Appendix 1 - SE Waste Management Plan

No & waste Code	Waste name	Waste Category	Handling, symbol & Labelling	Storage & Transport	Waste minimization effort	Treatment & Disposal
PRODUCTION RELATED WASTE						
1.	Explosive-expired	Hazardous due to its potential explosion	• use appropriate PPE • certain activities should be conducted only by personnel with special training and qualification on working with explosive (use only approved contractors) • symbol: explosive • - label: explosive, hazardous	- accumulate in a sealed drum and store in the explosive bunker/storage - complete waste manifest	- return to vendor	- explode the unused explosive materials in controlled manner - backfill the ashes as residue from the explosion - or dispose at an approved sanitary landfill - send to approved waste management facility
2.	Drilling mud & cutting	Listed in GOI no. 18 / 1999 & no. 85 / 1999 as a hazardous waste	- use appropriate PPE, eye and skin protection - respiratory protection may be required	- store in tanks - use proper tanks	- use of environmental friendly mud - Scrutinize MSDS - reuse mud if possible - minimize use of water - use water based mud if possible - prevent seepage and lost circulation - prevent well kick and blow-out	To manage the drilling waste, refer to KepMen ESDM no 45/2006 or any other applicable regulation supersede the obsolete guideline - backfill the HDPE along with cuttings at the drilling reserve pit, that has compacted clay as a liner or use HDPE as a liner; or use tanks as the alternative - consideration should be given not to allow releasing drilling related wastes with TDS>1000 mg/l and TSS>100 mg/l to ensure no impact to environment

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3.	Produced water	Non hazardous Regulated by GOI under PerMen LH no 19 / 2010 - regarding Liquid Waste Discharge	- use appropriate PPE, eye and skin protection - respiratory protection may be required - may contain flammable or combustible compounds including H_2S and ammonia	- put in a proper container for storage and transportation , or for further treatment - make sure the tank is properly sealed prior to shipment	- use for production purpose - inject produced water for zero discharge	- discharge as per PerMenLH no. 19 / 2010 - inject to designated disposal well - consideration should be given not to allow releasing produced water with TDS>1000 mg/l and TSS>100 mg/l to ensure no impact to environment
4.	Well work-over/ well-service fluids (including brine and well stimulation fluids)	Hazardous if contain solvent, acid, base and oil, which are listed as hazardous waste in GOI no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection - respiratory protection may be required - may contain flammable or combustible compounds including H_2S and ammonia	- put in a proper container for storage and transportation for further treatment considered as hazardous waste - make sure the tank is properly sealed prior to shipment	- use more environmental friendly products to perform well work-over/ well services and well stimulation , wherever practicable - if possible, use all of the well work-over/ well services and stimulation fluids by injecting them into the well and produced it back along with well fluids	- manage as per PerMen ESDM no. 045/2006, if it is not a hazardous waste - if in doubt, test for TCLP parameters, and LD50 as per PP 85 / 1999 to ensure that it is not a hazardous waste, i.e. If to be discharged to the environment - send to approved waste management facility if it is considered as hazardous waste - inject to designated disposal well - consideration should be given not to allow releasing work-over/ well-service related wastes with TDS>1000 mg/l and TSS>100 mg/l to ensure no impact to environment

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5.	Soil contaminated with oil (weathered / dead oil, slop oil, fuel oil, paraffin)	Hazardous if contain oil >1%TPH Hydrocarbon contaminated wastes is listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection - may also require respiratory equipment - handle as crude oil - pick up oil promptly to prevent weathering and return to Production stream - consider use of oil absorbent compounds near leak prone areas - symbol: toxic & flammable - label: soil, oil, hazardous	- accumulate in an open top poly propylene or steel drums, or in appropriate bulk containers - soil contaminated may be stored temporarily on site in area with dike with an impermeable liner (HDPE) to prevent contamination of ground water, surface water, air and soil - contain any leakage <u>If to be sent to</u> approved waste management facility : - accumulate in a closed top steel drums, or in an appropriate sealed container for transportation and preparation for disposal - store in a temporary hazardous waste storage - complete waste manifest	- conduct oil recovery process to result in saleable oil (recycle to production stream) - reuse as fuel at permitted cement factory, etc.	- conduct bioremediation to reduce TPH to 1%; and reuse the bioremediated soil for regreening; or backfill on site. Refer to KepMen LH no. 128/ 2003 - burn in a hazardous waste incinerator and sent the ashes to certified waste management facility. - send to approved waste management facility.

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6.	Glycol – spent	Hazardous Listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection. Use chemically resistant gloves, if required - may also require respiratory equipment, and protective clothing - refer to MSDS - symbol: toxic & flammable - label: glycol, hazardous	- accumulate separately in a sealed plastic container or in a closed steel drums - store in a temporary hazardous waste storage - complete waste manifest	- conduct usage control to prevent unnecessary waste generation - return to vendor for the containers and the unused material	- burn in a hazardous waste incinerator if it is allowable by relevant permit and sent the ashes to certified waste management facility - send to approved waste management facility

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7.	Tank bottom, sludge and/ or basic sediment/ produced sand	Hazardous Hydrocarbon contaminated wastes is listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection. Use chemically resistant gloves, if required - may also require respiratory equipment, and protective clothing - may be poisonous, avoid inhalation by using respirator with proper filtration canisters - may be commingled with other oily wastes -- provided that the wastes are compatible - pick up oil promptly to prevent weathering and stored in an approved containers after dewatering - consider use of oil absorbent compounds near leak prone areas - symbol: toxic & flammable - label: tank bottom, hazardous	- accumulate in an open top poly-propylene or steel drums, or in appropriate bulk containers - tank bottom may be stored temporarily on site in area with dike with an impermeable liner (HDPE) to prevent contamination of ground water, surface water, air and soil - contain any leakage - accumulate in a closed top steel drums, or in an appropriate sealed container for transportation and preparation for disposal - store in a temporary hazardous waste storage - complete waste manifest	- conduct oil recovery process - reuse as fuel at permitted cement factory, etc. - if possible, maintain turbulent flow in tank to reduce tank bottom generation/ prevent sedimentation - if possible, apply heat or add appropriate chemicals to reduce tank bottom generation	- conduct bioremediation to reduce TPH to 1%; and reuse the bioremediated soil for field regreening; or backfill on site. Refer to KepMen LH no. 128/ 2003 - burn in a hazardous waste incinerator, as suggested by applicable permit, and sent the ashes to approved waste management facility - send to approved waste management facility

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8.	Scale and/ or corrosion products and/ or pigging wastes (oily, no Naturally Occurring Radioactive Materials / NORM)	Hazardous if contain oil >1%TPH Hydrocarbon contaminated wastes is listed as hazardous waste in GOI Regulation no. 18/ 1999 & no. 85/ 1999 May be hazardous if contain oil more than 1% TPH and/ or contain NORM more than 25 micro-rems/ hour	- use appropriate PPE, eye and skin protection - respiratory protection may be required - add water to prevent explosion of pyrite (fes) due to auto ignition when pigging the gas line - the waste (scale and/ or corrosion products) should be examined for the presence of NORM before any work could be performed. Refer to waste no. 9 down below - symbol: toxic, flammable - label: scale products, hazardous; corrosion products, hazardous; pigging wastes, hazardous	- for transporting any scale and/ or corrosion products and/ or pigging wastes refer to waste no. 9 - If applicable, add water to prevent explosion of pyrite (fes) due to auto ignition when pigging gas line	use corrosion and scale inhibitor to prevent formation of scale and corrosion	- conduct bioremediation to reduce TPH to 1%; and reuse the bioremediated soil for field regreening; or backfill on site. Refer to KepMen LH no. 128 / 2003 - burn in a hazardous waste incinerator and sent the ashes to approved waste management facility - conduct special backfill on site as per recommendation from BATAN / BAPETEN (national atomic energy institution), if NORM > 25 micro-rems/ hour - send to approved waste management facility

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9.	TENORM (Technology Enhance Naturally Occurring Radioactive Materials) – including the scale and corrosion products, pigging wastes, etc.	Hazardous - may be hazardous if contain more than 1% TPH and/ or more than 25 micro rems/ hour.	- use appropriate PPE, eye and skin protection - respiratory protection may be required - any scale and corrosion products and pigging wastes and other suspicious oily solids waste materials should be examined for its NORM - if NORM (> 25 micro-rems/ hour), special worker protection procedures must be followed. Certain activities involving NORM should be conducted only by personnel with special training on working with NORM (use only approved contractors) - any metals that have been in contact with produced fluids (oil, gas, and/or water) must be examined for NORM before it is taken out of service and properly handled. Precautions must be taken to avoid inhalation, ingestion, or prolonged skin contact with NORM - if the material is reusable, it should be decontaminated at a specially permitted and previously approved NORM decontamination facility - NORM scrap metal should be accumulated separately from other waste. Small and medium size pieces of NORM scrap metal should be placed in a special approved bulk container or in a special epoxy-lined 200-liter drum - symbol: radioactive - label: NORM, hazardous	- prior to shipping any NORM contaminated equipment or tubing, all openings must be completely isolated. Fully closed thread protectors are required for tubing. For irregular openings, duct tape is recommended. If external contamination is present, the entire piece of equipment or tubing must be completely wrapped and taped securely in place. - after being decontaminated: sell to salvage/ scrap dealer (metal re-claimer) or use as pipe support at field - accumulate in drums, and store in a temporary hazardous waste storage - complete waste manifest	reuse the materials if possible (e.g. for metals contaminated with NORM). But, it should be decontaminated first at a permitted and approved (by BATAN / BAPETEN) NORM decontamination facility	- all NORM must be stored at a special backfill site in the field as per recommendation from BATAN / BAPETEN (national atomic energy institution), or - send to approved waste management facility

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10.	Amine - spent	Hazardous listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection - respiratory protection and protective clothing may be required - refer to MSDS - symbol: toxic & corrosive - label: amine, hazardous	- as a basic waste, separately stored from acid waste - accumulate separately in a closed, sealed plastic container or drums - store in a temporary hazardous waste storage - complete waste manifest	- conduct usage control to prevent unnecessary hazardous waste generation - return to vendor for the containers and the unused material	- dispose of at approved waste management facility
11.	Excess / expired production chemicals (demulsifier, scale / corrosion inhibitor, biocide, etc)	Hazardous listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection - respiratory protection and protective clothing may be required - refer to MSDS; may contain flammable or combustible compounds - symbol: toxic & corrosive; toxic & flammable - label: original label, hazardous	- drums should be banded together on wooden pallets and closed properly prior to shipment - accumulate in approved open-top or closed-top polypropylene or steel drums (or in appropriate bulk containers, if necessary), and store in a temporary hazardous waste storage - complete waste manifest	- utilize the excess/ expired production chemicals as much as possible - return to vendor for the containers and the unused materials	- dispose of at approved waste management facility

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12.	Excess cement (well cementing)	Non hazardous	- use appropriate PPE, eye and skin protection - refer to MSDS - proper packaging must be considered for delivery of the excess cement	- store in dry area, protected from rain - use sealed container to avoid dust release	- conduct usage control to prevent unnecessary waste generation	- backfill on site
13.	Oily waste water (pit water, floor drain liquid, vacuum truck rinse waste)	Non hazardous	- use appropriate PPE, eye and skin protection - respiratory protection and protective clothing may be required - refer to MSDS - may contain flammable or combustible compounds including H_2S, and ammonia	- if contains any free oil (or if it fails oil & grease test), it must be properly containerized (approved containers) for transport and disposal. - Ensure the approved containers is properly sealed prior to shipment. Care should be taken when handling these materials to minimize the possibility of spills	- minimize use of rinse water for floor and car washing - minimize use of vacuum truck rinse water	- discharge to a stream, as per PerMenLH no. 19 / 2010, or - inject to designated disposal well with reference to PerMen LH 13/2007 regarding Requirement and Guidelines for Effluent Management from Oil and Gas Activity and Geothermal by Injection - consideration should be given not to allow releasing work-over/ well-service related wastes with TDS>1000 mg/l and TSS>100 mg/l to ensure no impact to environment
Industrial waste						

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14.	Asbestos and ceramic fibre	Hazardous listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection - respiratory protection and protective clothing may be required - refer to MSDS - symbol: toxic - label: asbestos; ceramic fibre	- accumulate in approved open-top or closed-top polypropylene or steel drums (or in appropriate bulk containers, if necessary). Store in a sheltered area, avoid rain - drums should be banded together on wooden pallets and closed properly prior to shipment - accumulate in drums, store in a temporary hazardous waste storage - complete waste manifest	- do not use new equipment containing asbestos and ceramic - plan to replace existing equipment containing asbestos and ceramic	- send to approved waste management facility

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15.	Batteries (acid / lead - used) - dry or wet cell	Hazardous listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection. Wear chemical gloves - respiratory protection and protective clothing may be required - refer to MSDS - lead acid batteries contain sulphuric acid; extremely corrosive - place in leak-proof containers, metal baskets, place on pallets - if in metal drums, pack to prevent short-circuiting (arching) against the drum - if broken, place in hermetically sealed container with absorbent materials - symbol: toxic & corrosive - label: batteries, acid, hazardous	- off the ground in a shaded, dry, covered area, avoid rain - pack individually in wooden or fibreboard boxes; or if several packed together, then it should be securely cushioned - accumulate in drums, store in a temporary hazardous waste storage - complete waste manifest	- specify vendor pick-up of used lead/ acid batteries (return to vendor for recycle)	- send to approved waste management facility

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16.	Chemical, hazardous – unused / expired	Hazardous listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection. Wear chemical gloves - respiratory protection and protective clothing may be required - refer to MSDS - must be packed in good quality container, properly labeled as a hazardous waste - refer to Kepbapedal-05/ 1995	- put the drum on the wooden pallet and it should be banded together properly prior to shipment - use sealed container, use approved land or sea transport company only - refer to kepbapedal-01/ 1995 - accumulate in drums, and store in a temporary hazardous waste storage - complete waste manifest	- conduct usage control especially for field production chemical testing to prevent unnecessary waste generation - return to vendor - use them all up in a well, if possible, if it is a production chemicals	- send to approved hazardous waste management facility - if in doubt test for TCLP parameters and LD50 and if not hazardous, backfill on site or send to an approved sanitary landfill
17.	Chemical - non hazardous - unused/ expired	Non hazardous	- use appropriate PPE, eye and skin protection. Wear chemical gloves if required - respiratory protection and protective clothing may be required - refer to MSDS - pack in good quality containers which are clearly labeled - symbol: non hazardous waste - label: original label, non hazardous	- store in dry area, protected from rain, in good sealed container to avoid dust release - no special transportation is required	- conduct usage control to prevent unnecessary waste generation - return to vendor - use them all up, if possible	- send to an approved sanitary landfill, or - backfill on site

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18.	Debris, refuse and materials contaminated with chemicals and used lube oil	Hazardous Hazardous if Contaminant is a hazardous materials/ a hazardous waste The chemical contaminant may be listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection. Wear chemical gloves if required - respiratory protection and protective clothing may be required - refer to MSDS of the chemical contaminant - provide label depending on the chemical contaminant - symbol: toxic - label: debris, hazardous; refuse, hazardous, lube oil - label: debris, non hazardous ; refuse, non hazardous (if non hazardous)	- store in accordance with the proper measures depending on the chemical contaminant - transport in accordance with the proper measures depending on the chemical contaminant - accumulate in drums, and store in a temporary hazardous waste storage - complete waste manifest - segregate before placing in bin, leak-proof containers - use liner to prevent accumulated waste from sitting directly on ground - protect from rain; close and seal container prior to transport	- prevent contamination	dispose in accordance with the most hazardous chemical contaminant <u>Hazardous:</u> -- burn in a hazardous waste incinerator as suggested by the applicable permit and sent the ashes to approved waste management facility - send to Approved waste management company <u>Non hazardous:</u> - burn in incinerator and backfill the ashes on site - send to an approved sanitary landfill - if in doubt, assume it as a hazardous waste

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19.	Empty drums / cans / containers – of the hazardous waste	Hazardous listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection. Wear chemical gloves if required - respiratory protection and protective clothing may be required - refer to MSDS; if previous content is unknown, then treat as a hazardous waste - label with sufficient information to ensure proper use and/ or disposal and to allow selection of MSDS; use weather resistant marking and labelling should be used - symbol: toxic - label: drum, hazardous, etc. - label: empty (for empty drums)	- segregate based on its contents; cover, avoid storage on bare soil (ground) - band together for shipment to avoid accidental falling or spilling - accumulate in drums, store in a temporary hazardous waste storage - complete waste manifest	- return to vendor - where practical and feasible, bulk containers should be used instead of drums for high volume materials - send to re-claimer company for recycling	- crush after triple rinsing or washing and send to approved waste management facility

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20.	Drums / cans / containers - of the non hazardous waste	Non hazardous	- use appropriate PPE, eye and skin protection, avoid cuts from rusty drums - refer to MSDS - drums should be free of corrosion, severe dents, and bulging head and should have good seals on bungs; drums should be properly labeled and marked with weather-proof marking - symbol: non hazardous waste - label: original, non hazardous; drum, etc.	- segregate based on contents; cover, avoid storage on bare soil (ground) - band together for shipment	- return to vendor - where practical and feasible, bulk containers should be used instead of drums for high volume materials - send to re-claimer company for recycling - reuse drum to collect for oil spill, etc.	- crush the drums for reducing the size - send to an approved sanitary landfill

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21.	Filter – media & cartridge - hazardous waste (oily, lube oil, propane, fuel gas, glycol, dry gas, mercury guard bed, molecular sieve, amine carbon, cartridge filter)	Hazardous listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection. Wear chemical gloves if required - respiratory protection and protective clothing may be required - refer to MSDS - may contain hazardous material such as VOC, hydrocarbon and Hg - containers should be properly labeled and sealed prior to shipment - symbol: toxic - label: as per type materials stored inside the drums	- accumulate and store separately, do not mix with other materials - accumulate in drums, and store in a temporary hazardous waste storage - complete waste manifest	- conduct material selection and usage control - reduce filter bed and media consumption by using better materials, with longer expected life - state in the contract that vendor will pick up (handle) the used filter bed and media	Please refer further detail of treatment and disposal plan for this specific waste in Appendix 1.a
22.	Filter – media & cartridge – non hazardous waste (air filters, sand filter & carbon filter for potable water)	Non hazardous	- use appropriate PPE, eye and skin protection - containers should be labeled and sealed prior to shipment - symbol: non hazardous waste - label: filter media, non hazardous, etc.	- store in dry area, protected from rain - accumulate in original packaging or drums and sealed	- conduct usage control - require vendor to take back the used filter bed and media	- send to recycling company, or - send to an approved sanitary landfill

