

**Environmental Classification:**

The project was appraised in October/November 2001. This is a category III project according to the IIC's environmental review procedure because specific impacts may result that can be avoided or mitigated by adhering to generally recognized performance standards, guidelines and design criteria. The likely environmental issues associated with this project include: liquid effluents, air emissions, solid wastes management, fire protection, life safety, and emergency response. The sponsor has provided its "PAMA" (Program of Environmental Improvements and Management), which was presented to the Peruvian environmental authorities indicating a series of investments to be carried out over the next 5 years to bring its operations in line with Peruvian and international standards. IIC has met with QUIMPAC and reached agreement on the order of priority of the environmental investment program. With respect to the chemical operations, the projects relating to the mitigation of the environmental health and safety risks associated with mercury and preventing the accidental release of chlorine gas will occur within the project implementation period. In the paper operations, several projects, which are described below, have been developed to bring liquid effluent discharge, particularly the black liquor from the pulp plant, to internationally acceptable levels.

**Environmental and Labor Issues:**

**Environmental Compliance:** In Peru the Environment and Natural Resources code (D.L. No. 613) and the Promotion of Private Investment law (D.L. No. 757) require and define the contents of an Environmental Impact Assessment (EIA) for all new investments that have impacts that might be harmful to the environment. Similarly for the industrial/manufacturing sector, the Environment Protection for the Development of Manufacturing Industries law (D.S. No. 019-97-ITINCI) requires an EIA and Declaration of Environmental Impacts (DIA) for new companies. Companies with existing operations are required to present a Program of Environmental Improvements and Management (Programa de Adecuación y Manejo Ambiental - PAMA) demonstrating how it proposes to become compliant with the Manufacturing Industries law. This is a two-stage process requiring first a Preliminary Environmental Diagnosis (Diagnóstico Ambiental Preliminar - DAP) providing the results of monitoring tests, identifying the problems and their effects, and proposing solutions. Once the DAP is accepted and approved by the Ministry of Industry, the company submits its PAMA advising of the actions that it will take to achieve compliance, including the nature of the technology to be applied, the targets to be achieved, and quantities of contaminants that will be removed and how they will ultimately be disposed of. Quimpac submitted and obtained approval for its DAP. Quimpac has submitted its PAMAs for Oquendo and Paramonga, which are under consideration by the Ministry of Industry. In the interim, Quimpac reports its progress on the implementation of its PAMA and meets with the Ministry periodically.

During the appraisal, Quimpac provided information, including its PAMA, on how it is addressing and plans to address environmental and labor issues and demonstrate that the proposed project will comply with applicable national, regional, and IIC requirements. The information provided about how these potential impacts are addressed by the project is summarized in the following sections.

**Land Use:** The company has two chemical plants: one in Oquendo, located in a suburb north of Lima; and another in Paramonga, 210 km north of Lima. It also has two solar salt ponds, one in Huacho, 130 km north of Lima, and another in Otuma, 280 km south of Lima, as well as a pulp and paper plant and a distillery located at the Paramonga site. All of the property on which the company currently operates was used for the same types of activities prior to Quimpac's acquisition through their privatizations. The project does not contemplate the necessity for obtaining additional land. The project sites are not located near sensitive habitats, and no resettlement or economic

displacement will occur as a result of the project. The sites are not prone to flooding.

**Solid Waste Management:** Solid waste generated by Quimpac's plants consists of waste fiber and conventional trash. In the future it will include sludges, effluent treatment plant sludge from the paper plant, and salmuera/brine sludge from the chemical plants.

The main source of sludge from the chemical plant will be the decontaminated salmuera/brine sludge that will contain less than 0.005mg/l of mercury. This will be achieved by first increasing the purity of the brine salt via the \$3.95 million investment at the Huacho salina, which would improve the characteristics of the electrolysis process as well as reduce the sludge produced from 2,571 kg/yr to 327 kg/yr. The second stage would be to extract a further 178kg/yr via chemical precipitation. The final load would be removed via condensation in an extraction oven.

The company recycles waste fiber bagasse generated by the neighboring sugar mill at Paramonga using it as its source of fiber to make paper. Treatment plant sludge that is generated from the proposed paper plant liquid effluent treatment plant will be disposed of in accordance with local requirements. The remaining conventional trash will be disposed of in accordance with local requirements.

