

DEPARTMENT CIRCULAR NO. DC 2003-10-009
GEOHERMAL SAFETY AND HEALTH CODE OF PRACTICE

STATEMENT OF AUTHORITY

Pursuant to Rule 2, Section 8 of Department Circular No. 2000-02-001, otherwise known as the "Revised Geothermal Safety and Health Rules and Regulations", and in order to ensure adequate safety and protection against hazards to health, life and property as well as pollution of air, land and water from geothermal operations, the following geothermal safety and health code of practice are hereby promulgated:

GENERAL PROVISIONS

SECTION I. SAFETY AND HEALTH POLICY

A. SAFETY AND HEALTH POLICY STATEMENT

1. Providing a safe workplace while protecting the health of the workers must be the principal responsibility of the geothermal operator. To achieve this, safety and health concerns must be thoroughly integrated in the geothermal operator's management policy.
2. The geothermal operator, as a matter of policy, shall:
 - a. Issue a safety and health policy statement to reflect management's positive attitude, support and commitment for effective leadership and program administration;
 - b. Give importance to the safety and health aspect of their operation by creating a safety and health organization under the direct supervision of top management;
 - c. Establish a system to implement and monitor compliance of their contractors and sub-contractors to the safety and health policies of the company;
 - d. Implement programs to ensure that the relevant government safety and health rules, regulations and codes are complied with; and
 - e. Establish an emergency plan to address any incident that may pose serious and imminent danger to the company's personnel, the environment and the community.

SECTION

II. DEFINITION OF TERMS

1. **Accessory Valves** – refers to valves used for vent, sampling point, pressure tapping point and drain valves.
2. **Fluid Collection and Re-injection System (FCRS)** – also referred to as Steam Gathering System.
3. **Confined Space** – refers to any area that has hazardous atmosphere, with restricted means for entry and exit and/or not designated for continuous employee occupancy.
4. **CSEP** – refers to Confined Space Entry Procedures.
5. **Procedure** – refers to a formal step-by-step instruction describing how a specific task or work activity should be done.
6. **Program** – refers to a plan under which action may be taken toward a goal.
7. **R.A. 6969** – refers to Toxic substances and Hazardous and Nuclear Waste Control Act of 1990
8. **Standard** – refers to Specification or guidelines on how things ought to be done.
9. **Start-up of Wells** – refers to the flowing and discharging of geothermal fluid from a well to the atmosphere.
10. **Steam Gathering System (SGS)** – refers to Process of steam gathering and fluid collection, separation and injection.
11. **Stroking** – refers to a process done on the valve to check problems; like hard to operate and valve sticking by closing and opening by few turns.
12. **System** – refers to an organized scheme of how things are done; includes procedures, policies describing how an organization works.

SECTION III. SAFETY AND HEALTH PRACTICES

A. GENERAL SAFETY

1. OFFICE SAFETY

- a. An office maintenance and housekeeping program shall be in place as prescribed in Section III.A.4 hereof.
- b. Horse playing shall be prohibited within company premises.

- c. Only authorized personnel shall operate equipment and appliances.
- d. Electrical equipment and appliances shall be immediately shut-off when not in use.
- e. Smoking inside the office shall not be allowed.
- f. An ergonomics program shall be in place to address work procedures in order to minimize stress to the musculo-skeletal system.

2. LABORATORY SAFETY

- a. All chemicals and sample containers shall be properly stored and labeled.
- b. The Material Safety Data Sheets (MSDS) of all chemicals in storage or in use shall be made available for reference at all times.
- c. Safety work procedures for the following task shall be provided and reviewed/evaluated periodically:
 - i. Geochemical and Environmental Sampling
 - ii. Field Data Gathering
 - iii. Laboratory Analysis
 - iv. Laboratory Instrument Operation
 - v. Waste Collection, Storage, Transport, Treatment and Disposal
 - vi. Chemical Handling

Preparation of acids, bases and other corrosive chemicals shall be done in the fume hood.

- d. The laboratory is a non-smoking area.
- e. Compressed gas cylinders shall be stored, transported and handled as prescribed in Section III.G hereof.
- f. All instrument plugs, cables and power outlets shall be labeled with its corresponding power ratings.
- g. Eye wash stations and emergency showers shall be available in designated areas and regularly maintained.

3. PERSONAL PROTECTIVE EQUIPMENT (PPE)

- a. Employers shall have a PPE program in place.
- b. Employers shall make appropriate and adequate PPE available at all times.
- c. Employees shall be trained on the selection, use (fit-test) and maintenance of approved PPE.

- d. All work activities/workplaces requiring the use of PPE shall be identified.
- e. To communicate to employees the use of the required PPE, Adequate signs/warnings shall be posted in areas requiring PPE.
- f. PPE shall be properly maintained in good condition.
- g. All employees shall comply with PPE requirements.
- h. Hard hat shall be worn in designated "**HARD HAT AREA**".
- i. Appropriate eye protection shall be worn while handling chemicals, exposed to dusts or any operations that can cause eye injuries.
- j. Face shields shall be worn as protection against flying particles, sprays or hazardous liquid, splashes of molten metals and hot solution.
- k. Appropriate hearing protection shall be worn in areas where the noise level exceeds 85 decibels.
- l. Appropriate respiratory protection shall be worn in areas where air-borne contaminants such as toxic materials, gases, fumes, mist and dusts are present.
- m. Appropriate gloves shall be worn when handling toxic materials and working on energized electrical circuit or apparatus.
- n. Aprons, welding gloves, leggings and welding masks shall be worn while performing welding jobs. Head protection shall be worn when necessary.
- o. All employees shall wear suitable protective clothing against excessive temperature due to steam/hot water lines or other well appurtenances.
- p. Full body harness and/or lifelines shall be properly worn while working at elevated structures (minimum of 6 ft.), in pits, tunnels, ducts and other confined spaces. Lifelines shall be surely fastened/anchored while in use.
- q. Safety shoes shall be worn in areas where they are required.

4. **HOUSEKEEPING**

- a. Employers shall devise procedures or guidelines for the following in accordance with existing laws and regulations:
 - i. Obstructions (passageways, aisles, ingress and egress);
 - ii. Domestic and process waste management (generation; collection, segregation, storage and disposal);
 - iii. Storage of materials, tools and equipment;
 - iv. Signage (directional/instructional);
 - v. Barricades and zoning;
 - vi. Building and ground maintenance of offices and field facilities;
 - vii. Pest and rodent control ; and

- viii. Control for stray animals (e.g. snake, salamander, cats, dogs).

B. WORKPLACE MONITORING AND CONTROL

1. HYDROGEN SULFIDE (H₂S) SAFETY

- a. Employer shall have an H₂S monitoring and control program in place.
- b. Evaluate each job for H₂S hazard before starting job and while doing the work.
- c. Continuous monitoring of H₂S shall be conducted during work activity in areas where its presence is anticipated or expected.
- d. Signs indicating the location of H₂S detection equipment and supplied air-breathing equipment shall be provided.
- e. Employee shall report immediately areas with H₂S concentration.
- f. Areas with potential H₂S hazard shall have warning signs.
- g. The use of “Buddy System” is a **MUST** when working in an area suspected to have a high H₂S concentration.
- h. Wind direction shall be monitored prior to and during work where H₂S may be present. Flags or windsocks shall be installed at strategic locations to help indicate wind direction.
- i. Employers shall have in place an H₂S information and education campaign program to increase awareness of workers of it’s hazards.
- j. Emergency procedures shall be implemented in case of accidental discharge. Only trained and suitably equipped personnel shall conduct rescue and/or recovery operation in an H₂S emergency situation.

