3.2 Water Resources

3.2.1 Mine Water Supply

The major water supply of Atlas comes from the Malubog Reservoir that was constructed in 1971. It is situated some three (3) km. north of the Carmen concentrator or 12 km. of Barangay DAS. The reservoir consists of a man-made lake with an original pondage of about 20,441,223.63 cu. meter and a concrete dam across a gorge on the south that was once the natural drainage outlet. The entire reservoir has a potential watershed of about 7,000 ha. The dam overflow gravitates downstream to a smaller reservoir called the Sigpit Dam.

The Malubog Dam was designed with a safety factor of 2.0 against sliding and a factor of 1.5 against overturning from an earthquake load with 0.2 "*g*" acceleration. The structural resistance of the limestone gorge provides additional strength to the dam.

The previous total water demand from the Malubog Reservoir was about 58.67 cu.m/min distributed into 54.89 cu.m/min for industrial use and 3.79 cu.m/min for domestic household consumption inside the mine camp and outside in Barangay DAS. Two 3-km. main pipelines deliver this supply to the receiving sump at Abaca and to Carcon head tanks.

The present domestic water requirements still draw its supply from the Abaca sump that initially feed the raw stock to the nearby Water Treatment Plant for filtration and chlorination. The treated water is then stored to a 2,839.06 cu.m head tank before it is distributed to six smaller holding tanks strategically placed around the mine site.

Acceptable environmental impacts in so far as indigenous and usable water resource is concerned are as follows:

a] A stable Malubog Dam and reservoir that can supply continuous industrial and domestic water to the mine and households, and at the same time support aquatic life as secondary food source.

b] Maximum utilization of available water resources from existing supply.

c] Assured potable and treated water supply for domestic consumption.

d] Continued sharing of Malubog water supply with the surrounding communities.

The corresponding control strategies are as follows:

a] CCC will comply all applicable regulations and standards prescribed under DAO Nos. 34 and 35.

b] CCC will adopt water conservation as a company policy and practice both in industrial and domestic fronts. It will optimize used-water recovery and recycling in milling operation.

c] Water treatment plant operation and processes will be operated based on national standards.

d] Continuous inspection, repair and maintenance of Malubog Dam, sumps, holding and head tanks, treatment plant, and water delivery system will be implemented.

3.2.2 Acid Mine Drainage

By the nature and character of the CCC ore bodies which contain substantial amount of sulphide-rich rocks, mining and processing them have inevitably produced and will continue to generate above-normal levels of acid mine drainage (AMD). AMD are primarily produced as low-pH residuals from the exposed sulphide deposits, underground workings, open pit operations, and waste dumps, and secondarily from road cuts, stockpiles and mill drainage runoffs.

Specifically, the sources of the CCC AMD are identified in the following areas:

a) Carmen pit, which drainage outflow discharges to the Sigpit Biga Drain Tunnel (SBDT) and hence to the Sigpit Creek;

b) Waste dumps around the Lutopan catchments that drain toward and contained within the Lutopan Pit;

c) Waste dumps surrounding the Biga TSF draining toward and contained within the TSF facility;

d) Waste dumps north and east of the Biga pit that draining to the Malubog Reservoir.

3.2.3 Drainage System

The CCC mine complex is served by three major drainage systems namely: Cumba-Guinquiotan River at the north; Sigpit-Hinulawan River at the central portion; and Ilag River at the south. All these drainage systems eventually join the Sapang-Daku River that drains out towards Cebu's West Coast and to the Tañon Strait. A mountain range located east of the Atlas mine complex act as a divide that inhibits the flow of runoff water to the East Coast of Cebu.

3.2.4 AMD Control Measures

CCC, always conscious of its responsibility to protect the environment, has partially put in place and will continue to maintain a system to check acid mine drainage generation. It has always been the company's policy that all effluents flowing out of the mine complex must be within the standards prescribed by government regulations.

The AMD control strategies will consist of the following measures:

a) Backfilling of pit voids, such as, the storage and encapsulation of mill tailings within Biga pit;

b) pH control by dilution and chemical amendments to enhance mine drainage alkalinity and depress copper values;

c) Runoff water control by local drainage flow diversion and surface re-contouring;

d) Re-vegetation and afforestation of mine-disturbed pits and waste dumps to slow down oxidation of sulphide ores.

