Cladding Technology Shanxi Co., Ltd

HSE Major Hazard Source and Major Environmental Risk Source Management Procedure

Document No.: CLADDING-HSE-RM-08

1 General Provisions

1.1 Purpose

To establish a scientific and closed-loop management mechanism for Health, Safety and Environment (HSE) major hazard sources and major environmental risk sources; fully identify these two types of risk sources in the Company's business links including material procurement, warehouse management, transportation logistics, equipment maintenance and support; standardize the processes of assessment, registration, filing, monitoring, daily management and emergency response; prevent major safety accidents and environmental pollution incidents; fulfill corporate social responsibilities; meet the requirements of laws and regulations such as *Identification of Major Hazard Sources of Hazardous Chemicals* and *Enterprise Environmental Emergency Risk Classification Method*, as well as HSE management requirements of PIPING SYSTEM PTE LTD and COMPANY; and ensure the safety of the Company's production and operation and ecological environment. This procedure is hereby formulated.

1.2 Scope of Application

This procedure applies to all management activities of HSE major hazard sources and major environmental risk sources of Pipeline Materials and Equipment Co., Ltd. and its subordinate departments, branches and project departments (hereinafter collectively referred to as "all units"), covering:

1. Major Hazard Sources: Hazardous chemical storage/transportation units that meet the criteria of *Identification of Major Hazard Sources of Hazardous Chemicals* (GB 18218) (e.g., gasoline storage area ≥ 200t), lifting equipment with rated lifting capacity ≥ 30t (e.g., gantry cranes), and pressure-bearing equipment with pressure ≥ 10MPa (e.g., hydraulic pump stations);
2. Major Environmental Risk Sources: Pollution sources that may cause major or above sudden environmental incidents (e.g., hazardous chemical leakage sources, centralized

waste oil storage areas), and risk material storage/use facilities that may cause major environmental impacts (e.g., VOCs emission sources in coating workshops);

3. Business Links: Procurement (hazardous material procurement), warehousing (hazardous chemical storage), transportation (oversized equipment/hazardous material transportation), equipment maintenance (large-scale equipment disassembly/high-pressure equipment maintenance), waste disposal (hazardous waste temporary storage);
4. Relevant Parties: Hazardous material suppliers, carriers, maintenance contractors, government emergency/environmental supervision authorities, and surrounding communities.

1.3 Referenced Documents

1. *Work Safety Law of the People's Republic of China*
2. *Environmental Protection Law of the People's Republic of China*
3. *Regulations on the Safety Management of Hazardous Chemicals*
4. *Identification of Major Hazard Sources of Hazardous Chemicals* (GB 18218)
5. *Enterprise Environmental Emergency Risk Classification Method* (HJ 941)
6. *Guidelines for Enterprise Environmental Emergency Risk Assessment*
7. *Standards for Pollution Control on the Storage of Hazardous Wastes* (GB 18597)
8. *HSE Management System Requirements* (Q/SY1002.1)
9. *Supervision and Management Measures for Major Hazard Sources*
10. COMPANY *HSE Major Environmental Risk Source Control Detailed Rules*
11. Company *HSE Emergency Plan System*
12. Company *HSE Hazard Identification and Risk Assessment Procedure*
13. Company *HSE Environmental Aspect Identification and Evaluation Procedure*
14. Company *HSE Hidden Hazard Investigation and Control Management Procedure*
15. Company *HSE Change Management Procedure*

1.4 Terms and Definitions

1. Major Hazard Source: A unit (including sites and facilities) that produces, stores, uses or operates hazardous chemicals for a long-term or temporary period, and the quantity of hazardous chemicals is equal to or exceeds the threshold quantity. It is classified into chemical type, equipment type and operation type according to hazard types.
2. Major Environmental Risk Source: A pollution source that may cause major or above sudden environmental incidents, and risk material storage/use facilities that may cause major environmental impacts, with a risk level of "major" (risk value ≥ 100 in HJ 941).
3. Risk Classification:

- Major Hazard Sources: Classified into Level 1 (highest), Level 2, Level 3 and Level 4 in accordance with *Interim Provisions on the Supervision and Management of Major Hazard Sources of Hazardous Chemicals*;
- Major Environmental Risk Sources: Classified into Major (Red Zone, may cause death/major pollution), Moderate (Yellow Zone, may cause injury/moderate pollution) and General (Blue Zone, minor environmental impact) in accordance with *Guidelines for Enterprise Environmental Emergency Risk Assessment*. This procedure focuses on the control of the "Major" level.

1. Threshold Quantity: The minimum quantity threshold for hazardous chemical storage/transportation specified in *Identification of Major Hazard Sources of Hazardous Chemicals* (GB 18218) (e.g., 200t for gasoline, 50t for ethanol); when multiple hazardous chemicals exist in a unit, it shall be determined by the formula \sum_{i=1}^n \frac{q_i}{Q_i} \geq 1 (q_i is the actual quantity, Q_i is the corresponding threshold quantity).
2. Sudden Environmental Incident: An incident that occurs suddenly, causes or may cause major casualties, major property losses, poses a major threat and damage to the economic and social stability and political stability of the whole country or a region, has a major social impact, and involves environmental safety.

