REPORT OF MISSION

CHERNOBYL ASSISTANCE AND REHABILITATION PROGRAMME EVALUATION

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EXECUTIVE SUMMARY

In April 1986, in the Soviet Republic of Ukraine occurred what remains to date the worst disaster of civil nuclear technology. Though the death toll remains rather low at 32 deaths, the number of people affected goes well above 2 millions. In November 1991, the dissolution of the Soviet Union resulted in a major state of confusion for millions of people who have been living for more than seventy years in a system that was caring for everything and for all. Those already affected by the Chernobyl accident have suffered even more from this second event.

The Red Cross Movement has been involved in the provision of assistance to the communities affected by the accident since 1986, through the Soviet Alliance of Red Cross and Red Crescent Societies. In 1991, the International Federation was asked to launch a programme of assistance covering the three affected republics. The concept of this programme relies on the collection of information on the level of contamination of the person, its food stuffs and its environment, to feed back immediately the results of the measurement to the checked persons and to ensure for the provision of "safe food" to schools and other children institutions. In 1993, a first evaluation mission was followed by an international seminar attended by most partners of the programme.

In 1996, in line with the tenth anniversary of the accident, a second evaluation mission focusing on technical issues of the programme has been planned with a view to prepare for the next workshop which is to take place in April 1996, in Gomel, Belarus. Lot of scientific information has been made available during the last few years, in particular pointing towards the direct relationship between the accident and thyroid gland cancer which rate has dramatically increased since 1991 in the areas affected by the fall-out. The psycho-social consequences of the disaster have also appeared as an area of interest and some studies focusing on this subject have been initiated.

After this quick review of the historical background of the accident, its impact on communities, and the Federation Chernobyl Humanitarian Assistance and Rehabilitation Programme the report analyses the data collected by the six Mobile Dosimetry Laboratories of the programme during the years 1994 - 1995. Recommendations are made in four areas. It appears that the central concept of the programme remains valid and the following adaptations have been proposed:

- Intensify the ultrasound scan screening to detect thyroid gland cancer in their early stages and ensure adequate management and follow-up.
- Continue monitoring of radioactivity levels with particular attention to the areas known as highly contaminated or where clusters of thyroid cancers have been identified. Special measurements can also be made upon request when these appear relevant.
- Psycho-social programme based on education through simple and reliable information made available to communities, aiming at restoring self confidence in the affected communities and enhancing the rehabilitation process.
- Development of self sustainability of the programme, and advocacy at both national and international level.

1. INTRODUCTION

On request by the Europe Department of the Federation Secretariat, an evaluation mission has been organised in the three republics of the Former Soviet Union (FSU) affected by the accident at the Chernobyl Nuclear Power Plant, in April, 1986. Between 1986 and 1990, relief work in the affected areas has been carried out by the Alliance of Red Cross and Red Crescent Societies of Soviet Union. In 1990, following the huge work carried out by the Federation in Armenia struck by the earthquake in December 1988, the Alliance asked the Federation for some assistance in the Chernobyl affected areas. Since 1991, and the breakdown of Soviet Union, together with the three Red Cross National Societies (NS), namely Belarus, Russian and Ukrainian RC, the Federation is implementing an assistance and rehabilitation programme in six regions (two in each republics) to provide assistance to a population of 120,000 affected by the accident.

In November 1993, on the invitation of Ukrainian Red Cross Society (URC) and the Federation Regional Delegation in Kiev, the First International Symposium took place. It was organised with the objectives of exchanging information collected by the programme and to review the conclusions and recommendations of an evaluation mission that has taken place in October 1993. Representatives of the local governments and health authorities, operating NSs as well as participating NSs met for three days to discuss technical issues and visit the nuclear plant.

Thirty months after this first symposium, and in line with the tenth anniversary of the accident, a second symposium is to be organised in Gomel (Belarus,) from 16 to 20 April, 1996. The report below is made by the evaluation team put together by the Federation Secretariat, consisting of Professor Pierre Pellerin, (from Paris, France) international expert on nuclear medicine and radioprotection, and Dr Jean Pierre Revel, Advisor at the Relief Health Service, DROC, Federation Secretariat. Due to the short notice and administrative constraints in the preparation of the mission it was not possible to have national counterparts attached to the mission. Although members of the programme at local level have been deeply involved all along the mission, the absence of the above mentioned experts was felt as a limitation. Given its short time, the objective of the mission was limited to the evaluation of technical issues, reviewing achievements of the programme and making recommendations for further steps taking into consideration last up-to-date information.

Before the field trip, collection of background data encompassed participation in various meetings and international seminars, such as the WHO "Health consequences of the Chernobyl and other radiological accidents", in Geneva, 20 - 23 November 1995. A review of the important literature dealing with the consequences of the accident was also carried out. The primary focus of this work is the humanitarian aspects of this disaster, scientific and technical information is referred to when it contributes to the overall understanding of the problem.

The field visit took place between the 16 and 26 February, 1996, and included visits to districts from the affected areas in the three republics, meeting with Mobile Dosimetry Laboratory (MDLs) staff, representatives of Red Cross Local Branches as well as national and local health authorities. Further details on the areas visited and the agenda of the mission are included in Annexes, 7.1. and 7.4.

2. HISTORICAL BACKGROUND

2.1. The accident

At 1.23 a.m., Saturday 26 April 1986, following a series of odd manipulations, a major explosion occurred in the reactor 4 of the Chernobyl Nuclear Power Plant starting what remains today the worst accident of civilian nuclear industry. Immediately after, fire broke out in the wrecked reactor and the heat resulting from this fire helped to spread millions of curies of radionuclides all over territories of three republics of the former Soviet Union, namely Ukraine (where the power plant is located,) Belarus, the worst affected, and Russia. The fire raged for ten days during which the dispersion of the radionuclides coming from the fuel rods took place. Thousands of firemen, militia men and members of the plant were involved in combating the fire and clearing the debris. After that, most of the contamination, although very high, was purely local, in the immediate vicinity of the damaged reactor and due to the dusts and heavier fall-out which surrounded the plant. The wrecked reactor was eventually buried under 300,000 mt of concrete covered with 50,000mt of steel plates consisting the sarcophagus.

