently cannot finance such project. This issue should be rated as a critical one. International community should demonstrate a desire to help Ukraine to resolve the problems related to the Chernobyl accident. Today the realistic choice is good will with support of political forces, as well as financial guarantees for the whole time of the project.

Personnel Training Center in Slavutich

Rehabilitation Center

11 September 1995. On this date Ukrainian delegation participated in a meeting arranged by the EU Commission in Brussels. The purpose of this meeting was to define and coordinate further general measures based on the result of investigations of the Consortium "Alliance". Pursuant to the Decree of the Cabinet of Ministers of Ukraine (№ 696-r dated 14.11.95) the State Nuclear Committee and SE ChNPP were appointed as Client for the "Shelter" conversion into an environmentally safe system.

Pursuant to a "Memorandum of Understanding" signed by the G7 countries, the EU Commission and the Ukrainian Government about "Chernobyl Nuclear Power Plant shut down," dated December 1995, the document "Recommended Course of Actions" was developed under the TACIS project "Chernobyl Unit 4, short- and long-term measures — Measures 2+4". This document described measures, which were an alternative to the Consortium "Alliance" proposed option of OS conversion, and defined the main SIP concept, including a number of steps to convert the Object Shelter into an environmentally safe system.

Potential short- and long-term measures were defined and a complex of first-priority measures was offered. The recommended measures were split into 3 stages defining the strategy for assuring ecological safety of the Shelter from a long-term perspective:

- Stage 1. Stabilization and other short-term measures;
- Stage 2. Preparation for conversion into an environmentally safe system;
- Stage 3. Conversion into an environmentally safe system.

Year of 1997

At the G7 meeting, the "Shelter Implementation Plan" (SIP) was accepted. This Plan established the main structure of the project, including a number of stages to implement Phases 1 and 2 of the "Recommended Course of Actions" to convert the Shelter into an environmentally safe system.

The following three key stages (Programmatic Milestones) were defined in the Shelter Implementation Plan for project management and its further implementation:

- Confirmation of the stabilization decisions which included for the assessment of the possibility to complete both the earlier proposed and some additional stabilization works while ensuring for the necessary access to work places and for the protection of personnel during the works inside the "Shelter";
- A decision for a FCM removal strategy, which would define an optimal method and time for FCM removal and justify the expenses and the ability to complete the work;
- A decision for the optimal localizing envelope construction strategy and definitions of its functions. Based on this decision and the FCM removal strategy, the conceptual design would be developed, confirming the decisions for stabilization, and for the protection and the needs of the localizing envelope.

Industrial zone of the "Shelter" object

Clothes change facility for 1430 persons

On 20 November 1997 the donor countries conference was held in New York, and the donors committed to provide funding for implementation of this Plan through the especially established Chernobyl "Shelter" Fund (CSF). The European Bank for Reconstruction and Development (EBRD) was appointed as the Administrator of the CSF. The CSF objective is to provide assistance to Ukraine for conversion of the existing "sarcophagus" into a safe and environmentally stable system through implementation of the "Shelter Implementation Plan". Ukraine and the EBRD signed the Framework Agreement Relating to the Activities of CSF in Ukraine. The G7 Countries applied to the governments of interested countries and other potential donors with a request to join the initiative for complete implementation of the Plan.

