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MATERIALS ON ENVIRONMENTAL ASSESSMENT OF THE OZONE DEPLETING SUBSTANCES (CFC 11, CFC 12, HALON 2402) PRODUCTION CLOSURE PLAN AT THE OJSC "HALOGEN"

Perm

Perm, 1999

Environmental assessment (EA) of the Project of Organization of Operations on Ozone Depleting Substance (ODS) Production Closure has been made basing on the information supplied by experts of the Open Joint-stock Company (OJSC) "Halogen" (Perm) and international consulting firm Arthur D. Little Inc. (USA) during the pre-appraisal mission of the World Bank and CPPI experts from on July 4 to July 14, 1999 (Attachment 1) within the framework of the Special initiative on ODS production shut down in the Russian Federation.

OJSC "Halogen" begins realization of the ODS Production Closure Plan (CFC-11, CFC-12 and halon 2402) according to the Resolution of the Government of the Russian Federation "On prime measures on fulfillment of the Viennese Convention on ozone layer protection and Montreal Protocol" dated May 24, 1995 and under the London Addendum to the Montreal Protocol on ozone layer polluting substances.

The objectives of environmental assessment of the Plan of closing CFC 11/12 and halon 2402 production during meetings and negotiations with the experts of OJSC "Halogen" (Attachment 2) were:

- evaluation of the Enterprise's role in environmental pollution of Perm;
- revealing of sources of ODS production impact on the environment and evaluation of their "contribution" in forming the environmental situation at the plant and in the city;
- confirmation of availability of technical possibilities on ODS production closure at the plant;
- evaluation of environmental and related social consequences of the Closure Plan implementation;
- development of the Environmental Management Plan for implementation of the Closure Plan;

The order of Goscomecology No 306 dated June 07, 1999 assigned the monitoring of ODS production closure at OJSC "Halogen" to the Perm Oblast State Committee on Environmental Protection.

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I. GENERAL CHARACTERISTICS OF THE ENTERPRISE

History of Enterprise. OJSC "Halogen", Perm, was constructed during the Second World War for production of iron bromide used for high-octane benzene manufacturing for military purposes. The site of the Enterprise (area 150 ha) was selected because of close position to underground sources with high concentration of bromine. CFC 11/12 production began in 1964 with the design capacity 30,000 t/year and in 1985 the plant began to produce halon 2402 with design productivity 1,400 t/year

Major activities. The main business of the Enterprise was CFC 11/12 production, which achieved 30,000 t/year in some years. The Enterprise is one of the largest ODS manufacturers. In addition to CFC 11/12 and halon 2402, OJSC "Halogen" produces a number of fluorine compounds - perfluormethane, perfluorethane, etc. Total volume of sales of halogenated organic compounds, beside CFC 11/12 and halon 2402, does not exceed 3000 t/year.

II. DESCRIPTION OF ODS PRODUCTION AT OJSC "HALOGEN"

Production of CFC 11 and CFC 12

The process of CFC 11/12 production at OJSC "Halogen" is based on fluorination of carbon tetrachloride (CTC) by fluorine hydride (HF) in a fluid phase on antimony pentachloride catalyst. 21 % hydrochloric acid is produced as a by-product. The process consists of 8 main phases:

- receiving, storage and preparation of raw material;
- preparation and neutralization of catalyst;
- synthesis of CFC 11/12;
- removal of acid components from synthesis gas;
- separation, storage and shipment of hydrochloric acid;
- compression and condensation;
- distillation of CFC 11/12 mixture for production of finished products CFC 11 and CFC 12; and
- drying of CFC 11/12, pumping to filling station and filling in containers.

The following waste is generated at CFC production:

- acid wastewater – 71.1 kg per 1 ton of finished products;
- chlorine and fluorine containing wastewater;
- zeolite and alumina gel used in the CFC production process for moisture catching; and
- spent antimony catalyst.

Halon 2402 Production

The process of halon 2402 production at OJSC "Halogen" is based on photosynthesis of liquid bromine and tetrafluorethylene surplus (monomer 4). The reaction gas containing inert components, monomeric tetrafluorethylene, halon 2402, and halon 2411 arrives from the top of reactor into a cooler, where bromine and halon 2402 are condensed and returned into the reactor. The inert gases come to a scrubber and are removed using sprinkling by a sulfite solution with caustic.

