



INTERNATIONAL WATERS EXPERIENCE NOTES

Preparation of a Pollution Abatement Plan for Lachin 2012 Tannery



Abstract: Lachin 2012 is a tannery in Azerbaijan. It was identified by the Ministry of Ecology and Natural Resources as a significant polluter in the Kura River Basin. The ministry was in the process of requiring the company to construct a wastewater treatment facility, and asked for the projects assistance in developing appropriate implementation measures as part of the UNDP-GEF Kura II project.

The project proposed developing a pollution abatement plan, focusing initially on the implementation of cleaner production techniques to reduce pollution, and then developing plans for the treatment of the residual wastewater stream.

The pollution abatement plan developed includes 13 measures for improvements in water use efficiency and pollution reduction. Implementation of the plan is projected to achieve a 17% reduction in water consumption at the facility. Critically the measures will reduce the volume and load of wastewater to be treated in the proposed wastewater treatment plant by 21%, reducing the capital expenditure required for its construction and ongoing operational costs.

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Preparation of a Pollution Abatement Plan for Lachin 2012 Tannery

Experience of the GEF - sponsored

UNDP GEF/IW: Kura II: Advancing IWRM across the Kura river basin through implementation of the transboundary agreed actions and national plans

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PROJECT DESCRIPTION

The Kura II Project was developed to address the priority needs in the ministerially endorsed Strategic Action Plan (SAP) through implementation of the SAP and national Integrated Water Resources Management Plans to strengthen and harmonize coordinated conjunctive transboundary ground and surface water management. It comprised five components: Support for institutional governance protocols; professional development and capacity building for water managers across sectors; stress reduction measures in critical areas; stakeholder education and empowerment; and, enhanced science for governance.

This work was undertaken under Output 1.4 of the project the objectives of which were as follows:

Azerbaijan and Georgia have benefited from multiple projects on water quality monitoring in the past 15 years. There is high awareness of challenges at the local national and transboundary level and it is now time to take action towards abating point source pollution, where possible. This output is designed to support the countries to develop pollution abatement plans (PAP) and environmental compliance action plans (CAP) for pollution abatement in line with international best practices, including the EU WFD, and best available technologies. This will include the EU WFD pressure-impact analyses, and risk assessment guidelines, and support the implementation of EU WFD compliant Program of Measures. Compliance will be based on a combination of both positive incentives and punitive measures to improve water conditions in the Kura basin.

THE EXPERIENCE

Issue

Untreated wastewater emissions from the industrial sector were identified as a key source of pollution of the Kura River. The Ministry of Ecology and Natural Resources in Azerbaijan had identified Lachin 2012 Tannery as a significant polluter to the Kura River Basin.

Lachin 2012 is a tannery specialised in processing of cattle hides and sheepskins. Production site is located in Yevlakh, and consists of two separate processing halls, one for cattle hides and one for sheepskins. Current annual processing capacity of the tannery is 6,700 tons of cattle hides and 336,000 sheepskins. Processing of cattle hides includes: curing of raw hides, washing, dehairing, fleshing, splitting and tanning with chromium (Cr³⁺) salts. Sheepskins processing includes: soaking, dehairing (painting and wool removal), fleshing, washing and pickling with salt (NaCl). Tanning of sheepskins and post-tanning operations for bovine hides are not performed on site.

When the project commenced Lachin 2012 discharged untreated wastewater from its facility to the local sewage system and ultimately to the Kura river Basin. The company was interested in water preservation and was seeking expert support regarding wastewater treatment and potential reuse of treated water.

The Ministry were interested in the Pollution Abatement Plan approach proposed by the project and identified Lachin 2012 Tannery as a possible candidate for its application. The company agreed to participate in the project and agreed to develop a Pollution Abatement Plan with the assistance of the project.

Addressing the Issue

In order to develop Pollution Abatement Plan for Lachin 2012 a detailed environmental assessment was conducted within UNDP GEF Kura II project during period October 2019 – March 2020. The assessment included a resource efficiency (cleaner production) assessment, an assessment of best available techniques (BAT) and a benchmarking analysis. The entire site was assessed during the audit including all production activities.

The resource efficiency assessment was based on UNIDO Cleaner production methodology, and was undertaken by the International Expert during two extensive audits of the facility.

In order to analyze the performance of the tannery in more detail, a benchmarking study was undertaken. The production related water consumption indicator for cattle hide production hall was compared to average and peak industry values in order to identify possibilities for improvements and quantify potential for reduction of water consumption. The facility's key metrics including production and consumption data were also analyzed.

