



RESPONSIBLE CARE[®]

POLLUTION PREVENTION

CODE OF MANAGEMENT PRACTICES

Developed by
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POLLUTION PREVENTION CODE

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POLLUTION PREVENTION CODE

Introduction

Initially this Code was called the Waste and Release Reduction Code. There are 14 management practices which are aimed at helping firms to reduce both emissions released into various media and the amount of waste which they generate.

This Code attempts to present a broad framework that is useful to any firm, regardless of its existing efforts in pollution prevention. Companies are to measure or estimate amounts of waste generated and emissions, then form reduction plans based primarily on community concerns. Each plant then must measure its progress and update its inventory annually, going back to the community with its efforts.

At the heart of this Code is the need to develop a "quantitative inventory" of both releases and waste generated. This is meant to give a measure of the industry's performance and to ensure that individual facilities can chart progress which goes beyond current regulatory requirements.

With the first 10 management practices, the firms will have to set up and quantify waste reduction efforts and the last four management practices extend the Code to how the companies should deal with waste still generated.

Scope

The Code calls for companies to promote pollution prevention methods with customers, suppliers, other companies and the communities. The Code requires waste generators to take responsibility for waste generated by their contractors - including waste hauliers, tank cleaners and maintenance workers and thus covers both on-site and off-site releases and disposals.

Objectives

The Pollution Prevention Code is designed to improve the industry's performance by seeking :-

1. Ongoing, long-term reductions in all pollutants released to the environment
2. Steady reduction in the amount of wastes generated by chemical industry, and
3. Proper management of remaining wastes.

There is a high priority given to employee and community input in these processes, using the mechanisms established in the CAER Code. Progress shall be measured at least annually.

COMPLIANCE WITH RESPONSIBLE CARE GUIDING PRINCIPLES

1. Recognise and respond to community concerns about chemicals and the operations.
2. Develop and produce chemicals that can be manufactured, transported, used and disposed of safely.
3. Make health, safety and environmental considerations a priority in planning for existing and new products and processes.
4. Operate plants and facilities in a manner that protects the environment and health and safety of employees and the public.
5. Extend knowledge by conducting or supporting research on the health, safety and environmental effects of products, processes and waste materials.
6. Work with others to resolve problems caused by past handling and disposal of hazardous substances.
7. Participate with government and others in creating responsible laws, regulations and standards to safeguard the community, workplace and environment.

MANAGEMENT PRACTICES AND IMPLEMENTATION GUIDELINES

The 14 Management Practices that help protect the environment by reducing waste generation and pollution :-

| Management Practices | Implementation Guidelines |
|--|--|
| 1. Management commitment to ongoing reductions in releases to air, water, land and in generation of waste. | <ul style="list-style-type: none">• Written environmental policy statement and action plan by management showing commitment to continuous reduction in releases and waste generation.• Establish and maintain appropriate organisation and accountability at all levels to support management commitment. |
| 2. Facility inventory of waste generated and releases to environment. | Develop current inventory for on-site and off-site releases, waste discharges and recycling. (Please refer to Appendix 1) |
| 3. Evaluation of potential impact of releases on environment and health / safety of employees / public. | Conduct assessment to identify the potential impact of waste and releases on the environment and health and safety of employees and the public. (Please refer to Appendix 2 for guidance) |

Management Practices

4. Education and dialogue with employees/public about inventories, impact evaluation, risks to community.
5. Establish priorities, goals, plans for waste / release reduction, taking into account community concern / environment impact.
6. Ongoing waste / release reduction giving priority to source reduction, recycle / reuse, treatment.
7. Update inventory and measure progress at least annually.
8. Ongoing, face-to-face dialogue with employees / public on waste / release information / progress.
9. Waste / release prevention integrated in research / design of new or modified facilities, processes, products.
10. Promotion / support of waste and release reductions by others.
11. Periodic evaluation of waste management practices taking into account community concerns and HSE impacts.

Implementation Guidelines

Provision of opportunities for dialogue with employees and the public on pollution prevention, inventories potential risks and mitigation measures.

- Prioritise and plan targets for waste / release reduction taking into account community input and its impact on environment.
- Identify resource needs consistent with established goals.

Perform waste minimisation in the following order :-

- Source reduction.
- Reuse/recycle/sale of special materials.
- Reclamation.
- Treatment.

Update and maintain sufficient data to provide quantitative measurement of progress in waste minimisation and release/ reductions at least annually.

Regular dialogue and consultation with employees / community giving information on waste / release and stating the progress in the minimisation programme.

- Inclusion of waste minimisation and release prevention objectives in research and in design of new or modified facilities, processes and products.
- All projects, business expansion, joint ventures, acquisitions and divestments will be reviewed for their environmental impact by appropriate environmental personnel.

