SPILL MANAGEMENT PLAN

Project: Golen Gol Hydropower Activity
Capacity: 106 Megawatts
Location: Golen Gol, Chitral, Pakistan
Project Authorities: WAPDA

Purpose:

This plan defines the preliminary requirements for effective emergency preparedness and response, specifically with respect to oil spills. The purpose is to act as a foundation for future stakeholder capacity development. This plan establishes the procedures for activation and operation of the Project Emergency Management Team in order to:

a) Ensure that care/treatment is provided for any injuries, illness or loss,
b) Prevent escalation of the incident,
c) Provide timely & accurate information to stakeholders (including Regulatory Authorities, Public and other concerned parties), and
d) Effectively manage post oil spill recovery

This plan is applicable to all Project personnel, including employees, Contractors, Subcontractors and site visitors, when performing tasks and activities on behalf of the Project or Company (including travel to and from the work site). This plan is also applicable to all plant, tools, equipment and facilities utilized for and on behalf the Project, whether owned, hired, leased or borrowed by the Project, its employees, contractors, subcontractors or visitors.

Site characteristics:

The project is located in Hindukush mountain range characterized with rugged mountains and very low vegetation. Project site is located at the confluence of Golen Gol and Chitral rivers. Project site is about 22 km from main Chitral city on the road leading to Shandur National Park.

Being mountainous region with water ways around the project site, spills can result in water pollution thereby threatening biological resources of the region.
SPILL PREVENTION, CONTAINMENT, AND COUNTER MEASURES

Spill Response Plan/Contingency Plan

The purpose of this SPCC Plan is to meet the EMMP requirements as laid down in the Rapid Environmental Analysis of the project.

Commitment to Contingency Plan

WAPDA is committed to providing the manpower, equipment, and materials required to expeditiously control and remove any harmful quantity of oil discharged.

Need for a Contingency Plan

The Golen Gol Hydroelectric Project is located at the confluence of Golen Gol River with Chitral River. Therefore, any uncontained spills that occur could drain directly into the river. Although technically, the Golen Gol Hydroelectric Project does not have oil storage that exceeds 1,000 gallons the staff believes it is prudent to have a contingency plan.

Powerhouse

Golen Gol has a total of three turbine generators out of which one unit is functional at moment. The primary containment method is the floor drain/sump system. Oil leakage from the turbine runner hubs creates the potential for an oil spill directly into the river. Although large and significant instantaneous spills would be very unlikely, and would be the result of a catastrophic equipment failure, slow leaks could occur that would allow small quantities of oil leakage to the river. Such leaks would occur around or through failed seals.

If a catastrophic failure of a turbine were to occur, oil could spill into the river almost instantly.

More likely than a catastrophic oil leakage from the turbine runner hub is the potential for small leaks to occur from around the hub seals. However, the seals are actually in the water flow, and under normal operating head conditions the water pressure at this level is greater than the operating oil pressure. Therefore, any form of leakage at the seals would result in water leakage into the hub oil cavity rather than oil leakage into the water. Oil may leak out from any breach in the seals only when the turbine is under dewatering, during which time the spiral case is open for inspection and the leak detection is possible. During this type of maintenance the turbine is isolated from the river channel and flow.

Hub seals inspection is a regular activity as part of normal preventive maintenance program. Detection of any loss of oil during normal unit operation is easy by a change in oil level indication during daily inspection. If a significant leak were detected the unit could be isolated from the river flow path and repairs made.
Operators inspect all above water level turbine runner hub oil systems, such as sight glasses, piping, and valves, daily. Any small leak from this equipment is contained at the source, or flows to the main plant sump via the powerhouse drains. Operators also inspect the transformer at powerhouse which holds 18,740 kg of oil.

**Governor Oil System**

The governor oil system consists of a sump, storage tank, piping to the turbine oil head and shaft, and piping to other parts. The combined capacity of oil used in this system is 1,463 liters. Small leaks or total failures and the resultant spills from the reservoir or storage tank will result in spill flows to the generator floor, to the floor drains, and eventually to the main plant sump. Leaks in the governor oil head or turbine shaft area may go to the generator floor, or flow down the generator shaft to the turbine pit.

Operations personnel on their normal rounds, which occur daily, could visually detect all leaks and spills. Additionally the low governor oil pressure alarm on the plant enunciator system sounds after a loss of a specific quantity of oil. The low governor oil pressure alarm would indicate a loss of oil, at which point the operator would investigate the cause/spill. Also, draining and inspection of the entire system is in practice on a predefined cycle.

**Generator Thrust Bearings**

Each generator has an upper thrust and guide bearing assembly that support the weight of the rotor assembly and centers it within its bore. Although small leaks from seals and fittings are possible, a near instantaneous total loss of oil would occur only during a catastrophic equipment failure. Any loss of oil would flow down the generator shaft to the turbine pit, and be detected by operators on rounds, which occur daily. Operators may detect small spills and leaks and clean at the site. Any oil not contained by the turbine pit would flow via drains to the main plant sump.

