PLANNING ENVIRONMENTAL MANAGEMENT SYSTEM IMPLEMENTATION AT BEER LAO

PURPOSE

This case study examines environmental management at Beer Lao and documents measures implemented to date as the factory considers future adoption of an environmental management system (EMS) and possible accreditation under the ISO 14001 standard. Particular attention is given to steps that Beer Lao has completed in preparing for possible future accreditation and documents their ongoing efforts to address environmental issues at their factory through the application of best management practice such as EMS and cleaner production (CP).

ETP1 COURSE TOPIC COVERAGE:

- ENVIRONMENTAL MANAGEMENT SYSTEMS (EMS)
- ISO 14001 GENERAL REQUIREMENTS
- ISO 14001 ENVIRONMENTAL POLICY
- ISO 14001 ENVIRONMENTAL ASPECTS
- ISO 14001 OBJECTIVES AND TARGETS
- ISO 14001 MONITORING AND MEASUREMENT
- ISO 14001 NON-CONFORMANCE CORRECTIVE AND PREVENTIVE ACTION
- ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

ISSUES

Specific issues highlighted by this case study are:

1. Strategic and other benefits to industry of implementing an EMS and gaining ISO 14001 accreditation
2. Potential to address environmental impacts of industrial operations through voluntary EMS implementation
3. Adoption of EMS does not necessarily mean that industries should seek ISO accreditation
4. Planning for EMS implementation and ISO 14001 accreditation

LEARNING OBJECTIVES

On completion of this case study, participants will be able to:

- Assess whether Beer Lao's evolving environmental policy meets all requirements of ISO 14001 standard
- Identify environmental aspects of the Beer Lao operation
- Characterize environmental impacts associated with breweries
- Summarize and critique the findings of the environmental impact assessment (EIA) completed for Beer Lao's recent expansion

- Identify management practices and CP methods employed by the factory to prevent or reduce environment impacts
- Discuss and contrast environmental protection objectives and standards applicable in Lao PDR with those of other lower Mekong River Basin countries
- Describe environmental monitoring programs undertaken by Beer Lao and responsible government agencies in Vientiane
- Recognize the importance of education in developing greater environmental awareness among industry and the public

PROJECT SUMMARY

Introduction and Background

The Beer Lao factory, the first in Laos, was established in 1972. The factory is located in the southern part of Vientiane Municipality on Thadua Road and is situated close to Ban Salakham village, part of the Hatsayphong district. Initially, the factory was a joint investment between French (85%) and Lao (15%) investors and cost a total of US$3,750,000. Starting production capacity was 30,000 hectolitres/year (Note: a hectolitre, abbreviated as hl, is equal to 100 litres). The first beer was delivered in 1973.

From 1975 to 1976, beer production decreased from 28,541 hl/year to 128 hl/year, respectively, due to a lack of imported raw materials following the formation of Lao PDR in late 1975. In 1977, the beer factory was nationalized and increased production to 5,363 hl/year and again in 1978 to 22,444 hl/year. By 1990, beer production has increased to 45,000 hl/year.

Due to high domestic beer demand, the factory expanded operations in 1990 to increase production capacity to 69,000 hl and to 87,000 hl in 1992. Responding to ever increasing domestic demand, the factory was reconstituted as a joint venture between Loxley-Italian Thai Company (51%) and the Lao PDR Government (49%) in 1993. A second expansion of the factory was completed in 1994 allowing beer production to progressively increase from 102,000 hl by the end of 1994 to 250,000 hl in 1997.

Despite the two successive factory expansions, beer production was still insufficient to domestic requirements. Therefore, in August 1997, the factory planned another expansion and received approval to construct an additional beer making facility on the existing site. This third expansion, completed by the end of 1999, increased production capacity to 500,000 hl/year. Capital investment and corresponding production capacity from start of production in 1973 to the present are summarized in the following table.

