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Mid-Term Evaluation Report
of the UNDP Project Rus/95/004 -
"Water Quality Evaluation and Prediction in the Areas Affected by the Chernobyl Accident (Bryanskaya Oblast)".

I. EXECUTIVE SUMMARY

This Report has been prepared in accordance with the "Terms of Reference of Project Implementation Evaluation," given to the Implementing Agency by the UNDP Country Office in the Russian Federation. The Report utilizes information and analysis from the following documents:

- The Project Document (including its Budget in initial and revised version G),
- Project files,
- Project Field Study Reports,
- Mission reports drafted by project staff,
- Monitoring visit report provided by UNDP project officers,
- Annual reports prepared by the Implementing Institutions,
- Field survey and monitoring data at the territory under consideration,
- Information on the Project by National Project Coordinator,
- National and international experts' Reports,
- "Outlines for Preparation of Evaluation Report",

The Report also incorporates the results of interviews conducted with the following individuals and project personnel:
Dr. V.T. Dubinchuk, project coordinator; Eng. E.V. Lebedeva, project secretary; Dr. S.M. Vakulovsky, Deputy Director of the Institute of Experimental Meteorology of NPO "Tajfun" and responsible implementor

for "Surface water"; V.A. Polyakov, Head of Isotope and Nuclear Physics Laboratory of VSEGINGEO and responsible implementor for "Ground water; Dr. V.V. Gudzenko, international (CTS) expert; Drs. M.A. Khordikainen and S.B. Gogol, national experts; PhD. A.E. Tkachenko and N.V. Pyatnitsky, project implementors; direct and indirect beneficiaries at the local and federal levels; and others.

The following indicators were taken into account in terms of project performance:

a) obtaining diagnostic and prognostic information of the radiological effects of the Chernobyl accident in relation to surface and ground water systems, and the development of recommendations to national authorities at the federal and regional levels (scientific forecasts, field study reports, general reports);
b) improvement of the monitoring methodology;
c) increasing the radiological safety of water supplied to the population of Bryanskaya Oblast in terms of radionuclide contents.

The Project Evaluation Information Sheet (PETS) is attached to Evaluation Report.

The project evaluation focussed on the following main points:

(a) Relevance of the project (approach, objectives, modalities of implementation, etc) with regard to the prevailing context;
(b) The interim results with regard to the indicators;
(c) The effectiveness of the approach being used to produce the results;
(d) The efficiency of project management, including the delivery of inputs in terms of quality, quantity and timeliness; and the monitoring system;
(e) The transfer of capacity to the local institutions;
(f) The views of the direct beneficiaries on the preliminary outcomes and on the consultative process being used to implement the project.

Particular attention was paid to the assessment on the **national execution modality** of the project, especially the **impact** on:

(a) the assisted institutions and its staff, and (
b) the end-users, including specific groups.

This UNDP project addresses a serious concern of the Russian Government and is intended to support Government *efforts* in solving the problem of water resource protection in the Bryansk Region. The western part of the this Region was exposed to radioactive contamination during the Chernobyl accident.

The general (strategic) goal of the project is to evaluate the radiological status of the surface and ground waters that have been exposed to severe radio-nuclide contamination in the Bryanskaya Oblast in order to develop a forecast of possible radio ecological impacts and changes in the future.

The **immediate objectives** and **outputs** listed in the Project Document are as follows:

Immediate objective 1: To evaluate the quality of water resources and levels of their contamination by radio-nuclides in the areas affected by the Chernobyl accident (West Part of Bryanskaya Oblast).
Output 1: Report on water quality and levels of contamination by radio-nuclides.

Immediate objective 2: To forecast changes of water quality in terms of radio-nuclide content in surface and ground water (used or to be used for various aims - drinking water supply, recreation, industrial use) and degree of their possible contamination.
Output 2.1: Reports on key characteristics that determine the transport and contents of radio-nuclides in surface and ground waters as well as on water quality forecasts in terms of radio-nuclide content in these waters on local and regional levels. **Output** 2.2: Reports on water quality forecasts in terms of radio-nuclides content in surface and ground water on local and regional levels.

Immediate objective 3: To prepare recommendations to ensure radio-ecological safety of water supply in contaminated areas and protective measures to reduce the radiation risk and ensure sustainable water supply sources.
Output 3.1: A set of recommendations based on the results of the above mentioned reports.

