

**Plot No. 137-138, off Silvassa Road, Phase-II, GIDC, Vapi - 396195**

**SAFE SKILL SERVICES**

**4,Satkar Complex-2, Chitra , Bhavnagar.**

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PROCESS SAFETY AUDIT REPORT

OF

JAY CHEMICALS LTD

# 11TH SEPTEMBER 2020

**1.0 INTRODUCTION**

The Plant was inspected on 29th August 2020. This report deals with safety aspects of the unit. The report is based on the information gathered at site and documents made available by Jay chemicals.

# AUDIT METHODOLOGY

* + - Visit to various sections of the plant for in- depth study of hazard potential.
    - Study of the maintenance system of process, machines, pipes, equipment, buildings etc.,
    - Interaction with various levels of employees.
    - Perusal of documents relating to OS & H

# 3.0 BRIEF DETAILS OF THE UNIT

The plant is located in Plot No. 137-138, Phase-II, GIDC, Vapi, Gujarat. This facility is used for multipurpose process development as and when required. As per the details provided by the Jay Chemicals, the products made are

#### Audit Team

This audit is carried out as per IS 14489: 1998 and requirements under the Factories Act 1948, the Gujarat Factories Rules 1963 and other safety statutes

We have designated suitably qualified and experienced auditors to perform this audit as under:

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Name** | **Worked with** | **Experience** |
| 1. | **Mr. Bhadresh Patel**  B.sc(Chem.), PDIS  Safety Audit, HAC, QRA, Hazop study, safety report | Worked With Huber Group Ind. Ltd. For More than 11 Years in Production.  Worked with Phthalo color & Chemical Ind. Ltd. for more than 7 years in production.  Associated With SAFE SKILL Services from 5 years. | >23 Years |
| 2 | **Mr. Manish Mehta** |  |  |
| 3. | **Mr. Chandrajitsinh Chudasama** |  |  |

#### Management Representative

The officials of the auditee organization authorized to deal with us are as under:

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr.**  **No** | **Name** | **Designation** | **Department** |
| 1. | Dr.Rajesh Mishra | Manager | R & D |
| 2. | Mr. Vishal Patil | Assistant Manager | Process |
| 3. | Mr. ? | Assistant Manager | Operations |
| 4. | Mr. ? | Mechanical Manager | Engineering |

#### 

#### Audit Goals

Following goals are decided while starting this audit.

* + 1. To achieve process safety excellence, manage risk, and comply with regulations to avoid process safety incidents that can have catastrophic effects using PSM approach.
    2. To provide the auditee with an opportunity to assess its own PSM system against PSM system standard and identify areas for improvement;
    3. To meet regulatory requirements.(India has no regulation on PSM-Hence it is voluntary Standards)

#### Audit Objectives

Following objectives are kept before eyes while conducting this audit

* 1. To carry out a systematic, critical appraisal of all potential hazards involving personnel, plant, services, operations and procedures.
  2. To ensure that PSM system fully satisfy the legal requirements and those of the company’s written policies, objectives and progress.

#### Audit Scope

#### Following are the scope of the PSM Audit;

#### Physical boundary of the Company

1. Organizational activity performed by company employees, contractors, transporters and other agency
2. Applicable (Relevant) legal requirements pertaining to PSM

#### Audit Plan

Audit plan has been finalized after consultation with the client and communicated to all concerned, well in advance by Auditee.

Mainly manufacturing areas including material movement, hazardous chemical Storages and their safety aspects are audited on sample base. Areas like Manufacturing unit, Storages of Raw Materials, Finished Product & Safety Management System etc. was covered under Sample Audit.

#### SITING

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr. No.** | **Type of Exposure (name of the village/ town/ place)** | **Distance / Direction** | **Population** |
| **1** | ? | **North Side** | ? |
| **2** | ? | **East Side** | ? |
| **3** | ? | **West Side** | ? |
| **4** | ? | **South Side** | ? |

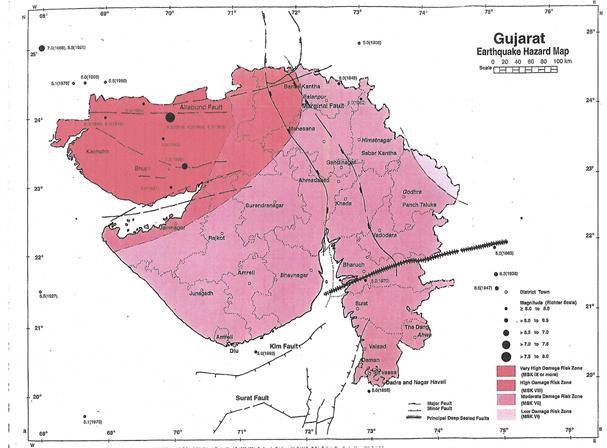
Vapi fire brigade is located approximately one kilometer from factory premises