YEARS	PHASE	CAPITAL INVESTMENT	PRODUCTION CAPACITY
1972	Start-up	3,570,000 US$	30,000 hl/year
1990 to 1993	I	800,000,000 Kip	80,000 hl/year
1994 to 1996	II	6,700,000 US$	250,000 hl/year
1997 to 1999	III	8,500,000 US$	500,000 hl/year

Description of Beer Lao Operations

The main raw materials for beer production are:

Malt – approximately 9,600 tonnes/year; imported from France
Hops – approximately 25.8 t/year; imported from Germany
Rice – approximately 3,550 t/year; locally sourced
Water – groundwater sourced from an undeveloped area of Vientiane municipality

The current annual production of 500,000 hl comprises three different products:

Bottled beer – 365,000 hl (73%)
Canned beer – 35,000 hl (7%)
Draft beer – 100,000 hl (20%)

Only 1.4% of production is currently exported to Cambodia, France, Japan, New Zealand, USA and Vietnam. The remaining 98.6% of beer produced is consumed locally, with 64% delivered to outlets in Vientiane municipality with the remaining 34.6 being destined for other provinces. As a result of the successive expansions, the Beer Lao factory now meets 98% of local beer demand with only 2% of beer sales being imported brands.

Pollution Sources from Brewery Operations

The primary sources of pollution from the Beer Lao operation are residue (draft), chemicals and water use. Wastewater discharges are of most concern from an environmental perspective. Factory waste steams and pollutant discharges are briefly characterized in the following sections.

Solid Waste

- **Residue** is a type of waste called 'draft' which is a residual substance from the beer production process. Approximately 500 tonnes/month of draft is currently generated. If this residue is not treated or disposed of, it can become a source of odors. Consequently, the draft is collected daily and removed from the factory site. Since draft can be used as animal feed, Beer Lao has no problem disposing of this production by-product which provides a substantial secondary income.
- **Glass (broken bottles)** create a solid waste problem because about 0.9-1% of bottles used in the factory are broken during the bottling process. At present,

waste glass is stored and removed for disposal by the Vientiane Municipality Cleaning Authority. In the future, the factory plans to recycle glass waste for other uses by contracting with interested companies or by exporting it the neighboring countries where the necessary recycling technology is available.

- **Sludge from the wastewater treatment process** constitutes a large volume of the solid waste generated by the factory. After de-watering, the sludge is collected and transported to bio-fertilizer plants.

Air Pollution

Air pollution from plant originates mainly from chemical evaporation, primarily NaOH used in the bottle washing process. Other source of air pollution is emissions from the factory's oil burning boilers. Although both the chemical and boiler emissions are released untreated to the atmosphere, the impact on air is considered negligible and is considered unlikely to affect either the health of factory workers or local area residents.

Wastewater

Wastewater is generated during all stages of beer production at the factory. The highest wastewater volumes are generated during:

- Bottle washing
- Spills during bottling
- Floor washing
- Process discharges and tank washing including the cooker, mash tub, and kettle
- Sanitary wastewater

The primary contaminants in the factory's combined wastewater are yeast and worth. Other common contaminants are:

- NaOH used for bottle washing
- H_3PO_4 used for washing beer tanks
- OXONIA, or acetic acid, used for killing germs at all stages of production
- Hypochlorit 60% CL_2 used for killing germs in raw water
- Chemicals used for washing floors, such as VIXON
- Oil and grease used for machinery maintenance

The Beer Lao factory produces s substantial volume of wastewater – approximately 700 - 1,000 m^3/day. If the factory had no treatment facility, wastewater discharge would constitute a serious environmental problem given the factory's close proximity to local communities and the agricultural activities adjacent to the factory site. To address concerns raised by both factory workers and area residents regarding potential environmental and social impacts, the factory owners and

management committed to investing in the construction of modern wastewater treatment systems in accordance with Lao Ministry of Industry and Handicraft standards. Treated wastewater is currently discharged from the factory to a nearby ditch which subsequently drains into paddy field before eventually finding its way to the Mekong River located at a distance of approximately 12 km from the factory. Specifics of Beer Lao's wastewater treatment system are detailed in the next section.

Beer Lao's Current Environmental Management Practices

Upgrading of Wastewater Treatment Facility

Untreated wastewater discharges from the factory have the potential to cause significant environmental impacts. Beginning in 1973 when the factory started operations, proper treatment of wastewater has been a management priority. Early treatment technologies were basic, involving retention of wastewater in small natural ponds to allow contaminants to settle out of suspension. With an increasing production capacity in 1993, the factory upgraded their wastewater treatment by adding large aeration lagoons. Unfortunately, the expanded system was unable to handle wastewater volumes and the treated effluent was determined not to meet applicable environmental standards. In 1996, the factory made a substantial investment in construction of a modern wastewater treatment facility. The new facility has the capacity to treat 1,200 m^3/day of wastewater containing up to 2,000 mg/l BOD (Note: BOD is the abbreviation for biochemical oxygen demand) and 200 mg/l suspended solids. The activated sludge system consists of an oil and grease separation tank, rotary screen, equalization tank, sedimentation tank, sludge digestion tank, sludge holding tank and sand drying beds. Treated effluent from the new facility meets standards for brewery operations set up by the Lao Ministry of Industry and Handicrafts as summarized in the following table.

