

PROJECT NAME

ACTIVITY– INSTALLATION, TESTING & COMMISSIONING OF CLEAN AGENT SYSTEM

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Serial No.	Sub-Activities	Hazards Identified (Generic & Task)	Risks Involved (People & Property)	Risk Rating			Control Measures	Residual Risk
				Severity	Probability	Initial Risk		
1.	Prepare work area	<ul style="list-style-type: none"> Unauthorized, untrained workers 	<ul style="list-style-type: none"> Cuts Abrasions 	2	A	L	<ul style="list-style-type: none"> TBT/DSTI to be conducted by the foreman/ safety officer prior to work commencement Task specific safety training to be provided Authorized personnel to undertake the job Daily safety inspection should be carried and eliminate the hazard. 	Low (ALARP)
2.	Manual Handling	<ul style="list-style-type: none"> Incorrect lifting of loads Sharp edges. Placing the object while fingers underneath. Slip/trip/fall (same level) Unsafe posture 	<ul style="list-style-type: none"> Back Injuries Cut to finger Strain Musculoskeletal Injuries 	3	C	M	<ul style="list-style-type: none"> TBT/DSTI to be conducted by the foreman/ safety officer prior to work commencement Task specific safety training to be provided Any lifting tasks shall be carried out by persons physically capable to do so No employee should be asked to carry loads above his capacity and in any case no load shall exceed 30kg per man. Mass of the load is more then to be equally shared Deploy enough number of personnel for lifting shall be appointed to the task depending upon the type of load to be lifted. Use easy mode of transport like trolley etc. Load not to be lifted above your shoulder Height Keep your fingers away from pinch point While placing the load Area to be illuminated with adequate lighting. Proper personal protective equipments to be used while manual handling of materials and loads. 	Low (ALARP)

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3	Handling and storing of Inergen Cylinders	<ul style="list-style-type: none"> • High pressure cylinder • Damaged valve • Collision • Fall of cylinders and Fall of materials into the valve • Unauthorized, untrained workers 	<ul style="list-style-type: none"> • Fatality • Eye damage • Skin damage • Inhalation 	4	B	M	<ul style="list-style-type: none"> • TBT/DSTI to be conducted by the foreman/ safety officer prior to work commencement • Task specific safety training to be provided • Cylinders to be handled by trained and qualified person. • Cylinder should be stored in vertical position only • Ensure the cylinders are transported in pallets with tightly secured by straps or in approved cylinder cages. • Manual unloading of Inergen cylinders are not allowed. • Ensure the cylinder valves are protected at all times. • Cylinder stored area to be barricaded and no materials to be stored in that place. • Warning boards and signage to be placed in the storage area. • Always keep the cylinders secured to pallets until it is permanently fixed to the wall bracket. • If the cylinders are stored in open area, provide adequate overhead protection from falling materials. • Close supervision to be done at all times. • Appropriate PPE to be worn while handling the cylinders (Helmet, shoe, vest, overall, Leather gloves, goggles, respirator. 	Low (ALARP)
4.	Handling chemicals (For pipe coating paint Sigma cover 380,410)	<ul style="list-style-type: none"> • Unauthorized, untrained workers • Spillage • Poor ventilation 	<ul style="list-style-type: none"> • Skin injury • Ingestion • Eye injury • Environment affect 	3	C	M	<ul style="list-style-type: none"> • TBT/DSTI to be conducted by the foreman prior to work commencement • Task specific safety training to be provided 	Low (ALARP)