3.2.5 Water Dilution to Control pH Level

<u>Sigpit Dam area @ Sigpit-Hinulawan River Junction</u>

At Sigpit-Hinulawan River junction, the Sigpit Dam was constructed to serve as a secondary water reservoir, silt trap and monitoring point of effluents coming from the central portion of the mine complex. The dam is covered by Water Permit No. 1162 for industrial use. Though the dam does not serve as a reservoir, but the area just before the dam overflow serves as a mixing area where water from the Sigpit Settling ponds, Sigpit tributary and Hinulawan river merge before flowing over the dam.

The water flowing from Sigpit tributary and likewise from the Hinulawan River are suitable for dilution process since the pH level of the flowing waters are always slightly basic (7.0 to 8.0) principally because their headwaters are within the limestone formation.

3.2.6 Tailings Impoundment at Biga Pit

Per proposed land-based tailings disposal system where it will utilize Biga Pit as a containment pond, the encapsulation of mill waste that will eventually prevent oxidation of sulphide minerals exposed at the pit and in effect reduce, if not eliminate, generation of AMD therein. Further, the tailings mass is highly basic (pH = 10 to 11) in composition and therefore a potent depressant for neutralizing acid formation.

3.2.7 Chemical Amendments to Control pH Level

A slaked lime or lime slurry injection facility which has been in operation since August 1999 shall be maintained at the SBDT outlet to ensure and control that the quality of water being discharged is within the DENR standard.

3.2.8 Water Diversion and Surface Re-Contouring

Storm runoffs and subsurface water in Carmen and Biga pits presently flowing and seeping into predominantly pyritic zones will be redirected to limestone beds or areas with low-sulphide characteristics. Additionally, combined reshaping and re-contouring of pit and dump surfaces will also divert water inflow away from sulphide-rich areas. These interventions are expected to reduce volume loading of AMD from the surrounding waste dumps into the two pits.

3.2.9 Re-vegetation of AMD-Source Areas

To finally augment and enhance capping and other measures mentioned above, inactive pit walls and waste dumps slopes will be planted with well adapted trees and shrubs as a special component of the overall company-wide greening program.

3.2.10 Storage of Hazardous Materials

The identified hazardous materials (hazmats) of importance that CCC frequently store and handle in the operations are:

a] Hydro-carbon-based liquid fuels and related oil products.

b] Industrial gases such as LPG, hydrogen, acetylene, nitrogen, etc.

c] Mill reagents such as frothers, collectors, and flocculants.

d] Laboratory chemicals, such as acids, bases and similar reagents.

e] Paints, thinners, cleaning agents, and the like.

The acceptable environmental impacts emanating from the management of these materials are:

a] Handling, storage, use and disposal of these hazardous commodities are safe and in accordance with current statutory/regulatory standards.

b] Accidental spills and/or emissions of these materials are contained and handled quickly.

Control strategies to be applied are:

a] CCC will comply with all regulatory standards that control acquisition, handling, transporting, use, accounting and disposal of hazmats. Systems and procedures in managing hazardous materials will be updated to conform to the latest standards.

b] CCC will improve existing spill recovery facilities such as bunds, dikes or traps and provision of the same to unprotected storage areas.

c] The company will maintain emergency response and disaster control capability and resources. These include its emergency preparedness plan, evaluation procedures, training program, fire-fighting equipment, self-contained breathing apparatus, and emergency response crew.

d] The mine will enforce the use of only appropriate personal protective equipment in handling and disposal hazardous waste materials.

3.3 Noise Quality

CCC mining operations will inevitably generate unwanted sounds of varied intensity levels, particularly in certain areas where heavy equipment and mine machinery are operating. This problem will be more critical when these facilities are silted in confined spaces like enclosed structures such as plants, buildings and shops, or when the activities involve earthmoving, blasting or drilling.

However, the adverse impacts of noise to the people in the residential centers will range from minimal to nil on account of the large distance separating them from the operational areas. The negative effects will be localized at the point of immediate emission and the primary receptors will be the operators and people working nearby the source of noise.

The specific areas in CCC and activities with potentially high noise levels include but not limited to the following:

a] heavy equipment shops and points of operation

b] pump chambers

c] crushers and ball mill sections

d] off-highway truck operations

e] Tractor and loader operations

f] During blasting