2 Responsibility Assignment

2.1 Company Top Management

1. Serves as the primary responsible person for the management of major hazard sources and major environmental risk sources, and assumes overall responsibility for the control of these two types of risk sources;
2. Approves the Company's *List of Major Hazard Sources*, *List of Major Environmental Risk Sources* and special control plans (e.g., hazardous chemical warehouse renovation, emergency material reserve plan);
3. Ensures the input of resources (human resources, funds, testing equipment, emergency equipment) required for the management of these two types of risk sources;
4. Approves emergency rescue plans and drill plans related to major risk sources.

2.2 Company Management Representative (HSE-in-Charge Leader)

1. Organizes the identification, assessment and confirmation of major risk sources;
2. Reviews the identification reports, lists, control plans and emergency plans of the two types of risk sources of the Company;
3. Coordinates cross-departmental disputes in risk source management (e.g., risk control responsibilities for hazardous material handover between warehousing and transportation);

4. Listens to work reports on major risk source control quarterly, and evaluates control effectiveness during the annual management review.

2.3 Quality, Safety and Environmental Protection Department (HSE Centralized Management Department)

1. Acts as the centralized management department for this procedure, responsible for the formulation, revision, interpretation and supervision of the implementation of the procedure, and organizes the formulation and improvement of major risk source management systems;
2. Organizes the identification, quantitative assessment and classification of company-level major hazard sources and major environmental risk sources, and establishes and maintains the *List of Major Hazard Sources* and *List of Major Environmental Risk Sources*;
3. Responsible for the registration, assessment and filing of major risk sources, and submits filing materials (assessment reports, emergency plans, etc.) to government authorities in accordance with regulatory requirements;
4. Organizes regular testing, assessment and monitoring of major risk sources, supervises the implementation of control measures for the two types of risk sources by all departments, and conducts special inspections quarterly (e.g., compliance of hazardous chemical storage, integrity rate of emergency materials);
5. Provides unified training on major risk source management methods (e.g., GB 18218 identification rules, HJ 941 risk calculation) and guides all departments in their work;
6. Takes the lead in compiling special emergency plans for the two types of risk sources, organizes emergency drills and evaluates their effectiveness.

2.4 All Business and Functional Departments

2.4.1 Procurement Department

1. Responsible for identifying the two types of risk sources in the procurement link: hazardous materials (e.g., gasoline, high-pressure gas cylinders) with procurement quantity exceeding the threshold quantity, suppliers without hazardous material operation qualifications, and over-quantity/mixed loading risks during procurement and transportation;
2. Conducts risk assessment in the procurement link, provides Safety Data Sheets (SDS) for hazardous chemicals, and verifies the risk source control capabilities of suppliers;
3. Formulates control measures: selects qualified hazardous material suppliers, signs safety/environmental clauses in procurement contracts (clarifying transportation protection requirements and SDS provision responsibilities);

4. Submits the dynamics of risk sources in the procurement link (e.g., new hazardous material categories, supplier changes) to the Quality, Safety and Environmental Protection Department semi-annually.

2.4.2 Equipment Department/Warehousing Center

1. Responsible for the identification and assessment of the two types of risk sources in the warehousing link:
    - Major Hazard Sources: Hazardous chemical storage quantity exceeding the threshold quantity (e.g., gasoline warehouse ≥ 200t), forklifts/cranes with rated lifting capacity ≥ 30t, gas storage tanks with pressure ≥ 10MPa;
    - Major Environmental Risk Sources: Hazardous chemical storage areas (leakage may pollute soil/water), hazardous waste temporary storage areas (waste oil exceeding 10t);
1. Formulates control measures and is responsible for the safe operation and maintenance of warehousing facilities (e.g., storage tanks, shelves, fire-fighting facilities);
2. Implements monitoring measures and patrol systems for major risk sources, conducts daily patrols of warehousing risk sources (e.g., temperature and humidity records, equipment operation status), and updates the warehousing risk source ledger monthly.

2.4.3 Logistics and Transportation Department

1. Responsible for the identification and assessment of the two types of risk sources in the transportation link:
    - Major Hazard Sources: Hazardous materials transported exceeding the threshold quantity (e.g., tank trucks loaded with gasoline ≥ 200t), overturning risks of oversized equipment (weight ≥ 100t) transportation, transportation vehicles without hazardous goods transportation qualifications;
    - Major Environmental Risk Sources: Hazardous material leakage during transportation (e.g., diesel tank truck leakage polluting water bodies), transportation routes passing through drinking water source protection areas;
1. Formulates control measures and implements safety inspections of transportation vehicles and containers (e.g., tank tightness, GPS monitoring);
2. Conducts risk confirmation before each transportation of hazardous materials/oversized equipment, and counts risk incidents in the transportation link (e.g., leakage warnings, route deviations) monthly.