Support waste reduction by neighbouring plants, subsidiaries and members by technology transfer and explore the possibility of waste exchange.

Conduct periodic, at least annually, evaluations of processes and facilities to identify sources of wastes and to develop the most effective ways to manage the wastes.

Management Practices

12. Review of contractor waste management and HSE practices.
13. Controls to improve prevention and early detection of releases that may contaminate soil, ground water, surface water and the atmosphere.
14. Address past operating and waste management practices and work to resolve identified problems.

Implementation Guidelines

Implement a system for selecting, retaining and reviewing contractors and toll manufacturers, taking into account sound waste management practices that protect the environment and the health and safety of employees and the public.

There shall be arrangements for early detection of releases and discharges and their proper management and disposal. Records of all solid, liquid and gaseous waste generated shall be maintained and arrangements shall be made to minimise the risk of contamination of the environment.

Review past operating and waste management practices and develop corrective action plans by adopting relevant and available technologies in both process and waste management.

STACK GAS EMISSION STANDARDS
(Extract from Environmental Quality (Clean Air) Regulations 1978)

| Pollution | | Emission Sources | Standards |
|-----------|--|---|---|
| 1. | Dark Smoke* | (1.1) Solid Fuel Equipment or Facilities (1.2) Equipment using other types of fuel | Ringelmann Chart No. 2 Ringelmann Chart No. 1 |
| 2. | Dust | (2.1) Facilities used for the heating of metals other than Cold Blast Foundry Cupola. (2.2) Facilities discharging dust containing asbestors and free silica. (2.3) Portland Cement Mfg : (2.3.1) Kiln (2.3.2) Clinker, cooler, grinder, others (2.4) Asphalt concrete/bituminous mixing plant: (2.4.1) #Stationary Plant (2.4.2) #Mobile Plant (2.5) Other sources | 0.2 gm/Nm ³ 0.12 gm/Nm ³ 0.2 gm/Nm ³ 0.1 gm/Nm ³ 0.3 gm/Nm ³ 0.4 gm/Nm ³ 0.4 gm/Nm ³ |
| 3. | Metal and metallic compound : 3.1 Mercury 3.2 Cadmium 3.3 Lead 3.4 Antimony 3.5 Arsenic 3.6 Zinc 3.7 Copper | Industry Industry Industry Industry Industry Industry Industry | 0.01 gm/Nm ³ 0.015 gm/Nm ³ 0.025 gm/Nm ³ 0.025 gm/Nm ³ 0.025 gm/Nm ³ 0.1 gm/Nm ³ 0.1 gm/Nm ³ |
| 4. | Gases (a) Acid gases (b) Sulphuric Acid Mist or SO ³ or both (c) Chlorine gas (d) HCL (e) Fluorine, Hydro-fluoric acid, inorganic fluorine compound (f) - do - (g) Hydrogen Sulphide (h) NOx (i) NOx | Sulphuric Acid Mfg. Any sources other than (a) Any source Any source Aluminium Mfg. from Alumina Any source other than (e) Any source Acid Nitric Mfg. Any source other than (h) | 3.5 gm of SO ³ /Nm ³ and no persistent mist 0.2 gm of SO ³ /Nm ³ and no persistent mist 0.2 gm of HCL/Nm ³ 0.4 gm of HCL/Nm ³ 0.2 gm of Hydrofluoric acid/Nm ³ 0.10 gm of Hydrofluoric acid/Nm ³ 5 ppm (Vol %) 1.7 gm of SO ³ /Nm ³ and Substantial Colourless 2.0 gm of SO ³ /Nm ³ |

* Allowable to exceed both standards not longer than 5 minutes in any period of one hour and 15 minutes in any period of 24 hours.

PARAMETER LIMITS OF EFFLUENT OF STANDARDS A AND B
(extract from Environmental Quality (Sewage And Industrial Effluents)
Regulations 1979