2. PERMISSIBLE NOISE EXPOSURE

- a. Employers shall have a hearing conservation program in place for the exposed workers.
- b. Employers must comply with noise exposure levels as mandated by occupational safety and health standards.

3. ILLUMINATION

- a. Skylights and windows shall be located and spaced so that daylight conditions are fairly uniform over the working area.
- b. All occupied offices and buildings, including perimeters, shall be properly illuminated during normal operation based on the Philippine Electrical Code.
- c. Adequate automatic emergency lighting system shall be provided in all stairways, exits, workplaces and passages as required by the Philippine Building Code and the Fire Protection Code.
- d. Adequate ground lighting shall be provided within the working premises.

4. GENERAL VENTILATION

- a. Suitable atmospheric conditions shall be maintained in all work areas by natural and/or artificial means. Measures shall be taken to minimize, if not eliminate, process-related airborne hazards such as dusts, gases, vapor, or mists at the source.

5. TEMPERATURE EXTREME

- a. All workers exposed to extreme temperatures shall wear suitable protective clothing.
- b. All equipment and facility shall undergo re-evaluation for possible redesign or engineering control to minimize temperature hazard.

6. RADIATION

- a. All potential sources of electro-magnetic radiation, such as switchyards, high voltage power lines and transformers, shall be identified and restricted to authorized personnel only.
- b. All works and materials emitting radiation, such as radiographic testing and naturally occurring radioactive materials from drilling, shall be covered by appropriate permit and signage.

C. ELECTRICAL WORKS

1. ELECTRICAL WORKS REQUIREMENTS

- a. All electrical works shall be covered by safe work permits.

- b. Only duly qualified and authorized personnel shall be allowed to conduct electrical works.
- c. Only authorized personnel shall supervise all electrical works and materials used shall conform to the established electrical codes.
- d. Required PPE shall be used as prescribed in Section III.A.3 hereof.
- e. Materials, tools and equipment shall be inspected for any wear and damages that may expose the worker to injury.
- f. Electrical tools and equipment shall be properly guarded and grounded.
- g. Electrical tools and equipment shall be maintained in a safe reliable condition and shall be periodically inspected or tested.
- h. Proper warning and instructional signs shall be visibly posted at all times when work is being performed, and shall be removed or recovered promptly after work is completed.
- i. Appropriate lock-out and tag-out procedures shall be implemented and observed.
- j. First aid and/or emergency response team shall be available during all electrical works.
- k. Hazardous electrical wastes shall be properly managed.

D. TOOLS, EQUIPMENT AND MACHINERY

1. TOOLS, EQUIPMENT AND MACHINERY OPERATIONS

- a. Only duly authorized personnel shall operate tools and equipment.
- b. Appropriate tools shall be used on a specific job.
- c. Defective tools and equipment shall be immediately removed and reported to proper authorities.
- d. All portable electrically driven tools shall be properly grounded before use.
- e. Air supply shall be shut off when pneumatic tools are not in use.
- f. Pointed or sharp tools shall be provided with cover.

2. MACHINE GUARDING

- a. Adequate machine guards shall be provided on all moving and rotating parts.
- b. Machine guards shall not be altered, adjusted or removed unless authorized.
- c. Missing or defective guards of equipment shall be reported immediately by the operator and shall be immediately replaced.

E. SAFE WORK PERMIT

1. SAFE WORK PERMIT PROCEDURES

- a. Established safe work permit procedures shall be implemented in the following works:
 - i. Electrical and Mechanical Lock-out/Tag-out
 - ii. Confined Space Entry
 - iii. Hot Work
 - iv. Excavation
 - v. Hazardous Materials Handling
 - vi. Work at Heights
 - vii. Major Lifts
 - viii. Radiation
 - ix. Blasting
- b. The above permit shall include the minimum applicable requirements:
 - i. Permit Number
 - ii. Authorized permit Originator and Issuer
 - iii. Date of Issue
 - iv. Work Description (Area/ Activity Covered)
 - v. Validity of Permit
 - vi. Work Precaution Checklist
 - vii. Protective Measure Checklist
 - viii. Work Party Acceptance
 - ix. Emergency Response/Equipment
 - x. Environment Monitoring
 - xi. Hazard Identification
 - xii. Work Carry Over (Turnover of Unfinished Work)
 - xiii. Sign Off (Closing)
- c. Control for issuance and recording of all permits shall be established.
- d. Permits shall be properly posted in the work area.

- e. Work covered by permit shall be immediately stopped if permit conditions is not complied with or violated.
- f. An assessment shall be conducted to determine the need for safe work permits on other facilities and equipment on site.
- g. Employees affected by the work permit procedures shall be trained on application procedures. Permitting authorities shall likewise be identified and properly trained.
- h. A periodic safety audit shall be in place to determine its adequacy on compliance and effectiveness.

F. HAZARDOUS MATERIALS

1. HAZARDOUS MATERIALS HANDLING AND STORAGE

- a. Toxic chemicals and hazardous waste/substances shall be properly managed (handling, storage, transport and disposal) in accordance with RA 6969.
- b. All related Material Safety Data Sheet (MSDS) shall be readily available and communicated to workers for information and reference.
- c. All workers that maybe exposed to chemical shall be trained on recommended hazard controls of various chemicals used in the workplace.
- d. Chemicals, especially those which exhibit peculiarities such as ammonia, hydrogen peroxide and caustic soda shall be stored in cool and dry area.
- e. Wear the appropriate PPE as stated in the instruction/procedure or as advised by the supervisor.
- f. All exposed workers shall immediately seek proper medical attention for any untoward effects from handling toxic chemicals and hazardous wastes/substances.

G. COMPRESSED GAS

1. COMPRESSED GAS HANDLING AND STORAGE

- a. Gas cylinders shall be chained/supported in an upright position at all times.

- b. Cylinder cap shall be properly installed when the cylinder is not in use and when being moved/transported.
- c. Gas cylinders shall be labelled, appropriately stored and secured in designated areas.
- d. All hoses, gas regulators and other accessories shall be regularly inspected and maintained.
- e. Appropriate shut-off tool/spanner shall be readily available for use.
- f. Flashback arresters shall always be available and properly installed.
- g. Compressed gas cylinders are prohibited inside confined spaces.

H. FLAMMABLE LIQUIDS

1. FLAMMABLE LIQUIDS HANDLING, STORAGE, LABELLING AND DISPOSAL

- a. Flammable liquids shall be properly stored, labeled, handled and disposed according to recommended controls as specified in the MSDS.
- b. Approved safety pumps and similar devices shall be used when transferring liquids from one container to another. Motorized pumps shall be properly grounded.
- c. Appropriate safety containers shall be used in handling or transporting flammable liquids.
- d. Adequate fire control and fire fighting equipment shall always be available in areas where flammable liquids are present.
- e. Flammable liquids shall not be discharged into the sewers, drainage, canals or natural waterways.
- f. Empty flammable containers shall be disposed of in accordance with the manufacturer's instructions.