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		<ul style="list-style-type: none"> • Fire • Health hazards (External / Internal 	<ul style="list-style-type: none"> • Property damage • Occupational health 				<ul style="list-style-type: none"> • Ensure the chemicals are stored as per the manufacturer recommendation and identification. • Adequate lighting and ventilation to be provided • MSDS to be referred prior and to follow the manufacturer instruction • Trained and authorized person to do the job • Only required quantity to take for the work • Do not store chemicals at non designated areas. • Old/ empty container return to store for proper Dispose • Container should check for leakage before Handling • Prevent materials from entering drains and water ways. • Clean with detergents, avoid solvents, contain and collect the spillage with noncombustible absorbent materials and place in container for disposal. • Personnel hygiene to be maintained while and after use of chemicals. • Suitable fire extinguisher (foam) placed in the storage area. • Rubber gloves, overall, helmet, vest, shoe, Goggles, mask to be worn while during the activity 	
5.	Pipe preparation and painting	<ul style="list-style-type: none"> • Untrained, unauthorized Workers • Poor lighting and ventilation • Slip, trip and fall • Use of undesignated area • Health hazard (External/ internal) 	<ul style="list-style-type: none"> • Skin injury • Ingestion • Eye injury • Occupational health • Property damage • Cut and abrasions 	3	C	M	<ul style="list-style-type: none"> • TBT/DSTI to be conducted by the foreman prior to work commencement • Task specific safety training to be provided • Trained and authorized person to do the job • Polythene sheet to be placed in the base level where the pipe painting work is carried out. • Hot work shall not be allowed in the vicinity. 	Low (ALARP)

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		<ul style="list-style-type: none"> • Fire 	<ul style="list-style-type: none"> • Burn • Damage to property 				<ul style="list-style-type: none"> • Close supervision to be done at all times. • Barricade and warning board to be placed in around the area. • Flammable paint usage to be controlled by the supervisor and left over to be returned to store on daily basis. • Keep fire extinguisher near the working area/ storage area. • Paint tins or other material should be stacked in required quantity only. • Personnel hygiene to be maintained while and after use of painting. • Area to be provided with adequate lighting and ventilation • Cover exposed skin while during the activity. • Maintain a good housekeeping policy. • PPE to be worn at all times. (helmet, shoe, overall, vest, gloves, goggles, mask) 	
6.	Transportation of materials to site using with trailer, pickup, fork lift and crane	<ul style="list-style-type: none"> • Unauthorized, Untrained Workers • Lifting failure. • Unsafe lifting. • Swinging of material • Damaged sling/wire rope or a chain • Poor maintenance of vehicle • Speedy operation • Over turn • Over load 	<ul style="list-style-type: none"> • Fatality • Fractures • Property damage • Injury to personal • Sprain and strain 	4	C	H	<ul style="list-style-type: none"> • TBT/DSTI to be conducted by the foreman prior to work commencement • Task specific safety training to be provided • Ensure the crane and forklift engaged is tested and having valid license and the operator has valid license and approved 3rd party certificate. • Engage trained and certified banks man. • Barricade and warning signs in to the area where lifting operation is carried out and restrict the entry. • Check list should be carried out to their vehicles by the operator prior to start any work • Use tagline for control of swing and alignment. 	M (ALARP)

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							<ul style="list-style-type: none"> • The crane must be stopped when the wind speed exceeds 38km/hr. • SWL should be clearly marked on the crane and should be check that is functioning. • The crane and trucks shall be periodically maintained and a periodical check has been done by the maintenance team. • Vehicle not to be left unattended at site (ie,to be switch off mode if required and keys removed) <ul style="list-style-type: none"> • Safe working load should be carry by crane and trucks and Secure the load before it is travelling. • Operators and rigger must worn high level of reflecting vest and adequate PPE (Shoe, helmet, leather gloves, goggles, over all) • Vehicle routes kept free of obstructions (with spillages being cleaned up promptly) • Any reversing that is necessary should be overseen by a trained flagman / Banks man. • Operator should follow the site speed limit and obey the traffic rules. • Colour coded system to be implemented to all lifting equipments as per the month. 	
7.	Hooking up cylinders by chain blocks and lifting gears	<ul style="list-style-type: none"> • Unauthorized, Untrained Workers • Damaged chain blocks lifting gears 	<ul style="list-style-type: none"> • Fatality • Fractures • Eye damage • Skin damage • Inhalation 	4	B	M	<ul style="list-style-type: none"> • TBT/DSTI to be conducted by the foreman prior to work commencement • Authorized personnel to undertake the job • 3rd party certified chain blocks to be used and to follow the colour code. • Chain pulley block's hook shall have safety Latch. • Visual inspection shall be carried out prior to use of chain block & lifting gears. 	Low (ALARP)

