

**E-296**  
**VOL. 7**

**MATERIALS**  
**ON ENVIRONMENTAL ASSESSMENT OF OZONE**  
**DEPLETING SUBSTANCES PRODUCTION**  
**CLOSURE PLAN AT OJSC “ALTAJKHIMPROM”**  
**(Yarovoye, Altaj region)**

Yarovoye – 1999

Present materials on environmental assessment (EA) of the Plan of closing ozone depleting substances (ODS) production has been prepared by the Executive Directorate (ED) of the National Abatement Pollution Facility (NPAF) on the basis of information presented by specialists of Open Joint Stock Company (OJSC) "Altajkhiprom" (Yarovoye, Altaj region), as well as by international consulting company "Arthur D.Little Inc." (USA) during pre-appraisal mission held by the World Bank on July 12-14, 1999 (attachment 1) in the frame of implementing the Special Initiative on closing ODS production in the Russian Federation.

In accordance with Special Initiative, ODS producing enterprises have the right to get compensation for fulfillment of the set task. OJSC "Altajkhiprom" is one of the seven Russian enterprises implementing this program. OJSC "Altajkhiprom" presented the Plan of closure ODS production (Closure Plan).

Objectives of this Plan EA during meetings and negotiations with OJSC "Altajkhiprom" specialists (attachment 2) in the frame of pre-appraisal mission were:

- identification of sources of impacts of the existing ODS production on the environment;
- verification of the enterprise's capacities for closing ODS production in the nearest future, and for liquidation of those sources of environmental impacts related to closing this production;
- evaluation of the identified environmental, social, economic and other consequences of Closure Plan implementation;
- evaluation of integrity and sufficiency of measures including into the Environmental Management Plan under Closure Plan implementation;
- evaluation of reliability of the proposed system of environmental monitoring of implementation of measures on ODS production closing;
- evaluation of environmental risks remained after Closure Plan implementation.

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

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### ATTACHMENTS

**Attachment 1.** Membership of pre-appraisal mission of the World Bank at OJSC "Altajkhimprom" on July 12-14, 1999.

**Attachment 2.** LIST of persons participated in meetings and negotiations at на OJSC "Altajkhimprom" during the pre-appraisal mission of the World Bank on July 12-14, 1999.

**Attachment 3.** LIST of materials used under environmental assessment of the Project on organization of works on closing ODS production at OJSC "Altajkhimprom"

**Attachment 4.** Environmental-technological scheme of ODS production at OJSC "Altajkhimprom"

**Attachment 5.** Copies of permissions of OJSC "Altajkhimprom" for air pollutants emission by fixed sources of pollution

**Attachment 6.** Copies of permissions of OJSC "Altajkhimprom" for wastewater discharge

**Attachment 7.** Copy of permission of OJSC "Altajkhimprom" for wastes disposal

**Attachment 8.** Principal scheme of ODS production closure at OJSC "Altajkhimprom"

**Attachment 9.** List of activities on mitigating unfavorable environmental impact under implementation of CFC 11/12 production closure plan at OJSC "Altajkhimprom"

**Attachment 10.** Schedule of verification of activities on mitigation of unfavorable environmental impact of CFC-11/12 production closure plan implementation at OJSC "Altajkhimprom"

## I. GENERAL CHARACTERISTIC OF THE ENTERPRISE

1. **History.** OJSC "Altajkhimprom" was constructed during the World War II for the purpose of ferric bromide production applied for production of high-octane gasoline. The Yarovoye settlement was founded near the enterprise for workers and engineering-technical personnel. Gradually, the settlement turned into town with population of 21 ths. people. All jobs in the town are connected with the enterprise's activity in one or another way. At present, the enterprise continues to produce bromine-containing compounds, as well as various chemical products for industrial and resident use.

2. **Situation.** OJSC "Altajkhimprom" is situated in north-west part of the Altaj Region, closely to the border with Kazakhstan. Its site takes more than 40 hectares. The enterprise was purposefully situated near Lake Boljshoye Yarovoye with high concentration of bromine in water.

3. **Activity.** During late years, the enterprise paid main attention to production of:

- freons R11 and R12;
- bromide-organic compounds, including compounds of ethyl bromide type;
- fire-smothering means (tetrabrom-p-xylo, hexabromcyclodecane, decabromdiphenyloxide);
- anesthetic mean "florotan" (halotan);
- varnish-and-paint materials;
- epoxy resins and near of kin substances, including silicon compounds of ethyl-silicate type, and different products on its basis.

