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MATERIALS FOR ENVIRONMENTAL ASSESSMENT OF TRIFLUORCHLORMETHANE (CFC-13) PRODUCTION CLOSURE PLAN AT THE OJSC "REDKINO PILOT PLANT"

(Redkino, Tverskaya oblast)

Redkino, 1999

The present materials for environmental assessment (EA) of trifluorchlormethane (CFC-13 or coolant 13) production Closure Plan have been prepared by the Executive Directorate (ED) of the Russian National Pollution Abatement Facility (NPAF) on the basis of the information made available by the experts of Open Joint-stock Company (OJSC) "Redkino Pilot Plant" (RPP), and by the international consulting firm Arthur D.Little (США) during the Pre-appraisal Mission conducted by the World bank oh July 5-6, 1999 (Attachment 1) within the framework of realization of the Special Initiative on shut down of ozone depleting substance (ODS) productions in the Russian Federation.

The Special Initiative is a program, under which the ODS producing Enterprises gets the indemnification for fulfillment of the set task. OJSC "RPP" is one of seven Enterprises of the Russian Federation, at which this program will be realized. OJSC "RPP" has agreed with the CFC-13 Production Closure Plan by organization of HFC-23 (coolant 23) production, which is not attributed to ozone depleting substances, on the same facilities.

The objectives of EA realization during meetings and negotiations with the experts of OJSC "RPP" (Attachment 2) during the Pre-appraisal Mission were:

- revealing of environmental impact sources at the operating CFC-13 production;
- confirmation of availability of technical possibilities to close CFC-13 production at the Enterprise in the near future and elimination of related sources of environmental impact;
- formulation of environmental management requirements to the Closure Plan;
- evaluation of reliability of the system of industrial environmental monitoring of the Closure Plan implementation; and
- evaluation of environmental risks, remaining at organization of HFC-23 production at the Enterprise.

EA materials have been prepared with the help of RPP specialists, specialists of Arthur D'Little International Inc. and other organizations (attachment 3).

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I. GENERAL CHARACTERISTICS OF THE ENTERPRISE

1. ***History of creation***. OJSC "RPP" is in an urban type settlement of Redkino between ancient Russian cities Tver and Klin at a distance of about 140 km from Moscow, 40 km from Tver and 6 km from the Volga River. The factory was created in 1902 for production of products from peat coking, first of all of coke, paraffins, phenol, creosole and kreoline. In 1957 the Enterprises was reoriented for development of new technological processes for manufacture of chemical products, for which purpose a complex of research laboratories and pilot productions was organized. In 1961 production of chlorfluorcarbons and halons was put in operation at the plant. Now OJSC "RPP" produces over 100 special chemical substances and catalysts both by experimental batches and for maintenance of large scale productions in Russia.

2. ***Condition of the environment at the Enterprise***. OJSC "RPP" is one of *air* pollution sources on the territory of the Tver oblast. On data of Konakovo District Committee on Environmental Protection, the Enterprise emits over 80 chemical substances (sulphurous anhydride, carbon oxide, nitric oxides, acetone, diethyl amine, aniline, soot, toluene, etc.), a large part of which is made by emissions of the Redkino municipal boiler-house, which is on the balance of OJSC "RPP". In 1998 the total volume of air emissions has made about 640 t, out of them 307.2 t is carbon oxide, 50 t - sulphurous anhydride, 62 t - acetone, 10 t - dimethyl sulfide. The sanitary-protective zone of teh Enterprise makes 1.5 km.

3. *Wastewater* of the Enterprise consists of household sewage of OJSC "RPP" and a part of sewage of Redkino's residential area with population about 6,000. The sewage passes biological treatment, while storm water from the territory of the industrial site is treated at mechanical treatment facilities. Then all streams of treated waters mix up with conditionally clean water from cooling equipment of the Enterprise, pass aftertreating in ponds-settlers and arrive to Shoshinsky Glide of Ivankovskoye Storage Lake and then into the Volga River. The technology of production at the Enterprise, including ODS production, does not use water and, consequently, there is no technological wastewater.