As a result of surveying and monitoring actions carried out within the project activity in 1997 and 1998, some typical water objects were sampled and analyzed to determine contents of natural isotopes and Chernobyl radio-nuclides in water and soil samples. New water samples were found to contain Chernobyl radio-nuclides in areas with surface contamination density from 1 to 100 Ci/km^2 by Cs-137 and from 1 to 10 Ci/km^2 by Sr-90.

The existing monitoring and survey network of surface and subsurface observation points was analyzed using existing and new information. Elaboration of recommendations to improve and extend the network call for the establishment of additional observation points within the main surface and subsurface water bodies. The network was modernized using these recommendations.

Field monitoring and surveying expeditions were conducted over the modernized observation network in Bryanskaya Oblast, especially by NPO "Tajfun" in 1998, VSEGINGEO and GGP "Bryanskgeologia" in 1997 and 1998. More than 100 observation points in the 10,000 km^2 area were sampled and more than 700 samples of soils, sediments, biota, and the surface and ground water (of main exploited horizons) were collected. These samples are in the process of being analyzed for their chemical, natural isotopes, and Chernobyl radio-nuclides content. Only half of the samples taken had been analyzed when this report was submitted. The analytical and field observation

results are currently being intensively processed and interpreted.

New data obtained during project implementation allowed the team to make a preliminary conclusion on the existance of Chernobyl radio-nuclides in surface and shallow ground water-bearing horizon. Moreover, the radio-nuclides are being detected in deeper aquifers. Registered data on the radio-nuclides content demonstrates unstable trends which reveal both positive and negative indicators. These trends are to be thoroughly studied on the further project stages to determine an adequate spatio-temporal model. Intense variability of soil and water radio-nuclide contamination in the research areas has also been revealed. Radio-nuclide content depends on surface contamination density, hydrological, hydrogeological, geochemical, landscape and geomorphologic conditions as well as on the man-caused environmental impact (chemical contamination, water resources exploitation, watering/dewatering, etc.). These and other preliminary project findings are to be further studied and ascertained.

It has been concluded that the main project implementation strategy is correct and is allowing the project to achieve its goals.

In general, this project evaluation of the implementation strategy creates the impression that it will be successful for the Government and UNDP efforts, as well as for regional, national and international beneficiaries which were determined at the project design stage.

II. PROJECT CONCEPT AND DESIGN.

A. Context of the project

1. The UNDP and Government project concept, design and institutional arrangements were appropriate at the time when they were approved. This evaluation concludes that they are still valid for the purpose of enhancing national capacity in addressing the problems related to sustainability of water use in the area most affected by the Chernobyl accident.

2. Consideration of the macro-economic policy framework was not applicable to the above project context.

3. The goals and objectives of the project are in agreement with and support national sector (Monitoring of the Environment; Water Resource Monitoring, Protection and Management; Geological Medium Monitoring) and sub-sector (Federal post-Chernobyl Programme) policies. These goals and objectives are focussed on providing assistance to analyze the region's water supply and support the environmental protection authorities in the implementation of their plans.

4. It was initially expected that the UNDP project could be supported by additional resources from the UNESCO and IAEA Chernobyl programmes. Unfortunately, this has not been the case. IAEA is only providing assistance for the recruitment of international experts/consultants and fellowships/training. Nevertheless, these

international Agencies participated in the co-ordination and formulation of the project.

5. The project fits well with the UNDP's comparative advantage of being completely involved in the solution of acute environmental problems and natural resources management. It is also devoted to transferring modern nuclear technologies for as a contribution to addressing this regional environmental problem. Female professionals (hydrologists, hydrogeologists, radioecologists and others) are actively involved in project implementation.

6. Two governmental bodies, the Federal Service for Hydrometeorology and Environment Monitoring (Roshydromet) and the Ministry of Mineral Resources ((MPR), former Roskomnedra) and the Ministry of the External Economic Relations (MVES) were involved in the drafting of the project document. The document was endorsed and supported at the national level by the National Committee of the RF for the International Hydrological Programme (NCIHP), Federal Ecological Committee (Goscomecologia), and Ministry of the Emergency Situation (MChES).