III. EVALUATION OF THE OJSC "HALOGEN" ROLE IN ENVIRONMENTAL POLLUTION OF PERM

Condition of the environment in the area of the Enterprise. OJSC "Halogen" is located in a flat, forested western part of the Kirov district of Perm. All infrastructure of the Enterprise (production shops, boiler-house, warehouses, transportation networks, and office buildings) is located on the area of 44.6 ha. The sanitary-protective zone of the Enterprise changes from 500 m to 1000 m with consideration of development prospects of the Enterprise and actual pollution of the air (Attachment 1). Sludge lagoons and landfill for industrial wastes disposal are located within the limits of sanitary-protective zone. The safe landfill for disposal of dangerous waste (classes of danger I and II) is located at a distance of 8 km from the main site of the Enterprise (on the site of "Iodobrom" factory). Residential areas are situated from 1 to 8 km from sanitary-protective zone borders. Due to such remoteness of the enterprise from residential areas, contribution of OJSC «Halogen» in creation of unfavorable environmental situation is moderate.

Air pollution. In 1998, emissions of pollutants from the main production of OJSC "Halogen" have made 232,856 t (herewith the permitted standard emission is 341,625 t) (table 1).

Table 1

VOLUME OF ACTUAL AND PERMITTED AIR POLLUTANT EMISSIONS AT OJSC «HALOGEN»

No	Pollutant	Actual total emission, t/year	Standard total emission, t/year
1	Nitrogen dioxide	6,48	9,125
2	Ammonia	0,241	0,306
3	Hydrogen chloride	1,957	2,826
4	Sulfuric acid	0,648	1,406
5	Carbon oxide	9,888	4,132
6	Chlorine	0,174	0,273

The enterprise makes air emissions according to the Permit (No 55 dated January 01, 1999), issued by the Perm Oblast State Committee on Environmental Protection and valid till July 01, 1999. (Attachment 4). After the expire of this Permit, the list and amount of actual and permitted pollutants will be reconsidered.

Water basin pollution. Each production at OJSC "Halogen" has local system of treatment facilities. A finishing phase of wastewater treatment at the Enterprise is their neutralization. Through a system of sludge lagoons, treated effluents are discharged into the Kama River. In 1998 the total discharge of the Enterprise has made 4,067,600 m^3/year.

Now the Enterprise makes discharges into the Kama River under the Permit for discharge into water bodies (Attachment 5), which validity is extended till January 01, 2000 by a special letter of State Committee on Environmental Protection of the Perm oblast (Attachment 6).

The effluents generated at neutralization of acid wastewater (from the wastewater neutralization shop) come to 2 sludge lagoons (No 6 and 7), located in the sanitary-protective zone of the Enterprise, which have areas 10.13 ha and 5.9 ha respectively. The dams of each sludge lagoon are 6.75 m high. A clay layer protects the sludge lagoon bottoms and dam sides. Now sludge lagoons are filled in by 29,5 % and 40 % respectively. After filling a sludge lagoon with sediments, it will be closed and recultivated. Each sludge lagoon has a technical passport agreed in accordance with the requirements of the Russian legislation. Attachment 7 shows a copy of the title page of the conclusion of State Committee on Environmental Protection of the Perm oblast on the passport of sludge lagoon 6-7 for disposal of dangerous waste, registration number is 1.014. After settling, wastewater is discharged into the Kama River (table 2).

Table 2

VOLUME OF ACTUAL AND PERMITTED POLLUTANT DISCHARGES IN WARTER BODIES FROM OJSC «HALOGEN»

No	Pollutant	Actual total discharge, m^3/h	Standard total discharge (MPD), m^3/h
1	Chlorides	233,310	233,310
2	Petroleum	0,085	0,071
3	Sulfates	246,400	246,400
4	Fluorine-ion	2,710	0,926
5	Carbon tetrachloride	0,001	not exist
6	Iron	1,232	0,396
7	Suspended substances	33,110	4,659

Industrial waste generation. At OJSC "Halogen" the fair quantity of solid industrial wastes of classes III and IV of danger is annually formed. In conformity with a limit of disposal of the unused waste of production and consumption, 40743 t of industrial waste were generated in 1998 at the plant, out of them the following wastes of class IV of danger:

- 39,825 t of fluorgypsum – (standard is 2000 t);
- 2.025 t of paraffin - (standard is 5,0 t);
- 1,300 t of household waste -(standard is 1300 t);
- 1,981 t of zeolite - (standard is 2,0 t);
- 1,53 t of activated carbon - (standard is 2,0 t);
- 17.2 t – chemical absorber - (standard is 35,0 t), etc. (Attachment 8).