4. *Solid waste* of two kinds is formed at OJSC "RPP": (1) the waste provisionally stored on the territory of the Enterprise and consequently processed and (2) the waste transferred for disposal to own landfill of dangerous waste. The first kind of waste includes spent luminescent lamps, scrap of ferrous metals, graphite chips, etc. The second kind of waste includes product of aluminum hydroxichloride neutralization; neutralized solution of spent hyposulphite; ammonium muriate polluted with gel of silicon acids and toluene; ferrocene production waste, and also waste of filter fabrics, incineration ashes, gel from air emission units cleaning. All waste is treated according to the operating rules, stored on the Enterprise's landfill with insulating cover. They do not render negative environmental impact. The total amount of waste is about 2,000 t/year at the Enterprise.

5. *Nature protection activity of the Enterprise.* The OJSC "RPP" realizes certain work on protection of the environment. A special service of nature protection subordinated to the Director on Production and Technical Issues was created. The monitoring of environmental impact of the Enterprise was organized, which is carried out by sanitary-industrial laboratory of the plant according to the schedules agreed with the Center of State Sanitary-Epidemiological Supervision (CSSES) of Redkino. The structure of the instrumentation is

indicated in Attachment 4. The sanitary-industrial laboratory of CSSES realizes a similar monitoring in parallel. The Enterprise has a Permit for air emission of pollutants from stationary sources (Attachment 5), Permit for provisional storage of waste on the territory of the Enterprise with its consequent processing (Attachment 6), Permit for long-term disposal of industrial wastes on own landfill (Attachment 7). At the same time, in a number of places on the territory of the Enterprise is littered with scrap, unused equipment, etc. So as OJSC of "Redkino Pilot Plant" is a debtors to the local budget, it has no right to cover the indebtedness under the nature protection payments before it covers the debts to municipal services for heat, gas, electric power.

Brief Characteristics of CFC-13 production

6. CFC-13 production, which is located 500 m from the residential blocks of Redkino (Attachment 7), is based on the direct catalytic gas phase disproportionation of CFC-12 on the surface of active aluminum oxide. The synthesis occurs due to several competing reactions, two major of which are indicated below:

$3CCl_2F_2$ ——————— $2CClF_3 + CCl_4$;
$5CCl_2F_2$ ——————— $3CClF_3 + CCl_4 + CCl_3F$

7. The process of CFC-13 production includes 5 phases (Attachment 7):
- preparation of raw material;
- synthesis of CFC-13;
- segregation and removal of CTC and acid ingredients;
- segregation and cleaning of CFC-13; and
- cleaning of containers and filling with finished product.

8. Now the OJSC "RPP" possesses of capacities for production of about 200 t/year of CFC-13, but actually makes no more than 20 t/year.

Sources of Environmental Impact of CFC-13 Production

9. The following by-products are formed at CFC-13 production:
- carbon tetrachloride - class II of danger for free air; MAC - 4 mg/m^3; and
- spent catalyst (aluminum oxide) - class IV of danger.

10. The CFC production during a number of years resulted in formation of contaminated CTC, which is stored inside the Enterprise in a diked concrete storage (30 m^3). Multiyear observations on the shift time basis of the balance of liquids indicate that the capacities (3 pcs) are in good condition.

11. No wastewater or solid waste is generated at production of CFC-13 at the Enterprise.

Safe Management of Operations

12. All operations at the Enterprise are carried out according to technological rules authorized by the management of the Enterprise in set order (for example, "Permanent technological rules No 770-85 for experimental installations for production of CFC13 –

trifluorchlormethane in shop 21" is authorized by the General Director of OJSC "RPP" on July 17, 1995). Each of such rules there has a section of safety precautions and work protection, observance of which requirements ensures a safe management of operations.

13. The technological rules on production of HFC-23 are in phase of development and will be authorized by the end of 1999.

II. DESCRIPTION OF THE CFC-13 PRODUCTION CLOSURE PLAN

14. Now OJSC "RPP" produces both CFC-13 and HFC-23 on the same technological line. The raw material for CFC-13 production is CFC-12 and raw material for production of HFC-23 is CFC-22. The unique essential distinction in the process are working parameters, first of all at the stage of distillation of the product.