The radionuclides distributed by the accident in the environment have different characteristics as well as biological impacts. Four types can be identified and they are as follows:

Isotope	Half Life Period (T)	Temperature of fusion (°C)	Weight /1 Curie (Ci)	Quant. emitted	Radioactivity ejected and areas covered
131 Iodine	8 days	140°	$8x10^{-6g}$	1.7kg	60 Mega Curies (= $2.2x10^{18}$Bequerel) Worldwide dispersion
137 Cesium	30 years	450°	$10^{-2}g$	25kg	Mega Curies 2.1 (= $9x10^{16}$ Bequerel) 3 Republics affected
90 Strontium	28 years	1.400°	7x10-3g	1.7kg	0.25 Mega Curies (= $9x10^{15}$ Bequerel) 80% in the "Zona"
239 Plutonium	23,000 years	3,800°	16g	80kg	Nearly 100% in the "Zona"

Table No 1: the most common radionuclides found in the/all out of Chernobyl accident (Adapted from Professor Pierre Pellerin)

Biological effects of these radionuclides vary greatly according to the types of radiation emitted during the decay, the physical (or half life) period, the "biological period" (time after which the item is replaced in the body by the effect of metabolism,) the specific target organs (if any,) as well as the chemical toxicity. This can be summarised as follows:

- ***Iodine 131,*** first in radioactivity, it is the most volatile, and due to the heat generated by the fire, it was spread all over the world as the well known "Chernobyl Cloud" traced by various agencies. Fortunately, its half life period is short (8 days) and after three months it was nearly all gone by natural decay. In the human body, it is immediately captured by the thyroid gland. Due to the huge geographical dissemination and the short half life

period, no map covering the total areas contaminated by this nuclide is available.

- ***Caesium 137,*** second in quantity. Because of its long radioactive period (30y) combined with its high volatility, it constitutes the major pollutant of this accident. Actually, it boils at a temperature of 450°C, also below the temperature reached by the fire and this explains why it is has been so widely spread. More than 21,000 km^2 in the three republics are reported contaminated by various quantities of this radionuclides. In the nature, this nuclide is captured by various biological bodies, integrated in food chains and might be concentrated in wild food stuff such as mushrooms and berries. In the human body, the caesium is just like the potassium, an intra cellular ion, found particularly in the muscles. Its turnover in the human body is alike, about 2 to 3 months. Its decay goes together with emission of gamma rays. See map of the contaminated areas in Annex 7.1.
- ***Strontium 90,*** (28 years for physical period) rank third in quantity. In terms of biological impact, it behaves very much like calcium, a major constituent of living bodies and in particular, the bones. When included in a child's bone, it remains there for years, since the "biological period" is very long. Its decay results in the emission of beta ray, which have a low penetration and a rather high potential for biological effects essentially on bone marrow. Fortunately, temperature of evaporation is very close to the one reached by the fire and this explains why the area contaminated by this radionuclide is far more limited than the previous one; nearly 80% of the released strontium remain in the 30 km radius forbidden zone called "Zona". See map of the contaminated areas in Annex 7.2. .
- ***Plutonium 239,*** is the last radionuclide of importance found in the contaminated areas. As it is the heaviest and the least volatile (3,800°C), it did not fuse and it was spread in the form of aerosol and remained almost entirely in the "Zona". See map of the contaminated areas in Annex 7.3. This radionuclide is among the most toxic ones. When inhaled (as a dust) it is alleged to provoke the growth of lung cancer. It has an extremely long half life period and its decay results in emission of alpha rays, creating a new radionuclide, americium emitting alpha and gamma rays, which makes it even more difficult to handle. This explain why the "Zona" will remain forbidden for ever.

In a lesser extent, few radionuclides resulting from the decays in the fuel can be found but evaluation of their health impact is difficult to make. In every case, their importance is secondary compared to the previous ones.

2.2. The follow-up

Immediately after the explosion, people in charge of the plant realised that a major accident was unfolding. Decisions were taken at the highest level of the Soviet Union, most of them being covered by secrecy linked with the twofold objective of this RBMK reactor: civilian (to produce electricity,) and military (to produce plutonium). Whilst a series of technical measures were taken inside the plant, populations were affected by various decisions that had sometimes a negative impact on their lives. Thorough analysis of the relevance of those decisions goes far beyond the terms of reference of the current mission, but full understanding of the final impact on affected populations requires knowledge on these decisions.

2.2.1. Populations displacement

The first measure to be decided was the evacuation of population from cities and villages in the contaminated zones. The 45,000 inhabitants of the closest city, Pripyat (2.7 km in the north west from the plant,) were all evacuated in one afternoon, 36 hours after the onset of the accident.

In the following days, villages in the contaminated zone, within a circle of 30 km radius around the plant, were also evacuated and population were displaced as far as Minsk and Kiev, the capital cities of Belarus and Ukraine. A total of 160,000 were eventually displaced. In the Zona and a few places, the villages were destroyed (houses were buried) but most of the time, they remain untouched. Frequently some old people have refused to leave their houses and still live there with their memories. It is of some importance to know that among the 6,000 currently living in the forbidden zone about 2,000 are not working in the plant... Out of the Zona, contaminated areas are still places for living and working for hundreds of thousands and for Belarus alone (the country most affected by the fallout,) more than 1.8 million people, including almost half of a million children below 17 years of age, are still living in areas with radioactive contamination.

2.2.2. Stable Iodine Distribution

In these regions, it was known since that the low level of natural stable iodine had resulted in high level of endemic goitre. The second important measure to be taken was the distribution of stable iodine. The thyroid gland traps very quickly any ion of iodine transported in the blood; when iodine is scarce the process is even faster. The aim of such a distribution is to saturate with stable and harmless iodine the thyroid gland of children and avoid it to be contaminated with radioactive '"Iodine coming from the fallout. To be fully effective, it is highly recommended to have this distribution organised within few hours after the accidental release of iodine in the atmosphere, and should not be carried out for long time. This measure was to be implemented over extremely large areas as this radionuclide disseminated widely over the borders. In Chernobyl, distribution started late and in few places, it was reported continued longer than needed.

2.2.3. Information

Lack of clear information about the consequences of the accident has been frequently mentioned as one of the most serious problems. In all countries, nuclear matters are subjects to military secrecy and all information is classified. This was even more true in the Soviet Union and local communities did not always receive clear information from the central authorities. In some villages of Ukrainian affected areas, we were told that the official decision to include the Oblast in the contaminated zones and to take relevant measures was taken even as late as 1st January 1990 after a survey that took place in December 1989, 44 months after the disaster. During that time, rumours spread and the effectiveness of measures can be questioned.