7. The project document clearly identifies the problem the project is intended to solve. The implementation of the project will assist in the assessment of the current status, and in the prediction of possible water quality changes caused by the severe regional radioactive contamination as well as in the preparation of the strategy/programme to provide a safe and sustainable water supply. This problem is of both national and international importance.

8. The major project assumptions were specified (water consumption situation, environment conditions on the territory, scale of the surface radio-nuclide contamination density distribution, main water objects to be investigated, methodological and technological infrastructure that existed and what was required, difficulties to be overcome, etc.) and the risks of implementation were recognized. It was stated that no essential risks were foreseen.

9. Two basic project strategies were identified following extensive diagnostic and prognostic analyses:

a) the classic approach using routine hydrological, hydrogeological and radiological methods, and

b) the modern radiological approach that uses technologies based on environmental indicators (environmental isotopes - deuterium, oxigen-18, tritium, as well as Chernobyl radionuclides themselves) developed by the

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Implementing Agencies during their post-Chernobyl activities. Added to this are those developed under sponsorship of and recommended by the IAEA (isotope hydrology methods, radionuclides transfer modelling and so on). Additional aspects of the project strategy were to balance existing needs and

available financial resources with their optimal distribution between the budget lines.

10. The institutional capabilities of the organizations were thoroughly assessed and the recipient institutions were selected as a result of this assessment. NPO " Tajfun" and VSEGINGEO, and their regional counterparts, were selected because they were the most experienced and qualified to carry out such complex work. The project area is also well known to them from a radiological, hydrological, and hydrogeological point of view.
11. The users of project outputs (Bryansk regional Administration, water resources and sanitary authorities, agriculture and forest services, and some others) were identified and involved in the design of the project. These users also participate in the consultative activities employed by the Implementing Agencies.
12. Females with the appropriate PhD credentials and technician expertise were identified and involved in project implementation.
13. The capacity building component is one of the main focus of the project.
14. Implications of the country structural adjustment programme were not applicable to the above project context.
15. The logical framework of the project document clearly describes the project objectives and outputs in verifiable and quantifiable terms. The phasing of the project activities and inputs was realistic.
16. The project document clearly identifies the project objectives and outputs in verifiable and quantifiable terms. All activities planned are provided with time allocations, related responsibilities, the required actions concerning the recruitment of experts, personnel training, etc. A monitoring mechanism for the tracking of major project milestones was outlined in the Project Document and developed in the Work Plans. Some difficulties developed when it was time to organize the fieldwork because the amount and level of work were underestimated at the project design stage. These difficulties were overcome by revising the budget and activities in a timely manner. These lessons learned with be applied to the field expeditions of 1999 and 2000. It is anticipated that some financial provisions/adjustments will be required for strengthening the field work and comprehensive prognostic modeling in future project stages.
17. The general work plan was included in the Project Document with more detailed planning included in the Annual Work Plans and in Field Work Plans. These plans were realistic.

III. **PROJECT IMPLEMENTATION**

A. **Activities**

18. Implementation of the main activities was carried out according to the initial Project Document and its schedule. There were some 10 to 15 day shifts in some field work actions because of technical and financial reasons.

19. All the parties (UNDP, Roshydromet, MPR and Bryansk regional authorities) were in full agreement regarding the main project implementation issues. Fieldwork plans of the hydrogeological regional counterparts (GGP " Bryanskgeologia") are agreed and co-ordinated with VSEGINGEO. The Field Work Plans of NPO " Tajfun" and VSEGINGEO were dovetailed to each other and well coordinated. The Executing Agency (Roshydromet) and Implemeting Agency (NPO "Tayfun") should make additional efforts to achieve better and more active involvement of local hydrologists/hydrogeologists working with the Bryansk Centre for Meteorology and Environmental Monitoring.

20. Activities implemented to date include:

-field expeditions in the contaminated area were undertaken to monitor the radiological state of natural waters, and

-analytical service bases were strengthened following the delivering of devices for radio-nuclide measurements in water and soil samples. The total amount spent for this is about US$50 000 from the UNDP budget and about Rbl 400 000 (ÚS$60 000) of the Government contribution. These were very modest expenses for the project. The effectiveness of the project work has been increased from a quantitative (more productive measurements) and from a qualitative (higher sensitivity and accuracy) points of view. The cost spent is realistic. Nevertheless, there is an additional need for equipment, especially field equipment and personal computers.

