

FORM-V

[See rule 14]

Environmental Statement for the financial year 2022-23

Part -A

(i)	Name and address of the owner / Occupier of the Industry operation or process.	Mr. Pankaj Kumar Sharma Director (Production) Nalco Bhawan, P/1, Nayapalli, Bhubaneswar – 751013
(ii)	Industry Category Primary (STC Code Secondary) (SIC Code)	RED 'A'
(iii)	Production Capacity-Unit.	Aluminium metal: 4.60 lakh MT/year
(iv)	Year of Establishment.	1981
(v)	Date of last Environment statement submitted.	09.09.2022

Part –B**Water and Raw Material Consumption:****1. Water Consumption M³/day**

Process water	64.27 M ³ /day
Cooling water (Includes recycled water)	2718.99 M ³ /day
Domestic water	2176.25 M ³ /day

Sl. No.	Name of Product	Fresh Water consumption per unit of product (Domestic+Cooling+Process)	
		During the financial year (2021-22)	During the financial year (2022-23)
01	Cast Aluminium Metal (Cast Ingot, Sow ingot, Tee ingot, Wire rods, Billet, Rolled product & Anode stems.)	3.509 M ³ /MT	3.375 M ³ /MT

Sl. No.	Name of Product	Water consumption per unit of product (Domestic+Cooling+Process+Recycled water)	
		During the financial year (2021-22)	During the financial year (2022-23)
01	Cast Aluminium Metal (Cast Ingot, Sow ingot, Tee ingot, Wire rods, Billet, Rolled product & Anode stems.)	4.198 M ³ /MT	3.935 M ³ /MT

2. Raw Material Consumption:

SL. No.	Name of raw materials	Name of the product Aluminium	Consumption of raw material per unit of output	
		Unit	During the year (2021-22)	During the year (2022-23)

01	Alumina	Kg/Ton	1919.4	1979.3
02	C.P Coke	Kg/Ton	382.3	381.4
03	C.T Pitch	Kg/Ton	95.7	95.2
04	Aluminum Fluoride	Kg/Ton	17.4	18.4
05	H.F.O	Ltr/Ton	64.2	65.5
06	DC Power	KWH/Ton	13446.8	13351.1

Part -C

Pollution discharged to Environment / unit of output (Parameters as specified in the consent issued):

1. Pollutant	Quantity of pollutant discharged (mass/day) During the year (2022-23)	Concentrations of pollutants in discharges (mass/ volume) mg/l. During the year (2022-23)	Percentage of variation from prescribed standards with reasons
(a) Water	Nil	Zero discharge system is implemented at Smelter, NALCO (Recycled inside plant for Fire use, compressor cooling, cooling tower make-up, anode cooling, vehicle washing, gardening and civil construction.	NA
(b) Air			
(i) Fluoride emission from Pots through stacks of FTP	215.5 kg/day (Prescribed limit: 380.3 kg/day)*	1.456 mg/Nm³ per stack (average of 8 stacks)	Meets the prescribed standard
(ii) Particulate emission from Pots through stacks of FTP		30.251 mg/Nm³ per stack (average of 8 stacks) (Prescribed CTO Norm: 100 mg/ Nm ³ per stack.)	
(iii) Fluoride emission from Bake Oven stacks (FTC)	15.2 kg/day (Prescribed limit: 126.8 kg/day)**	1.667 mg/ Nm³ (average of Bake Oven I & II)	
(iv) Particulate emission from Bake Oven stacks (FTC)		32.150 mg/ Nm³ (average of Bake Oven I & II) (Prescribed CTO Norm: 50 mg/ Nm ³ per stack)	
(v) Fugitive fluoride emission from Pot rooms	305.5 kg/Day (Prescribed limit: 507.0 kg/day)***	1.159 mg/ Nm³	
(vi) Total Fluoride Emission {Sum of (i)+(iii)+(v)}	536.2 kg/Day (Prescribed limit: 1014.1 kg/day)****		

* On the basis of CTO Norm 0.3 Kg/T, (considering Hot metal produced 462668 MT in 365 days)

** On the basis of CTO Norm 0.1 Kg/T, (considering Hot metal produced 462668 MT in 365 days)

*** On the basis of CTO Norm 0.4 Kg/T, (considering Hot metal produced 462668 MT in 365 days)

**** On the basis of EC Norm 0.8 Kg/T, (considering Hot metal produced 462668 MT in 365 days)

Part -D

Hazardous Waste: As specified under Hazardous & Other Wastes Rules 2016

a) Generated from Process	Authorised Quantity (MT)	Total Quantity	
		During the financial year (2021-22)	During the financial year (2022-23)
Cathode residues including pot lining waste	6000	4290 MT	2310 MT
Asbestos waste	45	7.313 MT	9.307 MT

