

FORM-V

[See rule 14]

Environmental Statement for the financial year 2023-24

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: 4.80 lakh MT/year
(iv)	Year of Establishment.	1981
(v)	Date of last Environment statement submitted.	16.09.2022

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

Process water	71.18 M ³ /day
Cooling water (Includes recycled water)	2792.12 M ³ /day
Domestic water	2239.14 M ³ /day

Sl. No.	Name of Product	Fresh Water consumption per unit of product (Domestic+Cooling+Process)	
		During the financial year (2022-23)	During the financial year (2023-24)
01	Cast Aluminium Metal (Cast Ingot, Sow ingot, Tee ingot, Wire rods, Billet, Rolled product & Anode stems.)	3.375 M ³ /MT	3.386 M ³ /MT

Sl. No.	Name of Product	Water consumption per unit of product (Domestic+Cooling+Process+Recycled water)	
		During the financial year (2022-23)	During the financial year (2023-24)
01	Cast Aluminium Metal (Cast Ingot, Sow ingot, Tee ingot, Wire rods, Billet, Rolled product & Anode stems.)	3.935 M ³ /MT	4.030 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 (2022-23)	During the year (2023-24)
01	Alumina	Kg/Ton	1979.3	1947.4
02	Aluminum Fluoride (AlF ₃)	Kg/Ton	18.4	19.7
03	H.F.O	Ltr/Ton	65.5	65.5
04	C.P Coke	Kg/Ton	381.4	391.7
05	C.T Pitch	Kg/Ton	95.2	93.6
06	DC Power	KWH/Ton	13351.1	13276.1

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 (2023-24)	Concentrations of pollutants in discharges (mass/ volume) mg/l. During the year (2023-24)	Percentage of variation from prescribed standards with reasons
(a) Water	Nil	Zero discharge system is implemented at Smelter, NALCO (Recycled inside plant for Cooling tower make-up, anode cooling, vehicle washing, gardening, civil construction, Firefighting and compressor cooling.)	NA
(b) Air			
(i) Fluoride emission from Pots through stacks of FTP	208.6 kg/day (Prescribed limit: 379.2 kg/day)*	1.39 mg/Nm ³ per stack (average of 8 stacks)	Meets the prescribed standard
(ii) Particulate emission from Pots through stacks of FTP		31.767 mg/Nm ³ per stack (average of 8 stacks) (Prescribed CTO Norm: 100 mg/ Nm ³ per stack.)	
(iii) Fluoride emission from Bake Oven stacks (FTC)	17.7 kg/day (Prescribed limit: 126.4 kg/day)**	1.646 mg/ Nm ³ (average of Bake Oven I & II)	
(iv) Particulate emission from Bake Oven stacks (FTC)		34.338 mg/ Nm ³ (average of Bake Oven I & II) (Prescribed CTO Norm: 50 mg/ Nm ³ per stack)	
(v) Fugitive fluoride emission from Pot rooms	265.5 kg/Day (Prescribed limit: 505.6 kg/day)***	0.82 mg/ Nm ³	
(vi) Total Fluoride Emission {Sum of (i)+(iii)+(v)}	490.5 kg/Day (Prescribed limit: 1011.3 kg/day)****		

* On the basis of CTO Norm 0.3 Kg/T, (considering Hot metal produced 467042 MT in 365 days)

** On the basis of CTO Norm 0.1 Kg/T, (considering Hot metal produced 467042 MT in 365 days)

*** On the basis of CTO Norm 0.4 Kg/T, (considering Hot metal produced 467042 MT in 365 days)

**** On the basis of CTO Norm 0.8 Kg/T, (considering Hot metal produced 467042 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 2022-23 (MT)	During the financial year 2023-24 (MT)
Cathode residues including pot lining waste	6000	2310	1925
Asbestos waste	45	9.307	38.269
Coke dust	800	194.15	184.69
Green anode cooling decantation tank sludge	5	4.5	5
Drain cleaning sludge (Potline area and Rodding Shop area)	24	21	22.08
Floor sweeping waste	7525	5653.01	4672.27
Shot blasting waste			
Rejected lining of furnace			
Ladle cleaning residues	600	132	176.25
Wastes/residues containing oil	205	65.72	75.22
Tar containing wastes	100	30	85
Empty barrels/containers/ liners contaminated with hazardous chemicals/ wastes	1000	0	34
Aluminum dross	10000	9669.8	9972.434
Spent copper catalyst	0.15	0	0
Rejected ALF ₃ bags	35	33.026	26.483
Green anode ridge waste	6000	4765	4042.6
Carbon anode baking waste	24	4	4
Spent Anode	70000	69895	76729
Used or Spent oil	1000	85.725	134.275
b) Generated from Pollution control facilities			
Incineration Ash	50	11.481	9.59
Spilled waste FTP	1200	600	637.5
Rejected filter bags(FTP)	50	15.601	28.436
Spent Ion-exchange resin containing toxic metal	10	6	0
Chemical sludge from Waste water treatment	10	8.62	0
Flue gas dust & Other particulates	15	2	1.5