| Parameter | | Unit | Standard | |
|-----------|----------------------------------|-----------|----------------|-----------|
| | | | A* | B |
| i) | Temperature | degrees C | 40 | 40 |
| ii) | pH Value | - | 6.0 - 9.0 | 5.5 - 9.0 |
| iii) | BOD ⁵ or 20 degrees C | mg/l | 20 | 50 |
| iv) | COD | mg/l | 50 | 100 |
| v) | Suspended Solids | mg/l | 50 | 100 |
| vi) | Mercury | mg/l | 0.005 | 0.05 |
| vii) | Cadmium | mg/l | 0.01 | 0.02 |
| viii) | Chromium, Hexavalent | mg/l | 0.05 | 0.05 |
| ix) | Arsenic | mg/l | 0.05 | 0.10 |
| x) | Cyanide | mg/l | 0.05 | 0.10 |
| xi) | Lead | mg/l | 0.10 | 0.5 |
| xii) | Chromium, Trivalent | mg/l | 0.20 | 1.0 |
| xiii) | Copper | mg/l | 0.20 | 1.0 |
| xiv) | Manganese | mg/l | 0.20 | 1.0 |
| xv) | Nickel | mg/l | 0.20 | 1.0 |
| xvi) | Tin | mg/l | 0.20 | 1.0 |
| xvii) | Zinc | mg/l | 1.0 | 1.0 |
| xviii) | Boron | mg/l | 1.0 | 4.0 |
| xix) | Iron (Fe) | mg/l | 1.0 | 5.0 |
| xx) | Phenol | mg/l | 0.001 | 1.0 |
| xxi) | Free Chlorine | mg/l | 1.0 | 2.0 |
| xxii) | Sulphide | mg/l | 0.50 | 0.50 |
| xxiii) | Oil and Grease | mg/l | Not Detectable | 10.0 |

* This standard applies to the industrial and development projects which are located within catchment areas.

GUIDELINES ON ENVIRONMENTAL IMPACT ASSESSMENT

- **EIA Guidelines for industrial projects**
- **EIA Guidelines for toxic and hazard waste treatment and disposal projects**

(available from Department of Environment offices for a fee)

FIRST SCHEDULE (Regulations 2) SCHEDULED WASTES FROM NON-SPECIFIC SOURCES AND SPECIFIC SOURCES

(extract From Environment Quality (Scheduled Wastes) Regulations - 1989)

PART I - Scheduled Wastes from Non-Specific Sources

1. Mineral oil and contaminated wastes.

NO11 Spent oil or grease used for lubricating industrial machines.

NO12 Spent hydraulic oil from machines, including plastic injection moulding machines, turbines and die-casting machines.

NO13 Spent oil-water emulsion used as coolants.

NO14 Oil tanker sludges.

NO15 Oil-water mixture such as ballast water.

NO16 Sludge from oil storage tank.

2. Waste containing polychlorinated biphenyls (PCB) or polychlorinated triphenyls (PCT).

NO21 Spent oil contaminated with PCB or PCT.

NO22 Discarded electrical equipment or parts containing or contaminated with PCB or PCT.

NO23 Containers contaminated with PCB or PCT.

3. Spent organic solvents containing halogen or sulphur, including methylene chloride, 1,1,1 trichloroethane, perchloroethylene and dimethyl sulphide.

NO31 Spent oil contaminated solvents from cleaning and degreasing processes.

4. Spent aromatic organic solvent without containing compounds of organic halogen or sulphur, including toluene, xylene, turpentine and kerosene.

NO41 Spent aromatic organic solvents from washing, cleaning or degreasing processes.

5. Spent non-aromatic organic solvents without containing compounds of organic halogen or sulphur including acetone, ketones, alcohols, cleaning-benzene and dimethyl formamide.

NO51 Spent non aromatic organic solvent from washing, cleaning or degreasing processes.

6. Residues from recovery of halogenated solvents, may contain oil, fat and solvents.

NO61 Residues from recovery of halogenated solvents.

7. Residues from recovery of non-halogenated solvents, may contain oil, fat and solvents.

NO71 Residues from recovery of non-halogenated solvents.

8. **Spent organo-metallic compounds may be mixed with benzene excluding mercury compounds.**
NO81 Residues of organo-metallic compound, including tetraethyl lead, tetramethyl lead and organotin compounds from mixing process of anti-knock compound with gasoline.
9. **Flux wastes, may contain mixture of organic acids solvents or compounds of ammonium chloride.**
NO91 Flux wastes from fluxing bath of metal treatment processes.
10. **Spent aqueous alkaline solutions not containing cyanide, may contain heavy metals.**
N101 Spent aqueous alkaline solutions from treatment process of metal or plastic surfaces.
N102 Spent aqueous alkaline solutions from bleaching process of textile materials.
11. **Spent aqueous alkaline solutions containing cyanide, may contain heavy metals.**
N111 Spent aqueous alkaline solutions containing cyanide from treatment process of metal or plastic surfaces.
12. **Spent aqueous chromic acid solutions.**
N121 Spent aqueous chromic acid solutions from treatment process of metal or plastic surfaces.
N122 Spent aqueous chromic acid solutions from leather tannery processes.
13. **Spent aqueous inorganic acid solutions other than spent chromic acid solutions, may contain heavy metals.**
N131 Spent aqueous acid solutions from treatment process of metal or plastic surfaces.
N132 Spent aqueous inorganic acid solution from industrial equipment cleaning.
14. **Spent aqueous or discarded photographic waste from film processing or plates making.**
N141 Spent aqueous or discarded photographic waste from film processing or plate making.
15. **Metal hydroxide sludges containing one or several of the following metals : chromium copper, nickel, zinc, lead, cadmium, aluminium and tin.**
N151 Metal hydroxide sludges from wastewater treatment system.
16. **Plating bath sludges containing cyanide.**
N161 Plating bath sludges containing cyanide from metal finishing processes.
17. **Spent salt containing cyanide.**
N171 Spent salt containing cyanide from heat treatment process.
18. **Sludges of inks, paints, pigments, lacquer with or without organic solvent.**
N181 Paint sludges from solvent recovery of solvent-based paint waste.
N182 Ink sludges from solvent recovery of solvent-based ink waste.
N183 Lacquer sludges from solvent recovery of solvent-based lacquer waste.