2.4.4 Engineering Technology Department

1. Responsible for the identification and assessment of the two types of risk sources in the equipment maintenance link:
    - Major Hazard Sources: High-alt fall risks during maintenance of large-scale equipment (e.g., gantry cranes), improper pressure relief risks of high-pressure

equipment (e.g., hydraulic systems), open flame operation risks of maintenance tools (e.g., cutting equipment);

- Major Environmental Risk Sources: Centralized storage of maintenance waste oil (exceeding 5t), large-scale use of cleaning agents (containing VOCs) (exceeding 100kg/time), random stacking of scrapped parts (containing heavy metals);

1. Responsible for the technical management of equipment and facilities related to major risk sources (e.g., equipment overhaul, protection device upgrading), and participates in the formulation of major risk source control plans;
2. Conducts risk source inspections in the maintenance link quarterly, and entrusts a third party to test the soil/atmosphere in the maintenance area annually (to investigate pollution hazards).

2.5 All Units (Branches, Project Departments)

1. Responsible for the on-site management of major risk sources within their jurisdiction, and identifies the two types of local risk sources in combination with local business characteristics (e.g., regional hazardous material control requirements, temporary warehousing/transportation);
2. Implements daily inspections and monitoring of major risk sources, and promptly reports abnormal conditions of major risk sources (e.g., leakage, equipment failure);
3. Implements emergency preparation and response measures, and accepts special inspections quarterly;
4. Re-identifies relevant risk sources and updates control measures within 48 hours after a local risk incident (e.g., small-scale hazardous material leakage) occurs.

2.6 All Employees

1. Participate in the identification of the two types of risk sources in their posts (e.g., warehouse staff identify excessive storage of hazardous chemicals, maintenance staff identify waste oil leakage risks);
2. Operators must hold certificates to work, and learn post risk source control operating procedures (e.g., hazardous material loading and unloading protection requirements, leakage emergency response steps);
3. Immediately report abnormalities of risk sources (e.g., excessive pressure of gas storage tanks, hazardous waste leakage) to the department's HSE administrator;
4. Participate in risk source emergency drills (e.g., leakage containment, personnel evacuation) and be familiar with the use of emergency equipment (e.g., fire extinguishers, chemical protective clothing).

3 Work Procedures

3.1 Identification of Major Hazard Sources and Major Environmental Risk Sources

3.1.1 Identification Basis and Scope

1. Identification Basis:
    - Major Hazard Sources: *Identification of Major Hazard Sources of Hazardous Chemicals* (GB 18218), *Work Safety Law*, hazardous chemical catalog and threshold quantity standards, the Company's historical safety accident cases;
    - Major Environmental Risk Sources: *Guidelines for Enterprise Environmental Emergency Risk Assessment* (HJ 941), *Environmental Protection Law*, environmental risk material and threshold quantity list, local environmental protection sensitive area (water source areas, residential areas) control requirements;
1. Identification Scope:
    - Facilities/Areas: Hazardous chemical warehouse areas, oil storage areas, pressure vessel/pipeline systems, special equipment concentrated areas, hazardous waste temporary storage areas, coating workshops;
    - Full Business Process: Procurement (hazardous material selection), warehousing (storage quantity/equipment), transportation (loading quantity/routes), maintenance (equipment/waste), waste disposal (hazardous waste);
    - Time and Status: Normal (daily storage/transportation), abnormal (equipment failure), emergency (leakage/fire).

3.1.2 Identification Methods and Tools

Risk Source Type	Identification Method	Applicable Scenarios	Operation Tools/Outputs
Major Hazard Sources	Threshold Quantity Calculation Method (Formula \sum_{i=1}^n \frac{q_i}{Q_i})	Hazardous chemical storage/transportation (e.g., gasoline storage quantity)	Threshold Quantity Calculation Table (ratio of actual quantity to threshold quantity)
	Equipment Parameter Verification Method	Lifting/pressure-bearing equipment (e.g., crane rated lifting capacity)	Equipment Ledger (parameter comparison with GB 18218 thresholds)
	Quantitative Risk Assessment	Complex scenarios (mixed storage of	Accident Consequence

	Method	multiple materials)	Simulation Analysis Report (leakage diffusion range)
Major Environmental Risk Sources	Risk Value Calculation Method (HJ 941)	Hazardous material leakage/waste storage	Risk Value Calculation Table (Risk Value = Likelihood × Consequence Severity)
	Sensitive Area Comparison Table	Transportation routes/warehouse site selection	Sensitive Area Map (marking distance to water source areas, residential areas)
	Material Balance Method	Waste oil/cleaning agent usage	Material Balance Sheet (whether generation quantity/storage quantity exceeds risk threshold)