**Liquid Effluent Treatment:** The project includes several measures, described below, that will be taken to reduce the environmental impacts of liquid effluents that are generated by Quimpac's chemical operations at Oquendo and the chemical and pulp and paper operations at Paramonga. Liquid effluents currently only receive primary treatment by Quimpac before they are discharged into the sea via two canals at Paramonga and one at Oquendo. At Oquendo maintaining low levels of suspended solids, COD, and mercury in the liquid effluents are the main concern. At Paramonga the situation is similar except that an additional concern is the organic content related to fibers from washing the bagasse. Because there is no recovery or recirculation in the paper plant or the bagasse washing plant, while the loads are as would be expected, the concentration of the effluent from the paper plant is not very high. Additionally, as stated above a significant amount of HCL is diluted to about 1% and sent to the sea; a practice which will be reduced significantly with the implementation of the project.

At the Oquendo facility there are two main sources of liquid effluents: the chlorine/caustic soda plant and the bicalcium phosphate plant. Other than the processes to remove mercury from the brine sludge of the chloro/caustic soda unit, filter units will be installed to reduce the traces of mercury from (1) the caustic soda, \$690,000; and (2) hydrogen, \$450,000 to 0.01ppm and 0.005mg/m<sup>3</sup> respectively. In order to reduce the COD load from the bicalcium phosphate plant, a press filter (\$467,500) will be installed to recover the monocalcium liquor and to compact the sludge that can be sent to a landfill. These two actions will ensure that the mercury content of the liquid effluents leaving the plant will be consistent with internationally acceptable standards. Additionally, they will significantly reduce the COD of the effluent leaving the plant. To improve the diffusion of the final effluents leaving the plant, a submarine line will be constructed from a central collector point that will have its discharge at a minimum depth of 9 meters. While current Peruvian laws do not prescribe discharge standards for chemical plants, the company is being proactive by committing to achieving IIC and internationally accepted discharge standards (including a COD level of less than 250 mg/l) within the project implementation period of two and one-half years. To measure the progress of the implementation of the projects to improve its liquid effluent properties, Quimpac has agreed to monitor the quality and volume of flows from the collector lines from (1) the chloro/caustic soda, (2) bicalcium phosphate, (3) ferric chloride, and (4) central collector chamber monthly and report to IIC quarterly.

At the Paramonga facility the main sources of liquid effluent are the chemical plant, the pulp and paper plants, and the distillation unit. Other than the processes to remove mercury from the brine sludge of the chloro/caustic soda unit, filter units will be installed to reduce the traces of mercury from (1) the caustic soda, \$690,000, and (2) hydrogen, \$400,000 to 0.01ppm and 0.005mg/m<sup>3</sup> respectively. The other large source of liquid effluent related to the chemical plant is the present practice of diluting and neutralizing surplus HCL and sending it to the sea. This practice will be reduced considerably if not stopped with the installation of the calcium chloride (\$1.9 million) and calcium hypochlorite (\$3.6 million) plants that will utilize the surplus HCL that exists today. Like the Oquendo plant, a submarine discharge line will be constructed to discharge the improved effluents, and monitoring will be required at the collector lines from (1) the chloro/caustic soda unit, (2) HCL unit, and (3) central collector chamber on a monthly basis, with quarterly reporting during the implementation of the projects.

There are four main sources of liquid effluent discharge from the pulp and paper plant. The main concern is the black liquor generated from pulp washing and bleaching. The company will extract the lignin thereby reducing the COD by 50%. The residual liquid that will mainly be sodium chloride will be discharged to the sea in the submarine line. The effluent from the three other sources, i.e., (1) the bagasse washing, (2) bleaching line, and (3) the paper plant will be treated via conventional primary and secondary methods to meet international standards. Additionally, projects are being investigated to recover and/or recycle some of the water, thereby reducing the volume that needs to be treated. As with the chemical plant, these discharges will also be monitored during the project implementation. A covered canal is being constructed to divert the final effluents from the pulp and paper plants from their current route, in an open canal through a neighboring community, and carry it directly to the sea. The company proposes to use lagoons to treat the liquid effluent discharge from the alcohol plant.

