Cladding Technology Shanxi Co., Ltd

HSE Special Emergency Response Plan for Hazardous Chemical Leaks

I. Basic Information of the Plan

Management Identification	Document No.: CLADDING-HSE-PD-45 Effective Date: January 1, 2026Filing Entities: HSE Department of COMPANY, Local Ecological and Environmental Bureau
Compilation Basis	"Regulations on the Safety Management of Hazardous Chemicals", "Regulations on Emergency Response to Work Safety Accidents", "Measures for the Emergency Management of Sudden Environmental Events", "Company HSE Overall Emergency Response Plan for Emergencies (V3.0)"
Scope of Application	Hazardous chemical leakage incidents involved in the company's production and operation, including: 1. Leakage of oils (hydraulic oil, diesel oil, lubricating oil); 2. Leakage of welding gases (oxygen, acetylene, propane); 3. Leakage of solvents (anti-corrosion coatings, thinners); 4. Leakage of acids and alkalis (derusting agents, cleaning agents)
Core Objectives	1. Control general leakage sources (Level Ⅲ) within 10 minutes, and control major leakage sources (Level Ⅰ/Ⅱ) within 30 minutes; 2. Zero cases of personnel poisoning/burning injuries; 3. Leaked substances not spreading to the external environment (soil/water bodies); 4. 100% compliance rate in the disposal of hazardous wastes

II. General Provisions

Article 1 Purpose of Compilation

To standardize the emergency disposal process for hazardous chemical leakage accidents, clarify the responsibilities of various levels and positions, quickly cut off the leakage source, control the scope of spread, reduce personnel injuries, property losses and environmental pollution, eliminate secondary accidents (such as gas explosions, soil pollution), and ensure the safe recovery of core businesses such as material storage, loading-unloading-transportation and equipment maintenance.

Article 2 Work Principles

1. **Protection First, Disposal Later**: Emergency personnel must wear corresponding protective equipment (chemical protective clothing/respirators), and it is strictly prohibited to operate without protection at the risk of danger;
2. **Source Control First, Cleaning Later**: Prioritize plugging the leakage point (closing valves, using leak-stopping clamps) to cut off the hazard source, then clean up the leaked substances, and strictly control ignition sources;
3. **Classified Disposal, Scientific Response**: Select measures such as adsorption/ventilation/neutralization according to the type of chemicals (oils/gases/solvents/acids and alkalis), and prohibit "one-size-fits-all" disposal;
4. **Environment Priority, Prevention of Spread as the Main Task**: Set up anti-seepage and interception facilities (sandbag embankments, absorbent cotton, anti-seepage membranes) to prevent leaked substances from spreading to soil, water bodies and the atmosphere;
5. **Collaborative Linkage, Integration of Internal and External Forces**: Rely on internal emergency teams as the main force, and link up with local ecological and environmental bureaus, fire brigades and hazardous waste disposal units when necessary to ensure compliant and efficient disposal.

III. Risk Identification and Prevention and Control

Article 1 Basic Information of Hazardous Chemicals and Accident Types

(I) Classification of Core Hazardous Chemicals

Chemical Category	Specific Varieties	Key Characteristics	Storage/Operation Risk Points
Flammable Liquids	Hydraulic oil, diesel oil, thinner for anti-	Low flash point (≤60℃), volatile,	Storage: Volatilization due to poor sealing;

	corrosion coatings	flammable and explosive when in contact with ignition sources	Operation: Leakage due to collision during loading and unloading, illegal dumping
Compressed Gases	Oxygen, acetylene, propane	Acetylene is flammable and explosive when in contact with ignition sources; oxygen supports combustion; propane is prone to leakage and accumulation	Storage: Cylinder deformation due to collision, valve damage; Operation: Falling during hoisting, pipeline leakage due to aging
Corrosives	Derusting agents (hydrochloric acid/sulfuric acid), cleaning agents (sodium hydroxide)	Acidic substances corrode skin/equipment; alkaline substances corrode metals; leakage causes soil/water pollution	Storage: Container damage and leakage; Operation: Excessive spraying leading to flowing, contact due to improper protection
Toxic Substances	Some solvent-based coatings, chemical reagents	Volatile gases irritate the respiratory tract, and long-term contact is harmful to health	Storage: Accumulation due to poor ventilation; Operation: Unprotected operation, failure to clean up in time after leakage

(II) Accident Type Classification (According to Leakage Amount and Hazard Degree)

Accident Level	Judgment Criteria	Typical Scenarios	Disposal Entity
Minor Leakage (Level Ⅲ)	1. Leakage amount < 10L (liquid) or < 1m³ (gas); 2. Confined to	Lubricating oil leakage during equipment	On-site team (3-5 people), with

	the vicinity of the operation point, no personnel injury; 3. No risk of environmental spread	maintenance, minor leakage from small paint buckets	support from the department
General Leakage (Level Ⅱ)	1. Leakage amount 10-50L (liquid) or 1-5m³ (gas); 2. Spreading to the operation area, no serious personnel injury; 3. Possible pollution to local soil	Hydraulic oil bucket damage and leakage in the storage area, minor leakage from acetylene hoses	Company emergency team (leakage control group + environmental prevention and control group)
Major Leakage (Level Ⅰ)	1. Leakage amount ≥ 50L (liquid) or ≥ 5m³ (gas); 2. Spreading outside the operation area, possibly causing personnel poisoning/burning; 3. Risk of external environmental pollution	Acetylene cylinder leakage during transportation, large storage tank rupture and leakage	Company emergency command + external support (fire brigade, ecological and environmental bureau, hazardous waste disposal unit)