Part –E

Solid Waste

		Total Quantity	
		During the financial year 2022-23 (MT)	During the financial year 2023-24 (MT)
a)	Generated from process		
	(i) Ferrous Scrap which includes:		
	Used Automobile part, Used Multiple cut Bearings, Used Sow moulds	1367.375	1878.9

	(Cast Iron), Used CI metal tapping pipe, Used G I Sheets, Used Mild Steel Scrap/Miscellaneous, Used M S Pallets, Used & Scrap MS Cathode Bar, Used MS cut pins, Used steel brackets.		
	(ii) Non Ferrous Scrap which includes: Used Aluminium sheets, Used Electrical scrap items, Used damaged HDPE/LDPE Bags, Used Rubber tubes, Used Rubber Items (tube, hose, flap etc), Used Pneumatic Tyres, Used solid Tyres, Used Unsegregated Electric Cable.	8.2	525.22
	(iii) Induction Furnace Slag	1066.491	3193.67
	(iv) Rejected / used refractory bricks	3457	4269.7
b)	From pollution control facility:	Nil	Nil
c)	(i) Quantity recycled or neutralized within the unit	3457	0
	(ii) Sold (Ferrous & Non-ferrous)	31506	2397.74
	(iii) Disposed	2064	0

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 2023-24 has been Rs 34,54,97,180 /-.

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 and recycled inside plant premises after treatment in ETPs.
- Online EQMS has been installed at the outlet of ETP for monitoring pH, F, BOD, COD & TSS. Real time online monitoring data are being uploaded to OSPCB Server.
- Proposal has been initiated for augmentation of waste water treatment Plant of capacity from 1 MLD to 2 MLD which is under administrative approval stage.
- Installation of ETP with recirculation system near watch tower No. 23 project is under way. Presently technical evaluation of vendors is in progress.
- Installation of online flow measuring device with digital display and data recorder at Drain- 2 completed. Placement of service contract for installation of flow meter at drain-1 & 3 is under way.

- Installation of HD IP camera and Online Fluoride Monitoring System at the Outlet of Holding Pool-1 is under way. PO has been placed to M/s Analyzer Instruments, Kota.
- 10 nos. Flow meters have been installed in canteen water supply line to monitor and control consumption of drinking water at Canteens which are working satisfactorily.

Air Pollution Control:

- Online CEMS (8 nos.) have been installed in the stack of FTP-1 to 8 of Potline for monitoring of stack emission for Fluoride and particulate matter. Real time online monitoring data are being uploaded to OSPCB Server.
- Online CEMS (2 nos.) have been installed in the stack of FTC-1 & 2 of Bake Oven for monitoring of stack emission for Fluoride and particulate matter. Real time online monitoring data are being uploaded to OSPCB Server.
- Online Laser Based Fugitive Fluoride Monitoring Systems have been installed in Pot line I, II, III & IV. Real time online monitoring data are being uploaded to OSPCB Server.
- Online SO₂ monitoring system have been installed in Bake oven stacks (FTC-1 & 2). Real time online monitoring data are being uploaded to OSPCB Server.
- Online CEMS has been installed in the stack of Hazardous Waste Incinerator for monitoring of stack emission. Real time online monitoring data are being uploaded to OSPCB Server.
- Online CAAQMS (4 nos.) have been installed in and around Smelter Plant for monitoring of ambient air quality. Real time online monitoring data are being uploaded to OSPCB Server.
- Installation of Online monitoring of flow, temperature and velocity of flue gas in stacks is under way.
- Re-calibration and data validation of PM-CEMS for Star Rating Programmme has been carried out in September 2023 and February 2024 for ten major stacks (FTP-1 to 8 attached to Potline & FTC-1 to 2 attached to Bake Oven) and reports 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.
- In GAP the Coke Handling area, Coke extraction de-dusting unit, replacement of mild steel bag house hopper with SS material completed along with new bags. Installation of another de-dusting system at the coke downstream of GAP 1 is under process.
- In the Butt de-dusting handling area, efficient study of P1, P2 & P3 has been conducted by OEM M/s DUCON.
- In Bath breaking and finishing m/c Handling Area, Study has been carried out by engagement of an expert agency M/s NIT Rourkela which is completed on 27.07.2023. Implementation of the recommendation to minimize the fugitive emission of dust is under way.