21. Several basic strategies emerged once project implementation began:

getting information about the radio-ecological status of water sources and their vulnerability to severe regional contamination for such wide territory.

interpretation of the obtained data to extract key parameters with respect to ways and dynamics of the radio-nuclides penetration and removal (if any) in natural water systems, especially in sources of drinking water. This is done with a view of possible rehabilitation and protection measures of the contaminated areas to avoid or exclude further radiological population impact.

The scarcity of general and specific information precipitated the need to use more adequate prognostic models for such a big territory and for typical water bodies.

One innovative approach was created with the widening of the monitoring network and in the use of tritium water content as anticipatory indicator for the assessment of water vulnerability of man-caused contamination as an enhanced methodology.

This idea is based on very important finding within the project: the more

environmental tritium content in an object sampled the more Chernobyl radionuclide content is observed in it.

The Government is interested in evaluating the water vulnerability of radio-nuclides and other contaminants on the territory. In this light, the development of methodology for the radio-ecological assessment of the drinking water sources vulnerability to the technogenic contamination impact using Chernobyl radionuclides is truly innovative work. In general, the developed project strategy reflects the Government policies and the results are expected to be applied to other contaminated areas.

22. Both governmental bodies, Roshydromet and MPR, demonstrated their commitment to the project by contributing qualified counterpart personnel, premises, and analytical services. The financial support of the Executing and Implementing Agencies should be strengthen and become more complete and regular. This is a concern of the regional project counterparts. The general political support at the Government, ministerial and regional authority levels was demonstrated.

23. The implementation of the project was managed by experienced national staff members. They are fully able to continue the management of the project upon its termination and reaching the established goals.

24. There have been no institutional changes or staff turnovers during the first implementation stage of the project.

25. The project implementation is linked to mainstream activities of the responsible agencies (Roshydromet and MPR) by involving their leading institutions in project implementation. It should be emphasized that NPO "Tajfun" and VSEGINGEO are responsible institutions not only for the project implementation but also for solving the same problems at the Federal level.

26. The project was administratively and financially well managed. The project management is the responsibility of the National Project Director, Dr. Yu. S. Tsaturov, the First Deputy Head of Roshydromet; and the National Project Coordinator, Dr. V.T. Dubinchuk, Leading Scientist of VSEGINGEO. They are working in the close cooperation with the Authorities of each Implementing Agencies, i.e. Director General of NPO "Tajfun", Dr. A.D. Orlyansky, and Director of VSEGINGEO, Acad. G.S. Vartanyan. They are also the Implementors nominated by the Authorities of the Implementing Agencies for "Surface waters" - Deputy Director of the Institute of Experimental Meteorology, Dr. S.M. Vakulovsky (NPO " Tajfun") and responsible for "Ground waters", Head of Laboratory on Isotope & Nuclear Methods of VSEGINGEO, Dr. V.A. Polyakov. All these people are well known professionals and managers that actively participated in the post-Chernobyl actions.

27. The funds distributed between the project items were transparent and there were no gaps for their leakage. There were no cost overruns or other financial difficulties that hindered implementation.

28. Limitation of Government funds for the Chernobyl problem, in general, and for

environmental projects, in particular, reduces the possibility of more intensive field monitoring work.

29. National and international scientific expertise has been accumulated and disseminated among the institutions and individual consultants involved in project implementation. The methodology and technology developed and used by the Implementing Agencies (VSEGINGEO, NPO "Taifun") has been transferred to the regional organizations and their staff. For instance, the multi tracer technology was brought over to GGP "Bryanskgeologia" to be used at the polygon "Demenka". Certain methodological approaches developed and recommended by IAEA (for example, see IAEA TECDOC-713 concerning nuclear techniques in pollutant transport study, results of the international programme VAMP) were actively used by VSEGINGEO and NPO "Tayfun". This materials has allowed to increase the project counterparts expertise and ability to carry out field work and field monitoring.

