



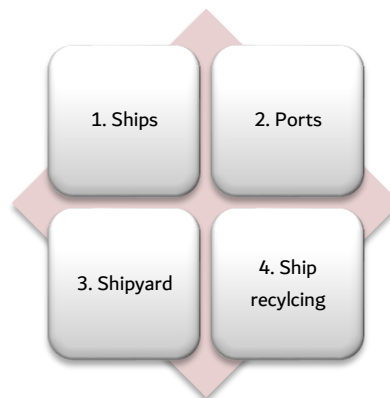
Pollution Prevention- Implementation Roadmap (Short Term)



Short term Implementation plan (0-6 months)

While a broad regulatory ecosystem exists, pollution compliance monitoring, reporting standardisation, and performance benchmarking remain fragmented across authorities and geographies. The Pollution Prevention pillar will therefore **not create new regulatory mandates but will consolidate, standardise, and operationalise compliance monitoring, reporting, and enforcement visibility** across maritime entities under a unified governance architecture.

Under the short-term implementation plan, the Pollution Prevention framework is structured across **four separate operational verticals** to enable focused compliance consolidation, monitoring alignment, and reporting activation, as illustrated below



Summary of Short-Term Action Focus Across Vertical Pollution Frameworks

Action Required	Ships	Ports	Shipyards	Ship Recycling
Action Required 1: Issue compliance clarification circular	Issue circular confirming ship pollution compliance continues under MARPOL and Merchant Shipping Act. (No new reporting introduced.)	Issue circular confirming Harit Sagar remains applicable and instruct ports to submit existing environmental reports in notified format.	Issue circular confirming shipyards will continue under SPCB consent framework, and require submission of pollution compliance data in a standardised national reporting format	Issue clarification confirming hazardous waste and environmental compliance continues and require pollution data submission in standard format.
Action Required 2: Issue standard reporting templates and collect baseline data	Compile and map the last 3 years of inspection records, detention data, and waste reception records from existing systems into a central maritime pollution database managed by the nodal authority	Issue a standard consolidation template aligned with existing Harit Sagar indicators , requiring all major ports to submit last 3 years of Harit Sagar environmental data (air, water, waste, spill, infrastructure) in uniform format for creation of a national port pollution baseline	A standard pollution reporting template will be issued (aligned with SPCB consent parameters), requiring all major shipyards to submit last 3 years of effluent, emission, hazardous waste, and infrastructure compliance data , to create the first consolidated shipyard pollution baseline at national level	A standard reporting template aligned with hazardous waste and recycling compliance conditions will be issued, requiring all recycling yards to submit last 3 years of hazardous material handling, sludge disposal, asbestos removal, and runoff monitoring data , for creation of a national recycling pollution baseline
Action Required 3: Define violation categories and penalty structure	Align existing MARPOL violations under defined grading system (Minor, Moderate, Severe, Critical).	Define violation categories for non-reporting, discharge exceedance, oil spill, and hazardous waste mismanagement with defined response timelines.	Define violation grading for effluent exceedance, reporting failure, and infrastructure non-compliance. Establish penalty calculation logic.	Define violation grading for hazardous waste dumping, runoff contamination, asbestos mismanagement, and repeat violations. Establish escalation logic.
Action Required 4: Prepare digital monitoring system blueprint	Design module to integrate inspection records, detention history, and waste portal data into central dashboard.	Map Harit Sagar indicators into digital reporting structure and define pollution monitoring dashboard design.	Design reporting modules for effluent, emissions, and waste tracking with validation and inspection linkage logic.	Design digital modules for hazardous material tracking, plot-level discharge reporting, and enforcement tracking system.

Action 1: Notification & Operationalization of Vertical Pollution Compliance Frameworks

1.1 Ships

India regulates ship-source pollution through enforcement of MARPOL (Annexes I–VI) under the Directorate General of Shipping, covering oil, sewage, garbage, and air emission discharges.

MARPOL Annex	Pollution Category Covered	Key Regulatory Provisions
Annex I — Oil	Oil and oily mixtures discharge	Regulates oil discharge; requires OWS and ODME systems; discharge limit of 15 ppm .
Annex II — Noxious Liquid Substances	Bulk chemical pollution	Controls discharge of liquid chemicals; mandates residue stripping systems.
Annex III — Harmful Substances (Packaged Form)	Dangerous goods in packaged cargo	Standards for packaging, labeling, and stowage of harmful substances.
Annex IV — Sewage	Vessel sewage discharge	Prohibits untreated discharge; requires approved STP or distance-based discharge.
Annex V — Garbage	Solid waste disposal	Plastic disposal banned; regulates food and cargo waste discharge.
Annex VI — Air Pollution	Air emissions (SO _x , NO _x)	Limits air emissions; 0.5% global sulfur cap or scrubber compliance.