3.1.3 Identification Frequency and Requirements

1. Identification Frequency:
    - Regular Identification: Conduct comprehensive company-wide identification of the two types of risk sources in Q4 each year (complete assessment and list update in January of the following year);
    - Dynamic Identification: Initiate special identification within 48 hours when the following situations occur:
        - New hazardous material categories/excessive procurement (e.g., first procurement of ethanol reaching 60t, exceeding the threshold quantity of 50t);
        - New/renovated major equipment (e.g., purchase of cranes with rated lifting capacity of 50t);
        - Business scope adjustment (e.g., new hazardous material transportation routes passing through water source areas);
        - Risk incidents (e.g., hazardous chemical leakage, equipment failure);
        - Regulatory standard updates (e.g., GB 18218 threshold quantity adjustment, HJ 941 risk calculation method changes);
1. Identification Requirements:

- Full Participation: Each post involving risk sources shall participate in at least one identification activity (e.g., warehouse team verification of hazardous chemical storage quantity);
- Complete Records: Fill in the *Major Hazard Source Identification Form* and *Major Environmental Risk Source Identification Form*, indicating identification time, personnel, risk source name, location, quantity/parameters, potential consequences, and surrounding sensitive targets;
- Cross-Verification: Conduct cross-departmental review of identification results (e.g., Procurement Department and Warehousing Center mutually review the matching of hazardous material procurement-storage quantities).

3.2 Risk Assessment and Classification

3.2.1 Assessment Methods (Mainly Quantitative Assessment)

Adopt multi-dimensional quantitative assessment methods to ensure scientific and accurate assessment results:

1. Major Hazard Source Assessment Methods:
   - Chemical Type: Calculate the "storage quantity/threshold quantity ratio", and combine material hazard (flammable/explosive/toxic), surrounding protection distance, and effectiveness of existing control measures;
   - Equipment Type: Assess equipment rated parameters (lifting capacity/pressure), service life, failure history, testing and maintenance records;
   - Operation Type: Analyze operation frequency, personnel qualifications, protection measures, emergency capabilities, and adopt "Accident Consequence Simulation Analysis Method" (e.g., leakage diffusion range, overturning impact force);
1. Major Environmental Risk Source Assessment Methods:
   - Risk Likelihood: Count the probability of leakage/emission from risk sources (e.g., annual leakage times of hazardous chemical storage areas);
   - Consequence Severity: Assess the impact range (e.g., leakage polluting water sources within 10km), duration, and ecological damage degree on environmental media (soil/water/atmosphere);
   - Sensitivity: Consider the distance and protection level of surrounding sensitive targets (water source areas, residential areas), and use "Risk Matrix Evaluation Method" to determine the risk level.

3.2.2 Classification Standards

1. Major Hazard Source Classification (in accordance with *Interim Provisions on the Supervision and Management of Major Hazard Sources of Hazardous Chemicals*):

Classification	Judgment Basis (Example for Chemical Type)	Control Level
Level 1	Storage quantity ≥ 10 times the threshold quantity (e.g., gasoline storage ≥ 2000t) with sensitive targets nearby	Highest
Level 2	5 times ≤ Storage quantity < 10 times the threshold quantity (e.g., gasoline storage 1000-2000t)	High
Level 3	2 times ≤ Storage quantity < 5 times the threshold quantity (e.g., gasoline storage 400-1000t)	Medium
Level 4	1 time ≤ Storage quantity < 2 times the threshold quantity (e.g., gasoline storage 200-400t)	Low

1. Major Environmental Risk Source Classification (in accordance with *Guidelines for Enterprise Environmental Emergency Risk Assessment*):

Risk Level	Judgment Basis	Impact Consequences
Major (Red)	Risk Value ≥ 100, may cause major sudden environmental incidents	Death/major pollution/impact on important sensitive targets
Moderate (Yellow)	50 ≤ Risk Value < 100, may cause moderate sudden environmental incidents	Injury/moderate pollution/impact on general sensitive targets

General (Blue)	Risk Value < 50, may cause general sudden environmental incidents	Minor environmental impact/limited to factory area

3.2.3 Assessment Implementation and Filing

1. Assessment Implementation:
    - Level 1/2 Hazard Sources, Major Environmental Risk Sources (Red Zone): Entrust third-party safety/environmental assessment institutions to conduct assessments and issue *Major Hazard Source Safety Assessment Report* and *Environmental Risk Assessment Report*;
    - Level 3/4 Hazard Sources, Moderate/General Environmental Risk Sources: The Quality, Safety and Environmental Protection Department organizes internal assessments (technical + operation experts) and forms assessment records;
1. Archive Establishment: Establish a special archive for each major risk source, including:
    - Major Risk Source Basic Information Form (location, type, parameters);
    - Risk assessment report, safety assessment report;
    - Monitoring measure records, inspection and maintenance records;
    - Emergency drill records, filing documents;
1. Filing Management:
    - File with emergency management departments (for major hazard sources) and ecological environment departments (for major environmental risk sources) in accordance with regulatory requirements;
    - Filing materials include assessment reports, emergency plans, and basic risk source information;
    - Update filing information in a timely manner when risk source parameters change or the assessment cycle expires (generally 3 years).