- N184 Paint sludges from paint wastewater treatment system.
- N185 Ink sludges from ink wastewater treatment system.
- N186 Pigment sludges from pigment wastewater treatment system.
19. **Wastes of printing ink, paint, pigment, lacquer or varnish containing organic solvents.**
- N191 Discarded or off specification ink, pigment and paint products.
20. **Sludges, dust, slag, dross and ashes, may contain oxides or sulphate of one or several of the following metals, lead, cadmium, copper, zinc, chromium, nickel, iron, vanadium and aluminium.**
- N201 Dross, slag, ash, dust from metal smelting process or dust emission control system.
- N202 Dross from soldering process.
- N203 Residues from recovery of acid pickling liquor.
- N204 Oxide or sulphate sludges from wastewater treatment system.
21. **Spent or discarded strong acid or alkalis.**
- N211 Spent or discarded acid of pH less or equal to 2
- N212 Spent or discarded alkali of pH greater or equal to 12.5
22. **Spent oxidizing agents.**
23. **Contaminated soil, water, debris or matter resulting from clean-up of a spill or chemical or scheduled wastes.**
- N231 Contaminated soil, water debris or matter resulting from clean-up of a spill of chemical or scheduled wastes.
24. **Immobilized scheduled wastes, including chemically fixed or encapsulated sludges.**
- N241 Immobilized scheduled wastes.
25. **Discarded drugs except living vaccines and euphoric compounds.**
- N251 Discarded drugs except living vaccines and euphoric compounds.
26. **Pathogenic and clinical wastes and quarantined materials.**
- N261 Pathogenic and clinical wastes and quarantined materials.
27. **Containers and bags containing hazardous residues.**
- N271 Used containers or bags contaminated with cyanide, arsenic, chromium or lead compound or salts.
28. **Mixtures of scheduled wastes.**
- N281 A mixture of scheduled wastes.
- N282 A mixture of scheduled wastes and non-scheduled wastes.

PART II

S. Scheduled wastes from specific sources

1. Mineral oil and oil contaminated wastes.

S011 Waste oil or oily sludge from wastewater treatment plant of oil refinery or crude oil terminal.

S012 Oily residue from automotive workshop or service station oil or grease interceptor.

S013 Oil contaminated earth from re-refining of used lubricating oil.

S014 Oil or sludge from oil refinery or petrochemical plant.

2. Tar or tarry residues from oil refinery or petrochemical plant.

S021 Tar or tarry residues from oil refinery or petrochemical plant.

3. Wastes of printing ink, paint pigment, lacquer, varnish or wood preservative containing organic solvents.

S031 Ink waste from washing of reaction tank or container of ink manufacturing plant.

S032 Paint waste from washing of reaction tank or container of paint manufacturing plant.

S033 Pigment waste from washing of reaction tank or container of pigment manufacturing plant.

S034 Lacquer or varnish waste from washing of reaction tank or container of lacquer or varnish manufacturing plant.

4. Clinker, slag and ashes from scheduled wastes incinerator.

S041 Clinker, slag and ashes from scheduled wastes incinerator.

5. Waste of printing ink, pigment, paint, or lacquer without containing solvents.

S051 Water-based paint waste from the washing of reaction tank or container of paint manufacturing plant.

S052 Water-based ink waste from the washing of reaction tank or container of ink manufacturing plant.

S053 Water-based pigment waste from the washing of reaction tank or container of pigment manufacturing plant.

S054 Ink waste from the washing or cleaning of printing machine of printing works.

S055 Pigment waste from tile works and hat manufacturing plant.

S056 Paint waste from the paint spraying or dipping process of metal works, motor vehicles assembly plant or electrical appliances manufacturing plant.