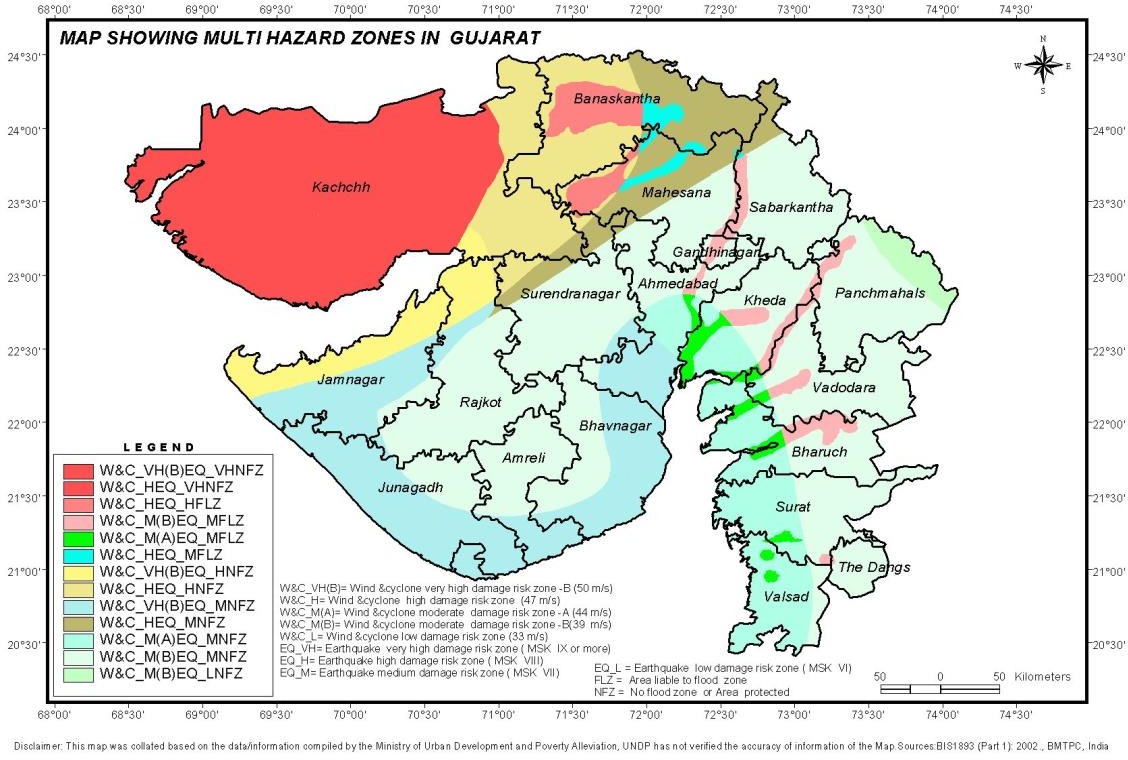
## Details of the Hospitals

|  |  |  |
| --- | --- | --- |
| **Hospital** | **Distance** | **No Beds Available** |
| ESIC Hospital | 1.8 Km. | 300 Beds |
| Usha Shalby | 1.1 Km. | 200 Beds |
| Haria Hospital | 3.0 Km | 250 Beds |
| Surya Hospital | 1.7 Km | 120 Beds |
| Janseva Hospital | 4.9 Km | 108 Beds |
| Jeevandeep Hospital | 3.7 Km | 40 beds |

**Flood** – As per the details available the plant has not experienced any major floods in the recent past.

**Earthquake**– As per earthquake map, the earthquake for the site is moderate



 According to multi hazard map the maximum wind speed is about 140kms/hr.

#### 11.0 LIST OF PROCESS

## Key processes developed / optimized in this unit are

1. Nitration
2. Acetylation
3. Hydrolysis
4. Methoxylation
5. Reduction
6. Ethoxylation
7. Cyclisation

#### 12.0 LIST OF FINISHED PRODUCTS

# 

|  |  |  |
| --- | --- | --- |
| SR. No | PRODUCTS | QUANTITY (max) (MT/Month) |
| 1 | m-Nitro-p-Toluidine |  |
| 2 | Fast Red Base |  |
| 3 | Fast Scarlet RC Base |  |
| 4 | Fast Bordeaux GP Base |  |
| 5 | 2,5 Dimethoxy aniline |  |
| 6 | 2,5 Diethoxy aniline |  |
| 7 | 4 Benzamido 2,5 Diethoxy aniline |  |
| 8 | 5-Cyanophthalide |  |
| 9 | 5-Nitroisophthalic acid OR 2-Bromoethanol OR N-methylformanilide OR 5- Nitroindazole OR 6- Nitroindazole OR 5-Nitrovanillin OR 2- Mercapto-5-methoxybenzimidazole |  |

***13.0 List of Hazardous Raw Materials:***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sr. No. | **Name of the hazardous substance** | **Type of storage** | **Quantity** | **Type of possible Hazards** | **Controls provided** |
| 1. | p-Toluidine |  |  |  |  |
| 2. | Acetic acid |  |  |  |  |
| 3. | Acetic anhydride |  |  |  |  |
| 4. | Methylene dichloride |  |  |  |  |
| 5. | Nitric acid (98%) |  |  |  |  |
| 6. | NaOH Lye (48%) |  |  |  |  |
| 7. | o- Anisidine |  |  |  |  |
| 8. | H2SO4 (98%) |  |  |  |  |
| 9. | p- Anisidine |  |  |  |  |
| 10. | Hydroquinone |  |  |  |  |
| 11. | Dimethyl sulphate |  |  |  |  |
| 12. | Diethyl sulphate |  |  |  |  |
| 13. | Benzoyl Chloride |  |  |  |  |
| 14. | Thionyl chloride |  |  |  |  |
| 15. | Ammonia |  |  |  |  |
| 16. | Monochlorobenzene |  |  |  |  |
| 17. | Isophthalic acid |  |  |  |  |
| 18. | Formic acid (85%) |  |  |  |  |
| 19. | Benzene(Recovered) |  |  |  |  |
| 20. | 2-Methyl-4-nitroaniline |  |  |  |  |
| 21. | Sodium Nitrite |  |  |  |  |
| 22. | Vanillin |  |  |  |  |
| 23. | 4-Methoxy-2-nitroaniline |  |  |  |  |
| 24. | NaHS(30%) |  |  |  |  |
| 25. | Carbondisulphide |  |  |  |  |
| 26. | Hydrobromic acid(48%) |  |  |  |  |
| 27. | Monoethyleneglycol |  |  |  |  |