3.3 Risk Source Control Measures

3.3.1 Control Principles and Priority

Follow the principles of "prevention first, classified control, combination of technology + management + emergency", with priority as follows:

1. Risk Elimination: Terminate high-risk activities (e.g., stop storage of hazardous materials exceeding the threshold quantity);
2. Risk Reduction: Technical transformation (e.g., installing explosion-proof walls in hazardous chemical storage areas), management optimization (e.g., reducing storage quantity to below the threshold quantity);

3. Risk Isolation: Physical isolation (e.g., setting guardrails, anti-seepage ditches), regional isolation (e.g., maintaining a safe distance between hazardous areas and residential areas);
4. Emergency Preparation: Reserve emergency materials and formulate plans to respond to sudden risks.

3.3.2 Classified Control Measures

1. Control of Major Hazard Sources (Level 1/2):
    - Technical Monitoring:
        - Install video surveillance systems (24-hour uninterrupted, full coverage without dead ends);
        - Install combustible gas/toxic gas detection and alarm devices in hazardous chemical areas (sensitivity ≤ 10% LEL, automatic alarm when exceeding standards);
        - Install safety valves + pressure gauges (calibrated quarterly), safety interlock protection and emergency shutdown systems for pressure-bearing equipment;
    - Management Measures:
        - Dedicated Personnel Control: Assign full-time safety officers (24-hour on duty), and implement "double-person double-lock" for hazardous material storage;
        - Regular Testing: Conduct monthly testing of hazard source status (e.g., leakage testing, equipment operation parameters), and third-party testing semi-annually;
        - Operation Permit: Implement operation permit system for hot work, equipment maintenance, etc., which can only be implemented after approval;
    - Emergency Measures: Reserve chemical protective clothing, self-contained breathing apparatus (SCBA), and leak-stopping tools, and conduct emergency drills semi-annually.
1. Control of Major Environmental Risk Sources (Red Zone):
    - Technical Monitoring:
        - Set up cofferdams, fire dikes, leak-proof pallets (capacity ≥ 1.2 times the maximum storage quantity), and anti-seepage floors (permeability coefficient ≤ 10^{-7}cm/s) in hazardous material storage areas;
        - Install VOCs adsorption + combustion devices (treatment efficiency ≥ 90%) and online monitoring systems (real-time data upload to environmental protection departments) for waste gas emission sources (e.g., coating workshops);
        - Install online monitoring equipment (COD, ammonia nitrogen and other indicators) at wastewater discharge outlets;
    - Management Measures:

        - Ledger Management: Establish dynamic risk source ledgers (storage quantity, emission quantity, testing data) and record daily;
        - Environmental Monitoring: Conduct quarterly testing of surrounding soil/water (e.g., heavy metal content, COD), and annual atmospheric testing;
        - Compliance Inspection: Verify the compliance of hazardous waste disposal (integrity of transfer manifests) monthly;
    - Emergency Measures: Reserve oil absorbent pads, oil booms, neutralizers, and conduct environmental emergency drills semi-annually (e.g., leakage collection, soil remediation).

1. Control of Medium and Low-Level Risk Sources (Level 3/4 Hazard Sources, Moderate/General Environmental Risk Sources):
    - Technical Monitoring: e.g., Level 3 hazard sources (gasoline storage 400t) are equipped with general ventilation and pressure gauges, and moderate environmental risk sources are equipped with simple leakage detection;
    - Management Measures: Conduct monthly patrols, annual training, and incorporate into daily management;
    - Emergency Measures: Reserve basic emergency materials (fire extinguishers, first-aid kits) and conduct annual emergency drills.

3.3.3 Daily Patrol and Maintenance

1. Patrol Requirements (Classified Frequency):

Patrol Entity	Patrol Object	Patrol Frequency	Patrol Content
Operators	Post-related risk sources (e.g., storage tanks)	≥ 2 times per shift	Pressure, temperature, liquid level, leakage signs
Professional Technicians	Equipment-type risk sources (e.g., cranes)	1 time per day	Equipment operation status, integrity of protective devices
Managers	All risk sources within jurisdiction	1 time per week	Implementation of control measures, integrity of records
Company-level Inspection	Major risk sources	1 time per month	Compliance, emergency preparation status

All patrols shall fill in the *Major Risk Source Patrol Record* for future reference;

1. Maintenance:
    - Formulate special maintenance plans (e.g., equipment lubrication, calibration of testing instruments);
    - Conduct regular inspection and testing of safety facilities (e.g., quarterly calibration of safety valves, semi-annual calibration of alarm devices);
    - Repair or replace failed equipment in a timely manner (e.g., leaking valves, damaged surveillance cameras);
    - Establish the *Major Risk Source Maintenance Ledger* and record maintenance time, content, and responsible persons.