**Storage (Fuel, Chemicals) and Spill Containment:** There is generally good provision for spill containment devices in Quimpac's facilities. The buried fuel storage tanks are generally metal and sit in concrete chambers. The tanks are pressure tested according to a maintenance schedule. Some minor routine repairs will be implemented to restore structures that have degraded over time.

**Water Supply:** Quimpac obtains its potable and process water from four (4) wells at the Oquendo site which provide 36 liters per second from an aquifer about 80 meters deep. Extraction of water is approved by Sedapal (Servicio de Agua Potable y Alcantarillado), a state authority that manages water resources. At Paramonga surface water is extracted and treated prior to use in the pulp and paper plant.

**Gaseous Emissions and Ambient Air Quality:** Quimpac's plants do not produce large quantities of process air emissions. The steam boilers at the pulp and paper plant are operated to minimize air pollution through combustion controls; the largest boiler is about 2,970 BHP. The DAP results demonstrate that emissions are comparable to World Bank standards.

The ambient air quality in most of the plant is acceptable. The two areas of most concern are (1) the drying and packaging areas around the bicalcium phosphate plant, and (2) downwind from the electrolysis cells and HCL units. Workers are provided with breathing apparatus in the bicalcium phosphate plant area and an electrostatic precipitator (ESP) has been installed, however, there continues to be a high level of particulates in the area. To improve the situation, increased attention will be placed on the maintenance of the ESP unit and other particulate collection devices in the area. Chlorine gas detectors have been installed at the Oquendo site that trigger an alarm if the chlorine concentration in the ambient air exceeds 0.05ppm. Quimpac has committed to installing similar detectors at the Paramonga chemical plant.

Occupational Health and Safety and Fire Safety: Quimpac has a health and safety committee and has submitted a Health and Safety Plan that has been approved by the Ministry of Industry. The safety committee, composed of representatives of management and the workers, meets periodically. The company provides safety equipment to the workers. However, based on the appraisal visit, there is not a demonstrated commitment to safety at all locations at which the company operates. The safety systems have been implemented and function well at Oquendo, the company headquarters, but conditions are quite different at the Paramonga chemical plant. This is evidenced by inconsistent use of safety equipment, safety signs of differing ages and state of cleanness posted throughout the plant, at the Paramonga chemical plant. Based on the lack of chlorine detectors and poor access to emergency equipment at the Paramonga chemical plant, a safety program is being designed to ensure that the correct equipment is available for the hazard presented at each plant location to focus on employee training. The IIC will require that a detailed program (by department) of the implementation of the safety and emergency response training, including a time schedule and record of evidence of its implementation be kept. Additionally, the minutes of the safety committee should be posted where the workers can observe them, and emergency response simulations should be performed at least twice a year.

The roof at the salt packaging plant at Haucho is made of asbestos and is in an advanced state of degradation. Parts of this roof are currently being replaced, and the rest will be changed as soon as possible.

Fire protection at Quimpac's operations is provided via a system of hydrants and extinguishers located around the plants. The hydrants are fed by the general water supply including dedicated storage tanks. The extinguishers at the plants are checked and recharged about once every two (2) months. Existing fire protection and emergency response programs will be reviewed in the context of the revised safety program to meet local requirements. Employees are trained for proper response to emergencies (2 drills per annum), including the use of fire extinguishers and hoses, and the procedures for evacuating the facility during an emergency.

Noise: Within the plants there is a relatively high level of noise, particularly in the paper plant. Quimpac provides earmuffs and earplugs. Noise levels will be measured in the plants and at the boundaries, particularly at Paramonga where there is a neighboring residential zone, to ensure that they are below 70dBA.

Labor: There are two unions present at Quimpac's plant representing about 20% of the employees. Quimpac's salary structure, benefits, and incentive structures far exceed the minimum requirements of the Peruvian law. Benefits range from the provision of subsidized meals to access to company medical schemes for workers families. Technical staff is continuously upgraded through attendance of internal and external courses.

Monitoring and Compliance: Quimpac is required to implement an environmental management plan (EMP) that is acceptable to the IIC. The EMP will include (1) a description of Quimpac's environmental and safety management systems, (2) implementation schedule for all of the environmental and safety items mentioned, and (3) the annual monitoring requirements. During the life of the project, IIC will monitor ongoing compliance with its own Environmental and Labor Review Guidelines policy by evaluating monitoring reports submitted annually to IIC by Quimpac and by conducting periodic site reviews during project supervision.