**Auditing Checklist for 29 CFR 1910.119**

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** |  | **Exceptions**  **Found?** | **Evidence / Comments** |
| A. | **Applicability** |  |  |
| A.1. | Does the OSHA PSM regulation apply: |  |  |
| A.1.i | A process which involves a chemical at or above the specified threshold quantities (see 29 CFR 1910.119 Appendix A) | Yes | HNO3, H2SO4, Thionyl Chloride, Ammonia |
| A.1.ii | A process which involves a flammable liquid or gas (as defined in 1910.1200(c) of this part) on site in one location, in a quantity of 10,000 pounds (4535.9 kg) or more except for:   1. Hydrocarbon fuels used solely for workplace consumption as a fuel (e.g., propane used for comfort heating, gasoline for vehicle refueling), if such fuels are not a part of a process containing another highly hazardous chemical covered by this standard; 2. Flammable liquids stored in atmospheric tanks or transferred which are kept below their normal boiling point without benefit of chilling or refrigeration. 3. Retail facilities, Oil or gas well drilling or servicing operations; or, Normally unoccupied remote facilities. |  |  |
|  |  |  |  |
| B. | **Definitions** |  |  |
|  | Do you understand the definitions as presented in 29 CFR 1910.119(b)? | No | Block & Process Flow Diagram available |
|  |  |  |  |
| C. | **Employee Participation** |  |  |
| C.1. | Do you have a written plan of action regarding the  Implementation of the employee participation required by 29 CFR 1910.119(c)? | No | Operating procedures available but require training of SOP and involvement in PSSR to shop floor employee |
| C.2 | Have you consulted with employees and their representatives on the conduct and development of process hazards analyses and on the development of the other elements of 29 CFR 1910.119? | Yes | MNPT HAZOP has been done but RD not installed yet as per recommended. Other product Hazop needs to be done. |
| C.3 | Have you provided to employees and their representatives | No | All employees have access to process hazard |

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** |  | **Exceptions**  **Found?** | **Evidence / Comments** |
|  | Access to process hazard analyses and to all other information required to be developed under 29 CFR 1910.119? |  | analyses and have required data. |
|  |  |  |  |
| D. | **Process safety information.** |  |  |
| D.1 | Has the following information been compiled and updated according to the schedule given in 29CFR1910.119 (e)? |  |  |
| D.1.i | Toxicity information | No | MSDS is available for all raw material and finish goods.. |
| D.1.ii | Permissible exposure limits | No | MSDS is available for all raw material and finish goods.. |
| D.1.iii | Physical data | No | MSDS is available for all raw material and finish goods.. |
| D.1.iv | Reactivity data | Yes | Isothermal reaction calorimetry test is needed. |
| D.1.v | Corrosively data |  |  |
| D.1.vi | Thermal and chemical stability data | Yes | Thermal screening test is needed. |
| D.1.vii | Hazardous effects of inadvertent mixing of different materials that could foreseeably occur |  |  |
| D.2 | Information pertaining to the technology of the process. |  |  |
| D.2.i | Information concerning the technology of the process shall include at least the following:   1. A block flow diagram or simplified process flow diagram (see Appendix B to this section); 2. Process chemistry; 3. Maximum intended inventory; 4. Safe upper and lower limits for such items as temperatures, pressures, flows or compositions; and, 5. An evaluation of the consequences of deviations, including those affecting the safety and health of employees. | No | Block diagram ,process flow diagram , process chemistry and SOP are available. |
| D.2.ii | Where the original technical information no longer exists, such  information may be developed in conjunction with the process hazard analysis in sufficient detail to support the analysis | No |  |
| D.3 | Information pertaining to the equipment in the process. | No |  |
| D.3.i | Information pertaining to the equipment in the process shall include:   1. Materials of construction; 2. Piping and instrument diagrams (P&ID's); 3. Electrical classification; | No  No  Yes | The plant has not carried out Hazardous Electrical Area Classification. |

