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Integrated Approach on Industrial Hygiene Program for Pharmaceutical Industry

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Abstract: ***Hazardous chemicals have the potential to purpose poisonous effects on human being. Industrial hygiene is the take a look at of the way to anticipate, understand, evaluate, and control of administrative centre situations which could result in people experiencing illness or injury. This take a look at goals to design what is the entire bodily category of airborne contaminants because of chemical compounds directly and circuitously in to our frame. Considering the importance of hygiene in occupational exposure to active pharmaceutical ingredient (API) may cause unintended health impacts in the handling of these drugs by employees. In an industrial setting, where a worker offers a route of exposure to a powerful chemical compound, there is a high likelihood or risk that the compound will produce the designed response. Industrial hygiene offers needed policies to prevent occupational exposure to powerful compounds and elements of a good powerful safety program for compounds. Industrial hygiene is all about anticipating and assessing the hazards of powerful compounds; determining which of the procedures present the greatest risks; assessing the risks; and controlling future occupational exposures mainly through engineering and administrative systems. all safety precautions should be introduced and failure of control exposures to powerful compounds may result in expensive program mistakes, delayed manufacturing schedules and possibly dangerous exposures to industrial employees.***

Keywords: Data collection, Hazard characterization, OEB wise characterization Hazard Labelling, Qualitative Risk Assessment (QRA), Quantitative Exposure Assessment (QNEA), Velocity measurement, Personal noise dosimetry, Respiratory Fit Test.

I. INTRODUCTION

A. General

In this project, we have performed for an industry to identified and evaluate workplace health hazards by personal & work place exposure monitoring. To concerned with the prevention & control of occupational health hazards that arise as a result of or during work. To suggested an engineering, work practice control, and other methods to control potential health hazards to work towards improving employee health, safety and well-being.

Industrial Hygiene

Industrial Hygiene has been defined by AIHA as “that science and art devoted to the Anticipation, Recognition, Evaluation and control of those environment factors or stresses arising in or from the workplace, which may cause sickness, impaired health and well-being, or significant discomfort among workers or among citizen of the community the employees.’’.