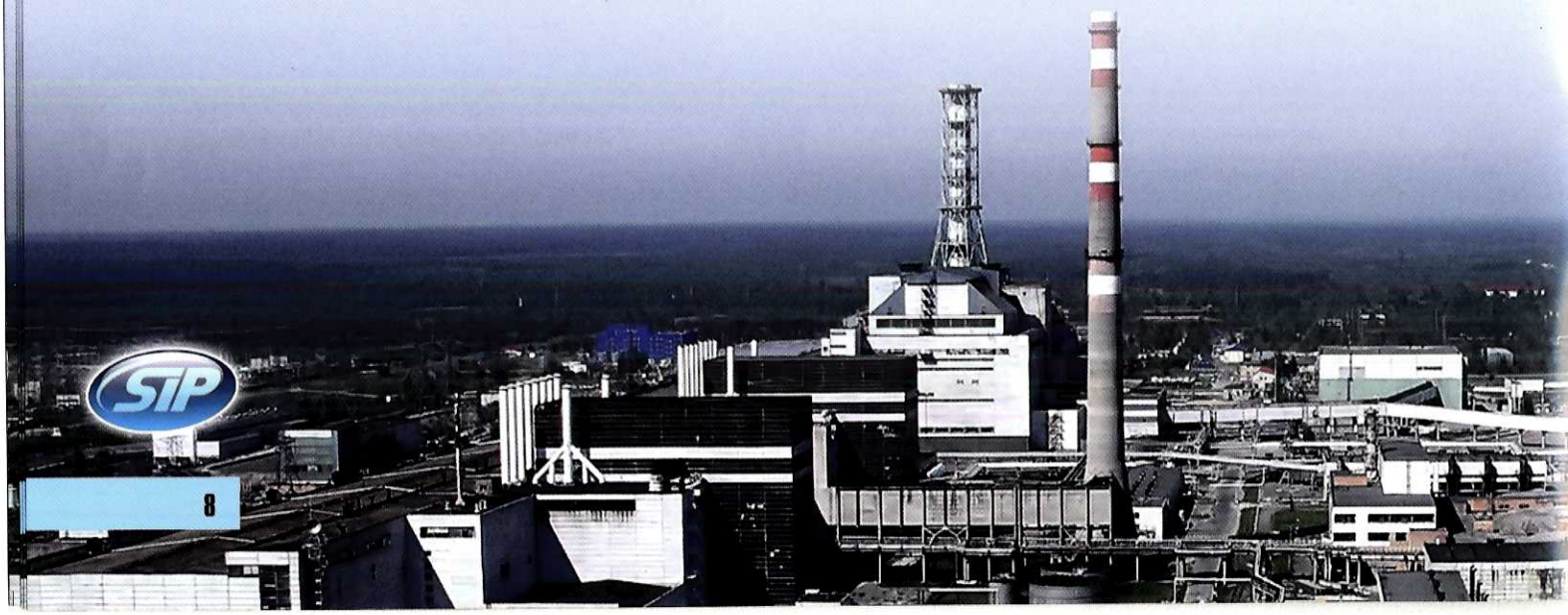
On 4 February 1998 the Ukrainian Supreme Rada ratified the "Framework Agreement between Ukraine and the EBRD Relating to the Activities of the Chernobyl "Shelter" Fund in Ukraine". The European Bank for Reconstruction and Development has become an Administrator of the Grant proceeds provided by the Chernobyl Shelter Fund Contributors and Donors. Considering the Grant allocated to finance the activity of the Regulatory Authorities, the total cost estimate for the Project is about US $1.3 billion. 29 donor countries and the European Commission are accumulating these funds in the CSF.

On 20 April 1998 a contract was awarded to the successful bidder for SIP Project Management Unit Consultant — Consortium comprised of Bechtel (USA), Battelle (USA) and EDF (France).

From May to November 1998 the tender procedures were finished and the contracts were signed between the NAEK "Energoatom" and the successful bidders for Early Biddable Project Packages A, B, C and D.

Scheduled maintenance of industrial TV of the "Shelter" object

Experimental installation of neutrons absorbent materials submission



SIP Objectives and Tasks

The General goal of activity is the protection of the personnel, the public, and the environment protection from the hazards of nuclear and radioactive materials danger by means of removal and isolation of these materials and their disposal.

The SIP is based on this general objective providing details in the form of five priority objectives, which should be achieved during its planned implementation and includes 22 tasks grouped per these objectives. The implementation of all tasks is interrelated. The progress of certain tasks defines the progress of the others.

OBJECTIVE 1
To mitigate the risk of collapse - structural stabilization

Task 1. Mobilization, protection and stabilization integrated project
Task 2. OS western area stabilization and shielding
Task 3. "Mammoth" beam and southern area stabilization and shielding
Task 4. Eastern and northern areas stabilization and shielding
Task 5. Stabilization of roofing, supports and cover
Task 6. Structural investigations and monitoring
Task 7. Geotechnical survey
Task 8. Seismic characteristics and monitoring

OBJECTIVE 2
To mitigate the accident consequences (collapse)

Task 9. Emergency readiness
Task 10. Dust management
Task 11. Emergency dust suppressing system

OBJECTIVE 3
Nuclear safety improvement

Task 12. Criticality and nuclear safety
Task 13. OS water management
Task 14. Fuel Containing Materials (FCM) characterization

OBJECTIVE 4
Personnel and environment safety improvement

Task 15. Radiological shielding program
Task 16. Technical safety, physical and fire protection
Task 17. Integrated monitoring system
Task 18. Integrated database

OBJECTIVE 5
Strategy and Feasibility Study (FS) for OS conversion in ecologically safe system

Task 19. Strategy and FS for FCM removal and RAW management
Task 20. Development of FCM removal technology
Task 21. New Safe Confinement strategy
Task 22. Construction of the Confinement for FCM deconstruction and removal

PROJECT IMPLEMENTATION PHASES

Phase 1: 1998 — middle of 2000 — is a phase of Early Biddable Projects (development of strategies, programs, conceptual designs), preparatory works for Phase 2, including implementation of two (out of five) top-priority stabilization measures.