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23.	Incinerator ash - hazardous waste incinerator	Hazardous listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye, respiratory and skin protection - containers should be properly labeled and sealed prior to shipment - symbol: mix waste - label: ash, hazardous	- accumulate and store separately, do not mix with other materials - accumulate in drums, and store in a temporary hazardous waste storage - complete waste manifest		- send to approved waste management facility
24.	Incinerator ash - non hazardous waste incinerator	Non hazardous	- use appropriate PPE, eye, respiratory and skin protection - containers should be labeled and sealed prior to shipment - symbol: non hazardous waste - label: ash, non hazardous	- store in dry area, protected from rain - accumulate in drums and sealed		- backfill on site, or - send to an approved sanitary landfill

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25	Liquid Mercury (including elemental mercury)	Hazardous listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection. Wear chemical gloves if required - respiratory protection and protective clothing may be required - refer to MSDS - containers should use HDPE bottles/material and put inside HDPE drum/containers - it is recommended to fill up the upper part of HDPE bottle with water as seal - symbol: toxic waste - label: liquid Hg or elemental Hg waste	- accumulate and store separately, do not mix with other materials - complete waste manifest - transfer to temporary storage		- send to an approved waste management facility

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26	Laboratory waste (used reagent and remain samples)	Hazardous May be listed as hazardous waste in GOI Regulation no. 18/ 1999 & no. 85/ 1999 Few may be non hazardous such as salt (NaCl; $CaCl_2$; $CaCO_3$, etc.)	- use appropriate PPE, eye and skin protection. Wear chemical gloves - respiratory protection and protective clothing may be required - refer to MSDS - may contain hazardous material such as VOC, hydrocarbon and Hg - segregate used reagent and remain sample based on its characteristics and stored in proper container (refer to MSDS) - containers should be properly labeled and sealed prior to shipment - laboratory solid waste such as glassware, filter paper, etc. Is not expected to be a hazardous waste. The waste should be stored in covered skips, or similar, prior to disposal in an approved sanitary landfill, or recycled - Symbol: toxic & corrosive - label: lab waste, hazardous - label: lab waste, non hazardous (if non hazardous)	- accumulate and store in leak proof container, sealed and covered - accumulate and store separately, do not mix if not compatible with other materials - accumulate in drums and/ or containers and store in a temporary hazardous waste storage - use only approved land and sea transportation with appropriate permit - complete waste manifest	- sent only appropriate amount of samples to laboratory - conduct materials selection and usage control for the laboratory reagent	<u>Hazardous:</u> - first rinse of the remain sample and used reagent shall also be assumed as a hazardous waste - send to approved waste management facility <u>Non hazardous:</u> - send to an approved sanitary landfill - if in doubt, assume it as a hazardous waste

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27.	Metals, scraps (piping, tanks, wire-line, junk spare-part, scrap casing & tubing connection, metal thread protectors, scrap structural steel)	Non hazardous	- use appropriate PPE, eye and skin protection. Handle rusty metals with care - any metals which have been in contact with produced fluids (oil, gas, and/ or water) and containing scale and corrosion product, must be surveyed for NORM before handling. Any metals which have NORM above 25 micro-rems/ hour is considered as NORM contaminated materials - label: metals, scrap, non hazardous	- small and medium size pieces should be placed in a special baskets - transport small and medium size pieces in baskets; large pieces should be transported intact, taking precautions so that they do not come apart during transport - scrap pipe should be bundled for transport safety	- conduct material selection and usage control - send to salvage or scrap dealer (metal re-claimer), or reuse at field such as for pipe support - donate to local government, ensure that it does not contain NORM above 25 micro-rems/ hours	Verify for NORM concentration before deciding for disposal this scrap waste at an approved sanitary landfill. Ensure all relevant requirement regarding write-off has been followed/fulfilled.
28.	Oil – used lube oil	Hazardous listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection - respiratory protection may be required - refer to MSDS - used lube oil is flammable and toxic - containers should be properly labeled and sealed prior to shipment - symbol: toxic - label: lube oil, hazardous	- store separately from oxidizing material, avoid from heat exposure, store on the pallet and properly banded - accumulate in sealed and leak proof drums and/ or metal containers and store in a temporary hazardous waste storage - use only approved land or sea transportation with appropriate permit - complete waste manifest	- conduct usage control to prevent unnecessary waste - return to vendor or re-claimer company for recycling - change the oil based on test instead of based on engine running hours	send to approved waste management facility

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29.	Paint – excess	Hazardous Hazardous if it contains lead, chromium, zinc and/ or solvent, etc. The additive use may be listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection. Wear chemical gloves - respiratory protection may be required (it could be ignitable and toxic) - refer to MSDS - paint brush is considered non hazardous if to use water based paint. This paint brushes should be properly cleaned and dried first prior to put in a trash bin - paint brush is considered hazardous if to use solvent based and lead based paint, and also if to use to paint tanks, pipelines, other vessel & other oil & gas field related equipment - symbol: toxic & flammable - label: paints, hazardous	- the paint cans should be emptied until no more than 3% by weight of the total capacity remains. If possible use them all up - once dry, the lid should be closed tightly - close and seal drums prior to shipment - accumulate in poly propylene drums, and store in a temporary hazardous waste storage - complete waste manifest	- estimate amount of paint required carefully to minimize paint excess - require suppliers to pick up paint surplus - prefer to use water based paint and restrict the use of lead based paint - use all paint	- burn the non hazardous paint brush in a non hazardous waste incinerator and backfill the ashes on site - burn the hazardous paint brush in a hazardous waste incinerator, if allowed by applicable permit, and send the ashes to approved waste management facility - send the non hazardous excess and/ or surplus paint and/ or paint brush to an approved sanitary landfill - send the hazardous excess and/ or surplus paint and/ or paint brush to approved waste management facility
30.	Pallets / wooden boxes / sacks	Non hazardous	- use appropriate PPE, eye, hand and skin protection	- bind together for shipment to avoid accidental falling	- conduct usage control to prevent unnecessary wastes	- burn in a non hazardous waste incinerator and backfill the ashes on site - send the pallet to an approved sanitary landfill

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31.	Refractory brick or ceramic insulation (of incinerator and boiler)	Hazardous May be hazardous, may contain NORM and may be listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection - must be packed in good quality container and properly labeled - use appropriate PPE, respiratory protection and rubber gloves. If necessary use protective clothing - symbol: mix waste - label: refractory brick, hazardous; ceramic.	- use sealed container and use only approved land and sea transportation with appropriate permit - accumulate in drums, and store in a temporary hazardous waste storage - complete waste manifest	- conduct usage control to prevent unnecessary wastes	- send to approved waste management facility - if proved non hazardous send to approved sanitary landfill or backfill on site
32.	Soil contaminated with lube oil/ used lube oil and/ or chemicals/ used chemicals	Hazardous listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection. Wear chemical gloves if required - respiratory protection may be required - refer to MSDS of the chemicals contaminated in the soil and prevent direct contact with skin and eyes - symbol: refer to chemical characteristics - label: soil, lube oil, hazardous	- remove free liquids prior to containerization, managed and disposed-of accordingly - seal containers prior to shipping - accumulate in drums, and store in a temporary hazardous waste storage - complete waste manifest	- take measures to prevent spills. For example, use containment devices in chemical storage areas. - develop procedures to prevent or reduce the contamination of soils, e.g. drip pans or secondary containment around compressors, pumps, gearboxes and chemical drums & storage to reduce spills	- send to approved waste management facility or bioremediation site (refer to KepMen LH no. 128/ 2003).

No & waste Code	Waste name	Waste Category	Handling, symbol & Labelling	Storage & Transport	Waste minimization effort	Treatment & Disposal
33.	Solvent or thinner - chlorinated or non chlorinated	Hazardous listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection. Wear chemical gloves - respiratory protection and protective clothing is required - refer to MSDS. Read warming labels on containers. Avoid inhalation by using respirator with proper filtration canisters. May be highly flammable. - symbol: toxic & flammable - label: solvent, hazardous	- store separately. Do not mix with other materials. Small containers such as cans or aerosol sprayers should be accumulated separately - store in a temporary hazardous waste storage - complete waste manifest	- conduct usage control to prevent unnecessary waste - return to vendor especially for the empty containers - put into production stream if possible - use water-based solvents or soap cleaners when possible - minimize the amount of solvents being lost during cleaning or maintenance. Use drip pans or other means such as secondary containment to catch any leaking solvent	- send to an approved waste management facility
34.	Tire - used	Non hazardous	- use appropriate PPE - pack it in a containers with a clear label - symbol: non hazardous waste - label: used tire	- no special requirement but ensure that there is no oil on the used tire	- conduct usage control to prevent unnecessary waste - return to vendor - send to re-claimer company for recycling - reuse for coral reef	- burn in a non hazardous waste incinerator and backfill the ashes on site - send to an approved sanitary landfill

No & waste Code	Waste name	Waste Category	Handling, symbol & Labelling	Storage & Transport	Waste minimization effort	Treatment & Disposal
Camp & office waste including clinic						
35.	Aerosol cans	Non hazardous Community waste – domestic garbage	- use appropriate PPE - do not puncture or burn - pack in a good containers with a clear and appropriate label - this is a domestic garbage waste but due to safety concern of the possibility to explode if puncture, heat or burn, it is recommended to manage it as a hazardous waste - symbol: explosive (pressure) - label: aerosol can, hazardous	- store separately, avoid heat source > 600 c and transport it in a closed, sealed drums - accumulate in an open-top drums, and store in a temporary hazardous waste storage - complete waste manifest	- use non-aerosol cans - conduct usage control to prevent unnecessary wastes - return to vendor - send to re-claimer company for recycling	- send to an approved sanitary landfill, or - send to approved waste management facility. Due to safety concern of the possibility to explode if puncture or burn, it is recommended to send it to approved waste management facility
36.	Carton boxes/ card board/ paper	Non hazardous Community waste - domestic garbage	- use appropriate PPE - accumulate in special trash bin or box which is used for this carton boxes/ card board/ paper/ domestic garbage	- use special trash bin or box to accumulate and store these materials - containers should be equipped with lids or nets to ensure that waste cannot escape from the container during storage or transport.	- select materials with less packaging if possible - conduct usage control to prevent unnecessary wastes - send to re-claimer company for recycling	- send it to approved sanitary landfill, or - burn in a non hazardous waste incinerator and backfill the ashes on site

No & waste Code	Waste name	Waste Category	Handling, symbol & Labelling	Storage & Transport	Waste minimization effort	Treatment & Disposal
37.	Toner (used toner) for copy & fax machine and Cartridge printer	Hazardous may contain solvent and lead from the toner, which are listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE - use gloves - accumulate in original packaging or drums - used cartridge printer may be toxic due to its Pb contents of this toner - symbol: toxic - label: cartridge printer, fax, copier.	- accumulate in drums, and store in a temporary hazardous waste storage - complete waste manifest	- conduct usage control to prevent unnecessary waste - return to vendor - send to re-claimer company for recycling	- send to approved waste management facility
38.	Clinic waste-solid waste (e.g. Expired medicine, syringe, etc)	Hazardous Biohazard (infectious) and toxic wastes listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection (biohazard waste, clinical solid waste) - containers should be properly labeled and sealed prior to shipment - symbol: bio hazard - label: clinic solid waste, bio hazardous	- accumulate in a plastic bag that is used exclusively for the clinical solid waste, and than put it in a wooden box, or in an open-top drums, or in a sealed drum and store in a temporary hazardous waste storage - complete waste manifest	- conduct usage control to prevent unnecessary wastes	- incinerate in a hazardous waste incinerator and send the ashes to approved waste management facility - send it to an approved medical incinerator

No & waste Code	Waste name	Waste Category	Handling, symbol & Labelling	Storage & Transport	Waste minimization effort	Treatment & Disposal
39.	Clinic waste – liquid waste (e.g. Blood sample, urine, expired infusion) and also domestic liquid waste from clinic (pantry, sink and toilet)	May be hazardous Biohazard (infectious) wastes if blood sample, urine and expired infusion Domestic liquid waste (if waste from pantry, sink and toilet)	- use appropriate PPE, eye and skin protection (biohazard, infectious clinical liquid waste) - if to put in a container, than the containers should be properly labeled and sealed prior to shipment - symbol: bio hazard - label: clinic liquid waste, bio hazardous	- if necessary, accumulate in a plastic bag that is used exclusively for the clinical liquid waste such as for blood samples - complete waste manifest (i.e. For liquid waste put in a plastic bag such as for blood sample)	- reduce water consumption to reduce unnecessary waste	<u>Medical Wastes:</u> - incinerate in a hazardous waste incinerator and send the ashes to approved waste management facility - send to approved medical incinerator <u>Liquid waste</u>: - treat in a separate septic tank or other biological treatment prior to treat along with other domestic liquid waste and discharge to surrounding environment as per PerMen LH 19 / 2010
40.	Domestic liquid waste	Non hazardous	- use appropriate PPE, eye and skin protection (biohazard, infectious liquid waste)		- reduce water consumption to reduce liquid waste generation	- treat in a septic tank or other biological treatment and discharge to the surrounding environment or to a stream as per PerMen LH 19 / 2010. Note: sludge generated is a non-hazardous waste that could be disposed of at an approved sanitary landfill

No & waste Code	Waste name	Waste Category	Handling, symbol & Labelling	Storage & Transport	Waste minimization effort	Treatment & Disposal
41.	Domestic solid waste (food waste, yard waste, office trash)	Non hazardous	- use appropriate PPE, eye and skin protection (biohazard, infectious solid waste)	- use special covered trash bin or box to accumulate and store these materials - containers should be equipped with lids or nets to ensure that waste cannot escape from the container during storage or transport	- conduct usage control to prevent unnecessary wastes - conduct waste segregation to reduce unnecessary waste: organic, paper, plastic, aluminium, glass, metal - send to re-claimer company for recycling such as for paper, plastic, aluminium, glass and metal - donate for fish and animal food feeding	- composting, especially for organic solids waste and reuse for field and site re-vegetation - burn in a non hazardous waste incinerator and backfill the ashes on site - send to an approved sanitary landfill - Food waste: after grinding, it can be used for animal / fish feeding
42.	Glass (and bottles), including aluminium can	Non hazardous	- use appropriate PPE and consider to use leather gloves and goggles when handling glass	- there is no special requirement is required	- conduct usage control to prevent unnecessary wastes - conduct waste segregation to reduce unnecessary waste - send to re-claimer company for recycling	- send to an approved sanitary landfill

No & waste Code	Waste name	Waste Category	Handling, symbol & Labelling	Storage & Transport	Waste minimization effort	Treatment & Disposal
43.	Pesticide & herbicide (and it cans & container)	Hazardous listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection. Wear chemical gloves - respiratory protection and protective clothing is required - refer to MSDS. Read warming labels on containers. Avoid inhalation by using respirator with proper filtration canisters. May be flammable. - symbol: toxic - label: pesticide, hazardous; herbicide, hazardous	- accumulate in a sealed drum and store in a temporary hazardous waste storage - complete waste manifest	- conduct usage control to prevent unnecessary wastes - return to vendor especially for the can - use them all prevent any left over	- send to approved waste management facility <u>For the can:</u> - crush after triple rinsing or washing and send to approved waste management facility
44.	Plastic & styrofoam	Non hazardous	- use appropriate PPE, eye protection if burn, it could release carcinogenic substances	- accumulate and store separately from other materials	- use non plastic/ styrofoam materials whenever alternatives exist - use biodegradable plastic/ Styrofoam - send to re-claimer company for recycling	- burn in a hazardous waste incinerator and send the ashes to approved waste management facility, or - send to approved waste management facility

No & waste Code	Waste name	Waste Category	Handling, symbol & Labelling	Storage & Transport	Waste minimization effort	Treatment & Disposal
45.	Tubular lamp, glass lamp (TL lamp), fluorescent lamp containing Hg	Hazardous Mercury is listed as hazardous waste in GOI Regulation no. 18 / 1999 & no. 85 / 1999	- use appropriate PPE, eye and skin protection. May contained mercury (Hg) - Symbol: toxic - label: tubular lamp, hazardous; glass lamp, hazardous	- accumulate in a special containers (wooden boxes or drums) exclusively for tubular lamp - store in a temporary hazardous waste storage - complete waste manifest	- select non mercury or other non-toxic heavy metals content glass lamp if possible	- send to approved waste management facility

Appendix 1B – Segregation of Wastes according to Waste Incompatibility Charts

No.	Reactivity Group	1	2	3	4	5	6	7	8
1	Acids, Mineral, Non-oxidizing	----							
2	Alcohols and Glycols	H	----						
3	Caustics	H		----					
4	Cyanides and Sulfides	GT GF			----				
5	Halogenated Organics	H GT		H GF	H	----			
6	Metals and Metal Compounds, Toxic	S		S			----		
7	Combustible and Flammable Materials, Miscellaneous	H G						----	
8	Oxidizing Agents, Strong	H GT	H F		H E GT	H GT		H F G	----

H	-	Heat generation
F	-	Fire
GT	-	Toxic gas generation
GF	-	Flammable gas generation
E	-	Explosion
G	-	Innocuous and non-flammable gas generation
S	-	Solubilization of toxic substances

Directions for Using this Appendix : To determine potential consequences of mixing two different chemicals, locate the box which represents the intersection of the chemical group in the rows on the left with a chemical identified in the columns across the top. For example, mixing oxidizing agents, strong (8) with acids, mineral non-oxidizing (1) will result in the generation of heat (H) and toxic gases (GT).