I. EXPLOSIVES

1. EXPLOSIVE STORAGE, USE AND TRANSPORTATION

- a. The government laws pertaining to the use, storage and transportation of explosives shall be strictly observed. Manufacturer's instructions for the safe handling and storage of explosives are to be followed.

- b. Disposal of all empty explosive containers shall be in accordance with manufacturer's recommendations.
- c. Warning signs about the use of radio transmitter must be posted on all access roads 1000 feet from the blasting area.
- d. All access points to the blasting area shall be properly guarded until a “**ALL CLEAR** ” signal is sounded.
- e. Explosives or dynamites used for quarrying or road construction shall be stored in magazines as per regulatory standard.
- f. Dynamites shall be separated from the blasting ingredients such as blasting caps or fuses when stored or transported.
- g. For security reasons, vehicles transporting explosives shall not be marked unless required.
- h. Only authorized and qualified personnel shall handle explosives.
- i. Explosive magazine shall be constructed as per standards. Danger signs shall be installed to warn the public. Explosive magazine shall be provided with at least two ventilation outlets.
- j. Stacking/Piling of boxes of explosives shall only be on eye level.
- k. Perimeter gates and doors of the storage magazine shall be provided with two (2) locks each. One for the military and one for the company custodian.
- l. Only authorized personnel shall be allowed to enter the storage areas or near explosive.
- m. Smoking is strictly prohibited in areas where there are explosives.
- n. Military escorts must be present during transport of explosives.

J. WAREHOUSE

1. WAREHOUSE INSTALLATION

- a. Warehouses shall be well ventilated and well lighted.
- b. If a warehouse is provided with fire sprinkler system, maximum height of stock shall conform to OSHS stacking limit.
- c. Storage areas shall be provided with adequate fire extinguisher located at strategic places.

- d. Adequate clearance between stocks and wall shall be provided for easy access.
- e. Warehouse shall be provided with enough space for the operation of material handling equipment.
- f. Materials stored in open areas shall be protected against weather.
- g. Eye wash stations and emergency showers shall be regularly maintained and available in designated areas.

K. FACILITY IMPROVEMENT WORKS

1. EXCAVATION AND FILLING WORKS

- a. All excavation and filling works shall be covered with appropriate safe work permit.
- b. Only authorized personnel shall supervise all excavation and filling works.
- c. Required PPE shall be used while doing excavation and filling works.
- d. Proper warning and instructional signs shall be visibly posted at all times when work is being performed, and shall be removed or recovered promptly after work is completed.
- e. Excavation sites shall be properly barricaded, delineated and provided with proper safety and warning signs.
- f. Gangplanks with railing or metal plates shall be provided where an excavation crosses driveways or streets.
- g. Approved access ladder shall be provided and regularly inspected.
- h. Work permits to identify location of buried gas, water, electricity and telephone lines shall cover all excavation works.
- i. Shoring built in accordance with standard engineering practice shall be provided on excavation sites.
- j. Excavation works on identified H₂S prone area shall be inspected for presence of H₂S before any work will commence and regularly monitored during the duration of the work.
- k. First aid and emergency response shall be available at all times.

2. CONCRETING AND STRUCTURAL WORKS

- a. Work permits shall cover all structural works at heights and all works that require the use of oxy-acetylene cutting and any kind of welding works.
- b. Only authorized person shall supervise all concreting and structural works.
- c. Required PPE shall be used while doing concreting and structural works in accordance with Section III.A.3 hereof.
- d. Proper warning and instructional signs shall be visibly posted at all times when work is being performed, and shall be removed or recovered promptly after work is completed.
- e. Work sites shall be properly barricaded, delineated and provided with proper safety and warning signs.
- f. Standard scaffoldings shall be provided when working at height.
- g. Lifting procedure shall be implemented for heavy and special lifting works.
- h. First aid and emergency response shall be available at all times.

3. ROAD WORKS / EARTH MOVING

- a. Only authorized person shall supervise all road works.
- b. Required PPE shall be used while doing road works.
- c. Proper warning and instructional signs shall be visibly posted at all times when work is being performed, and shall be removed or recovered promptly after work is completed.
- d. Work place conditions shall be inspected to eliminate or control hazards that may expose the worker to injury.
- e. Work sites shall be properly barricaded, delineated and provided with proper safety and warning signs.
- f. Only duly qualified and authorized personnel shall be allowed to operate equipment.
- g. Heavy equipment shall have spotter to assist the operator.
- h. First aid and emergency response shall be available at all times.

4. PIPING AND INSULATION WORKS

- a. Only authorized person shall properly all piping and insulation works.
- b. Only duly qualified and authorized personnel shall be allowed to conduct piping and insulation works.
- c. Required PPE shall be used while doing piping and insulation works.
- d. Proper warning and instructional signs shall be visibly posted at all times when work is being performed, and shall be removed or recovered promptly after work is completed.
- e. Work place conditions shall be inspected to eliminate or control hazards that may expose the worker to injury.
- f. Work sites shall be properly barricaded, delineated and provided with proper safety and warning signs.
- g. Only duly qualified and authorized personnel shall be allowed to perform equipment.
- h. All coded piping and insulation works (i.e. high pressure pipe welding, hot tapping) shall have detailed and approved safe work procedures.
- i. All piping and insulation works shall be covered with appropriate safe work permits.
- j. All coded piping and insulation work wastes shall be properly disposed of according to environmental regulations.
- k. First aid and emergency response shall be available at all times.

5. HOT WORKS

- a. Only authorized personnel shall supervise all hot works.
- b. Only duly qualified and authorized personnel shall be allowed to conduct hot work.
- c. Required PPE shall be used while doing hot works.
- d. Proper warning and instructional signs shall be visibly posted at all times when work is being performed, and shall be removed or recovered promptly after work is completed.

- e. Work place conditions shall be inspected to eliminate or control hazards that may expose the worker to injury and potential property damage.
- f. All hot works shall have detailed and approved safe work procedures.
- g. All hot works shall be covered with appropriate safe work permits.
- h. First aid and emergency response shall be available at all times.

6. MECHANICAL AND EQUIPMENT INSTALLATION

- a. Only authorized personnel shall supervise all mechanical and equipment installation.
- b. Required PPE shall be used while doing mechanical and equipment installation.
- c. Proper warning and instructional signs shall be visibly posted at all times when work is being performed, and shall be removed or recovered promptly after work is completed.
- d. Work place conditions shall be inspected to eliminate or control hazards that may expose the worker to injury.
- e. Only duly qualified and authorized personnel shall be allowed to install mechanical equipment.
- f. All mechanical and equipment installation shall have detailed and approved safe work procedures.
- g. All mechanical and equipment installation shall be covered with appropriate safe work permits.
- h. All mechanical and equipment installation work wastes shall be properly disposed according to environmental regulations.
- i. First aid and emergency response shall be available at all times.
- j. Appropriate lifting equipment and procedures shall be used in mechanical installation.