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| --- | --- | --- | --- |
| **Question** |  | **Exceptions**  **Found?** | **Evidence / Comments** |
|  | 1. Relief system design and design basis; 2. Ventilation system design; 3. Design codes and standards employed; 4. Material and energy balances for processes built after May 26, 1992; and, 5. Safety systems (e.g. interlocks, detection or suppression systems). | Yes | Pressure safety valve or rupture disc is need where material transfer by air.  Need to be review Ventilation system and energy balance.  To be implement safety system at Nitration, Acetylation, reduction and distillation process. |
| D.3.ii | Has the employer documented the ways in which that equipment complies with recognized and generally accepted good engineering practices? | Yes | To be maintain Equipment History record. |
| D.3.iii | For existing equipment designed and constructed in accordance with codes, standards, or practices that are no longer in general use, has the employer shall determine and document that the equipment is designed, maintained, inspected, tested, and  Operating in a safe manner? | Yes | Inspection Due date is expire of below equipment  (1)Pressure Vessel -20 Nos.  (2)Centrifuge -7 Nos.  (3)Lift 1 Ton & 1.5 Ton  (4) Thermic Fluid Heater |
|  |  |  |  |
| **E.** | **Process hazard analysis.** |  |  |
| E.1 | Has the employer performed an initial process hazard analysis (hazard evaluation) on processes covered by this standard, that  Is appropriate to the complexity of the process that identifies, evaluates, and controls the hazards involved in the process? | No | When trail carried out in R & D, The process hazard is Identified and evaluated. |
| E.2 | Has the employer shall use one or more of the following methodologies that are appropriate to determine and evaluate the hazards of the process being analyzed?   1. What-If; 2. Checklist; 3. What-If/Checklist; 4. Hazard and Operability Study (HAZOP): 5. Failure Mode and Effects Analysis (FMEA); 6. Fault Tree Analysis; or 7. An appropriate equivalent methodology. | No | The employer has implemented Hazop study methodology.  Need to be prepare Checklist of all process and also need to be implement What –if, FMEA and FTA. |
| E.3 | Has the process hazard analysis addressed: |  |  |
| E.3.i | The hazards of the process; | Yes | Explosion , fire and toxic are available |
| E.3.ii | The identification of any previous incident which had a likely | Yes |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** |  | **Exceptions**  **Found?** | **Evidence / Comments** |
|  | potential for catastrophic consequences in the workplace; |  |  |
| E.3.iii | Engineering and administrative controls applicable to the hazards and their interrelationships such as appropriate application of detection methodologies to provide early warning of releases. (Acceptable detection methods might include process monitoring and control instrumentation with alarms, and  Detection hardware such as hydrocarbon sensors.); | Yes | At Nitration process audio visual alarm & two RTD installed but more interlocks require  No load alarm of stirrer  if temp. increase stop the HNO3 addition  if utility failure stop HNO3 addition |
| E.3.iv | Consequences of failure of engineering and administrative controls; | Yes | Observe PPE’s violence & poor house keeping |
| E.3.v | Facility siting; | Yes | Only one exit available for R& D  Observe poor Illumination at plant |
| E.3.vi | Human factors; and | No |  |
| E.3.vii | A qualitative evaluation of a range of the possible safety and health effects of failure of controls on employees in the workplace. | Yes | HIRA (Hazard identification and risk assessment ) needs to be done. |
| E.4 | Has the process hazard analysis been performed by a team with expertise in engineering and process operations, and the team included at least one employee who has experience and knowledge specific to the process being evaluated? Also, was at least one member of the team knowledgeable in the specific  Process hazard analysis methodology being used? | No | One of the Hazop is been done by the third party with company’s knowledgeable employees. |
| E.5 | Has the employer established a system to promptly address the team's findings and recommendations; assure that the recommendations are resolved in a timely manner and that the resolution is documented; document what actions are to be taken; complete actions as soon as possible; develop a written schedule of when these actions are to be completed; communicate the actions to operating, maintenance and other employees whose work assignments are in the process and who  May be affected by the recommendations or actions? | Yes | Hazop is done of nitrator RK-16 in 2017 but recommended things are not yet implemented. |
|  | Has the process hazard analysis been updated and revalidated by a team meeting the requirements in paragraph (e)(4) of this section at least every five (5) years after the completion of the  Initial process hazard analysis, to assure that the process hazard analysis is consistent with the current process? |  | PHA should be reviewed after ever 5 years. |
|  | Has the Employer retained process hazards analyses and |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** |  | **Exceptions**  **Found?** | **Evidence / Comments** |
|  | updates or revalidations for each process covered by this section, as well as the documented resolution of  Recommendations described in paragraph (e)(5) of this section for the life of the process? |  |  |
|  |  |  |  |
| **F.** | **Operating Procedures** |  |  |
| F.1 | Has the employer developed and implemented written operating procedures that provide clear instructions for safely conducting activities involved in each covered process consistent with the  Process safety information which shall address at least the following elements? |  |  |
| F.1.i | Steps for each operating phase:   1. Initial startup; 2. Normal operations; 3. Temporary operations; 4. Emergency shutdown including the conditions under which emergency shutdown is required, and the assignment of shutdown responsibility to qualified operators to ensure that emergency shutdown is executed in a safe and timely manner. 5. Emergency Operations; 6. Normal shutdown; and, 7. Startup following a turnaround, or after an emergency shutdown. | Yes | SOP is there but need to improve by adding emergency handling, emergency shutdown.. |
| F.1.ii | Operating limits:   1. Consequences of deviation; and 2. Steps required to correct or avoid deviation. | No |  |
| F.1.iii | Safety and health considerations:   1. Properties of, and hazards presented by, the chemicals used in the process; 2. Precautions necessary to prevent exposure, including engineering controls, administrative controls, and personal protective equipment; 3. Control measures to be taken if physical contact or airborne exposure occurs; 4. Quality control for raw materials and control of hazardous | Yes | Nitration is exothermic reaction.  Engineering control’s stirrer trip alarm and measure stirrer tork should be implemented. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** |  | **Exceptions**  **Found?** | **Evidence / Comments** |
|  | chemical inventory levels; and,  (E) Any special or unique hazards. |  |  |
| F.1.iv | Safety systems and their functions. | Yes | PSV is needed where materials transferred by air. |
| F.2 | Are operating procedures readily accessible to employees who work in or maintain a process? | No | SOP and MSDS should be provided in local language. |
| F.3 | Have the operating procedures been reviewed as often as necessary to assure that they reflect current operating practice, including changes that result from changes in process chemicals, technology, and equipment, and changes to facilities? Has the employer certified annually that these operating  Procedures are current and accurate? | No |  |
| F.4 | Has the employer developed and implement safe work practices to provide for the control of hazards during operations such as lockout/tag out; confined space entry; opening process equipment or piping; and control over entrance into a facility by maintenance, contractor, laboratory, or other support personnel? Do these safe work practices apply to both employees and  Contractor employees? |  | Lockout and tagout system is followed.. Safety work permit system should be develop.  Competent person is needed for confined space entry. |
|  |  |  |  |
| **G.** | **Training** |  |  |
| G.1 | Initial training. |  |  |
| G.1.i | Has each employee presently involved in operating a process, and each employee before being involved in operating a newly assigned process been trained in an overview of the process and in the operating procedures as specified in paragraph (f) of this section? Has the training included emphasis on the specific safety and health hazards, emergency operations including shutdown, and safe work practices applicable to the employee's  Job tasks? | Yes | Training record not available. |
| G.1.ii | In lieu of initial training for those employees already involved in operating a process on May 26, 1992, has the employer certified in writing that the employee has the required knowledge, skills,  And abilities to safely carry out the duties and responsibilities as specified in the operating procedures? | Yes | Training record not available |
| G.2 | Has refresher training been provided at least every three years, | Yes | Found experienced operator but Training record not available |