Place of Occupational Hygiene in Occupational Health

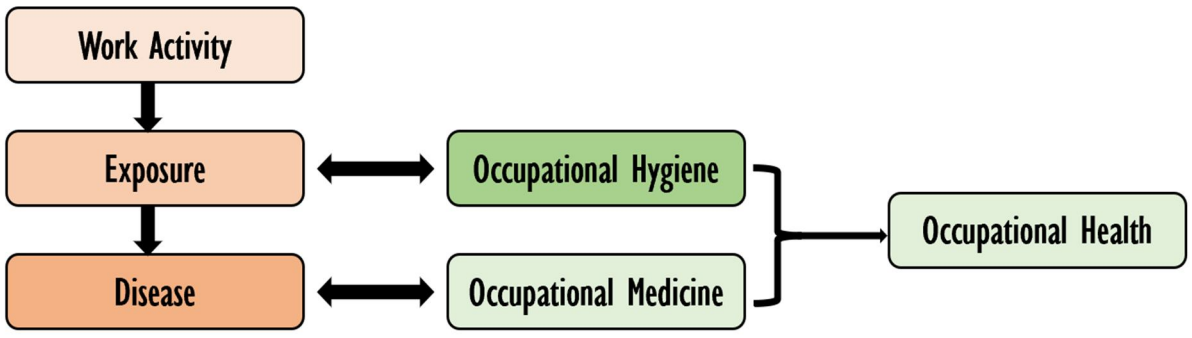


Figure 1.1 Place of Occupational Hygiene in OH

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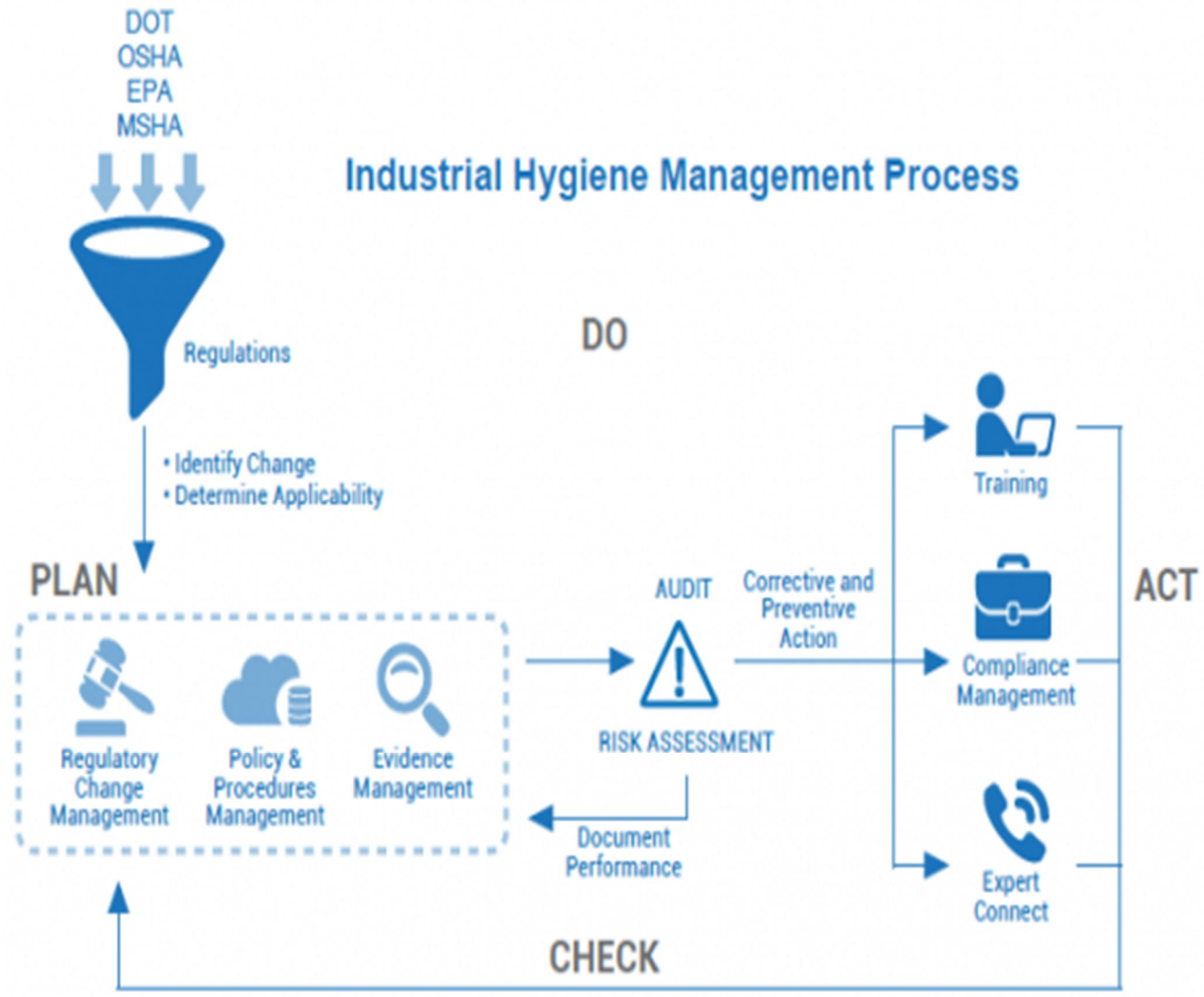


Figure 1.2. Management of Industrial Hygiene

B. Objective

Works Co-ordination between Industrial Hygiene, Medical Officer & Safety Officer for the purpose of Safety & Health Industrial Hygienist will carry out personal monitoring & report individual exposure. Safety Officer will study the IH report and check the feasibility of recommended control measure. Medical officer will examine the worker for effect of exposure and suggest the need biological monitoring as well as give medical guidance. Work of IH is useful to health physician in drawing conclusion for occupational disease

II. METHODOLOGY

A. Introduction

The industrial hygiene program is integrated system to develop in industry to make the employee health and safety in workplace. It's the Responsibility of Industrial Hygienist includes such as Hazard communication. Qualitative and qualitative health risk assessment Carry out personal and workplace exposure monitoring by adopting standard IH practices Giving recommendations to control and reduce the exposures below exposure limits Provide training to employment on occupational health hazards Increase productivity and employee efficiency by protecting and promoting employee's health.

The following process in the Integrated Industrial hygiene Program.

1) *Data Collection:* Data collection is process of collection of the required data from different corresponding reliable sources. MSDS of sigma Aldrich, Chem watch MSDS and science lab can be referred for data collection of hazard characterization of different chemicals.
2) *Hazard Characterization:* Hazard characterization is evaluation of collected data according to the nature and properties of particular chemical and hazards associated with it. Data can be Categorize data in to following categories: Carcinogenicity data, Reproductive data, Toxicity data, Corrosive data, Flammability Data., Reactivity data
3) *OEB Wise Characterization:* A mechanism to quickly and accurately assign chemicals into "categories" or "bands" based on their health outcomes and potency considerations.