Coke dust	800	150.48 MT	194.15 MT
Green anode cooling decantation tank sludge	5	3.5 MT	4.5 MT
Drain cleaning sludge (Potline area and Rodding Shop area)	24	23 MT	21 MT
Rejected lining of furnace	7525	4210.25 MT	5653.01 MT
Floor sweeping waste			
Shot blasting waste			
Ladle cleaning residues	600	153 MT	132 MT
Wastes/residues containing oil	180	23.9 MT	65.06 MT
Tar containing wastes	100	0	30 MT
Empty barrels/containers/ liners contaminated with hazardous chemicals/ wastes	1000	0	NIL
Aluminum dross	10000	8515 MT	9669.8 MT
Spent copper catalyst	0.15	0.2 MT	0
Rejected ALF ₃ bags	35	147289 Nos. (146109 small & 1180 large)	33.026 MT
Green anode ridge waste	6000	3048 MT	4765 MT
Carbon anode baking waste	24	4 MT	4 MT
Spent Anode	70000	64609 MT	69895 MT
Cotton and other residual waste	25	1.41 MT	0.66 MT
Used or Spent oil	1000	263.355 MT	85.725 MT
b) Generated from Pollution control facilities			
Incineration Ash	50	18.12 MT	11.481 MT
Spilled waste FTP	1200	402.5 MT	600 MT
Rejected filter bags(FTP)	50	20.444 MT	15.601 MT
Spent Ion-exchange resin containing toxic metal	10	0	6 MT
Chemical sludge from Waste water treatment	10	0	8.62 MT
Flue gas dust & Other particulates	15	1.5 MT	2 MT

Part –E

Solid Waste

		Total Quantity	
		During the financial year 2021-22	During the financial year 2022-23
a)	Generated from process		
	(i)Ferrous Scrap which includes Used Automobile part, Used Multiple cut Bearings, Used Sow moulds (Cast Iron), Used CI metal tapping pipe, Used GI Sheets, Used Mild Steel Scrap/Miscellaneous, Used MS Pallets, Used & Scrap MS Cathode Bar, Used MS cut pins, Used steel brackets	1650.535MT	1367.375 MT
	(ii)Non Ferrous Scrap which includes Used Aluminums sheets, Used damaged HDPE/LDPE Bags, Used Rubber tubes of Pneumatic Tyres, Used Rubber Items (tube, hose, flap etc.), Used Pneumatic Tyres, Used solid Tyres	715.38 MT	8.2 MT
b)	From pollution control facility:	Nil	Nil
c)	(i)Quantity recycled or neutralized within the unit	6321 MT	3457 MT
	(ii)Sold (Ferrous & Non-ferrous)	41801 MT	31506 MT
	(iii)Disposed	1737 MT	2064 MT

Part –F

Please specify the characterizations (in terms of composition and quantum) of hazardous as well as solid wastes and indicate disposal practice adopted for both these categories of wastes: (Enclosed at Annexure-1)

Part – G

Impact of the pollution abatement measures:

1. On conservation of natural resources: Given in Annexure -2

Cost impact includes: The total expenditure towards pollution control measures during the year **2022-23** has been **Rs 78,75,99,768 /-.**

Part –H

Additional measures/investment proposal for environmental protection including abatement of pollution /prevention of pollution:

Surface Water Management:

- Surface run-off and effluent generated inside Smelter Plant is being treated for removal of fluoride at Ion-exchange Defluoridation (DF) Plant & Emrion Nano DF Plant (ETPs). Treated water is being reused as cooling water make-up and for anode cooling, vehicle washing, civil construction & horticulture purpose.
- The sewage generated in canteen and toilets is being treated at Sewage Treatment Plant (STP) by using a modified activated sludge process. The treated water from STP is reused for anode cooling vehicle washing, gardening etc. after treatment in ETPs.
- Augmentation of Emrion Nano Defluoridation Plant from 1.0MLD to 2.0MLD in 1st phase and 2.0MLD to 3.0MLD in 2nd phase for treatment of fluoride contaminated surface run off & subsequent recycling as cooling water is under progress which is 1st of this kind in the world in such a huge scale having zero reject and negligible sludge.
- Installation of ETP with recirculation system near watch tower No. 23 project is under administrative approval stage.
- Installation of online flow measuring device with digital display and data recorder at Drain-1, 2 & 3 is in progress.
- Installation of HD IP camera and Online Fluoride Monitoring System at the Outlet of Holding Pool-1 is under administrative approval stage.
- 10 nos. Flow meters have been installed in canteen water supply line to monitor and control consumption of drinking water at Canteens.