Article 2 Risk Identification of Key Scenarios

Risk Scenario	Involved Chemicals	Trigger Factors	Potential Consequences	Risk Level	Key Prevention and Control Points
Hazardous Chemical Storage Leakage	Hydraulic oil, acetylene, anti-corrosion coatings	1. Oil bucket collision and damage, valves not closed tightly; 2. Lack of anti-vibration rings for gas cylinders,	1. Hydraulic oil seeping into soil, polluting groundwater; 2. Acetylene leakage causing explosion when in contact with	Extremely High Risk	1. Store oil buckets/cylinders separately with a spacing of ≥0.5m, and the spacing between oxygen and acetylene ≥10m; 2. Install gas detection alarms

		collision during handling; 3. Aging of paint bucket sealing covers, expansion and leakage due to temperature and humidity changes	ignition sources; 3. Volatile gas from coatings causing personnel poisoning		(acetylene ≤1.5% LEL) and liquid level monitors in warehouses; 3. Check the sealing status daily and replace aging sealing covers monthly
Loading and Unloading Operation Leakage	Welding gases, hydraulic oil	1. Crane spreader wear, cylinder falling; 2. Forklift puncturing the bucket wall when loading and unloading oil buckets; 3. Personnel illegally dumping residual coatings	1. Gas leakage spreading to the operation area, causing suffocation; 2. Hydraulic oil flowing to the road surface, causing personnel to slip; 3. Volatile coatings polluting the operation environment	High Risk	1. Use special spreaders (with anti-slip pads) for hoisting cylinders, and prohibit single-fork picking; 2. Place rubber buffer pads under oil buckets during loading and unloading; 3. Collect residual coatings uniformly into special containers, and prohibit random dumping
Transportation Leakage	Hydraulic oil attached to over-limit equipment, solvent-based coatings	1. Oil bucket fixing ropes loosening due to vehicle jolting; 2. Paint buckets	1. Leaked substances polluting the road, washed into farmland by rainwater; 2. Volatile solvents causing	High Risk	1. Fix oil buckets/paint buckets with anti-slip pallets and fasten them with ropes during transportation; 2. Stacking

		stacked too high (>2 layers), bottom layer damaged by pressure; 3. Tank rupture due to vehicle collision	discomfort to surrounding personnel; 3. Traffic congestion, expanding the scope of impact		height ≤2 layers, with partitions between layers; 3. Equip transport vehicles with leakage treatment kits (absorbent cotton, neutralizer), and drivers master the emergency process
Equipment Maintenance Leakage	Lubricating oil, derusting agents	1. Oil pipes not plugged during equipment disassembly; 2. Excessive spraying of derusting agents, flowing to the ground; 3. Failure to replace gaskets after maintenance leading to leakage	1. Lubricating oil seeping into the equipment, affecting operation; 2. Derusting agents (acidic) corroding the ground and burning personnel's skin; 3. Volatile leaked substances irritating the respiratory tract	Medium Risk	1. Plug oil pipes and lay anti-seepage pads before equipment maintenance; 2. Spray derusting agents in small amounts and multiple times, and equip with absorbent cotton; 3. Check the sealing status after maintenance and conduct pressure tests (pressure ≥1.2 times the working pressure)

Article 3 Daily Prevention and Control Measures

(I) Engineering and Technical Measures

1. Equipment and facility prevention and control:

◦ Hazardous chemical warehouses: Install explosion-proof lamps and static grounding devices, lay epoxy resin anti-seepage layers on the ground, and set up diversion ditches at the corners (leading to 10m³ emergency collection pools);

◦ Detection and alarm: Install fixed gas detectors (acetylene/propane) in gas operation areas, liquid level alarms in oil storage areas, and give automatic reminders when exceeding limits;

◦ Anti-leakage equipment: Equip cranes with special clamps for hoisting cylinders, install rubber protective sleeves on forklift tines, and set up eye wash stations (≤15m from the operation point) in acid-base operation areas.

1. Operation process prevention and control:

◦ Loading and unloading operations: Equip with mobile leakage treatment kits (absorbent cotton, explosion-proof tools), additionally equip 50kg oil-absorbing felt for oil operations, and 25kg sodium bicarbonate neutralizer for acid-base operations;

◦ Maintenance operations: Close the upstream and downstream valves before equipment disassembly, lay anti-seepage membranes (10m×5m), and use explosion-proof tools to prevent sparks;

◦ Transportation operations: Hazardous chemical transport vehicles must obtain the "Hazardous Goods Transport Permit", be equipped with GPS positioning and emergency contact cards, and lay anti-seepage pads at the bottom of the carriage.

(II) Management Measures

1. Personnel management:

◦ Training and assessment: Operators of hazardous chemicals (warehouse managers, loaders and unloaders, drivers) must pass special training (no less than 8 hours per year) and obtain the "Hazardous Chemical Operation Certificate" after passing the assessment before taking up their posts;

◦ Certificate-based employment: Gas detectors and hazardous waste disposers must hold corresponding qualification certificates and receive regular re-training (once every six months);

◦ Health monitoring: Conduct physical examinations for personnel engaged in acid-base operations and solvent operations every six months, establish health records, and immediately transfer personnel with occupational contraindications to other positions.

1. Patrol inspection and maintenance:

◦ Daily patrol inspection: Teams check the storage status (sealing, pressure) of hazardous chemicals and the integrity of operation equipment daily, and record in the "Hazardous Chemical Patrol Account";

◦ Regular maintenance: Check the calibration status of gas detectors and the validity period of emergency materials monthly, and conduct pressure tests on storage tanks and valves quarterly;

◦ Hidden danger rectification: Immediately rectify hidden dangers (such as aging seals, equipment corrosion) when found; for those that cannot be rectified immediately, mark them for warning and complete rectification within a time limit (24 hours for minor hidden dangers, 48 hours for general hidden dangers).

IV. Emergency Organization and Responsibilities

Article 1 Organizational Structure

graph TD A[Hazardous Chemical Leak Emergency Command] --> A1[Commander-in-Chief: General Manager] A --> A2[Deputy Commander-in-Chief: Deputy General Manager in Charge of Safety] A --> B[On-site Emergency Group] B --> B1[Leakage Control Group (Business Department/Equipment Department: 8 people)] B --> B2[Protection and Rescue Group (Administration Department: 4 people, including 2 first-aid personnel)] B --> B3[Environmental Prevention and Control Group (Quality and Safety Department: 3 people, including 1 monitor)] B --> B4[Alert and Evacuation Group (Security Team: 5 people)] A --> C[Rear Support Group] C --> C1[Material Support Group (Administration Department: 3 people)] C --> C2[Communication and Liaison Group (Administration Department: 2 people)] C --> C3[Hazardous Waste Disposal Group (Quality and Safety Department/Finance Department: 2 people)] C --> C4[Technical Support Group (Equipment Department: 3 people)]