The waste disposal is carried out according to the Permit issued by the State Committee on Environmental Protection of the Perm oblast (Attachment 9).

The landfill for disposal of solid industrial wastes of class IV of danger is located within the limits of the sanitary-protective zone of the Enterprise (sludge lagoon No.1-5). The area of landfill is 8.36 ha, height of the dam is 1.0 m. The bottom is provided with a screen of compacted clay. Ground water pollution is not detected. The waste disposal is carried out separately by kinds for probable consequent use of accumulated fluorgypsum waste. A copy of the title page of the conclusion of State Committee on Environmental Protection of the

Perm oblast on the passport of a sludge lagoon 1-5 for dangerous waste disposal is shown in Attachment 10, registration number is 1.013.

All the activity of OJSC "Halogen" related to utilization, storage, replacement and disposal of industrial waste (solid and liquid) is carried out on the basis of the License No 59M/98/420/001/L dated February 11, 1998 (Attachment 11).

Nature protection activity of the Enterprise. The nature protection policy of OJSC "Halogen" is directed on gradual termination of all kinds of technogenic environmental impact. Annually, at the Enterprise develops the Plan of Environmental Protection Measures, which is coordinated in the State Committee on Environmental Protection of Perm oblast. The last also monitors fulfillment of measures included in the Plan. The ODS production closure and liquidation of accumulated waste from this production is one of directions of nature protection policy. The Plan of measures on environmental protection for 1999 includes:

- construction and mounting of pilot production of coolant 125;
- rehabilitation of grounds under sludge lagoon 1-5; and
- utilization of abgaseous hydrochloric acid and other. (Attachment 12).

The measures included in this Plan are financed both by the Enterprise and at the expense of the Environmental Fund. The operating at OJSC "Halogen" Department of Labor Safety and Air Laboratory realize monitoring of the enterprise's environmental impact as agreed with the Perm Center on Hydrometeorology, Chief State Doctor of the Kirov district of Perm oblast and inspection of Goscomecology of Perm oblast. With this purpose the following measures are jointly developed:

- programs of air analyses in the sanitary-protective zone (Attachment 13) and on the territory of the Enterprise; and
- schedules of wastewater sampling in different source of impact (Attachment 14, 15).

A specially interesting are studies of wastewater discharged into the Kama River. The sampling is carried out at monthly basis for the contents of chlorides, sulfates, COD, fluorine-ion, petroleum, etc.

Nature protection payments. OJSC "Halogen" realizes payments for environmental pollution. In 1998 they have made 145,760.22 Rbl (Attachment 10), including for:

- air pollution – 4,400 Rbl (from CFC production – 49.4 Rbl);
- discharges in water bodies – 54,000 Rbl (from CFC production - 520 Rbl);
- waste disposal – 90,066.28 Rbl (from CFC production – 113.8 Rbl).

The enterprise has no environmental payments debt (Attachment 16).

IV. ENVIRONMENTAL IMPACT FROM CFC 11/12 AND HALON 2402 PRODUCTION AT OJSC "HALOGEN"

The sources of environmental impact from ODS production at OJSC "Halogen" are:

- reactors of synthesis of CFCs and halon 2402,
- shop of washing water neutralization;
- incinerator;
- sludge lagoons;
- landfill for solid industrial wastes disposal.

The documentation on monitoring impact of CFC and halon productions on the environment is a component of the general plant documentation.

The air emissions from CFC 11/12 and halon 2402 production is reflected in the Permit for air emissions of pollutants, single for the entire Enterprise (Table 3).

The surplus of tetrafluorethylene, which is used as raw material for halon 2402 production, is incinerated in incinerator intended for burning of halogenated organic matters. Tetrafluoroethylene can be used in case of CFC 114 B2 production introduction (Fig.1). In addition, chlorine and fluorine containing wastewater and oils from CFC 11/12 production (in volume of 8.35 kg per 1 t of finished product) (Fig. 2) are burnt in this incinerator.

There are three incineration furnaces at the Enterprise. Two of them are in working regime and one in a reserve. The fuel is natural gas, decomposition temperature is 1400°C. The stack gas is treated in scrubbers before its emission into the air. Enterprise has a 100% reserve for chlorine-fluorine organic wastes decomposition.