Implementation of Early Biddable Projects:

- EBP A — Civil Engineering (geotechnical studies; design of the Structural Monitoring System; infrastructure for stabilization measures; determination of the Scope of Work for Stabilization; decision regarding New Safe Confinement strategy).
- EBP B — Operation and Monitoring (industrial and fire safety; Integrated Monitoring System and Database; seismic monitoring; Radiological Protection Program).
- EBP C — Emergency Systems (development of emergency plans, emergency safety related systems, dust and water monitoring).
- EBP D — FCM Removal Strategy (preliminary characterization of fuel containing materials; conceptual study of FCM removal strategy and associated RAW management; conceptual study of FCM removal technologies and the decision regarding FCM removal prototype).

About 30 companies from different countries were engaged in the implementation of the Early Biddable Projects, including Morrison Knudsen Ltd (USA), BNFL Engineering Ltd (Great Britain), NUKEM (Germany), SGN (France), JGC Corporation (Japan), RSC "Kurchatov Institute" (Russia), as well as Ukrainian research institutes, namely Research Structural Institute, Kiev Research Design Institute "Energoproekt", Interdisciplinary Scientific-Technical Center "Shelter" of the National Academy of Sciences of Ukraine (at present - Institute of Safety Problems of NPP of the National Academy of Sciences of Ukraine) and many others. The deliverables were prepared and approved under all the above tasks, and the key programmatic decisions were taken on their basis.

Implementation of two top-priority stabilization measures:

1. Repair of ChNPP Unit 3&4 Ventilation Stack foundation and bracing - 1998.

The total project cost was US $ 2 249 966. Project funding was provided out of the trilateral contribution proceeds: the USA and Canada contribution was US $ 1 800 000, and the Ukrainian contribution was US $ 449 966. Ukraine provided personnel for work implementation, radiological protection, dose monitoring of workers at the construction site, and provided the necessary information. The Collective Construction and Erection Enterprise "Ukrenergostroy" was the Contractor. The Object Shelter personnel managed the works and had all the responsibilities and authorities for work implementation. The USA and Canada experts provided technical aid and consultations, exercised the overall supervision over project implementation, assessed work progress and the compliance of project implementation with the objectives set. Together with the Ukrainian side they controlled quality and safety assurance. The average external exposure dose of the personnel engaged in the work implementation was below 1cSv. No cases of a worker exceeding the control individual exposure dose level of 4cSv was recorded.

Repair of Units 3 and 4 Ventilation Stack (VS-2) ties

Decontamination of VS-2 sites

2. Reinforcement of Beam B1 and B2 Supports - 1999.

The total project cost was US $ 2844079. The Collective Construction and Erection Enterprise "Ukrenergostroy" was the Contractor. All the operations for installation of shielding and hinged equipment, fabrication of formwork for concreting, and implementation of welding operations were first worked through at the specially created mockup in Chernobyl. The specific feature of this project was implementation of works inside Object shelter at the upper elevations under extreme conditions associated with significant temperature differences and high radiation fields. The average external exposure dose of the personnel engaged in the work implementation under the dose monitoring orders was 1.31cSv. No case of a worker exceeding the control individual exposure dose level of 2cSv was recorded.

In addition, the following activities were carried out under Project Phase 1, which have enhanced Object Shelter safety and improved the infrastructure:

- Installed a prototype of the Neutron Monitoring System "Pilot",
- Completed works on sealing the Shelter roof. The implementation of 5 stages of this task reduced water ingress inside OS through the roof leaks,
- Constructed vehicle roads for transportation of radioactive waste (RAW) and structures,
- Commenced trial operation of the Object Shelter fuel containing materials database,
- Performed removal and disposal of the upper soil level, installed fencing, installed a power supply, and con structed the Unheated Storage Facility at the Small Stroibaza for execution of stabilization measures,
- Reconstructed indoor power systems of Unit 4 and provided fire protection coating of the cable lines,
- Commenced preparation of site for construction of the Change Facility for 1430 Persons and other activities.