Air Pollution Control:

- Previously Online Laser Based Fugitive Fluoride Monitoring Systems had been installed only in Pot line IV. In the year 2022-23, installation and commissioning of Online Laser Based Fugitive Fluoride Monitoring Systems in Pot line I, II & III have been completed and are in operation. Online monitoring data is being uploaded to OSPCB Server.
- Installation and commissioning of Online SO₂ monitoring system in Bake oven stacks (FTC-1 & 2) completed with linking to OSPCB Server.
- Installation of Online monitoring of flow, temperature and velocity of flue gas in stacks is under process.

- Re-calibration and data validation of PM-CEMS for Star Rating Programme carried out in June 2022 and Feb 2023 for ten major stacks (FTP-1 to 8 attached to Potline & FTC-1 to 2 attached to Bake Oven) and submitted to OSPCB.
- Vacuum cleaning of dust by mechanized sweeping machines from the floors of Pot Room and Carbon Area is being carried out on regular basis to reduce the fugitive emission of dust and same is recycled in the process.
- Regular Contract has been engaged in Carbon Area for maintaining housekeeping and to prevent fugitive emission of dust.
- Additional mechanical sweeping Contract has been initiated for one small and one bigger sweeping machine for cleaning of internal roads and all work zone areas to reduce the fugitive emission of dust.
- Nalco Smelter has taken initiatives for efficiency study of all De-dusting Units of Rodding Shop I & II for better controlling of fugitive emission of dust which is in progress.
- Initiation taken for installation of De-dusting Unit at the downstream of Green Anode Plant (GAP) for better controlling of fugitive emission of dust which is in progress.
- Additional new contract has been initiated for study and monitoring of Butt & Bath handling system at Rodding Shop I & II to control fugitive emission of dust.
- Revamping of Conveyor De-dusting system of P1, P2 & P3 in Bath section has been initiated for better controlling of fugitive emission of dust.

Hazardous Waste Management:

- Segregation of Carbon and Refractory portion of SPL separately is being carried out as per the direction of OSPCB and stored separately under shed. Carbon portion of SPL has is regularly being disposed to M/S Green Energy Resources, Sambalpur. Permission for disposal of refractory and mixed fines of SPL in CHWTSDF is obtained from OSPCB. Process has been initiated for disposal of refractory and mixed fines of SPL in CHWTSDF which is under progress.
- A fresh contract for disposal of 8000 MT of SPL (Carbon Portion) has already been initiated and it is under process.
- Most of the dross generated is recycled into the smelting process which is inbuilt into the system. Left out stock dross is being sold to authorized recyclers.
- Wastes/ residues containing oil such as used emulsion filter paper from Cast House-A, used filter paper, filter spent materials and roll grinder debris from Rolling Plant, used vehicle oil filters from MES, oil soaked cotton waste from all mechanical maintenance departments and used AlF₃ jumbo bags from Potline are regularly being disposed at Captive Hazardous Waste Incinerator.
- The other hazardous waste includes floor sweeping waste, shot blasting waste & rejected lining of furnace from carbon plant are regularly being disposed to M/s Resustainability Ltd., Jajpur (operator of Common Hazardous Waste Landfill). Hazardous waste such as asbestos waste and ladle cleaning residues from Potline are also disposed to common hazardous waste landfill at Jajpur.

- Various types of used oils generated in the plant (e.g. emulsion oil, transformer oil and hydraulic oil) are also coming under hazardous waste. The used oils are stored in barrels on concrete floor under cover shed for periodical disposal to the authorized recyclers.
- Discarded empty barrels (hazardous waste) are being disposed to authorized recycler.
- Third party Audit on hazardous waste management in Smelter Plant for the year 2022-23 has been conducted by M/s Sun Consultancy and Services, an ISO 14001 Certified body and audit report has been submitted to OSPCB.
- ESA-II and contaminated sites remediation Study has been completed by M/s NEERI, Nagpur.
- Performance evaluation & monitoring of ground water around secured landfill is being conducted as per the protocol in line with the guideline of CPCB by engaging an external agency empanelled with OSPCB. The results of contaminant levels are within norm.