Table 3

VOLUME OF ACTUAL AND PERMITTED POLLUTANTS EMISSION FROM ODS PRODUCTION AT OJSC "HALOGEN" IN 1997

No	Pollutant	Actual total emission, t/year	Total standard emission, t/year
1	Bromine	0.376	0.401
2	Hydrogen chloride	1.957	2.826
3	CFC 12	15.746	30.452
4	HCFC 21	5.302	5.805
5	Ethylene tetrachloride	0.115	0.191
6	Tetrafluorethylene (monomer 4)	15.504	21.547
7	Tetrafluordibrometan (CFC 114B2)	11.337	16.418
8	CFC 11	4.742	12.729
9	HCFC 23	29.210	45.300

On the inventory data, the pollutants generated at incineration of tetrafluorethylene and chlorine and fluorine containing liquid waste from CFC 11/12 production are represented by:

- CO_2 - 46,28 kg/h;
- N_2 - 177 kg/h
- NaF - 0,0002 kg/h;
- NaCl - 0,0004 kg/h.

Under incineration of gaseous and liquid wastes from shop 207 (halon 2402 production) there are such air emissions after appropriate purification as:

- hydrogen fluoride - 0,032 t/yr;
- hydrogen chloride - 0,085 t/yr;
- monomer-4.

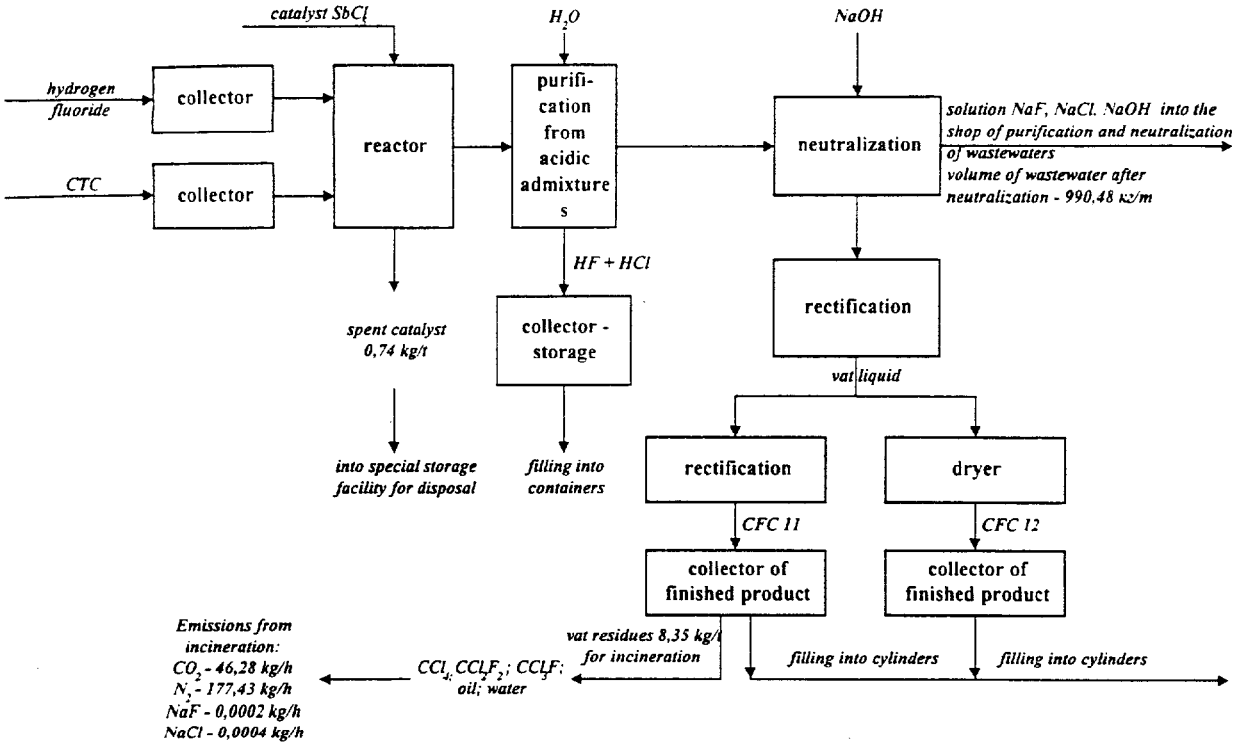

Fig. 1. Generation of wastes under CFC 11/12 production at OJSC "Halogen" (shop 21)