OEB 1	*OEB 2*	*OEB 3*	*OEB 4*	*OEB 5*
Least hazardous		→		*Most Hazardous*

4) *Hazard Labelling:* Hazard labeling is being done to provide guidance in the development, implementation and maintenance of an effective Hazard Labeling plan. Hazard labeling incudes following data: Material Name, Manufacturer's Name and Address, CAS Number, Emergency Contact Number, Signal Word, Hazard Classification, Hazard Statement, Precautionary Statement, Pictogram
5) *Qualitative Risk Assessment (QRA):* Qualitative risk assessment is evaluation of potential personal exposure to workplace chemicals, physical, radiological, and/or biological agents based on personal experience and professional judgment. Qualitative assessment mainly focused on following parameters., Area, Unit operation/process, Duration of exposure, Quantity per batch or Activity, Physical form of material, Hazard classification
6) *Quantitative Exposure Assessment (QNEA):* QNEA is evaluation of actual personal workplace exposure to chemical, physical, radiological, and/or biological agents using accredited numerical and mathematical analysis. QNEA can be planned based on results of QRA. It is being performed to measure personal exposure. This includes: Media selection, low rate setting, Calibration, Personal exposure monitoring, Sending sampled media to the laboratory, Results
7) *Velocity Measurement:* Velocity measurement is the quantification of Air flow. Air flow can be measured in a variety of ways. Velometer is being used for measurement of Air flow. Velocity measurement Includes measurement of capture velocity, duct velocity and face velocity.
8) *Personal Noise Dosimetry:* Every worker who is exposed to or likely to be exposed to high noise levels shall be included in the noise monitoring exercise. The noise monitoring exercise refers to performing personal noise dosimeter measurement which involves in the measurement of individual workers noise exposure level using personal dosimeter. Noise Monitoring includes area selection for Personal Dosimetry, Calibration of Personal Dosimeters, personal Noise Monitoring and results.
9) *Respiratory Fit Test:* It is 10-15 minutes test to check whatever respirator is being used by person/worker/employee is fit for that particular person or not. Selection of test Agent, Hood preparation, Solutions fill up in to squeeze bottle, Respiratory Fit testing,

B. Risk Control Plan

1) Risk control is a step of the hazard management process that involves dealing with the risk in question.
2) Risk control is generally carried out in a hierarchical way, wherein the elimination of the risk is considered optimal (and at the top of the hierarchy), whereas personal protective equipment is considered to be the least effective option, and therefore sits at the bottom on the hierarchy.
3) Controlling risk is a key aspect of maintaining a safe workplace. it is including risk control plan of air, noise and ventilation.

C. Existing System

In this chapter introduce about the existing Industrial hygiene system not consist of integrated industrial Hygiene program for completed analysis of the hygiene study in Industries. It can be used to execute in industries.

D. Requirement Specifications

Responsibility of Occupational Physician. Discuss the results with Industrial Hygienist and suggest him required correction. Change in medical surveillance if necessary. Regular periodical biological exposure monitoring of all the employees of facility Increase productivity and employee efficiency by protecting and promoting employee's health.