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** |  | **Exceptions**  **Found?** | **Evidence / Comments** |
|  | And more often if necessary, to each employee involved in operating a process to assure that the employee understands and adheres to the current operating procedures of the process? Has the employer, in consultation with the employees involved in operating the process, determined the appropriate frequency of  Refresher training? |  |  |
| G.3 | Has the employer ascertained that each employee involved in operating a process has received and understood the training required by this paragraph? Has the employer prepared a record which contains the identity of the employee, the date of  Training and the means used to verify that the employee understood the training? | Yes | To be prepare the list of training and maintain record |
|  |  |  |  |
| **H.** | **Contractors** |  |  |
| H.1 | Application. NOTE: This paragraph applies to contractors performing maintenance or repair, turnaround, major renovation, or specialty work on or adjacent to a covered process. It does not apply to contractors providing incidental services which do  Not influence process safety, such as janitorial work, food and drink services, laundry, delivery or other supply services. |  |  |
| H.2 | Employer responsibilities. |  |  |
| H.2.i | Has the employer, when selecting a contractor, obtained and evaluated information regarding the contract employer's safety performance and programs? |  |  |
| H.2.ii | Has the employer informed contract employers of the known potential fire, explosion, or toxic release hazards related to the contractor's work and the process? |  |  |
| H.2.iii | Has the employer explained to contract employers the applicable provisions of the emergency action plan required by paragraph  (n) Of this section? |  |  |
| H.2.iv | Has the employer developed and implement safe work practices consistent with paragraph (f)(4) of this section, to control the entrance, presence and exit of contract employers and contract employees in covered process areas? |  |  |
| H.2.v | Has the employer periodically evaluated the performance of |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** |  | **Exceptions**  **Found?** | **Evidence / Comments** |
|  | Contract employers in fulfilling their obligations as specified in paragraph (h) (3) of this section? |  |  |
| H.2.vi | Has the employer maintained a contract employee injury and illness log related to the contractor's work in process areas? |  |  |
| H.3 | Contract employer responsibilities. |  |  |
| H.3.i | Has the contract employer assured that each contract employee is trained in the work practices necessary to safely perform  His/her job? |  |  |
| H.3.ii | Has the contract employer assured that each contract employee is instructed in the known potential fire, explosion, or toxic release hazards related to his/her job and the process, and the applicable provisions of the emergency action plan? |  |  |
| H.3.iii | Has the contract employer documented that each contract employee has received and understood the training required by this paragraph? Has the contract employer prepared a record which contains the identity of the contract employee, the date of training, and the means used to verify that the employee  Understood the training? |  |  |
| H.3.iv | Has the contract employer assured that each contract employee  Follows the safety rules of the facility including the safe work practices required by paragraph (f) (4) of this section? |  |  |
| H.3.v | Has the contract employer advised the employer of any unique hazards presented by the contract employer's work, or of any hazards found by the contract employer's work? |  |  |
|  |  |  |  |
| **I** | **Pre-startup safety review** |  |  |
| I.1 | Has the employer performed a pre-startup safety review for new facilities and for modified facilities when the modification is significant enough to require a change in the process safety information? | Yes | To be develop Pre-startup safety review system |
| I.2 | Has the pre-startup safety review confirmed that prior to the  introduction of highly hazardous chemicals to a process: |  |  |
| I.2.i | Construction and equipment is in accordance with design specifications | No |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** |  | **Exceptions**  **Found?** | **Evidence / Comments** |
| I.2.ii | Safety, operating, maintenance, and emergency procedures are in place and are adequate; | Yes | Emergency handling procedure not available |
| I.2.iii | For new facilities, a process hazard analysis has been performed and recommendations have been resolved or implemented before startup; and modified facilities meet the requirements  Contained in management of change, paragraph (l). | Yes | To be implement management of change procedure |
| I.2.iv | Training of each employee involved in operating a process has been completed. | Yes | Training record not available |
|  |  |  |  |
| **J.** | **Mechanical integrity.** |  |  |
| J.1 | Application. NOTE: Paragraphs (j)(2) through (j)(6) of this section apply to the following process equipment: |  |  |
| J.1.i | Pressure vessels and storage tanks; |  |  |
| J.1.ii | Piping systems (including piping components such as valves); |  |  |
| J.1.iii | Relief and vent systems and devices; |  |  |
| J.1.iv | Emergency shutdown systems; |  |  |
| J.1.v | Controls (including monitoring devices and sensors, alarms, and interlocks) and, |  |  |
| J.1.vi | Pumps. |  |  |
| J.2 | Written Procedures. Has the employer established and implemented written procedures to maintain the on-going  Integrity of process equipment? | Yes | To be prepare standard maintenance procedure. |
| J.3 | Training for process maintenance activities. Has the employer trained each employee involved in maintaining the on-going integrity of process equipment in an overview of that process and its hazards and in the procedures applicable to the employee's  Job tasks to assure that the employee can perform the job tasks in a safe manner? | Yes | Training record not available |
| J.4 | Inspection and testing. |  |  |
| J.4.i | Have inspections and tests shall be performed on process  Equipment? | Yes | Inspection Due date is expire of below equipment  (1)Pressure Vessel -20 Nos.  (2)Centrifuge -7 Nos.  (3)Lift 1 Ton & 1.5 Ton  (4) Thermic Fluid Heater |
| J.4.ii | Have the inspection and testing procedures followed recognized and generally accepted good engineering practice? | Yes | Inspection and testing schedule not followed |
| J.4.iii | Is the frequency of inspections and tests of process equipment | Yes | To prepare preventive maintenance schedule |

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| **Question** |  | **Exceptions**  **Found?** | **Evidence / Comments** |
|  | Consistent with applicable manufacturers' recommendations and good engineering practices, and more frequently if determined to be necessary by prior operating experience? |  |  |
| J.4.iv | Has the employer documented each inspection and test that has been performed on process equipment? Does the documentation identify the date of the inspection or test, the name of the person who performed the inspection or test, the serial number or other identifier of the equipment on which the inspection or test was performed, a description of the inspection or test performed, and the results of the inspection or test? | No | Third part inspection report are available with require information |
| J.5 | Equipment deficiencies. Has the employer corrected deficiencies in equipment that are outside acceptable limits (defined by the process safety information in paragraph (d) of  This section) before further use or in a safe and timely manner when necessary means are taken to assure safe operation? | No |  |
| J.6 | Quality assurance |  |  |
| J.6.i | In the construction of new plants and equipment, has the employer assured that equipment as it is fabricated is suitable for  The process application for which they will be used? | No |  |
| J.6.ii | Have appropriate checks and inspections been performed to assure that equipment is installed properly and consistent with design specifications and the manufacturer's instructions? | No |  |
| J.6.iii | Has the employer assured that maintenance materials, spare  Parts and equipment are suitable for the process application for which they will be used? | No |  |
|  |  |  |  |
| **K** | **Hot work permit** |  |  |
| K.1 | Does the employer shall issue hot work permits for hot work operations conducted on or near a covered process? | Yes | Hot work permit system not available |
| k.2 | Do the permits document that the fire prevention and protection requirements in 29 CFR 1910.252(a) have been implemented prior to beginning the hot work operations; indicate the date(s)  Authorized for hot work; and identify the object on which hot work is to be performed? Have the permits been kept on file until | Yes | Safety officer not available or define permit authority |