6. Spent tars or anti-corrosion oils.

S061 Anti-corrosion oil or tar residue from the sealing or spraying or coating processes of motor vehicle assembly plant or automotive workshop.

7. **Spent ethylene glycol.**
 - S071 Contaminated ethylene glycol from gas processing plant.
 - S072 Unhardened ethylene glycol from polyester manufacturing plant.
8. **Wastes containing phenol or formaldehyde.**
 - S081 Phenol or formaldehyde waste from the washing or reaction or mixing tank of adhesive or glue or resin manufacturing plant.
 - S082 Sludges containing phenol or formaldehyde from the wastewater treatment system of adhesive or glue or resin manufacturing plant.
9. **Residues of isocyanate compounds (excluding solid polymeric materials).**
 - S091 Residues of isocyanate compounds from foam manufacturing process.
10. **Adhesive or glue waste may contain solvents (excluding solid polymeric materials).**
 - S101 Off-specification adhesive or glue products from adhesive or glue manufacturing plant.
 - S102 Effluent from washing of the reaction or processing tank of adhesive or glue manufacturing plant.
11. **Uncured resin waste, may contain organic solvents or heavy metals including epoxy resin, phenolic resin.**
 - S111 Uncured resin residues from electronic or semiconductor, electrical appliances, fibreglass manufacturing plants and metal works.
 - S112 Effluent from washing of reactor of resin manufacturing plant.
 - S113 Resin sludge from wastewater treatment system of resin manufacturing plant.
12. **Latex effluent, rubber or latex sludges containing organic solvents or heavy metals.**
 - S121 Rubber or latex sludge containing heavy metals from the wastewater treatment system of rubber products manufacturing plant.
 - S122 Rubber or latex sludge containing organic solvents from rubber products manufacturing plant.
 - S123 Latex effluent from rubber products manufacturing plant.
13. **Sludges from the re-refining of used oil products including oil sludges containing acid or lead compounds.**
 - S131 Acid sludge from the re-refining of used lubricating oil.
14. **Sludge containing fluoride.**
 - S141 Sludges containing fluoride from the wastewater treatment system of electronic or semiconductor manufacturing plant.

15. **Mineral sludges, including calcium hydroxide sludges, phosphating sludges, calcium sulphite sludges, and carbonates sludges.**
- S151 Sludges from phosphating process of motor vehicle assembly, air conditioning, electrical appliances and electronic or semiconductor plants.
- S152 Sludges from wastewater treatment system of plant producing ceramic or tiles, industrial gas and bleaching earth.
16. **Asbestos wastes.**
- S161 Asbestos sludges from wastewater treatment system of asbestos / cement products manufacturing plant.
- S162 Asbestos dusts or loose asbestos fibre wastes from asbestos / cement products manufacturing plant.
- S163 Empty bags or sack containing loose asbestos fibres from asbestos / cement products manufacturing plant.
17. **Wastes from the production, formulation and trade pesticides, including herbicides, insecticides, rodenticides and fungicides.**
- S171 Dust from air emission control equipment of pesticides formulation plant.
- S172 Sludges from wastewater treatment system of pesticides formulation plant.
- S173 Residues from filtering process of intermediate products of pesticides formulation plant.
- S174 Waste from washing of reaction tank or maxing tank and spillages of pesticides formulation plant.
- S175 Solid residues resulting from stamping process of mosquito coil production plant.
- S176 Off-specification products from pesticides formulation plant and trade of pesticides.
- S177 Waste from the production of pesticides.
18. **Press cake from pre-treatment of glycerol soap lye.**
- S181 Press cake from pre-treatment of glycerol soap lye from detergent or soap or toiletries plants.
19. **Wastes containing dye.**
- S191 Wastewater containing dye from textile manufacturing plant.
20. **Wastes from wood preserving operation using inorganic salts containing copper, chromium as well as arsenic of fluoride compound or using compound containing chlorinated phenol or creosote.**
- S201 Wastes from wood preserving operation using inorganic salts containing copper, chromium and arsenic of fluoride compounds or using compound containing chlorinated phenol or creosote.