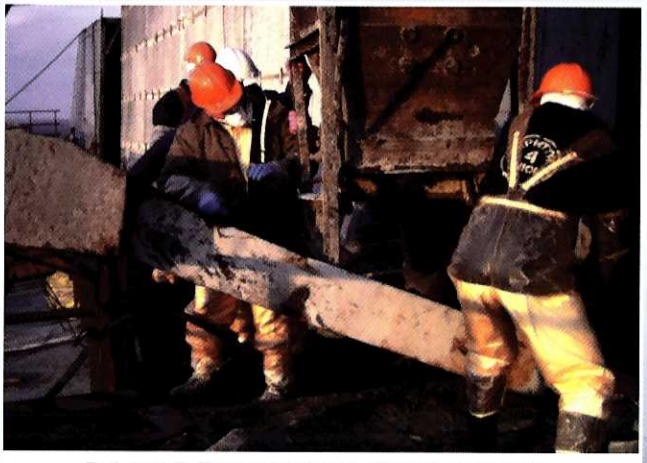
During Phase 1, significant progress was achieved in all the areas defined by the SIP Project strategy and work execution schedule.

Transition Period: middle of 2000 — beginning of 2001: analyzed the results of the Early Biddable Project studies and made decisions with regard to the key Programmatic Milestones.

Phase 2: beginning of 2001 — 2013: design and procurement of equipment, construction and commissioning of facilities and systems.

This phase is characterized by the Project transition to the stage of actual implementation of Phase 1 results. Primarily it includes the activities associated with the structural stabilization, the installation and commissioning of Monitoring Systems and the Integrated Database, the development and testing of FCM removal technology, the implementation of technical decisions for water and dust management, the construction of the New Safe Confinement (NSC) and the deconstruction of unstable structures under NSC envelope.

The implementation of these tasks is being supported by the radiological protection program, the technical and fire safety assurance, and the access control projects. Very complicated and usually unique activities are being implemented at the OS and ChNPP site during Phase 2, and the technical contents of these tasks are different for every task.



B-1 and B-2 Beams places of rests concreting

Preparatory works for B-1 and B-2 Beams reinforcement

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Under the strategy for implementation of SIP Phase 2, 22 Tasks were united into the following projects to be implemented:

1. Preparatory works aimed at creation of infrastructure required to achieve the main goals of Phase 2.

- Under the Ukrainian Contribution, the OS Information-Analytical Center was created to provide technical support for the integrated OS database. (General Contractor - Research and Production Company "Sinaps", Kiev).
- "Ukrtransstroy" Corporation constructed the Personnel Training Centers located in Slavutich city and at theChNPP Site, Personnel receive theoretical and practical knowledge for implementation of works under the specific conditions of the ChNPP Industrial Site.
- "Uzhteploenergomontazh" (UTEM) Company built the 1430 Change Facility which provides hygiene and sanitary conditions for personnel working at the OS Industrial Site and future NSC construction.
- JSC UTEM Slavutich Affiliate built the Rehabilitation Center in Slavutich city. The purpose of this facility is to provide professional selection, monitoring and rehabilitation of personnel performing hazardous works at the Object Shelter.
- "Ukrenergostroy" Company built the so called "Small Stroibaza" which accommodates the Combined Administrative Building, the Heated and Unheated Storage Facilities, and a site with a gantry crane for storage and preassembly of steel structures, utilities, approach motor roads and the railroad.
- JSC UTEM Slavutich Affiliate constructed the Guard Building.
- The following activities have been completed directly at the Object Shelter:
  - Construction and installation activities to eliminate the unauthorized passages in Unit 4 roof,
  - Construction of the sewage pump station and the stationary sanitary lock at elevation +5.8 of Deaerator Stack to ensure personnel access to the most contaminated areas of the Object Shelter,

Liquidation of the non-authorized passes in Unit 4 roof

Small construction site

- Construction of the entrance to the OS which provides dose monitoring services and a workplace for operational personnel,
- Reconstruction of Unit 4 rooms to create workplaces for OS personnel,
- Construction of a facility for decontamination of small-size equipment and tools at elevation +1.0 of Deaerator Stack,
- Modernization of Object Shelter Dust Suppression System,
- Reconstruction of Liquid Radioactive Waste Collection and Removal System