2.2.4. Assistance to the most affected

Specific assistance to "Liquidators" and, and to a lesser extent, to affected populations was also required. Compared to the magnitude of the accident and its environmental consequences, the initial death toll of the disaster at 30, might appear very low. 2 were

crushed under debris and 28, most of them firemen, died from acute radiation sickness in the first few days of the accident. Approximately 500 are said to have suffered from this disease, 203 were sent to hospitals as far as Moscow. The numerous firemen, soldiers of the Red Army and plant workers who took part in the process of combating the fire, cleaning the debris and
erecting the sarcophagus received various dose of radiation, most of them below the level of 25 Rad set up as the limit admissible for this kind of work. 200,000 were granted the status of Liquidator and received special compensations and advantages. The total number of those claiming to be liquidators is now at 600,000 (some reports mention a figure of 800,000). The actual mortality and morbidity rates of this group are subject to fierce discussions.

As well, affected populations in the most contaminated zones received donations of "clean food" and special medical attention. Unfortunately, the actual value of these advantages dramatically decreased in the last few years because of the economical difficulties faced by these republics. This is source of concern and frustration for quite a high number of people around the areas affected.

Most of the relief work during the first five years was carried out by the Soviet authorities, the three NSs assisting in their implementation. Although total amount of work carried out during this phase is huge, it remains largely unknown as it was considered just like an "internal matter". Things changed at the end of 1991, with the dissolution of the Soviet Union.

2.3. The breakdown of FSU

The dissolution of the Soviet Union in November 1991, has had much more consequences than anticipated for the daily life of people. The whole system which was once providing free health care, education and guarantee of work and housing for nearly everybody is gone. Even though this system was different and not the most efficient by western standards, it was meeting the needs of quite a lot of people, including the most vulnerable. Although their life was known to be difficult because of various material limitations, pensioners, veterans and the new group of the "liquidators" were not that much anxious for their future, as it was taken care for by the State. Suddenly all these people had to fight for their survival, but with inadequate assets as they were not trained for the competition. This has resulted in a widespread mixture of feelings such as frustration and bitterness. Among the population, quite a lot of depressions are said to be related to that change and concern is voiced among senior executives at Ministry level that the breakdown of the Union had a more severe impact than the accident itself.

2.4. Health consequences, direct and indirect

The health consequences of the disaster have been in the focus of discussions for many years. Experts have put forward figures which range from the total harmlessness of the accident in the long term to major increase by several tens of thousands in the number of cancers in the decades to come. At the last WHO Geneva Conference, the only disease which was directly reported to the accident was the thyroid gland cancer. It has demonstrated highly significant increase in the last five years among children.

2.4.1. Thyroid Gland Cancer

Between 1986 and the end of 1994, a total of 565 cases have been identified by the WHO/ IPHECA Programme, most of them being found in Belarus (Gomel and Mogilev Oblast). Since the management of this type of tumour is well defined, including surgery, chemotherapy and hormone supply in the long term, most of these cases have received adequate treatment in each of the 3 countries and the mortality rate so far remains low. The problem is to ensure as early detection as possible so that treatment can be most efficient. This can be done through manual palpation or, best, through ultrasonic scan (a fairly cheap and highly sensitive
technique, provided it is adequately used by competent staff). Therefore the need to screen large number of children in villages spread all over vast areas appears obvious. The decreasing resources available at the Ministries of Health make this problem more and more serious.

2.4.2. Other consequences

Reports regularly mention, increases in the number of cases of leukaemia, congenital abnormalities, brain damage and mental retardation. So far there is no significant evidence that such increases really exist and can be related to the accident. The WHO Conference in Geneva,

last November reviewed at length these issues but no conclusion was made. Monitoring of the incidence rates of these diseases is still going on so as to detect any slight increase.

2.4.3. Non specific ailments

The accident and the measures taken in the immediate aftermath have had also indirect consequences on the health of the populations. To prevent contamination by ingestion of contaminated food stuff, authorities strongly recommend to avoid not only all food items coming from forests, such as mushrooms, berries, but also milk coming from cows that have grazed in areas known to be contaminated. This was a very unpopular recommendation as these rural populations rely heavily on such food stuff. At the beginning, importation of "clean" food (coming from non contaminated areas of the Union or from abroad,) made the burden less difficult, but nowadays, food assistance is less and less possible and this results in an unbalanced diet, depleted in fruits and vegetables, which is particularly harmful for children. This is particularly true in rural communities that can be isolated for days by heavy snow falls. Five years of restrictions have changed communities' food habits and some people complain quite a lot. Decreased accessibility to food makes villagers more and more hesitant to comply with recommendations about contaminated areas; wild food remain culturally an important part of their diet. At the time of the mission shops were desperately lacking of fresh food (vegetables and fruits) and the available food stuff were very expensive for local populations.

Besides these qualitative and quantitative restrictions on the usual diet, consumption of alcoholic beverage and tobacco (sometimes far more than what is commonly accepted,) does not help in raising the health status of this population. The depressive mood of population resulting from unemployment and sometimes displacement is also increasingly reported as a cause for increased consumption of alcohol.

Complaints were forwarded, such as loss of appetite, loss of memory and various pains and ailments have been repeatedly mentioned in the literature. It is a complex combination of symptoms which can be related to purely somatic disorders but also to other symptoms, clearly of psycho-somatic origin. Sometimes called "Chronic Radiation Sickness", it may last for months, sometimes years, with little improvement if any. Often it does not respond adequately to treatments prescribed, moreover these treatments tend to be incomplete because of lack of drugs in the dispensaries and high cost of the imported drugs in the newly established private pharmacies, another source of frustration...

The combination of all these factors result in serious health problems that are less and less attended by a collapsing health care system.

3. CHERNOBYL HUMANITARIAN ASSISTANCE AND REHABILITATION PROGRAMME

In this context, the Chernobyl Humanitarian Assistance and Rehabilitation Programme, carried out by the three Red Cross Societies with the support of the Federation, initiated five years ago appears more and more relevant. The initial objective was to provide medical screening, radiation monitoring of food and environment as well as some key health related information to population affected by the disaster. Supplementary food was also provided to children in the most affected areas. Based on the concept of autonomous units called "Mobile Dosimetry Laboratory" (MDL), the information was collected in villages, even the most remote ones, where people are living. On the managerial point of view, the central body is the International Chernobyl Co-ordinating Committee, where representatives from the three NSs and from the federation are sitting. The Committee meets regularly to take decisions pertinent to the orientation of the programme.