Article 2 Core Responsibility Division

Organization/Position	Core Responsibilities (Exclusive to Leakage Scenarios)
Commander-in-Chief (General Manager)	1. Approve the activation/termination of Level Ⅰ/Ⅱ emergency responses, and issue the instruction of "requesting external support" (ecological and environmental bureau, fire brigade, hazardous waste disposal unit); 2. Coordinate and allocate emergency resources (large-scale adsorption equipment, neutralizer, emergency vehicles); 3. Make major decisions such as "area blockade", "personnel evacuation" and "environmental restoration"; 4. Report major leakage incidents to higher-level units (HSE Department of COMPANY) and local governments
Deputy Commander-in-Chief	1. Assist the Commander-in-Chief in his work and perform his duties when the Commander-in-Chief is absent; 2. Command on-site disposal of Level Ⅱ/Ⅲ leaks and coordinate linkage

	among various groups; 3. Review emergency disposal reports and environmental assessment reports; 4. Organize plan revision, training and drills
Leakage Control Group	1. Leakage source control: Use explosion-proof tools to close valves, replace damaged gaskets, wrap sealing tapes (for oils), and use leak-stopping clamps to plug cylinder leaks; 2. Leaked substance cleaning: Collect oils with oil-absorbing felt/absorbent cotton + transfer with explosion-proof oil pumps, cover acids and alkalis with neutralizers (sodium bicarbonate/lime), and disperse gases with forced ventilators; 3. Equipment protection: Isolate equipment in the leakage area to prevent leaked substances from seeping into the interior
Protection and Rescue Group	1. Personnel protection: Distribute corresponding protective equipment to emergency personnel (oils: anti-static clothing + anti-slip shoes; gases: respirators + positive pressure air breathing apparatus; acids and alkalis: chemical protective clothing + acid and alkali-resistant gloves/goggles); 2. Medical rescue: Provide first aid to injured personnel (acid-base burns/gas poisoning) (burns: rinse with plenty of water for ≥15 minutes; poisoning: transfer to a ventilated area for oxygen inhalation), and contact 120 to transfer seriously injured personnel; 3. Personnel counting: Count the number of people after evacuation to confirm no one is trapped
Environmental Prevention and Control Group	1. Pollution monitoring: Use portable equipment (oils: infrared oil detector; gases: four-in-one detector; acids and alkalis: pH test paper/portable pH meter) to monitor the concentration and spread range of leaked substances; 2. Anti-spread measures: Set up sandbag embankments to intercept leaked substances and prevent them from flowing into sewers/soil, and dig emergency collection ditches (covered with anti-seepage membranes) around the leakage area; 3. Environmental assessment: After leakage control, assess the degree of soil/water pollution and formulate a restoration plan; 4. Data recording: Record monitoring data every 10 minutes to form the "Leakage Pollution Monitoring Report"
Alert and Evacuation Group	1. Alert area setting: Demarcate according to the type of leakage (minor: 10m; general: 50m; major: 100m), enclose with warning tapes, and prohibit irrelevant personnel/vehicles from entering; 2. Personnel evacuation: Guide personnel on the downwind side of the leakage to the upwind safety area

	(minor: 50m; general: 200m; major: 1km), and inform evacuated personnel to cover their mouths and noses with wet towels (for gas leakage); 3. Traffic guidance: When leakage occurs on the road, coordinate with traffic police to close relevant road sections (500m before and after) and guide vehicles to detour
Material Support Group	1. Material allocation: Urgently allocate leakage disposal materials to the site (absorbent cotton: 10kg per 10L of leaked substances; neutralizer: 2kg per 5L of acids and alkalis; protective equipment: 1:1.2 of the number of emergency personnel); 2. Equipment support: Provide explosion-proof oil pumps, forced ventilators, emergency lighting and decontamination equipment; 3. Logistics support: Provide drinking water and replacement parts for protective equipment (respirator cartridges, chemical protective clothing gloves) for emergency personnel, and arrange shifts for rest
Communication and Liaison Group	1. Internal communication: Maintain communication among various groups with explosion-proof walkie-talkies (channel CH09), and report leakage control progress and concentration changes every 5 minutes; 2. External communication: Call the local ecological and environmental bureau (12369) to report the type and amount of leakage, make appointments with hazardous waste disposal units for recycling, and contact 120 for medical rescue; 3. Record keeping: Record emergency instructions, disposal time nodes and material usage to form the "Leakage Emergency Disposal Record"
Hazardous Waste Disposal Group	1. Collection of leaked substances: Put contaminated oil-absorbing felt, neutralized residues, cleaning waste liquids, etc. into special hazardous waste buckets (20L, with lids), and affix labels (name, production time, quantity, hazard characteristics); 2. Compliant disposal: Contact qualified units within 72 hours, handle the "Hazardous Waste Transfer Manifest", and prohibit random dumping; 3. Account management: Record the amount of hazardous waste generated and disposed of, retain the transfer manifest, and keep it for ≥5 years
Technical Support Group	1. Provide technical support: Leakage equipment drawings (pipeline/valve positions), chemical MSDS, leak-stopping technical schemes; 2. Guide disposal: Assist the leakage control group in selecting leak-stopping tools and neutralizer

	dosage; 3. Equipment assessment: Assess the degree of equipment damage after leakage and formulate a maintenance plan

V. Early Warning and Emergency Response

Article 1 Early Warning Actions

(I) Early Warning Conditions (Key Signals Triggering Early Warning)

1. Equipment abnormal signals: Gas detector alarm (concentration exceeding the threshold: acetylene ≥1.5% LEL), liquid level alarm reminder (oil storage tank exceeding liquid level), abnormal equipment pressure gauge (sudden pressure drop of cylinders);
2. Abnormal operation signs: Discovery of container damage/leakage during loading and unloading, oil pipe seal leakage during maintenance, material displacement after vehicle jolting during transportation;
3. Environmental and meteorological conditions: Strong winds (wind speed ≥5m/s, which may accelerate gas spread), heavy rains (which may wash leaked substances into water bodies), high temperatures (which may intensify solvent volatilization);
4. Personnel reports: Patrol personnel detect peculiar smells (solvents/gases), oil stains/water stains (acids and alkalis) on the ground, and abnormal noises of equipment (valve loosening).