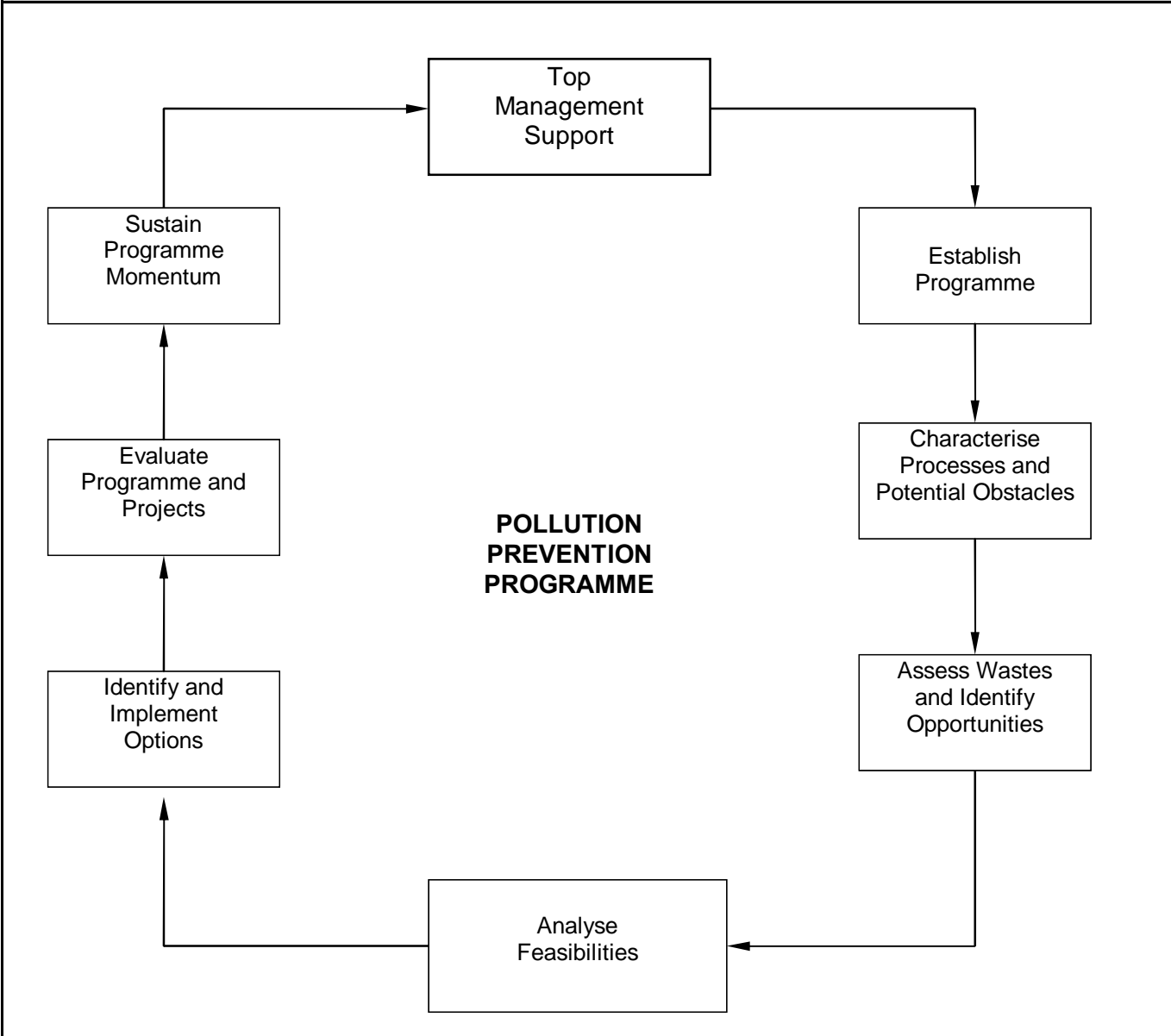
21. **Mercury wastes, containing metallic mercury, organic and inorganic mercury compounds.**
- S211 Mercury waste containing metallic mercury from manufacturing of fluorescent lamps.
 - S212 Activated carbon waste containing mercury from hydrogen gas purification process.
 - S213 Mercury bearing sludges from brine treatment and mercury bearing brine purification muds from chlorine production plant.
22. **Arsenic wastes from the purification process of phosphoric acid.**
- S221 Arsenic waste from the purification process of phosphoric acid plant.
23. **Spent catalysts.**
- S231 Spent industrial catalysts from chemical plant and plant manufacturing detergent or soap or toiletries.
24. **Leachate from scheduled waste landfills.**
- S241 Leachate from scheduled waste landfills.
25. **Rags, papers, plastics or filters contaminated with organic solvents.**
- S251 Rags, plastics, papers or filters contaminated with paint or ink or organic solvent from motor vehicle assembly plants, metal works, electronic or semiconductor plants and printing or packaging plants.
26. **Containers and bags containing hazardous residues.**
- S261 Used containers or bags contaminated with residues of raw materials and products of pesticides formulation plant.
27. **Discarded or off-specification batteries containing lead, mercury, nickel and lithium.**
- S271 Discarded or off specification batteries from battery manufacturing plant.
28. **Pharmaceutical wastes.**
- S281 Wastewater from washing of reaction vessels and floor of pharmaceutical products manufacturing plant.
29. **Spent aqueous inorganic acid solution.**
- S291 Wastewater from acid and battery manufacturing plant.
30. **Waste from manufacturing or processing or use of explosives.**
- S301 Waste from manufacturing or processing or use of explosives.