Execution Action already in place:

- Enforcement of prevention and containment of ship-source pollution under the Merchant Shipping Act, 1958 (Chapter XIA), applicable to all ships registered under the Act.
- Rules notified by the Central Government under Section 356E of the Merchant Shipping Act to regulate pollution arising from ship-generated sources.
- Mandatory inspection of vessels at the construction stage to verify installation of required pollution prevention equipment.
- Periodic inspections conducted at regular intervals to ensure operational compliance of pollution prevention systems onboard.
- Surprise inspections undertaken by surveyors of the Mercantile Marine Department on Indian and foreign vessels.
- Boarding powers exercised under statutory authority to verify compliance with pollution prevention regulations.
- Detention of vessels found in contravention of pollution prevention requirements until deficiencies are rectified, including imposition of detention fees.
- Provision of port reception facilities mandated under statutory provisions to enable discharge of ship-generated wastes at ports.

- Operationalisation of a centralized digital portal (“Swachh Sagar”) for request and provisioning of ship waste reception services.
- Regulation of inland waterway vessel pollution through oversight by the Inland Waterways Authority of India in coordination with State Maritime Authorities.

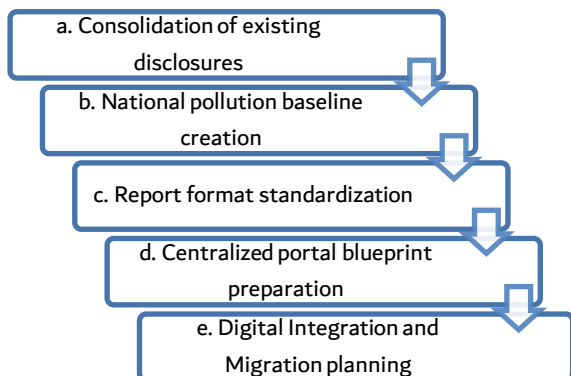
Action: No separate national compliance framework will be instituted for ships during the short-term implementation phase given the existence of established international and statutory pollution prevention regimes

1.2 Ports

For the ports vertical, the pollution prevention implementation approach will build upon the existing environmental compliance and monitoring mechanisms instituted under the Harit Sagar Green Port Guidelines. Rather than creating parallel compliance frameworks, the short-term focus will be on leveraging ongoing monitoring, audit, and disclosure systems including annual environmental performance reporting and third-party verification while aligning these disclosures for national-level consolidation and digital integration.

*Action: No parallel national compliance framework will be instituted for ports during the short-term implementation phase; **instead, existing environmental monitoring, audit, and disclosure mechanisms under the Harit Sagar Green Port Guidelines will be consolidated, standardized, and integrated into a national pollution reporting architecture***

Breakdown of Actions:



a. Consolidation of Existing Disclosures

- Ports will be formally notified to submit all historical environmental disclosures published under Harit Sagar.
- Submissions will include EPI reports, audit statements, and annual environmental disclosures.
- Data will be submitted through notified email/temporary submission repository until portal activation.

Non-submission response

- Reminder notices issued within defined submission window.
- Escalation to administrative ministry/regulator for non-compliance.
- Non-reporting ports flagged in baseline dataset as “Data Deficient.”

b. National Pollution Baseline Creation

- Submitted EPI datasets will be compiled into a consolidated national database.
- Indicators will be grouped under air, water, waste, and ecosystem parameters.
- Baseline pollution intensity and performance benchmarks will be established.

Non-submission response

- Baseline classification assigned as “Unassessed.”

- Ports excluded from performance benchmarking until data submission.
- Reporting compliance linked to future incentive eligibility.

c. Reporting Format Standardization

- Existing disclosures will be converted into a standardized reporting template.
- Indicator units, formats, and definitions will be harmonized.
- Standard workbook formats will be issued for future reporting cycles.

Non-submission / non-alignment response

- Ports required to resubmit disclosures in standardized format.
- Technical support provided for template alignment.
- Non-standard submissions not accepted for national consolidation.

d. Centralized Portal Blueprint Preparation

- Functional requirements derived from existing Harit Sagar reporting indicators.
- Data submission modules, dashboards, and audit upload systems designed.
- IT architecture drafted for national pollution monitoring integration.

Dependency note

- Portal development aligned with ongoing Harit Sagar digital system rollout.
- Interim reporting continues through decentralized submission channels.

e. Digital Integration & Migration Planning

- Website disclosures mapped to portal submission fields.
- Data migration formats and upload protocols defined.
- Ports onboarded for phased transition to centralized reporting.