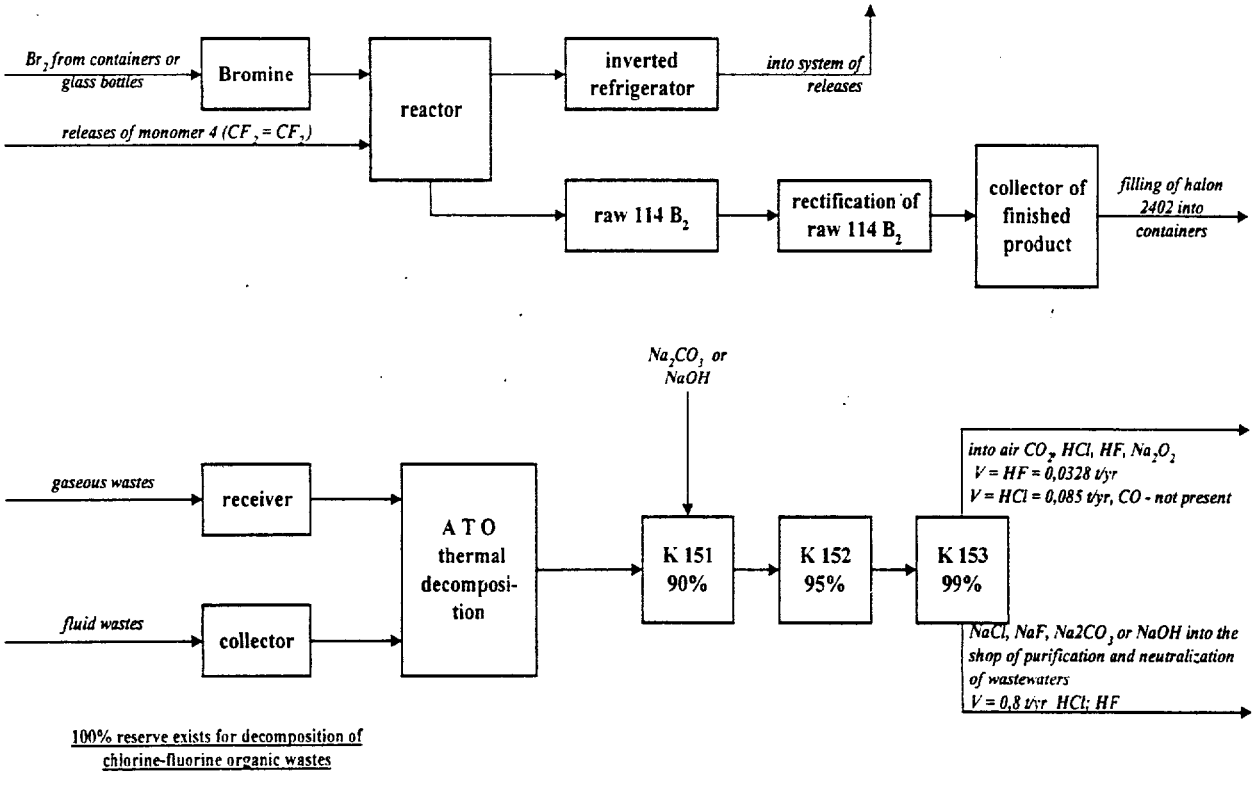

Fig. 2. Generation of wastes under Halon 2402 production at OJSC "Halogen" (shop 27)

In the Enterprise's annual report on emissions of pollutants no exceedance in limit levels on indicated substances was reported. Technical Passport of thermal decomposition facility is agreed with the State Technical Control Authority and State Inspection for Gas Purification (Attachment 21) ***Wastewater*** from CFC production mainly contains:

- chlorides - 107 t;
- fluorine ions – 0.4 t;
- iron – 0.2 t.

The wastewater from scrubbers is directed to neutralization shop, then by pipes it is pumped to sludge lagoon No. 6-7, therefrom after settling - into the Kama River. Volume of wastewater after neutralization is 980.48 kg/t finished product.

The wastes from CFC production is attributed to substances of classes III-IV of danger. For 1998 their volume has made about 12,000 t, including

- zeolite – 0.18 t;
- activated coal – 0.12 t;
- hydrochloric acid – 11,703 t.

11 257 t of these have been sold. The rests of hydrochloric acid, zeolites and activated coal are disposed at sludge lagoon 1-5.

The spent catalyst (in volume of 0.74 kg/t of finished product), which could not be regenerated, earlier was sent back to the supplier (Kirgyzstan), now its disposal at a secure storage facility located at the site of «Iodobrom» is planned. Control over environmental state around the storage facility, and its proper operation is carried out by the Control Service of «Iodobrom» in association with territorial environmental agencies.