Appendix 2 - Packaging Recommendation

Charateristic	Type Of Packaging																							Remarks
	Drum									Jerrican						Box							Bag			
	Steel		Aluminium		Fibre	Plastic (HDPE)		Metal		Steel		Aluminium		Plastic (HDPE)		Steel	Aluminium	Wooden		Fibre	Plastic		Plastic / Wooven Plastic			
	1	2	1	2		1	2	1	2	1	2	1	2	1	2			1	2		1	2	1	3	4	
Explosive																										
Flammable liquids	√		√			√		√		√		√		√												
Flammable solids, self-reactive substances	√	* √	√	* √	o √	√	* √	√	√	√	* √	√	* √	√	* √	o √	o √	o √	o √	o √		o √		o √	o √	•Box & bag are not allowed for substances extremely flammable •For Bag shall not exceed 50 kg •Special packaging for substance with water or alcohol content: - shall designed to prevent the loss of water or alcohol - shall constructed and close so as to avoid an explosive overpressure or pressure build-up of > 300 kPa •effectively closed
Substances liable to spontaneous combustion	√	* √	√	* √	o √	√	* √	√	√	√	* √	√	* √	√	* √	o √	o √	o √	o √	o √		o √		o √	o √	•Box & bag are not allowed for substances liable to spontaneous combustion •For Bag shall not exceed 50 kg •For wet waste, necessary shall be provided with a suitable inner coating or treatment (shift-proof & teraproof) •For wet metal (with a visible excess of liquid) --> metal packaging a venting devices is required •Bag shall not be used for packaging group II in powder/dust phase
Substances which, in contact with water, emit flammable gases	√	* √	√	* √	o √	√	* √	√	√	√	* √	√	* √	√	* √	√	o √	o √	o √	o √		o √		o √	o √	•For Bag shall not exceed 50 kg •For wet waste, necessary shall be provided with a suitable inner coating or treatment (shift-proof & teraproof)
Oxidizing substances	√	* √	√	* √	o √	√	* √	√	√	√	* √	√	* √	√	* √	√	o √	o √	o √	o √		o √		√	√	•For Bag shall not exceed 50 kg •Drum (steel, aluminium, metal) max. capacity 250 Kg •Drum (fibreboard, playwood) fitted inner liners with max. capacity 200 Kg
Organic peroxides	√	√*	√	√*	√o	√	√*			√	√*	√	√*	√	√*											•Effectively closed
Toxic substances	√	√*	√	√*	√o	√	√*	√	√	√	√*	√	√*	√	√*	√	√ o	√ o	√ o	√ o		√ o		√ o	√ o	
Infectious substances																√	√	√	√	√			√	√	√	•Inside wodden box shall lined with alumunium, metal, plastic to prevent leak of any liquid •Liquid form shall contained in shift-proof •For sharps & piercing waste shall not be packed in bags
Radioactive material	√	√	√	√	√	√	√	√	√							√	√	√	√	√						•Packaging may, in particular, consist of one or more receptacles, absorbent materials, spacing structures, radiation shielding and service equipment for filling, emptying, venting and pressure relief; devices for cooling, absorbing mechanical shocks, handling and tie-down, thermal insulation; and service devices integral to the package. •Packaging requirements refer to Kep. Ka BAPETEN No. 04/Ka-BAPETEN/V-99, Bab I no. 113 - 114
Corrosive substances	√	√			√	√	√			√	√			√	√	√		√	√	√		√		√	√	•For used battries : shall be protected from short circuit

Note :
* shall not be used for substance of packaging group I that may beome liquid during carriage
o shall not be used when substance being may become liquid during carriage
f These packaging shall only be used for packaging group II when carried in a closed vehicle or container

1 : Non-Removable Head
2 : Removable Head
3 : Shift-Proof
4 : Water Resistant

4.1.1.1 The packaging shall :

- shall be strong enough to withstand : the shocks and loadings normally encountered during carriage, removal from a pallet or overpack
- shall be constructed and closed so as to prevent any loss of contents when :prepared for transport which might be caused under normal conditions of transport, by vibration, or by changes in temperature, humidity or pressure (resulting from altitude, for example)
- No dangerous residue shall adhere to the outside of packagings

4.1.1.2 Parts of packagings which are in direct contact with dangerous goods :
- shall not be affected or significantly weakened by those dangerous goods
- shall not cause a dangerous effect e.g. catalysing a reaction or reacting with the dangerous goods
- Where necessary, they shall be provided with a suitable inner coating or treatment

4.1.1.4 When filling packagings with liquids, sufficient ullage (outage) shall be left to ensure that neither leakage nor permanent distortion of the packaging occurs as a result of an expansion of the liquid caused by temperatures likely to occur during transport.

4.1.1 Liquids may only be filled into inner packagings which have an appropriate resistance to internal pressure that may be developed under normal conditions of carriage. Where pressure may develop in a package by the emission of gas from the contents (as a result of temperature increase or other cause), the packaging may be fitted with a vent, provided that the gas emitted will not cause danger on account of its toxicity, its flammability, the quantity released, etc. A venting device shall be fitted if dangerous overpressure may develop due to normal decomposition of substances. The vent shall be so designed that, when the packaging is in the attitude in which it is intended to be carried, leakages of liquid and the penetration of foreign matter are prevented under normal conditions of carriage.

4.1.3 Packing groups :
Packing group I: Substances presenting high danger;
Packing group II: Substances presenting medium danger;
Packing group III: Substances presenting low danger

In general, above packaging requirement could be summarized as follows:

Hazardous waste containers should:
- Be free of rust and leaks.
- Be suitable for the characteristics of the hazardous waste stored in the container;
- Be made of plastic (HDPE, PP or PVC) or metal (Teflon, Carbon Steel, Stainless Stell) as long as the materials do not react with the waste type.
- Have a tight cover to prevent any spillage during transfer or off-site transportation.

Each hazardous waste should be placed in a container that will be exclusively used for the purpose of accumulating a specific hazardous waste. Each location should maintain a small supply of containers that can be used for storing solid and hazardous waste.

Storage containers used can vary in volume.
The filled hazardous waste container should:
- Be labeled with the appropriate symbol.
- Always kept closed and only opened when the waste is being taken out or added into the container.

The filled hazardous containers should be inspected at least once a week. Each site will develop an inspection checklist based on the types of waste generated, the various areas for inspection, etc.

If any leak occurs, the content of the containers should be transferred to a more suitable container. The spill should be collected; and kept in a separate container the area cleaned.

The hazardous waste containers can be re-used to store other hazardous waste if the characteristics of the new waste are the same or compatible with the previous waste stored. If it's not compatible, the containers are not recommended to be re-used.

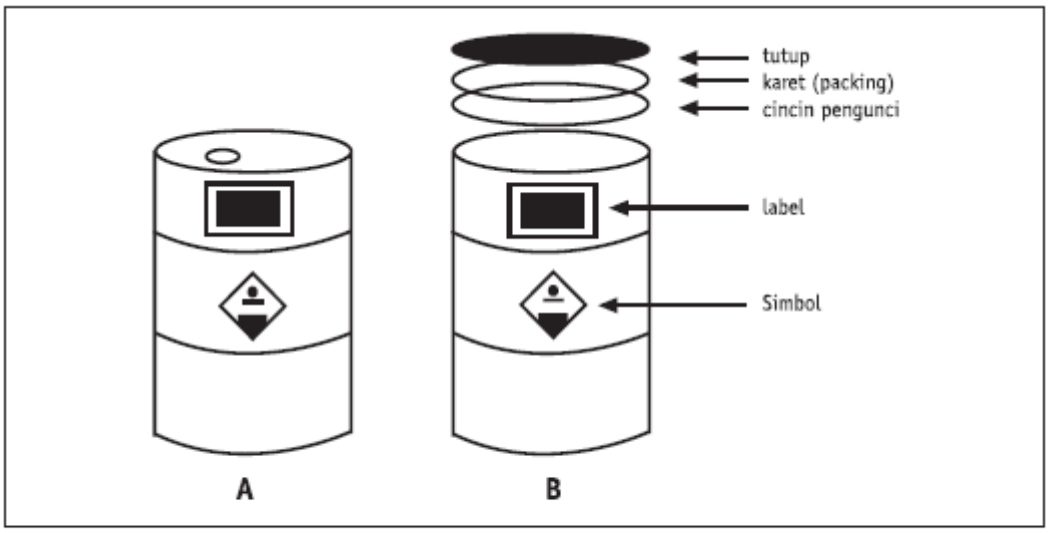


Illustration of waste packaging using drum for: (A) liquid hazardous waste; and (B) sludge or solid hazardous waste

Appendix 3- Guideline for Labeling and Placing Symbols for Hazardous Waste Handling

- All waste containers for storage and transportation should be labeled in conformance to prevailing Indonesian regulations.
- All waste containers should be labeled with the waste hazard warning symbols shown below:

Waste Label

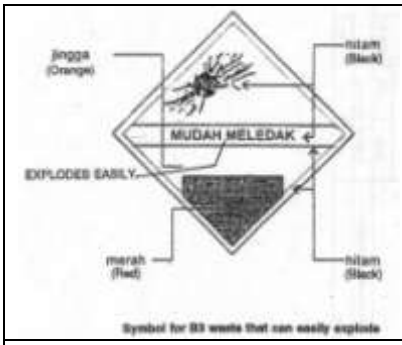
- At the minimum, the following information should be included on the label for hazardous waste:
  - The symbol should be suitable for the characteristics of the waste stored. If the waste has more than one hazard class, the label should reflect the more dominant characteristics that pose the greater degree of hazard. If there is more than one dominant characteristic, the container should be labeled with a mixed characteristic symbol.
  - Each hazardous waste container has a minimum 10 cm x 10 cm symbol of the predominant characteristic of the waste.
  - The label should be made of material that can withstand chemical corrosion and the fastenings are strong on the surface of the container.
  - The labels are fastened on the sides of the container and are not blocked from view by the other containers stored.
  - The fastened symbol should not be detached before the content of the container is removed and cleaned.
  - The label on top of the container should have a minimum 7 cm x 15 cm arrows (2) symbol to indicate the position of its cover.

SYMBOL on the Hazardous Waste Building

The symbol attached to the hazardous waste building should adhere to the following requirements:

- The symbol should be placed on every door and on the outer wall of the building, and it should not be blocked.
- The type of symbol should be suitable to the characteristic of the stored waste.
- The minimum size of the symbol is 25 cm x 25 cm or bigger and should be visible from a distance of at least 20 meters.
- The label should be made of material that can withstand chemical corrosion or any other material that it comes in contact with.
- As long as the building is being used for hazardous waste storage purposes, the symbol should not be taken out or replaced unless the building is going to be used to store wastes of different characteristics.

APPENDIX 3A : Waste Hazard Warning Symbols (based on Indonesian Regulation)

<table>
<tr><td> 
</td><td> 
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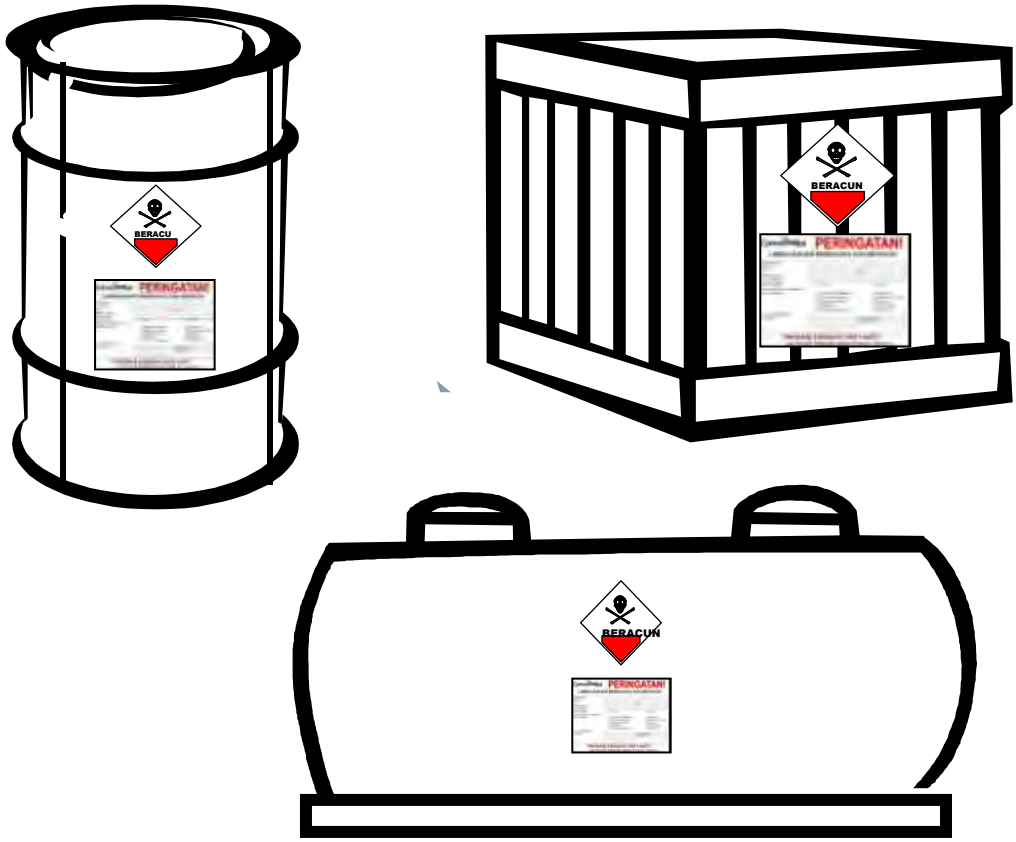
<tr><td>Symbol B3 Waste that can easily explode</td><td>Symbol for reactive B3 Waste</td><td>Symbol for poisonous B3 Waste</td></tr>
<tr><td colspan="2"> 

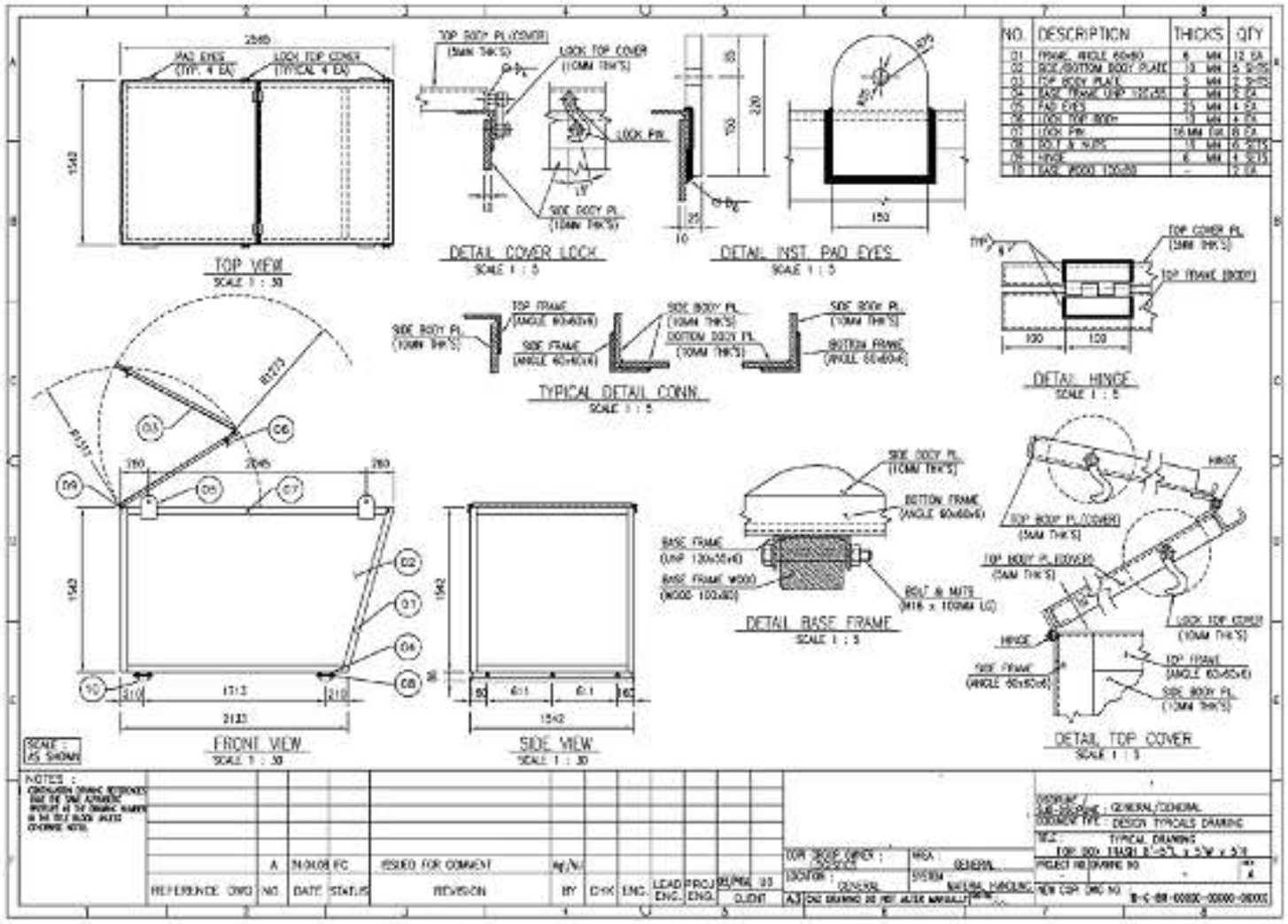

</td><td> 
</td></tr>
<tr><td colspan="2">Symbol for flammable B3 Waste</td><td>Symbol for corrosive B3 Waste</td></tr>
<tr><td> 
</td><td></td><td>  </td></tr>
<tr><td>Symbol for infectious B3 Waste</td><td></td><td>Label Showing the Position on the Hazardous Waste Covers</td></tr>
<tr><td> 
</td><td></td><td> 
</td></tr>
<tr><td>Symbol for Empty HAZARDOUS Waste Containers</td><td></td><td>Symbol for a mixture B3 Waste</td></tr>
</table>



An Illustration on proper placement of symbol and label of hazardous waste

Appendix 4 - Scheme of Measurement Practices

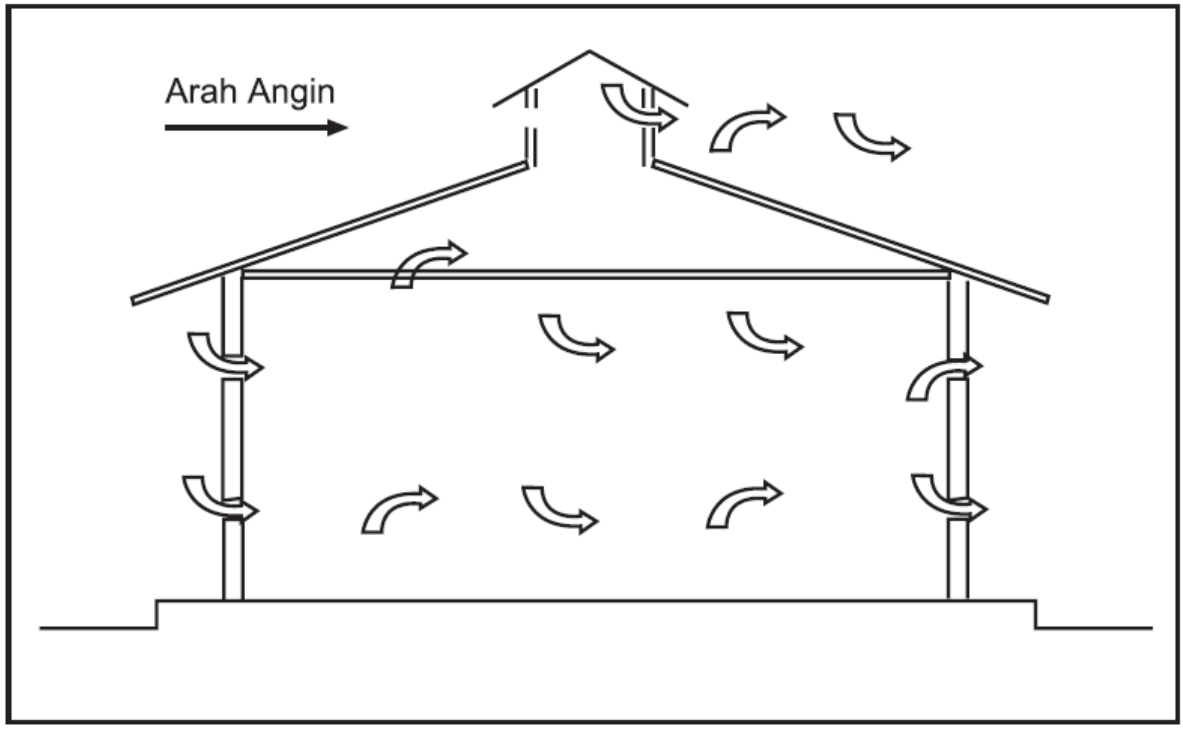
Appendix 5 – Recommended waste container or waste bin



Appendix XX - Storage Methods for Hazardous Waste

The requirements stated below are defined for the "Temporary Hazardous (B3) Waste Storage" facilities in the field/ offshore support base locations.