Non-compliance response

- Portal reporting to become mandatory post-activation.
- Failure to migrate may impact compliance recognition and incentive access.

1.3 Shipyard

Pollution prevention across shipbuilding and ship repair facilities is presently governed through industrial environmental compliance frameworks administered by State Pollution Control Boards and national environmental regulations. These facilities operate under consent-based pollution control systems covering effluent discharge, air emissions, hazardous waste handling, and industrial wastewater management. While pollution control infrastructure and reporting mechanisms exist, compliance monitoring remains fragmented, state-specific, and non-standardized, with limited national-level consolidation or maritime-sector benchmarking

Execution Area	Current Practice	Illustrative Example
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Compliance Governance	Shipyards operate under Consent to Establish (CTE) & Consent to Operate (CTO) issued by SPCBs.	Cochin Shipyard Limited regulated by Kerala SPCB under consent compliance.
	Consent conditions prescribe discharge & emission limits.	Effluent oil & grease ≤ 10 mg/L; pH range 5.5–9.0.
Pollution Control Infrastructure	Effluent Treatment Plants (ETPs) operational for dock wastewater.	Mandatory for major shipyards under SPCB consent.
	Oil-water separators installed for oily discharge treatment.	Typical oil removal efficiency ≥ 90%.
	Hazardous waste storage areas maintained on-site.	Impermeable flooring + covered storage required.
Waste Management Practices	Surface treatment waste collected as hazardous waste.	Paint sludge, blasting grit stored before disposal.
	Disposal through authorized recyclers / TSD facilities.	Hazardous waste transported with manifest documentation.
	Waste tracking through manifest system.	Filed under Hazardous Waste Manifest (Form 10).
Monitoring & Reporting	Effluent & emission monitoring conducted periodically.	Effluent testing monthly; stack monitoring quarterly.
	Environmental compliance reports submitted to SPCBs.	Goa Shipyard Limited submits monitoring reports to Goa SPCB.
	Hazardous waste annual returns filed.	Filed under Form IV — Annual Waste Return.
Inspection & Enforcement	SPCB site inspections conducted.	1–2 inspections annually (Red Category industries).
	Compliance audits during consent renewal.	CTO renewal cycle typically 5 years.
	Violations addressed through enforcement notices.	Closure warnings / environmental compensation penalties imposed.

Indicative Framework: -

Execution Area	Current Execution Reality	Identified Gap	Indication Actions
Compliance Governance	SPCB-issued CTE & CTO consent-based compliance.	Compliance fragmented across states; no maritime-sector consolidation.	National shipyard pollution compliance framework required.
Regulatory Mapping	Multiple environmental laws applicable.	No unified regulatory mapping specific to shipyards.	Consolidated pollution regulation mapping for shipyard sector.

Infrastructure Compliance	ETPs, oil-water separators, waste storage installed.	No standardized infrastructure benchmarks across yards.	Definition of minimum pollution control infrastructure standards.
Waste Management	Hazardous waste disposed via authorized recyclers.	No sector-wide waste quantification or benchmarking.	Standardized hazardous waste reporting & tracking system.
Monitoring & Reporting	Data submitted to SPCBs locally.	No national-level reporting consolidation.	Centralized shipyard pollution reporting architecture.
Data Standardization	Reporting formats differ by state.	Non-uniform reporting indicators & units.	Standardized pollution reporting templates.
Performance Benchmarking	Compliance-based monitoring only.	No pollution performance ranking or comparison.	Sectoral benchmarking & performance classification framework.
Inspection & Enforcement	SPCB inspections conducted periodically.	Enforcement not linked to maritime transition frameworks.	Integrated inspection & compliance monitoring system.
Digital Reporting	Manual/state portal-based submissions.	No centralized maritime pollution database.	National digital pollution reporting platform integration.



a. Compliance & Regulatory Framework Consolidation

Consolidation of applicable pollution regulations, consent conditions, and compliance obligations across shipbuilding and ship repair facilities to establish a unified maritime pollution compliance framework.

(Detailed regulatory mapping and compliance consolidation is provided in the Appendix and remains subject to refinement based on stakeholder consultations, regulatory feedback, and inter-agency alignment.)

b. Infrastructure & Monitoring Standardization

Definition of minimum pollution control infrastructure benchmarks and standardization of monitoring, waste management, and environmental reporting practices across shipyards.