15. According to the CFC-13 Production Closure Plan, production of HFC-23 will be organized at OJSC "RPP" and the following changes in the technological scheme and equipment will be made:

(1) raw material will be replaced - instead of ozone depleting CFC-12, ozone-safe HCFC-22 will be used;
(2) the number of Freon synthesis reactors will be reduced from seven to six;
(3) the scheme of operation of six reactors will be changed.

Chloroform, which meets the requirements of Technical Specifications, is formed at production of Coolant 23 as a by-product in the reaction of disproportionation.

III. ENVIRONMENTAL CONSEQUENCES OF THE CLOSURE PLAN IMPLEMENTATION

16. The CFC-13 Production Closure Plan implementation will result in local general improvement of the environment at the Enterprise and in:

- elimination of ozone depleting Freon from consumption as it is stipulated by the international agreements, to which the Russian Federation has conceeded;
- production of by-product (chloroform) of proper quality, which has better sales at the market than CTC; besides, chloroform will be used for production of CFC-22 - raw material for production of HFC - 23;
- improvement of working conditions at production due to exception of CTC formation;
- preservation of jobs at production of HFC-23 at OJSC "RPP".

Environmental Impact of the Closure Plan

17. The implementation of the Closure Plan will result in necessity of utilization or destruction of carbon tetrachloride (30 t) formed at production CFC-13. Now the Enterprise studies a possibility of CTC transfer for destruction to another enterprise having the license for its processing by incineration or utilization by a method eliminating getting of CTC into the atmosphere by an unorganized method.

V. ENVIRONMENTAL MANAGEMENT PLAN

18. During the last several years the Enterprise develops and realizes a number of nature protection measures directed on reduction of environmental impact from chemical productions. The Enterprise has developed and agreed with Konakovo District Committee on Environmental Protection the draft MAE, including emissions from CFC-13 production, for 1998. According to the draft MAE, air emissions of pollutants from plant's productions are within the limit values. Exceedance in limit level is not observed in the air around the Enterprise. The Enterprises has duly authorized Plan of Nature Protection Measures for 1998 (Attachment 9).

19. ***Mitigation measures.*** The Enterprise envisages the following arrangements for industrial environmental monitoring of the CFC-13 Production Closure Plan (Attachment 10):

- setting of schedule of air sampling in the working area for the CTC contents and its coordination with the Center of State Sanitary Epidemiological Supervision of Redkino;
- organization of checking of three underground storage tanks for leakage;
- confirmation of change of technological scheme of operation at the stayed reactors (4 + 2) and absence of the seventh reactor;
- check of production sector, container storage and surrounding site for absence of containers with CFC-12;
- check of disposal places of CFC-13 waste products; and
- in case of leakage from CTC storage tanks, provision of analyses of soil and ground water, as well as development of a plan of rehabilitation of the CFC-13 production sector and coordination of it with Konakovo District Committee on Environmental Protection.

20. ***Environmental monitoring***. For organization of control after the observation of environmental requirements and conditions of Closure Plan implementation the Enterprise (Nature Protection Service and Center of State Sanitary and Epidemiological Control of Hospital 57) will create a permanent and periodic environmental monitoring of changes of the environmental condition in the process of implementation. The control of the progress of ODS production closure will be carried out according to schedule approved in the established order with corresponding notes in log book.

21. ***Schedule of control.*** The schedule of control of mitigation measures at implemetntaion of the ODS production Closure Plan is indicated in Attachment 10.

22. ***Integration.*** The indicated measures on environmental quality management make part of the Closure Plan, which provides the integration of economic and nature protection activity of the Enterprise. The coordination of these measures with State Committee on Environmental Protection of the Tver oblast, after the State Environmental Review of the substantiation of ODS production Closure Plan and fulfillment of environmental requirements at its realizations will allow to avoid unfavorable environmental consequences its fulfillment.

VI. ENVIRONMENTAL RISKS

23. The environmental risks at the HFC-23 Production Closure Plan implementation can arise at non-observance of the labour safety rules:

- at disloading of CTC accumulation containers and its transportation to the place of utilization or elimination;
- at rehabilitation of the site of CTC tanks;
- at non-observance of nature protection legislation requirements at commissioning and operation of HFC-23 production; and
- at production and handling of HFC-23.