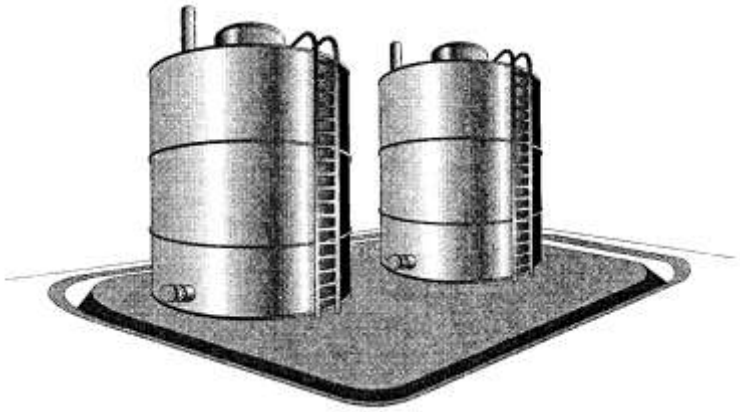
Note: The term "Temporary B3 Waste Storage" is not specifically defined in the regulations, but it is inferred from the regulatory context to mean interim storage either outside of the generator's facility or in any part of the facility other than the formal, longer-term storage facilities (shall be no more than 90 days storage and will require KEMENTERIAN NEGARA LINGKUNGAN HIDUP approval for another 90 days extension with a valid reason/ justification) [Refer to Decree of the Head of BAPEDAL KEP-01/BAPEDAL/09/1995].



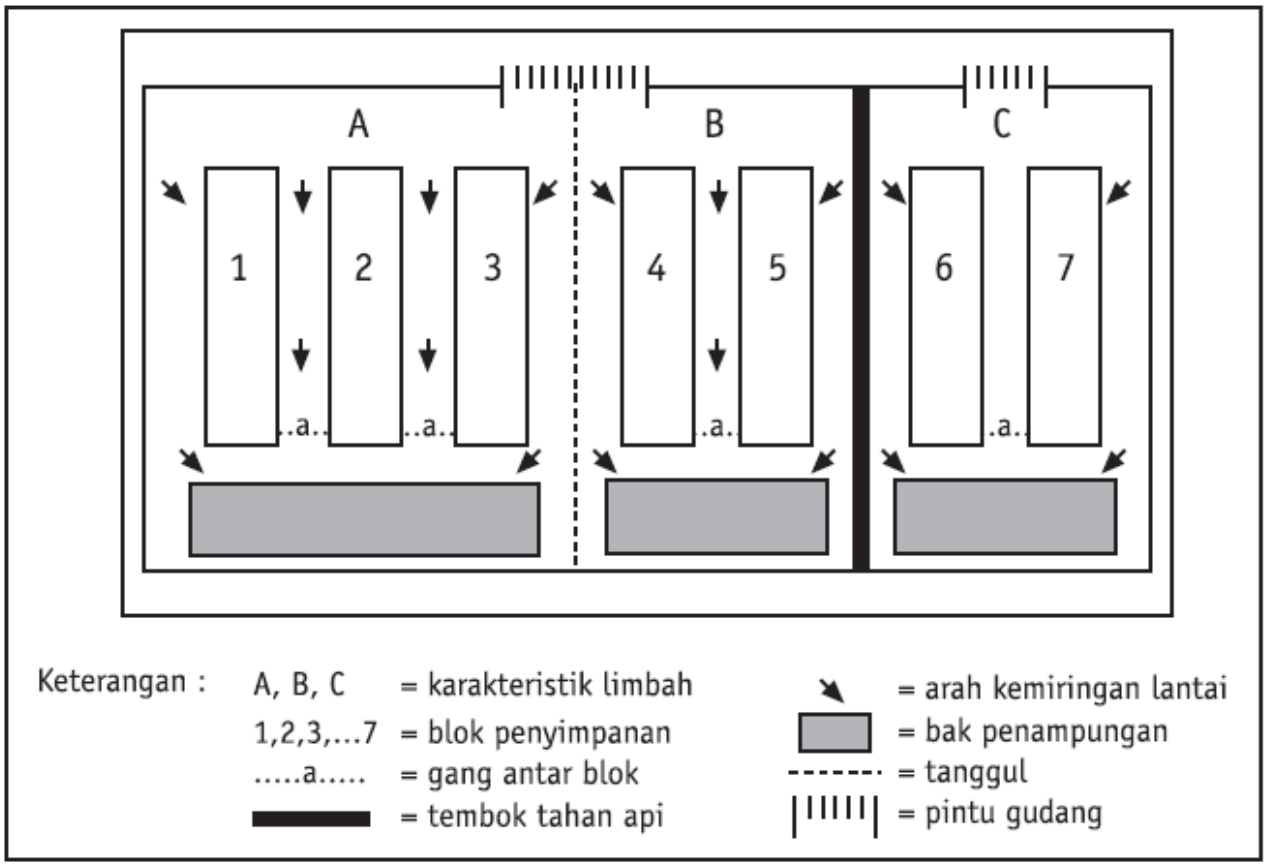
Picture 1 : Ventilation System Inside the HAZARDOUS Waste Temporary Storage Building

Storage of hazardous waste tanks should be maintained in the following manner:

- The tanks must have secondary containment with drains/ gutters leading to a containment ditch (Picture 2).
- The containment ditch should be water-tight, and is able to hold 110% capacity of the maximum tank volume.
- The tanks should be arranged in a manner that if a tank fails, it will remain within the containment area and will not give any effect to the other tanks around it.
- The tanks used for must be protected from direct sunlight and infiltration of rainfall.



Picture 2 : Tanks to store large volumes of hazardous waste

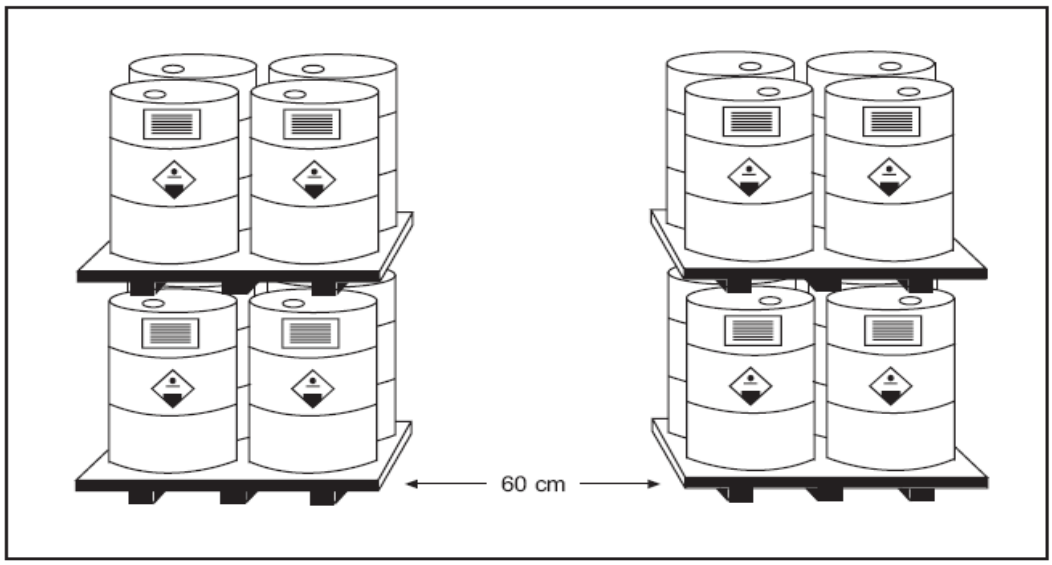


Picture 3 : Segregated Compartments for the Different Waste Types.

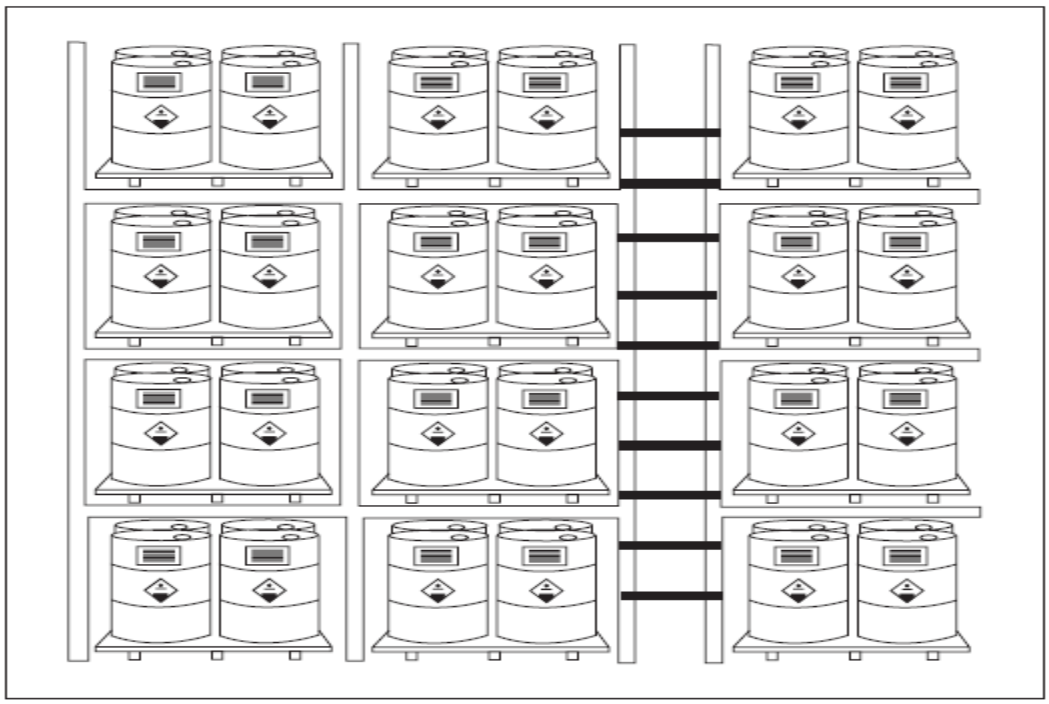
Storage of hazardous waste containers should be maintained in the following manner:

- Containers (i.e. metal drums) are stored in block systems. Each block consists of 2 x 2 drums (Picture 4), and is kept in a manner that will ease inspection of the drums.
- The minimum width between the blocks should be 60 cm for human passage and suitable for the movement of transportation vehicles; e.g., fork-lifts.
- Storage methods should take into consideration the stability of the stacked drums. If the containers are metal drums (200 liters), they should be stacked on pallets in groups of four, no more than three levels high. If the drums are stacked more than three levels high, they should be stacked on racks/ shelving units, with a ladder providing access to the drums (Picture 5).

- The distance between the highest stacked drum and the roof and the distance between the most outer drum and the wall of the storage room should be not less than one meter.
- Incompatible waste containers should be stored separately, not in one block and not in the same storage section. They should also be stored in a manner that prevents the mixing of incompatible waste in the containment area in case of a spillage.



Picture 4: Storage Methods of Drums on the Pallets with a Minimum Distance between the Blocks



Picture 5: Storage of Hazardous Waste Drums Using Racks or Shelving Units

Appendix 7- Final Treatment or Disposal of Waste

Selection of final waste treatment and or disposal alternatives is key element of an organization's environmental management system. Efficient management of wastes can reduce operating costs and potential liabilities. Selection of final treatment or disposal methods should consider:

- hierarchy of waste minimization efforts (from reduction at source to disposal)
- Apply the 3R concepts of: Reduce, Reuse, Recycle.
- When options of recycling, reuse or reduction are not available, practical or technically feasible, operating unit locations shall consider final treatment and disposal methods which permanently alter, neutralize, de-toxicity or destroy waste so as to minimize the impact to human health and the environment and limit potential future liability.
- Use 3rd party waste management facility which has been considered to be qualified
- In the absence of qualified 3rd party waste treatment, storage, disposal and recycling facilities (due to consideration of area location and transportation requirements), each location shall:
    - consider installation of on-site waste treatment or recycling processes (except for the Hazardous Waste Landfills) that conform to with applicable requirements
    - implement long term storage on-site until such time that qualified vendors have become available.
- potential liability issues (covering the aspects of applicable regulation; environmental sensitive areas; health and safety hazards/risks)
- technologically proven to be environmentally friendly
- costs effective

Site operational units may select alternate equivalent waste management technologies consistent with the hierarchy of waste management and using best engineering judgment and with recommendation from Field HSE Advisor or Environmental Advisor.

The depositing of waste in an on-site landfill shall be prohibited unless the site has fulfilled requirements listed under Government Regulation No. 18/ 1999 concerning Hazardous and Toxic Waste Management, Article 36 to 39.

The use of underground injection wells for hazardous waste would be considered not recommended. Consult HSE Dept. for more details.

Waste that is generated shall be managed: in accordance with the hierarchy of waste management options and using best engineering judgment.

PRIORITY

Re-use

Waste that can be used for other than their original purpose/ usage/ form, such as:

- Used / Junk Tubing for the Pipe Support of the Other Pipeline
- Spilled oil / Tank Bottom for the Field Road Asphalt
- Used Tires for a Coral Reef growing (Artificial Reef)

Recycling or Recovery

Recycling is an effort to use the waste for the same purpose/ usage/ form again (and again). Treatment applied will be able to do this conversion of waste into the exactly the same usable materials and/ or extraction of energy from the materials and/ or from the waste. Examples include the following process of recycling:

- Used Battery as a new Battery
- Scrap Metals as a new Steel
- Drilling Water Based Mud used at Other Wells
- Produced Water Injected for Enhanced Oil Recovery and return as a new Produced Water
- Plastics as a new Plastic
- Broken Glass as a new Glass

Return to Vendor or Manufacture

- Unused Chemical, Bulk Container (Drum), Used Batteries, etc. should be able to be returned to the Vendor or Manufacturer for a reason, such as: Impurities, Surplus, Waste, etc. This may required a special arrangement with the vendor/ manufacturer and most likely have to be spelled-out in the contract/ re-purchase agreement.

Donate to Local Authority/ Community/ NGO

Specific waste such as for a certain non hazardous waste can be donated to the local authority/ community/ NGO after preparing a Write Off Procedure (WOP) and receiving approval from BPMigas. Examples include:

- Junk Pipes, Beams, Steel Scrap.
- Used Tires.
- Junk Wellheads;
- All for a Coral Reef growing (as an Artificial Reefs).

Send to a Junk Dealer (Waste Re-Claimer)

- Scrap such as: Steel Scrap, Junk Drums, Plastic Scrap, Aluminum cans, etc., can be sent to junk dealer (waste re-claimer) for recycling.

Treatment

- This includes the treatment, destruction, detoxification and/or neutralization of residues through processes such as:
    - biological methods: composting, tank based degradation
    - thermal methods: incineration, thermal desorption or use of waste as fuel in combustion processes and thermal destruction. Note: Energy Recovery from incineration process may be preferable treatment in some cases
    - chemical methods: neutralization, stabilization
    - physical methods: filtration, centrifugation

Responsible Disposal

In general, non-hazardous solid waste shall be incinerated using the domestic waste incinerator. The combustible hazardous wastes may be incinerated in hazardous waste incinerator as long as the incinerator permit includes this waste category.

For remote areas where non-hazardous solid waste incineration is not possible, a controlled landfill disposal may be implemented, which requires a site assessment to ensure that this alternative does not pose significant risks to the environment. This landfill shall be covered and monitored in daily basis

Disposal of wastes on land or in water should consider implementing methods that are appropriate for a given situation. These disposal methods include alternative for underground injection.

The potential ecological sensitivity of the location of operations is the key to the selection of an appropriate management practice for a specific waste. This may require information on geology, hydrology, hydro-geology, climate conditions and biological habitats.

Note:

Waste Hand-Over Agreement

Waste that will be: donated to a local authority; disposed of at a proper facility; sent to junk dealer; returned to vendor; or otherwise transferred to a third party, must be accompanied by a properly executed waste hand-over agreement signed by Company and third parties or the receiver. The purpose of this document is to provide a record of the agreed transaction and to ensure correct transfer of all future liabilities pertaining to the transferred waste.

Appendix 8- An illustration of Emergency Response Preparedness in relation to waste management incident

One person should be designated as responsible person for handling emergencies situation, including coordination of action, reporting to Incident Commanders and regulators, and liaising with emergency response team. A deputy should be appointed to act incase of absence.

In establishment of Emergency Response, spillage of hazardous waste is probably the most common type of emergency involving infectious or other hazardous material or waste. Implementation of Emergency Response procedure shall cover below minimum requirements:

- The waste management plan is respected;
- Contaminated areas are clean and, if necessary disinfected/isolated;
- Exposure of workers is limited as much as possible during the clearing up operation;
- The impact on patients, medical and other personnel, and the environment is as limited as possible.

Following actions would be considered as steps in managing any emergency situation related to hazardous waste incident/spillage**:**

- The witness inform to emergency call
- Evacuate the contaminated area
- Inform or notify Incident Commander
- Compile all information of spills including MSDS
- Evacuate all the people not involved in cleaning up if the spillage involves a particularly hazardous substance.
- Provide first aid and medical care to injured persons
- Assess all information determine action to be taken
- Instruct appropriate party to investigate.
- Determine if spill is a threat to the facility and personnel, take action and wash over the side if necessary.
- Request additional resources as required from Company IMT.
- Isolate sources of leak & initiate clean up
- Notify relevant personnel when incident over
- Maintain a detail log of the events.

More detail emergency procedures, shall be further developed by each respective area considering site specific requirement and needs, but should be still within the framework of complying with and conforming to applicable standards/procedures.