Indicative infrastructure benchmarking may include:

- Effluent Treatment Plant (ETP) systems — aligned with treated discharge conformance norms observed across international shipyard wastewater management systems.
- Oil-water separators — benchmarked to oily discharge treatment efficiencies adopted in major global ship repair docks.
- Impermeable hazardous waste storage zones — aligned to hazardous material containment practices followed in EU-regulated shipyards.
- Stormwater containment & drainage segregation — consistent with dock runoff control systems implemented in advanced dry-dock facilities.
- Paint booth emission filtration & VOC capture — reflective of air emission control systems adopted across OECD shipbuilding facilities.

Indicative infrastructure benchmarks remain preliminary and subject to validation, consultation, and contextual adaptation based on national regulatory feasibility.

c. Data Reporting & Digital Integration Activation

Development of standardized pollution reporting templates, baseline dataset creation, and preparation for integration into a centralized national pollution monitoring platform.

Indicative reporting module structuring may include:

- Effluent discharge monitoring module
- Air emission & VOC monitoring module
- Hazardous waste generation & disposal tracking module
- Surface treatment & blasting waste reporting module
- Dock wastewater & oily residue reporting module

Standardized capture formats will enable consolidation of facility-level disclosures into national datasets and alignment with the broader digital reporting architecture being developed across maritime operational verticals.

The above indicative actions establish the short-term institutional, infrastructure, and reporting foundations required to operationalize pollution prevention monitoring across shipbuilding and ship repair facilities

1.4 Ship recycling

a. Compliance & Regulatory Framework Consolidation

Consolidation of applicable pollution regulations, hazardous material handling provisions, and environmental compliance obligations across ship recycling facilities to establish a unified maritime pollution compliance framework.

(Detailed regulatory mapping, including alignment with ship recycling environmental compliance requirements and hazardous waste management regulations, is provided in the Appendix and remains subject to refinement based on stakeholder consultations, regulatory feedback, and inter-agency alignment.)

b. Infrastructure and Monitoring standardization

Infrastructure Component	Indicative Benchmark Reference	Contaminant / Pollution Risk Addressed
Impermeable & Concretized Dismantling Plots	Containment-aligned dismantling surfaces observed in compliant international recycling yards.	Prevents oil seepage, heavy metal leaching, and asbestos fibre migration into soil and marine ecosystems.
Drainage Collection & Treatment Systems	Runoff capture and treatment systems implemented across regulated dismantling zones.	Captures hydrocarbon residues, paint particulates, rust scale, and suspended dismantling debris prior to discharge.
Hazardous Waste Storage Facilities	Controlled storage environments aligned with international hazardous material containment practices.	Safe storage of asbestos insulation, PCB materials, oil sludge, and toxic coating residues.
Oil Spill Containment & Recovery Systems	Spill control mechanisms adopted across compliant ship recycling plots.	Prevents bilge residues, fuel remnants, and lubricating oil leakages from contaminating soil and water.
Gas-Freeing & Safe Tank Cleaning Systems	Pre-dismantling vapor evacuation and tank cleaning practices in certified recycling yards.	Removes residual hydrocarbons, toxic vapors, and explosive gases prior to structural dismantling.

Indicative infrastructure benchmarks remain preliminary and subject to validation, stakeholder consultation, and contextual adaptation based on national regulatory feasibility and yard-level operational conditions.

c. Data Reporting and digital activation

Development of standardized pollution reporting templates, baseline dataset creation, and preparation for integration into a centralized national pollution monitoring platform for ship recycling facilities.

Indicative reporting module structuring may include:

- Hazardous material inventory & disposal reporting module
- Oil sludge & bilge waste handling reporting module
- Asbestos removal & storage tracking module
- Solid scrap & recyclable waste quantification module
- Plot-level environmental monitoring & discharge reporting module

Standardized capture formats will enable consolidation of recycling facility disclosures into national datasets and alignment with the broader digital reporting architecture being developed across maritime operational verticals.

Action 2: Pollution data collection and reporting framework operationalisation

Aim: Establish a standardised pollution data capture, reporting, and monitoring mechanism across ports, shipyards, and recycling facilities to enable compliance tracking and baseline pollution assessment.

Implementation Component	Execution Activity	Stakeholders Involved	Output Generated
Standardised reporting templates	Pollution data reporting formats issued vertical-wise	MoPSW / SPCB / Port Authorities	Uniform reporting structure
Excel reporting workbooks	Indicator-wise data sheets created (air, water, waste)	Ports / Yards / Recycling Facilities	Structured pollution datasets
Reporting frequency notification	Monthly / Quarterly submission cycles defined	MoPSW / Regulators	Reporting calendar issued
Evidence submission protocols	Lab reports, monitoring records mandated	Facilities / SPCB	Verified compliance records
Data validation mechanism	Submitted datasets cross-checked	SPCB / Regulatory bodies	Validated pollution database
Baseline data consolidation	National pollution dataset compiled	Central authorities	Pollution baseline inventory

1. Standardised Reporting Templates Issuance

- Standardised pollution data reporting templates will be developed and issued separately for *ports, shipyards, and recycling facilities*.
- These templates will capture indicator-wise pollution parameters covering air emissions, effluent discharge, waste generation, spill incidents, and pollution control infrastructure availability.
- Template structures will be aligned with regulatory monitoring requirements to ensure uniform data capture.