(II) Early Warning Measures (Preparation Work After Early Warning Issuance)

1. Minor early warning (corresponding to Level Ⅲ leakage):

◦ Teams increase patrol frequency (once every 15 minutes), focusing on monitoring leakage risk points;

◦ Prepare on-site leakage treatment kits (absorbent cotton, gloves), and keep operators on standby;

◦ Restrict leakage risk operations (such as suspending non-essential oil loading and unloading).

1. General early warning (corresponding to Level Ⅱ leakage):

◦ The department initiates emergency preparation, and personnel of the leakage control group and environmental prevention and control group are on standby;

◦ Allocate emergency materials (oil-absorbing felt, neutralizer, protective equipment) to potential leakage areas;

◦ Evacuate non-essential personnel around the leakage risk area and turn off ignition sources in the area (such as powering off distribution boxes).

1. Major early warning (corresponding to Level Ⅰ leakage):

◦ The company emergency command enters the standby state and notifies external cooperative units (fire brigade, hazardous waste disposal unit) to make preparations;

◦ Evacuate personnel within 500m around the leakage risk area and block roads in the area;

◦ Allocate large-scale emergency equipment (forced ventilators, anti-seepage membranes, emergency collection pools) to the site.

Article 2 Information Reporting Procedures

(I) Reporting Process (Clear Hierarchy, Time-Limited Reporting)

graph LR A[First Discoverer] --> B[Team Leader/On-site Supervisor] (within 5 minutes) B --> C[Department Head] (minor: within 30 minutes; general: within 15 minutes; major: immediately) C --> D[Emergency Command (Communication and Liaison Group)] (minor: within 1 hour; general: within 30 minutes; major: within 10 minutes) D --> E[Higher-level Unit/Local Government] (major: within 1 hour, approved by the Commander-in-Chief)

(II) Reporting Content (Complete Elements, Concise and Accurate)

1. Basic information: Leakage occurrence time (year/month/day hour: minute), specific location (such as "east side of No.1 hazardous chemical warehouse", "K2+300m of XX transportation section");
2. Leakage information: Chemical name (such as "hydraulic oil (46#)", "acetylene"), estimated leakage amount, leakage form (dripping/jetting/spreading);
3. Hazard information: Personnel injury situation (number of injured persons/type of injury), spread range (whether exceeding the operation area), environmental impact (whether polluting soil/water bodies);
4. Disposal information: Measures already taken (such as "valve closed", "sandbag embankment set up"), current disposal difficulties, resources requiring support (such as "explosion-proof oil pump needed", "medical rescue needed").

(III) Reporting Time Limits (Hierarchical Management, Avoid Delay)

Leakage Level	First Discoverer → Team Leader	Team Leader → Department Head	Department Head → Command	Command → External Units (Major)

Minor Leakage (Level Ⅲ)	≤5 minutes	≤30 minutes	≤1 hour	—
General Leakage (Level Ⅱ)	≤5 minutes	≤15 minutes	≤30 minutes	—
Major Leakage (Level Ⅰ)	≤5 minutes	Immediately	≤10 minutes	≤1 hour (approved by the Commander-in-Chief)

Article 3 Hierarchical Emergency Response Process

(I) Level Ⅲ Response (Minor Leakage, Such as Lubricating Oil Leakage < 10L During Equipment Maintenance)

1. Activation conditions: Leakage amount < 10L (liquid) or < 1m³ (gas), no personnel injury, confined to the vicinity of the operation point;
2. Disposal steps (0-20 minutes):

◦ 0-5 minutes: On-site personnel immediately stop operations, cover the leaked substances with absorbent cotton to prevent flowing, and report to the team leader via the internal short number (8889);

◦ 5-10 minutes: The team leader leads 3-5 people to the site, and the leakage control group carries small treatment kits (sealing tapes, oil-absorbing felt) to plug the oil pipe leakage point;

◦ 10-15 minutes: The protection and rescue group checks personnel protection (wearing anti-slip gloves), and the environmental prevention and control group uses pH test paper to detect the leaked substances (lubricating oil is neutral) to confirm no corrosiveness;

◦ 15-20 minutes: Collect contaminated absorbent cotton (put into hazardous waste buckets), clean the site, and the team leader confirms that the leakage is completely controlled and announces the termination of the response;

1. Follow-up work: The department rechecks the sealing status of similar equipment within 24 hours and records in the "Minor Leakage Disposal Account".

(II) Level Ⅱ Response (General Leakage, Such as Hydraulic Oil Leakage 30L in the Storage Area)

1. Activation conditions: Leakage amount 10-50L (liquid) or 1-5m³ (gas), spreading to the operation area, no serious personnel injury, possible pollution to local soil;

2. Disposal steps (0-60 minutes):

◦ 0-10 minutes: The department head reports to the emergency command, the Deputy Commander-in-Chief activates the Level Ⅱ response, and the leakage control group, environmental prevention and control group and alert and evacuation group arrive at the site;

▪ Alert group: Set up a 50m alert area and evacuate personnel in the warehouse to the safety area;

▪ Leakage control group: Divide into 2 teams (1 team uses explosion-proof wrenches to close oil bucket valves, 1 team uses sandbag embankments + oil-absorbing felt to intercept leaked substances and prevent them from flowing into diversion ditches);

◦ 10-30 minutes:

▪ Material support group: Supplement oil-absorbing felt (50kg) and explosion-proof oil pumps to the site, and transfer the collected hydraulic oil to a 10m³ special storage tank;

▪ Environmental prevention and control group: Use an infrared oil detector to detect the leakage range (confirm no spread outside the warehouse), and set up oil-absorbing felt at the warehouse exit to prevent personnel from bringing out oil stains;

▪ Communication group: Report progress to the Commander-in-Chief every 15 minutes (such as "Leakage has been plugged, 28L of hydraulic oil has been collected, no personnel injury");

◦ 30-60 minutes:

▪ Environmental prevention and control group: Detect oil residue on the warehouse floor (compliance standard: <5mg/cm²) and clean the floor with a special cleaning agent (neutral);

▪ Hazardous waste disposal group: Put contaminated oil-absorbing felt and cleaning agent waste liquid into hazardous waste buckets and record the production amount (about 30kg);

▪ Deputy Commander-in-Chief: Review the disposal report, confirm no residual risks, and announce the termination of the response;

1. Follow-up work: The command organizes hidden danger investigation within 48 hours, focuses on checking the sealing status of oil buckets in the storage area, and updates the "Hazardous Chemical Storage List".