The most striking characteristics of this programme can be listed as follows:

- Address immediate needs of the population, particularly in providing answers to critical questions such as how affected can be their health? by measuring some biological tests, and how far is the environment contaminated or the food safe by direct measurements of radioactivity.
- Immediate feed back was given to those checked, since they were volunteering to come for the investigations. Advise and exchange of information was encouraged and a booklet of basic information about radioactivity and its health impact has been printed in 150,000 copies for distribution to families during the test.
- In all three republics, the work has been carried out in close co-operation with local authorities so as to avoid duplication of tests in some areas and gaps in others.

Given the scope of its activities and the above mentioned specificity, the RC Chernobyl Programme remains a unique one in the regions affected. Other scientific programmes exist and collect much more data than the Red Cross one, but the feed back to affected communities remains so far minimal.

Geographically it covers affected areas in the three republics, two oblasts among the most affected in each republics namely:

- Belarus: Gomel and Mogilev

- Ukraine: Rovno and Zhitomir
- Russian Federation: Briansk and Kursk.

The MDLs were initially designed to work for two years in the difficult environment of these regions. They have now completed their fourth year of intensive work. Since they are performing tests for a total of 50 children and adults work, that makes a total of 60,000 screened every year. As pointed out earlier, they are fully autonomous and travel with their staff of five to the areas to be investigated. They stay in this area for an average of one week, but always until the screening of the population is completed.

After registration, the full examination of a patient includes:

- Dosage of body radioactivity with the whole body monitoring which measure gamma radiation in the body of the patient. This equipment is built in a 1,500 kg pay load van and requires a 1,000 kg lead shielding which makes the whole equipment very heavy. The detection is made by a scintillator BC16 which is linked to a computer that procss the data and gives an indication of the gamma radiation. The pros of this technique is the high sensibility but it goes together with a fairly low specificity. This equipment appears therefore as an excellent equipment for mass detection in particular immediately after a nuclear accident.
- Then, a blood sample is collected in micropipettes to search for 8 tests and a urine sample is processed as well for 10 tests. Both these examinations are fully automatic, giving the analysis in a short period of time.
- Medical examination, is performed by a physician fully aware of the results of previous examinations. Decisions ranging from simple advice/recommendations for better hygiene or improved diet to medical prescription and possible referral for further analysis, is the last step of the process.

Dosages of the radioactivity in the environment complete the information collected. This step includes:

- Measurement of the gamma radiation in the environment (contamination by '"Caesium) with the MIRA counter.
- Measurements of alpha and beta radiation (contamination by ""Plutonium and ""Strontium) with the MINICONT counter.
- Level of contamination of food stuff is checked by measuring the gamma radiation (contamination by '"Caesium) in samples provided by the members of the communities.

In 1994, ultrasonic scanning of the neck was made possible by a donation of 6 ultra sound scanners by a participating NS. This examination was added to the list of tests aiming at the detection of thyroid gland cancer at its early stage.

Provision of information is completed in some cases by distribution of powdered milk free from radioactive contamination and micro nutrients to children through education institutions.

So far, it is estimated that approximately 700,000 have benefited in one way or another from this programme. In term of budget, this represents a total of more than 3.8 millions Swiss Francs over a period of five years. The breakdown is as follows:

YEARS	*CASH*	*KIND*
1992	310,842	150,000

1993		
1994	1,648,433	45,118
1995	807,818	116,167
1996	741,424	
TOTAL	**3,508,517**	**311,285**
Grand Total	***3,819,802***	

Table No 2: IFRC Contributions to Chernobyl Programme, fin Swiss Francs,) 1992 - 1996.

4. FINDINGS OF THE MISSION

4.1. Meetings with authorities

The mission has had meeting with local and national authorities in all three countries. In Minsk, meetings were organised with Mr I. A. Kenik, Ministry of Chernobyl (a former Prime Minister of Belarus,) and with Dr N. A. Kosenko, Deputy Ministry of Health. Both praised the Federation for their support to the NS in the assistance to affected populations. Mr Kenik reminded that 1.8 million of Belarus people (almost 30% of the total country population) are still living in contaminated areas. The Cabinet is setting up a rehabilitation programme, taking into consideration soils, crops and people that looks very promising. Dr Kosenko described the structure of MoH's screening programme and the way they were working in a co-ordinated way with the different partners and centralised by the Special dispensaries. He admitted that the stress factor is a very important one for the understanding of the situation: "Psychological stress is the most destructive factor of Chernobyl, but we do not study it and we do not know how to tackle it", he said. Recognising the lack of structure and lack of trained staff to deal with this issue, he welcomed the mission's offer to look more closely into this issue.

4.2. Visits to the MDLs

Since one of the objectives of the mission was to review the condition of the laboratories, it was important to have direct contact with some of them. After a general revision carried out in 1995, in Kiev, the conditions of the vehicles seen is not that good. The heavy shield (1.5mt of lead) of the whole body monitor (WBM) has affected the structure of the van. It is clear that by western standards these vehicle should be replaced within a near future, however, several technical issues are to be considered before the replacement or the suspension of that service.

4.2.1. MDLs workload

Out of the six MDLs working, the mission was able to visit three, one in each republics at the following areas: Gomel in Belarus, Novozybkhov in Russian Federation and Start' Cello in Ukraine. In all three locations, the mission has been impressed by the level of attendance. Of course, it is out of question to assume that this is the case all the year round, but the planned figure of 50 patients checked per working day is consistent with the average number of exams performed per year for the last two years, 60,000 (50 patients x 6 MDLs x 200 days).