L. MOTOR VEHICLE AND HEAVY EQUIPMENT

1. MOTOR VEHICLE AND HEAVY EQUIPMENT OPERATIONS

- a. Only duly qualified and authorized personnel shall be allowed to operate motor vehicles and heavy equipment.
- b. Drivers/operators under the influence of liquor and or sleep inducing drugs or any medication that will affect vision, judgment and reflexes shall not be allowed to operate motor vehicles and heavy equipment.
- c. All motor vehicles and heavy equipment shall be
 - i. Provided with basic emergency tools and equipment like early warning device, choke block, fire extinguisher etc.
 - ii. Subjected to a pre-use inspection.
 - iii. Loaded up to its rated capacity only.
 - iv. Subjected to scheduled preventive maintenance.
- d. All drivers/operators shall immediately report any observed unsafe condition of the motor vehicles and heavy equipment.
- e. All drivers/operators shall strictly follow all established company and government traffic rules and regulations.
- f. All vehicles and heavy equipment deemed or reported to be unsafe shall be removed immediately from service and shall not be used until appropriate repair has been undertaken.
- g. All drivers shall report immediately any vehicular incident to the company and appropriate authorities.
- h. All motor vehicles and heavy equipment shall be equipped with the prescribed and approved seat belts.
- i. Only qualified and authorized personnel shall conduct repairs to all motor vehicles and heavy equipment.

M. HOIST AND LIFTING WORKS

1. HOIST AND LIFTING WORKS OPERATIONS

- a. Only authorized personnel shall supervise hoist and lifting works.
- b. Only duly qualified and authorized operator shall be allowed to operate hoist and lifting equipment.
- c. Only duly qualified and authorized rigger shall be allowed to direct and guide hoist and lifting operation.
- d. Operators under the influence of liquor and or sleep inducing drugs or any medication that will affect vision, judgment and reflexes shall not be allowed to operate hoist and lifting equipment.

- e. All hoist and lifting equipment shall be provided with basic emergency tools and equipment where applicable like horn, lights, outrigger matting, fire extinguisher etc.
- f. All hoist and lifting equipment shall be subjected to a pre-use inspection for safe operation.
- g. All hoist and lifting equipment shall be loaded up to its rated capacity only.
- h. All hoist and lifting equipment shall be subjected to scheduled preventive maintenance.
- i. All operators shall immediately report any observed unsafe condition of the hoist and lifting equipment.
- j. All unsafe hoist and lifting equipment shall be removed immediately from service and shall not be used until appropriate repair has been undertaken.
- k. All operators shall report immediately any incident/accident to the company and appropriate authorities.
- l. All hoist and lifting equipment shall be equipped with the prescribed and approved seat belts.
- m. Only qualified and authorized personnel shall conduct repairs to all hoist and lifting equipment.
- n. All hoist and lifting equipment shall be subjected to load test inspection as recommended by the manufacturer and as prescribed by DOLE.
- o. All critical lift works or jobs shall be covered by critical lift procedure.

N. FIRE HAZARDS, PROTECTION AND CONTROL

1. GENERAL OBJECTIVE

- a. All geothermal operators shall establish a fire prevention and control program.

2. PORTABLE FIRE EXTINGUISHER

- a. Fire extinguishers shall be inspected once a month and shall be maintained in operating condition at all times.

- b. Fire extinguishers shall be kept in their designated places. If they are removed for refilling/repair, it shall be replaced immediately with the same type and capacity.
- c. Durable inspection tags shall be attached securely to each extinguisher showing the servicing data properly recorded and signed by the designated safety engineer or end user.
- d. Fire extinguishers shall be installed in strategic locations free from obstructions. Only fire extinguishers shall be placed inside the extinguisher box to avoid exposure to excessive heat.
- e. Tampering of markings, tags and other emergency instructions labeled on all fire protection equipment shall be prohibited.
- f. Fire extinguishers shall conform to the fire protection standard.

3. FIRE HYDRANTS, FIRE HOSES AND ACCESSORIES

- a. Fire hydrants, hoses and accessories shall conform to the fire protection standard.
- b. Fire hydrants, hoses and accessories shall be kept in good condition. They shall be used properly and only for the purpose for which they are intended.
- c. Fire hose installed at yard hydrant shall be kept in well-ventilated fire hose cabinet properly locked and marked "**FOR FIRE USE ONLY**".
- d. Only authorized personnel shall conduct inspection and/or testing of fire hydrants, hoses and accessories at least once a month. Defective items shall be replaced immediately.
- e. Fire fighting equipment shall be placed in strategic locations and free from obstructions.
- f. Tampering of fire alarms, valves and other accessories is prohibited. Recommend immediately for repair on any damaged parts.

SECTION IV. GEOTHERMAL ACTIVITIES

A. GEOTHERMAL ACTIVITY REQUIREMENTS

- 1. All geothermal activities shall comply with the following requirements:
 - a. Standard Operating Procedure;
 - b. Orientation/Training;

- c. Work Permits;
- d. Close Supervision;
- e. Monitoring Tools/Instruments;
- f. Communication Tools/Equipments;
- g. Emergency Response Team; and
- h. Personal Protective Equipment

B. STEAM GATHERING SYSTEM (SGS)

1. SGS MAINTENANCE

- a. Only qualified personnel shall operate geothermal wells and SGS.
- b. Opening and Closing of wells to the SGS and Re-Injection (RI) System shall be done in accordance with lock-out/ Tag-out (LO/TO) procedure as described in Section III.E. hereof.
- c. Opening and Closing of wells to the SGS and Re-Injection (RI) System shall be done in accordance with lock-out/ Tag-out (LO/TO) procedure as described in Section III.E. hereof.
- d. Valves in SGS shall be assured through a Preventive Maintenance Program (PMP) which include regular opening and closing where appropriate or stroking as described in Section IV.F. hereof.
- e. Personnel entering an area around discharge facilities (e.g. rock muffler, silencer, diffuser, rupture disc, etc.) shall be properly informed of the hazard (e.g. splashing of hot fluids, noise, H₂S and other hazard that maybe present.

C. ABRASIVE BLASTING

1. ABRASIVE BLASTING GUIDELINES

- a. Use of blasting equipment shall follow guidelines in Section III.F.1 hereof.
- b. Blasting agent must be dry and free from unwanted items.
- c. Blaster shall be provided with fresh air supply for breathing and ventilation.
- d. Blasting operation shall be done in such a way as to prevent exposure to other personnel not involved in the operation.
- e. The compressor operator must be in close coordination with the blasting operator.

- f. The relief valve or plug of abrasive blasting equipment must conform to the standards.

D. SGS VALVE

1. SGS VALVE REPAIR/REPLACEMENT

- a. All valve replacement shall be done in conformity with the manufacturer's and company standards.
- b. Isolation of valves for repair or replacement shall follow the lock-out/tag-out procedures as described in Section III.E.1 hereof.
- c. Use appropriate PPE in accordance with Section III.A.3 hereof.
- d. A self-contained breathing apparatus shall be stationed in the area for rescue purposes.
- e. If a significant level of poisonous gas is present and persistent, industrial blowers shall be used to lessen and prevent gas accumulation within the area. In case level is above 10 ppm, the work shall be suspended or deferred for remedial action.
- f. Replacement of the wellhead master and wing valves shall be done in accordance with company standards to prevent blowouts.
- g. Proper coordination between workers shall be observed to prevent injuries and untoward incidents.
- h. Appropriate equipment shall be used for lifting purposes.

E. VALVE PACKING/ INJECTION

1. VALVE PACKING/INJECTION REQUIREMENTS

- a. Ensure that trapped body pressure is properly relieved to zero.
- b. Packing injection pressure shall not exceed the rated pressure requirement provided in the manufacturer's specifications.