Appendix 9 - Site Specific Waste Matrix (Sample)

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WASTE MATRIX

Waste Name / Operation	Waste Type	B-3/Non B-3	Total Vol/Wt	Waste Description	Waste Stream ID	Waste Segregation	Disposal and Reuse/Recycle Options
Production Facility Waste							
Used Lube Oil	Liquid	B-3	Unknown	May be a characteristic hazardous waste due to heavy metals or flammability	LB-001	HZ-02	Collect and put into Belanak facilities and processed with crude (check its compatibility first)
Waste Paint or Paint Solvent	Liquid	B-3	Unknown	Due to ignitability	LW-002	HZ-02	Small quantities of paint solvents maybe amenale to putting into slop oil system
Waste Paint or Paint Solvent Cans/Pails	Solid	B-3	Unknown	Due to ignitability	SW-002	HZ-01, separate waste plastic bags	Allow waste paint containers to dry and handle as hazardous waste
Spent Dry Batteries	Solid	B-3	Unknown	Hazardous waste due to acid and heavy metal	SP-005	HZ-01, separate waste plastic bags	Bring to onshore facility and scraped or incinerated
Acid Wet Batteries	Liquid, Solid	B-3	Unknown	Hazardous waste due to acid and heavy metal	SP-006	HZ-01, separate cardbox	Bring to onshore facility and scraped or incinerated
Used Flourescent Lamp	Solid	B-3	Unknown	Hazardous waste due to heavy metal	SP-007	HZ-01, separate container	Bring to onshore facility and scraped or incinerated
Drilling							
Drilling Mud	Liquid	B-3	Unknown	Waste based system with few additive, potential to contain heavy metals, high pH, hydrocarbon and inorganic salts	SP-001	N/A	Repumped it to downhole or dump to overboard
Cuttings	Solid	B-3	Unknown	Drilled solids	SP-002	N/A	Same as for drilling mud Reinject to downhole or collect and treat in onshore facility
Waste Completion Fluids	Liquid	B-3	Unknown	Contain hydrocarbon, inorganic salts, pllymer residues, etc.	SP-003	N/A	Reinjected to Belanak facility, check its compatibility first
Waste Work Over Fluids	Liquid	B-3	Unknown	Same as completion fluids with slightly more oil	SP-004	N/A	Reinjected to Belanak facility, check its compatibility first

Appendix 10 - Waste Manifest Forms

Internal Waste Manifest Forms:

- The Manifest Form consists of 5 copies and shall be filled out accordingly by the Waste Generator (Company), waste transporters and the temporary storage facility.
- Waste Generators at the respective work areas (i.e. representatives from the generators/collection point) shall complete Internal Manifest Forms (which will then need to be filled out by the transporters and representative from temporary storage facilities).
- XXX Department is responsible for compiling B3 waste manifest generated by operations as they are responsible for delivering the B3 waste to approved third party collector or disposal facilities.
- Representatives of temporary storage shall return the completed manifest as immediately as possible from the date when the waste was shipped to the collector. A copy of the Internal Waste Manifest Form is shown in Appendix 10A.
- HSE Department will use this internal manifest as a base for calculation of waste mass balance.
- For non hazardous waste, the internal waste manifest is also used for controlling the waste disposal process.

External Waste Manifest Forms

- An external hazardous waste manifest (known as KNLH Waste Manifest) is required when shipping or transporting hazardous waste from any Company location to any destination that is an approved third party collector or disposal facility by KEMENTERIAN NEGARA LINGKUNGAN HIDUP.
- The external hazardous waste manifest form consists of 7 copies and shall be filled out accordingly by the Waste Generator (Company), waste transporter and the collector or waste disposal facility.
- The hazardous waste disposal facility or collector shall return the completed manifest (Manifest no 7 – purple color) within 120 days from the date when the waste was shipped or transported to the collector or waste disposal facility.
- Waste Generators, in this case is the exit point from the respective work areas (location of temporary storage) shall complete external Manifest Forms (filled out by all third parties-generators, transporters and disposal facilities). Once every six (6) months, the Manifest Forms shall be submitted to KEMENTERIAN NEGARA LINGKUNGAN HIDUP or the District BAPEDALDA.

In general, the manifest consist of three sections that have to be filled out in following order:

a. Section I : filled by the generator
b. Section II : filled by the transporter
c. Section III : filled by the waste management facility

Distribution method for each document and responsibility for acknowldgement/signing are described below

Colour of Copy	Page No	Signatured by	To be kept by
White	Original	Generator	Generator
Yellow	2	Transporter	Local BAPEDALDA sent by Generator
Green	3	Transporter	Generator
Pink	4	Generator	WM Facility sent by Transporter
Blue	5	WM Facility	Relevant institution sent by the WM facility
Cream	6	WM Facility	Local Authority, sent by the WM Facility
Purple	7	WM Facility	Generator after completed and sent by the WM Facility

Appendix 10A - Internal Waste Manifest Forms

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DOKUMEN PENGIRIMAN LIMBAH B3 dan Non B3
HAZARDOUS AND NON HAZARDOUS WASTE MANIFEST

Serial No:.....

1. BAGIAN YANG HARUS DILENGKAPI OLEH PENGHASIL LIMBAH *(THIS SECTION MUST BE COMPLETED BY WASTE GENERATOR)*

Nama dan Lokasi/*Name and Location Generator*: .....
Nomor Telepone/*Telephone Number*:.....
Tanggal Pengiriman/ *Date of Shipment* .....Tujuan Pengiriman/*Destination Of Shipment*.....

Pernyataan lokasi/department penghasil limbah B3: Dengan ini saya nyatakan bahwa limbah B3 yang dikirim sesuai dengan perincian pada daftar isian baku yang disebut diatas, serta dikemas label dan dalam keadaan baik untuk angkutan dijalan raya, sesuai dengan peraturan Pemerintah RI atau Peraturan Internasional. *Generator certification: I hereby declare the contents of this consignment are accurately above by the proper shipping description and have been labeling and are in proper condition by highway according to GOI or International regulation*

Nama/*Name (Generator)*	Tanda Tangan/*Signature*	Jabatan/*Title*	Tanggal/*Date*
Nama/*Name (Approved by Supv.)*	Tanda Tangan/*Signature*	Jabatan/*Title*	Tanggal/*Date*

2. DATA PENGHASIL LIMBAH / *WASTE DATA*

First Drop Date	Waste ID	Waste Name 01	Quantity (Kg / Liter)	Container

Waste Type: ☐ Padat/Solid ☐ Cair/Liquid Labeling ☐ Ya/Yes ☐ Tidak/No Waste Characteristic : ☐ Hazardous ☐ Non Hazardous

Characteristic Hazardous Class ☐ Mudah Terbakar /Flammable ☐ Beracun/Toxic ☐ Reaktif/Reactive ☐ Korosif/Corosive

First Drop Date	Waste ID	Waste Name 02	Quantity (Kg / Liter)	Container

Waste Type: ☐ Padat/Solid ☐ Cair/Liquid Labeling ☐ Ya/Yes ☐ Tidak/No Waste Characteristic : ☐ Hazardous ☐ Non Hazardous

Characteristic Hazardous Class ☐ Mudah Terbakar /Flammable ☐ Beracun/Toxic ☐ Reaktif/Reactive ☐ Korosif/Corosive

First Drop Date	Waste ID	Waste Name 03	Quantity (Kg / Liter)	Container

Waste Type: ☐ Padat/Solid ☐ Cair/Liquid Labeling ☐ Ya/Yes ☐ Tidak/No Waste Characteristic : ☐ Hazardous ☐ Non Hazardous

Instruksi Penanganan Khusus/ *Special Instruction:*

3. Pengangkut/ *Transportation Data*

Nama Penggangkut/Transporter Name ..... Tanda Tangan/Signature :.....
Izin Pengangkutan/ *Shipping Permit*..... Jenis alat angkut/Type of transporter :.....
Nomor Identitas alat angkut/ *Id. Vehicle No*: .....

4. BAGIAN YANG HARUS DILENGKAPI OLEH PENGUMPUL SEMENTARA LIMBAH B3. *THIS SECTION MUST BE COMPLETED BY THE TEMPORARY COLLECTOR*

4.a Nama Lokasi pengumpul sementara limbah B3. *Name Location temporary Collector*		Nomor telepon. E-mail:	
4.b. Nama/*Name (Received by)*	Tanda Tangan/*Signature*	Jabatan/*Title*	Tanggal/*Date*
4.c. Nama/*Name (Approved by Supv.)*	Tanda Tangan/*Signature*	Jabatan/*Title*	Tanggal/*Date*

Pernyataan pengumpul sementara limbah B3: Dengan ini saya menyatakan bahwa saya telah menerima kiriman limbah B3 dengan jenis dan jumlah seperti tersebut diatas dan bahwa limbah tersebut akan ditempatkan sesuai dengan peraturan Pemerintah RI atau peraturan internasional. *Collector certification: I hereby declare that have received the type and quantity of waste as described above by the generator and that it will keep according to GOI or international regulation*

5. Pengangkut/ *Transportation Data*

Nama Penggangkut/Transporter Name ..... Tanda Tangan/Signature :.....
Izin Pengangkutan/ *Shipping Permit*..... Jenis alat angkut/Type of transporter :.....
Nomor Identitas alat angkut/ *Id. Vehicle No*: .....

6. BAGIAN YANG HARUS DILENGKAPI OLEH PENGUMPUL AKHIR LIMBAH B3. *THIS SECTION MUST BE COMPLETED BY FINAL COLLECTOR*

6.a. Nama Lokasi pengumpul akhir limbah B3. *Name Location End Collector*		Nomor telepon. E-mail:	
6.b. Nama/*Name (Received by)*	Tanda Tangan/*Signature*	Jabatan/*Title*	Tanggal/*Date*
6.c Nama/*Name (Approved by Supv.)*	Tanda Tangan/*Signature*	Jabatan/*Title*	Tanggal/*Date*

6.d. Catatan pengolahan/pembuangan/pemanfaatan limbah B3/ Note of treatment/disposal/utilization of hazardous waste :

	Tanggal/Date :	Tujuan/Place :	Volume/Jumlah/Quantity :	No Manifest :
Waste Name 01	...../...../.....	.....	.....	.....
Waste Name 02	...../...../.....	.....	.....	.....
Waste Name 03	...../...../.....	.....	.....	.....

Pernyataan pengumpul sementara limbah B3: Dengan ini saya menyatakan bahwa saya telah menerima kiriman limbah B3 dengan jenis dan jumlah seperti tersebut diatas dan bahwa limbah tersebut akan ditempatkan sesuai dengan peraturan Pemerintah RI atau peraturan internasional. *Collector certification: I hereby declare that have received*

Copy 1: Pengumpul Akhir Limbah/ *Final Collector*, **Copy 2: Pengumpul Semetara Limbah/** *Temporary Collector*, **Copy 3: Pengangkut Limbah/** *Transporter*
Copy 4: Penghasil Limbah/*Waste Generator Collector*, **Copy 5: Pengangkut Limbah /** *Transporter*

Appendix 10B - External Waste Manifest Forms

DOKUMEN LIMBAH B3
(HAZARDOUS WASTE MANIFEST)

Bagian I : diisi oleh Penghasil

Bagian II : diisi oleh Pengangkut

Bagian III : diisi oleh Pengolah

Chapter 2: Section 7 :
Project Execution Planning - Safety Health Environmental

Content

7. PROJECT EXECUTION PLANNING : SAFETY HEALTH ENVIRONMENTAL

7.1 Safety, Health & Environmental Policy

2. SAFETY, HEALTH AND ENVIRONMENTAL (SHE) POLICY

2.1. Policy Intent

The Company is determined to implement the highest standards of Safety, Health and Environmental (SHE) execution to ensure that all areas of operation are environmentally proactive and safe places for our stakeholders. SHE is a line function with full accountability throughout the entire corporate structure.

2.2. Policy

It is the policy of the Company to provide a safe and healthy work environment. The Company is committed to proactively protecting human health and the environment. The Company shares this commitment with its employees, our customers, other companies, and the communities we work with. Our policy is to continuously improve our safety and health performance by routinely reviewing our practices, policies and procedures to identify opportunities for reducing accidents and enhancing compliance. Our policy is founded on the following basic principles:

- We will comply fully with applicable safety and health laws and regulations;
- We will review our operations and assess the potential for safety and health risks and will develop and implement plans to manage these risks prudently;
- We will regularly review our safety and health performance to identify opportunities to enhance our performance;

The Company Safety and Health Policies are designed to ensure that specific requirements, performance-based standards, and the intent of regulations are specifically identified in order to minimize interpretive errors. The Company is committed to efficiently reduce the potential impacts of our business on safety, health and environment (SHE) by managing hazards, preventing injury, reducing waste, emissions and discharges and by using energy efficiently. We will eliminate injury by observing hazards, reporting and rectifying all unsafe actions and any condition which could lead to an incident.

Each employee is responsible for complying with company policies, guidance and procedures to ensure that work is performed in a safe and healthful manner. Responsibilities for SHE performance shall be visible throughout the organization with clear management accountability. Full implementation of SHE Management Policies throughout the entire life of the project is essential to our business. Every employee, affiliate, consultant, contractor and subcontractor of the Company shall unconditionally support and rigorously apply the Supreme SHE goals, objectives and all statutory requirements.

Our business, operational and implementation plans and personal objectives shall including quantifiable measurable SHE targets are that will be established annually, reviewed regularly and adjusted as needed to improve the effectiveness of the program. Every employee is accountable for implementation of this policy. If you have any doubt or questions, don't hesitate to seek guidance from your immediate supervisor.

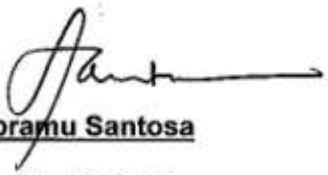
Safety is everyone's responsibility. We are all responsible for both our own safety and that of our co-workers. This objective is fundamental to our business. All employees of

Company and Contractors have the same responsibility to comply with safety precautions during performing their work for Company. We are all responsible to work correctly and safely.

In carrying out the policy intent, the Company will:

- ensure that systems are developed and established to identify and control hazards within the work place and to monitor SHE performance.
- ensure that all employees to understand that Safe Operations is "good business", and has an equal importance with any other business matter.
- motivate and encourage all employees, suppliers (vendors and contractors) and other stakeholders to maintain high standards of SHE consciousness.
- communicate openly with employees, suppliers and all stakeholders to continually improve the SHE standards.
- meet all legal obligations wherever we operate and always strive to exceed requirements.
- adopt best practices and apply standards that protect the Safety and Health of the employees and prevent harm to the Environment.
- follow written procedures for high risk or unusual situations.
- involve the right people in decisions that affect SHE procedures and equipment
- ensure that every employee understands that have the duty to prevent SHE losses and provide a safe and healthy place of work.

Jakarta, May 2011



Supramu Santosa

President & CEO

7.2 Introduction

The requirements described in this Section are designed as minimum requirements. If it is deemed necessary, Supreme Energy's Safety, Health and Environmental Manual and Contractor Safety Management System (CSMS) shall be referred to cover any specific needs related to the work.

7.3 Contractor Responsibility

All Contractors working on Supreme Energy (SE) premises are required to ensure that their employees comply fully with all SE SHE regulations, policies and procedures.

Contractors are responsible for providing Personal Protective Equipment (PPE) for their employees and their Sub-Contractors while they are working on SE premises. PPE is clothing, equipment or substances designated to be worn by someone to protect them from risks of injury or illness.

Contractors shall ensure that its employees and its Sub-Contractor's employees are trained and competence to perform the work in a safe, healthy and environmentally responsible manner.

Contractors shall ensure that all Contractor furnished machineries, tools and equipment are maintained properly, in a safe operating condition, are inspected regularly, and have been re-checked and accepted by an authorized SE Representative.

Contractors shall take all necessary SHE measures in relation to the work to be provided and shall conduct itself and its work-force in such a way as to comply at all times with the provisions of the national and/or international SHE regulations pertinent to work.

Contractors shall take such reasonable steps to provide a safe and healthy working environment for its personnel, Company's personnel and related third parties in the performance of this work.

7.4 SAFETY and HEALTH

7.4.1 Safety Procedures and Safety Plan

The Corporate wide SHE procedures (published as SE SHE Manual) and SHE Plan (published in SE CSMS Manual Chapter 5 and Appendix III.2) shall be complied by all employees, Contractors, sub-contractors and visitors. A Safety Officer will be appointed by SE to coordinate with Safety Officers to be appointed by each Contractor and to oversee compliance with safe working practices.

The procedures include all required general safety procedures for normal construction site as well as for those which are unique to a geothermal site, plus provisions for medical and first aid treatment, site evacuation and notification of incidents, including the following:

- Safety clothing – headgear and footwear
- Welding and cutting safety – goggles / face masks, gloves, exclusion barriers, fire sentries and fire fighting equipment, radiography

- Lifting – general dangers of heavy lifts overhead, testing of slings and other equipment, control of cranes
- Excavations – maximum depth, requirements for shoring sides of excavations, roping-off excavations
- Electrical hazards – high voltages, wandering / extension leads to be protected, portable equipment, earth fault isolators to be used, overhead transmission lines
- Gas hazards – dangers in enclosed areas, excavations, pits and holes, H_2S and CO_2 gases, portable monitor equipment
- Steam and hot water hazards – water and steam within the steamfield systems, natural thermal features
- Drilling and other sumps – to be fenced off, safety life lines to be fitted, safety harness to be available
- First aiders to be nominated, first aid equipment to be supplied and signed
- Ambulance, medical support
- Reporting of accidents, accident register

Particular attention must be given to the presence of a local population who conduct farming in the area and whose homes are within the project area. Care must be taken to ensure that no injury can eventuate to people and livestock.

7.4.2 Safety in Design

All designers, whether SE or Contractor, are to pay particular attention during their design to the safety of operators, maintainers and members of the general public who may be in the area.

7.4.3 Safety in Construction

All Contractors are required to produce a safety plan and detailed safety procedures to ensure that the work will be conducted with due regard to the SHE aspects.

Copies of the source documents shall be provided to SE if the procedures are referenced only. This plan shall comply with the SE Corporate SHE Policy and is to be submitted for review and approval by a SE SHE representative.

7.4.4 Safety Briefing

All Contractors are to hold weekly safety meetings for all employees on the site. These safety meetings are to include particular reference to geothermal hazards:

- steam and other hot, pressurized fluids
- geothermal gas (H_2S and CO_2)
- fumarole areas

The meetings shall also include reference to normal hazards to personnel, assets and the environment encountered during construction, including:

- electrical hazards
- use of portable power tools
- overhead power lines

- welding and cutting hazards
- ladders and scaffolds
- working at height
- general working hazards
- use of lifting equipment, cranes, etc
- excavations
- fire prevention
- disturbance to environmental and community
- health hazards
- security

7.4.5 Tool Box Meeting

Tool box meetings shall be held before the start of each job to coordinate the tasks to be done. All involved personnel shall participate in these meetings.

7.4.6 Site Safety Checklist

Each Contractor's Site Manager is to regularly prepare and sign a Site Safety Checklist and submit to the Engineer's Representative at each weekly site meeting or when the SE SHE Representative requires it.

The SE CSMS Manual Appendix V.I SHE Inspection Checklist should be used as the basis for this Checklist, although this may be modified as agreed with the SE SHE Representative and the Engineer's Representative to suit the particular contract.

7.4.7 Alcoholic Liquor or Drugs

The project base camp and project areas are deemed to be "dry". No alcohol or illegal drugs are to be brought onto or consumed on the project premises. Any worker found under the influence of alcohol or illegal drugs at work will be summarily dismissed.

7.4.8 Arms and Ammunition

Arms or ammunition are not permitted at any time on the site or on any of the project facilities, except for use by authorized and trained security guards personnel or members of the Indonesia police and army forces.