Template coverage structure:

Reporting Module	Data Fields Captured
Effluent Monitoring	pH, BOD, COD, TSS, Oil & Grease
Air Emissions	PM10, SOx, NOx equipment emissions
Waste Management	Hazardous waste tonnage, disposal records
Solid Waste	Segregation volumes, landfill tie-ups
Spill Reporting	Incident type, response time, quantity
Infrastructure Status	ETP, STP, spill kits availability

2. Excel Reporting Workbook Development

- Multi-sheet Excel reporting workbooks will be designed to operationalise template-based data submission.
- *Each workbook will include parameter definitions, unit formats, automated calculation fields, and validation check to minimise reporting errors.*
- Facilities will be required to submit completed workbooks along with supporting documentation.

3. Reporting Frequency Notification

- Defined reporting cycles will be formally notified to all regulated entities.
- *Operational pollution data will be submitted on a **monthly basis**, while compliance and infrastructure disclosures will follow **quarterly submission timelines**.*
- Annual consolidated disclosures may also be required for baseline and benchmarking purposes.

4. Evidence Submission Protocols

- Facilities will be mandated to submit documentary **evidence supporting** reported pollution data.
- This includes laboratory test reports, waste disposal manifests, emission monitoring records, and consent compliance documents.
- Evidence submission ensures traceability and credibility of self-reported data.

5. Data Validation Mechanism (Detailed out in Action 3)

- Submitted datasets will undergo structured **validation** through cross-verification with *regulatory filings, third-party lab certifications, and inspection records*.
- Data discrepancies will be flagged for clarification or resubmission. This validation layer *ensures reliability* of the national pollution dataset.

Indicative structured verification and compliance assessment system to validate submitted pollution data and determine facility-level compliance status below:

Component	Execution Activity	Stakeholders	Output
Data verification framework	Structured validation of submitted datasets	SPCB / Nodal authority	Verified pollution database
Third-party environmental audits	Independent facility inspections	Accredited auditors	Audit assessment reports
Regulatory compliance cross-verification	Alignment check with consent filings	SPCB / Regulators	Compliance confirmation records
Site inspection mechanism	On-ground pollution control verification	Inspecting authorities	Inspection findings reports
Compliance grading system	Facility compliance status classification	Nodal authority	Compliance grading register

1. Data Verification Framework

Submitted pollution datasets will undergo structured validation to ensure completeness, accuracy, and consistency. Reported parameters will be **cross-checked against regulatory thresholds and historical submissions**. Data gaps or anomalies will be flagged for rectification.

2. Third-Party Environmental Audits

Accredited environmental auditors will conduct independent facility-level assessments to validate reported pollution performance. Audits will review monitoring systems, pollution control infrastructure, and waste handling practices. Findings will feed into compliance evaluation.

3. Regulatory Compliance Cross-Verification

Facility submissions will be compared with **statutory filings** such as consent compliance reports and environmental returns. This ensures alignment between *self-reported and regulator-filed data*. Non-alignment will trigger compliance review.

4. Site Inspection Mechanism

Targeted physical inspections will be conducted to verify operational status of pollution control systems. Inspectors will assess **infrastructure functionality, monitoring practices, and discharge management systems**. Observations will be formally recorded.

5. Compliance Grading System

Facilities will be categorised based on verification outcomes into **compliant, partially compliant, or non-compliant classifications**. This grading will inform enforcement prioritisation and corrective action requirements. The **grading register** will serve as the enforcement reference base

6. Baseline Data Consolidation

- Validated pollution datasets from all facilities will be aggregated to establish the first national maritime pollution **baseline**.
- This consolidated inventory will enable **sector-wide pollution profiling and compliance benchmarking**.
- The baseline will serve as the **reference point for future pollution reduction interventions**.