30. The training of project personnel was performed at the national and international level. The first one was realized by using "on job training" techniques or "post graduated" teaching. The second one was conducted in assistance with the IAEA. Two persons, including one woman, were successfully trained at the International Training

Courses on Isotope Hydrology. One engineer was individually trained in the Isotope Laboratory of the IAEA on modem isotope measurements as well as on Isotope Hydrology. The woman is one of the senior project researchers, and the man was a senior engineer implementing tritium low level measurements in water samples. 31. The equipment (gamma-spectrometer, beta-counter, alpha-radiometer and PC), provided under the project were appropriate. Spare parts were also purchased. The equipment is now in daily and effective use. This equipment is planned to be used about 5-6 years.

32. Internal monitoring and evaluation of the project took place through regular meetings of senior staff and technical personnel briefings. This was bolstered by oral reports to the National Project Director and through day-to-day control by the National Project Coordinator and the Project Secretary. This project monitoring system seems to be effective and an adequate one.

33. The local UNDP office carried out in-depth external evaluations of project implementation (December, 1997, 1998). Quarterly financial and periodic written and oral reports were presented to the UNDP project officer. These internal monitoring and evaluation systems promote successful project implementation. This Report provides the first in-depth external evaluation.

34. The first Tripartite Review Meeting of the project with participating representatives of the Government, Executive and Implementing Agencies, UNDP and Co-operating Agency (IAEA) is planned to be held in April 1999.

35. Complementary support to the project was provided by the IAEA in the form of recruiting international experts, fellowships and training for project personnel at the cost of funds provided by UNDP for the project. The IAEA was involved in discussions on the methodology and general project policy related to the problem of radioecology

of the environment. These were a useful support to the UNDP project. A contact between the Project Authorities and The Chernobyl Desk of the Geneva UNO Stabquarters has been established.

IV. PROJECT RESULTS

A. Relevance

36. The purpose, approach, modality of execution and the selected recipient institutions are still relevant in the current context.

B. Efficiency

37. The project was well managed and implemented with regard to personnel, training, equipment, and the Government contribution.

C. Outputs

38. The main outputs produced by the project, at the stage under review, are the following:

- analysis of the existing (recently published by other organizations and received by implementors) information on water quality and the degree of water contamination by radionuclides within project and neighbouring territories. It was concluded that a big deficit of information exists on the regional dynamics in radio-nuclides transfer in the environment water system and geological media. Concerning the mechanism and parameters of such a transfer, a circle of additional data needed was drawn and field

investigation plans were made more adequate (objective I, output 1.1, activity 1.1.1; NPO "Tajfun", VSEGINGEO, GGP "Bryanskgeologia' ; national expert - Dr. Khardikainen).

- state of the art analysis of the existing monitoring network was made, a set of new (about 50) monitoring points (lakes, rivers, springs, dug-wells; drilled, exploited and regime wells for the main aquifers) were selected and used, two experimental polygons ("Kozhany" - hydrological-hydrogeological one, - "Demenka" - hydrogeological-hydrological one) were organised and used for more detailed observations of radio-nuclides transfer in typical hydrological and hydrogeological conditions (objective I, output 1.1, activity 1.1.2; VSEGINGEO, GGP "Bryanskgeologia", NPO "Tajfun"; national experts - S. V. Dadykin and Dr. S.B. Gogol', training at the course on Isotope Hydrology, IAEA, Vienna - Senior researcher A.E. Tkachenko, 1997);

three scientific and field teams for carrying out project activities were organised by NPO "Tajfun", VSEGINGEO and GGP "Bryanskgeologia" (objective I, output 1.1, activity 1.1.3 - 1.1.6);

field monitoring and surveying expeditions over the modernised observation network of the most contaminated territory of Bryanskaya Oblast were conducted, particularly by NPO "Tajfun" in 1998, VSEGINGEO and GGP "Bryanskgeologia" in 1997, 1998 (objective I, output 1.1, activity 1.1.3 - 1. 1.6);

more than 100 observational points at the area of 10,000 km2 were searched and more samples of soils, sediments, surface and ground waters (from the main exploited horizons) were taken for chemical, natural isotopes, Chernobyl radionuclides content and so on (objective I, output 1.1, activity 1.1.3 - 1.1.6; NPO "Tajfun", VSEGINGEO and GOP "Bryanskgeologia"); stationary observation on the erosion radio-nuclide run off from contaminated areas at typical water catching basins (objective I, output 1.1, activity 1.1.4; NPO "Tajfun", international (CIS) expert - Eng. O.M. Zhukova; objective II, output 2.1, activity 2.1.1; NPO "Tajfun", training-document in preparation);

about one half of the samples taken have already been analyzed (objective I, output