Arms in possession of security guard personnel are to have a corresponding license issued by the Indonesian police force. It is the responsibility of the security guard company to ensure that this requirement is observed.

7.4.9 Protective Equipment and Clothing

The wearing of appropriate safety equipment is mandatory on the site. As a minimum, this will include safety headgear and appropriate footwear (non-slip safety shoes or boots or equivalent robust footwear are to worn at all times on sites except inside an office space).

7.4.10 Fire Protection

Precautions are to be taken against fire, both within the actual construction environment and also within the rural areas in which the Project is located.

Appropriate portable fire fighting equipment is to be available at all sites involving “hot work”, such as welding or cutting.

All materials shall be stored and handled with due regard to their fire characteristics. Material shall be stored in such a way as to minimize the spread for fire internally and to permit convenient access for fire fighting. Storage shall not obstruct means of exit.

Smoking is not to take place during any operations involving the transfer of hydrocarbon fluids and fuels. Cigarette butts are in all cases to be properly disposed of after being carefully extinguished. Smoking is not permitted on or adjacent to any drilling rigs or inside an office space.

Heat and/or smoke detecting devices and fire alarms are to be installed in certain location as appropriate (including buildings and warehouses) and are to be kept in good condition and tested from time to time an authorized party. In other areas where no permanent detection and alarm systems are installed, emergency telephone numbers such as fire fighting department, shall be conspicuously posted.

7.4.11 Flammable and Combustible Liquids

Special care must be undertaken to handle flammable or combustible liquids. Storage areas and containers shall be conspicuously labelled “Flammable” and the related safety signs such as “no smoking” shall be posted at surrounding area.

Storage areas shall be kept free of weeds, debris and other combustible material not necessary for the storage.

Storage of flammable and combustibel liquids shall have containment bund and/or drip pan.

7.4.12 Gas Hazards

Geothermal project involve a particular risk from build up of geothermal non-condensible gas e.g. primarily CO_2, with a significant proportion of H_2S. Both of these gases are heavier than air and can build up in holes and excavation. CO_2 does not support life and causes death by suffocation. Its action can be insidious and an individual may not realize that he or she is in danger until too late. H_2S is poisonous and in higher concentrations it is not detectable by smell.

Well cellars and deep excavations are not to be entered without first checking for the presence of gas and oxygen content. Forced ventilation may be required to make safe entry to the hole concerned.

Personal and portable H_2S monitors (and oxygen monitor, as appropriate) are to be available on the Project and are to be available whenever undertaking any well operations or discharging geothermal fluids or steam.

7.4.13 Fluid Discharges

Geothermal fluid is hot, under pressure and very dangerous. Care is always to be exercised when discharging geothermal fluids (two-phase, steam and/or brine). In particular the discharge route is to be clearly defined and checked clear of personnel and livestock. Sentries are to be posted to ensure that personnel stay clear. Also, as some discharges are very noisy, adequate warning must be given to workers and residents in the general vicinity.

7.4.14 Electrical Hazards

The power supply onto the site is at 13.8 kV. This will be transformed down to 220-240 V for construction purposes. These are dangerous voltages and care is to be taken to ensure that all equipment being used is correctly grounded in accordance with manufacturer's instructions. Equipment in use on site is to be inspected regularly for worn leads or other damage which could result in electric shock and labelled to show the date of last inspection.

All extension leads are to be supported above ground to avoid risks of vehicles running over them, heavy or sharp weights being placed on them or their immersion in water, or are to be suitably protected with timber either side to avoid direct weight on top of them.

Care is to be taken with mobile cranes, etc that no contact is made with any overhead lines. Operators are to be warned of the presence of any overhead lines and must have a sentry / signal man available to watch for inadvertent approach to such lines.

Overloading an electrical fitting shall be avoided.

7.4.15 Welding and Cutting

Suitable fire protection equipment is to be available whenever cutting and welding operations are taking place. This includes operations in the field where there is a risk of starting grass or bush fires. Care is also to be taken that personnel are not standing in a position where they might be burned by falling slag or sparks or be exposed to direct arc glare. Welding area shall be sufficiently barricaded to prevent unauthorized entry.

Before starting welding or cutting:

- Operators must be properly trained and supervised.
- An assistant is to be provided to every operator. The assistant is to be instructed to watch for, recognize and resolve fire hazards.
- Secure all gas cylinders so they do not tip or fall.
- Avoid wet or damp area which can cause a serious electrical shock.
- Cutting and welding shall be permitted only in areas are or have been made fire safe.
- Personal protective equipment is mandatory:
  - Appropriate eye protection is required, including but not limited to, welding mask and goggles with side shields.
  - Welding gloves and apron.
- Ensure all equipment used is maintained in a safe condition.
- Never strike an arc in the presence of other people whose eyes are not shielded.
- Gas cylinders shall be moved by tilting and rolling them on their bottom edges. They shall not be intentionally dropped, struck, or permitted to strike each other violently.

- Fuel gas hose and oxygen hose shall be easily distinguishable from each other. A single hose having more that one gas passage shall not be used.
- Torches shall be lit by friction lighters and not by matches or from hot work
- Cylinders shall be kept in an upright position and securely tied at their body to a rigid stand. Use of cylinder cage is preferred.
- Cylinders shall be kept far enough away from the actual welding or cutting operation so that spark, hot slag, or flame will not reach them. When this is impractical, fire resistant shield shall be provided.
- Cylinders, including empty cylinders, shall be marked for its content.

7.4.16 Radiography

When radiography of welds is being undertaken, suitable warning notices are to be placed to establish an exclusion zone around the working area. Sentries are to be used to control vehicle traffic passing the working area.

Radiography personnel and equipment shall have a valid license from BATAN.

Radiography equipment shall be stored in a safe manner when not in use.

7.4.17 Scaffolding

Scaffolds shall be erected properly to avoid fall hazards. Scaffold nust be rigid and sufficient to carry out its own weight plus four times the maximum intended load without settling or displacement, and shall be accessed by ladder or similar.

All openings at the platform shall be guarded. Scaffolds must be equipped with guardrails, midrails and toeboards. Scaffold board overhangs shall be minimised.

A minimum 0.6 m wide working area / surface shall be installed for working platform.

7.4.18 Working at Height

Safety harness shall be worn when working in areas of more than 1.5 meters above the working surface, or as prescribed by applicable work rules or regulations.

7.4.19 Blasting

Blasting activities shall only be carried out with the express permission of the Site Construction Manager. All project personnel shall be advised prior to the start of blasting and the blasting area should be cleared at the start of work. Perimeter sentries are to be posted around the work area, equipped with radios to ensure coordination of the operation, and they shall be required to visually confirm that no persons are within the safety radius established by the blasting officer.

Explosives are not permitted to be stored near or within working areas or in the base camp area; Explosives must be storage in approved buildings / containers situated at least 200 m from any work area or other facilities. The area proposed for temporary storage of explosives is at the open yard area, where a security guard is placed to maintain security.

7.4.20 Excavation

Excavation presents several types of hazard which need to be addressed:

- Gas hazard – within the project area there is a risk of geothermal gas being emitted from the soil. This gas is mostly carbon dioxide (CO_2) with some hydrogen sulphide (H_2S). These gases are heavier than air and will tend to collect in excavated pits. Portable oxygen content and gas detection equipment must be used to test the air in excavations before allowing anyone to enter a hole or an excavation. Continuous forced ventilation with blowers may be necessary to make a safe entry. Additionally, a sentry must always be present at the surface, equipped with safety lines, to monitor and assist any worker who may be overcome by gas.
- Soil collapse leading to burying or crushing of workers. The soils shall be classifed for the class of soil involved and suitable protection plan shall be established by the person responsible for excavation activites. Sloping / shoring / battering / benching requirements are to be determined to prevent collapse and entrapment.
  - The bottom edge of spoiled ground shall not be stored less than 0.6 m from the trench / excavation.
  - If digging is using excavators / heavy equipment / dump truck, precautions shall be made for safe access and parking of the equipment to prevent collapse / disturbance / vibration to the excavation.
- Risk of falling into the excavation. All excavations are to be cordoned off with temporary posts and safety tape warning of the danger. In any locations where workers are required to cross any excavation more than 0.5 m deep, a suitable walkway with guardrails is to be provided.
- Flooding. Work inside an excavation area shall be reassessed after weather change such as heavy rain. Flood water shall not be allowed.
- Damage to other facilities and structures. Before commence any excavation work, all underground and overhead facilities and adjacent structures shall be identified to prevent injury to personnel, damage / collapse of structures, and business interruption

All excavations deeper than 1.5 m must be previously checked by a competent civil engineer to assess the hazards and determine requirements for safe excavation. Excavation working permit shall be made available.

7.4.21 Confined Space Entry

The entire workplace shall be evaluated to determine which areas are confined spaces. Areas determined to be confined spaces shall have warning signs posted at all points of possible entry. (A sign reading “DANGER - CONFINED SPACE - DO NOT ENTER” or similar language would satisfy this requirement).

Entry into a confined space shall require a specific permit prepared by a Contractor’s competent person and is then to be reviewed by the SE Engineer’s Representative and Safety Officer prior to submission for approval by the SE Engineer.

7.4.22 Heavy Lifting

All operations involving the lifting of loads in excess of 10 tonnes are to be carried out in accordance with a pre-approved lifting procedure. Lifting procedures are to be prepared by the Contractor’s

engineer directly responsible for carrying out of the work and are then to be reviewed by the SE Engineer's Representative and Safety Officer prior to submission for approval by the SE Engineer.

All lifting equipment (i.e. mobile crane, overhead crane, etc.) and lifting gears shall regularly be inspected and certified by an authorized party.

The Safe Working Load (SWL) shall be indicated on lifting equipment.

Only certified operators are permitted to operate such lifting equipment.

7.4.23 Hydrotesting

Wherever possible, pressure testing shall be carried out in a permanent dedicated area. Concrete walls with inspection windows shall shelter such area.

When it is not possible to do this way, pressure testing shall be supported by a Job Safety Analysis and controlled under the Permit To Work procedure. As a minimum barriers and warning signs shall be erected at a safe distance around the concerned area.

In any case warning tags shall be used to identify lines under test.

Pneumatic tests and very high-pressure hydro-testing (above 5.000 psig or 350 bar) shall be only conducted in sheltered area.

7.4.24 Drilling

Drilling and related activities shall be carried out in accordance with American Petroleum Institute, Recommended Practices for Occupational Safety for Oil and Gas Well Drilling and Servicing Operations, API RP 54, which should be referred to in conjunction with this Plan. Where applicable, compliance with the National and Local standards, codes or regulations will be mandatory and take precedence over the requirements of the API Recommended Practices.

7.5 Work Permits

Work which requires isolation of energi (fluids, electrical power, mechanical, heat, etc) is to be undertaken only when a Work Permit has been issued by the appropriate authorities. This form is to be prepared by the Contractor in consultation with the SE Engineer's Representative, who is then to organise the requisite isolations and, when safe to do so, issue the permit to the Contractor, who is to sign receipt of the permit. On completion of the work, the Contractor is to certify that the isolations can be removed, when the Engineer's Representative is to arrange for their removal and the cancel the permit.

All valves, isolating switches or fuses and other isolating devices which are involved in an isolation for a Work Permit are to be locked and tagged in accordance with the Lock Out Tag Out (LOTO) procedure.

Prior to undertaking excavations, the Contractor is to request an Excavation Permit from the appropriate authority. The Engineer's Representative is to check for the presence of underground services or other hazards, such as the potential for interference with the safe passage of personnel or

vehicles or the possibility of a gas hazard, and advise the Contractor of any precautions to be observed. The Engineer's Representative shall also advise the Contractor of any requirements for an Owner's Representative to be present when opening the excavation or to give approval for backfilling.

A confined space entry permit shall be made and approved by appropriate authorities before entering any confined space.

7.6 Lock Out Tag Out Procedure

Lock Out Tag Out (LOTO) is a procedure used to identify items (such as valves, switches etc) that are not to be operated because their operation could result in damage to plant or injury to personnel. Operation in this context includes the opening or shutting of valves, operating switches, inserting blank / blind, removing fuses, etc i.e ensuring that all hazardous energy sources are positively isolated.

LOTO procedure needs to be controlled carefully to ensure the safety of people working on the project while avoiding unnecessary operational restrictions.

7.7 Housekeeping

Aisles, walkways, corridors and passageways shall be clearly marked and kept free from obstructions.

Contractor shall allocate adequate time and resources to maintain an acceptable level of housekeeping and cleanliness in all working areas.

Particular attention shall be paid to housekeeping and cleanliness at height to prevent falls of materials on persons working below. Wherever possible safety nets shall be used.

All Contractors and personnel are to observe a "clean site" policy. There is to be no uncontrolled disposal of garbage, litter or waste materials. Contractors are to ensure that their employees place such materials in designated places and containers for collection and appropriate disposal.

7.8 Fire

All Offices and Administration building shall be equipped with a proper fire protection system that may include heat / fire / smoke alarms and fire extinguisher systems. Safe briefing area shall be determined.

7.9 Vehicles

Vehicles and drivers using project roads and within the project site and base camp are to follow normal Government road code requirements, including the wearing of safety belts. Note that there is a site-wide speed limit of 40 kph, and 60 kph at public / access road. Speed is further restricted in selected area as indicated by signs. Furthermore, care is to be taken always to drive within the prevailing conditions.

Particular care is to be taken when driving on un-metalled roads which may be slippery when wet. On narrow roads, priority is to be given to vehicles coming downhill. Care is also to be exercised when passing work places where a worker may accidentally step into the path of an oncoming vehicle, where obstructions may be found in the roadway or near to excavations.

Drivers should be aware that on roads within the project area and the public / access road, particular care should be taken, especially at night, for livestocks, motorcycles, and pedestrians using the same roads.

7.10 Accidents

All accidents and health and safety related incidents SHALL be reported to the SE Safety Officer (through the Engineer's Representative in the case of Contractors and their Sub-Contractors) as soon as possible, no later than 12 hours after the event by phone or radio (first advice) and in a hard copy.

All the Contractors shall provide monthly accident statistics to the SE Engineer and Safety Officer within the first five (5) calendar days after the end of the month, including total man hours worked in the month, total number of accidents and total lost work time (man-hours).

The SE Safety Officer is responsible for maintaining accurate and up-to-date records and statistics of accidents and other health and safety incidents. These will be included in the Project Manager's monthly report.

7.11 Hazard Communication

Contractor shall provide the employees with effective information (e.g. posters, displays, letters, programs, etc) and training on workplace hazards and hazardous materials / chemicals.

Hazard communication program shall also ensure that all employees working with chemicals know the hazards of those substances and use the proper protective equipment. Material Safety Data Sheet (MSDS) shall be available at sites.

7.12 Emergency Preparedness

Contractor and its sub-Contractor shall have emergency preparedness and Emergency Response Plans and Procedures ("ERP") that are available at all times throughout the duration of the Contract.

Contractor shall assist SE to create the "Bridging Document" to indicate and clarify the agreed communication and coordination links between Contractor and SE emergency response plans.

7.13 ENVIRONMENTAL

7.13.1 Environmental Impact Assessment

An environmental impact assessment has been undertaken as part of the permitting process for the Project.

7.13.2 Ongoing Environmental Monitoring & Compliance

A Safety, Health and Environmental (SHE) Manager has been appointed to oversee compliance with the requirements of the Environmental Impact Assessment and the Environmental Permits.

Contractor shall comply with all laws, rules and regulations of governmental agencies having jurisdiction, which now exist or may be promulgated during the term of the Contract, relating to the control and prevention of damage to the environment

7.13.3 Waste Management

Site cleanliness is important for both safety and environmental reasons. All Contractors are to maintain clean work areas and to correctly dispose of rubbish and waste material on a daily basis.

The site waste management system consists of the classification, collection, transport, recycling or disposal of waste materials produced during construction and plant operation activities and domestic waste.

7.13.3.1 Waste Classification

This is the identification of the nature of the waste and sorting into appropriate groups, depending on the eventual disposal requirement. Groups include:

- Paper
- Plastic
- Organic material
- Metal
- Oil and oil contaminated material
- Specifically identified hazardous materials (drill sludge, dril cutting, hazardous chemicals and its containers, etc)
- Other inorganic (soil, rock, concrete, etc)

Suitable containers are to be provided around the work site to enable waste material to be easily classified and properly disposed of. In the case of hazardous waste, the SHE Manager is to be advised of the presence of this and will make separate arrangements for collection and disposal.

7.13.4 Spoil Disposal

Spoil is only to be disposed in designated areas. The SE Civil Engineer will designate any spoil disposal areas required.

7.14 Notification

Contractor shall notify SE Engineer Representative and SHE Representative immediately with respect to any pollution, loss, damage, claim or demand (or occurrence which may give rise to same) resulting from the work performed under the Contract. Contractor shall report to Company any incidents of non-compliance with legislative and regulatory environmental requirements that occur during the performance of the work.

7.15 Vegetation

Vegetation is important in stabilizing soil surfaces. Vegetation is NOT to be stripped from the ground unless absolutely necessary, in which case the SHE Manager is to be advised so that he can determine

any re-vegetation requirements. Trees in particular are not to be disturbed without the permission of the Project Manager and the SHE Manager.

SE will establish a re-vegetation plan, primarily aimed at planting trees to support sustainable environment.

7.16 HEALTH

7.16.1 Medical Fitness

In hard environmental conditions or when local medical assistance is weak or remote from the working site, Contractor shall take appropriate measures to ensure that their employees are “fit to work”.

7.16.2 Working Rhythm

Contractor shall grant a reasonable rest time to its personnel on daily, weekly and yearly basis.

7.16.3 Occupational Noise Exposure

When workers are required to work in areas where the sound level exceeds the long term permissible noise exposure level of 85 dB(A), hearing protection equipment (ear plugs or ear defenders) must be provided and worn.

Noise level signs shall be posted at appropriate equipment, locations and for certain activities that produce excessive noise.

7.16.4 Ergonomic

In order to avoid musculo-skeletal inflammatory diseases attention shall be paid to tasks with repetitive movement or uneasy long time posture and corrective measures shall be taken.

7.16.5 Lighting

Adequate lighting shall be provided to all working areas.

Portable lighting equipment shall be fitted with an approved plug.

Only authorized personnel shall undertake repairs to lighting equipment.

7.16.6 Toilet Facilities

Toilets facilities shall be provided on working site in sufficient number and shall be regularly cleaned and maintained.

There shall be no discharge of human waste direct to the environment. Septic tank shall be the minimum requirement. Care shall be taken so as not to pollute the water supply used by others such as ground water.

7.16.7 Drinkable Water

Drinkable water shall be provided in several locations and in sufficient quantity on construction and installation sites.

Quality of supplied water shall be regularly tested by competent persons.

7.16.8 Accommodation and Catering

Accommodation provided to personnel shall be of a good standard and equipped with safety features.