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		<ul style="list-style-type: none"> • Slip, trip and fall • Damaged valve • Collision 					<ul style="list-style-type: none"> • Ensure the Inergen cylinders are tightly secured to wall brackets before starting the hooking up activity. • Never over tight the connections on cylinder valve. • Ensure the protective stands are installed on cylinder valves after installation. • Warning signs and barrication to be provide around the area to restrict the other workers of the hazards. • Maintain a good housekeeping policy to prevent slip, trip, fall hazards • Close supervision to be done at all times. • Proper communication to be maintained between the workers while doing the activity • Appropriate PPE to be worn while handling the cylinders (Helmet, shoe, vest, overall, Leather gloves, goggles and if required to wear organic vapor gas cartridge. 	
8.	Working with Hand tools (Hammer, spanner, file, lever, screw driver, cutting plier)	<ul style="list-style-type: none"> • Slip, trip and fall • Damaged warn out hand tools • Flying objects • Mushroom Heads • Using incorrect type 	<ul style="list-style-type: none"> • Fatigue • Trigger finger • Cuts and abrasions 	3	C	M	<ul style="list-style-type: none"> • TBT/DSTI to be conducted by the foreman/ safety officer prior to work commencement • Task specific safety training to be provided • Defective tools should not be issued or used to perform the task, to be checked by store keeper • Don't extend the spanner by using a pipe as an extension bar • Never use a file as a lever • Never use a screw driver as a chisel • Don't work with oily or greased hands • Use eye/ face protection when there is flying materials hazard, wear gloves while required to protect the hands • Use right tools for the job 	Low (ALARP)

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9.	Working with power tools (Drill machine, Grinding)	<ul style="list-style-type: none"> • Defective equipment • Electricity • Improper use of equipment • Poor maintenance • Untrained workers • Flying object • Noise and vibration • Fire • Dust 	<ul style="list-style-type: none"> • Hearing losses • Eye injury • Crushing • Back injury • Burns • Electric shock • Ringing in the ear / Deafness 	3	C	M	<ul style="list-style-type: none"> • TBT/DSTI to be conducted by the foreman/ safety officer prior to work commencement • Job related training to be provided • PTW to be applied and obtained prior to start, If spark producing activity is performed • Defective tools should not be issued or used to perform a task. • Monthly inspection should be carried out by the electrician and record to be kept at the store • All portable power tools should be fitted with adequate fuse protection either in the tool body or in its electrical plug. • The disk used to be more than the rated capacity of the power tools and it should be checked by store keeper/ operator prior to start the activity • The weight, size and type of tool should be selected to suit the job being carried out. • Don't lay the cables around the access way, it should be proper routing • Industrial distribution board and socket only to be used at site • No joints shall be made in electrical cable. • Electrical connection shall be routed through ELCB only. • Correct rate of ELCB should be used (Ex:- 30ma only acceptable) • Only those persons who have been adequately trained and experienced in the use of the tool should be allowed to use the same. • Power tools shall have inspection sticker. 	M (ALARP)

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							<ul style="list-style-type: none"> •Tools should be stored and maintained in good working condition. • Appropriate PPE Should use (Goggles, Mask, Ear plug, Gloves, Shoe, Helmet, Overall, Vest) 	
10.	Operating with Thread Machine	<ul style="list-style-type: none"> •Defective Machine •Improper use of Machine •Poor maintenance •Untrained, Unauthorized Workers • Slip, trip and fall • Spillage 	<ul style="list-style-type: none"> • Cuts • Crush • Skin Effect • Entanglement • Eye, finger injury • Fracture 	3	C	M	<ul style="list-style-type: none"> • TBT/DSTI to be conducted by the foreman/ safety officer prior to work commencement • Task specific safety training to be provided • Polythene sheets to be laid and drip trays to be placed below the machine to prevent spillages. • Defective machine should not be used to perform a task. • Only those persons who have been adequately trained and experienced in the use of the machine should be allowed to use the same. • Machine should be maintained in good working Condition. • All spillages must be clean immediately • Waste oil should be disposed in an approved manner • Operator should check the machine condition prior to start the work. • Adequate lighting and ventilation to be Provided. • Don't lay the cables around the access way, it should be proper routing • Industrial distribution board and socket only to be used at site • No joints shall be made in electrical cable. • Electrical connection shall be routed through ELCB only and should be used (Ex:-30ma only acceptable) • Fire extinguisher to be provided • Area to be barricade and provide signage. 	M (ALARP)