1.1, activity 1.1.7,1.1.8; NPO "Tajfun", VSEGINGEO and GGP Bryanskgeologia");
analytical and field observation results are being intensively processed and interpreted (objective I, output 1.1, activity 1.1.7, 1.1.6; NPO "Tajfun", VSEGINGEO and GGP `Bryanskgeologia");
analysis of existing assessment methodology of parameters determining interaction "water - mineral phase (bottom sediment, suspended solids, soil and rock matrix) as well as a retardation factor as a key radio-nuclide migration characteristic (objective II, output 2.1, activity 2.1.3; NPO "Tajfun", VSEGINGEO; national experts - Dr. A.V. Konoplev and Dr. Meshchankina; international (CIS) expert Dr. V.V. Gudzenko);
a computerised project data base was started used for further project actions (objective I, output 1.1, activity 1.1.7, 1.1.8; objective II, output 2.1, activity 2.1.7; NPO "Tajfun", VSEGINGEO and GGP " Bryanskgeologia"; national expert - Dr. M.A. Novitsky);
penetration logging of unsaturated zone bodies to determine their litology construction, sorption ability and protective properties (retardation factors) had
already been implemented at the stage of adopting the project document (objective II, output 2.1, activity 2.1.7; VSEGINGEO);
multi tracer experiments to determine real velocity of water and radio-nuclides infiltrating through the aeration zone were started (objective II, output 2.1, activity 2.1.7; VSEGINGEO and GGP "Bryanskgeologia");

A preliminary conclusion of these data indicates that:

Chernobyl radio-nuclides are observed at the measurable level in surface water objects and in the shallow horizons. Moreover the radio-nuclides are more likely detected in deeper aquifers that are exploited for the centralised water supply. The radio-nuclide contents in water objects investigated is showing unstable trends (both of negative and positive characters) which must be carefully studied during the next project stages.
A big variability of the radio-nuclide has been noted between the contents in soils, and surface and ground water bodies investigated depending on the surface contamination density, hydrological, hydrogeological, geochemical, landscape and geomorphologic conditions. The quality of any forecast on the radio-nuclide water contamination is determined by the above dependence factor. Therefore the dependence of the radio-nuclide content in the natural waters should be thoroughly studied and specified on the further project stages. A strong and direct correlation has been found between the content of the environmental tritium and the Chernobyl cesium-137 content in ground waters. It is a good for indicating the vulnerability of these waters to surface radionuclide (and other contaminants too!) contamination.
It was found that protective properties of the aeration zone bodies, with respect to surface radio-nuclide contamination, is strongly dependent on the water infiltration velocity (water residence time) and retardation effect caused by inter phase exchanges between solid matrix and soil solution. Such an effect can be evaluated using both environmental and artificial isotope tracer techniques.
Radio-nuclide transfer processes in surface water flows and reservoirs are

controlled by the same inter phase exchange parameters (distribution coefficient, retardation factor) as well as by flow and diffusion velocity. This is why the project concentrates
on these effects and their parameters.
On the basis of environmental isotope data, an evaluation of ground water genesis and dynamics (residence time) in water-bearing strata were preliminary made that can be further used in constructing more adequate models and in the prediction of radio-nuclide behavior in future at the local and regional scale. Databases related to these issues are under contruction for use in the project.

These preliminary factual findings should be specified and studied further in detail.

Strategies and approaches selected and used during project implementation are considered to be adequate and will further result in the successful achievement of project objectives.

Two CIS experts, five national experts, as well as about 20 professionals were involved into the development of the project tasks. Their findings are reflected in the related reports noted at the beginning of this report.

39. The quality and timeliness of these outputs were in-line with those established by the Project Document and Work Plans.
40. All outputs mentioned in the Project Document were for the reporting period were achieved. Moreover, some overall outputs, in full or partial degree, have already been reached, well ahead of schedule (2.1.3, 2.1.5, 2.2.2). Nevertheless some delays in performance of some concrete actions can be noted: there was a three month delay in the delivery of low level five sample beta spectrometer of RISO from Denmark because of the financial crisis that gripped Russia in August 1998; the financial crisis also delayed the training of two candidates on low-level radiometry (Eng. Borodina, NPO "Tajfun", now her documents are to be in the IAEA, activity 1.1.5) and on vulnerability ground water mapping (PhD. S.B. Gogol', GGP " Bryanskgeologia", activity 1.1.5, 1.1.9); there was also a two month delay in recruiting an international expert for the isotopic network through the IAEA.