In the short-term phase, pollution data will be collected through template-based Excel reporting submissions from regulated facilities. Submitted datasets will be consolidated within a centralised data repository managed by the nodal authority. Parallely, a digital reporting platform will be designed to transition toward automated data capture and monitoring in subsequent phases (Action 4)

Action 3: Penalty and Enforcement framework Operationalization

Establish a structured penalty and enforcement mechanism to address pollution non-compliance and ensure adherence to notified environmental standards

1. Non-Compliance Definition Framework

Standardised criteria will be defined to identify pollution violations across reporting, discharge limits, waste handling, and infrastructure compliance. Non-reporting, misreporting, and regulatory threshold breaches will be classified as enforceable violations. This establishes uniform enforcement triggers.

Indicative pollution violations may include below and can be further refined with stakeholders

Violation Category	Indicative Non-Compliance Criteria
Reporting Non-Compliance	Non-submission of environmental reports within notified timelines
Misreporting / Data Manipulation	Submission of false, incomplete, or unverifiable pollution data
Discharge Limit Exceedance	Effluent discharge beyond permitted oil, chemical, or suspended solids limits
Air Emission Breach	VOC, particulate, or combustion emissions exceeding notified thresholds
Hazardous Waste Mismanagement	Improper storage, transport, or disposal of asbestos, sludge, chemicals
Infrastructure Non-Compliance	Absence or malfunction of mandatory pollution control systems (ETP, containment, etc.)
Oil Spill / Runoff Incidents	Uncontained hydrocarbon leakage or dismantling runoff discharge

2. Severity Grading Mechanism

Identified violations will be categorised based on environmental impact, frequency, and operational negligence. Minor, moderate, and severe violation bands will be defined to differentiate enforcement intensity. This ensures proportional regulatory response.

Violations will be categorised based on environmental impact, recurrence, and operational negligence

Severity Level

1. Minor : **Administrative** (Delayed reporting , incomplete documentation)
2. Moderate : Operational **non compliance** with limited environmental impact (Partial treatment failure, minor discharge)
3. Severe : **High environmental risk** or regulatory **breach** (Hazardous waste dumping, oil spill incidents)
4. Critical : Repeated or intentional **violations** (Recurring discharge breaches, falsified reporting)

3. Penalty Calculation Methodology

Penalty computation frameworks will be developed linking fine values to violation severity and pollution magnitude. Financial penalties may be indexed to discharge exceedance levels, reporting failures, or hazardous waste mismanagement. This ensures quantifiable enforcement.

Penalty Basis	Indicative Calculation Logic	Reference Practice
Discharge Exceedance	Fine indexed to % exceedance over permitted limits	Industrial pollution control penalties
Reporting Failure	Fixed penalty per reporting cycle missed	Environmental compliance laws
Hazardous Waste Violation	Fine linked to quantity mishandled	Hazardous waste management penalties
Infrastructure Absence	Penalty until compliance installation	Consent-to-Operate enforcement
Repeat Violations	Multiplier applied to base penalty	Escalation enforcement frameworks

Existing ones to be drawn from Pollution control board penalty structures, environmental protection act enforcement provisions and Hazardous waste rules penalty schedules

4. Enforcement Notification System

Formal violation notices will be issued to non-compliant facilities outlining breach details, corrective actions, and penalty implications. Defined response timelines will be notified for compliance rectification. Enforcement records will be centrally maintained.

Indicative execution structure

- Violation Notice Issuance : formal notice issued detailing breach type , regulatory reference and severity classification (Official non compliance notice)
- Corrective Action Mandate: Facility directed to implement rectification measures within defined timelines as per case to case (Compliance rectification plan)
- Penalty Intimation: Applicable financial penalties communicated alongside violate notice (Penalty demand notice)

Indicative timelines at the base level maybe as per below

- Notice issues : within 30 days of violation detection
- Corrective compliance window : 30-90 days
- Penalty payment window: 30 days post notice

5. Repeat Violation Escalation Mechanism

Facilities demonstrating repeated non-compliance will be subject to escalated enforcement measures. May include the bellow

- ✓ Enhanced monitoring and follow-up inspections
- ✓ Compliance reminders and corrective action directives
- ✓ Higher financial penalties for repeated breaches
- ✓ Time-bound infrastructure or discharge compliance mandates

- ✓ Referral for regulatory review in cases of persistent violations

Action 4: Functional and technical blueprint for digital platform and monitoring system development

During the short-term implementation phase, **parallel focus will be on developing the functional and technical blueprint** for a centralized digital pollution monitoring platform (Covering ships, shipyards and ship recycling). Full system deployment will not occur within this phase; instead, architecture design, module structuring, data flow definition, and enforcement linkage planning will be completed to enable phased digital implementation in subsequent stages.