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HAZARD ASSESSMENT FORMAT

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| Company : | Pollution Prevention Assessment Worksheets | Prepared by : |
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WORKSHEET 1 **ASSESSMENT OVERVIEW**



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| WORKSHEET 2 | PLANNING TEAM FUNCTIONS |
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| Planning Team Members | Role in Understanding the Facility | Role in Changing the Facility | Role in Maintaining Pollution Prevention Plan |
|------------------------------------|--|---|--|
| 1. Management | Demonstrate commitment Authorise commitment of resource | Demonstrate commitment Issue policy, consider changes, make decisions | Set and enforce long-term goals Make decisions |
| 2. Legal | Understand potential environmental liability | Evaluate effects of changes on regulatory status | Supply facts on upcoming liability / regulation |
| 3. Finance, Accounting, Purchasing | Provide information on costs of current operation | Provide information on financial impact of change Establish purchasing policies that consider pollution prevention | Track changes in material costs, volumes, types, track costs and benefits of changes Provide information on further new ideas Track pollution control and waste management |
| 4. Research & Development | Consider modifications to existing product design | Suggest ideas for methods | Provide information on new ideas |
| 5. Process Engineering | Provide reasoning for current processes Provide information on barriers to change Provide information on current process functions | Provide information on proposed changes Suggest ideas on new approaches Coordinate changes with other processes | Supply feedback on problems, successes |
| 6. Quality Control | Provide performance data on current systems Provide data on constraints of specifications | Analyse product quality aspects of proposed changes Provide information on specification constraints | |

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| WORKSHEET 2 | | PLANNING TEAM FUNCTIONS | |
|---|--|--|---|
| Planning Team Members | Role in Understanding the Facility | Role in Changing the Facility | Role in Maintaining Pollution Prevention Plan |
| 7. Environmental | Provide information on current costs of waste treatment and disposal | React to effect of change on current treatment / disposal Suggest ideas on new methods | Evaluate effects of changes on treatment / disposal Evaluate effects of changes on costs / volumes of wastes Report on current and future compliance issues |
| 8. Sales / Marketing | Provide information on customer requirements | Educate customers on proposed changes Suggest ideas on new approaches Provide information on customer requirements | Monitor customer reaction / acceptance of changes Provide information on new ideas Investigate possibilities for change |
| 9. Safety / Health | Provide information on costs and problems related to use of toxic substances | Evaluate effects of changes on work environment Provide information on costs / problems | Provide information on new ideas |
| 10. Production | Provide accurate description of processes and operations Supply feedback on proposed changes Suggest ideas on new approaches | React to proposed changes / suggest ideas on new methods Supply feedback on proposed changes | Suggest ideas on new methods |
| 11. Production Facilities / Maintenance | Provide realistic descriptions of processes and operations | Provide accurate description of operation of implemented changes | Provide information on factors affecting progress |
| 12. Material Control / Inventory | Provide information on material use / losses | Suggest ideas on new methods | Provide information on new ideas |

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|-----------------------|-------------------------|
| WORKSHEET 4 | SITE DESCRIPTION |
|-----------------------|-------------------------|

| | |
|-------------------------------------|------------------|
| Company : | |
| Plant : | |
| Department : | |
| Area : | |
| Address : | |
| Telephone : | Fax no. : |
| Major Products : | |
| Major Unit : | |
| Product or Service : | |
| Operations : | |
| Facilities / Equipment Age : | |
| | |
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|------------------------|--------------------------|
| WORKSHEET 5 | PROCESS OPERATION |
|------------------------|--------------------------|

| | | |
|------------------|---------------------------------------|-----------------------|
| Operation Type : | * Continuous * Batch or Semi Batch | * Discrete * Other |
|------------------|---------------------------------------|-----------------------|

| Question | Answer | | |
|--|--------|-----|-----|
| Principal products | (a) | (b) | (c) |
| Quantities | (a) | (b) | (c) |
| Processes used | | | |
| Process chemicals used :- a) What kind b) How much c) Suppliers d) How / where stored e) How / where used | | | |
| Hazard Potential :- a) Explosion and Flammability b) Fire c) Electrical Static d) Reactivity / Stability Hazards | | | |
| Immediate Health Hazards :- a) Inhalation / toxicity b) Irritant / corrosive c) Sensitizer d) Chronic Health Hazard | | | |
| Environmental Hazards :- a) Aqueous b) Gaseous c) Ground | | | |
| Hazardous Breakdown Products | | | |
| Emergency Response Procedure | | | |