Production of CFC 11 and 12 in early 1990s takes up to 30% of output (attachment 4), and about 150 men from engineering-technical personnel were employed there.

4. The enterprise produced articles in aerosol packing using CFC 11/12 as propellant. About 250 men from operating personnel were taken into this production.

5. **State of environment in area of enterprise situation.** OJSC "Altajkhimprom" is a dominating enterprise in determining environmental state on the territory of 3 km radius, which include the town of Yarovoye, unique natural salt Lake Bolshoye Yarovoye. The state of environment at the site of location of the object of closing is determined by:

- air pollutants emission;
- industrial wastewaters discharge;
- solid wastes.

6. **Air.** The enterprise has more than 800 sources of air pollution. Total emission is 2880 t/year (attachment 3 [2]). Major polluter of air basin is the Power Station which belongs to the enterprise. Specific pollutants from main chemical productions of OJSC "Altajkhimprom" are mercury, ammonia, hydrogen chloride, hydrogen fluoride, chlorine, antimony, organic solvents, etc. However, content of these substances in the air of residential zone does not exceed standards of maximum permissible concentrations (MPC) or even have not been found by available methods of analysis (table 1.1).

Table 1.1

**CONTENT OF POLLUTANTS IN THE AIR OF RESIDENTIAL ZONE  
OF THE YAROVOYE TOWN  
(May 1999)**

Name of pollutant	Content of pollutant, mg/m <sup>3</sup>	MPC, (mg/m <sup>3</sup> )
Hydrogen fluorine	not detected	0,02
Hydrogen chloride	not detected	0,2
Nitrogen oxides	0,03 - 0,02	0,085
Sulfur dioxide	not detected	0,5 and less
Ammonia	0,013 – 0,03 and less	0,2
Mercury	not detected	0,0003
Toluene	not detected	0,6

7. **Wastewaters.** Sources of pollution of water objects on the territory of OJSC “Al-tajkhimprom” are number of shops and productions. In accordance with statistical data for 1998, water disposal into the Lake Bolshoye Yarovoye basin was 12,1 mln. m<sup>3</sup>, including 8,36 mln. m<sup>3</sup> of the lake’s brine, 2,81 mln. m<sup>3</sup> of biologically treated wastewaters, and 0,9 mln. m<sup>3</sup> of conditionally treated wastewaters. (attachment 3 [3]). Characteristic of wastewaters at major discharge No.2 (there are 8 discharges at the enterprise) for II quarter of 1999 is shown in Table 2.2.

Table 1.2

**CHARACTERISTIC OF INDUSTRIAL WASTEWATERS DISCHARGED BY  
OJSC “ALTAJKHIMPROM” INTO LAKE BOLSHOYE YAROVOYE, (mg/l)**

Name of pollutant	Quantity of pollutants			
	Actual			Standard
	g/m <sup>3</sup>	t	g/h	g/h
Discharge 2 - after neutralizing agents				
Standard expenditure of wastewaters - 1089 ths. m <sup>3</sup>				
Actual expenditure of wastewaters - 53 ths. m <sup>3</sup>				
Suspended substances	22	1,17	536	32731
BOD total	70	3,7	1703	212
Fluorine - ion	0,7	0,037	16,9	1274
Antimony	0,01	0,0005	0,23	16,2
Nitrates	3,5	0,186	85	4843
Manganese	not detected	-	-	106
Iron	0,43	0,023	10,5	127
Calcium	31	1,65	755	339840
Chlorides	327	17,4	7962	424,8
Sulfates	99	5,3	2408	169920
Petroleum	0,17	0,009	4,1	254,9

Discharge 2 - Map of hydraulic ash removal

Standard expenditure of wastewaters – 591 ths. m<sup>3</sup>

Actual expenditure of wastewaters (brine) – 591 ths. m<sup>3</sup>

Suspended substances	19	11,23	5142	32731
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8. **Soil.** Pollution of soil/grounds at the enterprise is only at the place of liquid wastes utilization, containing fluorine-ion. Content of fluorine-ion in soil/ground in a bound form (in the form of calcium fluoride) is up to 3%, that presents certain environmental danger out of this area's location in water protection zone of Lake Bolshoye Yarovoye.