F. WELLHEAD VALVE

1. WELLHEAD VALVE SERVICING/STROKING

- a. Prior to wellhead valve servicing, all personnel shall follow requirements in Section IV.B.1 hereof

- b. Safety remarks on work permit shall be carefully observed whether the well can be stroke or not.
- c. Stroke or exercise wellhead valves based on scheduled PMP. Stroking or exercising of wellhead shall be done in close coordination with the authorized operations personnel.
- d. Defective master valve shall not be stroked/exercised.
- e. Stroking activities shall not be done during bad weather or when gas is beyond exposure limit.

G. DRAIN VALVE

1. DRAIN VALVE DE-CLOGGING

- a. De-clogging equipment/devices must be inspected and checked prior to use.
- b. De-clogging activities shall conform to company's standard operating procedures.

H. VESSEL/HEADER/SILENCER

1. ENTRY TO VESSEL/HEADER/SILENCER REQUIREMENTS

- a. Hazard assessment shall be conducted prior to entry to any vessel/header or silencer.
- b. Entry to vessel/header/or silencer must conform with the established company Confined Space Entry Procedure (CSEP).
- c. Isolation tags, chains and padlocks shall be installed on the respective servicing valves to notify and prevent accidental opening.
- d. The inside of the vessel/header or silencer must be free of leaks or gas accumulation before a person is allowed entry.
- e. Before opening any enclosure, confirm that the pressure is zero.
- f. No entry shall be permitted in case only one manhole is opened or when there is only one opening; otherwise; the use of industrial blower is needed.
- g. Personnel shall be equipped with life or tagging lines prior to entry.
- h. Personnel working at height shall securely fasten or tie the tools to a rope string to prevent injuries or property damage when they fall or drop.

- i. A safety observer or lookout shall be stationed at the access whenever personnel are inside the vessel, header or silencer.
- j. Ensure that vessel is leakage free by installing a skillet blind flange and must be well ventilated.
- k. Rotation of personnel working inside vessel shall be observed.
- l. No compressed gas cylinder shall be allowed inside the vessel.
- m. Only explosion proof tools and lighting shall be used when working inside the vessel.
- n. Supervisor shall thoroughly inspect the vessel/header of personnel and tools that maybe left before resealing.

I. PRESSURE RELIEF VALVE (PRV) AND RAPTURE DISC

1. PRV AND RAPTURE DISC OPERATION REQUIREMENTS

- a. Appropriate safety sign shall be installed at the PRV and rupture disc.
- b. Unauthorized personnel shall not be allowed to enter within the vicinity of the relief valves and rupture disc.
- c. Appropriate protection shall be installed at the tip of the exhaust stack of the PRV and bursting disc. These shall be covered with light materials to prevent rain or foreign objects from going in.

J. MOTORIZED / PNEUMATIC VALVE

1. MOTORIZED/PNEUMATIC VALVE CALIBRATION

- a. Only authorized personnel shall be allowed to operate, stroke or calibrate motorized and/or pneumatic valves.

K. PRESSURE RELIEF VALVES (PRV)

1. PRV TESTING

- a. PRV shall be properly calibrated and certified by the manufacturer before installation.
- b. PRV shall conform to company's Preventive Maintenance Program.

- c. PRV lift and reset pressures shall not be altered or changed without approval from authorized personnel.
- d. Alteration or changing of the lift and reset pressure of PRV shall have prior approval of the authorized approving officer from the SGS operations. Maximum settings shall not exceed the manufacturer's recommended set limits.

L. START-UP OF WELLS

1. WELL START-UP REQUIREMENTS

- a. Notification of personnel and community shall be conducted prior to start-up of wells.
- b. Only proper tools and equipment shall be used.
- c. Work site evaluation shall be conducted and necessary corrective measures shall be implemented prior to start-up of wells.
- d. Appropriate pressure relief system shall be installed.
- e. Release of trapped gases shall be properly managed.

M. GAUGES

1. GAUGES MAINTENANCE

- a. Gauges and accessories to be used shall conform with the required specifications.
- b. Installed gauges shall be properly calibrated.
- c. Proper tools and equipment shall be used when replacing gauges.
- d. Use appropriate PPE when replacing gauges.

SECTION V. GEOTHERMAL WELL MAINTENANCE

A. GEOTHERMAL WELL MAINTENANCE REQUIREMENTS

- 1. The following Well maintenance activities shall comply with the requirements stated in Section IV.
 - i. Master Valve Replacement;
 - ii. Downhole Measurement;
 - iii. Well Discharge / Testing;

- iv. Well Blowout Prevention; and
- v. Wellhead Valve Servicing/Stroking

SECTION VI. RIG SAFETY

1. SLIPS AND ELEVATOR

- a. Slips and elevator shall not be modified.
- b. Keys, pins, dies, handles and bodies on all pipe and collar slips shall be checked frequently for wear.
- c. Rig personnel shall keep their hands and feet, as well as chains, ropes, etc., away from the rotary table when it is in motion.
- d. Slips shall be properly positioned when not in use.
- e. Slip handles shall be used to manually raise and lower slips. Handles shall be grasped with palm up.
- f. At least three employees shall pull slips using proper techniques.
- g. Latches, latch springs, hinge pins and elevator shoulders shall be inspected periodically and maintained as necessary.
- h. Riding the elevator as a means of personnel transport is prohibited.
- i. The elevator ear locks shall be fitted with steel bolts of proper size.
- j. The elevator or bails shall not be grasped in the area of the link eyes.

2. CATHEADS

- a. When in operation, the driller or assistant driller shall be at the driller's console to disengage and stop the cathead.
- b. Repair or replace worn, damaged or grooved catheads and worn dividers.
- c. Catheads shall be equipped with anti fouling devices (Rope Divider) at all times. The recommended clearance between the cathead friction surface and the Rope Divider edge is 6.5mm (1/4").
- d. A swivel and safety hook attached to a lifting cap shall be used when catlines are used to pull pipe through the V-door.
- e. Use only the amount of wraps necessary to raise the load.

- f. Objects shall be raised and lowered at a safe pace and the wraps removed after the load is landed. The locking device shall not be used to suspend a load.
- g. The rope or line shall not be left wrapped on or in contact with the cathead while it is not in use. The rope shall be safely stored when not in use.
- h. Rig personnel shall not be lifted into the derrick by use of the catline.
- i. The rope shall not be wrapped around the operator's hand when in use. Do not stand inside rope coiled on floor.
- j. Except for specially spliced ropes that are used for spinning casing, a rope spliced or a frayed part of a rope or line shall not be used on a cathead.
- k. Use a flagman or two-way communication device when the cathead operator cannot see the object being raised or lowered.

3. AIR HOISTS

- a. All air hoists shall be equipped with a drum guard and line guide.
- b. All hoisting lines shall be inspected periodically.
- c. The hoisting line shall not be in contact with any derrick member.
- d. The recommended load capacity of the air hoist and wire rope shall not exceed the manufacturer's recommendation.
- e. Rig personnel shall stand clear of a suspended load.
- f. The air hoist operator shall set the drum brake anytime a load is in suspension. The operator shall not leave the hoist unattended.

4. PIPE TONGS AND LINES

- a. Make up and break out shall be provided with lines of sufficient size and length.
- b. Tong counterbalance and parts thereof shall be restrained, guarded, or located as to prevent them from falling on or striking crewmembers.
- c. Makeshift weights such as tools, pipe, protectors, bits, etc., shall not be added to the counterbalance weights.

