

# **New Task 5: PRACTICAL APPLICATION OF THE ALARA PRINCIPLE IN LICENSING PROCESS**

## **Background**

- The Administration does not have a clear methodology and criterial basis for ALARA application.
- There are no criteria to define priorities and in some cases necessity for activities performed at the Shelter Object.
- SSTC is a MACCS code user.

## **Technical Approach**

SSTC, SNRA's technical support organization, proposes to define man-Sievert cost equivalent on the basis of ALARA assessments, which would be used in work optimization procedures for reduction of dose loads at the Shelter Object. Develop a methodology to derive ALARA-criteria. A four-part project has been outlined

Part 1 - Study of HECOM model and its adaptation for Ukraine.

Part 2 - Assessment of cost equivalent of a man-Sievert for conditions of the Shelter Object.

Part 3 - Development of a methodology to calculate losses in cost equivalent (by MACCS code) at example of basic emergency scenarios for the Shelter Object.

Part 4 - Obtaining of cost criteria for possibility to perform work in different areas.

## **Deliverables**

Interim reports for Parts 1, 2 and 3.

Final report for Part 4

## **Schedule**

Study of HECOM model (Part 1) done by end of Month 6

Assessment (Parts 2) done by end of Month 8

Development of a methodology (Parts 3) done by end of Month 14

Obtaining of cost criteria (Part 4) done by end of Month 19

## **Resource Requirements**

114 man-months (SSTC)

Western technical assistance required (Parts 1 and 2)

Foreign travel required (Part 2)

**PRACTICAL APPLICATION OF THE ALARA PRINCIPLE IN LICENSING PROCESS**

**1 INTRODUCTION**

It became obvious during the work on licensing of activity on conversion of the "Shelter" Object (SO) at Chornobyl NPP, that one of the most important problems concerning assessment of nuclear safety of Projects implemented at the SO is lack of clear methodology and criterial basis for using ALARA. This basic principle of radiation safety is presently declared in the Law of Ukraine "On Nuclear Power Using and Radiation Safety" and NRB-97, however, it is free of methodical assurance.

As the first analyses of SAR showed, it resulted in that the designer often neglects possibility to reduce individual doses by thorough planning of routes to working places, shielding of some structural elements and parts of human body, etc. On the other hand, he abuses the excessive conservatism concerning radiation regulations by establishing of wittingly over-reduced target levels, thereby increasing staff number. These actions resulted in unjustified increasing of collective dose versus apparent well being as to individual doses.

Activity on radiation monitoring leads to a number of contradictions. Scope of radiation monitoring is often unjustified from ALARA point of view. However, the main drawback of the whole SO transformation project is the lack of criteria on which base it could be possible to identify priorities as well as necessity to perform some work. Those criteria are meant which shall be laid into the basis for analysis of the benefit from the planned activity performing and harm under its unavailability. One of such criteria can be the cost equivalent value of the risk. Such criterion, which is based upon cost evaluation in man-Sieverts, will allow, if necessary, to obtain objective assessments as to justification of application of these or those technologies or to assist in selection of optimum regulations on performing of radiation dangerous activities (for example, regulations for monitoring) or places for location of facilities and productions. Under such approach to analysis of all activities on SO transformation it is necessary to assess radiation consequences within boundaries of large territories in appropriate terms. For these purposes the code is needed, applicability conditions of which allow this.

Since 1994 the SSTC NRS is a member of users of the MACCS code which capabilities are consistent with the above formulated tasks. In connection with determining of a new circle of tasks in the Priority frames, the SSTC NRS obtained a possibility to use this powerful tool to perform analysis concerning necessity of the certain work performing and selection of their profitability criteria. Such analysis will make it possible to impose objective requirements on restriction of the collective dose for the whole upgrading project along with separate works. It seems necessary by the moment to perform analysis of man-Sievert cost in Ukraine in compliance with model HECOM (Health Effect Costs Model) NUREG/CR-4811 and NUREG/CR-0110 and to develop the similar national documents. Thus, two basic directions of activity within the Project frames become obvious:

*NUREG/CR-4811, "The Economic costs of radiation-induced health effects: Estimation and Simulation" Conf 1988*  
*L.A. Nieves, J.J. Tawil, PNNL,*  
*NUREG/CR-0114 (INREM-II), A*  
*computer*

**Proposed work**

1. Reduction of dose loads at the SO by using the procedure for optimization of radiation dangerous work on the basis of ALARA assessments for man-Sievert equivalent cost.
2. Development of methodology to obtain objective cost ALARA-criteria as to necessity (or possibility) to perform works based on the basis of ALARA assessments for man-Sievert equivalent cost with use of the MACCS computer code.

Work, performance of which envisages using the results of the work proposed

Work on SO transformstion

Project within the frames of the Contract RISKAUDIT/SSTC NRS "Support to the Ukrainian Regulatory Authority's licensing activity connected with projects funded for construction of Chornobyl NPP decommissioning facilities, TACIS/NSA" SC 99/10-98.0365

## 2 STATEMENT OF WORK

### *Task 1. Study of HECOM model and its adaptation for Ukraine*

Study of the US normative and methodological base which allow to perform cost analysis and assessments of consequences to health caused by exposure. Adaptation of HECOM (Health Effect Costs Model) model to conditions of Ukraine.

*Result:* Recommendations on assessment of damage cost.

*Deliverable:* Stage report

### *Task 2. Assessment of cost equivalent of a man-Sievert for conditions of Ukraine*

Analysis of the US methodical instructions and recommendations to assess cost equivalent of a man-Sievert. Identification of cost equivalent of a man-Sievert for conditions of Ukraine based upon international recommendations

*Result:* Estimated value of cost equivalent of a man-Sievert.

*Deliverable:* Stage report

### *Task 3 Development of a methodology to calculate losses in cost equivalent (by MACCS code) at example of basic emergency scenarios for the SO.*

Analysis of basic emergency scenarios at the SO with the use of the MACCS computer code: assessment of radioactive contamination of territories caused by potential accidents and economic losses taking into account expenses by temporal periods (short-term and long-term protecting actions). Identification of modern approaches to the methodology of losses calculation in cost equivalent.

*Result:* Methodology for losses calculation in cost equivalent at example of emergency scenarios for the SO

*Deliverable:* Stage report

### *Task 4. Obtaining of cost criteria for possibility to perform work in different areas*

Using separate activities on SO transformation, to analyze dose expenses to perform these activities, undertake protecting measures. Proceeding from estimation of economic losses and cost equivalent of a man-Sievert to identify cost criteria for possibility (necessity) of the work performing. Development of recommendations on reduction of dose loads at the SO based upon procedure of optimization of radiation dangerous work with the use of ALARA-estimations of cost equivalent of a man-Sievert.

*Result:* Cost criteria for possibility of work performing in different directions. Recommendations on reduction of dose loads at the SO.

*Deliverable:* Stage report

### 3 LABOR EXPENSES

Title of the stage	Staff involved	Duration, months
1. Study of HECOM model and its adaptation for Ukraine	Project Manager -1 Head of Laboratory - 2 Researcher - 1 Leading Engineer - 2	6
2. Assessment of cost equivalent of a man-Sievert for conditions of Ukraine	Project Manager -1 Head of Laboratory - 2 Researcher - 1 Leading Engineer - 2	2
3 Development of methodology to calculate losses in cost equivalent (by MACCS code) at example of basic emergency scenarios for the SO	Project Manager -1 Head of Laboratory - 2 Researcher - 1 Leading Engineer - 2	6
4. Obtaining of cost criteria for possibility to perform work of different directions	Project Manager -1 Head of Laboratory - 2 Researcher - 1 Leading Engineer - 2	5

#### Identification of labor expenses

Labor expenses needed to implement the Project as a total can be subdivided into the following groups::

1. Project Manager - 19 man/months;
2. Head of Laboratory - 38 man/months;
3. Researcher - 19 man/months;
4. Leading Engineer - 38 man/months

Thus, labor expenses needed to perform the work on the Project are equal to 114 man/months.