9. **Solid wastes.** In 1998, the enterprise generated 196 t of wastes of all classes of danger (attachment 3 [4]). Chemical wastes of the enterprise (the 3<sup>rd</sup> and 4<sup>th</sup> class of danger) are utilized at the enterprise's on-site landfill No. 310. The bottom of this landfill is covered with an impermeable liner, and observation wells are around the landfill. Mercury-containing wastes (8 t) belong to the 1<sup>st</sup> class of danger, antimony-containing wastes (3,5 t) belong to the 2<sup>nd</sup> class of danger. These relate to the object of closing.

10. **Environmental activity.** OJSC "Altajkhimprom" keeps full control over impacts of its economic activity upon the environment. The enterprise has worked out the book of MPE standard, got permission for air pollutant emissions (attachment 4), worked out the book of MPD standard and got the limit for wastewater discharge (attachment 5), worked out Draft standards of limiting disposal of wastes, and got permission for wastes disposal (attachment 6). In the frame of regional program "Protection of the Environment", OJSC "Altajkhimprom" carries out construction of the second phase of wastewater treatment facilities (BT-2) with capacity of 15 ths. m<sup>3</sup>/day, which is designated for biological treatment of industrial wastewater.

11. **Control.** Air service of OJSC "Altajkhimprom" keeps control over pollutants discharges and emissions in accordance with schedules of this control approved by the State Committee of Environmental Protection of the Altaj Region; statistics of quality and quantity of discharges/emissions is kept; quarterly and annual reports are made. Control over environmental activity is executed by the Center of state sanitary epidemiological control of Medical Sanitary Division No. 128 (Yarovoye) and Slavgorod Inspection of Analytical Control of the State Committee of Environmental Protection of the Altaj Region.

12. **Environmental payments.** Calculation of payments for environment pollution is made on the basis of mentioned above data. Total environmental payments are about 371 ths. rbls./year, including payments for air pollutants emissions from fixed sources of pollution at amount of 85,2 ths. rbls., from portable sources – 1 ths. rbls., for discharges of pollutants within wastewaters - 106,5 ths. rbls., for the Power Station's ash storage – 178,2 ths.rbls.

#### **Brief characteristic of CFC 11/12 production**

13. The following ozone depleting substances were produced at OJSC "Altajkhimprom" during the last 25 years: freon R11 and freon R12. Production capacity – 30 ths. t/year.

14. Production of freon R11 and freon R12 and their mixtures has been based on a liquid-phase fluorating of carbon tetrachloride by hydrogen fluorine at the temperature of 110 – 160 C °, pressure of 1,9 – 2,3 MPa at the presence of antimony pentachloride catalyst. As

a by-product, commercially-grade 30% muriatic acid is obtained, which are sold to consumers.

15. **Sources of impact of ODS production upon the environment.** Basically, chemical environmental impacts took place under freons R11 and R12 production, such as:

- air pollution;
- wastewater discharge into natural water object;
- solid wastes disposal.

There are no other environmental impacts under freons production.

16. **Air.** There were 15 sources of air pollution at the site. 97 sources of pollutants emission were combined in these 15 sources. Major sources were technological releases (hydrogen fluoride and hydrogen chloride), as well as releases from the unit of propellant preparation (propane-butane mixture and mixture of R11 and R 12 freons), emitted into the atmosphere through air-lift scrubber.

17. **Wastewaters** from ODS production, including liquid wastes (solutions of fluorine-containing salts), at volume of 350 kg per ton of CFCs produced, are fed to fluorine-ion areas where fluorine-ion is sedimentated by a lime milk with generation of calcium fluoride, which is sent to landfill No. 310. Floors wash-out wastewaters, air ventilation scrubbers wastewaters, wastewaters from technological releases neutralization are fed into all-plant sewerage system.

18. **Solid wastes** from CFC production represent waste antimony-containing catalysts at volume of 17,2 kg/t, which were sent to the Kadamzhajsky Antimony Plant (Kirghizia) for processing. Zeolite and alumogel (4<sup>th</sup> class of dander), used in freons production for moisture catching, were buried at ground No. 310 at corresponding volume of 0,11 kg/t and 0,045 kg/t.

### **Safe operation**

19. All operations under ODS production are carried out in accordance with technological regulations approved by management of OJSC "Altajkhimprom" in the established order, as well as regulating documents of the State Mining Technical Control of Russia. ODS production process was remotely operated, that provided safety for operating personnel under a normal production regime, in cases of decline from normal regime, and in accidental situations. All the personnel was supplied with individual protection means.