D. Immediate objectives

41. There were partial or full achievements of the immediate objectives in accordance with the Project Document and Work Plans. The outputs reached have already been discussed above in points 38 and 39. Some of them were instrumental, such as observational network maps, data tables of radiometric, chemical and soil analyses, etc. All outputs have been reached in accordance with the project schedule. All these outputs are documented in the Project Office.
42. The micro level effects of the project consisted of the improvement of the analytical infrastructure of the project executors, development of the field monitoring

network, as well as direct capacity building for the project counterparts.

43. Further increases in the ability of the Executing Agencies and project counterparts are expected, as well as the regional Authorities in providing more effective environmental water monitoring and, as a consequence, in increasing the safe water supply. The support of the regional and local organizations in strengthening their ability to perform such monitoring can be considered as an important task and achievement at the micro level.

E. Development objectives

44. The project will result in the elaboration of the diagnostic and prognostic conclusions on the quality of water in the research area and recommendations on safe water supply. Together with the developed methodology and technological infrastructure these reports will likely promote the elaboration of relevant countermeasures with respect to possible radiological water quality changes on the contaminated territory. Moreover, the project results will contribute to improving institution's and environmental experts' ability (at the local, regional and federal levels) to overcome after-effects of the similar accidents.

F. Effectiveness

45. The approach adopted within the project framework was selected as the most effective one. Another more effective approach may exist, but in real economic and natural conditions it would demand a more developed infrastructure and capacity(more sophisticated equipment, for instance). As to the current situation with the established

project budget, there is only way to increase effectiveness of project implementation. This would involve increasing and concentrating funds for carrying out decisive field work during the remaining two seasons (1999, 2000) on the contaminated area in order to provide more adequate diagnostic and prognostic results. The current financial crisis has exhausted the internal reserves of the Implementing Agencies. They are no longer in a position to improve the efficacy of their work due to the depletion of these reserves. It is only the equipment purchased with UNDP funds that provide some additional ability in this respect.

The overall costs of the budget resources are justified with regard to those results that have already been and will be obtained.

Capacity building

46. The main project results in terms of capacity building at this stage of the project evaluation are in the areas of enabling environment, institutional development and human resources development. These can be summarized as follows: (a) The

development and improvement of the observational network within the contaminated area. Data obtained via this network help with regards to the distribution and redistribution in time & space of radioactive contaminants in the water environment systems. This allows for better understanding of how to provide as radiological safe water supply as possible;

(b) Experience gained in finding the solution of such complicated and multidisciplinary problems has led to the creation of a team of specialists that have deepened and widened their knowledge and experience in solving such problems. This capacity building will have future benefits for similar work.

H. Impact

47. No significant unforeseen negative effects have been stated except for the financial and economic crises. The project itself is resulting in many positive impacts. Again, it should be stressed that the project has provided real support to all project counterparts to carry out work of national and international importance.

48. There were no losers, but there are a number of winners. These are the scientists and surveyors who have become more experienced; federal, regional and local authorities who obtained and will yet obtain current and predictive radiological data for elaborating more realistic measures to provide safe water supply; finally, there is a population within the contaminated area which will be provided with a safe water supply.

49. The implementation of the project did not have any negative impacts on the environment.

50. The impact of the project work on the recipient institution was positive. This has already been explained above.

I. Sustainability

51. It is anticipated that the positive results of the project will be sustainable after the international assistance ceases. This conclusion is based on the facts that during the first evaluated stage of project implementation there was strong evidence of national capacity building, such as the provision of an equipment base, training of

national specialists, transfer of scientific expertise to the regional and local institutions engaged in the project activities and establishment of the effective inter-institutional teams of experts. It should be noted that additional financial support is being sought for the successful accomplishment of the project and comprehensive achievement of its objectives.