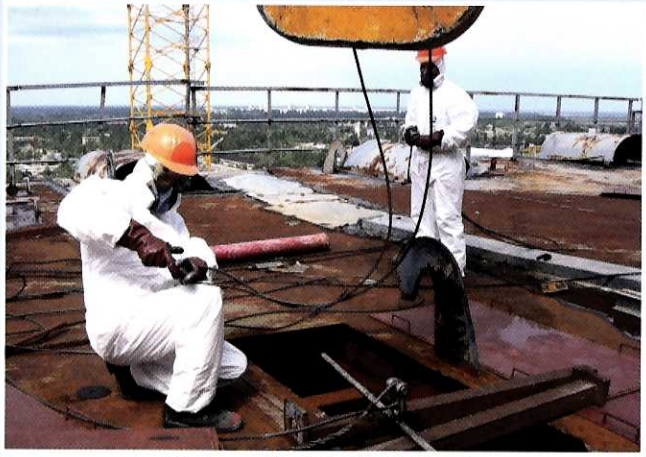
- Commissioning of the Integrated Shelter Data Base into Trial Operation.
- Construction of a sewage distribution and a pump station together with a sanitary lock on elevation +5.8 of Deaerator Stack was completed. These facilities will ensure admission of personnel to the most contaminated areas of the Object "Shelter".
- Completed construction of off-site utilities and associated facilities for implementation of Phase 2. (Contractor — "Ukrtransstroy"). Heating, sewage, fire extinguishing pipelines, power supply networks, and a sanitary waters sewage pump stations were commissioned. Telephone, trunk communication, low voltage signaling and LAN systems were commissioned as well.

2. Design and Construction of Stabilization Measures

The objective of OS structural stabilization is to reduce the risk of structural collapse, which will inevitably lead to the release of large quantity radioactive materials into the environment. As a result of the activities carried out in 1997-1998 and 2004-2007 the risk of Object Shelter structural collapse was reduced for a period of 15 years. This will provide the time required to construct the new safe confinement above the damaged unit and complete the other activities in the frame of SIP.

The Stabilization Detailed Design was developed by the KSK Consortium comprised of NIISK, KIEP, and ISTC "Shelter". It passed the State expert review and was approved in February 2004.

The stabilization measures actually commenced in December 2004 and were completed in April 2007.
Contract: SIP07-1-001-02, Stabilization Measures. Services, Equipment and Materials.
Contractor: Russian-Ukrainian Consortium "Stabilization", led by CJSC "Atomstroyexport" (Russia), UTEM, AESP, CA RNPP (Ukraine).



Works on the "Shelter" object's Western fragment stabilization

Preparatory works foe Deaerator Stack Frame stabilization

Measure 14 (completed on 01 November 2005), Western support of "Mammoth" beam

Reinforcement of the western support of "Mammoth" beam consisted of extension of existing X-braces areas located along the borders of spacial metal support.

Measure 14A (completed on 20 December 2005), Eastern support of "Mammoth" beam

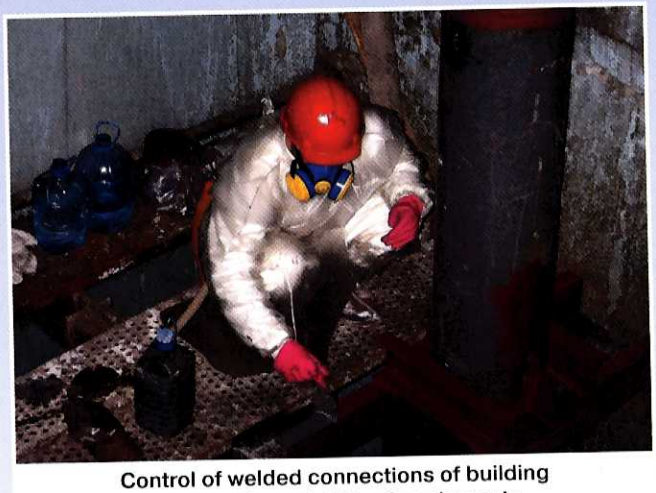
The support is made of a concrete pier. The foundation of the support is debris of metalwork filled up with concrete. It is located on the pre-existing slab. Visual inspection of the support revealed the presence of cavities inside the foundation. Such cavities could impact the stability of the support in case of seismic event. The reinforcement was realized by means of grouting of the foundation following the installation of a frame made of steel beams attached to the existing reinforced concrete columns. Concreting of the support's foundation was done in the retained formwork from the northern and eastern sides.