## **II. CHARACTERISTIC OF CLOSURE PLAN**

20. The following Plan of closure ODS production at OJSC "Altajkhimprom" was presented for environmental assessment. This includes the following actions:

- stop of production;
- disconnection of technological process operating devices and other engineering systems;
- collection and removal of all raw material products, reaction mediums and final products;
- washing and cleaning of equipment and communications;

- organization of control over execution of works on disassembling and cleaning of equipment;
- removing of 4 synthesis reactors and a part of technological pipes from operational area;
- disassembling of pumps for hydrogen fluoride pumping into synthesis reactors;
- disassembling of pumps for carbon tetrachloride pumping into synthesis reactors;
- disassembling of technological lines of feeding carbon tetrachloride and hydrogen fluoride to production site;
- transfer of disassembled and cleaned equipment into storage or other processes of OJSC "Altajkhiprom", or its delivery as a scrap-metal.

Scheme of ODS production closing at OJSC "Altajkhiprom" is shown in attachment 8.

### **Impact of Closure Plan implementation upon the environment**

21. Implementation of Closure Plan will lead to necessity of liquidation of the following environmental impact sources:

- carbon tetrachloride, accumulated at the enterprise in volume of 50 m<sup>3</sup>;
- wastewaters that will be generated under cleaning of main and auxiliary ODS production equipment;
- wastes from disassembling of equipment.

22. The list of actions included into the Plan of closing, which will be an integral part of Sub-grant Agreement, represents a full and sufficient complex of measures, which was implemented by the enterprise since May 1997 in accordance with Order of 26.05.97 No. 202 "On conservation of buildings 104 and 192 of ODS production". At present, works on ODS production closing are suspended for need of funds. Documentation substantiating this complex of ODS production closing measures, is on the stage of preparation by OJSC "Altajkhiprom".

### **III. ENVIRONMENTAL AND RELATED SOCIAL CONSEQUENCES OF IMPLEMENTATION OF CLOSURE PLAN**

23. OJSC "Altajkhiprom" informed local public about its intention of complete closing ODS production through the meeting with correspondent of "Yarovskiy Novosti" newspaper during pre-appraisal mission, and through daily news-program "Visit" on local TV.

24. Closure Plan implementation will apparently lead to:

- liquidation of ODS air emission in accordance with requirements of international agreements (Vienna Convention for the Protection of the Ozone Layer – 1985, Montreal Protocol – 1987, London Addition to Montreal Protocol - 1990, etc.), as well as requirements of the Decree of the Government of the Russian Federation of 05.05.99 No. 490 "On strengthening measures of the state control over ozone depleting substances production and consumption";
- liquidation of emissions of hydrogen fluoride, hydrogen chloride and other pollutants from ODS production;

- stop of fluorine-ion delivery to sedimentation areas situated in Lake Bolshoye Yarovoye water protection zone;
- improvement of operational regime of industrial wastewater biological treatment facilities, construction of which is planned for later 1999, through reduction of fluorine-ion and antimony content in wastewaters under treatment;

25. By present, the number of employees in building 104 has been reduced from 130 to 12 people. The majority of the released employees has been placed in a job at OJSC "Altajkhimprom" and related structures. Only 12 people have not been placed in a job yet.

#### IV. EVALUATION OF ENVIRONMENTAL QUALITY MANAGEMENT UNDER CLOSURE PLAN IMPLEMENTATION

26. **Measures on mitigation of unfavorable impact on the environment.** The enterprise plans to carry out the following environmental quality management measures under Closure Plan implementation (Attachment 9):

- cleaning of main (four synthesis reactors) and auxiliary ODS production equipment (pipings, pumps);
- treatment of wastewaters (400-500 m<sup>3</sup>) generated under washing and cleaning and auxiliary technological equipment;
- utilization of temporary stored non-used raw materials (carbon tetrachloride, antimony-containing catalyst, silica gel and zeolite), semi-products of ODS production;
- collection and removal of wastes from dismantling of equipment;
- execution of preparatory measures on solid wastes utilization from fluorine-ion areas;
- cleaning and rehabilitation of structures of buildings No. 104, 192, 198;
- disposal of solid wastes from fluorine-ion areas at all-plant landfill No. 310;
- recultivation of soil in fluorine-ion areas;
- conducting of public consultations;
- getting necessary permits of regulatory authorities.