4.2.2. MDLs Staff

MDLs staff consists of up to eight people with various professional qualifications, namely: the driver, the WBM technician, the blood and urine analysts, the thyroid gland ultrasonic

scanner and doctors therapist and specialists such as endocrinologist, paediatrician among others. They can be either from the NS or from the MoH, but in both cases the work is co-ordinated with the health authorities through the Regional Special Dispensaries. Each time they are coming to some place, they are working in close collaboration with the local health service when it exists. In the places visited, the staff appeared competent, dedicated and motivated. The problem once mentioned of high turnover in the personnel seems to have been adequately addressed by a re-evaluation of wages. Since very few of the initial staff that started the programme in 1992 (and who were trained for that,) are still employed, regular on-going training of the MDL staff needs to be revived. A special budget has been made available for that in 1996 and the training should be implemented as soon as possible. It will be a unique opportunity for the staff of the six MDLs to meet at the same time and review technical matters and ways of better standardising the data collected.

4.2.3. Data collected

Analysis of the activities of the MDLs shows that it goes far beyond the search for disease specific to radiation exposure, and a complete check-up is provided to the population. As seen on table 6 "12 Month Medical Analysis, 1995" (See Annex 7.4.) MDLs help in identifying a whole range diseases and the need for treatment or medical reference for further investigation. Looking more closely at figures, it is interesting to see that out of a general total of 50,571 medical examinations, the first group is made of those patients (13,193) who have no precisely defined complaints as they cannot fit in one of the 14 groups identified. Second comes the group of symptoms from digestive origin with 8,338, then come the group of endocrinological system (7,445 cases) and the blood circulation (5,906). Since, these diagnosis were established according to the traditional lists of the FSU health system, it has to be interpreted within this system, in particular, the lack of differentiation between functional versus organic symptom is an important limitation. On the other hand, there is no clear case definition for all these groups of pathology, it is difficult to go further in the analysis of the data collected. This clearly demonstrates the need for the Ministries of Health to work out a list of diseases in accordance to international standards. However, one can question what percentage of these symptoms can be functional and therefore related to general malaise and chronic stress factors?

This brings the issue of the general health status of the population, adults as well as children. All along the interviews conducted by the mission, it was reported decreasing sometimes allegedly because of the accident, sometimes because of the general deterioration of the situation. On public health grounds, there is no reasons for the health status to remain the same if the general context is affected. It might be interesting to bring the complaints of the population in line with others indicators such as the dramatic increase in communicable diseases that resulted among others in outbreaks of poliomyelitis and diphtheria over the past two years.

4.2.4. Specific disorders from radiation

More specific among the health consequences of radioactivity are the thyroid gland cancer and what is called sometimes as "Chronic Radiation Sickness". The increase in the incidence rate of the thyroid gland cancer identified at the beginning of the 90's has been reported to the accident though the mechanism of this relationship remains yet to be defined. The three countries have been diversely affected by this disease, Belarus (and in particular Gomel Oblast,) being the worst affected. Apart from this cancer, thyroid gland is affected by the chronic lack of iodine in the diet of almost the entire population. As demonstrated by the

analysis of the data collected by the programme, in 1994 and 1995, (See table 7, in Annex 7.5.) quite a lot of cases present abnormalities. The most frequent is the hyperplasia related to an increase in the volume and activity of the gland so as to trap every single ion of iodine in the blood.

Although the programme is by no means a scientific one, it has collected significant amount of data during the last four years. The work carried out during the last two years can be summarised as follows:

	ADULTS		CHILDREN	
THYROID DISORDERS	**Adults 1994**	**Adults 1995**	**Children 1994**	**Children 1995**
Hyperplasia 1st stage	4,817(20.8%)	2,162(11.8%)	5.727 (19.2%)	6.426 (18.2%)
Hyperplasia 2nd stage	1,160(5.0%)	951(5.2%)	1,360 (4.6%)	2,839(8.0%)
Hyperplasia 3rd stage	124 (0.5%)	123 (0.7%)	44(0.1%)	186 (0.5%)
Hyperplasia Total	6,101 (26.4%)	3,236	7,131 (23.9%)	9,451(26.7%)
Thyroiditis	702 (3.0%)	772 (4.2%)	295 (1.0%)	321 (0.9%)
Hypoplasia	101 (0.4%)	145 (0.8%)	43(0.1%)	155 (0.4%)
Cysts	276 (1.2%)	432 (2.4%)	25(0.1%)	115(0.3%)
Nodular Goiter	1,211(5.2%)	1,116(6.1%)	138 (0.5%)	124 (0.4%)
Cancer				

Table No3: Summary of data collected on thyroid gland disorders, 1994 - 1995

The data have been collected in the six Oblast of the programme over two years. A major problem in the interpretation of these data is the impossibility to make any comparison either year after year or between Oblast as the places checked are not the same every years. However it is important to compare these with the results of IPHECA programme which shows that, except cancer, there is no significant increase in the thyroid pathologies. Figures are rather high, in particular first stage of hyperplasia (most of the time functional,) but this can be explain by the lack of iodine in the environment. Lessons to be drawn from this work include:

- The need to increase the screening for detection of thyroid cancer.
- The need to ensure timely and adequate implementation of referral decisions, mainly surgical treatment.
- The need to supplement the diet with iodine, iodination of salt might be considered.
- Considering the adaptation of the work of the MDLs toward more scientific work, making comparisons possible by developing a "sentinel" surveillance system, this

might be considered as a by-product as it is far beyond the objectives of a humanitarian programme.

4.2.5. Environment contamination

The measurements carried out by the MDLs teams include also the dosage of radioactivity in the environment, with the following equipment:

- MINICONT analyses alpha and beta radiation on the ground.
- MIRA 661 measures background gamma radiation, mainly due to Caesium, in milli Sievert per hour.
- LB200 to check the food for contamination, also by Caesium.

The results available so far show that the level of alpha and beta radiation indicates some contamination but not in excess, in any cases compatible with the results of the International Atomic Energy Agency published in 1991.

The MINICONT results are remarkably low all over the areas tested, and this is consistent with the dissemination of plutonium and strontium mainly inside the forbidden zone, the "Zona".