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III. RESULT AND DISCUSSION

A. QRA Sheet Performed

Area	Unit Operation	Value	Duration of Exposure	Value	Quantity per Batch/Activity	Value	Physical Form	Value	Hazard Classification	Value	Inherent Risk Calculation	Inherent Risk	Controls	Value	Residual Risk Calculation	Residual Risk	Actions
API PART-A	Closed System transfers	3	<30 minutes	1	>50 kg or >50 liters	5	Low VP Solvents	4	OEB 4 (>1-<10ug/m3); TLV 6-20 ppm	4	240	Medium-High	Closed System Transfers	1	240	Medium	Perform air monitoring; Ensure effectiveness of current controls, including respiratory protection
API PART-A	Sampling	1	<30 minutes	1	<100 grams or < 100 ml	1	Low VP Solvents	4	OEB 4 (>1-<10ug/m3); TLV 6-20 ppm	4	16	Low	Open handling with local exhaust ventilation	4	64	Low	Periodically re-evaluate; Review RA when changes or new information becomes available
API PART-A	Dischargin g	4	<30 minutes	1	1-50 kg or 1-50 liters	4	Low VP Solvents	4	OEB 4 (>1-<10ug/m3); TLV 6-20 ppm	4	256	Medium-High	Open handling with local exhaust ventilation	4	1024	Medium-High	Perform air monitoring; Ensure effectiveness of current controls, including respiratory protection
API PART-A	Charging	4	<30 minutes	1	1-50 kg or 1-50 liters	4	API/ interme diate/ RSM	5	OEB 1 (>1000 ug/m3); TLV >501 ppm	1	80	Low-Medium	Open handling with local exhaust ventilation	4	320	Low-Medium	Periodically re-evaluate; Review RA when changes or new information becomes available
API PART-A	Charging	4	<30 minutes	1	1-50 kg or 1-50 liters	4	API/ interme diate/ RSM	5	OEB 1 (>1000 ug/m3); TLV >501 ppm	1	80	Low-Medium	Open handling with local exhaust ventilation	4	320	Low-Medium	Periodically re-evaluate; Review RA when changes or new information becomes available
API PART-A	Charging	4	<30 minutes	1	1-50 kg or 1-50 liters	4	Low VP Solvents	4	OEB 4 (>1-<10ug/m3); TLV 6-20 ppm	4	256	Medium-High	Open handling with local exhaust ventilation	4	1024	Medium-High	Perform air monitoring; Ensure effectiveness of current controls, including respiratory protection
API PART-A	Liquid Drum Charging	2	<30 minutes	1	1-50 kg or 1-50 liters	4	High VP Solvent	5	OEB 2 (>100-<1000 ug/m3); TLV 101-500 ppm	2	80	Low-Medium	Open handling with local exhaust ventilation	4	320	Low-Medium	Periodically re-evaluate; Review RA when changes or new information becomes available
API PART-A	Charging	4	<30 minutes	1	1-50 kg or 1-50 liters	4	Low VP Solvents	4	OEB 4 (>1-<10ug/m3); TLV 6-20 ppm	4	256	Medium-High	Open handling with local exhaust ventilation	4	1024	Medium-High	Perform air monitoring; Ensure effectiveness of current controls, including respiratory protection
API PART-A	Sampling	1	<30 minutes	1	<100 grams or < 100 ml	1	Low VP Solvents	4	OEB 4 (>1-<10ug/m3); TLV 6-20 ppm	4	16	Low	Open handling with local exhaust ventilation	4	64	Low	Periodically re-evaluate; Review RA when changes or new information becomes available
API PART-A	Charging	4	<30 minutes	1	1-50 kg or 1-50 liters	4	Granulat e Material	3	OEB 1 (>1000 ug/m3); TLV >501 ppm	1	48	Low	Open handling with local exhaust ventilation	4	192	Low	Periodically re-evaluate; Review RA when changes or new information becomes available

B. Report of Air Sampling

Analyte	Activity	Duration(min)	Media type/media ID	Pump Flowrate (liter/min)	No. of employee sampled	Result
Bromine	Charging of solvent/acid to reactor	49	225-9006/11058	1 liter/min	1	0.01 ppm
Toluene	Toluene Tanker Sampling	15	226-09/6786503146	0.2 liter/min	1	1.23 ppm
LR Grade HCL	LR GRADE HCL Dispensing	43	225-9032/11004	2.0 liter/min	1	1.02 ppm
LR GRADE HCL	LR GRADE HCL solution Preparation-Utility	23	225-9032/11004	2.0 liter/min	1	0.23 ppm
Acetonitrile	Mobile phase Preparation	15	226-09/6786503147	0.1 liter/min	1	0.09 ppm
DMF	DMF charging	15	226-09/6786503150	0.1 liter/min	1	1.35 ppm
MDC	Discharging from Centrifuge	25	226-09/6786503148	0.05 liter/min	1	2.67 ppm
HCL	HCL Charging	15	225-9032/11004	2.0 liter/min	1	1.37 ppm
DMF	DMF charging	18	226-09/6786503235	0.2 liter/min	1	1.98 ppm
API-2	API-2 discharging from RVD	30	TFE3A/37000731	2.0 liter/min	1	0.98 mg/m^3
Acetonitrile	HPLC waste transfer	15	226-09/6786503231	0.20liter/min	1	0.03 ppm
THF	Cleaning of candle or sparkler filter	55	226-09/6786503230	0.1 litr/min	1	5.23 ppm
H2SO4	H2SO4 Charging to Reactor	17	225-9033/11118	2.0 liter/min	1	2.78 ppm
Total Particulate	Inorganic salt unloading	455	2 pc. PVC filter	2.0 liter/min	1	0.02 mg/m^3
Analyte	Activity	Duration(min)	Media type/media ID	Pump Flowrate (liter/min)	No. of employee sampled	Result
API-2	API-2 discharging from RVD	23	TFE3A/37002518	2.0 liter/min	1	0.89 mg/m^3
THF	Cleaning of candle or sparkler filter	32	226-09/6786503234	0.1 litr/min	1	4.68 ppm
Acetonitrile	HPLC waste transfer	15	226-09/6786503236	0.2 liter/min	1	0.09 ppm
Acetonitrile	Dispensing	15	226-09/6786503228	0.2 liter/min	1	0.98 ppm
ethyl acetate	Ethyl acetate Charging and Preparation	50	226-09/6786503143	0.05liter/min	1	0.54 ppm
Acetonitrile	Mobile phase Operation	15	226-09/6786803233	2.0 liter/min	1	0.04 ppm
API-3	Lab weighing of API	15	TFE3A/37001830	2.0 liter/min	1	0.01 mg/m^3