- d. Tong die slots shall be properly maintained.
- e. Tongs shall be provided with sharp dies at all times and properly pinned in die slots.
- f. Die drivers shall be used to remove tong dies.
- g. A hard hat, full-face shield, safety glasses and protective gloves shall be worn when changing tong dies.
- h. The rotary table shall not be used for final making up or initial breaking out of a pipe connection. Two tongs shall be used during make up and break out.
- i. When excessive pull is needed to break a tight joint, all floor crew shall move away from the rotary and out of the path of the tongs before torque is applied.
- j. Personnel shall not stand between the two pipe tongs while the driller is making up or breaking out pipe or collars.
- k. All pins used to secure chain and jaws shall be kept in place with cotter pins or safety pins.
- l. Power tongs are to be operated by the driller or assistant driller only.

5. ROTARY TABLE AREA

- a. Personnel shall not step on the rotary table while it is rotating.
- b. The rotary table area shall be constructed or covered with a non-skid material.
- c. Hoses, ropes and lines shall be clear of the rotary table and adjoining rotating equipment while it is in motion.
- d. When not in use, the pipe tongs shall be secured away from the rotary table.
- e. If the rotary table is removed, the pick-up lines shall be of sufficient strength and condition and placed evenly around the block hood to ensure a level lift.
- f. Rotary hoses shall be equipped with safety lines at both ends.
- g. Safety chains shall be used to secure vibrator hoses to an immovable object such as pump base or sub base.

- h. Hoses shall be inspected periodically and maintained to manufacturer's specifications.

6. FLOORS AND WALKWAYS

- a. All moving machinery that presents a hazard to personnel working in its proximity shall be adequately guarded.
- b. Any removed guard shall be replaced before the machinery is returned to operation.
- c. Appropriate lock-out and tag-out procedures shall be used before removing guards.
- d. All discharge piping openings in floors shall be protected or provided with covers and closed when not in used.
- e. Guardrails shall be provided for all raised floors and walkways over 1.2m in height or when adjacent to tanks or other hazardous equipment.
- f. Non-skid material shall be positioned around the rotary table.
- g. Rig personnel shall not run on stairs, floors and walkways except in cases of extreme emergencies

7. EQUIPMENT GUARDING

- a. All moving machinery that presents a hazard to personnel working in its proximity shall be adequately guarded.
- b. Any removed guard shall be replaced before the machinery is returned to operation.
- c. Appropriate lock-out and tag-out procedures shall be used before removing guards.
- d. All discharge piping that could cause burns shall be insulated or guarded.
- e. All portable tools with exposed moving parts shall be equipped with proper guards.

8. DERRICKS AND MASTS

- a. Inspections of the derrick or masts shall be performed periodically.

- b. The pipe racking fingers shall be kept straight and secured with a safety device.
- c. Drill collar tie back ropes shall be secured to a derrick or mast member.
- d. Personnel shall not be in the mast or derrick when pulling or jarring on stuck pipe.
- e. The derrickman prior to each trip shall be visually check the derrick or mast escape device.
- f. Safety lines shall be checked regularly to make sure they are properly secured.
- g. The derrickman shall inspect the monkey board prior to its use.
- h. Personnel shall not ride the mast as it is being raised or lowered. All other personnel shall stand clear of the A-frame until the mast radius is in position.

9. PIPE RACKS AND BINS

- a. When pipe, casing or any other piece of equipment is being moved on pipe racks and in bins, personnel shall not be allowed under, inside or on top of pipe racks and bins.
- b. Each layer of tubulars shall be secured to avoid movement.
- c. Pipe racks shall be inspected periodically.
- d. Pipe racks and bins shall be level.

10. DERRICK ESCAPE LINE

- a. The escape line shall only be attached to non-moveable objects and the landing area kept clear of obstructions at all times. For example, do not use a power tong skid as an anchor if it will be moved during casing jobs.
- b. The escape line and safety buggy shall be installed before drilling out of the surface casing.
- c. The escape line shall be with a minimum of 12mm (1/2") diameter wire rope and shall be tightened to a tension that allows a person descending on the line to touch clear ground between 6-8 meters (20 - 26 feet) from the ground anchor.

- d. The safety buggy shall be equipped with a suitable hand brake and shall be kept at the principal working platform (monkey board) and be readily accessible at all times.
- e. A visual inspection of the safety buggy shall be performed prior to each trip by the derrickman.
- f. The safety buggy shall be installed according to manufacturer's specifications.
- g. The safety buggy shall only be used in the event of any emergency.

11. DRILLING LINE, CROWN BLOCK AND TRAVELING BLOCK

- a. Drilling lines shall be visually inspected daily for wear and breaks, in addition to the regular ton-miles inspection.
- b. Workers shall use caution when handling the drilling line.
- c. The deadline anchor bolts shall be checked periodically.
- d. All excess drilling line shall be spooled up off the ground.
- e. The crown block and traveling block sheaves shall be checked periodically for proper gauge.
- f. A slip and cut program shall be followed. Calculate the ton-miles and follow the slip and cut program as recommended by the drilling line manufacturer.

12. DRAW WORKS, BRAKES, CLUTCHES, SAND REEL AND WIRE LINE UNIT

- a. All guards shall be in good condition and shall remain in place when the draw works is being operated.
- b. Only the driller or assistant driller shall operate the draw works.
- c. The tool pusher and maintenance supervisor shall supervise all draw works repairs.
- d. Personnel shall not stand on top of the draw works or inside the sand line or main drum guard when the drums are moving.
- e. The driller shall chain the brake down anytime he leaves the driller's console.

- f. The sand reel shall be equipped with a proper line-spooling device.
- g. Defective zerk and alemite fittings shall be replaced.
- h. The brake blocks, linkage, pins, cotter keys, etc. shall be checked periodically.
- i. Water shall not be directed at the brake band when washing the draw works.
- j. While operating the draw works the operator shall not be distracted.
- k. Clutches shall be kept in good condition and properly adjusted.
- l. All personnel shall be instructed on how to shut down the draw works and rotary table in case of an emergency.

13. MUD PUMPS AND EQUIPMENT

- a. Caution shall be used when working around high-pressure components.
- b. Appropriate lock-out/tag-out procedures shall be used when repairing or maintaining equipment.
- c. Mechanically driven pumps shall have air isolation valve closed and a sign put on driller's console, advising pump is under repair/maintenance.
- d. Mud pumps shall have pressure relieving safety devices. The devices shall be installed and maintained according to manufacturer's recommendations.
- e. Measures to eliminate the use or restrict the operation of the safety device shall not be taken.
- f. Liners shall not be removed or seated in a pump by running the pump, applying hydraulic, pneumatic or gas pressure.
- g. Guards shall be in place and secured while a pump is in operation.
- h. Studs and nuts on the fluid end shall be maintained in good condition and kept tight.
- i. Good housekeeping and lighting shall be maintained around the mud pumps.