		1993			**1994**			**1995**	
MDL	No of tests	A	A+B	No of tests	A	A+B	No of tests	A	A+B
Gomel	1,320	0	2.0-300	1,007	0	3.0-60	652	0	5.0-170
Mogilev	1,004	0	2.0-120	1,575	0	2.0-50	1,014	0	2.0-200
Bryansk	-	-	-	228	0.1-0.7	1.0-90	745	0.2-0.8	5.0-19
Kursk,	1,808	0	2.0-40	2,769	0	2.0-50	754	0	2.0-200
Zhitomir	850	0.1-0.2 2	3.0-130	2,466	0	4.0-45	1,358	0	0
Rovno	682	0	4.0-110	1,935	0.1-0.3	2.0-20	1,678	0.1-2.0	2.0-75
Total	5,664			9,980			6,201		

Table No4 : MINICONT Results 1993 - 1995, in the six Oblast of the programme

The results of the gamma radiation measurements in the environment are as follows:

	Gomel		**Mogilev**		**Bryansk**		**Kursk**		**Zhitomir**		**Rovno**	
Year	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
1992	0,08	1,3	0,07	0,32	0,08	0,91	0,09	0,23	0,07	1,2	0,06	0,73
1993	0,06	2,2	0,07	0,25	0,06	0,23	0,09	0,23	0,07	2,3	0,04	0,52
1994	0,06	1,58	0,07	0,25	0,06	0,84	0,07	0,19	0,07	0,246	0,04	0,48
1995	0,06	0,9	0,07	0,55	0,05	0,96	0,06	0,17	0,07	0,99	0,04	0,52

Table No5 : MIRA Results in mSV/h 1992 - 7995, in the six Oblast of the programme.

Similarly the food monitoring shows discrepancies between the regions and the years, but taking into consideration the current knowledge on the "small doses effects", the overall values do not seem to represent a major health hazards. Although everything must be done to ensure safe food to everybody, one must also take into consideration the need for these people to produce their own foodstuff and further develop their self sustainability. There is among the population a widespread belief that food and environment must be totally free from radiation. This might be due to the severity of doses limits set by the authorities in the immediate aftermath of the disaster and to certain confusion between norms for normal situations and reference for accident situations. At that time, this severity was probably a wise and relevant decision; but after ten years one may question whether it does not create more trouble than it actually solve them? It adds to the psychological burden of local communities who are asked to ban from their diet wild food stuff that they were usually using. Therefore their diet is eventually poorer than it was before... A careful monitoring of the places where these food items are picked up help in selecting safe areas.

Given the uneven distribution of the contamination, one might question the distribution of MDLs according to level of contamination? As clearly illustrated with the IAEA maps, the areas most contaminated are located in Belarus and Ukraine. In Russian Federation, the reallocation of one MDL in Russia might be considered. It might be either the transfer from one Oblast (Kursk) to another in the same country or to another republic. The objection against reallocating in another Oblast of the Russian Federation, is the fact that the contamination is rather low in that country and the Oblast of Tusia is already covered by the MDL from the Obninsk Centre. This major re-orientation might be perceived negatively as initially the three NSs were supposed to be treated in the same way. However, the mission thinks that this question must be addressed by the ICCC.

4.2.6. Involvement of National Societies

This was an important recommendation from the Kiev Symposium. Unfortunately it was not as successfully implemented as expected. Many reasons can be put forward to explain this lack of result. Clearly, the continuing deterioration of the condition in the FSU plays a major role. During the last two years, the three NSs have witnessed major setback in their programmes and significant reductions in the number of staff have been reported. It is of utmost importance to reverse this declining trend and the NSs with the assistance of the Federation are clearly committed to this objective. The Chernobyl Humanitarian Assistance and Rehabilitation Programme offers a unique chance to the NSs to demonstrate their expertise and to develop their image. Investing in psycho-social programme through the visiting nurses might offer the best opportunity since long to further increase the positive impact of the programme in the affected communities, the mission recommends such approach (see below). All opportunities should be seized to further increase the involvement and support of the NSs to the programme, with an ultimate objective of self sustainability.

5. RECOMMENDATIONS

During the period of ten years of this post disaster situation, incredible wealth of knowledge and experience has been accumulated in technical departments but also among humanitarian organisations. Consensus is far from being reached among all parties in these interventions, but the debate goes sometimes much further beyond the scope of the mission. The following recommendations are based on a cost effectiveness analysis and take into account the part of this knowledge which is most relevant to the Federation's action. This action can be defined as *"to make everything possible to alleviate the suffering of people made more vulnerable by the accident and the subsequent collapse of the FSU"*. First and foremost, it appeared to the mission that the central concept of the programme (collection of data with immediate feedback to the person checked,) remains valid and should not be drastically altered, the following adaptations are proposed for areas already covered by the programme.

The recommendations listed hereafter are in line with the mandate of a humanitarian organisation, committed to address unmet needs and not to duplicate other NGOs' operations or the role of Ministries of Health. Four major areas of intervention can be identified.

5.1. Detection of thyroid cancer in children

During the last three years, a significant increase in the number of thyroid cancers gland in children was demonstrated in the regions affected by the fall out of the accident. Although most of these cancer appeared to be very invasive, the management of such cancer is well defined and very effective when initiated early. Hospital facilities in the three republics exist to provide adequate treatment to these children, the gap is in the detection. Therefore, the screening for detection of thyroid gland cancer among children, already part of the Programme, must be increased.

More ultra sonic scans should be made available in the affected areas, so that any child could be checked once a year. Taking into consideration the cost of the hard ware and the availability of personnel who can be trained in this technique, on the one hand, the fact that such an equipment with its limited staff can be easily transported from one dispensary to another in light vehicle, the mission recommends that such equipment should be made available at the branch level and arrangements to be found with local health authorities to

provide transport to the most remote areas. One scanner is already functioning in each Oblast, a minimum of two more should be added per Oblast to get closer to the potential patients.

Transport appears to be a weak link in the system currently operating. The mission was told that families do not regularly attend referral clinics and sometimes they cannot afford the price of bus or train tickets to the hospital where treatment will take place. It is of utmost importance to advocate for transport facilities to be provided to the families of children diagnosed with the disease so that adequate treatment can be ensured in due course. Authorities should establish a clear policy for priority transportation of the diagnosed patients to the referral level, so as to ensure proper follow-up.

5.2. Control of radioactivity levels

5.2.1. *Alpha and beta radioactivity*

Uneven radioactive contamination affects thousands of square kilometres. As shown by the series of measurements done by the teams, alpha and beta doses seem to decrease and remain within acceptable levels. The mission has identified the issue of the severity of the limits set by the authorities. It is not in the mission's mandate to recommend the revision of such limits but it is strongly advised to reconsider the strategy of dosage of the radioactivity within the programme.