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C. Area Noise Monitoring and Personal Noise Monitoring

NOISE SURVEY REPORT		
Plant Name	Location	Sound Level (dB)
Block -A	Ground Floor	63.9
	1st Floor (outside of the Cubicles)	66.5
	Raw Material Storage 1st Floor	69.1
	2nd Floor	67.2
Block- B	Ground Floor	61.3
	1st Floor	63.2
	Raw Material Storage First Floor	61
	2nd Floor	61.3
Block-C	Ground Floor	70.9
	1st Floor	75
	2nd Floor	69.2
	3rd Floor	68.6
	4th Floor	68.3
Block-D	Ground Floor	70.9
	1st Floor	68.2
	2nd Floor	67.2
	3rd Floor	67.2
Block-E	Ground Floor	65.5
	1st Floor	68.3
Block-F	Ground Floor	69.2
	1st Floor	62.2
Block-G	Ground Floor	63.1
	First Floor	67.2
	Chamber	71.5
	Lab	69.5
	QC Area	67.4
Block-H	Ground floor	82.1
Block-H	Ground Floor	73.4
Block-H	Ground Floor	77.2
Block-H	1st Floor - CB Compressor	86
	Ground Floor - DG Engine	86
Block-I	Ground Floor - DG Engine-1	85.5
	Blower Room	80.9
	Liquid gas Area	63.3
	(1st Floor)- Plant	86.7
	plant (2nd Floor) -Air Compressor	86.6
Block-J	Ground Floor	61.8

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	Ground Floor Near RVD/CNF (off condition)	60.7
	Ground Floor Near RVD/CNF (off condition)	60.8
	Ground Floor - Technical Area	60.7
	1st Floor - Outside of the cubicles	60.8
	1st FloorCubical-1	61.3
	1st Floor Cubical-2	61
	1st Floor DCS Room	64.4
	1st Floor DCS panel room	64.6
	1st Floor Utility	60.4
	2nd Floor - Outside of the cubicles	61.1
	2nd Floor Purified Water System	77.3
	2nd Floor Hot Water room	77.2
	2nd Floor Cubical-1(off condition)	60.9
	2nd Floor Cubical-2(off condition)	60.8
	2nd Floor Raw material Storage	62.1
	2nd Floor Near CSR 31004(off condition)	63.2
	2nd Floor Utility	60.7
Block- K	Ground Floor (off condition)	67.8
Block -K1	Ground Floor (off condition)	64.5
Warehouse	Ground floor	73.5
	CNF/VTD	78.9
	CNF/VTD	74.6
	CNF/VTD	68.6
	CNF/VTD	65.5
	Dispensing Room	63.2
	First floor	71
	Cubical-1	72.8
	Cubical-2	70.9
	Cubical-3	67.4
	Cubical-4	67.5
	Dispensing Room	64.9
	Nonmoving Material room	65.3
	second Floor	69.7
	Intermediate	64.2
	Finished goods storage	63.2
	Cubical-1	71.5
	Cubical-2	73.5
	Cubical-3	71.3
	Cubical-4	69
	PWS and Distribution system	83.5
	Cubical-3	71.1
	Cubical-4	64.7

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Personal Noise dosimeter : Noise Pro, Calibrator : Quest QC-10, Acoustic calibrator		
The Factories Act, PLE-TWA: 85 dBA (at 5 dB Exchange Rate for 8 hours) ACGIH established TLV-TWA : 85 dBA (at 3 dB Exchange Rate for 8 hours)		
Pre-Calibration: 114 (dB) Post-Calibration: 114 (dB)		
Colour Coding	Colour	Range
Above TLV	Red	>85
Below TLV	Green	<85

Personal protective Device	Make	Noise reduction Rate
Ear Muff	3M 1426 model	21 dB
Ear Plug	3M corded disposable ear Plug 1110	29 dB

Noise Dosimetry Personal sampling data											
S. No	Date	EMP. code	Job title	Activity	Daily Exposure Time (hrs)	Start Time (hrs)	End Time (hrs)	Run Time (hrs)	TWA dB (A)	STD TWA dB (A)	Dose %
1	10.10.22	73674	Operator	Air Compressor Operation	8	15:10	23:10	8	76	85	13.4
2	12.10.22	73393	Operator	Air Blower operation	8	15:00	23:00	8	71	85	7
3	13.10.22	73252	Operator	DG engine Operation	1	07:00	08:00	1	70	85	6.3
4	17.10.22	76922	Operator	CB Compressor Operation	8	23:10	07:10	8	71	85	7.2
5	18.10.22	72426	Operator	DG engine-1 Operation	8	09:00	17:00	8	69	85	5.6