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| **Question** |  | **Exceptions**  **Found?** | **Evidence / Comments** |
|  | Completion of the hot work operations? |  |  |
|  |  |  |  |
| **L.** | **Management of Change** |  |  |
| L.1 | Has the employer established and implemented written procedures to manage changes (except for "replacements in kind") to process chemicals, technology, equipment, and procedures; and, changes to facilities that affect a covered  Process? | Yes | To be establish and implement management of change procedures. |
| L.2 | Do the procedures assure that the following considerations are addressed prior to any change: |  |  |
| L.2.i | The technical basis for the proposed change; |  |  |
| L.2.ii | Impact of change on safety and health; |  |  |
| L.2.iii | Modifications to operating procedures; |  |  |
| L.2.iv | Necessary time period for the change; and, |  |  |
| L.2.v | Authorization requirements for the proposed change. |  |  |
| L.3 | Are employees involved in operating a process and maintenance and contract employees whose job tasks will be affected by a change in the process informed of, and trained in, the change  Prior to start-up of the process or affected part of the process? |  |  |
| L.4 | When changes covered by this paragraph resulted in a change in the process safety information required by paragraph (d) of this section, was such information shall be updated accordingly? |  |  |
| L.5 | When changes covered by this paragraph resulted in a change in the operating procedures or practices required by paragraph  (f) Of this section, were such procedures or practices updated accordingly? |  |  |
|  |  |  |  |
| **M.** | **Incident Investigation** |  |  |
| M.1 | Has the employer investigated each incident which resulted in, or could reasonably have resulted in a catastrophic release of  Highly hazardous chemical in the workplace? | Yes | Investigation report not available |
| M.2 | If so, was the incident investigation initiated as promptly as possible, but not later than 48 hours following the incident? |  |  |
| M.3 | Was the incident investigation team established, consisting of at |  |  |

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| --- | --- | --- | --- |
| **Question** |  | **Exceptions**  **Found?** | **Evidence / Comments** |
|  | least one person knowledgeable in the process involved, including a contract employee if the incident involved work of the  Contractor and other persons with appropriate knowledge and experience to thoroughly investigate and analyze the incident? |  |  |
| M.4 | Was a report prepared at the conclusion of the investigation which included at a minimum? |  |  |
| M.4.i | Date of incident; |  |  |
| M.4.ii | Date investigation began; |  |  |
| M.4.iii | A description of the incident; |  |  |
| M.4.iv | The factors that contributed to the incident; and, |  |  |
| M.4.v | Any recommendations resulting from the investigation. |  |  |
| M.5 | Did the employer establish a system to promptly address and resolve the incident report findings and recommendations? Did the employer document resolutions and corrective actions? |  |  |
| M.6 | Was the report reviewed with all affected personnel whose job tasks are relevant to the incident findings including contract employees where applicable? |  |  |
| M.7 | Were incident investigation reports been retained for five years? |  |  |
|  |  |  |  |
| **N.** | **Emergency planning and response.** Has the employer established and implemented an emergency action plan for the entire plant in accordance with the provisions of 29 CFR 1910.38(a)? In addition, does the emergency action plan include procedures for handling small releases? NOTE: Employers covered under this standard may also be subject to the  Hazardous waste and emergency response provisions contained in 29 CFR 1910.120(a), (p) and (q). | Yes | To be establish emergency action plan |
|  |  |  |  |
| **O.** | **Compliance Audits** |  |  |
| O.1 | Has the employer certified that they have evaluated compliance with the provisions of this section at least every three years to  Verify that the procedures and practices developed under the standard are adequate and are being followed? |  |  |
| O.2 | Has the compliance audit been conducted by at least one person |  |  |

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| **Question** |  | **Exceptions**  **Found?** | **Evidence / Comments** |
|  | Knowledgeable in the process? |  |  |
| O.3 | Has a report of the findings of the audit been developed? |  |  |
| O.4 | Has the employer promptly determined and documented an appropriate response to each of the findings of the compliance audit, and document that deficiencies have been corrected? |  |  |
| O.5 | Has the employer retained the two (2) most recent compliance audit reports? |  |  |
|  |  |  |  |
| **P.** | **Trade secrets.** |  |  |
| P.1 | Has the employer made all information necessary to comply with the section available to those persons responsible for compiling the process safety information (required by paragraph (d) of this section), those assisting in the development of the process hazard analysis (required by paragraph (e) of this section), those responsible for developing the operating procedures (required by paragraph (f) of this section), and those involved in incident investigations (required by paragraph (m) of this section), emergency planning and response (paragraph (n) of this section) and compliance audits (paragraph (o) of this section) without  Regard to possible trade secret status of such information? |  |  |
| P.2 | Nothing in this paragraph shall preclude the employer from requiring the persons to whom the information is made available under paragraph (p)(1) of this section to enter into confidentiality agreements not to disclose the information as set forth in 29  CFR 1910.1200. |  |  |
| P.3 | Subject to the rules and procedures set forth in 29 CFR 1910.1200(i)(1) through 1910.1200(i)(12), do employees and their designated representatives have access to trade secret information contained within the process hazard analysis and  Other documents required to be developed by this standard? |  |  |