(III) Level Ⅰ Response (Major Leakage, Such as Acetylene Leakage 10m³ During Transportation)

1. Activation conditions: Leakage amount ≥50L (liquid) or ≥5m³ (gas), spreading outside the operation area, possibly causing personnel poisoning/burning, existing risk of external environmental pollution;

2. Disposal steps (0-180 minutes):

◦ 0-15 minutes: The Commander-in-Chief activates the Level Ⅰ response, and the communication group immediately contacts external support (fire brigade, 120, gas recovery unit);

▪ Alert and evacuation group: Close the accident road section (500m before and after), guide vehicles to detour, and evacuate surrounding residents to the upwind safety area (≥1km);

▪ Leakage control group: Wear positive pressure air breathing apparatus, fasten cylinder valves with explosion-proof tools (use leak-stopping clamps to plug if valves are damaged), and turn on 2 forced ventilators to disperse gas;

▪ Environmental prevention and control group: Use a four-in-one detector to monitor acetylene concentration in real time (compliance standard: ≤1.5% LEL) and demarcate a no-fire area (no smoking, no mobile phone use);

◦ 15-60 minutes:

▪ External cooperation: Cooperate with the fire brigade to set up a water curtain (to dilute gas concentration), and the gas recovery unit arrives at the site to connect cylinders and recover residual acetylene;

▪ Protection and rescue group: Set up a temporary rescue point in the safety area, provide oxygen inhalation treatment for 2 personnel with discomfort due to gas inhalation, and cooperate with 120 to transfer them to the hospital;

▪ Technical support group: Provide acetylene cylinder parameters (volume 40L, pressure 1.5MPa) and guide the use of leak-stopping clamps;

◦ 60-120 minutes:

▪ Leakage control group: After the acetylene concentration drops to a safe value (≤1.0% LEL), transfer the cylinders to a special transport vehicle and send them to a qualified unit for disposal;

▪ Environmental prevention and control group: Detect the air and soil of the accident road section (no acetylene residue), rinse the road surface with clean water, and collect the rinsing water into an anti-seepage pool;

▪ Communication group: Report progress to the Commander-in-Chief and local ecological and environmental bureau every 30 minutes (such as "Acetylene has been completely recovered, no environmental pollution, 2 personnel with discomfort have been sent to the hospital");

◦ 120-180 minutes:

▪ Hazardous waste disposal group: Put contaminated protective equipment (respirator cartridges, gloves) into hazardous waste buckets and contact the disposal unit for recycling;

▪ Environmental prevention and control group: Submit the "Leakage Pollution Monitoring Report" and confirm no soil/water pollution;

▪ Commander-in-Chief: Confirm that the leakage source is completely eliminated and personnel are properly placed, and announce the termination of the response;

1. Follow-up work: The command organizes an accident investigation within 7 days, forms the "Major Leakage Accident Investigation Report", revises the cylinder fixing standards for transport vehicles, and organizes warning education for all employees.

Article 4 Key Disposal Points for Special Chemicals

(I) Oil Leakage (Hydraulic Oil, Diesel Oil)

• Prohibited actions: Prohibit rinsing with water (to prevent spread), prohibit approaching with ignition sources, prohibit random dumping of leaked substances;

• Disposal steps:

a. Source control: Close oil bucket valves/storage tank inlet and outlet valves, plug damaged parts with sealing tapes or leak-stopping plugs;

b. Interception: Enclose the leakage area with sandbag embankments (height ≥15cm) to prevent flowing;

c. Collection: Cover with oil-absorbing felt (laid 5cm thick), replace when saturated, and transfer the collected oil to a special storage tank with an explosion-proof oil pump;

d. Cleaning: Clean the floor with a neutral cleaning agent, collect the cleaning waste liquid (put into hazardous waste buckets);

• Precautions: Oil-saturated oil-absorbing felt must be stored separately and must not be mixed with other hazardous wastes; residual oil must be recovered before disposal.

(II) Gas Leakage (Acetylene, Propane)

• Prohibited actions: Prohibit switching on/off electrical appliances (to prevent sparks), prohibit using mobile phones, prohibit personnel staying in the leakage area;

• Disposal steps:

a. Ventilation: Turn on forced ventilators (air volume ≥5000m³/h) to disperse leaked gas; if indoors, open doors and windows;

b. Source control: Wear positive pressure air breathing apparatus, fasten cylinder valves with explosion-proof wrenches (use special leak-stopping clamps to plug if valves are damaged);

c. Recovery: Contact the gas recovery unit to transfer residual gas to qualified cylinders;

d. Detection: Continuously monitor the concentration with a four-in-one detector until it drops to ≤1.0% LEL before lifting the alert;

• Precautions: If cylinder leakage cannot be plugged, continuously spray water to cool the cylinder (to prevent explosion) until the gas is completely burned out.

(III) Acid and Alkali Leakage (Derusting Agents, Cleaning Agents)

• Prohibited actions: Prohibit direct contact (to prevent burns), prohibit mixing acids and alkalis (to prevent toxic gas generation), prohibit random discharge;

• Disposal steps:

a. Protection: Emergency personnel wear chemical protective clothing, acid and alkali-resistant gloves/goggles, and respirators (type A filter cartridges for acids, type B for alkalis);

b. Neutralization: Sprinkle sodium bicarbonate (dosage: 2kg per 1L of hydrochloric acid) for acid leakage, and sprinkle lime (1.5kg per 1L of sodium hydroxide) for alkali leakage, stir until the pH value reaches 6-8;

c. Collection: Cover the neutralized residues with absorbent cotton and put them into anti-corrosion hazardous waste buckets;

d. Cleaning: Rinse the site with plenty of water (collect the rinsing water into an anti-seepage pool), and detect the pH value until it meets the standard before discharge;

• Precautions: The neutralization process generates heat, so add neutralizers slowly to prevent splashing and burns; avoid excessive water flow during rinsing to prevent spread.