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							<ul style="list-style-type: none"> • Good housekeeping should be maintained. • Personnel protective equipment to be worn (helmet, shoe, overall, vest, gloves, goggles, mask) 	
11.	Working with ladder	<ul style="list-style-type: none"> • Fall from height • Over reaching • Over loading • Obstructing the access way • Slippery or uneven surface 	<ul style="list-style-type: none"> • Sprain and strain • Fracture • Spinal cord damage 	3	C	M	<ul style="list-style-type: none"> • TBT/ DSTI and Visual inspection to be done before using the ladder • Jobs specify training to be provide • The ladder should extend minimum one meter from the top for safe movement • Heavy materials should not be carried • Do not erect in slippery, uneven surface • Should be set up with a 4 vertical to 1 horizontal slope (4:1) • Inspection carried out by competent person on a regular basis • Step ladder must fully open and lock and the devices to be as per manufacturer • Defective ladder should not be used and report it immediately • Do not work from the top of two rungs • Remember the 3 point contact • Do not work in front of the door. If work is carried then locked the door or blocked off • Ladder to be used for short duration works only limited to 15 min. • Colour coded system to be implemented 	Low (ALARP)
12.	Working on mobile scaffold	<ul style="list-style-type: none"> • Uneven surface • Overhead structure and cable • Materials and worker fall from height • Untrained, unauthorized Workers • Collapse of scaffold 	<ul style="list-style-type: none"> • Sprain and strain • Fracture • Spinal cord damage • Musculoskeletal Injury • Fatality 	3	C	M	<ul style="list-style-type: none"> • TBT/ DSTI to be provide prior to start work • Jobs specify training to be provide • Do not stack materials on to the scaffold • Visual inspection should carry before use • Out rigger fitted and breaks are locked on • Only certified erection person do the alteration and Modify 	Low (ALARP)

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							<ul style="list-style-type: none"> No person to be on the scaffold while it is being moved Scaffold only use in on level and surface area Safety harness to be used above 2mtr height and anchored in above shoulder height at all time Tagging system to be implemented (i.e., all safe scaffolds shall be provided with green tags and unsafe scaffolds with red tag) Keep walkways free of obstacles, tools and Equipment Never stand and sit on the hand rails Mobile scaffold height should be restricted to 3.5 to 4 times the shortest base width, If height of scaffold exceeds raker support or it should be tied to the structure properly. 	
13.	Working in near floor openings	<ul style="list-style-type: none"> Material/equipment fall from height Slip/trip/fall 	<ul style="list-style-type: none"> Fatality Property Damage Fracture 	4	B	M	<ul style="list-style-type: none"> TBT/DSTI to be conducted by the foreman/ safety officer prior to work commencement Task specific safety training to be provided PTW to be applied and obtained prior to start work Rigid barrication to be provided to all external Edges and where a fall can occur. Warning signboards to be provided in those areas. PPE to be used at all times (Helmet, Shoes, Vest, Overall, Harness) 	Low (ALARP)
14.	Stacking and Storing	<ul style="list-style-type: none"> Unauthorized, untrained workers Material fall from height Improper stacking Collapse 	<ul style="list-style-type: none"> Crush Cut and abrasion Damage to property 	3	B	M	<ul style="list-style-type: none"> TBT/DSTI to be conducted by the foreman/ safety officer prior to work commencement Task specific safety training to be provided All materials shall be stored below 2 meter height. 	Low (ALARP)