Control measures for personal noise monitoring								
Activity	Before Hearing protection				After Hearing protection			
	Leg dB(A)	LP Max dB(A)	PK Max dB(A)	SEL	Leg dB(A)	LP Max dB(A)	PK Max dB(A)	SEL
Utility Operation	83.6	110.2	130.5	126.5	72.6	99.2	119.5	115.5
Air Blower operation	83.1	118.9	136.3	125.4	72.1	107.9	125.3	114.4
DG engine Operation	96	107.6	122.6	128.8	85	96.6	111.6	117.8
Utility Operation	78.8	92.2	122	123.4	67.8	81.2	111	112.4
DG engine Operation	82.8	95.6	142.3	110.3	71.8	84.6	131.3	108.3

D. Results of Velocity measurement

Velometer : TSI Velocicalc; Model: Velocicalc 8347								
ACGIH Industrial ventilation manual recommended captur velocity of LEV 0.3 to 0.5 m/s (for the vapour), 1-2.5 m/s (for the Particulates)								
Location	**Captur e velocity (fpm)**	**Captur e velocity (m/s)**	**Face Velocity-01 (fpm)**	**Face Velocity-02 (fpm)**	**Face Velocit y-03 (fpm)**	**Average face velocity (fpm)**	**Average face velocity (m/s)**	**Obervation/ Recommendations**
Open flexible duct SSR-101	108	0.55	2340	2455	2340	2378	12.08	No comments
Open flexible duct SSR-102	97	0.49	2250	2355	2240	2382	12.1	
Open flexible duct SSR-103	98	0.5	2540	2430	2250	2407	12.23	
Open flexible duct SSR-105	240	1.22	870	830	740	740	3.76	No comments
Open flexible duct SSR-106	28	0.34	762	608	1289	963	4.86	
Open flexible duct SSR-107	62	0.31	720	640	1380	913.33	4.64	
Open flexible duct in Chemical Ware house -01	48	0.24	647	630	678	651.6	3.31	**Observations:** Chemical drums only stored no activity performed in this room hence was not compared with ACGIH capture velocity range
Open flexible duct in Chemical Ware house -02	33	0.17	690	610	632	644	3.27	
Open flexible duct in Chemical Ware house -03	40	0.2	680	638	631	649.6	3.3	
Open flexible duct in Chemical Ware house -04	28	0.14	636	672	680	662.6	3.37	
Open flexible duct SSR-112	61	0.31	1300	1220	1110	1346.67	6.82	No comments
Open flexible duct SSR-113	64	0.33	2000	1330	1120	1575	8	
Open flexible duct GLR-301	76	0.37	2060	1610	1330	1381.67	7.02	
Open flexible duct GLR-302	63	0.32	1310	1010	970	1097.5	5.58	
Open flexible duct GLR-303	84	0.43	1280	1025	990	1557.5	7.91	
Open flexible duct GLR-304	61	0.31	2160	2060	1830	1536.67	7.81	
Open flexible duct GLR-305	59	0.3	1230	1050	890	1070	5.44	
Open flexible duct GLR-306	79	0.4	1110	1050	1090	1196.67	6.08	
Open flexible duct GLR-307	78	0.4	1120	1500	1310	1210	6.15	
Open flexible duct GLR-308	69	0.35	1020	1000	980	1000	5.08	