Measure 3B (completed on 27 July 2006), Reinforcement of upper level of Deaerator Stack frame

The reinforcement of upper level of Deaerator Stack frame was carried out by means of installation of additional steel diagonal braces to link upper part of columns with the ceiling structures.

Measure 3C (completed on 25 May 2005), Reinforcement of Deaerator Stack floor slabs

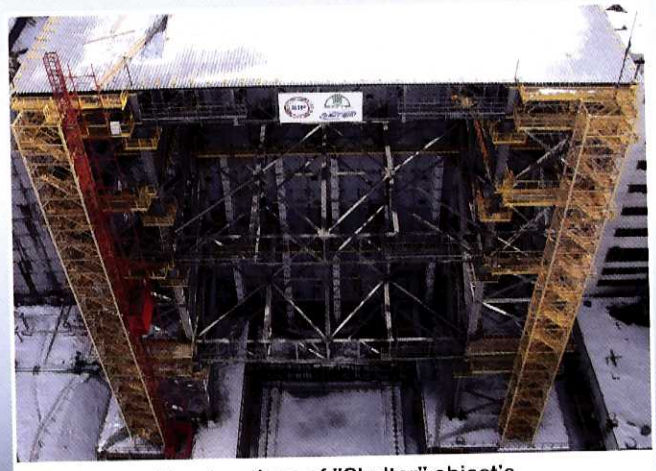
7 Deaerator Stack floor slabs on elevation 33,70 were in an emergency condition. In order to avoid their collapse and create safe work conditions during execution of activities under Measure 3B, their reinforcement was carried out through installation of support poles.



Control of welded connections of building constructions stabilization elements

Works on Deaerator Stack Frame stabilization

"Shelter" object's Northern Buttress Wall reinforcement



Constructions of "Shelter" object's Western fragment reinforcement

Measure 2, Reinforcement of OS Western Fragment

Reinforcement of the western fragment of OS was achieved by means of construction of spacial reinforcement metalwork (RM) at the western Buttress Wall, which is located inside Local Zone. RM of tower type is made of pivot supports with dimensions (8,5x15м) and height 49,2 m and spacial cantilevers up to 22,8 m in height. The supports were installed on concrete foundations.

Stabilization of the western area was accomplished by the transfer of load resulting from the Beams B1/B2, light roof and pipe roofing, from the western wall on axes 50 to the new reinforcement structures. Reinforcement of the wall was carried by means of arrangement of 7 rests on 3 different levels. All the works under Stabilization Measure 2 were completed on 16 December 2006. 50% of the orgianl load was transferred from the wall, and the structures are being closely monitored.

At present, the Technical Decision "Completion of 80% Load Transfer from the Wall along Axis 50 to DSSS" is being reviewed by the State Nuclear Regulatory Committee of Ukraine. In parallel, a contract will be awarded to the Consortium "Stabilization" for implementation of the additional load transfer to the DSSS, and for the repair of the OS lightweight roofing. The performance of physical works under this contract is forecasted for the first half of 2008.

Measure 5/11 (completed on 27 October 2006), Connection of northern "Hockey Sticks" panels with northern part of Buttress Wall with a help of fixation anchors

Connection of the northern "Hockey Sticks" panels with the northern Buttress Wall was carried out by means of installation and fastening on the support traverses of "hockey sticks" supporting the top of the steel false work of the northern Buttress Wall, with specifically fabricated steel fixation anchors (Stabilization measure №5) and with further additional concreting of the upper level of the northern Buttress Wall (Stabilization measure №11).

Measure 8 (completed on 12 December 2006), Connection of southern "Hockey Sticks" with southern panels

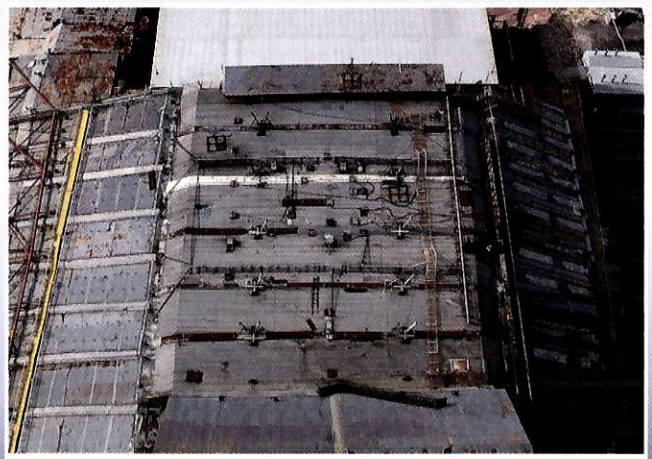
Stabilization of southern part of OS roof was carried out by means of joining of southern "Hockey Sticks" with southern roof panels. This prevents displacement of hockey sticks in the southern direction. This was accomplished by means of the installation of a fixation frame along row B between axis 41-50 on elevation +57.500. The frame is located in parallel to the roof surface at approximately 500-700mm from the roof surface, and rests on mounting hooks of southern panels with "Hockey Sticks" protruding above the roof surface.