3.3.4 Personnel Management

1. Operators must receive special training, pass assessments, hold certificates to work, and receive re-training annually;
2. Conduct regular special training on risk source control (e.g., hazardous chemical properties, emergency response skills), and include training records in personal files;
3. Strictly implement operating procedures and prohibit illegal operations (e.g., excessive storage, operation without testing);
4. Establish a personnel qualification ledger and update it dynamically (e.g., remind re-training before certificate expiration).

3.4 Emergency Management

3.4.1 Compilation of Special Emergency Plans

1. The Quality, Safety and Environmental Protection Department takes the lead in compiling special emergency plans for the two types of major risk sources:
    - Major Hazard Sources: *Emergency Response Plan for Hazardous Chemical Leakage*, *Emergency Response Plan for Lifting Equipment Overturning*, *Emergency Response Plan for Pressure-Bearing Equipment Explosion*;
    - Major Environmental Risk Sources: *Emergency Response Plan for Environmental Pollution from Hazardous Material Leakage*, *Emergency Response Plan for VOCs Excessive Emission*, *Emergency Response Plan for Hazardous Waste Leakage*;

1. The plan content shall clearly specify:
    - Emergency Organization Structure (commander-in-chief, emergency rescue team, evacuation team, monitoring team, medical team, external liaison team);
    - Emergency Response Process (alarm → initial disposal → personnel evacuation → professional rescue → environmental monitoring → post-disposal);
    - Emergency Material List (e.g., chemical protective clothing, leak-stopping tools, oil absorbent pads, portable detectors, emergency communication equipment);

- External Linkage Mechanism (contact with emergency management departments, ecological environment departments, hospitals, fire brigades, environmental protection disposal units);
- Environmental Monitoring and Protection Measures (e.g., soil/water sampling after leakage, pollutant interception).

3.4.2 Emergency Preparation

1. Reserve emergency materials in accordance with plan requirements, store them near risk sources (e.g., set up emergency material cabinets next to hazardous chemical storage areas), clarify material names, quantities, validity periods, and maintenance responsible persons, and establish the *Emergency Material Ledger*;
2. Set up obvious safety warning signs (e.g., risk source location signs, emergency evacuation route maps, contact information);
3. Establish an emergency communication system (24-hour unobstructed, including internal walkie-talkies and external emergency phones);
4. Regularly check the integrity rate of emergency materials (e.g., tightness of chemical protective clothing, battery level of detectors, pressure of fire extinguishers), and replace expired/damaged materials in a timely manner.

3.4.3 Emergency Drills and Evaluation

1. Drill Frequency: Conduct special practical drills for major risk sources semi-annually, and drills (practical or tabletop exercises) for medium and low-level risk sources annually;
2. Drill Organization: Coordinated by the Quality, Safety and Environmental Protection Department, specifically implemented by the department where the risk source is located, and invite surrounding communities and government supervision agencies to observe if necessary;
3. Effect Evaluation: Form the *Major Risk Source Emergency Drill Record* within 24 hours after the drill, summarize problems (e.g., slow access to emergency materials, chaotic personnel evacuation), and formulate improvement measures (e.g., adjust material storage locations, strengthen personnel training);
4. Continuous Improvement: Revise emergency plans based on drill results, optimize emergency response processes, and ensure the practicality and operability of the plans.

3.5 Supervision and Inspection, and Continuous Improvement

3.5.1 Supervision and Inspection

1. Inspection Content:
   - Effectiveness of major risk source monitoring measures (e.g., alarm device sensitivity, video surveillance coverage);
   - Integrity of safety facilities (e.g., leak-proof, fire-proof, explosion-proof facilities);

- Implementation of management systems (e.g., patrols, operation permits, training);
- Adequacy of emergency preparation (e.g., materials, plans, drills);
- Implementation of hidden hazard rectification (e.g., rectification of problems found in previous inspections);

1. Inspection Methods:
   - Daily Inspection: Conducted in conjunction with patrols;
   - Special Inspection: Conducted before major holidays and seasonal changes (e.g., anti-leakage in rainy seasons);
   - Unannounced Inspection: Random sampling to verify the actual control status;
   - External Inspection: Cooperate with compliance inspections by government supervision agencies;
1. Problem Disposal:
   - General Hidden Hazards (e.g., incomplete records): Issue the *Hidden Hazard Rectification Notice* and require rectification within a time limit (generally ≤ 3 days);
   - Major Hidden Hazards (e.g., untreated leakage): Immediately stop relevant operations, activate the emergency procedure, and resume operations only after acceptance of rectification.