Since alpha and beta rays are specific from radionuclides such as plutonium and strontium known to be limited to the forbidden zone, measurements of these dosages should not be kept as part of the regular programme. Monitoring of radioactivity should focus exclusively on gamma rays (^{137}Caesium) and in some specific areas, to be determined either based on the high levels identified previously or the existence of a cluster of specific diseases such as thyroid gland cancers. Co-ordination with the relevant health authorities at Oblast level must be reinforced so that adequate planning of the measurements is ensured.

Further training of the staff was recommended in the October 1993 Evaluation Report. It should be pursued, focusing on technical information and the best way to make it available to local communities. Co-ordination with the specific training programme for the visiting nurses might appear critical to standardise the information delivered to the community from various sources. Updating of the content of the booklet should be considered before printing a new batch.

5.2.2. *Mobile diagnostic Laboratories*

Condition of the MDL appears to be a source of concern as they are getting old. The mission is concerned with the long term sustainability of the programme as the monitoring of the cases might be still needed for some time. Therefore, the mission is thinking that as such these vehicles should be maintained so as to continue their work of measuring gamma radiation attributable to Caesium for at least one year or, best, till the end of 1997. The phasing out of this equipment should go together with the increase in the detection of thyroid gland cancers. On the other hand, it is important to realise that these laboratories have brought to the NS's unique expertise that might be used in case of another nuclear accident in the FSU. It is a unique asset for organisatinos in the context of FSU that should not be overlooked. It appears therefore of crificial importance to maintain this expertise. The staff must be kept with a sufficient level of training and the equipment must be maintained as much as possible. The MDL's as they are now must be maintained and four of them must be kept on duty, the two remaining ones becoming reserve of spare parts when needed. The staff of these two vans should be assigned in priority to the "New MDL's" described hereafter. It is suggested that the

ICCC should include in the agenda of one of their meetings the discussion of such issues. Further details can be provided on request.

5.2.3. Development of new MDL's

The budget saved by this new orientation should be invested into the new mobile units. These units could be developed on the basis of the following equipment:

- A light vehicle such as a Volskwagen/Toyota van transporting both the staff and the equipment so as to ensure mobility.
- An ultrasonic scan, with a printer and 2 probes, for the detection of nodules in the thyroid .
- The blood and urine analysis equipment.
- A labtop computer to collect the data immediately and allow their processing later.
- A staff of six to seven people should be able to run this equipment on a fully autonomous basis as it is the case now.

In order to cover adequately the needs a minimum of two of these light diagnosis units should be made added to the MDLs already working in Belarus and Ukraine, and one for Russian Federation, far less affected than the other two republics. Technically, it is fully possible to consider the MDLs to become one after the other reserves for spare parts once the are grounded to a halt. It must be made clear that they must be deployed according to the needs.

5.2.4. Food distribution Programme

Distribution of milk powder to children institutions can be pursued as long as it is supported by external assistance. The distribution of micro-nutrients can be as well continued as it complement a depleted diet in these component. Careful attention should be paid to the distribution of multivitamins, few vitamins (A, c and D,) in adequate quantities are much better than all the vitamins in insufficient quantities. The later would provide a false feeling of confidence "as the needs are covered by the pills" when they are not.

5.3. Psycho-social programme

In the state of confusion currently experienced by most of the populations met during the mission, decision making process is extremely difficult and sometimes inadequate, therefore the actual rehabilitation is delayed. It is important to realise that this important stage of the disaster management process requires full use of the potential of affected communities. The aim of any psycho-social programme is to restore self confidence in the community and make them able to take appropriate decisions based on relevant information.

Radiation issues are so complex that anybody who is not a specialist can get lost and confused, when it comes to simple questions such as: Is this environment so contaminated that it can affect my children's health? Is this food safe? Is this pain, headache or fatigue related with radioactivity? Moreover, numerous interest groups make the picture even more confused by spreading alarmist, or on the contrary overoptimistic rumours. It is therefore of critical importance to develop an "education to the information" programme so as to make this information simple, clear, useful and easy to implement for the community. Should they be willing to revive Visiting Nurses as messengers for this programme, NSs may easily have both the network and the manpower to implement such a programme. What is needed is the content: basic, simple and reliable information on the health effects of radioactivity, how to monitor it and how to develop coping mechanisms among the communities. During the last

five years, the RC programme, together with other scientific programmes, has collected data that can help in developing answers to those questions. The mission got clear signals from Ministries that this was a timely initiative for the tenth anniversary of the accident.

Given the scarcity of resources available in the countries, it is of utmost importance to make the best use of the available resources. In all three NSs, there is or has been an important network of visiting nurses (VNP). This programme has suffered from a bad image and a lack of support from authorities. Because of the socio-economic changes, the needs are increasing but the number of visiting nurses has dramatically decreased. However, there is still a potential for the recruitment of new nurses and developing a broader training; initial funding should come from abroad, as this has been the case during few years. Participating NSs should condition their support to a re-orientation of the VNP and deadlines for the development of self sustainability. This would make a perfect link with long term development programmes.

5.4. Long term sustainability

In October 1993, the previous evaluation mission recommended to increase the 3 ONSs" participation in funding & running the programme, and to try to achieve over a period of two years the transfer of the programme. This has not been possible for various reasons, among which the continuously decreased level of the resources of these NSs has been a key factor.
However, the ultimate goal must remain the long term sustainability of the programme. The emergency phase is over, less and less resources are likely to be mobilised but enormous needs still remain. If the monitoring of radioactivity is likely to decrease, detection of cases and continuous monitoring of blood will be carried on for a while. NSs must develop strategies aiming at making best use of their limited resources whether they are internal or coming from abroad. It is time to demonstrate their specificity: meeting needs that would have remain unmet otherwise, and to get support from the local authorities for the service provided. The above psycho-social programme seems to be of great interest in this regard.

Given its structure, the International Federation of Red Cross and Red Crescent Societies, should advocate in international forum as well as at local level for the continuous support to the victims of the Chernobyl accident. This support must be adapted to the progress made by the affected communities toward their rehabilitation. A limited number of dedicated agencies, that co-ordinate their efforts with ministries and other relevant bodies, could make a significant contribution to this goal. The Federation could take a leading role in this regard.