(IV) Solvent Leakage (Thinners for Anti-corrosion Coatings)

• Prohibited actions: Prohibit approaching with ignition sources, prohibit inhaling volatile gases, prohibit using ordinary adsorption materials (high adsorption materials are required);

• Disposal steps:

a. Coverage: Cover the leakage area with anti-seepage membranes (5m×5m) to prevent volatile spread;

b. Adsorption: Cover with high adsorption cotton (2kg per 1L of solvent), seal and put into hazardous waste buckets when saturated;

c. Ventilation: Turn on explosion-proof ventilators and stop until the VOCs concentration is detected to be ≤100mg/m³;

d. Cleaning: Wipe the floor with a special solvent cleaning agent, collect the cleaning waste liquid (put into hazardous waste buckets);

• Precautions: Tools must be cleaned after disposal (with ethanol) to avoid solvent residue and corrosion; operation personnel must be rotated every 30 minutes to prevent excessive gas inhalation.

VI. Emergency Support

Article 1 Personnel Support

(I) Emergency Team Configuration

Team Name	Personnel Composition	Quantity	Qualification Requirements	Training Requirements
Leakage Control Group	Technical personnel from the Business	8 people	Hold the "Hazardous Chemical Operation	1 practical training session per month (leak-

	Department/Equipment Department		Certificate" and "Explosion-proof Tool Use Certificate"	stopping, adsorption), 1 special training session per quarter (new chemical disposal)
Protection and Rescue Group	Personnel from the Administration Department (including 2 first-aid personnel)	4 people	First-aid personnel hold the "Red Cross First-aid Certificate", all personnel hold the "Protective Equipment Use Certificate"	1 first-aid skills training session per quarter, 1 protective equipment wearing training session per month (complete chemical protective clothing wearing within 5 minutes)
Environmental Prevention and Control Group	Monitoring/environmental protection personnel from the Quality and Safety Department	3 people	Hold the "Environmental Monitoring Qualification Certificate" and be familiar with the operation of infrared oil detectors/four-in-one detectors	1 monitoring equipment calibration training session per quarter, 1 environmental restoration technology training session per year
Technical Support Group	Engineers from the Equipment Department	3 people	Familiar with the structure of hazardous chemical equipment (storage	1 equipment leakage case analysis training session every six months,

			tanks/valves), hold the "Equipment Maintenance Qualification Certificate"	participate in external technical seminars (1 session per year)
Hazardous Waste Disposal Group	Personnel from the Quality and Safety Department/Finance Department	2 people	Hold the "Hazardous Waste Management Qualification Certificate" and be familiar with the hazardous waste transfer process	1 hazardous waste disposal regulation training session per quarter, 1 on-site learning session at the disposal unit per year

(II) Training and Drill Plan

Training/Drill Type	Frequency	Content/Form	Participants
Special Knowledge Training	Once a quarter	Hazardous chemical MSDS, leakage disposal process, protective equipment use	All employees (focus on front-line operators)
Practical Skills Training	Once a month	Leak-stopping tool use, neutralizer proportioning, absorbent cotton laying	Emergency teams (leakage control group, protection and rescue group)
Table-top Drill	Once a quarter	Simulate leakage in different scenarios (such as transportation leakage, storage leakage), discuss disposal plans	Emergency command + team leaders of each emergency group

On-site Drill	Once every six months	Simulate oil (Level Ⅱ) and gas (Level Ⅰ) leakage disposal respectively, invite fire brigade guidance	All emergency teams, some front-line employees observe
Comprehensive Drill	Once a year	Simulate major leakage (Level Ⅰ) + secondary fire, link with external units (fire brigade, hospital, ecological and environmental bureau)	All employees participate, evacuation drill is conducted simultaneously

Article 2 Material Support

(I) Core Emergency Material Configuration (Classified by Chemical Type)

Chemical Type	Material Name and Specification	Storage Location	Quantity	Maintenance Requirements	Supplementary Cycle
Oils	Oil-absorbing felt (1m×0.5m, oil absorption ≥10L/sheet)	Hazardous chemical warehouse, transport vehicles, maintenance workshop	200 sheets	Check moisture resistance every quarter (storage environment humidity ≤65%), replace every 2 years (even if unused)	Replenish within 48 hours after consumption, issue an early warning when inventory is less than 50 sheets
	Explosion-proof oil pump (flow rate	Emergency warehouse, No.1 storage area	5 units	Test run once a month (30 minutes), replace oil	Repair or replace within 24 hours after failure

	≥50L/min, lift ≥5m)			once every six months, clean the filter element every quarter	
	Sandbags (25kg/piece, anti-seepage type)	Emergency cabinets in each operation area	100 pieces	Store in a dry environment (humidity ≤60%), check for damage every six months	Replenish within 72 hours after consumption, issue an early warning when inventory is less than 30 pieces
Gases	Positive pressure air breathing apparatus (pressure ≥25MPa, battery life ≥4 hours)	Emergency warehouse, gas operation area	10 units	Check pressure (green zone) every month, calibrate once a year, disinfect the mask every quarter	Replace the gas cylinder when pressure is less than 20MPa, replace the filter element every six months
	Leak-stopping clamps (5 specifications: suitable for Φ10-100mm pipelines)	Emergency warehouse, maintenance workshop	2 sets	Check anti-rust treatment (apply anti-rust oil) every quarter, test clamping force every month	Replace immediately after damage, supplement when specifications are incomplete
	Forced ventilators (explosion-proof type, air volume ≥5000m³/h)	Emergency warehouse, hazardous chemical warehouse	8 units	Test run once a quarter (1 hour), clean fan blades every six months	Repair or replace within 48 hours after failure
Acids and	Chemical protective clothing (acid	Emergency warehouse,	10 sets	Clean and disinfect after each use, test	Replace immediately after damage,