- Contract proposal for engagement of an expert agency for monitoring and maintenance of Butt Bath System at RS-II has been initiated which is in the process of Administrative approval.
- Vacuum Cleaning Machine at Rodding Shop-I has been revamped by OEM- M/s TPS during November and December 2023.
- Proposal has been initiated for engagement of one bigger mechanised floor sweeping machines for cleaning of internal road and work zone area of Carbon Area which is under way.

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 is regularly being disposed to M/S Green Energy Resources, Sambalpur and M/s Regrow Tanso Pvt. Ltd., Jharsuguda. Permission for disposal of refractory and mixed fines of SPL in CHWTSDF is obtained from OSPCB. Proposal has been initiated for disposal of refractory and mixed fines of SPL which is under Administrative approval stage.
- 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 and filter spent materials from Rolling Plant, used vehicle oil filters from MES, oil soaked cotton waste from all mechanical maintenance departments and used AIF3 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 CHWTSDF). Hazardous waste such as asbestos waste, ladle cleaning residues and tar containing waste 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.
- As a part of compliance to the order of Hon'ble Supreme Court of India, Third Party Audit on Hazardous Waste Management in Smelter Plant for FY 2023-24 has been carried out by M/s Mitra S. K. Pvt. Ltd., 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. Excavation work at Site-1 is going on departmentally by PL (O) as a part of approved action plan.
- 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-leaved 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 **2023-24**, total **3010** nos. of saplings were planted in & around Smelter Plant. As on **31.03.2024** the cumulative total of **17, 69, 795** 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 **2023-24**, total **550 nos.** of avenue plantation have been done.
- c) **Free distribution of Sapling:** Apart from plantation activities, free distribution of Sapling is being carried out by Nalco to various clubs, schools, NGOs, Associations, Panchayat offices, Yubak Sangha and other philanthropic organization. In the year **2023-24**, total **15500** nos. of saplings were distributed in periphery areas.

Annexure -1

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 Captive Hazardous Waste Incinerator.
03	Cathode residues including potlining wastes	Potlines			-	Stored in covered sheds on concrete floor. Since Feb' 2016 Carbon portion and refractory portion of SPL are being segregated and stored separately under shed.
	a) Carbon portion of SPL	Potlines	2300	39.2	---	a) Carbon portion of SPL is being

	b) Refractory Portion of SPL	Potlines	28.4	0.8	---	disposed to Authorized recyclers.
	c) Mixed fines of SPL	Potlines	150	1.1	---	b) Permission for disposal of refractory and mixed fines of SPL in CHWTSDF is obtained from OSPCB. Process has been initiated to dispose the same in CHWTSDF which is under Administrative approval stage.
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 Captive Secured Landfill.
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 Captive Secured Landfill.
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 Captive Secured Landfill.
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 Captive Secured Landfill.
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 Captive Secured Landfill.
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	-	-	-	Disposed to authorized recycler of OSPCB through E Auction.

Annexure-2

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

AIR EMISSION	POLLUTION CONTROL MEASURES TAKEN	NORM	STATUS 2023-24
(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	0.165 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	31.767 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	0.014 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	34.338 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	0.210 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	0.388 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 2023-24
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	0.63 mg/l

IMPACT OF TREATMENT OF EFFLUENT IN STP (SMELTER PLANT)

PARAMETERS	POLLUTION CONTROL MEASURES TAKEN	NORM	STATUS 2023-24
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	6.98
Suspended Solids		<100 mg/l	8.33
BOD 3days at 27 °C		<30 mg/l	4.67
Fecal Coliform		100 MPN/100 ml	86.17

.....X.....