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							<ul style="list-style-type: none"> • If the material is too heavy, use hydraulic trolley to shift the material. • No storage of materials to be done in the work place, only required quantity to be taken for the job. • Personnel protective equipment must wear at all time during the activity. (Helmet, shoe, vest, overall, gloves, goggles, mask.) 	
15.	Pipe Joining Work With use of Grooving machine	<ul style="list-style-type: none"> • Fire • Untrained, Unauthorized Worker • Electricity • Hot surface • Lighting and ventilation • Improper identification 	<ul style="list-style-type: none"> • Burns • Property damage • Electrical shock 	3	C	M	<ul style="list-style-type: none"> • TBT/DSTI to be conducted by the foreman/ safety officer prior to work commencement • Task specific safety training to be provided • Authorized personnel to undertake the job • Warning boards should be provided and Barricaded • Proper lighting and ventilation to be provided • Appropriate fire extinguisher should be placed in to the work area (Dry powder, CO2, Fire blanket) • All Flammable /combustible materials should be removed from the area • Appropriate PPE Should use (Goggles, Gloves, Shoe, Helmet, Overall, Vest) 	Low (ALARP)
16.	Working with Concrete Cutter	<ul style="list-style-type: none"> • defective equipment • Electricity • Improper use of equipment/ disk • Poor maintenance • Untrained workers • Flying object 	<ul style="list-style-type: none"> • ringing in the ear/ deafness • Eye injury • Crushing • Back injury • Burns 	3	C	M	<ul style="list-style-type: none"> • TBT/DSTI to be conducted by the foreman/ safety officer prior to work commencement • Job related training to be provided • PTW to be applied and obtained prior to start, If spark producing activity is performed • Defective tools should not be issued or used to perform a task. 	M (ALARP)

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		<ul style="list-style-type: none"> Noise, vibration and dust 	<ul style="list-style-type: none"> Breathing Difficulties Cut and abrasions 				<ul style="list-style-type: none"> Monthly inspection should be carried out by the electrician and record to be kept at the store The disk used to be more than the rated capacity of the power tools and it should be checked by store keeper/ operator prior to start the activity Cutting tools should be fitted with adequate fuse protection either in the tool body or in its electrical plug. The weight, size and type of tool should be selected to suit the job being carried out. Don't lay the cables around the access way, it should be proper routing Industrial distribution board and socket only to be used at site Correct rate of breaker should be used (Ex:- 30ma only acceptable) Only those persons who have been adequately trained and experienced in the use of the tool should be allowed to use the same. Tools should be stored and maintained in good working condition. Appropriate PPE Should use (Ear plug, Dust mask, Goggles, Gloves, Shoe, Helmet, Overall, Vest) 	
17.	Installation of pipes, manifolds, conduits and fittings	<ul style="list-style-type: none"> Untrained, unauthorized Workers Material Fall Sharp edges Unsafe posture Slip, trip and fall 	<ul style="list-style-type: none"> Cut and abrasion Back Injuries Fatigue Musculoskeletal Injuries 	3	C	M	<ul style="list-style-type: none"> TBT/DSTI to be conducted by the foreman/ safety officer prior to work commencement Task specific safety training to be provided Authorized personnel to undertake the job Daily safety inspection should be carried and eliminate the hazard 	Low (ALARP)

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							<ul style="list-style-type: none"> • Close supervision to be done at all times • Materials should not kept in walkways, edge of the opening. • Deploy enough number of personnel for material lifting shall be appointed to the task depending upon the distance • Proper communication to be maintained between the workers while doing the installation • Avoid over reaching the pipes to reduce from strain and pain. • Maintain a good housekeeping policy to prevent from slip, trip, and fall hazards. • Two level works to the openings and edges not to be performed. • PPE to be worn at all times(Gloves, goggles, mask, helmet, shoe, vest, overall) 	
18.	Cable pulling and laying into the conduits	<ul style="list-style-type: none"> • Sharp edges • Slip, trip and fall • Unauthorized, untrained Workers • Over reaching • Poor posture • Poor communication 	<ul style="list-style-type: none"> • Back Injuries • Cut to finger • Strain • Musculoskeletal Injuries 	3	C	M	<ul style="list-style-type: none"> • TBT/DSTI to be conducted by the foreman/ safety officer prior to work commencement • Task specific safety training to be provided • Deploy enough number of personnel for cable pulling shall be appointed to the task depending upon the distance • Avoid over reaching the cable to reduce from strain and pain. • Be informed and communicated well with their co-worker • Close supervision to be done at all times • PPE to be worn (Gloves, helmet, shoe, overall) 	Low (ALARP)