Location	Capture velocity (fpm)	Capture velocity (m/s)	Face Velocity-01 (fpm)	Face Velocity-02 (fpm)	Face Velocity-03 (fpm)	Average face velocity (fpm)	Average face velocity (m/s)	Obervation/ Recommendations
Open flexible duct GLR-309	60	0.3	327	359	381	355.67	1.81	No comments
Open flexible duct GLR-310	104	0.53	990	930	970	963.3	4.89	
Open flexible duct HLR-401	50	0.25	470	490	420	460	2.53	**Recommendations:** Keep the Spot extractor as possible to the activity ehile performing the activity
Open flexible duct HLR-402	45	0.23	510	530	510	517	2.85	
Open flexible duct ANFD-201	45	0.23	530	510	510	517	2.85	
Open flexible duct ANFD-202	50	0.25	390	370	400	386.67	1.96	**Recommendations:** Keep the Spot extractor as possible to the activity ehile performing the activity
Open flexible duct ANFD-203	29	0.15	920	1130	545	865	4.39	**Recommendations:** Place the LEV hood near to material handling area
Open flexible duct ANFD-204	19	0.1	160	135	140	145	0.74	**Recommendations:** Coonect a flexible duct to the up to equipment to increase the capture velocity
Open flexible duct CF-101	24	0.12	487	437	459	461	2.34	**Obsevation:** Distance between the material handling area and LEV hood was major contributory for the lesser capture velocity **Recommendations:** Locate the LEV hood at a minimum possible distance from the material handling area.
Open flexible duct CF-102	53	0.27	923	873	841	879	4.47	
Open flexible duct CF-103	47	0.24	1070	852	776	899.3	4.57	
Open flexible duct CF-104	74	0.34	1230	1140	835	1074	5.46	
Open flexible duct CF-105	114	0.58	1850	1230	1815	1631.67	8.29	
Open flexible duct MM-101	83	0.42	1465	1290	948	1234.33	6.27	
Open flexible duct MM-102	63	0.32	690	879	687	752	3.82	
Open flexible duct MM-103	59	0.3	1405	1515	1425	1448.33	7.36	
Open flexible duct SF-101	72	0.37	1630	1505	970	1368.33	6.95	
Open flexible duct TD-101	59	0.3	1540	1400	1090	1343.33	6.82	
Open flexible duct TD-102	20	0.1	218	240	230	229.33	1.17	**Observation:** Capture velocity was measured near TD which was approximatly 2 feet from the LEV hood **Recommendations:** place the LEV hood near to TD
Open flexible duct TD-103	17	0.09	77	69	56	67.33	0.34	**Recommendations:** Ensure the spot extractors are palced as near as possible to the location of activity at the Hood to increase the capture velocity
Open flexible duct RCVD-101	13	0.07	69	62	57	62.67	0.32	
Open flexible duct VTD-101	61	0.31	1300	1220	1110	1346.67	6.84	No comments
Open flexible duct NF-101	64	0.33	2000	1330	1120	1575	8	
Open flexible duct NF-102	76	0.39	2060	1610	1330	1381.67	7.02	
Open flexible duct NF-103	63	0.32	1310	1010	970	1097.5	5.58	

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Based on the above integrated industrial hygiene program implementation in Pharmaceutical Industries Employees who working in Manufacturing plant has to follow the following Hazards Control Measures;

1) Air Sampling Risk Control Plans:

- Make engineering or administrative controls more effective, where feasible, such as local exhaust ventilation, and scrubbers. Where necessary to reduce exposures below the OEL, use protective equipment or other protective measures.
- Use all available work practices to control dust exposures, such as water sprays.
- Wear only fit tested respirators, if respirator protection is required. Do not alter the respirator Make, model, size once a fit test is completed. Do not wear a tight-fitting respirator with a beard or mustache that prevents a good seal between the respirator and the face.
- Wear disposable work clothes and take a shower if facilities are available. Vacuum the dust from your clothes or change into clean clothing before leaving the work site.
- Participate in training, exposure monitoring, and health screening and surveillance programs to monitor any adverse health effects caused by crystalline silica exposures.
- Be aware of the operations and job tasks creating exposures in your workplace environment and know how to protect yourself.
- Do not eat, drink, smoke, or apply cosmetics in areas where dust is present. Wash your hands and face outside of dusty areas before performing any of these activities.

2) Hazard Characterization Recommendation:

- Ensure that the chemicals which are dispensed in containers are provided with label having its name, CAS Number, EC Number, signal word, GHS Pictograms, emergency contact number, hazard classification, hazard statement, precautionary statement/first aid on the container before taking it in to use.
- For mixtures and alloys – label should include chemical identities of all ingredients or alloying elements that contribute to acute toxicity, skin corrosion or serious eye damage, germ cell mutagenicity, carcinogenicity, reproductive toxicity, skin or respiratory sensitization, or specific target organ toxicity (STOT).
- Where a substance or mixture is supplied exclusively for workplace use, competent authority may choose to give suppliers discretion to include chemical identities on the MSDS, in lieu of including them on labels. Vendor also should be asked for same format for Incoming Chemicals.
- If the skull, corrosive symbol and Health Hazard symbol for respiratory sensitization applies, the exclamation mark should not appear [as used for acute toxicity, Skin or Eye irritation and skin sensitization].
- Ensure that the labels of hazardous chemical empty containers are not removed or defaced until the container is decontaminated and disposed.
- Ensure that the labels should visible, firmly attached at least one side of the container with indelible writing and readable position on container and illegible labels are replaced.

3) Noise Risk Control Plans:

- Engineering Controls – Effective Acoustical Enclosure, Sound dampening and Absorption, anti-vibration mounts.
- Administrative Controls
- Use of Hearing Protection Device-considering the Noise Reduction Rating (NRR)
- PPEs to be used in case of Noise level higher than 85 dBA.
- Personal Protective devices provided to operator NNR rated 21 dBA and NRR rated 29 dBA ear muffs and Ear Plugs respectively.

4) Air Velocity Risk Control Plans:

- Keep the Spot extractor as possible to the activity while performing the activity.
- Connect a flexible duct to the up to equipment to increase the capture velocity.
- Locate the LEV hood at a minimum possible distance from the material handling area.