14. MUD TANKS AND EQUIPMENT

- a. High-pressure fittings and lines shall be properly rated for the expected working pressures.
- b. Mud gun unions and connections shall be kept tight.
- c. Only competent personnel shall be allowed to operate mud guns.
- d. Flow lines shall be placed to prevent tripping hazards.
- e. Electrical mud equipment shall be located to prevent contact with fluids.
- f. Caustic soda shall be added to water slowly to avoid splashing and shall be mixed using a mixture tank or barrel.
- g. Approved explosion proof lighting fixtures shall be installed on mud tanks.
- h. Agitator power source shall be isolated and locked out before entering the mud tanks. Confined space entry permits shall be issued and only suitably qualified personnel may enter.
- i. At the mud mixing hopper or mixing location, the following items shall be available for the employees use.
 - i. Eye protection;
 - ii. Face protection;
 - iii. Proper respiratory protection;
 - iv. Rubber gloves and apron;
 - v. Eyewash station; and
 - vi. Appropriate warning/danger signs.

15. PRESSURE LINES AND FITTINGS

- a. All pressure lines and "flexible" joints shall have safety devices attached to prevent line whip in case of rupture.
- b. Personnel shall familiarize themselves with the location of high-pressure lines and fittings.
- c. Personnel shall not attempt to tighten or loosen hammer unions or other connections under pressure.
- d. Pressure release valves shall be checked periodically according to manufacturer's recommendations.

- e. Lines or piping systems that may kick under pressure shall be secured.
- f. Lines under pressure shall not be hammered on.
- g. High-pressure lines shall be fitted with high-pressure fittings. Caution shall be exercised during repairs to ensure that only high-pressure fittings are being installed.
- h. All personnel shall stand clear of high pressure lines being used during cementing, acidizing, well testing procedures, etc.
- i. Chican sections in high-pressure lines shall be watched for leaks. Caution shall be used during movement.
- j. A pre-operation safety meeting shall be held before unusual or non-routine jobs begin. Pressure Vessel Work Permits shall be issued.

16. ENGINES

- a. Positive lock-out measures shall be provided to ensure that the source of power is not activated during engine repair, inspection or adjustments.
- b. All exposed revolving parts such as radiator or cooling fans, belts, flexible drives, generators, water pump pulleys, shafts, couplings and other moving parts shall be provided with adequate guarding to prevent contact.
- c. Guarding removed for maintenance purposes shall be replaced as soon as possible and prior to operation of the equipment.
- d. Spark arresting devices shall be installed in engine exhaust systems where required.
- e. Engines shall be equipped with safety alarms and/or automatic shutdown controls to be activated during emergencies or operational difficulties such as over-heating, low oil pressure and over-speeding.
- f. Exhaust manifolds and piping shall be constructed, installed and maintained to prevent exhaust gases from leaking between the engine and discharge line. The discharge line shall be directed away from the engine and the work area.
- g. Areas below engine skids and beneath the sub base shall be kept clear of drained motor oil and filters.

- h. The air box drains, on engines so equipped, shall be drained according to the manufacturer's recommendations.
- i. Personnel working in high noise areas shall wear hearing protection.

17. AIR OPERATED EQUIPMENT

- a. All air receivers (tanks) shall have their maximum pressure limitations stenciled on them.
- b. Air tanks shall be drained frequently to prevent accumulation of moisture in the absence of auto drain.
- c. A valve shall not be installed between the tank/compressor and the relief valve if it cannot be isolated.
- d. Compressed air used for cleaning purposes shall be regulated to limit pressure.
- e. Each airline shall be secured to prevent it from coming loose at the connections.
- f. Compressed air or pressurized air shall not be used as a means of dusting off personnel.

18. BLOWOUT PREVENTION (BOP) EQUIPMENT

- a. All repairs to BOP equipment shall be documented and supervised by the toolpusher.
- b. Pick-up lines, eyes and shackles shall be inspected for strength and condition prior to lifting a blow out preventer.
- c. Blow out preventer and components shall not be climbed on until they are set on the wellhead flange, the test stump, the flange of another blow out preventer unit, in the stowed position or on the spider beam and at least 4 securing bolts installed and tightened.
- d. While guiding or aligning the blow out preventer into place, personnel shall ensure their hands and feet are kept from between the flanges and not placed on top of the bolts that have already passed through the holes of an upper flange, while the unit is being lowered.
- e. While hammering up the blow out preventer bolts and nuts, only closed socket hammer wrenches of correct size, as well as sledge hammers of suitable weight and size shall be used. Hydraulic

torque equipment shall be used according to manufacturer's recommendations.

- f. A rope shall be used on the hammer wrench to hold it in place when hammering.
- g. Personnel shall not be permitted on the blowout preventer when the stack is being pressure tested.
- h. When nipping down the blowout preventer, all hydraulic lines shall be held to zero pressure before hammering is permitted on the hydraulic unions.

19. BOP ACCUMULATORS, PULSATION AND SUCTION DAMPENERS

- a. All repairs to the accumulator shall be documented and supervised by the tool pusher
- b. Accumulators and high-pressure pulsation dampeners shall be charged with nitrogen by qualified personnel as per the manufacturer's recommendations. The pre charge shall be checked frequently.
- c. Each control on the BOP accumulator and each BOP remote unit shall be clearly marked as to its exact function.
- d. Suction dampeners shall be charged by qualified personnel as per manufacturer's recommendations.
- e. Oxygen **SHALL NEVER** be used to pre charge any pressure vessel.

20. STABBING BOARD

- a. Stabbing board locking devices shall be provided so that:
 - i. One locking device operates when the lifting handle is in neutral.
 - ii. One locking device operates if the hoisting mechanism fails.
 - iii. Both devices are independent of each other.

22. TUBULAR

- a. Joints of drill pipe that are to be added to or removed from the drill string shall not be allowed to remain in the mouse hole while hoisting or lowering pipe during a trip.

- b. Each stand of drill pipe being hoisted from the rig floor shall be held back as the pipe is lifted, so it shall not swing freely across the rig floor.
- c. The driller's view of the drill pipe in the rotary table shall not be obstructed at any time.
- d. Pipe shall be racked by pushing against the outer face of the pipe when setting it back. Feet shall be kept away from beneath the pipe as it is set down.
- e. Feet shall not be placed beneath the pipe when rabbiting drill pipe.
- f. When rabbiting tubulars, crewmembers shall face away from the pipe rack to avoid possible eye injury, even though eye protection is being worn during this operation.
- g. Each drill collar lift sub shall be tightened into the collar before the collar is hoisted into the derrick to prevent the sub backing out while working with the drill collar.
- h. Feet, knees and hands shall not be placed on the underside of a drill collar clamp while the clamp is being tightened onto a drill collar in the rotary table.
- i. A drill collar clamp secured to a drill collar shall not be hoisted over head height into a derrick.
- j. When setting the drill bit into a bit breaker, hands and feet shall not be placed on the bit breaker while the bit and collar are guided into the bit breaker opening. Feet shall not be used to adjust the lock on the bit breaker at any time.
- k. Stabilizers, wall scrapers or pup joints, being added into the drill string, shall not be set on the rotary table unsupported by a hoist line.
- l. Tools removed from the drill string shall not be thrown or allowed to fall onto the rig floor. They shall be handled with a hoist line.
- m. Formation mud shall be scraped off the drill collards and stabilizer blades before the collars are hoisted and stood in the derrick.
- n. Personnel shall not peer through the rotary table when the BOP is operated.
- o. Casing equipment shall not be rigged up until the drill pipe has been hoisted out of the well bore.
- p. The casing tong safety door shall not be removed; this will ensure hands and limbs are protected from the tong's drive works.