All the works on Stabilization Measures were being carried out under conditions of high radiological contamination.

Measure N/N, Local sealing (repair) of lightweight roofing

The light roof is located above the Central Hall. It consists of six assembled blocks of a 36m length, and it is made of galvanized profiled planking with sheets of 1mm thickness. In the course of a survey, it was revealed that across the whole area the profiled planking has corroded areas, and there is no sealing between joints, etc. A contract will be awarded to the Consortium "Stabilization" for repair of OS light roofing. The implementation of physical works under this Contract is forecasted for the first half of 2008.

Metal construction, connecting "Southern sticks- panels" with Southern panels



Lightweight roof of the "Shelter" object

3. Radiation protection, safety and monitoring systems

The "Temporary OS Emergency Plan" developed and concured by the Regulatory Authority. (General Contractor — NUTECO). Under the Ukrainian Contribution a Radiation Protection Program was developed and concurred by the Regulatory Authority (Contractor - Slavutich Laboratory of International Research and Technologies).

The Upgrade of Physical Protection and Access Control System is ongoing. The Working Design successfully passed the expert review. Construction and installation activities are being performed on site. The restructuring of the contract took place with physical works transferred to a separate contract with the Ukrainian company "Atomremontservice". "ABB ALSTOM POWER Service" and "Transexpo" perform works on Engineer of Record Supervision, Erection Supervision and will be performing pre-commissioning activities.

Design and installation of Integrated Automated Monitoring System (IAMS) is ongoing. Contractor — "ANSALDO" (Italy). Commissioning of IAMS will support OS in safe condition during both construction of NSC and in the future during the period of removal of fuel containing materials. The IAMS Technical Design was developed by the Contractor and agreed by the Regulatory Authority. The Contractor finished the development of software; preparations for Factory Acceptance Tests, shipment of equipment and installation works are ongoing.

The Upgrade of OS Dust Suppression System was accomplished. Special dust suppression compounds that prevent generation of dust were used to form a thick film protective layer. Contractor "UTEM". The project expanded the area of dust suppression and has reduced the spread of dust. As a result of testing and a trial period of operation of the modernized dust suppression system, the Contractor defined the optimal composition of dust suppression compounds, elaborated the composition application schedule, remedied system's defects, created appropriate environment for execution of stabilization measures, and developed reports about safety and efficiency of MDSS operation. The dust suppression system was successfully commissioned into industrial operation.

The Consortium composed of Russian Company "Informational Business Systems" and Chernobyl Center for Nuclear Safety, Radioactive Waster and Radiation Ecology Problems (Ukraine) completed a project to create the Integrated Shelter Database (ISDB) — a huge informational resource that will help to manage electronic archives, interface with IAMS, and support the planning and safe execution of future works.

Experimental Radiation Monitoring System "Pilot"

Installation of new dust suppression system at the "Shelter" object

4. Design and Construction of Safe Confinement.

Construction of a new protective envelope or New Safe Confinement (NSC) above Object Shelter is one of the most critical conditions for Object Shelter conversion into an environmentally safe system.

The "Confinement" is a protective facility enclosing Unit 4 that will also enclose a complex of processing equipment for removal of materials containing nuclear fuel from the destroyed Unit 4 of Chernobyl NPP, the radioactive waste management and the other systems designed for execution of activities on conversion of this Unit into an environmentally safe system and the assurance of personnel, public and environment safety.

The following shall be achieved through NSC construction:

- enhance radiation safety level. The integrity of NSC envelope shall limit radiological impacts on the public, personnel and the environment for a period of NSC operation (100 years),
- reduce probability of accidental structural collapse due to deconstruction of unstable structures,
- reduce consequences of accidental structural collapse through the construction of enclosing and load-carrying structures and monitoring systems inside NSC,
- enhance OS nuclear safety by preventing ingress of precipitation to the FCM accumulations, which will drastically reduce the risk for occurrence of a self-sustaining chain reaction,
- enable implementation of the strategy of OS conversion into an environmentally safe system by the life of NSC structures, possible deconstruction of unstable structures of the existing Object Shelter and removal of fuel containing materials.