24. The indicated operations will be executed by the Enterprise according to the operating standards and rules of the State Mining and Technical Supervision of Russia and are also inspected by the Service of Labor Safety of OJSC of "RPP". Taking into account a high level of organization of these operations, environmental risks of emergencies related to inobservance of safety precautions could be evaluated as controllable, and the Enterprise as capable to control them..

VII. CONCLUSIONS

25. The made environmental assessment of the CFC-13 Production Closure Plan has allowed to make conclusions that:

- sources of environmental impact of the operating CFC-13 production are completely revealed;
- the Enterprise has technical possibilities for shut down of CFC-13 production in the near future and elimination of related sources of environmental impact;
- environmental requirements to the Closure Plan are generated;
- the reliability of the system of industrial environmental monitoring of the Closure Plan implementation is evaluated as adequate;
- the new production of HFC-23 could be environmentally sound at observance of all set requirements;
- the environmental risks remaining at organization of HFC-23 production at the Enterprise are evaluated as insignificant; and
- the degree of controlability of all foreseen measures is rather high.

26. All this indicates that the fulfillment of Closure Plan arrangements will surely result in closure of CFC-13 production at OJSC "Redkino Pilot Plant".

VII. THE RECOMMENDATIONS

27. The Enterprise should:

- to finish preparation of materials on the substantiation of the Closure Plan and to submit them for the State Environmental Review to State Committee on Environmental Protection of the Tver oblast;
- during preparation of the substantiation documentation it is necessary to ensure public participation in discussion of technical decisions on ODS production closure according to the operating standards and rules.

"AGREED":

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Director of OJSC
"Redkinsky Pilot Plant"

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Leading Expert
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ATTACHMENTS TO MATERIALS ON THE ENVIRONMENTAL EVALUATION OF THE CFC-13 PRODUCTION CLOSURE PLAN AT OJSC "REDKINO PILOT PLANT "

Attachment 1

STRUCTURE
of the World Bank Pre-appraisal Mission to RRC "Rekino Pilot Plant" on July 5-6, 1999.

Name	Post, organization	Phone, E- mail
Vladimir V. Tsirkinov	Senior Environmental Specialist of the Moscow Office of the World Bank – Chief of the Mission	095 745-70-00 vtsirkunov@worldbank.org
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Attachment 2

LIST

of participants to meetings and conversations at OJSC "Redkino Pilot Plant" during the Pre-appraisal Mission of the World Bank on July 5-6, 1999.

Post, organization	Name	Phone, e-mail
General Director of OJSC "RPP"	Eugeny V. Kurbatov	095 539-63-11
The chief of a technological department of OJSC "RPP"	Nadezhda I. Silaeva	095 539-27-03
Deputy Head of Technological Department of OJSC "RPP"	Nikolai V. Eremochkin	095 539-27-03
Head of the Nature Protection Service of OJSC "RPP"	Aleksey A. Kabanov	095 539-27-03
Chief of Shop 21 of OJSC "RPP"	Alexander G. Nev'yantsev	095 539-27-03
Deputy Chief Doctor of the Centre of State Sanitary-Epidemiological Supervision of Hospital 57, Redkino	Anatoly V. Shlyakov	095 539-27-03
The Chairman of Konakovo District Committee on Nature Protection of State Committee on Environmental Protection of Tver oblast	Robert A. Krepyshev	08242 Konakovo 4-42-46

LIST MEASUREMENT EQUIPMENT, USED IN THE SANITARY LABORATORY OF OJSC "RPP"

PERMIT FOR AIR EMISSIONS OF POLLUTING SUBSTANCES BY STATIONARY SOURCES

PERMIT FOR PROVISIONAL WASTE STORAGE ON THE TERRITORY OF THE ENTERPRISE WITH SUBSEQUENT PROCESSING

PERMIT FOR LONG-TIME STORAGE OF INDUSTRIAL WASTE AT OWN LANDFILL

LOCATION PLAN
OF SHOP 21 OF OJSC "RPP"