Part-I

Any other particulars for improving the quality of environment:

Plantation :

- a) **Inside Smelter:** NALCO's Smelter Plant is situated by the NH-55 road covers an area of approximately 1030 acres of land. Out of the total area, more than 33% of land is covered by thick plantations with suitable plant species. The plant is surrounded by a thick green belt planted as per the design of Roorkee University. The plantation consists of mostly broad-leafed species like Ficus, Teak, Pterospermum, Gamhari etc. in order to absorb the dust and gaseous pollutants. The available vacant areas in between the office buildings, workshops are also taken up with buffer plantations. In the year **2022-23**, total **3,278** nos. of saplings were planted in & around Smelter Plant. As on **31.03.2023** the cumulative total of **17, 66, 785** nos. of trees have been planted with survival rate of **69.10%** in Smelter and Township. As prescribed, plantation density of 1000 trees per acre is maintained.
- b) **Peripheral Plantation:** Nalco as a responsible Corporate Citizen has taken the responsibility of developing social forestry in the periphery villages involving Villagers and the local youths. To generate environmental awareness, saplings of forest and Fruit Plants are being distributed every year among the villagers to plant in their home yards, Clubs, Temples, Schools premises in the surrounding villages like Balaramprasad, Kukudang etc. In the year **2022-23**, total 650 nos. of avenue plantation have been done.
- c) **Free distribution of seedlings:** Apart from plantation activities, free distribution of seedlings to various clubs, schools, NGOs, Associations, Panchayat offices, Yubak Sangha and other philanthropic organization. In the year **2022-23**, total **12700** nos. of saplings were distributed in periphery areas.

SOURCE, WASTE CHARACTERISTICS & DISPOSAL PRACTICE

Sl. No	Description of waste	Source	F (In mg/l)	CN (in mg/l)	Others	Disposal Practice
01	Used or Spent oil	All Mech. Sections, Cast House, 220 KV S/S	-	-	Mineral oil	Sold to authorized recyclers.
02	Wastes/ Residues containing oil	All Mech. Maint. Shops, Cast House, Rolling Plant	1.6	Not Detected	Contaminated with Mineral oil	Incinerated in Hazardous Waste Incinerator.
03	Cathode residues including potlining wastes	Potlines			-	Stored in covered sheds on concrete floor. Since Feb' 2016 refractory portion & Carbon portion of SPL are segregated and stored separately under shed. a) Carbon portion of SPL is being disposed to Authorized recyclers. b) Permission for disposal of refractory and mixed fines of SPL in CHWTSDf is obtained from OSPCB. We are in the process to dispose the same in CHWTSDf.
	a) Carbon portion of SPL	Potlines	2300	39.2	---	
	b) Refractory Portion of SPL	Potlines	28.4	0.8	---	
	c) Mixed fines of SPL	Potlines	150	1.1	---	
04	Tar containing wastes	GAP	11	<1.0	-	Disposed in CHWTSDf at Sukinda.
05	Chemical sludge from waste water treatment.	DF Plant	28	<1.0	-	Disposed in secured landfill inside the plant premises.
06	Flue gas dust and other particulates.	Bake oven	556	-	-	Recycled in anode making.
07	Spent copper catalyst	Cast House Mech.	0.29	<1.0	-	Disposed in secured landfill inside the plant premises.
08	Rejected filter bags(FTP)	FTP of Potlines	46	<1.0	-	Incinerated in house in the pots for fluorine recovery.
09	Asbestos waste	Potlines	110	Not Detected	-	Disposed in CHWTSDf at Sukinda.
10	Coke dust	Bake Oven	1800	< 1.0	-	Recycled in the process.
11	Spent Ion-exchange resin containing toxic metal	DF plant	3.8	<1.0	-	Disposed in secured landfill in the plant premises.
12	Green anode ridge waste	GAP	353.4	-	-	Recycled in the anode making process.
13	Green anode cooling decantation tank sludge	GAP	150	<1.0	-	Recycled in the anode making process.
14	Carbon anode baking waste	Bake Oven	5347.3	113	-	Recycled in the anode making process.
15	Drain cleaning sludge	Rodding Shop & Potline area	19	<1.0	-	Disposed in secured landfill in the plant premises.
16	Ladle cleaning residues	Potlines	110	Not Detected	-	Disposed in CHWTSDf at Sukinda.
17	Spilled waste (FTP)	Potlines	11332.68	-	-	Recycled in the process.
18	Incineration ash	HW Incinerator	28	Not Detected	-	Disposed in secured landfill inside the plant premises.
19	Spent Anode	Rodding shop	50.2	3.2	-	Recycled in the process.
20	Floor sweeping waste	Carbon Area	9800	<1.0	-	Disposed in CHWTSDf at Sukinda
21	Shot blasting waste	Rodding Shop	22500	< 1.0	-	Disposed in CHWTSDf at Sukinda.
22	Rejected ALF ₃ bags	Potlines	36	<1.0	-	Incinerated in the Pots/ Hazardous Waste Incinerator.
23	Aluminum dross	Cast House, Rolling Plant & Potline	41.0	0.09	-	Recycled in the process of bath making/Anode covering. Legacy stock sold to authorized recyclers.
24	Rejected lining of furnace	Rodding shop	300	-	-	Disposed in CHWTSDf at Sukinda.