J. Follow-up

52. The project is expected to prepare a set of recommendations concerning safe water supply in areas contaminated by radionuclide. These could include proposals for development and optimization of water supply system for major towns, settlements and rural population within the area; and searches for new ground water deposits to replace sources contaminated or endangered by contamination, etc. At this stage of the project and its evaluation all follow up activities can be implemented as established by the Project Document. Some changes in this respect may be needed at the end of the project based on the evaluation and analysis of the final results. In this case, additional Government and regional decisions concerning an the optimal use of the project results, protective countermeasures and further continuation of field activities will be required.

V. **FINDINGS**

53. The most important conclusions of the evaluation process are:
(a) This UNDP project seems to be an important extra tool in solving an extremely complex regional environmental problem.
(b) The experimental data collected by the project on radio-nuclide content and their transfer in surface and ground water bodies, together with systematized information of the previous post-Chernobyl results, will allow for the creation of an outline that maps the general trends in possible natural water sources vulnerability to radio-nuclide contamination and selfpurification by such processes as inter phase exchanges, diffusion and dispersion, wash out and run off, filtration and infiltration, and so on. (c). Unique, multidisciplinary teams of specialists involving hydrologists, hydrogeologists, physicists, chemists, radio-ecologists and engineers allowed for the strengthening of the intellectual capacity of the Executing and Implementing Agencies and their ability to finalize the project successfully

54. The main answers to the main questions of concern to the Government, UNDP and to the Executing and Implementing Agencies are expected to be finalized during forthcoming project stages. The answers will be submitted in the form of diagnostic and prognostic reports as well as a set of recommendations for the follow up actions (See point 52).

55. The general conclusions that can be drawn from the evaluation of this stage of the project are the following:

- the project is relevant,
- it is performing well, and
- it will **likely be successful.**

VI. RECOMMENDATIONS

56. In order to improve the project, following actions should be undertaken during 1999 and 2000

1. The project monitoring network should be made more dense and widened, including the newly discovered contaminated area in the eastern part of the region under investigation. 15 - 20 stations, as least, should be added to this area; (Roshydromet, NPO "Tajfun", Bryansk Centre of Hydrometeorology and Monitoring; MPR, VSEGINGEO, GGP "Bryanskgeologia").

2. To increase the number of (objects) of tritium water sampling points.

3. To strengthen and improve Government financial support for the project counterparts. This has to be done, in the first line, with respect to local organizations that are responsible for the state monitoring of surface and ground waters (Government, Roshydromet and Ministry of Mineral Resources).

4. To re-allocate certain financial resources allotted to fund international expertise for the recruitment of the national experts/consultants.

5. To extend the project till December 2000 in order to carry out the next cycle of the field study in the autumn of the year 2000. An increase of funding will allow the project to enhance the quality of the project conclusions and recommendations and to proceed further with essential activities in the area of radio-nuclide water contamination research.

6. To carry out an intercalibration of isotope and other measurements by all project counterparts (Roshydromet, NPO "Tajfun", Bryansk Center of Hydrometeorology and Monitoring, VSEGINGEO, GGP "Bryanskgeologia").

7. To begin thinking of a framework for follow up actions as well as for the continuation of the work after this project is finalized.

57. As to project planning and implementation in the future, there is a preference that UNDP financial support should be provided for recruiting national professionals and experts. The Russian institutions have been releasing large numbers of highly qualified specialists that have unique post-Chernobyl experience because of their budget situations. These specialists possess invaluable knowledge that in terms of the real hydrological, hydrogeological, and geological conditions existing on the territory

under investigation.

It would be desirable to shorten (without any prejudice) the amount and volume of project documentation required for the planning, implementing and monitoring of such kind of projects. Unfortunately, they now take too much effort and time which could be used for real project implementation.

VII. LESSONS LEARNED

56. The following positive lessons have been learned from implementing the project:

The project performance made by the UNDP activity and fund contribution certainly provided an essential support for Government efforts and sectors concerned. It has made it possible to examine this national problem and to identify safer water supplies in the areas contaminated by the Chernobyl Accident. Moreover, developed during the project infrastructure, factual and methodological results already have proven extremely useful and helpful for national and international sectors involved in finding solutions for similar problems in other contaminated territories. Qualified, experienced and trained (in course the project) national specialists will be ready to take part in any future projects that are implemented in other contaminated territories.

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