**Appendix A to § 1910.119 -- List of Highly Hazardous Chemicals, Toxics and Reactive (Mandatory)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Chemical Name** | **CAS\*** | **TQ\*\*** | **On Site above TQ** |
|  |  |  |  |
| Acetaldehyde | 75-07-0 | 2500 |  |
| Acrolein (2-Propenal) | 107-02-8 | 150 |  |
| Acrylyl Chloride | 814-68-6 | 250 |  |
| Allyl Chloride | 107-05-1 | 1000 |  |
| Allylamine | 107-11-9 | 1000 |  |
| Alkylaluminums | Varies | 5000 |  |
| Ammonia, Anhydrous | 7664-41-7 | 10000 |  |
| Ammonia solutions (>44% ammonia by weight) | 7664-41-7 | 15000 |  |
| Ammonium Perchlorate | 7790-98-9 | 7500 |  |
| Ammonium Permanganate | 7787-36-2 | 7500 |  |
| Arsine (also called Arsenic Hydride) | 7784-42-1 | 100 |  |
| Bis(Chloromethyl) Ether | 542-88-1 | 100 |  |
| Boron Trichloride | 10294-34-5 | 2500 |  |
| Boron Trifluoride | 7637-07-2 | 250 |  |
| Bromine | 7726-95-6 | 1500 |  |
| Bromine Chloride | 13863-41-7 | 1500 |  |
| Bromine Pentafluoride | 7789-30-2 | 2500 |  |
| Bromine Trifluoride | 7787-71-5 | 15000 |  |
| 3-Bromopropyne (also called Propargyl Bromide) | 106-96-7 | 100 |  |
| Butyl Hydroperoxide (Tertiary) | 75-91-2 | 5000 |  |
| Butyl Perbenzoate (Tertiary) | 614-45-9 | 7500 |  |
| Carbonyl Chloride (see Phosgene) | 75-44-5 | 100 |  |
| Carbonyl Fluoride | 353-50-4 | 2500 |  |
| Cellulose Nitrate (concentration >12.6% nitrogen | 9004-70-0 | 2500 |  |
| Chlorine | 7782-50-5 | 1500 |  |
| Chlorine Dioxide | 10049-04-4 | 1000 |  |
| Chlorine Pentrafluoride | 13637-63-3 | 1000 |  |
| Chlorine Trifluoride | 7790-91-2 | 1000 |  |
| Chlorodiethylaluminum (also called Diethylaluminum |  |  |  |
| Chloride) | 96-10-6 | 5000 |  |

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| **Chemical Name** | **CAS\*** | **TQ\*\*** | **On Site above TQ** |
|  |  |  |  |
| 1-Chloro-2,4-Dinitrobenzene | 97-00-7 | 5000 |  |
| Chloromethyl Methyl Ether | 107-30-2 | 500 |  |
| Chloropicrin | 76-06-2 | 500 |  |
| Chloropicrin and Methyl Bromide mixture | None | 1500 |  |
| Chloropicrin and Methyl Chloride mixture | None | 1500 |  |
| Cumene Hydroperoxide | 80-15-9 | 5000 |  |
| Cyanogen | 460-19-5 | 2500 |  |
| Cyanogen Chloride | 506-77-4 | 500 |  |
| Cyanuric Fluoride | 675-14-9 | 100 |  |
| Diacetyl Peroxide (Concentration > 70%) | 110-22-5 | 5000 |  |
| Diazomethane | 334-88-3 | 500 |  |
| Dibenzoyl Peroxide | 94-36-0 | 7500 |  |
| Diborane | 19287-45-7 | 100 |  |
| Dibutyl Peroxide (Tertiary) | 110-05-4 | 5000 |  |
| Dichloro Acetylene | 7572-29-4 | 250 |  |
| Dichlorosilane | 4109-96-0 | 2500 |  |
| Diethylzinc | 557-20-0 | 10000 |  |
| Diisopropyl Peroxydicarbonate | 105-64-6 | 7500 |  |
| Dilaluroyl Peroxide | 105-74-8 | 7500 |  |
| Dimethyldichlorosilane | 75-78-5 | 1000 |  |
| Dimethylhydrazine, 1,1- | 57-14-7 | 1000 |  |
| Dimethylamine, Anhydrous | 124-40-3 | 2500 |  |
| 2,4-Dinitroaniline | 97-02-9 | 5000 |  |
| Ethyl Methyl Ketone Peroxide (also Methyl Ethyl |  |  |  |
| Ketone Peroxide; concentration > 60%) | 1338-23-4 | 5000 |  |
| Ethyl Nitrite | 109-95-5 | 5000 |  |
| Ethylamine | 75-04-7 | 7500 |  |
| Ethylene Fluorohydrin | 371-62-0 | 100 |  |
| Ethylene Oxide | 75-21-8 | 5000 |  |
| Ethyleneimine | 151-56-4 | 1000 |  |
| Fluorine | 7782-41-4 | 1000 |  |
| Formaldehyde (Formalin) | 50-00-0 | 1000 |  |
| Furan | 110-00-9 | 500 |  |