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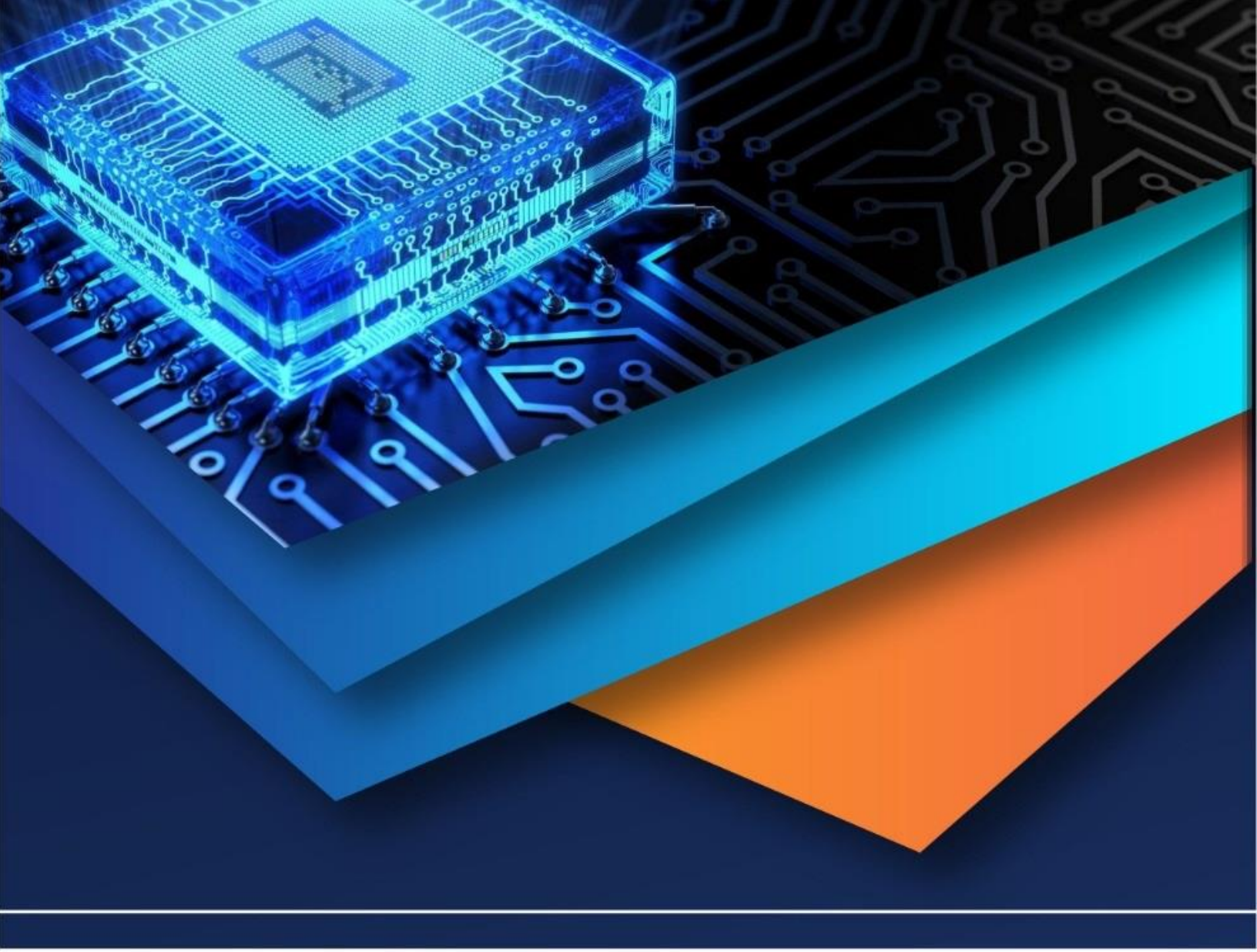
IV. CONCLUSION

The number of Occupational Exposure accidents and fatalities in hazardous pharmaceutical industry and the Breathing Rate during different activities of significant hazardous chemical safety. However, currently hazardous chemical accidents are still frequent in workplace. Moreover, the severity of major hazardous chemical accidents is significant compared to that of other types of industrial accidents. Meanwhile, Organization decided to make and implement a special Industrial Hygiene Program for hazardous chemical safety. Of course, at present and in the future, Organizations hazardous chemical safety is facing a series of opportunities (such as the organization support, the growing safety need of people, and the rapid progress of science and technology). To improve hazardous chemical safety, organization will need to take an Industrial Hygiene principles Anticipation, Recognition, Evaluation, Control and Confirmation, comprehensive approach, which mainly includes risk investigation and control, legislation, supervision, scientific research, technology, education, economy, safety culture, and so on.

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