Safe Management of Operations

The management of all operations in ODS production is carried out according to the technological rules of State Mining and Technical Supervision, authorized by the management of OJSC "Halogen" in regular order. All ODS production process control was carried out remotely from the control board, that provided safety of attendants at normal mode of production, in case of deviations from it, and at emergencies. All staff was supplied with means of individual protection.

V. CHARACTERISTICS OF CFC 11/12 AND HALON 2402 PRODUCTION CLOSURE PLAN AT OJSC "HALOGEN"

OJSC "Halogen" undertakes to shut down completely all production of CFC 11, CFC 12 and their mixture, as well as halon 2402 production.

Closing of CFC 11/12 production

To ensure shut down of production of CFC 11, CFC 12 and their mixtures on a constant basis, the following measures should be executed:

- removal of six synthesis reactors (shop 201);

- removal of CTC and HF supply systems to reactors (valves and reactors) into shop 201;
- removal of the feeding CTC line;
- removal of the feeding line HF;
- removal of the CFC 11/12 transportation line from shop 201 to storage tanks;
- cutting off of technological process control units of CFC 11/12 production; and
- removal of CTC feedback from the territory of the Enterprise.

Use of equipment for production of alternate products is not stipulated now at the Enterprise.

Closing of halon 2402 facilities

To ensure shut down of halon 2402 production on a constant basis, the closing should include the following measures:

- removal of tetrafluorethylene feeding system to located in shop halon 2402 reactors;
- removal and disposal of bromine storage tanks from shop 238;
- installation of blank flanges on reactors of halon 2402 synthesis;
- removal of all bromine feedstock from the territory of the Enterprise.
- removal of control system connections between the control room and process units.

OJSC "Halogen" plans production of some substitutes of halon in the shop of halon 2402 production, using a part of the remained equipment.

VI. ENVIRONMENTAL IMPACT OF THE CFC 11, CFC 12 AND HALON 2402 PRODUCTION CLOSURE PLAN IMPLEMENTATION

The main environmental impact of the CFC 11/12 and halon 2402 production Closure Plan at OJSC "Halogen" is increase of waste of this production. All the wastes and residuals have the same volume and content with the wastes generated during regular maintenance of the given production process. Treatment and disposal of these wastes will be carried out in accordance with Permits of the State Committee of Perm Oblast on Environmental Protection. Removal, handling, transportation and disposal of wastes will be carried out in accordance with regulatory documents. As the pre-investment studies have shown, such waste includes the following:

(1) 60 tons of carbon tetrachloride located at the bottom of tanks. As the Enterprise does not plan to utilize this stock for organization of new production, any residual material will be incinerated. The capacity of furnaces is sufficient for burning of this stock.

(2) 50 tons of tetrafluorethylene (monomer 4), released after Closure Plan implementation, should be burnt in the incinerator till the Enterprise will find other application for it. The capacity of incineration facility is sufficient for incineration of stocks of tetrafluorethylene and carbon tetrachloride.

(3) Spent antimony catalyst amount will increase at washing of reactors for the purpose of their removal. In view of refusal of the catalyst supplier to accept it back, the Enterprise plans to transfer a part of it for disposal in a specially equipped secure storage facility located on territory of «Iodobrom» plant.

(4) Acid washing waters, which volume will increase in the first three months of the Closure Plan implementation will be treated in the neutralization shop. The Capacity of the chop and sludge lagoons is sufficient for processing this flow of wastewater.

VII. ENVIRONMENTAL AND RELATED SOCIAL CONSEQUENCES OF THE CLOSURE PLAN IMPLEMENTATION

The developed by the Enterprise the Closure Plan was considered and is agreed by State Committee on Environmental Protection of the Perm oblast (Attachment 17)

Social consequences of the Closure Plan implementation

Employment problems. About 2700 persons work at OJSC "Halogen". The Enterprise is stable and almost did not dismiss workers during the last 10 years. Directly in CFC 11/12 and halon 2402 production 240 persons (165 and 75 persons respectively) were engaged at OJSC "Halogen". In 1997, preparing measures for transfer to production of ozone-safe coolants and halons, the Enterprise began redistribution of labour force inside the main and auxiliary productions. 85 persons, in main, of low-skill staff, were relocated. For the Closure Plan implementation (removal of equipment, washing, cutting off of devices, waste disposal, etc.), 155 persons will remain in shops of production and filling of CFC 11/12 and halon 2402, which hereinafter will work in the same shops at production of CFC 22, halon substitutes, or reassigned into other productions after proper training.