Implementation architecture:

Implementation Component	Execution Activity	Stakeholders Involved	Output Generated
Platform system design blueprint	Functional and technical architecture development	MoPSW / IT consultants	Platform design document
Online data submission module	Digital reporting interface creation	Platform developers	E-reporting portal
Compliance tracking dashboard	Real-time compliance monitoring system	Nodal authority	Monitoring dashboards
Verification integration module	Audit & inspection data integration	Regulators / Auditors	Compliance validation system
Enforcement & penalty linkage	Violation and fine tracking system	Regulators	Enforcement monitoring module

1. Platform System Design Blueprint

A detailed system architecture will be developed defining platform structure, user access levels, reporting workflows, and database design. Functional specifications will include data submission, validation, compliance grading, and enforcement tracking modules. This blueprint will guide phased platform deployment.

2. Online Data Submission Module

A digital reporting interface will be developed to enable facilities to submit pollution data electronically. The system will replicate template formats currently used in Excel reporting while enabling automated data capture. Upload functionality for supporting evidence will also be incorporated.

3. Compliance Tracking Dashboard

Centralised dashboards will be created to monitor facility-wise compliance performance. Indicators will include reporting status, pollution exceedances, infrastructure gaps, and violation history. This enables real-time regulatory oversight.

4. Verification Integration Module

Inspection findings, audit reports, and validation outcomes will be integrated into the digital platform. This allows compliance grading to reflect both reported and verified performance. The module ensures unified monitoring across verification layers.

5. Enforcement & Penalty Linkage

The platform will incorporate violation tracking and penalty assessment systems linked to compliance grading outputs. Regulators will be able to issue notices, track corrective actions, and monitor fine recovery status. This creates an end-to-end enforcement monitoring system.

Appendix

A. Port Pollution regulation mapping framework

Pollution Area	Key Pollution Sources in Ports	Applicable Regulatory Standards / Requirements	Governing / Oversight Authority
Effluent / Wastewater Discharge	Stormwater runoff, berth drainage, workshop effluents, sewage discharge	pH (5.5–9.0), BOD ≤ 30 mg/L, COD ≤ 250 mg/L, TSS ≤ 100 mg/L, Oil & Grease ≤ 10 mg/L as per industrial discharge norms	CPCB / SPCB
Sewage Management	Crew facilities, port buildings, terminal sanitation systems	Mandatory sewage treatment or municipal disposal linkage; discharge only post-treatment	SPCB / Local Authorities
Oil Spill & Oily Waste Management	Bunkering operations, tanker berths, pipeline transfers	Oil Spill Contingency Plan (OSCP), spill response equipment, containment booms, recovery systems	Port Authority / Maritime Administration
Air Emissions — Cargo Handling Equipment	Diesel cranes, RTGs, forklifts, yard tractors	Compliance with diesel emission norms; PM, SO _x , NO _x monitoring where applicable	CPCB / SPCB
Fugitive Dust Emissions	Coal, iron ore, bulk cargo handling	Dust suppression systems, water spraying, covered conveyors, wind barriers	SPCB / Port Authority
Hazardous Waste Management	Oily sludge, chemical residues, maintenance waste	Storage, labeling, transportation, and disposal as per hazardous waste management rules	SPCB / Authorized Waste Handlers
Solid Waste Management	Plastics, packaging, food waste, operational waste	Segregation, storage, authorized disposal; prohibition of marine dumping	SPCB / Municipal Authorities
Ballast & Bilge Reception Facilities	Vessel waste discharge to port reception systems	Provision of MARPOL-compliant waste reception facilities	Port Authority / Maritime Administration

Dredging & Disposal	Channel deepening, berth dredging	Dredge material testing, designated disposal zones, turbidity control	Environmental & Coastal Authorities
Stormwater & Runoff Control	Rainwater runoff from cargo yards	Oil interceptors, drainage filtration systems, runoff treatment	SPCB / Port Authority
Noise Pollution	Cargo handling, vessel engines, machinery	Industrial noise limits; monitoring in operational zones	SPCB
Coastal & Marine Ecosystem Protection	Land reclamation, shoreline activity	Coastal regulation compliance, ecological clearance, discharge restrictions	Coastal Zone Authorities