27. **Environmental monitoring.** The system of continuous environmental monitoring of changes in the environment under the process of works implementation is being developed by the service of air protection and the Center of state sanitary-epidemiological control of the Medical Sanitary Division No. 128 for the purpose of organization of control over fulfillment of environmental requirements of the Closure Plan. Control over works on ODS production closing will be carried out in accordance with schedules approved in the established order with relevant records in observation journal.

28. **Verification schedule.** The schedule of verification of implementation of activities on mitigation unfavorable environmental impact under ODS production Closure Plan implementation is shown in Attachment 10.

29. **Integration.** Mentioned above measures on environmental quality management are included into Closure Plan. This will ensure the integration of economic and environmental activities of the enterprise. Approval of this measures by the State Committee of Environmental Protection of the Altaj Region after the State Environmental Expertise on the Proj-

ect of organization of works on ODS production closing and meeting environmental requirements under Closure Plan implementation will allow to avoid unfavorable environmental consequences of works implementation.

## **V. ENVIRONMENTAL RISKS**

30. Environmental risks under Closure Plan implementation may occur under breaching the accident prevention rules at :

- re-sale of freons R11 and R12 synthesis reactors;
- preparation for utilization of waste antimony-containing catalyst at the enterprise;
- processing of temporary stored non-used raw materials, semi-products of ODS production.

31. The indicated works are carried out by the enterprise in accordance with effective regulations of the State Mining Technical Control, and are controlled by the Department of Labor Protection and Accident Prevention of OJSC "Altajkhimprom". Taking into account a high level of these works organization, environmental risks from accidents related to breaching rules of accidents prevention can be assessed as negligible and manageable by the enterprise.

## **VI. CONCLUSIONS**

32. The environmental assessment of Closure Plan carried out at OJSC "Altajkhimprom" resulted in the following conclusions:

- sources of impacts of ODS production and the planned measures on its closing upon the environment have been identified completely;
- the enterprise has technical capacities to liquidate sources of environmental impacts remained from freons production;
- the List of environmental requirements for Closure Plan implementation seems to be well-founded and sufficient. Approval of this List by State Committee of Environmental Protection of the Altaj Region, and meeting environmental requirements under Closure Plan implementation will result in ODS production phase out without unacceptable environmental consequences;
- the proposed system of environmental quality monitoring can be evaluated as sufficient for executing such works;
- degree of manageability of all envisaged measures is rather high.

33. Execution of measures envisaged by Closure Plan will not result only in complete stop of R11 and R12 freons production, but in improvement of environmental state indexes at OJSC "Altajkhimprom".

## **VII. RECOMMENDATIONS**

34. It is necessary for the enterprise:

- to complete preparation of materials on the Closure Plan substantiation, and submit them to the State Committee of Environmental Protection of the Altaj Region for the State environmental expertise;

- under preparation of feasibility study, to ensure public participation in discussions on ODS production closure design decisions in accordance with the established regulations.

“APPROVED BY”:  
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**ATTACHMENTS TO  
MATERIALS ON ENVIRONMENTAL ASSESSMENT  
OF THE OZONE DEPLETING SUBSTANCES  
PRODUCTION CLOSURE PLAN AT OJSC  
“ALTAJKHIMPROM”**

**(Yarovoye, Altaj region)**

**MEMBERSHIP**  
**of pre-appraisal mission of the World Bank at OJSC "Altajkhimprom"**  
**on July 12-14, 1999.**

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Vladimir Knoroz	Deputy Director of CIP "OZONE" CPPI	095 971-04-23
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## LIST

of persons participated in meetings and negotiations at na OJSC "Altajkhiprom" during the pre-appraisal mission of the World Bank on July 12-14, 1999.

