NUCLEAR WASTE PROGRAM IN UKRAINE

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ABSTRACT

The new state of the Ukraine has inherited a waste management program from the old Soviet Union that is in a state of near collapse.

This paper reviews the status of radioactive waste in the Ukraine including high level, intermediate level, low level and uranium mill tailings and the actions taken to try to establish order by developing and publishing standards and regulations.

The National Program of Radioactive Waste Management is divided into a program of Urgent Matters (1993-1995) and a Perspective Program for 1996-2010. These programs are just now beginning to be implemented in detail.

INTRODUCTION

Ukraine being one of heirs of the former Soviet Union inherited a partial collapse of a waste management system for all the new countries. The Ukraine has a great deal of radioactive waste sources both within the nuclear fuel cycle and from other nuclear applications.

Principal radwaste sources are as follows:

- nuclear power plants;
- uranium mining and milling facilities;
- nuclear applications at medical, industrial and research institutes;
- cleanup of the territory and facilities contaminated by radionuclides owing to the Chernobyl accident.

NUCLEAR POWER PLANTS

At present five nuclear power plants (NPPs) with a total output of 12.8 million kW(e) are operated in Ukraine, including two units with RBMK-1000 type reactors, two units with WWER-440 (model B-213), and ten with WWER-1000.

The two RBMK type units of the Chernobyl NPP are shutdown: No. 4 - as a result of the accident of 1986, and No. 2 - by the decision of the Ukrainian Parliament after the major turbine hall fire in October 1991. By the same decision the rest of the units (two) are to be shutdown by the end of 1993.

When the Ukrainian NPPs were being constructed it was assumed that the spent fuel from WWER type reactors would be treated at reprocessing plants located in Russia. Construction of such plants in the Ukraine was not planned resulting in a large problem now, namely spent fuel management.

As for operational radwaste it is stored within NPP sites without any processing, in most cases. The state-of-the-art of radwaste management at the Ukrainian NPPs is shown by Table I.

A great deal of radioactive waste is generated at uranium mining and milling facilities on the "East Mining & Dressing Integrated Plant". One more source of radioactive tailings was the "Pridneprovsky Chemical Plant" in Dneprodzerzinsk (Table II).

There are more than five thousand enterprises in the Ukraine which use radioactive materials. With reference to the information from the Public Health Ministry of the Ukraine, the number of radioisotope devices stock-produced under operation now is in excess of 17,500. In addition, until 1980, radiation sources were supplied without any regulatory control and registration.

TABLE I
Radwaste Processing Facilities at Ukrainian NPPs

NPP	Radwaste Type	
	Liquid	Solid
Zaporozhye South-Ukrainian Khmelnitsky Chernobyl Rovno	deep evaporating facilities evaporation bitumization	only separation by activities

TABLE II
Mining and Milling Tailings in Ukraine

Facilities Name	Radwaste Type	Volume, 10 m^3	Activity, Ku/m^3	Total Activity, KKU
East Mining & Dressing	Gangue	2 555	0.001	0.00255
Integrated Plant	depleted ore	910	0.003	0.00273
	tailings	29 000	0.002	58
Pridneprovsky Chemical Plant	tailings	40 000	0.002	80

Between 1960 and 1962 6 regional centers for the management of radioactive waste from nuclear applications at medical, industrial and research institutes were built (Table III). All the territory of Ukraine was divided into five regions which were assigned to respective regional centers as shown by Table IV excluding Donetsk center which has no disposal facility up to now.