Alkalis	and alkali-resistant type, grade ≥Type 3)	acid-base operation area		anti-seepage performance (water pressure test) once a year	mandatory scrapping after 3 years of use
	Neutralizers (sodium bicarbonate 25kg/bag, lime 25kg/bag)	Emergency warehouse, maintenance workshop	20 bags / 20 bags	Store in a moisture-proof environment (humidity ≤55%), check for caking every six months	Replenish within 72 hours after consumption, issue an early warning when inventory is less than 5 bags
	Portable pH meter (range 0-14, accuracy ±0.01)	Toolbox of the Environmental Prevention and Control Group	3 units	Calibrate once a month (with standard buffer solution), avoid dropping	Calibrate or replace immediately when accuracy exceeds the limit
Solvents	High adsorption cotton (solvent-absorbing type, oil absorption ≥20g/g)	Emergency warehouse, coating operation area	50kg	Seal for storage (anti-volatilization), check for aging every quarter	Replenish within 48 hours after consumption, issue an early warning when inventory is less than 10kg
	Anti-seepage membranes (5m×10m, thickness ≥0.5mm)	Emergency warehouse, transport vehicles	5 rolls	Avoid sun and rain, check for damage every six months	Replace immediately after damage, issue an early warning when inventory is less than 2 rolls
	Explosion-proof ventilators (air	Emergency warehouse,	5 units	Test run once a quarter, check	Repair or replace within

	volume ≥3000m³/h)	solvent operation area		explosion-proof performance every six months	48 hours after failure
General	Explosion-proof tool set (16 pieces including wrenches, pliers)	Emergency cabinets in each operation area	5 sets	Check for rust every quarter, apply explosion-proof oil, avoid hitting hard objects	Replace immediately after damage, supplement when the set is incomplete
	Emergency lighting (explosion-proof type, battery life ≥8 hours)	Emergency warehouse, each operation area	20 sets	Charge once a month, check brightness every six months	Replace within 24 hours after failure, issue an early warning when inventory is less than 5 sets
	Hazardous waste buckets (20L, with lids, anti-corrosion type)	Emergency warehouse, hazardous waste storage area	100 pieces	Check for damage and leakage every quarter, cover and seal when storing	Replenish within 72 hours after consumption, issue an early warning when inventory is less than 30 pieces

(II) Material Management Requirements

1. Account management: The Quality and Safety Department establishes the "Hazardous Chemical Leak Emergency Material Account", records the material name, specification, quantity, location, validity period and maintenance records, conducts inventory checking before the 5th day of each month, and forms the "Material Inventory Report";
2. Receipt process: Materials can be "received first and formalities completed later" in emergency situations; the recipient must fill in the "Emergency Material Receipt Form" within 24 hours, which shall be submitted to the Quality and Safety Department for filing after being signed by the department head;

3. Maintenance responsibility: The person in charge of each storage point (such as warehouse manager, workshop director) is responsible for daily maintenance; if expired/damaged materials are found, report to the Quality and Safety Department immediately, and the Material Support Group shall replace them uniformly;
4. Emergency allocation: Establish a "material allocation green channel"; in case of major leakage, the Commander-in-Chief directly issues allocation instructions, and the Material Support Group completes the allocation within 30 minutes to ensure on-site material supply.

Article 3 Communication and Technical Support

(I) Communication Support

1. Internal communication:

◦ Equip the emergency groups with 15 explosion-proof walkie-talkies (channel CH09), check the battery power (≥80%) every morning shift, and set up charging bases next to each emergency cabinet;

◦ Set up emergency phones (24-hour unblocked) in key areas such as hazardous chemical warehouses, loading and unloading areas, and maintenance workshops, and post them in prominent positions (1.5m above the ground);

◦ Establish an "emergency contact WeChat group" to release disposal progress in real time; group members include all emergency personnel and contacts of external cooperative units.

1. External communication:

◦ Compile the "External Emergency Cooperative Unit Contact List", including the local ecological and environmental bureau (12369), fire brigade (119), 120 emergency center, hazardous waste disposal unit and gas recovery unit, and post it in each emergency cabinet;

◦ Equip 2 satellite phones (to cope with signal interruption in extreme weather), store them in the emergency warehouse, test the call quality once a month, and shut down for standby after charging.

(II) Technical Support

1. Detection equipment:

◦ Regular calibration: Calibrate portable gas detectors once a quarter (sent to a third party for calibration), infrared oil detectors once every six months, and pH meters once a month (with standard buffer solution); retain calibration records for ≥3 years;

◦ Backup equipment: Equip backup units (2 units) for key detection equipment (such as four-in-one detectors) to ensure immediate replacement in case of failure.

1. External technical cooperation:

◦ Sign a "Technical Service Agreement" with the local ecological and environmental monitoring station, agreeing to arrive at the site within 2 hours after leakage to provide monitoring support;

◦ Sign an "Emergency Disposal Agreement" with the hazardous waste disposal unit to ensure that leaked substances are recycled and disposed of within 48 hours;

◦ Sign an "Emergency Maintenance Agreement" with the equipment manufacturer to provide technical guidance in case of major equipment leakage (response time ≤2 hours).

1. Plan digitalization:

◦ Enter this plan, hazardous chemical MSDS, leakage disposal flowcharts and emergency material lists into the company's OA system, set up an "emergency channel", and employees can access them at any time;

◦ Produce "leakage disposal pocket cards" (waterproof material) and distribute them to front-line operators; the front side contains common leakage disposal steps, and the back side contains emergency phone numbers.

Article 4 Fund Support

1. Special funds: The company allocates no less than 500,000 yuan from the work safety expenses as special funds for hazardous chemical leakage emergency every year, which shall be accounted for separately by the Finance Department and used exclusively for the designated purpose;
2. Fund uses: Procurement and maintenance of emergency materials (60%), training and drills (20%), external technical cooperation (10%), post-leakage environmental restoration (10%);
3. Allocation mechanism: In case of major leakage, the Commander-in-Chief approves the advance allocation, the Finance Department completes the fund allocation within 2 hours, and supplements the approval procedures afterwards; for minor/general leakage, the Deputy Commander-in-Chief approves the allocation, which shall be completed within 24 hours;
4. Audit supervision: The Finance Department and Audit Department jointly conduct an audit on the use of special funds every year to ensure compliant use, and the audit report is submitted to the General Manager's Office Meeting for review.