3.5.2 Dynamic Update and Review

1. Dynamic Update: When the following situations occur, the responsible department shall update the lists, assessment results and control measures of the two types of risk sources within 48 hours, and submit them to the Quality, Safety and Environmental Protection Department for filing:
   - Risk Source Parameter Changes (e.g., hazardous chemical storage quantity increases from 180t to 220t, exceeding the threshold quantity);
   - Business Adjustments (e.g., stop procurement of a certain type of hazardous material, add new equipment);
   - Regulatory Standard Updates (e.g., GB 18218 threshold quantity adjustment);
   - After Risk Incidents (e.g., optimize storage protection measures after leakage accidents);
   - Changes in External Requirements (e.g., government adds new risk source control clauses);
1. Regular Review:
   - In Q1 each year, the Quality, Safety and Environmental Protection Department organizes the management review of the two types of risk sources, with inputs including:
     - Annual implementation of control measures (e.g., testing reports, patrol records);
     - Risk incident handling results (e.g., rectification of leakage accidents);

        - Government inspection feedback (e.g., filing review opinions);
        - Relevant party complaints (e.g., community noise/pollution complaints);
        - Impact of regulatory standard updates;
    - Review Outputs: Updated *List of Major Hazard Sources* and *List of Major Environmental Risk Sources*, optimized control measures, and resource adjustment suggestions (e.g., add testing equipment);
    - The review report shall be submitted to the Management Representative for review and the Top Management for approval before implementation.

3.6 Records and Archiving

1. Process Records: All departments collect the *Major Hazard Source Identification Form*, *Major Environmental Risk Source Identification Form*, *Major Risk Source Assessment Report*, *Major Risk Source Patrol Record*, *Major Risk Source Maintenance Ledger*, and *Emergency Drill Record*, and organize them into volumes monthly;
2. Archive Management:
    - Paper Archives: Stored in the Archives Management Department, retention period: risk source existence period + 5 years, and retained for 10 years after cancellation;
    - Electronic Archives: Uploaded to the HSE management system, permanently backed up, with access permissions set (only authorized personnel can view/modify);
1. Access Permissions:
    - Internal Employees: Access departmental records with work permits, and cross-departmental access requires approval from the record-keeping department head;
    - External Units (e.g., government supervision agencies, audit institutions): Require approval from the Management Representative, and only provide non-confidential copies (marked "For Review Only");
    - Access to records shall be registered in the *Major Risk Source Record Access Ledger*, and copying/dissemination of confidential information (e.g., detailed risk source locations, sensitive target information) is prohibited.

4 Relevant Documents and Records

4.1 Relevant Documents

1. *Identification of Major Hazard Sources of Hazardous Chemicals* (GB 18218)
2. *Enterprise Environmental Emergency Risk Classification Method* (HJ 941)
3. *Guidelines for Enterprise Environmental Emergency Risk Assessment*
4. *Regulations on the Safety Management of Hazardous Chemicals*
5. *Supervision and Management Measures for Major Hazard Sources*

6. Company *HSE Emergency Plan System*
7. Company *HSE Hazard Identification and Risk Assessment Procedure*
8. Company *HSE Environmental Aspect Identification and Evaluation Procedure*
9. Company *HSE Hidden Hazard Investigation and Control Management Procedure*
10. Company *HSE Change Management Procedure*
11. Company *Hazardous Waste Management Measures*
12. Company *Special Equipment Safety Management Regulations*

4.2 Record List

Record No.	Record Name	Filling Department	Storage Department	Retention Period
HSE-JL-001	*Major Hazard Source Identification Form*	All departments/units	Quality, Safety and Environmental Protection Department	Risk source existence period + 5 years
HSE-JL-002	*Major Environmental Risk Source Identification Form*	All departments/units	Quality, Safety and Environmental Protection Department	Risk source existence period + 5 years
HSE-JL-003	*Major Risk Source Assessment Report*	Quality, Safety and Environmental Protection Department	Quality, Safety and Environmental Protection Department	Risk source existence period + 5 years
HSE-JL-004	*List of Major Hazard Sources*	Quality, Safety and Environmental Protection Department	Quality, Safety and Environmental Protection Department	Long-term
HSE-JL-005	*List of Major Environmental Risk Sources*	Quality, Safety and Environmental	Quality, Safety and Environmental	Long-term

		Protection Department	Protection Department	
HSE-JL-006	*Major Risk Source Monitoring Record*	All departments/units	Quality, Safety and Environmental Protection Department	3 years
HSE-JL-007	*Major Risk Source Patrol Record*	All departments/units	Quality, Safety and Environmental Protection Department	3 years
HSE-JL-008	*Major Risk Source Maintenance Ledger*	All departments/units	Quality, Safety and Environmental Protection Department	3 years
HSE-JL-009	*Emergency Material Ledger*	Quality, Safety and Environmental Protection Department	Quality, Safety and Environmental Protection Department	Long-term
HSE-JL-010	*Major Risk Source Emergency Drill Record*	All departments/units	Quality, Safety and Environmental Protection Department	5 years
HSE-JL-011	*Major Risk Source Filing Documents*	Quality, Safety and Environmental Protection Department	Quality, Safety and Environmental Protection Department	10 years
HSE-JL-012	*Major Risk Source Record Access Ledger*	Archives Management Department	Archives Management Department	3 years

5 Appendix

Appendix A Major Hazard Source Identification Standards

A1 Hazardous Chemical Classification

1. Explosives (e.g., TNT, ammonium nitrate);
2. Flammable Gases (e.g., methane, propane), Toxic Gases (e.g., chlorine, ammonia);
3. Flammable Liquids (e.g., gasoline, ethanol, diesel);
4. Flammable Solids (e.g., red phosphorus), Spontaneously Combustible Substances (e.g., yellow phosphorus);
5. Oxidizing Agents and Organic Peroxides (e.g., potassium permanganate, hydrogen peroxide);
6. Toxic Substances (e.g., cyanides, arsenic trioxide);
7. Radioactive Substances (e.g., uranium);
8. Corrosive Substances (e.g., sulfuric acid, sodium hydroxide).