PROCESS SCHEME
OF CFC - 13 PRODUCTION AT OJSC "RPP"

Attachment 9

LIST OF MITIGATION MEASURES AT IMPLEMENTATION OF THE CFC - 113 PRODUCTION CLOSURE PLAN AT OJSC "REDKINO PILOT PLANT "

№	Measure	The description	Term of fulfillment
1.	Removal and destruction of residual CTC from by-product storage tanks	Approximately 30 t of CTC polluted by chloroform will be removed from three storage tanks a (33_{1-3}), filled in safe containers and transported to an outside incinerator, which has a license for incineration of such materials	06/00.
2	Disposal of waste	Insignificant amounts of waste of classes 3 and 4 (spent catalyst - oxide of aluminium), which can be formed as a result of CFC-113 production closure and conversion to production of HFC-23 will be removed to dangerous waste landfill of the Plant, authorized for disposal of waste of classes 3 and 4. Waste of classes 1 and 2 at CFC-113 production closure are absent.	06/00.
3.	Consultations with public and staff	Among the local population (Redkino) the public consultations will be held on ODS production closure with participation of representatives of local non-governmental organizations and territorial body of Goscomecology. The consultations will include the announcement of the planned project of closing, public hearings and distribution of the information. The realization of regular meetings with staff affected by the implementation of the Closure Plan will proceed	Proceed
4.	Receiving of permits of local government bodies	Submission of documentation on the project of closing of CFC-13 production and conversion to CFC-23 production to the State Committee on Environmental Protection of Tver oblast for the State Environmental Review. The documentation should include the Technical Substantiation and Environmental Assessment of the Closure Plan. The receiving of the positive conclusion of SER is a condition of coming into force of the Sub-grant Agreement	06/00.

Additional measures beyond the Closure Plan			
1.	Assessment of the area around the CTC storage tanks	On the area around three partially deep in ground tanks of CTC storage 10 m^3 each (33_{1-3}) at detection of CTC even in one, the ground will be sampled and analyzed. The soil and ground water will be sampled, and then, if necessary, a Rehabilitation Plan under the requirements of State Committee on Environmental Protection of Tver oblast will be developed	06/00.
2.	Rehabilitation of area	Completion of rehabilitation of area around CTC storage tanks after closing CFC-113 production	06/00.

Attachment 10

SCHEDULE OF VERIFICATION FULFILLMENT OF THE LIST OF MITIGATION MEASURES AT IMPLEMENTATION OF THE CLOSURE PLAN OF CFC-113 PRODUCTION AT OJSC "REDKINO PILOT PLANT"

№	Measure	The description
1.	Removal and destruction of residual CTC from by-product storage tanks	To make sure that approximately 30 t of CTC polluted by chloroform are removed from three tanks (33_{1-3}), filled in containers and sent to incinerator outside of the Enterprise. To control that the incineration process is carried out according to the operating Russian rules
2.	Disposal of waste	To check up that any waste of classes 3 and 4, which can be formed at closing CFC-113 production and conversion to HFC-23 production are disposed on the dangerous waste landfill and that the enterprise has all necessary permits for disposal of this waste.
3.	Assessment of the area around CTC storage tanks	To conduct monitoring of assessment of area around CTC tanks (33_{1-3}), including sampling of soil and ground water and, if necessary, a rehabilitation plan of the area, designed with the help of specialist
4.	Rehabilitation of the area (if necessity)	To monitor measures on rehabilitation of the area around CTC tanks. To make a detailed report on monitoring
5.	Consultations with public and staff	To analyze proceeding public consultations on closing of old production and beginning of new with use of former installation of CFC-113 production, including contacts (if necessary) with local government bodies, non-governmental organizations and staff
6.	Social impacts	To analyze current records of employment in former CFC-113 production and transfer of staff to other productions
7.	Observance of regulatory requirements	To see the permits given with reference to former CFC-113 production and new production on the area. To consult with local representatives of State Committee on Environmental Protection of Tver oblast concerning observance of conditions of the issued permits connected to former CFC-113 production and waste management facilities within the framework of its closing