6. CONCLUSION

Ten years after its onset, the disaster of Chernobyl remains in the focus of fierce debate, far more than what one could expect after a technological accident. Its impact has been reinforced by the collapse of the political and economical system that was ruling the country. The management of the long term consequences is affected by these political changes and this is the reason why humanitarian organisations could play a role in assisting affected communities.

As in any disaster, most of the assistance comes from within the affected communities themselves. In this particular case, quite a lot of technical information has to be made available to these communities making it possible for them to understand the mechanisms at work and ultimately become more able to interpret and act upon them. Deteriorating trends in the affected communities must be reversed, and this may only be done through the combination of several actions. In order to achieve the above and restore self-confidence in the affected communities, serious handicaps must be overcome on both sides.

Given its mandate and its fundamental principles, the Red Cross Movement has strategic advantages to be a major actor in this situation. Its independence and neutrality, together with its grassroots network of volunteers committed to alleviating suffering of the most vulnerable, make it particularly adapted to stand up against this challenge. Involved since the beginning in delivering assistance to the affected villages, the Red Cross Movement has gained recognition and credibility in all the three republics. In 1991, it demonstrated its capacity to adapt to changing circumstances and managed to develop a new approach for specific assistance, more than ever it must be ready to re adapt again, when needed. Its twofold approach is a major asset.

National resource, through the commitment of NSs, proved to be critical. Even though these NSs are badly affected by the socio-economical turmoil, they remain a unique potential to disseminate information and initiate action. Visiting nurses and trained volunteers are to be revived with adapted terms of reference, specific objectives and adequate means. On the other hand, the Federation by its international network of NSs ready to provide support when needed has already proved to be reliable when it comes to technical and material assistance. Long term commitment is needed, as demonstrated by the past ten years. The challenge ahead

of us is to learn how to restore life quality for the hundreds of thousands whose life have been badly affected by the accident and its follow-up.

Successful management of the consequences of Chernobyl accident is one of the most challenging programmes ever undertaken by the RC Movement. New knowledge and experience must be gained during the process. Health of children and adults will be at the centre of our concern. Key issues, such as access to reliable information in highly technical areas, presented in an understandable manor,, development of new skills and capitalising on experience, are solutions that partly meet the needs created by the worst technological disaster on record. Whether we want to take this challenge or not is a decision that relies upon us.

7. ANNEXES

7.6. AGENDA OF THE MISSION

16.02. * Meeting Professor Pellerin in Munich.
Travel to **Minsk.** Meeting with Gill Men, Relief Administration Delegate & Ben Hofman, HoDelegation.

17.02. * **Minsk,** Delegation new office, meeting with Dr Alexander Komov (Medical Coordinator for Chernobyl Programme)

18.02. * **Minsk,** meeting at the office, working on file, presentation on the April, 1986 Chernobyl accident, by Professor Pellerin.

19.02. * **Minsk,** meeting with Mr Kenik, Ministry of Chernobyl, and Dr Nikolai Kosenko, Dep. Ministry of Health. Afternoon, travel to Gomel.

20.02. * **Gomel,** visit of the MDL working in a school of the city, technical discussion with the MDL staff. Meeting with Vladimir S. Vorobey, Director for Health, Gomel Oblast, and Dr Vadim Kot, Director in charge for the Gomel Regional Specialised Dispensary.
Visit to the evacuated village of **Lipa** in the highly contaminated zone.

21.02. * **Novosipko** (Russian Federation) Meeting with Mr Nikolai Manuelova, Briansk RC Branch Chairman, Ms Liubov Muravyova, Novosibko RC Branch Chairlady, Dr Vitali Todorof, Dep. Direct, of Briansk Specialised Dispensary.
Visit to Briansk MDL working in a village.
Return to Gomel, Meeting with Gomel RC Branch, re VNP.

22.02. * Travel day from Gomel to **Rokitno** (Ukraine, Rovno Region,) meeting with Mr Nikolai Miskov, Head of the Rokitno City Administration.

23.02. * **Rokitno,** Meeting with "Spotlight" team, travel to **Staroe-Selo,** meeting with local authorities, visit of the MDL. Travel to Rovno.

24.02. * **Rovno,** meeting, for technical discussions, with Dr Alexander Komov, Yvan Nikiforuk, from MDL Staff. Travel to Kiev.

25.02. * **Kiev,** drafting mission report.

26.02. * **Kiev,** Meeting with Ukrainian RC, President Dr Ivan Usichenko, Vice-President Ms Alia N. Khabarova and Anatoly D. Zagrebel'Ny, Head of Humanitarian Dept. Travel back to **Geneva.**

7.5. LIST OF BACKGROUND MATERIALS

7.5.1. Red Cross materials

- Report of the Evaluation mission, October 1993; Prof. Harriet Dige Pedersen,

- Report on "The Red Cross Chernobyl Humanitarian Assistance and Rehabilitation Programme", Michael Behr, Thomas Scorer, March 1994.

- "Final Operation Report, Humanitarian Aid to those affected by the Chernobyl Nuclear Power Plant Disaster in Belarus, Ukraine and the Russian Federation", ECHO/RUS/B7- 510/93/2701, Geneva, October 1994.

- "Chernobyl Humanitarian Assistance & Rehabilitation Programme," Federation Emergency Appeal 1996, (Pp 187 - 1990)

7.5.2. UN and UN Related materials

- "The International Chernobyl Project, an overview" Assessment of Radiological Consequences and Evaluation of Protectives measures, Report by an International Avisory Commute"; International Agency for Atomic Energy, Vienna, 1991.

- DHA News, Focus on Chernobyl, "No visible end to the menace." DHA Geneva: September/October 1995

- Health Consequences of the Chernobyl Accident" Results of the IPHECA Pilot projects and related national programmes, Summary Report, WHO Geneva, 1995.

7.5.3. Others.

- Sasakawa Memorial Health Foundation, Reports on the Chernobyl Sasakawa Project, workshops in Mogilev (June 1992) and Moscow (June -July 1993)

- "Ablaze, the Story of Chernobyl", Piers Paul Reads; Martin Seeker & Warburg Ltd, 1993, (London)

- "Chernobyl, One Year After", Mike Edwards, Steve Raymer, Pierre Mion, in National Geographic Magazine, May 1987 (Pp 632 - 653).

- "Chornobyl, living with the monster", Mike Edwrads, Gerd Ludwig, in National Geographic Magazine, August 1994 (Pp 100 - 115).