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| **Chemical Name** | **CAS\*** | **TQ\*\*** | **On Site above TQ** |
|  |  |  |  |
| Hexafluoroacetone | 684-16-2 | 5000 |  |
| Hydrochloric Acid, Anhydrous | 7647-01-0 | 5000 |  |
| Hydrofluoric Acid, Anhydrous | 7664-39-3 | 1000 |  |
| Hydrogen Bromide | 10035-10-6 | 5000 |  |
| Hydrogen Chloride | 7647-01-0 | 5000 |  |
| Hydrogen Cyanide, Anhydrous | 74-90-8 | 1000 |  |
| Hydrogen Fluoride | 7664-39-3 | 1000 |  |
| Hydrogen Peroxide (52% by weight or greater) | 7722-84-1 | 7500 |  |
| Hydrogen Selenide | 7783-07-5 | 150 |  |
| Hydrogen Sulfide | 7783-06-4 | 1500 |  |
| Hydroxylamine | 7803-49-8 | 2500 |  |
| Iron, Pentacarbonyl | 13463-40-6 | 250 |  |
| Isopropylamine | 75-31-0 | 5000 |  |
| Ketene | 463-51-4 | 100 |  |
| Methacrylaldehyde | 78-85-3 | 1000 |  |
| Methacryloyl Chloride | 920-46-7 | 150 |  |
| Methacryloyloxyethyl Isocyanate | 30674-80-7 | 100 |  |
| Methyl Acrylonitrile | 126-98-7 | 250 |  |
| Methylamine, Anhydrous | 74-89-5 | 1000 |  |
| Methyl Bromide | 74-83-9 | 2500 |  |
| Methyl Chloride | 74-87-3 | 15000 |  |
| Methyl Chloroformate | 79-22-1 | 500 |  |
| Methyl Ethyl Ketone Peroxide (concentration > 60%) | 1338-23-4 | 5000 |  |
| Methyl Fluoroacetate | 453-18-9 | 100 |  |
| Methyl Fluorosulfate | 421-20-5 | 100 |  |
| Methyl Hydrazine | 60-34-4 | 100 |  |
| Methyl Iodide | 74-88-4 | 7500 |  |
| Methyl Isocyanate | 624-83-9 | 250 |  |
| Methyl Mercaptan | 74-93-1 | 5000 |  |
| Methyl Vinyl Ketone | 79-84-4 | 100 |  |
| Methyltrichlorosilane | 75-79-6 | 500 |  |
| Nickel Carbonly (Nickel Tetracarbonyl) | 13463-39-3 | 150 |  |
| Nitric Acid (94.5% by weight or greater) | 7697-37-2 | 500 |  |

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| **Chemical Name** | **CAS\*** | **TQ\*\*** | **On Site above TQ** |
|  |  |  |  |
| Nitric Oxide | 10102-43-9 | 250 |  |
| Nitroaniline (para Nitroaniline | 100-01-6 | 5000 |  |
| Nitromethane | 75-52-5 | 2500 |  |
| Nitrogen Dioxide | 10102-44-0 | 250 |  |
| Nitrogen Oxides (NO; NO(2); N(2)O(4); N(2)O(3)) | 10102-44-0 | 250 |  |
| Nitrogen Tetroxide (also called Nitrogen Peroxide) | 10544-72-6 | 250 |  |
| Nitrogen Trifluoride | 7783-54-2 | 5000 |  |
| Nitrogen Trioxide | 10544-73-7 | 250 |  |
| Oleum (65% to 80% by weight; also called Fuming |  |  |  |
| Sulfuric Acid) | 8014-94-7 | 1000 |  |
| Osmium Tetroxide | 20816-12-0 | 100 |  |
| Oxygen Difluoride (Fluorine Monoxide) | 7783-41-7 | 100 |  |
| Ozone | 10028-15-6 | 100 |  |
| Pentaborane | 19624-22-7 | 100 |  |
| Peracetic Acid (concentration > 60% Acetic Acid; |  |  |  |
| also called Peroxyacetic Acid) | 79-21-0 | 1000 |  |
| Perchloric Acid (concentration > 60% by weight) | 7601-90-3 | 5000 |  |
| Perchloromethyl Mercaptan | 594-42-3 | 150 |  |
| Perchloryl Fluoride | 7616-94-6 | 5000 |  |
| Peroxyacetic Acid (concentration > 60% Acetic Acid; |  |  |  |
| also called Peracetic Acid) | 79-21-0 | 1000 |  |
| Phosgene (also called Carbonyl Chloride) | 75-44-5 | 100 |  |
| Phosphine (Hydrogen Phosphide) | 7803-51-2 | 100 |  |
| Phosphorus Oxychloride (also called Phosphoryl |  |  |  |
| Chloride) | 10025-87-3 | 1000 |  |
| Phosphorus Trichloride | 7719-12-2 | 1000 |  |
| Phosphoryl Chloride (also called Phosphorus |  |  |  |
| Oxychloride) | 10025-87-3 | 1000 |  |
| Propargyl Bromide | 106-96-7 | 100 |  |
| Propyl Nitrate | 627-3-4 | 2500 |  |
| Sarin | 107-44-8 | 100 |  |
| Selenium Hexafluoride | 7783-79-1 | 1000 |  |
| Stibine (Antimony Hydride) | 7803-52-3 | 500 |  |

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| --- | --- | --- | --- |
| **Chemical Name** | **CAS\*** | **TQ\*\*** | **On Site above TQ** |
|  |  |  |  |
| Sulfur Dioxide (liquid) | 7446-09-5 | 1000 |  |
| Sulfur Pentafluoride | 5714-22-7 | 250 |  |
| Sulfur Tetrafluoride | 7783-60-0 | 250 |  |
| Sulfur Trioxide (also called Sulfuric Anhydride) | 7446-11-9 | 1000 |  |
| Sulfuric Anhydride (also called Sulfur Trioxide) | 7446-11-9 | 1000 |  |
| Tellurium Hexafluoride | 7783-80-4 | 250 |  |
| Tetrafluoroethylene | 116-14-3 | 5000 |  |
| Tetrafluorohydrazine | 10036-47-2 | 5000 |  |
| Tetramethyl Lead | 75-74-1 | 1000 |  |
| Thionyl Chloride | 7719-09-7 | 250 |  |
| Trichloro (chloromethyl) Silane | 1558-25-4 | 100 |  |
| Trichloro (dichlorophenyl) Silane | 27137-85-5 | 2500 |  |
| Trichlorosilane | 10025-78-2 | 5000 |  |
| Trifluorochloroethylene | 79-38-9 | 10000 |  |
| Trimethyoxysilane | 2487-90-3 | 1500 |  |

\* Chemical Abstract Service Number.

\*\* Threshold Quantity in Pounds (Amount necessary to be covered by this standard).

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