Position, organization	Name	Telephone number, E-mail
General Director of OJSC "Altajkhiprom"	Valery Ivanov	38568 4-11-76 4-08-98 fax 4-25-20
Chief engineer of OJSC "Altajkhiprom"	Boris Fedotchenko	38568 4-09-05
Assistant Chief Engineer of OJSC "Altajkhiprom" on production issues	Nikolay Skribunov	3-52-22
Deputy General Director of OJSC "Altajkhiprom" on financial issues	Tatiana Bolvanova	3-53-77
Assistant Chief of Production-Technique Department of OJSC "Altajkhiprom"	Vladimir Andriyaka	4-28-94
Principal Specialist of the State Committee of the Yarovoye on Environmental Protection	Sergey Lykov	3-16-98
Chief Health-Officer of Central State Sanitary-Epidemiological Control of Medical Department 128	Lubovj Zhupikova	3-23-04

**LIST**

**of materials used under environmental assessment of the Project on organization of works on closing ODS production at OJSC "Altajkhiprom"**

1. Plans of closing of ozone depleting substances production in the Russian Federation. Arthur D.Little International, Inc. Acorn Park, Cambridge, Massachusetts. USA, 1999. No. 02140-2390;
2. Form No.2-TP (Air). Data on air protection for 1998.
3. Form No.2-TP (Water). Data on water use for 1998.
4. Form No. 2-TP (Toxic wastes). Data on generation, delivery, use and disposal of toxic wastes in production and consumption for 1998.
5. Federal law "On environmental expertize". 1995.
6. Provision on environmental impact assessment in the Russian Federation. Approved by Order of MEPNR of 18.07.94 No.222.

**ENVIRONMENTAL-TECHNOLOGICAL  
SCHEME OF ODS PRODUCTION  
AT OJSC "ALTAJKHIMPROM"**

**COPIES OF PERMISSIONS  
OF OJSC "ALTAJKHIMPROM"  
FOR AIR POLLUTANTS EMISSION BY FIXED  
SOURCES OF POLLUTION**

**COPIES OF PERMISSIONS  
OF OJSC "ALTAJKHIMPROM"  
FOR WASTEWATER DISCHARGE**

**COPY OF PERMISSION  
OF OJSC "ALTAJKHIMPROM"  
FOR WASTES DISPOSAL**

**PRINCIPAL SCHEME OF ODS PRODUCTION  
CLOSURE AT OJSC "ALTAJKHIMPROM"**

**LIST OF ACTIVITIES ON MITIGATING UNFAVORABLE  
ENVIRONMENTAL IMPACT UNDER IMPLEMENTATION OF CFC 11/12  
PRODUCTION CLOSURE PLAN AT OJSC "ALTAJKHIMPROM"**

Item	Activity	Description	Deadline
1	Disposal of spent catalyst	Remove approximately 10 tonnes of antimony catalyst from the two synthesis reactors (P1 and P3) still containing catalyst. This will be treated by addition of an alkaline solution and converted to antimony hydroxides. After settling, the solids will be put into double-skinned polyethylene containers and send to the antimony supplier (the Kadamdzhajsky Antimony Plant) or disposed in the enterprise's hazardous waste landfill. This material is classified as Class 3 waste under Russian regulations and the receiving facility is licensed for disposal of Class 3 and Class 4 hazardous waste. Record of the actual quantity and deposition will be maintained in accordance with enterprise procedures and logs, and the receiving facility will be subject to ground water monitoring continuously in summer period (from May to September) in accordance with "Schedule of water quality control", adopted by Chief Engineer of the enterprise.	06/00
2.	Disposal of CTC Stocks	Approximately 50 tones of CTC contaminated with CFC-11 (23%), CFC-12 (5%), water and various solids will be disposed of by one of two options. If the water and solid contaminants can be removed, the material will be returned to the CTC supplier or transferred to another permitted non-emissive use as a feedstock. The second option involves the transfer of the material to an off-site high organic destruction efficiency incineration facility, permitted to receive and burn this material.	06/00

3.	Process Equipment Cleaning Wastewater	Equipment washing will be executed in rotation. Primary, the most polluted wash water (100-150m <sup>3</sup> ) will be removed into fluorine and antimony-bearing wastewater collector. Further cleaning wastewater bearing fluorine-ion in permissible concentrations (up to 1,5 mg/l) at the volume of 300-350 m <sup>3</sup> will be sent into the enterprise' sewerage system with further treatment at Biological treatment facilities with productivity of 250 m <sup>3</sup> /h.	06/00
4	Disposal of Insulation Material	Insulation materials (3 t of insulation plates and about 2 t of glass wool) will be reused. Unapplicable glass wool and glass fabric will be disposed in the enterprise's toxic waste landfill. Asbestos was not applied as an insulation material.	06/00
5	Disposal of Absorbent Material	Zeolite (about 2.5 t) used for CFC-11 and CFC-12 drying, and silica gel (up to 0.7 t) used for CTC drying, will be disposed of as Class 3 waste in the enterprise's permitted hazardous waste landfill site.	06/00
6	Public and staff consultation	Public consultation on the closure activities will be undertaken in the local community (Yarovoye) with the involvement of local NGO's and the State Committee of the Altaj region for environmental Protection. This will involve a project announcement inviting input, public hearings, and dissemination of information. Regular information sessions with staff affected by the closure activities will continue to be undertaken.	Ongoing
7	Local regulatory approvals	Submit to the State Committee for Environmental Protection in Altai Region, documentation for undertaking a state environmental expertise. This will include a Closure Plan Feasibility Study and Environmental Assessment. Clearance of this by the state environmental expertise process is understood to be a condition of sub-grant effectiveness.	12/99