Impact on health of the workers. The risks of the Closure Plan impact on health of workers are only related to probability of labour safety violation. The responsibility for it bears the Enterprise and the monitoring is realized by the Labour Safety Service.

Public participation. At preparation of the Closure Plan, during pre-appraisal mission, the Enterprise has held the first meeting with the representatives of public, during which the main aspects of the Closure Plan and possible environmental and social consequences of its realization were discussed (Attachment 18). The arrangements were made on organization of environmental monitoring of fulfillment of measures included in the Closure Plan. It was also proposed to illuminate in mass-media the progress of the Closure Plan implementation.

Environmental Consequences of the Closure Plan Implementation

The realization of the ODS Production Closure Plan at OJSC "Halogen" is carried out according to the Resolution of the Government of the Russian Federation "On prime measures for fulfillment of the Vienna Convention on ozone layer protection and Montreal Protocol" and under the London Addendum to the Montreal Protocol on ozone layer depleting substances. Besides, positive long term environmental consequences of realization of the given plan will be:

- termination of air emissions of pollutants related to ODS production;
- reduction of volumes of acid wastewater and, as a consequence, reduction of chloride discharges into the Kama River;
- reduction of volumes of solid industrial wastes arriving to the landfill and sludge lagoon 1-5.

Within the funds received for the Closure Plan implementation, the Enterprise can realize a number of nature protection measures related to cleaning of the territory from pollution and to strengthen the nature protection service by modern monitoring devices.

VIII. ENVIRONMENTAL MANAGEMENT PLAN AT THE CLOSURE PLAN IMPLEMENTATION

Mitigation measures. At implementation of the Closure Plan, the Enterprise is going to realize the following measures on the environment quality management at CFC 11/12 and halon 2402 production:

- cleaning of the main and auxiliary ODS process equipment;

- treatment of wastewater formed at washing and neutralization of the main and auxiliary process equipment;
- utilization of unused raw products;
- collection and removal of waste from the process equipment dismantling.

The Environmental Management Plan was developed to monitor compliance with nature protection requirements and requirements to management of economic activity. The plan consists of two parts:

- measures on fulfillment of nature protection requirements (Attachment 19); and
- verification of compliance with the indicated measures (Attachment 20).

In addition to environmental aspects, the Plan includes such social aspects as obligatory employment of workers dismissed at ODS production closing, their retraining for relocation into new productions, etc.

The indicated measures on environmental quality management are included into the Closure Plan, which will provide the integration of economic and nature protection activity of the Enterprise.

Environmental monitoring. The ODS production closure monitoring at OJSC "Halogen" is assigned to the State Committee on Environmental Protection of Perm oblast by the Order of Goscomecology No 306 June 07, 1999.

IX. ENVIRONMENTAL RISKS

The environmental risks at the Closure Plan implementation relate to waste utilization (wash wastewater, waste antimony-containing catalyst, incineration of chlorine-fluorine organic compounds).

The indicated operations are executed by the Enterprise according to the operating standards and rules of State Mining and Technical Control of Russia and are also inspected by the Labour Safety Department of OJSC "Halogen".

XI. CONCLUSIONS

The conducted environmental assessment of the Closure Plan at OJSC "Halogen" allows to make conclusions that:

- sources of environmental impact of ODS production are completely revealed;
- measures included in the Closure Plan will allow the Enterprise to liquidate available sources of negative impact and to realize a number of nature protection measures;
- environmental consequences of the Closure Plan implementation are related to ODS production closure and to improvement of the environmental situation at the Enterprise and in Perm due to reduction of technogenous load on the environment;
- social consequences of the Closure Plan implementations related to the problem of employment of workers, engaged in ODS production, are resolved due to redistribution of the staff inside the Enterprise;
- Environmental Management Plan, designed within the framework of the ODS Production Closure Plan at OJSC "Halogen" will allow Goscomecology of Russia to

realize monitoring of the progress of realization of measures included in the Closure Plan.

XII. RECOMMENDATIONS

The Enterprise should finish preparation of the justifying documentation for closing the ODS production and to submit it to the State Environmental Review to the State Committee on Environmental Protection of the Perm oblast.