**Turbine Bearings**

Each turbine is fitted with a lower bearing to support the shaft axially. The bearing is grease lubricated. Leakage from this location in an perceptible volumes is highly unlikely, due to the nature of the grease lubrication.

**Turbine Pit**

Each of the three generator units has a turbine pit, an enclosure just above the turbine head cover but below the elevation level of the turbine floor. Any spills or leakage from any of the components directly above this area, including the generator bearings and governor, will be contained within the turbine pit.
Each pit has a total storage volume greater than any single total catastrophic spill from any of the individual components. Operators may detect small oil spills that accumulate in this area on daily basis. Cleanup up of spills in this area would consist of using portable pumps to transfer large spill volumes to drums for disposal. Removal of small leaks from the water surface is possible with the use of absorbent mats, which would then be disposed-off in an approved manner. Large spills and volumes of oil would flow through the pit overflow drain to the main plant sump.

Oil Storage Room

Approximately 500 gallons of grease, oil, and solvents are stored in the common oil storage room. Most storage is in 55-gallon drums, and the drums are stored on racks to allow for periodic dispersion of small amounts for maintenance purposes. Small drips or leaks from any drums are contained in local oil booms and absorbents. A total failure of any single drum would result in the loss of up to 55 gallons of oil to the floor, which would drain to the main plant sump. Operations personnel daily inspect the oil storage room.

Emergency Generator

A diesel powered emergency generator is located in its own building. It has motor oil diesel fuel. Spills from either of these systems would drain directly to the diesel generator building floor. The building floor has a contained spill pit that fully encircles the generator skid.

The generator has daily visual inspection procedure, and a more thorough operational check occurs monthly, or before each starting operation. Detection of leaks or spills is possible at this time. At this time, it is easy to repair the leak source, and the spill containment pit cleaned out and the contents properly disposed-off. There is virtually no chance for spill leakage to reach grounds or waterways.

Substation/Switchyard

The Golen Gol Substation/Switchyard houses high voltage switchgear, switchyard equipment, protection and relay equipment, supervisory, metering and control equipment as well as two step-up transformers. Operations personnel inspect all equipment within the switchyard on daily basis.

Transformers

The generation step-up (GSU) transformers are the primary generator transformers that transmit the produced power to transmission line voltages. Each has transformer oil and each transformer is within its own spill containment dike. The main transformer at switchyard has the total oil of 17,750 kg. Minor drips and leaks, and a total GSU shell failure that allows for the spill of the entire volume of oil can be contained within these dikes. Control measures for small leaks and spills include mopping up with absorbent pads and then proper disposal. Large spills would require the transfer of the oil to drums for disposal and additional cleanup measures within the dike structure. It is highly
unlikely that oil would reach any grounds or waterways.

**Maintenance shop**

Golen Gol powerhouse has a Maintenance Shop to support all levels of maintenance activities at the Golen Gol site, including fabrication and repair of powerhouse equipment, and maintenance of the facilities’ mobile equipment. For this task up to 500 gallons of new oil is stored. The waste oil drums are located on a fully contained spill pallet and would not allow the release of any oil in the event of a drum failure. When the capacity of the two drums is over, the waste oil is properly disposed-off. All oils and fluids are stored on spill containment pallets or in shop locations where a spill could be readily contained prior to reaching a drain.

**Contingency Procedures**

The importance of oil spill prevention, containment, and clean up should be of importance during the annual safety training. According to the section on “Training for capacity building”, all work crews will be familiar with the SPCC Plan and the Contingency Plan. As soon as an employee notices an oil spill of any kind, he or she will notify the Operator Control Room. Notification of all interested parties shall then follow. If the spill is not contained within the facility, the oil spill discoverer shall recover as much oil as is feasible, using the oil-containing equipment stored on site while waiting for further instructions.

Once notified, the plant Manager shall concurrently follow the notification while organizing oil containment, recovery, and clean-up operations. For extended clean-up operations, the Operator Control Room shall be the communication center.

Golen Gol Project personnel shall provide the emergency containment and oil collection procedures of which they are capable with the supplies on hand. When it is determined that a thorough cleanup of any oil spill in harmful amounts is beyond the capabilities of the on-site resources of the Golen Gol Project, hiring of an oil spill response contractor is important.
EMERGENCY PROCEDURES – SPILL RESPONSE PLAN/CONTINGENCY PLAN

General
An important facet of an effective response procedure during an oil or hazardous substance release incident is to keep the material separated from water to minimize migration and the resulting potential increase in human and environmental exposure. There should be every effort to prevent spills and emphasize substance containment at the source rather than resort to separation of the material from expanded portions of the environment or downstream water.

Discovery of a Release
The person discovering a release of material from a container, tank, or operating equipment should initiate certain actions immediately, including:

Extinguish any sources of ignition
Remove all potential sources of ignition in the area until it is clear that the material is nonflammable and noncombustible. Turn off the vehicles. If the ignition source is stationary, attempt to move spilled material away from ignition source. Avoid sparks and movement creating static electricity.