Catering service shall be of a good level and adapted to customs of people working on the construction or installation site. Catering personnel shall be certified and shall undergo regular medical examination and regular sanitary inspection.

Kitchen, freezers, refrigerators and restaurant shall be regularly inspected by competent persons. For freezers and refrigerators a special attention shall be paid to the control of temperature.

Chapter 2

Section 17 : Hydrogen Sulfide (H_2S)

Contents

7. Hydrogen Sulfide (H_2S)

7.1 Introduction

Hydrogen Sulfide (H_2S) is a highly toxic chemical compound that is heavier than air in its gaseous form. It is a colorless and a sweetish taste, flammable gas with a pungent (rotten egg) odor at low concentrations. Despite its characteristic odor, sense of smell cannot be relied upon to detect the presence of H_2S because the gas rapidly deadens the sense of smell by paralyzing the olfactory nerve. Exposures to H_2S at concentrations as low as 600 parts per million (ppm) can cause death in a matter of minutes due to paralysis of the respiratory system.

H_2S is a naturally occurring gas that arises from the decomposition of organic material (animal or vegetable) by microorganisms (bacteria). It is found in regions of geothermal activity, occurring around sulphur springs and lakes. It is also found in areas of oil and gas exploitation, in foul sewers and in pools (stagnant water) such as mud ponds, and swamps. Along with carbon dioxide, it is one of the main hazardous components of the non-condensable gas phase associated with geothermal steam. It is possess a significant risk to personnel working in and around geothermal power generation facilities.

7.2 Characteristics

H_2S is a colorless, flammable gas that may be liquefied under pressure. It can occur in a variety of geothermal, oil and gas exploration and production operations, and has the following properties:

- **Toxicity.** H_2S is extremely toxic. The lethal concentration is 600-700 ppm.
- **Heavier than Air.** H_2S is approximately 19 percent heavier than air (vapor density = 1.19). It tends to accumulate in low or enclosed places such as pits, trenches, enclosed well bays and cellars, sumps, the tops of floating roof tanks, buildings, shale shakers and portable containers. However, H_2S mixed with natural gas may form a lighter-than-air mixture.
- **Soluble in Liquids.** High concentrations of H_2S may be present in crude oil, molten sulfur, tank and pit-bottom sludge, produced water, etc., all which may release H_2S when agitated, heated, or depressurized.
- **Odor.** At very low concentrations, H_2S has a characteristic odor suggestive of rotten eggs. However, smell cannot be used as an adequate means of detecting its presence because hydrocarbon vapors in asphalt, bunker fuel and some crude oils can mask the rotten egg odor.

  Additionally, at higher concentrations (>100 ppm), H_2S deadens the sense of smell, leading people to believe falsely that no H_2S is present. Consequently, sense of smell is not dependable as a means of detection.

- **Flammable.** H_2S is an extremely flammable gas with a wide range of flammability (4.3 - 45.5% by volume in air). When burned, H_2S forms sulfur dioxide (SO_2), which is a colorless, highly toxic and very pungent gas.
- **Highly Corrosive.** H_2S accelerates corrosion, producing a general loss of metal and strength, deformation, and cracks. Copper alloys corrode rapidly in H_2S service.
- **Reactive.** In an oxygen-deficient atmosphere, iron and steel will react with H_2S to form iron sulfide deposits on the surface of the metal. Some iron sulfides (known as pyrophoric iron sulfide) are unstable and when exposed to air will undergo a rapidchemical reaction creating an ignition source that should be considered duringequipment shutdowns.

7.3 Health Effects / Toxicity

7.3.1 Health Effects and Exposure Standards

- Depending on the concentration, the effects of acute exposure to H_2S may range from detecting a recognizable odor to causing death
- H_2S oxidizes rapidly in the body; therefore, there are normally no permanent aftereffects from acute exposure if the victim is rescued promptly and resuscitated before experiencing prolonged oxygen deprivation.
- Symptoms from repeated exposures to low concentrations usually disappear after not being exposed for a period of time.
- There is little or no data on the effects of chronic exposure; however, frequentexposures to low concentrations that do not produce effects initially may eventually lead to irritation of the eyes, nose, and throat.

7.3.2 General Properties

- Colorless gas having an offensive odor (rotten eggs) and sweetish taste.
- Slightly heavier than air with a specific gravity of 1.19 (air = 1.00 at 15^oC).
- Highly flammable (auto ignition temperature of 260^oC).
- Explosive limits in air 4.3% (Lower Explosive Limit / LEL) to 45.5% (Upper Explosive Limit / UEL) (43,000 ppm to 460,000 ppm volume/volume).
- Moderately soluble in water and alcohol.
- Boiling point is - 60.2^oC.
- Flash point is - 83.8^oC.
- Corrosive to metals and to a lesser extent masonry and concrete materials
- Toxic to humans.

7.3.3 Human Health Effects and Toxicity

Table 7.1-A (ppm)and Table 7.1-B (mg/m^3) presents human health effects for exposures to a range of H_2S concentrations.

Table 7.1-A: Human Health Effects for Exposures to a Range of H_2S Concentrations (ppm)

H_2S in Air By Volume	Remarks
> 1 ppm	Perceptible odor except for masking by other odors.
10 ppm	A small percentage of workers may experience eye irritation. Threshold Limit Value (TLV) for an eight-hour Time-Weighted Average (TWA) recommended by the American Conference of Governmental Industrial Hygienists (ACGIH).
15 ppm	Minimum eye and lung irritation. Short Term Exposure Limit (STEL) as a 15-minute TWA (as recommended by the ACGIH).
50 ppm	Mild eye and throat irritation after one-hour exposure.
100 ppm	Deadens sense of smell in 3 to 15 minutes and may cause coughing, and burning of the eyes and respiratory tract.
200 ppm	Immediate loss of sense of smell. Marked eye and respiratory irritation.
300 ppm	The maximum concentration from which one could escape within 30 minutes without a respirator and without experiencing escape-impairing or irreversible health effects. Generally recognized Immediately Dangerous to Life and Health (IDLH) concentration.
500 ppm	Respiratory disturbances in 2 to 15 minutes. Dizziness, collapse, and unconsciousness after half to one hour.
700 ppm	Loss of consciousness quickly. Breathing will stop and death will result if not rescued promptly.
1,000 ppm	Immediate unconsciousness. Death in three to five minutes.

H_2S causes nuisance from its unpleasant odor at concentrations well below those that cause physical health effects. However, continuous exposure to H_2S reduces a person's sensitivity to it.

Table 7.1-B: Human Health Effects for Exposures to a Range of H_2S Concentrations (mg/m^3)

H_2S Concentrations mg/m^3	Health Effects
0.0002 - 0.002	Level of human detection (depending on H_2S purity).
0.016 - 0.02	Smells like rotten eggs.
15	Eye irritation.
70	Permanent eye damage.
225	Paralyses olfactory so odor is no longer a warning signal of the presence of H_2S.
400	Over stimulates the central nervous system, causing rapid breathing, followed by cessation of breathing, convulsions and unconsciousness.
1400	It is lethal (Immediate unconsciousness, death in three to five minutes).

Little information is available on the effect of chronic exposure to H_2S. Adverse effects have been observed in occupationally exposed populations at average concentrations of 15 to $30mg/m^3$. Symptoms include restlessness, lack of vigor, and frequent illness. In occupationally exposed groups, at concentration of $30mg/m^3$ or more, 70% complained of fatigue, somnolence, headache, irritability, poor memory, anxiety, dizziness, and eye irritation.

7.4 Occupational Health Exposure Standards

Occupational health exposure standards for individuals exposed in the workplace to various chemical compounds have been set by a range of governmental organizations. These standards are commonly referred to as Threshold Limit Values (TLV) or Workplace Exposure Standards.

The American Conference of Governmental Industrial Hygienists (ACGIH) *Threshold Limit Values and Biological Exposure Indices* is regarded by most western international occupational safety and health organizations as the benchmark document for the setting of occupational health standards for worker exposure to chemicals.

The 1993-94 Threshold Limit Values for hydrogen sulfide are as follows:

- TLV-TWA 10 ppm ($14 mg/m^3$)
- TLV-STEL 15 ppm ($21 mg/m^3$)

The TLV (Threshold Limit Value - Time Weighted Average) is defined as the time weighted average concentration for a normal eight hour work day and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day, without adverse health effects.

The TLV-STEL (Threshold Limit Value - Short Term Exposure Limit) is defined as the 15-minute time-average which should not be exceeded at any time during the work day even if the eight hour time-weighted average is within the TLV-TWA. Exposures for the TLV-STEL should not be longer than 15-minutes and should not be repeated more than four times per day, with at least 60-minutes between successive exposures to the STEL.

A worker will be required to wear respiratory protective equipment for exposures to hydrogen sulfide concentrations exceeding 50% of the published Threshold Limit Values.

Steps in determining what respiratory protection is required to protect against a known H_2S concentration are presented in **Table 7.2**.

Table 7.2 : Hierarchy of Respiratory Protection for H_2S Exposure

Concentration	Activity	Respiratory Equipment Requirements
≤ 10 ppm	• Entry for work or rescue, < 8 hours only • Emergency egress	Respiratory protection not required but personalexposures should becontinuously monitoredwhenever H_2S hazards may exist.
> 10 ppm, < 300 ppm	• Entry is permitted forwork or rescue • Emergency egress	• Self-contained, positive-pressure breathingequipment (SCBA) • Positive-pressure/pressure-demand air-line breathing equipment coupled with a SCBA rated for a minimum of fifteen minutes • Positive-pressure / pressure-demand air line breathing equipment with an auxiliary self-contained air supply rated for a minimum of 5 minutes if the air-line is connected to a source of breathing air
> 300 ppm	No entry except for rescue • Emergency egress	Requires the same equipment as above (> 10 ppm) but also with a second SCBA-equipped personnearby in a safe area for rescue.
Note: Gas mask canister-type or air purifying (negative pressure) respirators are not recommended for controlling exposures to H_2S.		

7.5 H_2S Hazardous Activity

7.5.1 Hazardous Areas

There are areas / activities at each site where hydrogen sulfide could be encountered at a concentration that poses a significant hazard to workers, for which safe work practices and permit-to-work systems will need to be rigorously adhered to.

These areas should be identified as part of the sites hazard identification and assessment process, and recorded on the Site's Hazard Identification Register (see Section …: *Hazard Identification, Assessment and Control*) :

- Process vessels and related equipment, condensers, cooling towers and boilers.
- Spaces and areas located below ground such as basements, hot well pits, wellhead cellars, vaults, excavated ditches and holes.
- Enclosed spaces such as steamlines, sewers, sewer manholes, wet wells, and vessels.
- Areas near to lines, rock mufflers, silencers, etc. at which vent gases may contain hydrogen sulfide.
- Any ditch or opened topped vault where air circulation is poor so hydrogen sulfide can accumulate at the bottom.
- Degasser, mud tank, mud pond and trip tank.

7.5.2 Designated Hazardous Areas

Areas where there is potential for hydrogen sulfide to accumulate and pose a risk to worker safety will be identified at the site.

Personnel trained in working in areas where hydrogen sulfide may be present and holding the appropriate Permit-To-Work (PTW), shall be authorized to undertake work in the hydrogen sulfide Designated Hazardous Areas. Specific actions with regard to work control and for entering a confined space are detailed in Section …: *Work Control* and Section …: *Confined Space*.

7.5.3 Work In and Around an Area with Hydrogen Sulfide Present

The following general safe work practices should be observed by all personnel working in an area where a hydrogen sulfide gas hazard may be present. Specific safe work practices shall be adhered to for work in Designated Hazardous areas.

- When approaching a job site, check for any obvious sources / signs / smells of hydrogen sulfide.
- Check the general condition flags and sign posted (for hazardous area, displays "Danger" and "Poison Gas" signs) at the site:

  - red — Condition III - extreme danger to life. H_2S has reached injurious levels (above 50 ppm). Do not enter area.
  - yellow/black — Condition II - moderate danger to life. This condition is when H_2S is 10 to 49 ppm. Non-essential personnel shall proceed to Safe Briefing Areas.
  - yellow — Condition I - caution, possible H_2S hazard.
  - green — Safe to work / enter

- Identify the location of the nearest "Safe Briefing Areas" which will be sign posted.
- Check the wind direction by observing the wind socks and streams which are located throughout the site. Wind socks should be checked on a regular basis throughout the working shift, to ensure changes in wind direction are not overlooked.
- Remember H_2S is heavier than air, so avoid low lying areas. If an area or trench is suspected of containing H_2S gas, do not enter without following Permit-To-Work procedures. Gas testing must be performed before entering. The test results shall be written on the permit.
- Observe all warning signs at the site (as specified above).
- Do not attempt to enter any restricted Designated Hazardous Area without the appropriate authorization.
- Be aware of the location of emergency escape breathing apparatus (EEBA).
- In the event of an emergency, follow the site's excavation drills, which you must know.

Emergency Action:

- Should you encounter someone overcome by H_2S, **DO NOT ATTEMPT TO RESCUE THE PERSON.** Only persons wearing Self Contained Breathing Apparatus should enter the area.
- As quickly and as safely as you can, raise the alarm.

- Advise emergency personnel of the location of the incident and number of personnel involved.
- Let the personnel trained in emergency rescue, etc. to carry out the rescue.

7.5.4 Specific Site Work Practices

For all personnel entering Designated Hazardous Areas or equipment where hydrogen sulfide is a known potential hazard, the Permit-To-Work system shall be followed at all times.

For entry into confined spaces, the requirements of the confined space permit-to-work and entry permits shall be followed. These permits and the steps required in actioning them are detailed in Section …: *Work Control* and Section …: *ConfinedSpace.* Please refer to these sections.

7.6 Hydrogen Sulfide Detection / Monitoring

Hydrogen sulfide levels should be monitored in any work area that may reasonably be expected to exceed an atmospheric concentration of 5 ppm (one-half of the Threshold Limit Value). Two broad categories of monitoring devices available: fixed systems and portable units. There are three types of monitoring systems currently used to detect / monitor hydrogen sulfide concentrations.

7.6.1 Fixed Monitoring System

This system is commonly used in a process or drilling environment and is used to detect leaks / failures from equipment, e.g. wellhead, condenser. The main features of the system are listed below:

- Fixed monitoring systems, which continuously measure the concentration of H_2S in an atmosphere, should be installed in facilities containing process equipment handling steam / gases or fluids containing H_2S when the locations are both an enclosed area (room, building, or space) and are inadequately ventilated. (Inadequately ventilated is defined as ventilation that is not sufficient to prevent the accumulation of H_2S in concentrations exceeding 10 ppm.)
- A number of electronic sensors are placed at strategic locations in the workplace.
- The sensors send an electronic signed to a master control system which, via a computer terminal or screen, displays the H_2S concentration recorded for each sensor.

- The H_2S concentration is usually measured as parts per million (ppm) and alarm points can be set, so when H_2S concentration exceed the TLV / Workplace Exposure Standard (10 ppm), a Hi alarm is activated with a general evacuation alarm (Hi-Hi) set when the H_2S concentration exceeds 20 ppm.

A single Hi indication will initiate a Control Room alarm and two Hi's or a single Hi-Hi will initiate appropriate automatic shutdown of wells or production train, as appropriate.

Audio visual alarms will be installed in areas where fixed monitors are installed (wellheads, condenser area). The audio visual alarms will coincide with alarm signals generated by the fixed H_2S monitoring system. They will be distinct in sound and color from all other alarms at the site.

The drawback of such a system is that it is primarily designed to detect process leaks and covers only a small percentage of the workplace. The positioning of sensors is critical if one is to use such a system for personnel protection.

Note: In all instances, one should manually test the atmosphere using a personal H_2S monitor or personal gas detector prior to entry, to verify that the Fixed Monitor System reading is correct.

7.6.2 Personal Portable H_2S Monitor

- Personal electronic monitors are small devices designed to fit in a shirt pocket or attach to a belt to provide personnel with monitoring and early warning of an H_2S release in their immediate work area
- Personal electronic monitors should be used when the atmospheric concentration of H_2S in a person's immediate work area could exceed 10 ppm and fixed monitoring systems are not installed or do not provide adequate coverage of the immediate area
- These units are electronic, using electrochemical cells and are usually hand-held or belt mounted.
- The measure H_2S concentrations continuously, providing a digital read out of the concentration in ppm.
- They are fitted with audible alarms which are activated when concentration exceed a predetermined action level, usually TLV-TWA.
- Monitors should be held or worn as low as possible, definitely no higher than the waist.

7.6.3 Personal Detectors

There are a number of personal detectors that can be used. These units are usually supplied with a hose extension which allows the base of wells, sumps, cellars, etc. to be tested without the testing personnel having to enter the potentially contaminated work area.

Portable H_2S Detectors use a battery-operated pump to pull air / gas samples to a sensor. They can be used with an extendable wand and hose to test an atmosphere without requiring a person to enter the area.

Portable H_2S detectors are generally used to test spaces for the presence of H_2S before conducting work in the area and to search out release sources.

Two common type of devices are listed below.

i) Colorimetric Tape Detector Unit

This unit takes a sample of gas, passes the gas onto a reaction chamber and, via a reaction mechanism, and produces a stain on a tape. The color and depth of the stain indicates the concentrations of H_2S.

These units are not suitable for high concentrations, as they are primarily used to measure low concentrations of H_2S in ambient air.

ii) Colorimetric Tube Gas Detector

This type of unit incorporates a pump, colorimetric detector fuse and a scale for reading of three concentrations of H_2S detector. There are a number of commercial types available, with the most common being Drager and Gastec.

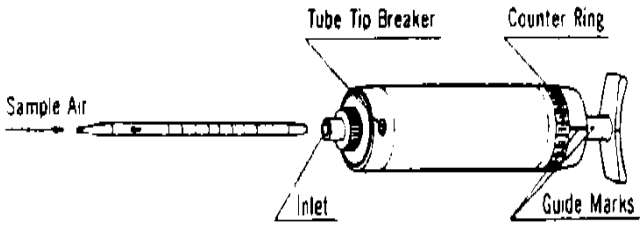


Figure 7.2 Typical Colorimetric Tube Gas Detector

7.6.4 Procedure for Using Colorimetric Tube Gas Detector

Typical sampling and measurement procedure is detailed below:

Set Up

1. Break tips off a fresh detector tube by bending each tube end in the tube tip breaker of the pump.
2. Insert tube securely into pump inlet with arrow on tube pointing toward pump.

To Sample Air

3. Make certain pump handle is all the way in. Align guide marks on pump body and handle.
4. Pull handle out to desired stroke volume. Handle can be locked on either ½ pump stroke (50 ml) or one pump stroke (100 ml).
5. Read concentration at the interface of stained-to-unstained reagent when staining stops. Unlock handle by making ¼ turn and return it to starting position.
6. Where more pump strokes are indicated in the instruction sheet included in each box of tubes, take additional sample by repeating pump strokes without removing tube.

An extension hose can be used to detect gas concentration in vessels and sumps, etc.