25	Empty barrels/containers /liners contaminated with hazardous chemicals / wastes	Scrap & Salvage	-	-	-	Disposal to authorized recycler of OSPCB through E Auction.
26	Cotton and other residual waste	All mech. Sections	62	<1.0	-	Incinerated in Hazardous Waste Incinerator.

Annexure-2

Table below shows impact of pollution control measures taken on conservation of resources.

AIR EMISSION	POLLUTION CONTROL MEASURES TAKEN	NORM	STATUS 2022-23
(i)Fluoride Emission from Pots through stacks of FTP	Fume treatment plants (FTP): Adsorption of fluorine by fresh alumina through dry scrubbing technology & recycling the charged fluorinated alumina to pots.	0.3 Kg/T of Al. produced	0.170 Kg/T of Al. produced
(ii)Particulate emission from Pots through stacks of FTP	Controlled through bag houses in FTPs The flue gas dust is recycled into the pots.	100 mg/ Nm ³	30.251 mg/Nm ³
(iii)Fluoride emission from Bake oven Stacks (FTC)	Fume Treatment Centers (FTC), adsorption of fluorine by fresh alumina through dry scrubbing technology & recycling the charged fluorinated alumina to pots.	0.1 Kg/T of Al. produced	0.012 Kg/T of Al. produced
(iv)Particulate emission from Bake oven stacks.(FTC)	Controlled through bag houses in FTCs. The flue gas dust is recycled into the pots.	50 mg/ Nm ³	32.150 mg/Nm ³
(v)Fugitive fluoride emission from Pot rooms	Air tight hooding system & applying negative pressure by fans through FTP	0.4 Kg/T of Al. produced	0.241 Kg/T of Al. produced
(vi)Total Fluoride Emission {Sum of (i)+(iii)+(v)}	All of the above.	0.8 Kg/T of Al. produced	0.452 Kg/T of Al. produced
(vii)Poly Aromatic Hydrocarbon emission from Bake oven stacks (PAH)	Fume treatment centers (FTC).	2 mg/ Nm ³	<0.2 mg/ Nm ³

IMPACT OF DEFLUORIDATION PLANT IN WATER POLLUTION CONTROL AND MEASURES TAKEN ON CONSERVATION OF RESOURCES

PARAMETERS	POLLUTION CONTROL MEASURES TAKEN	NORM	STATUS 2022-23
Fluoride as F	Contaminated surface run-offs are collected in three Holding pools of capacity 100000 M ³ , 51000 M ³ & 38000 M ³ . This water is treated in ion exchange Defluoridation plant and EMRION NANO Defluoridation plant. Treated water is used for cooling tower make-up, anode cooling, vehicle washing, gardening and civil construction.	2.0 mg/l	0.66 mg/l

IMPACT OF TREATMENT OF EFFLUENT IN STP (SMELTER PLANT)

PARAMETERS	POLLUTION CONTROL MEASURES TAKEN	NORM	STATUS 2022-23
pH	Domestic water from canteen & toilets are collected in a sump of STP through dedicated piping network where it is treated by activated sludge process. The treated water from STP is reused for cooling tower make-up, anode cooling, vehicle washing, gardening and civil construction after treatment in ETPs.	6.5 to 9.0	7.13
Suspended Solids		<100 mg/l	7.83
BOD 3days at 27 °C		<30 mg/l	2.67
Fecal Coliform		100 MPN/100 ml	70.08

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