VII. Post-Disposal

Article 1 On-Site Cleaning and Leaked Substance Disposal

(I) On-Site Cleaning

1. Cleaning principles: Clean the vicinity of the leakage source first, then expand outward; clean liquid leaked substances first, then solid residues; clean high-risk areas (such as water sources, operation channels) first, then low-risk areas;
2. Cleaning requirements:

◦ Oil leakage: Clean the floor with a special cleaning agent (neutral), then rinse with clean water, and finally wipe the residue with oil-absorbing felt to ensure no oil stains on the floor (detected by infrared oil detector <5mg/cm²);

◦ Acid and alkali leakage: After neutralization, rinse with clean water 3 times, detect the pH value (6-8) after each rinsing, and finally wipe dry with a dry cloth;

◦ Gas leakage: After ventilation to reach the concentration standard, wipe the floor with a wet cloth (to collect possible condensate), and purge the equipment surface with compressed air;

◦ Solvent leakage: Wipe with a special cleaning agent, ventilate until the VOCs concentration ≤100mg/m³, then wipe once with clean water.

(II) Disposal of Leaked Substances

1. Collection and storage:

◦ Put all leaked substances (contaminated oil-absorbing felt, neutralized residues, cleaning waste liquids) into special hazardous waste buckets, and affix labels (name, production time, quantity, hazard characteristics, production unit);

◦ Store hazardous waste buckets in a special hazardous waste warehouse (anti-seepage, ventilated, away from ignition sources), with a storage time ≤7 days, and long-term storage is prohibited.

1. Compliant transfer:

◦ The Hazardous Waste Disposal Group contacts a qualified unit within 72 hours after leakage, handles the "Hazardous Waste Transfer Manifest" (electronic manifest + paper manifest), and retains the manifest for ≥5 years;

◦ Use special transport vehicles (with hazardous waste transport qualification) for transfer, track the whole process with GPS, prohibit stopping midway, and include the transfer records in the hazardous waste management account.

1. Disposal supervision:

◦ After hazardous waste disposal, require the disposal unit to provide a "Disposal Confirmation Certificate", including the disposal amount, disposal method (such as incineration, landfill) and pollutant discharge compliance certificate;

◦ The Environmental Prevention and Control Group supervises the disposal process and conducts on-site verification if necessary to ensure compliant disposal and no secondary pollution.

Article 2 Environmental Restoration

(I) Soil Restoration

1. Mild pollution (oil content ≤100mg/kg):

◦ Adopt the "biological restoration method": Spread degrading bacteria agents (such as petroleum-degrading bacteria), maintain soil moisture (20%-30%), and plow regularly, with a restoration period of 2-4 weeks;

◦ Post-restoration detection: Detect the oil content once every 7 days until it meets the standard (≤50mg/kg) before resuming use.

1. Moderate pollution (100mg/kg < oil content ≤500mg/kg):

◦ Adopt the "ex-situ thermal desorption method": Excavate the polluted soil to special treatment equipment, heat to 300℃ to volatilize the oil, and collect the volatile gas for incineration;

◦ Post-restoration detection: The oil content of the treated soil shall be ≤50mg/kg and the pH value 6-8 before backfilling.

1. Severe pollution (oil content >500mg/kg):

◦ Entrust a professional environmental restoration company for disposal, adopt the "chemical oxidation method" (adding hydrogen peroxide) + "solidification and stabilization method", send the restored soil to a third party for detection, and landfill it after meeting the standard;

◦ Restoration process recording: Take videos, keep detection reports, form the "Soil Restoration Report", and file it with the local ecological and environmental bureau.

(II) Water Body Restoration

1. Mild pollution (oil content ≤5mg/L):

◦ Adopt the "adsorption method": Add activated carbon (dosage 50g/m³), salvage the activated carbon after 24 hours, and detect the oil content ≤0.5mg/L;

◦ For flowing water bodies, set up adsorption dams (filled with oil-absorbing felt) to intercept leaked substances.

1. Moderate pollution (5mg/L < oil content ≤20mg/L):

◦ Adopt "oil separation + adsorption": First separate the floating oil through an oil separation tank, then adsorb the dispersed oil with oil-absorbing felt, and finally add microbial agents to degrade the dissolved oil;

◦ Post-restoration detection: Detect the oil content ≤0.5mg/L and COD ≤50mg/L for 3 consecutive days before discharge.

1. Severe pollution (oil content >20mg/L):

◦ Immediately cut off the water flow, build a temporary anti-seepage pool, transfer the polluted water into the pool, and treat it with the "demulsification + air flotation + adsorption" process, and reuse or discharge it after meeting the standard;

◦ Invite the local ecological and environmental bureau to supervise on-site, and retain the treatment records for ≥5 years.

(III) Air Purification

1. After gas leakage:

◦ Continuously ventilate until the concentration meets the standard (acetylene ≤1.5% LEL, VOCs ≤100mg/m³); if there is residual odor, treat it with an activated carbon adsorption tower (air volume ≥10000m³/h);

◦ Detection frequency: Detect once every 10 minutes during ventilation, and detect once every 30 minutes after meeting the standard; stop ventilation only after meeting the standard for 3 consecutive times.

1. After combustion/volatilization pollution:

◦ Adopt "spraying + adsorption": Set up a water spray tower (adding deodorant), then treat it with an activated carbon adsorption tower, and discharge after purification;

◦ Detection indicators: Particulate matter ≤10mg/m³, sulfur dioxide ≤50mg/m³, nitrogen oxides ≤100mg/m³, meeting national standards.

Article 3 Accident Investigation and Evaluation

(I) Investigation Organization

1. Level Ⅰ/Ⅱ leakage: Led by government departments (ecological and environmental bureau, emergency management bureau), the company cooperates to establish an investigation team, with members including experts in emergency, environmental protection, equipment and other fields;
2. Level Ⅲ leakage: The company establishes an investigation team (headed by the Commander-in-Chief, with members including the Quality and Safety Department, Business Department, Equipment Department and Human Resources Department), and invites external experts to participate if necessary.

(II) Investigation Content

1. Direct causes:

◦ Equipment factors: Valve damage, container breakage, pipeline aging, etc.;

◦ Personnel factors: Illegal operations (such as failure to close valves, collision during loading and unloading), inadequate patrol inspection, improper protection;

◦ Environmental factors: Strong winds, heavy rains, etc., which aggravate leakage spread.