Leading Expert in Environmental Assessment

NPAF ED Irina D. Gorkina

ATTACHMENTS TO MATERIALS ON ENVIRONMENTAL ASSESSMENT OF THE OZONE DEPLETING SUBSTANCES (FREON - 11, FREON - 12, HALON - 2402) PRODUCTION CLOSURE PLAN AT OJSC «HALOGEN»

Perm

Attachment 19

ENVIRONMENTAL MANAGEMENT PLAN UNDER OZONE DEPLETING SUBSTANCES PRODUCTION CLOSURE PLAN IMPLEMENTATION AT OJSC «HALOGEN»

Environmental Management Plan under ODS production Closure Plan implementation at OJSC «Halogen»

No	Activity on production closure	Description	Deadline Month/Yr
	CFC-11/12		
1.	Recovery of catalyst from reactors P_{1-5}	Antimony catalyst will be placed into hazardous wastes secure storage facility at JSC «Iodobrom». Waste water from the process of catalyst neutralization will be treated in neutralization shop and fed to sludge lagoon No 6	10/00
2.	Process equipment wash water	Wash water from cleaning process equipment will be will be treated in the complex's waste water management system before release.	10/00
3	Disposal of CTC residues and feedstock inventory	Inventory CTC feedstock and residues from tanks will be collected for incineration in the OJSC «Halogen»'s high temperature liquid injection incineration facility	9/00
	Halon 2402		
4.	Disposal of bromine residues	Removal of bromine residues from storage tanks and transfer for utilization in JSC «Halogen»'s associated enterprise involved in bromine production.	8/00
5.	Management of excess relief tetrafluoroethylene (TFE)	TFE produced as a by-product within the complex and which is incinerated will increase upon close of Halon 2402 production up to 50 tonnes annually. The incineration will be done in the JSC 'Halogen»'s high temperature liquid injection incineration facility, operating under permits from the Permj Oblast State Committee for Environmental Protection.	Ongoing
6.	Public and staff consultation	Public consultation on the closure activities will be undertaken in the local community with the involvement of local NGO's and the local branches of the State Committee for environmental Protection. This will involve a project announcement inviting input, public meetings, and dissemination of information. Regular information sessions with the staff from shops to be closed will continue to be undertaken on the issues of requalification and placing in job.	Ongoing

7.	Local regulatory approvals	Submit the Closure Plan substantiation documentation for the State Environmental Expertise. Approval of this by the State environmental expertise process is understood to be a condition of sub-grant effectiveness.	9/1/00

CLOSURE VERIFICATION PLAN - CFC 11/12 PRODUCTION SHUT DOWN AT OJSC «HALOGEN»

Closure Verification Plan – CFC-11/12 Production Shut Down at JSC «Halogen»

No	Activity on production closure	Description
	CFC-11/12	
1	Recovery of catalyst	Verify by physical inspection the removal antimony catalyst from synthesis reactors P_{1-5}, and its storage in secure, permitted, hazardous materials storage facility at «Iodobrom». Verify by record inspection that permits are current for this facility and inspect environmental monitoring data applicable to the facility.
2.	Process equipment wash water removal	Verify disposal of wash water used for equipment cleaning, as well as availability of permits for wastewater transfer to sludge lagoon No 6-7.
3.	Disposal of CTC residues and feedstock inventory	Verify the incineration of CTC feedstock inventory and residues in the JSC 'Halogen»'s high temperature liquid injection incineration facility, and inspect regulatory permits and environmental performance records applicable to the operation of this facility when this disposal occurs.
	Halon 2402	
	Management of excess relief tetrafluoroethylene (TFE)	Inspect the JSC 'Halogen»'s high temperature liquid injection incineration facility and examine general TFE generation records related to its disposal, including regulatory compliance and environmental performance data
4.	Public and staff consultation	Review information on public consultations carried out, execution of wishes, etc., including contact as appropriate with local authorities, NGO's and staff.
5.	Social Impacts	Review current employment records related to current staffing of CFC-11/12 and Halon 2402 production and the re-assignment of staff as applicable.
6.	Regulatory Compliance	1. Review regulatory permits for CFC-11/12 and Halon 2402 production applicable to all operations with ODS production wastes controlled by the State Committee for Environmental Protection. Consult with the local branches of the State Committee for Environmental Protection respecting compliance with applicable permits related to the CFC-11/12 and Halon 2402 production and waste management facilities utilized in their closure. 2. Verify availability of approval of the State Environmental Expertise for ODS production Closure Plan documentation