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| WORKSHEET 6 | MAINTENANCE CHEMICAL USED |
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| | What kind ? | Quantity | Suppliers | How / where stored ? | How / where used ? | Recycle/ what method ? | Disposal of spent chemical* |
|----------------------------------|-------------|----------|-----------|-------------------------|-----------------------|---------------------------|-----------------------------------|
| Hydraulic Fluids | | | | | | | |
| Transmission Fluids | | | | | | | |
| Solvents / Degreasers | | | | | | | |
| Paint Thinners | | | | | | | |
| Pesticides | | | | | | | |
| Herbicides | | | | | | | |
| | | | | | | | |
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* For spent chemicals which are classified as scheduled wastes, please refer to worksheet 9 (b)

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| WORKSHEET 7 (a) | PROCESS WATER SOURCES |
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| | |
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| <p>1) What are the process water sources ?</p> | <p>a) Townsupply b) River water c) Underground water d) Others</p> |
| <p>2) Quantity</p> | |
| <p>3) How is process water treated ?</p> <p>a. On-site treatment</p> <p style="padding-left: 20px;">i) What kind of treatment ?</p> <p style="padding-left: 20px;">ii) Storage tanks, pitponds, lagoons</p> <p style="padding-left: 20px;">iii) Where discharged ?</p> <p>b. Off-site treatment</p> | |
| <p>4) Sludges (non-scheduled)</p> <p>a. How much ?</p> <p>b. How disposed ?</p> <p>c. Analytical data ?</p> <p><i>* for scheduled wastes, please go to Worksheet 9(b)</i></p> | |
| <p>5) Process Water Recycling</p> <p>a. How</p> <p>b. Quantity</p> | |
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| WORKSHEET 7 (b) | WASTEWATER SOURCES |
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| <u>WASTE</u> | |
| 1) What are the wastewater sources ? | a) Process b) Utilities c) Sewerage d) Stormwater Drainage |
| 2) Quantity | |
| 3) How is wastewater treated ? a. On-site treatment i) What kind of treatment ? ii) Storage tanks, pitponds, lagoons iii) Where discharged ? b. Off-site treatment | |
| 4) Sludges (non scheduled) a. How much ? b. How disposed ? c. Analytical data ? <i>* for scheduled wastes, please go to worksheet 9(b)</i> | |
| 5) Wastewater Recycling a) How b) Quantity | |
| 6) Spill History | |
| 7) Compliance ? | Yes / No |
| | |

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| WORKSHEET 8 | AIR EMISSION SOURCES |
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|--|-----------------|
| 1) Air pollutants generated (refer to Appendix 1a) | |
| 2) What are sources ? | |
| 3) Prevailing wind directions ? | |
| 4) How are emissions controlled ? • Type • Location | |
| 5) Discharge points | |
| 6) Monitoring Requirements | |
| 7) Compliance ? | Yes / No |
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| WORKSHEET 9 (a) | SOLID WASTE |
|----------------------------|--------------------|

| | |
|--|-----------------|
| 1) What are the sources ? | |
| 2) Quantities and types ? | |
| 3) Treatment a) how b) by whom c) where | |
| 4) Storage a) how b) by whom c) where | |
| 5) Transport and disposal a) how b) by whom c) where | |
| 6) Waste Recycling ? a) how b) quantity | |
| 7) Compliance ? | Yes / No |
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| WORKSHEET 9 (b) | SCHEDULED WASTE |
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| | |
|---|-----------------------------|
| 1) What are the sources ? | |
| 2) Quantities and types ? | |
| 3) Storage a) how b) by whom c) where | |
| 4) Treatment, transportation and disposal | Kualiti Alam Sdn Bhd |
| 5) Chain-of-Custody Record | |
| 6) Compliance ? | Yes / No |
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| WORKSHEET 10 | FUEL MANAGEMENT |
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| 1) What type ? a) natural gas b) fuel oil c) solid fuel d) others | |
| 2) Purpose a) process b) utilities c) others | |
| 3) Quantity ? | |
| 4) Underground storage tanks a) no. of tanks b) size and tank materials c) contents d) test procedures and results e) problems | |
| 5) Above Ground Storage Tanks a) no. of tanks b) size and tank materials c) contents d) test procedures & results e) problems | |
| 6) Preventive Maintenance Programme a) pressure testing b) leak detection c) corrosion protection d) spill / overfill protection e) frequency | |
| | |
| | |

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