- q. A work scaffolding or platform shall be constructed around the casing spider to prevent having to over stretch or become off balance to reach the equipment.
- r. Hands shall not be placed on top of the casing collar (joint) protruding from the casing slips when another joint of casing is being stabbed. Hands shall be kept on the outside of the casing at all times.
- s. Single joint elevator shall be used to pick up casing and shall have a safety pin attached by chain.
- t. When removing cores from a core barrel on the drill floor, personnel shall not place their hands or feet under the core barrel opening.

23. CHEATER BARS

- a. Consideration shall be given to the strength of the component (bolt, spindle, etc.) to be turned and a cheater bar shall not be used if a "TWIST OFF" is considered possible.
- b. Do not use cheater bars on handles, wrenches, etc. constructed of cast or welded material.
- c. Do not extend the operating length of any tool/handle by more than 100%.
- d. The option of changing the tool for a larger one is to be considered prior to use of a cheater bar.
- e. Cheaters are to be used in a pushing motion with body stability maintained by adopting a wide legged stance.
- f. Do not position yourself between the tool/handle and any obstruction, trip hazard or drop.
- g. Care shall be exercised that the bar does not slide on the tool/handle being operated.

SECTION VII. POWER PLANT AND CONTROL ROOM SAFETY

A. POWER PLANT

1. POWER PLANT SAFETY

- a. All personnel shall be qualified and trained in their respective job assignments.

- b. All personnel shall undergo occupational safety and health orientation and training.
- c. All personnel shall immediately report any observed unsafe condition, incident and accident in accordance with the established company safety reporting procedures and guidelines.
- d. All personnel shall be required to wear appropriate and prescribed PPE's.
- e. Only qualified and authorized personnel shall conduct repairs and calibration to any plant equipment and instruments.
- f. All power plants shall establish work procedures for:
 - i. Start-up and Shut-down
 - ii. Emergency
 - iii. Normal and Abnormal Operation
 - iv. Maintenance Work for the following:
 - ◆ Pressure Vessel
 - ◆ Pumps
 - ◆ Condensers
 - ◆ Cooling Towers
 - ◆ Turbines and Generators
 - ◆ Electrical and Instrumentation

Such procedure shall include hazard identification, analysis, mitigation and emergency response.

- g. All works shall be covered with appropriate safe work permits

B. CONTROL ROOM

1. CONTROL ROOM SAFETY

- a. Unauthorized personnel are prohibited to manipulate control panel knobs, buttons, and switches. Bystanders are not allowed inside the control room unless authorized.
- b. Keep air conditioning unit running 24 hours a day to maintain the control room temperature and to keep the air clean and filtered.
- c. Always close the door of control rooms to reduce outside air infiltration/cooling loads and H₂S contamination.
- d. Control rooms are **NO SMOKING** areas and such policy shall be observed religiously.

- e. Lock-out/tag-out procedure and proper clearance from the authority shall be strictly complied.
- f. Automatic/emergency lighting system shall be provided at all access and means of egress.
- g. Keep the door of circuit breaker/panel always closed.

C. UPS AND BATTERY

1. UPS AND BATTERY BANK ROOM REQUIREMENTS

- a. No unauthorized personnel are allowed to enter the room.
- b. Air conditioning unit must be operated 24 hours a day at temperature not greater than 15 °C for electronic equipment cooling.
- c. Always close the door of UPS and battery bank room to reduce outside air infiltration/cooling loads and H₂S contamination.
- d. Keep battery bank free from leaking solutions.
- e. Do not use battery room as dressing room.
- f. The exhaust ventilation must be placed in the proper portion of wall ceiling to eliminate the explosive gas emitted by the battery.
- g. The DC system shall be readily available whenever the DC power is interrupted to the system.
- h. Eyewash station must be provided near the battery room.
- i. Check-up of battery electrolyte leak and specific gravity should be done regularly.
- j. Proper handling/storage/disposal of unserviceable batteries should be observed.

D. ELECTRICAL POWER FACILITIES AND EQUIPMENT

1. ELECTRICAL POWER FACILITIES AND EQUIPMENT REPAIR AND TROUBLESHOOTING

- a. Never attempt to execute troubleshooting and repair of any line conductors and electrical equipment and circuitry at compressor control panel board without permission and proper coordination with SGS supervisor.

- b. Always wear safety rubber shoes when performing troubleshooting and repair of any faulty line conductors encased in metallic cable tray.
- c. Place warning tags (indicating reasons for isolation) on any circuit cut-out/breakers with the requested “**DE-ENERGIZE**” line associated.
- d. Insulate all dangling and bare terminals of power conductors right after disconnection.
- e. De-energize all power line conductors, when troubleshooting and repairing of a particular line running and encased with other lines in metallic cable tray.
- f. Ensure all electrical tools/equipment used are properly insulated and must be capable to handle the voltage of the work piece.
- g. Conduct insulation resistance testing on any line conductors and equipment being repaired and/or replaced prior to re-energization to determine the di-electric strength of the insulation.
- h. Advise superior immediately any faults, tripping or hazards observed on any electrical equipment or installation.

SECTION VIII – SEPARABILITY CLAUSE

In the event that any provision of the Code or the application of such a provision to any person or circumstance is declared invalid, the remainder of the Code and the application of such a provision to other persons or circumstances shall not be affected by such declaration.

SECTION IX – RESOLUTION OF CONFLICTS AND OVERLAPPING JURISDICTIONS

In case any provision of the Code conflicts, duplicates or overlaps with rules and regulations being implemented by other government agencies, such conflict, duplication or overlapping shall be resolved by coordination or any other means of cooperation among such agencies.

SECTION X – REPEALING CLAUSE

All geothermal safety and health rules and regulations, orders or parts thereof which are inconsistent with or contrary to the Code are hereby repealed, amended, or modified accordingly.

SECTION XI – EFFECTIVITY

The Code shall take effect fifteen (15) days after publication in at least two (2) newspapers of general circulation.

Fort Bonifacio, Taguig, Metro Manila

October 6, 2003.

(Sgd.)

VINCENT S. PÉREZ, Jr.

Secretary

Acknowledgement

This Code of Practice on Safety Management System for the Geothermal Industry has been developed by a Working Group, which comprised representatives from the Geothermal Contractors and other Concerned Agencies.

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29. Malvin P. Suson	Ormat - LGPP	Safety Officer
30. Anacleto Adviento Jr.	Marubeni – M1GP	Plant Manager
31. Ernest S. Salarda	Marubeni – M1GP	Safety Officer
32. Roberto Mendoza	NPC – Diliman	QA Manager
33. Danilo C. Cano	NPC - Tiwi	OIC–Performance Section
34. Numeriano Lucenio Jr.	NPC - GENCO 4	Principal Engineer A
35. Reynaldo V. Abua	NPC - GENCO 6	Principal Engineer A
36. Panfilo F. Cadelina Jr.	NPC - LGPP	Principal Engineer A
37. Rosalina L. Jarabelo	NPC - Mak-Ban	Principal Engineer A
38. Neal V. Martinez	NPC - Mak-Ban	Principal Engineer B
39. Romeo C. Carmona	NPC - Bac-Man	Principal Engineer B
40. Camilo C. Cadapan	NPC - NNGPP	Principal Engineer B
41. Fausto L. Manalansan	MIESCOR	Project Director
42. Arnel V. Rivera	MIESCOR - Makban	Project Manager
43. Octavio C. Cruz	MIESCOR - Tiwi	Project Manager