Identify the material released
Consult MSDS sheets, which provide the information for proper identification of the characteristics of the released material. Assure that no danger to human health exists, then attempt to stop the release at its source.

Simple procedures (turning valves, plugging leaks, etc.) are important by the discoverer if there are no health or safety hazards and there is a reasonable certainty of the origin of the leak.

Initiate spill notification and reporting procedure
Report the incident immediately to the Operations Control Room. If there is an immediate threat to human life (e.g. a fire in progress or fumes overcoming workers), an alarm should be sounded to evacuate the building, which will initiate a fire department response. Request the assistance of the fire department’s hazardous materials response team if an uncontrollable spill has occurred and/or if the spill has migrated beyond the site boundaries.

Containment of a Release
If material moves outside a containment area, it is critical that the material be contained as quickly
as possible. Actions may include:

**Attempt to stop the release at the source**

If the source of the release is not clear; if special protective equipment is necessary to approach the release area; or if assistance is required to stop the release, initiate the fire department response by contacting the Operations Control Room.

**Contain the material released into the environment**

Following proper safety procedures, absorbent materials and dikes using shovels and brooms should contain the spill. Consult applicable MSDS sheets for material compatibility and environmental precautions.

**Recover or clean up the material spilled**

As much material as possible should be recovered and reused where appropriate. Treat the material with no reuse property as hazardous waste. Liquids absorbed by solid materials shall be shoveled into open top drum, or if the size of the spill warrants, into a roll-off container. When drums are full after a cleanup, secure the drum lids and label the drums appropriately identifying the contents, the date of the spill/cleanup, and the site name and location. Combining non-compatible materials can cause potentially dangerous chemical and/or physical reactions or may severely limit disposal options. Compatibility information is available on the MSDS sheets.

**Cleanup of the spill area**

Clean the contaminated surfaces using an appropriate substance or water. Minimize, contain and properly dispose-off the cleanup water. Occasionally, porous materials (such as wood, soil, or oil-dry) may be contaminated; such materials will require special handling for disposal.

**Decontaminate tools and equipment used in cleanup**

Even if dedicated to cleanup efforts, decontaminate the tools and equipment used before replacing them in the spill control kit.

**Notification and reports to outside agencies**

The SPCC Coordinator shall determine if a reportable spill has occurred and shall make all necessary notifications. Execute verbal notification to government agencies and emergency planning committees, if necessary. In all cases where verbal notification is given, send a confirming written report to the same
entity.

**Review the SPCC Plan**

Appropriate personnel shall review spill response efforts, notification procedures, and cleanup equipment usage to evaluate their adequacy during the spill episode. Where there are deficiencies, the plan shall be revised and amended.

**IN-HOUSE NOTIFICATION**

The discoverer of an oil spill at the Golen Gol Project shall immediately notify the Operations Control Room. The control room shall notify the Maintenance Foreman or Manager.

The Manager or Maintenance Foreman will be the Incident Commander (IC) in the event of a spill. The IC will assemble cleanup crews and notify District or local authorities of the spill as required by law and described in this document.

**NOTIFICATION TO OTHERS**

The Incident Commander shall notify the local fire department or designee if there is a potential fire hazard concurrent with the oil spill occurrence.

The Incident Commander shall notify the local police department or designee if there is evidence of sabotage, misconduct, or other wrong doing.

The responsibility of contacting and/or responding to the news media shall be the exclusive responsibility of the Project Director.

**DOCUMENTATION OF SPILL EVENT**

Project staff should keep log of all oil spill events. The log shall contain the date and time of discovery, actions taken, telephone calls, and weather conditions. It shall be a complete account of the spill event through completion of cleanup and restoration. The Golen Gol Project Director shall keep the log on file in the event of any future legal or government action that may result from the spill event.

Oil spill discoverer along with the operator who was on duty at the time of the spill, should complete the log with their initials. Keep all reports of oil spill on file for a minimum of three years and shall include the following information:

1. Date and time of the spill, and the location where observed.
2. Type and quantity of the oil spill.
3. Cause of the spill.
4. Personnel and equipment involved.
5. Containment and cleanup action taken.
6. Sequence and time of events.
7. Evidence, such as witnesses, photographs, and samples.
8. Action taken to prevent similar occurrences.
9. Assessment of damage and steps required for restoration.
10. Samples taken and laboratories used.

**Training for capacity building:**

Capacity building through training is critical for effective implementation of spill control plan. Following training plan will be very beneficial in this regard:

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>No. of trainees</th>
<th>Duration</th>
<th>Location</th>
<th>Frequency</th>
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</table>
| 1   | Spill Management covering following topics:  
     a. Spill prevention and controls  
     b. Spill management and clean-up measures  
     c. Inspection, Record and Reporting | 5 to 10 | 1 day | Onsite | After every 6 months |
| 2   | Disaster Management and Emergency Response | 5 to 10 | 2 days | Onsite | After every 6 months |