<b>Supplementary Environmental Measures to be Undertaken Outside the Scope of the Closure Plan</b>			
1	Site Sampling and Analysis.	Sampling and analysis of soils and groundwater around the fluorine-ion disposal areas 245a and 245b.	06/00
2	Plan of recultivation of fluorine-ion disposal areas.	Development of the Plan of recultivation of fluorine-ion disposal areas (245 a and 245b) consistent with requirements set by the regulatory authorities to eliminate fluoride contamination.	06/00
3	Recultivation of fluorine-ion disposal areas.	Completion of recultivation of fluorine-ion disposal areas (245 a and 245b) following the agreed plan.	06/00

**SCHEDULE OF VERIFICATION OF ACTIVITIES ON MITIGATION OF  
UNFAVORABLE ENVIRONMENTAL IMPACT OF CFC-11/12  
PRODUCTION CLOSURE PLAN IMPLEMENTATION AT OJSC  
“ALTAJKHIMPROM”**

Item	Activity	Description
1	Disposal of spent catalyst	Verify the removal of approximately 10 tones of antimony catalyst from the two synthesis reactors (P1 and P3) which still containing catalyst, its treatment, and the disposal of precipitated antimony hydroxides, either by return to the antimony supplier for recovery of antimony or deposition in the enterprise's hazardous waste landfill (Class 3 and 4) in accordance with Russian regulations. Inspect the permit and environmental monitoring documentation applicable to the disposal facility.
2.	Disposal of CTC Stocks	Verify the removal and appropriate disposal of approximately 50 tonnes of contaminated CTC, through return to the CTC supplier, transfer to another user for a permitted non-emissive use, or the transfer of the material to a high organic destruction efficiency incineration facility, permitted to receive and burn this material.
3.	Process Equipment Cleaning Wastewater	Verify the volume of disposed equipment cleaning wastewater: first portion of 100-150 m <sup>3</sup> (disposal in collector of fluorine and antimony-bearing wastewater); second portion of 300-350m <sup>3</sup> (into the enterprise's wastewater management system) and the compliance with discharge standards applicable to this facility.
4	Disposal of Insulation Material	Verify the appropriate disposal in accordance with Russian regulations and reuse of removed insulation materials.
5	Disposal of Absorbent material	Verify the records of landfilling of zeolite (2.5 t) and silica gel (0.7 t) in the enterprise's permitted toxic waste landfill site.

6	Public and staff consultation	Review records of public consultation activities related to shut down and associated new production activities utilizing the former CFC-11/12 plant, and reuse of dismantled equipment, including contact as appropriate with local authorities, NGO's and staff.
7	Social Impacts	Review current employment records related to current staffing of the former CFC-11/12 plant and the re-assignment of staff as applicable.
8.	Regulatory Compliance	Review regulatory permits applicable to the former CFC-11/12 plant, any banking of ODS materials and new production operations developed on the site. Consult with the local representatives of the State Committee of Altaj region for Environmental Protection respecting compliance with applicable permits related to the former CFC-11/12 plant operation and waste management facilities utilized in its closure.
9	Site Sampling and Analysis.	Review the results of soil and ground water sampling and analysis around fluorine-ion disposal areas (245a and 245b) to confirm basis for the recultivation plan.
10	Recultivation Plan	Evaluate the Plan of recultivation of fluorine-ion disposal areas and discussions with authorities to ensure regulatory compliance.
11	Recultivation	Inspection of areas 245a and 245b for visual evidence that remediation was completed; review of confirmatory sampling results following recultivation.