B. Port Compliance obligation and Infrastructure benchmark (Suggestive)

Compliance Obligation	Regulatory Source Mapping	Infrastructure Benchmark (Suggestive)
Effluent treatment & discharge compliance	CPCB / SPCB Discharge Norms	ETP systems, oil-water separators
Effluent sampling & testing compliance	CPCB Monitoring Requirements	Sampling chambers, lab testing tie-ups
Sewage treatment & disposal compliance	SPCB Consent Conditions	STP systems, sewer linkages
Oil spill preparedness & response compliance	National Spill Contingency Norms	Containment booms, skimmers, spill kits
Equipment emission compliance	CPCB Emission Standards	Cleaner fuel systems, electrified equipment
Fugitive dust control compliance	SPCB Air Pollution Guidelines	Water spraying, covered conveyors
Hazardous waste handling compliance	Hazardous Waste Rules	Storage sheds, containment flooring
Solid waste segregation & disposal compliance	Municipal Waste Rules	Segregated bins, disposal tie-ups
Ship waste reception compliance	MARPOL Reception Facility Norms	Oily waste tanks, sludge reception units
Dredging environmental compliance	Coastal Clearance Regulations	Sediment testing, disposal systems
Stormwater runoff control compliance	SPCB Drainage Norms	Oil interceptors, filtration drains

C. Shipyard Pollution regulation mapping framework (Suggestive)

Pollution Area	Key Pollution Sources	Applicable Regulatory Standards / Requirements	Oversight Authority
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Effluent / Wastewater Discharge	Painting runoff, surface treatment wash water	Industrial effluent discharge norms (pH, BOD, COD, TSS, Oil & Grease)	CPCB / SPCB
Sewage Management	Worker sanitation, yard facilities	Treated sewage discharge norms	SPCB
Air Emissions	Surface blasting, painting fumes, machinery exhaust	Industrial air emission standards, PM & VOC limits	CPCB / SPCB
Hazardous Waste	Paint sludge, solvents, chemical residues	Hazardous Waste Management Rules compliance	SPCB
Solid Waste	Scrap metal, packaging waste	Authorized waste segregation & disposal	Local Authorities
Noise Pollution	Heavy machinery, fabrication	Industrial noise standards	SPCB
Stormwater Runoff	Yard surface runoff contamination	Runoff treatment & containment norms	SPCB

D. Shipyard Compliance obligation and Infrastructure benchmark (Suggestive)

Compliance Obligation (Keyword Format)	Regulatory Source Mapping	Infrastructure Benchmark (Suggestive)
Effluent discharge compliance	CPCB / SPCB Discharge Norms	Effluent Treatment Plants (ETP)
Effluent sampling & testing	CPCB Monitoring Norms	Sampling chambers, testing tie-ups
Sewage treatment compliance	SPCB Consent Conditions	STP systems
Surface blasting emission compliance	Air Pollution Norms	Dust collectors, blasting enclosures
Paint & coating emission control	VOC emission guidelines	Paint booths, filtration systems
Hazardous waste handling compliance	Hazardous Waste Rules	Storage sheds, containment flooring
Scrap waste disposal compliance	Solid Waste Rules	Segregated scrap yards
Noise level compliance	Industrial Noise Norms	Noise barriers, PPE controls
Stormwater runoff control	SPCB Drainage Norms	Containment drains, interceptors

E. Ship recycling Pollution regulation mapping framework (Suggestive)

Pollution Area	Key Pollution Sources	Applicable Regulatory Standards / Requirements	Oversight Authority
Oil & Sludge Disposal	Residual fuel, oily waste	Hazardous waste disposal norms	SPCB

Effluent Discharge	Washing & dismantling runoff	Industrial discharge standards	CPCB / SPCB
Hazardous Material Handling	Asbestos, heavy metals, coatings	Hazardous Waste & Worker Safety Rules	SPCB / Labour Authorities
Air Emissions	Cutting, torching, dismantling	Industrial emission & particulate norms	SPCB
Solid Waste	Steel scrap, insulation waste	Scrap segregation & disposal norms	SPCB
Coastal Contamination	Yard drainage to shore	Coastal environmental protection norms	Coastal Authorities
Stormwater Runoff	Yard surface oil contamination	Runoff containment requirements	SPCB

F. Ship recycling Compliance obligation and Infrastructure benchmark (Suggestive)

Compliance Obligation (Keyword Format)	Regulatory Source Mapping	Infrastructure Benchmark (Suggestive)
Oil sludge handling compliance	Hazardous Waste Rules	Sludge collection tanks
Effluent discharge compliance	CPCB / SPCB Discharge Norms	Effluent treatment systems
Effluent sampling & testing	Monitoring Norms	Sampling chambers
Hazardous material handling compliance	Hazardous Waste & Safety Rules	Hazardous storage zones
Asbestos management compliance	Worker Safety Regulations	Controlled removal facilities
Cutting emission control compliance	Air Pollution Norms	Emission containment systems
Scrap segregation compliance	Waste Management Rules	Segregated scrap storage
Coastal contamination prevention	Coastal Regulations	Impermeable flooring
Stormwater runoff control	SPCB Drainage Norms	Containment drains