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19.	Integrity testing	<ul style="list-style-type: none"> • Untrained, unauthorized Workers • Faulty equipments • Poor lighting • Improper identification 	<ul style="list-style-type: none"> • Property damage • Full body injury 	3	B	M	<ul style="list-style-type: none"> • TBT/DSTI to be conducted by the foreman/ safety officer prior to work commencement • Task specify safety training to be provided • PTW to be applied and obtained prior to start work • Damaged equipment should not be used • Close supervision to be done at all times • Proper lighting to be provided in around the working area • Warning signs and boards should be provided and area to be well barricaded 	Low (ALARP)
20.	Flushing, pressure and leakage testing	<ul style="list-style-type: none"> • Untrained, unauthorized Workers • Faulty pressure gauge • Poor lighting • Improper identification • Bursting of pipes 	<ul style="list-style-type: none"> • Fatality • Property damage • Fractures • Full body injury 	4	B	M	<ul style="list-style-type: none"> • TBT/DSTI to be conducted by the foreman/ safety officer prior to work commencement • Task specify safety training to be provided • PTW to be applied and obtained prior to start work • Calibrated pressure gauge only to be used for pressure testing • Never pressure test the system/ pipe above its designed pressure. • Never do hot work on a pressurized system (always de-pressurize) • Air compressor should be check prior to start the work and authorized person only to operate the compressor. • Close supervision to be done at all times • Proper lighting to be provided in around the working area. • Warning signs and boards should be provided And area to be well barricaded 	Low (ALARP)

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21.	Cable and earth testing used with multi meter and megger	<ul style="list-style-type: none"> Unauthorized/ untrained Person Faulty Instrument Improper identification Electrocution 	<ul style="list-style-type: none"> Electric shock and Burns Cut and abrasion 	3	B	M	<ul style="list-style-type: none"> TBT/DSTI to be conducted by the foreman/ safety officer prior to work commencement Trained person only to do the megger testing PTW to be applied and obtained prior to start work Ensure that the circuit is not live before using the megger. Calibrated / certified megger only shall be used. Warning boards should be provided and Barricaded 	Low (ALARP)
22.	While working at night shift	<ul style="list-style-type: none"> Poor illumination Slip/trip/fall 	<ul style="list-style-type: none"> Fatality Cuts 	3	B	M	<ul style="list-style-type: none"> Proper illumination to be provided light post to be secured from fall Proper cable management system to be Followed All materials to be staged in proper manner without obstacles 	Low (ALARP)
23.	Working in hot weather	<ul style="list-style-type: none"> Heat 	<ul style="list-style-type: none"> Dehydration Sunburn Skin Cancer 	2	B	M	<ul style="list-style-type: none"> Drink plenty of water Proper awareness of heat stress symptoms Avoid highly physical tasks during the hottest part of the day Isotonic drinks to be provided 	Low (ALARP)
24.	Work Completion	<ul style="list-style-type: none"> Poor housekeeping Slip/trip/fall 	<ul style="list-style-type: none"> Fire 	2	A	L	<ul style="list-style-type: none"> General housekeeping, Remove all surface, unwanted waste materials from the building All necessary precautions will be adopted to prevent fire 	Low (ALARP)

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RISK MATRIX

					Probability				
					A	B	C	D	E
Severity	People	Assets	Environment	Reputation	Improbable 1 in 100,000 Years	Remote 1 in 10,000 Years	Occasional 1 in 1000 years	Probable 1 in 100 years	Frequent 1 in 10 years
5-Catstrophic	Multiple fatalities or permanent total disabilities	Extensive damage	Massive effect	International impact	<p align="center">High Risk</p> <p align="center">Medium Risk (ALARP)</p> <p align="center">Low Risk</p>				
4-Severe	Single fatalities or permanent total disabilities	Major damage	Major effect	National impact					
3-critical	Major injury or health effects	Local damage	Localised effect	Considerable impact					
2-Marginal	Minor injury or health effects	Minor damage	Minor effect	Minor impact					
1-Negligible	Slight injury or health effects	Slight Damage	Slight effect	Slight impact					

HIGH	3-E 4-C,D,E 5-B,C,D,E
MEDIUM	1-D,E 2-B,C,D,E 3-A,B,C,D 4-A,B 5-A
LOW	1-A,B,C 2A