PARAMETER	VALUE
PH	6 - 9.5
BOD_5	Not exceeding 30 mg/l
TSS	Not exceeding 30 mg/l

Environmental Management Initiatives in Progress

Although Beer Lao does not as yet have a written environmental policy, the factory management emphasizes environmental awareness and protection in all aspects of the operation. A recent initiative was the setting up of a four person environmental unit within the production section of the factory under direct supervision of the Production Section Head. The unit reports to the factory Production Director. The environmental unit is responsible for:

- Overseeing day-to-day operations of wastewater treatment facility
- Monitoring water use and wastewater volumes

- Conducting daily analyses of pH and DO to assess wastewater quality
- Regular reporting of results to factory management

To ensure the continued effective operation of the wastewater treatment facility as production capacity continues to increase, the factory management approved a budget in 2001 for the addition of a suspended solids separation stage. This stage will allow separation of suspended solids from the combined wastewater stream before entering the main system to further reduce suspended solid loadings in the final effluent.

Achieving reductions in water used in the production process is also a priority for the factory management. Benefits of reduced water use include: (i) reduction in costs of beer production; (ii) lower expenditures for treating wastewater; and (iii) less impacts to the environment. Although no targets have been set by management, water use and wastewater volumes are closely monitored to determine the best management and technical response.

Another important environmental initiative at the factory is aimed at raising environmental awareness among factory workers and administrative staff. Employees are asked to pay close attention to waste separation and containment, especially to avoid solid waste materials entering into wastewater stream. When problems occur they are investigated and follow-up measures are taken to determine the cause of the problem and how best to avoid repeats in the future.

SITE VISIT METHODOLOGY

This case study will involve a site visit to the Beer Lao factory to provide participants, through hands-on learning (e.g., observations, interview, and document reviews) deeper insights into and understanding of the principles and practices of EMS. The site visit will start with briefing by factory representatives on production process, waste and emissions arising from each stage of production and their associated environmental impacts. Participants will then tour the factory and grounds during which time they can observe all aspects of factory operations and interview company managers and employees, in addition to local people living around the factory. The Beer Lao factory is conveniently situated just 12 km from Vientiane ensuring that participants will have enough time to complete assigned tasks in a single day. Before departure, participants will be organized in small groups of 4-5 persons, and specific tasks will be assigned to each group. The small groups will be expected to consider the following questions:

- What are Beer Lao's significant environmental aspects and impacts?
- Does Beer Lao's environmental policy meet all the requirements of the ISO 14001 standard?
- Do Beer Lao's environmental protection objectives and standards meet the ISO requirements?
- Is the corporate culture of Beer Lao compatible with seeking ISO accreditation?

On completion of the site visit, the small groups will be asked to present their findings to the class with emphasis on the practical lessons learned by course participants which reinforce EMS/ISO and EIA theory taught in the course.

TAKE HOME MESSAGES

Anticipated lessons learned by course participants in completing the case study and site visit might include:

1. The importance of EMS in helping companies proactively address operational environmental issues on an ongoing basis. In this way, EMS is an environmental management tool available to companies to help them remain in compliance with applicable environmental regulations and requirements.
2. Benefits to companies of seeking ISO accreditation go beyond good environmental management. For companies operating in competitive markets and those seeking to export their product, ISO accreditation can have important marketing benefits by providing assurances to consumers and investors that the company operates in an environmentally friendly manner.
3. EMS and ISO can be regarded as complimentary to EIA in providing assurances that accredited companies continue to address environmental concerns by seeking ways to minimize and effectively mitigate environmental impacts associated with their operations. Ongoing assessment of environmental impacts in this way reflects the emerging view that EIA should be regarded not just as a one time exercise but part of an ongoing process (i.e., covering all aspects of a project or activity from cradle-to-grave).

REFERENCE READING

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