Measurements shall be carried out only by persons trained in the correct use of the gas detector.

7.7 Maintenance and Calibration of H_2S Monitors

Due to the hazard poised by equipment failure, all H_2S monitoring equipment will be inspected on a regular basis for defects and corrosion. This work will be undertaken by SUPREME ENERGY equipment Technicians.

Fixed and portable monitors will be routinely calibrated and maintained in accordance with manufacturer's requirements to ensure that H_2S monitoring and alarm systems continue to operate properly.

Calibration records will be kept to show when the unit was calibrated, by whom and the results of the tests. Only trained personnel should calibrate, test, and conduct maintenance on monitoring equipment. Since known concentrations of

H_2S are utilized to calibrate monitoring equipment, such work should only be carried out in well-ventilated areas.

7.8 Ventilation

Hydrogen sulfide (SG = 1.19) is one to two times heavier than air and does not readily dissipate. It tends to accumulate in low lying areas and confined spaces. As stated earlier, these areas must be tested for H_2S concentrations before entering.

If areas are found to contain H_2S, forced ventilation can be applied to remove the accumulated gas and make the areas safe for entering. See Section …: *Confined Space* for further details.

7.9 Training

All employees subject to H_2S exposure in their work areas should receive appropriate initial and periodic training that addresses the following:

- Hazards, characteristics, and properties of H_2S.
- Sources of H_2S.
- Proper use of H_2S detection methods used in the workplace.
- Symptoms of H_2S exposure.
- Rescue techniques and first aid to victims of H_2S exposure.
- Proper use and maintenance of breathing equipment including fit testing and demonstrating proficiency by donning equipment.
- Workplace practices and relevant maintenance procedures that have been established to protect personnel from the hazards of H_2S.
- Wind direction awareness and routes of egress.
- Recognition of and proper response to warning signals or alarms and procedures to follow during an alarm condition.
- Locations of emergency assembly areas and shelter-in-place locations.
- Employees should also participate in periodic drills to practice using breathing apparatus and rescuing workers. Contractors should be required to provide training to their employees unless the Company agrees to do so.
- H_2S trained personnel should receive badge-sized plastic laminated certificates that should be shown when entering H_2S restricted areas.

Chapter 2: Section 6 : Travel / Journey Management

Content

9 Travel / Journey Management

9.1 Land Transport

1. Facts
   - 10,000 crashes each year are caused by fatique drivers
     - 18 hours awake causes blood alcohol content equal to 0.08% (disinhibition / poorer risk assessment ; poorer motoric response, instinctual, emotional, cognitive and perceptual aspects)
     - <6 hours sleep triples the risk
     - Driving at night triples the risks than driving during day time (NSC) due to limitation of vision and possible fatique.
   - 55% of drowsy driving crashes are caused by drivers less than 25 years old

2. Background
   - Driving is one of the greatest risks most likely faced by any Company employee and their Contractors. To minimize the risk, the following journey management standards shall be implemented for Vehicle Operations with a specific business purpose in all Company facilities, including Contractors within their own area for supporting Company activities.

3. Purpose
   To carefully manage all phases of the transportation process to eliminate hazards and unnecessary exposure, reduce the residual risk through the proper selection and preparation of people, equipment and routes, in order to ultimately eliminate driving fatalities and injuries to all Company employees, families, Contractors and third parties and minimize damage to equipment.

4. Application
   Vehicles and motorcycle at all Company facilities used for Company business. It includes all Company and Contractors owned and rented vehicle that operates to support Company activities.

5. Responsibilities
   - Line Management
     Line management at all levels shall demonstrate active, visible leadership and personal participation in all aspects of journey management by:
     - Ensuring that drivers under their control have the relevant Company approved driving license before allowing them to drive Company vehicles and to ensure that drivers who drive on Company business meet all requirements.
     - Promoting safe driving awareness and Company initiatives to minimize night driving and the total number of kilometers driven.
     - Always searching for safer means of transportation other than driving.
     - Ensuring that all Company transport / approved transporter are equipped with adequate safety equipment.
     - Ensuring that the Company transport / approved transporter is maintained in accordance to the manufacturer's specification

- Providing adequate resources to help drivers conform to the requirements of this Standard, including driver training and a safe transport. With an ever-changing business, particular attention must be given to the hazards of driving in unfamiliar locations.
- Developing Site Specific Procedure, if applicable, to ensure that particular local driving hazards (terrain, weather conditions, driving culture etc.) and ensure that they are addressed through specific training courses.

- Driver
  Any personel that drives a Company transport is responsible for:
  - Drive safely and comply with applicable laws and regulation.
  - Have a Company approved license prior to driving a Company transport.
  - Comply with this Travel / Journey Management Procedure.
  - Ensure all passengers comply with applicable Company regulation on the Company transport, e.g. wearing a seat belt.
  - Actively participating in pre-trip briefings, if applicable.
  - Comply with the pre-trip plans and all other procedures detailed in this procedure.

6. Travel / Journey Management Requirements

a. Management review of Trip Necessity
Managers at every level shall question the need for all journeys, always searching for a way to eliminate the journey or find an alternative means of achieving the trip objective, i.e. use existing shuttle vehicle schedule. Dispatcher shall encourage all departments to coordinate in arranging a business trip.

Where driving is unavoidable, alternatives such as combining trips and using approved Transportation Contractors shall always be explored.

b. Trip Planning and Execution
All trip to / from operating area should have trip planning with clearly defined route and timing. Once it is determined that the trip risk is increased and unavoidable, Line Manager and Dispatcher shall ensure that:
- A formal pre-trip briefing, if applicable, is held involving everyone involved in the journey
- Potential driving hazards, especially dangerous intersections, are identified in advance, taking into consideration the terrain, weather, known dangerous routes, speed limits, holidays (especially those which involve fasting), etc.
- Appropriate Company transport are assigned to the journey taking into account the hazards identified
- **Only Company approved drivers** with valid certification are assigned for the type of Company transport to be used
- Drivers and passengers are fully briefed on the journey: route, hazards, planned stops, etc.
- Company transport is inspected using an appropriate checklist before the journey begins.
- It may be necessary to take advise from Security Section to get information on the security condition of the route

c. Speed Limit

All Company/Contractor/Sub-contractor drivers shall comply with the approved Company speed limits set in the specific operating area/ location as well as public road and may have to be lowered during adverse weather conditions. These limits will have been set following a local hazard identification assessment (see SHEMS Section 6.16 Traffic Regulation).

On Company's operating area, these speed limits will be clearly posted at all locations

Drivers shall always be aware of the speed, road condition and weather condition. *A certain location may be used as mark of the speed by the driver and passenger(s).*

d. Night Driving

Night driving is a journey that all or some part of it is conducted at night.

All night trips at sites to outside Company location shall be approved by the line manager and local top manager before they begin. Wherever night driving required, a site-specific night driving requirement shall be established based on the risk assessment.

- It is strongly recommended that the safe stop point should be reached at no later than 10pm to avoid the risks of "driving when normally asleep".
- Driver should have at least one companion to travel during night trip
- Additional check shall be conducted to ensure that the vehicle may be use safely for night trip and driver is fit for the travel :
  - Head lights
  - Signal lamps
  - Brake condition
  - Tire condition, including spare tire readiness
  - Car emergency equipment (warning triangle, jack, tire kit, tool kit, flash light, fire extinguisher, first aid kit, etc)
  - Towing hook and sling (if necessary)
- Additional information on road security shall be available from *Security Section*.

e. Medical requirements

All persons employed as drivers and persons regularly driving vehicles for Company business must be medically assessed to ensure that they have functional capacity to operate a vehicle safely.

f. Driver's Fitness and Alertness

Drivers must not operate vehicles unless appropriately rested and alert. In particular:

- Driver shall have adequate rest time prior to drive. A process shall be in place to check prior to each journey whether the driver is fit to drive.
- Maximum duty hours for driver should be defined by site line management based on applicable regulations and standards.
- Drivers must advise management when they have a disability or condition that could prevent them from driving safely.
- Drivers shall have the right to refuse to drive when they feel that they are not fully rested or alert.
- Drivers shall be informed on how to identify driver fatigue and alertness, and means of dealing with them.

- A safe location may be determined by Company for convenient stop especially for long hour journey / travel

g. Driver Training
All Company drivers shall be trained in compliance with relevant Company manual / procedures, including Defensive Driving Course.

h. Contractor / Sub-contractor Driver Training
100% compliance to section of the Company's Contractor Safety, Health and Environment Management System (CSMS) and Project's SHE plan shall be attained.

i. Vehicle Accident / Incident Reporting
All on-the-job incident / accident shall be immediately reported to the Superior / Company and shall be not later than the end of the Shift for shift work or when time permits not later than 1 x 24 hours for any other jobs (see SHEMS Section 11.5 Incident Notification and 11.4.5 Spills).

j. Substance Abuse
Drivers shall not operate a vehicle while under the influence of alcohol, drugs, narcotics or medication that could impair the driver's ability to safely operate the vehicle.

Driving a Company transport while under the influence of alcohol or any drugs or narcotics, is strictly prohibited and subject to disciplinary action which may include termination of employment.

Post accident test of alcohol or any drugs or narcotics, if applicable, should be carried out to the driver after vehicle accident occurred.

k. Mobile Phone and Two-Way Commnuciation Device
Driver is prohibited to use mobile phone and/or two-way communication devices in the following condition:

- Operating a Company vehicle on public roadways.
- Operating a personal vehicle on Company Business.
- Operating a motor vehicle on Company Property, unless allowable areas and circumstances are designated by applicable work site rules and instructions (such as areas restricted from public access inside an operating facility or controlled area).

The driver should safely park the vehicle before using mobile phone and two-way communication devices.

The exception to this is for the use of two-way communication devices as part of convoy management if there is no front seat passenger available to assist, i.e. when escorting a heavy equipment vehicle or onshore drilling rig, or for use during emergency situation. Two-way communication uses in this circumstance should be kept to the minimum as necessary to communicate and control the hazards and risks of the journey being undertaken.

l. Maintenance of Company Transport
All Company transport and approved Contractor vehicles used for Company business shall be maintained and serviced on a regular basis. Necessary repairs shall be performed immediately in accordance with the manufacture's manual.

m. Audit / Inspection

Audit shall be implemented to assess compliance to this Journey Management Procedure. Inspection is conducted regularly using at minimum the pre-trip check-list and other inspection defined by the site specific journey management procedure.

n. Reassigment and Temporary Assigment

- The highest Company authority at site shall ensure that every work location has a specific plan addressing new arrivals (permanent transfers, temporary transfer and visitors).

  This plan shall be adhered to before the new person is allowed to drive a Company Transport. As a minimum, the plan shall include an orientation briefing on local driving risks and verification of the person's current driving training compliance.
- A good example of this could be Jakarta based engineering or exploration staff visiting the field operations without attending Defensive Driving Training.
- The plan shall address the particular case of persons transferred from a country where they were driving on the opposite side of the road.

o. Regulatory requirements

Company driver must observe the following government laws and regulations concerning driving:

a. Have a valid driving license to operate the vehicle (SIM) (see SHEMS Section 6.17 Driving Certificate).
b. Have appropriate health record.
c. Have appropriate and valid car license (STNK) for the vehicle.

p. Metrics

To help track the total number of accidents and to provide for continuous improvement, Company have established a driving safety metric. Company Management may want to use additional metrics, such as cumulative safe driving distance, to encourage safe performance.

a. Each department shall be responsible for monitoring the performance of its drivers.
b. Line Management shall report the following statistics to SHE Department:
   - The total number of on-the-job vehicle accidents
   - The total distance driven (in miles) for the business
c. Company shall track the percentage of driver training that has been completed for each category of driver.
d. Company shall track the percentage of driving audits completed.

SHE Department shall use the following formula to track its vehicle accident rates:

$$\text{Vehicle accident rate} = \frac{\text{Number of accidents x 1,000,000 km}}{\text{Total km driven}}$$

q. Vehicle (see SHEMS Section 6.18 Vehicle Regulation)

q.1 General Safety Considerations

- Vehicles shall be used for their designated function. Vehicles shall not be loaded beyond the manufacturer's specified capacities.

- Any Company vehicle which has an obvious mechanical problem affecting the safe operation of the vehicle shall not be driven.
- Transportation of hazardous materials must be done in accordance with applicable laws and regulations.
- Luggage must be secured to prevent loose articles from flying into the passenger area.
- The driver of each vehicle shall walk around his vehicle to promote awareness of hazards such as objects, people or other vehicles prior to driving. During the walk-around driver shall observe the condition of the vehicle (tires, broken lights, etc.), and shall ensure windows, lights, and mirrors are clean to promote maximum visibility while driving.
- Regular vehicle checklist shall be developed and maintained for each area.
- Where possible, vehicles shall be reverse-parked.
- No smoking is allowed while onboard vehicle.

q.2 Seatbelt

- The wearing of seat belts is mandatory and a condition of employment. Any persons in non-compliance with this rule are liable to disciplinary action which could lead to dismissal.
- Seat belts must also be worn in all cars that are operated by all persons and used on Company business. The number of passengers shall be equal to number of seatbelts.
- All Contractors and Sub-contractors drivers and passengers must comply with the wearing of the seat belt rule.

q.3 Hand brake

- Hand brake must be set whenever the vehicle is parked.
- Additional stopper shall be used if the vehicle's tire is being changed.

q.4 Tire

- Tires of the same construction (e.g., radial or steel-belted and size) shall be used on all wheels.
- Tires shall be checked daily and inspected in accordances with the manufacture manual.
- Car tires shall be replaced when tread depth decreases to minimum indicator level.

q.5 Headrest

Headrest shall be used for front passenger and shall be adjusted to the proper height.

q.6 Door - Lock

Car doors shall be locked at all times.

q.7 Vehicle selection

The following procedures must be applied when choosing vehicles for Company business:

- Vehicles with convertible, removable, or no tops must not be used.
- Vehicle to be used on mud terrain must be four wheel drives (4WD).
- Vehicle shall be equipped with Anti-lock Braking System (ABS).
- The following equipment should be installed and securely fixed, where appropriate, on light duty vehicle. As a minimum, vehicles shall be equipped with the following:
  - Head rests
  - A basic radio type to receive any alerts e.g. Economic, Social and Political, road conditions
  - Air conditioner
  - Solar film coating (maximum 60% darkness)

- First Aid Kit
- Fire Extinguishers of minimum 2 kg ABC class
- Towing hooks/sling (nylon tow ropes must not be used)
- Safety belts for the driver and passengers.
- Tool kits to change the tire
- Suitable spare wheel and tire
- Disable vehicle marker (e.g. warning triangle)
- Flash light.

- Vehicle is recommended to be equipped with dual airbags or at minimum driver's airbag.
- Vehicle is recommended to be equipped with Global Positioning System (GPS).

Where a risk assessment demonstrates that the risk of rollover due to terrain, a vehicle type or work condition is higher than normal, a properly engineered rollover protection device must be installed (internally or externally).

6.2 Air Transport

GENERAL

- Employees shall take scheduled flight to travel for Company business.
- Any non-scheduled flight or use of air transport with propeller (rotary) shall be assessed for their hazards and risks by SHE group.

- DOMESTIC
  - All employees is strongly recommended to travel by Garuda Airways (the state owned airline company). However other reputable domestic providers such as Sriwijaya Air, Lion Air, Mandala and Air Asia might be used if there is no Garuda Airways flight services the route. The use of any other airline shall be assessed by the Company.

- INTERNATIONAL
  - Reputable providers shall be used to travel for Company business.
  - The approved airline company will be decided by the Company upon sufficient risk assessment.

6.3 Water Transport

GENERAL

- Employees shall take scheduled water transportation to travel for Company business.
- Any non-scheduled water transportion or special boat shall be assessed for their hazards and risks by SHE department.

Attachment-1 LAND TRAVEL NOTICE FOR SPECIAL TRAVEL ARRANGEMENT

LAND TRAVEL NOTICE : SPECIAL TRAVEL ARRANGEMENT (to be filled in by the Employee or Contractor who plans to conduct the journey)				
1.	*Name of Employee/Contractor:*			
2.	*Cellular Phone Number:*			
3.	*Email Address:*			
4.	Place of Destination: Approximate Distance (km): Travel duration (hours) : Estimated Time Departure : Estimated Time Arrival at Arrival :		Address: Phone Contact # at Destination :	
5.	*Purpose of Travel:*			
6.	***TRAVEL CHECK LIST***			
	Can the task be completed by facsimile, telephone or email?			[Yes/No]
	Can the task be rescheduled / combined with another one to be made a safer time?			[Yes/No]
	Can the task be done by another person available at the Place of Destination?			[Yes/No]
	What is the main route? (Please mention names of cities/villages you will pass to reach the destination):			
	What is the alternative route? Please mention another route in case the main route is not possible for you to pass:			
	Do you know physical and Security condition of the routes?			[Yes/No/Not Sure]
	What is the type of the vehicle (4WD/4 x 4, MPV, Microbus, SUV, Truck, Trailer, etc.)?			
	Is the vehicle in the good or roadworthy condition (lightings, engine, brakes and clutch work properly and tires are in good condition, etc.)?			[Yes/No/Not Sure]
	Does the vehicle have sufficient fuel and lubricant?			[Yes/No/Not Sure]
	Is the vehicle equipped with necessary safety equipment and materials (seat belt, fire extinguisher, first aid kit, etc.)			[Yes/No/Not Sure]
	Is the driver in a good physical condition (not sick, tired/fatigue, sleepy, etc.) and will be still in good condition after arrival?			[Yes/No/Not Sure]
	Has the Driver had sufficient resting time?			[Yes/No/Not Sure]
	Does the Driver have appropriate driving license (A, B1, B2)?			[Yes/No/Not Sure]
	Know the location of Police Offices, Hospitals and Fuel Stations along the route?			[Yes/No/Not Sure]
	Is it a Convoy Journey? ..... *Consisting of how many vehicles? .....* *What are the types of vehicles?.....* *Is an escort required?.....*			[Yes/No] …… Vehicle(s) …….. [Yes/No]
7.	*Drivers:*	No.	Name	Mobile Phone #
	(may be described in an Additional attachment, if space not sufficient)			
8.	*Passengers:*	No.	Name	Mobile Phone #
	(may be described in an Additional attachment, if space is not sufficient)			
9.	*Load/Cargo:*		Name	Quantity/Weight
	(may be described in an Additional attachment, if space is not sufficient)			
10.	*Important Notes from Employee or Contractor (to be filled in by Dispatcher) :*			
11.	Control Information (to Be Filled in by Driver) :			
Has Employee or Contractor arrived safely at Place of Destination? [Yes/No] If 'Yes',at when/what time? : If <u>not</u>, please put <u>NOTES</u> here for future record or further follow up: *[E.g. if an incident (accident and near miss) had occurred or been found during the journey]*				
This Notice is submitted by : Name (of Employee or Contractor): On (day/date): At (time): Signature :			This Notice is received by Dispatcher : Name: On (day/date): At (time): Signature:	