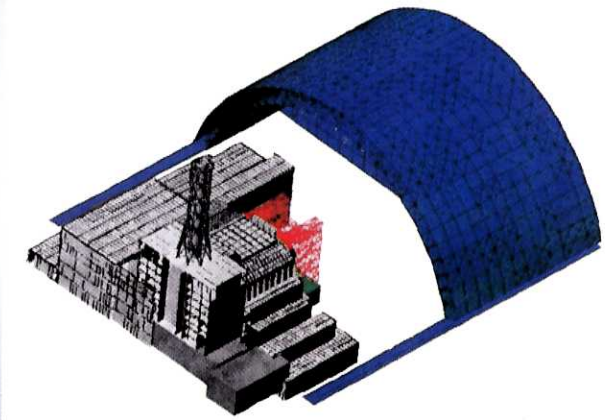
The Safe Confinement representing a multi-functional facility with a 100-year life time which will allow future removal of fuel containing materials, and their conditioning for the subsequent safe storage.

Per request of the Chernobyl NPP, the NSC Conceptual Design was developed by the Consortium comprised of Bechtel (USA), Battelle (USA), EDF (France) with engagement of the Ukrainian KSK Consortium comprised of the Research Institute of Building Constructions (NIISK), the Kiev Institute "Energoproekt" (KIEP) and the Interdisciplinary Scientific-Technical Center "Shelter" (now it is Institute for Safety Problems of NPP). The Conceptual Design was reviewed during the public hearings held in Slavutich in March 2004, discussed by the scientific institutions of Ukraine, and received positive conclusion of the State Comprehensive Expert Review. As a result of these discussions the Cabinet of Ministers of Ukraine, by its Decree 443-p dated 05 July 2004, approved this design as a basis for the subsequent design development.

In accordance with the NSC Implementation Strategy the project will be implemented in two stages.

The preparatory works, which are to ensure the safe and effective NSC construction shall be carried out during the first stage. It is planned to carry out the preparatory works in the following sequence.

Contract signing for NSC designing, construction and commissioning



Expected New Safe Confinement

Berm Wall Removal.

In order to construct the NSC foundations it is necessary to deconstruct the berm of the Pioneer Wall to the south of the Turbine Hall along row "A".

The Pioneer Wall surface was used for arrangement of a stand of the erecting crane DEMAG, which was used for installation of the southern steel structures of the Shelter under construction. At present, the Pioneer Wall Berm represents a rectangular concrete structure of a 103 x 26.05 m dimension and of a 7.0 m height. A contract was awarded to the Corporation "Ukrtransbud" for design and construction of the Berm Wall Removal to ensure the subsequent construction of the NSC foundations. The design and technological documents for execution of the works were prepared and agreed, and the preparatory works have been completed. The main period works on Berm Wall Removal started on 17 August 2006. The completion of the works is forecasted on 31 March 2008.

Site Clearance, Levelling and Excavation Works for Construction of NSC Foundations

For the purposes of optimizing the NSC construction schedule it is necessary to clear the site to acceptable radiological parameters and to level the site leveling for the future NSC construction. At present, the tender for execution of the above works is ongoing, and the evaluation of tenders is being completed.

5. Development of FCM removal strategy and waste management.

The FCM removal is mandatory because Ukrainian Law prohibits disposal of long-lived and high-level waste (including FCM) in storage facilities of any type, except for storage facilities located within stable geological formations. Due to this very reason Object Shelter cannot be converted into the FCM and long-lived RAW storage facility. FCM and long-lived RAW shall be retrieved and disposed of in accordance with the established norms. The construction of the new confinement without intention of the future removal of these materials will not resolve the problem but will shift it to the shoulders of the future generations.

The preliminary FCM Management Strategy proposes deferring removal to that time when the storage facility for final FCM disposal is available, i.e. by several decades, and meanwhile to perform continuous monitoring of FCM conditions. That is why the International Advisory Group of experts did not recommend continuing works in this area. Furthermore, it shall be considered that the required data for development of the FCM Removal Strategy (cost, manpower and doses) can be obtained in the course of implementing early deconstruction of unstable Shelter structures.

Container for Solid RAW

Dismantling of "Pioneer" wall berm

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