In the former USSR these centers were placed under the command of the Ministry of Municipal Services along with public bathes, barbershops, cemeteries etc. And technological and administrative levels were corresponding. From 1991 the regional centers are placed under the command of Chernobyl Ministry but the problems remain the

TABLE III

Regional Centers for Radwaste Management

Regional centers	Zones of service
Kiev	Kiev
	Cherkassy
	Chernigov
	Khmelniskiy
	Vinnitsa
	Zhitomir
Dnepropetrovsk	Dnepropetrovsk
	Donetsk
	Zaporozhye
	Kirovograd
	Lugansk
Odessa	Odessa
	Crimea
	Nikolayev
	Kherson
Lvov	Lvov
	Volyn
	Zakarpatye
	Rovno
	Ternopol
	Chernovtsy
Kharkov	Kharkov
	Poltava
	Sumy

same: no processing of liquid radwaste, no loading facilities for spent radiation sources, no proper inventory of radwaste etc. In addition from 1990, the a problem of public relations has been strained. As a result local authorities imposed some restrictions on the operation of the Odessa, Lvov and Dnepropetrovsk regional centers and closed the Kiev regional center. Thus the only one operated normally is the Kharkov Regional Center.

As a result at the present time spent radiation sources and radioactive wastes accumulate at medical, industrial and research institutes which measure the probability of radiation accidents.

One more source of a great deal of radwaste is the radioactive contamination due to the Chernobyl accident. We don't dwell with on this problem in detail since it is dealt elsewhere.

It should be noted that one of the causes of such a state of affairs is a lack of a legal and regulatory basis of radwaste management. By now the Ukrainian State Committee on Nuclear & Radiation Safety has issued a Draft Law on Nuclear Energy Utilization and Radiation Protection and a Draft Law on Safety of Radwaste Management and this will be the next action.

PLANS AND PROGRAMS

In these circumstances the Cabinet of Ministers issued an ordinance of December 21, 1992 whereby the Ukrainian State Committee on Nuclear and Radiation Safety and the Ukrainian Environmental Protection Ministry were charged to develop a National Program of Radioactive Waste Management.

By now a conception of this program has been developed by UkrSCNRS staff and been presented to all the parties concerned with and the formation of the National Program continuing.

The Program is divided into two subprograms. The first one is a Program of Urgent Measures which is intended for the period of 1993-1995. The second one is a Perspective Program for 996-2010.

- Both the subprograms are divided into six sections:
- Section One. Legal and Regulatory Environment,
- Section Two. Radwaste Inventory,
- Section Three. Scientific Basis,
- Section Four. Database of Radwaste Management,
- Section Five. Infrastructure, and
- Section Six. Personnel Training and Education.

Section One includes work on the creation of a legal and regulatory framework at the national level harmonized with existing ones at international levels within which the radioactive waste management and disposal have to be carried out. Taking into account of the absence of proper regulations in the former USSR this take requires some help from western countries in the field of regulatory staff training.

Section Two includes works on formation of a state system of radwaste inventory and formation of a state policy of radwaste storage and repositories. These works are closely connected with the works on Section Four which includes in addition a forecast of a radwaste formation rate, a creation of data banks on R&D activities in the field of radwaste management and on existing technologies and technical means.

Section Three includes research and development activities and investigation of different options for radwaste management and disposal and for the relevant radiation protection and monitoring.

Section Five includes development of a system of financing of radwaste management and a creation of effective waste management system from collecting o radwaste at sources to ultimate disposal.

Section Six represents an integrated program of staff and personnel training and education beginning with an elementary vocational training to a highest education for NPP and waste management office head staff and regulatory staff.

SUMMARY

It is self evident that the problems are many. The large inventory of radwaste and it's continuing increase has resulted in a crash program to bring waste management under control. The structure is now in place but what is needed is help from western nations to implement the programs. This is particularly needed in the areas of regulatory staff training.

TABLE IV

Quantities of Radwaste Stored at Regional Centers

Regional Centers	Radwaste Type	Volume, m^3	Qualitities of SRS kgRa	Reserves m^3
Dnepropetrovsk	Solid	370		30
	Liquid	100		100
	Biological	20		-
			4	46
Kiev	Solid	1800		-
	Liquid	480		120
			42	58
Lvov	Solid	200		840
	Liquid	20		180
			0.1	39.9
Odessa	Solid	530		50
	Liquid	118		282
			1.2	18.2
Kharkov	Solid	820		1320
	Liquid	50		380
			20	100