A2 Threshold Quantity Calculation

When multiple hazardous chemicals exist in a unit, it shall be determined whether it is a major hazard source by the formula \sum_{i=1}^n \frac{q_i}{Q_i} \geq 1, where:

• q_i: Actual quantity of the i-th hazardous chemical (t);

• Q_i: Threshold quantity of the i-th hazardous chemical (t, in accordance with GB 18218);

• Example: A unit contains 150t gasoline (Q=200t) and 60t ethanol (Q=50t), then \frac{150}{200}+\frac{60}{50}=0.75+1.2=1.95\geq1, which is determined as a major hazard source.

Appendix B Major Environmental Risk Source Classification

Risk Level	Risk Value (R)	Judgment Basis	Potential Impact Consequences
Major (Red)	R≥100	Risk materials exceed the threshold quantity by more than 3 times, with concentrated residential areas/water source areas within 5km	Death/serious injury, cross-regional pollution, severe ecological damage

Moderate (Yellow)	50≤R<100	Risk materials exceed the threshold quantity by 1-3 times, with sensitive targets within 1-5km	Minor injury to personnel, pollution around the factory, mild ecological damage
General (Blue)	R<50	Risk materials do not exceed the threshold quantity, no external sensitive targets	Minor environmental impact, limited to the factory area, no personnel injury

Appendix C Major Risk Source Monitoring and Inspection Form

Inspection Item	Inspection Content	Inspection Standard	Inspection Result	Rectification Requirements	Inspector	Inspection Date
Safety Facilities	Leakage alarm device	Sensitive and reliable, automatic alarm when exceeding standards	□Qualified □Unqualified			
	Safety valve/pressure gauge	Within calibration validity period, normal reading	□Qualified □Unqualified			
	Leak-proof facilities (cofferdam/pallet)	Intact without damage, capacity meets	□Qualified □Unqualified			

		requirements				
Monitoring System	Video surveillance	Full coverage without dead ends, clear image	□Qualified □Unqualified			
	Online monitoring equipment (VOCs/wastewater)	Normal data, real-time upload	□Qualified □Unqualified			
Emergency Equipment	Chemical protective clothing/self-contained breathing apparatus	Intact, within validity period	□Qualified □Unqualified			
	Fire extinguisher/leak-stopping tools	Sufficient quantity, intact and effective	□Qualified □Unqualified			
Signs and Marks	Risk source identification/warning signs	Clear and complete, prominent location	□Qualified □Unqualified			
	Emergency evacuation route map	Clear and easy to understand, no obstruction	□Qualified □Unqualified			
Records and Archives	Patrol records/maintenance ledger	Complete and standardized, fully signed	□Qualified □Unqualified			

	Assessment report/filing documents	Valid, updated on schedule	□Qualified □Unqualified			

Appendix D Major Risk Source Emergency Response Flowchart

D1 Hazardous Chemical Leakage Emergency Response Flowchart

1. Detect leakage → Immediately stop operations and activate the alarm device (report to team leader/central control room);
2. Initial Disposal: Wear protective equipment (chemical protective clothing, breathing apparatus), use leak-stopping tools to block the leakage point, and set up a warning area;
3. Personnel Evacuation: Organize surrounding personnel to evacuate to a safe area along the emergency route and count the number of personnel;
4. External Liaison: Call 119 (fire brigade), 120 (medical service), and report to government supervision agencies;
5. Professional Disposal: Cooperate with the fire brigade to conduct leakage collection and neutralization treatment after their arrival;
6. Environmental Monitoring: Test the pollution degree of surrounding soil/water/atmosphere and evaluate the impact range;
7. Post-Disposal: Clean up the leaked materials, repair equipment, compile an accident report, and revise control measures.

Appendix E Hazardous Chemical Storage Safety Distance Requirements (in accordance with GB 18218)

Hazardous Chemical Type	Storage Method	Distance to Civil Buildings (m)	Distance to Open Flame/Heat Source (m)	Distance to Other Chemical Storage Areas (m)
Flammable Liquids (gasoline)	Above-ground storage tank	≥50	≥30	≥10 (with non-flammable chemicals)
Toxic Gases (chlorine)	Gas cylinder cabinet	≥100	≥20	≥20 (with other gas types)

Corrosive Substances (sulfuric acid)	Anti-corrosion storage tank	≥30	≥15	≥5 (with flammable chemicals)