A best available techniques (BAT) assessment was undertaken to identify areas within the production process on site can where improvements could be made. The BAT Reference documents on best available techniques produced by the European Commission were used as a reference source and only BATs related to water (consumption, wastewater generation and quality) and applicable to the size of installations in Azerbaijan were considered. A BAT assessment matrix developed for Kura II project was used for the detailed audit of the tannery.

On foot of the audits and analyses undertaken, a pre-feasibility study was developed which detailed technical efficiency measures, aimed at optimization and reducing water consumption, pollution prevention and pollution abatement. As the key environmental issues are high organic load and high content of suspended solids, sulfides and chromium in the wastewater, a preliminary design of a wastewater treatment plant (WWTP) and accompanying pollution abatement measures were developed to address these issues.

Potential financial benefits associated with the implementation of the proposed improvement measures were estimated taking into account all costs associated with extraction, use and discharge of water. Further economic assessment included cost-benefit analysis to identify the main drivers for the PAP economic viability and to determine the approach that minimizes implementation cost.

In order to select the most effective sequence for the implementation of proposed measures, a comparative ranking analysis was used to prioritize opportunities for implementation. The highest priority was given to measures that reduce water consumption and have low cost. Based on the results obtained from an analysis of the specific requirements for the measures established through pre-feasibility study and results of the cost-benefit analysis, a final implementation sequence and timeline for the PAP were developed.

The proposed pollution abatement plan was developed leading to the design and construction of WWTP, as the final and the most expensive step in pollution abatement. All preventive measures which result in pollution reduction and reduction of effluent volume were given priority, in particular low cost measures. Emphasis was also placed on the need for dedicated measures for the monitoring and measurements of water consumption within in the facility. This is a proven strategy to reduce water consumption and in turn the volume of wastewater generated.

RESULTS AND LEARNING

Summary of work and outputs

The proposed PAP for Lachin 2012 is devised as a detailed step-by-step guideline for the company to reduce water pollution. The PAP developed and the approach undertaken in its development can and should be used as a template and an example of good environmental practice for the tanning sector.

In general, the sector can benefit from implementation of resource efficiency measures and best available techniques. The lack of a proper wastewater treatment, poor water and wastewater management and lack of monitoring are some of the key problems in the sector. Based on estimates from the PAP, implementation of resource efficiency measures can reduce overall water consumption in a tannery and reduce the volume of wastewater requiring treatment by 15-20%. The most important measure to reduce water consumption relates to implementation of a dedicated monitoring system for water consumption. In addition, measures that reduce spills and prevent excessive use of water, and opportunities for possible water recovery and reuse should be investigated. Collection and reuse of water from processes like samming and recycling of spent pickling solution in processing of sheepskins can reduce the volume of wastewater sent to treatment by 4-5%. Also, separating the discharge of sanitary water from the process effluent stream can reduce it by additional 2-3%. Similarly, a significant reduction of pollution load can be expected from the implementation of pollution prevention measures, for example, the use organic sulfur compounds for the dehairing of bovine hides, which can reduce sulfide loads in the wastewater by 40 - 70%. The possibility to precipitate chromium from spent tanning solution and reuse it in the tanning process should also be investigated. The expected benefits from the implementation of this measure include reducing the amount of chromium in the effluent and a 30% reduction in the consumption of new chemicals. The implementation of the measure may also have a wider impact in the region, since it will allow a company to provide a service to other tanneries for the recovery of chromium from process wastes streams.

In adopting this approach, it is recommended that the design and construction of a WWTP is undertaken in a multi-staged approach where possible, to allow sufficient time for optimization of water consumption/wastewater generation in the plant. Chromium and sulfides must be removed (precipitated) from the wastewater before conventional wastewater treatment. This is likely to require time during the initial phase of the project for the reconstruction/reconfiguration of the wastewater collection system within the facility.

A cost-benefit analysis has shown that the implementation cost is the main driver for the PAP economic viability and that implementation of the PAP is justified on economic grounds only if implementation costs are minimized. Therefore, when developing the pollution abatement plans, all measures aimed at reduction in water consumption and wastewater generation should be frontloaded as far as is practicable in advance of the final and the most expensive step, the construction of the wastewater treatment plant. A staged approach that minimizes implementation cost and gives priority to the implementation of preventative measures, while improving the available data on wastewater flow and load to provide for proper sizing of the WWTP, should be adopted. The implementation timeframe will need to be agreed with the regulator, however according to the project findings an implementation period of approximately two and a half years, divided into four phases, may be sufficient.

REPLICATION

The critical criteria for the replication of this approach is the buy in and support of the Environmental Regulator and of the Company for which the Pollution Abatement Plan is being developed. As the plan will generally be developed outside of existing legislative frameworks both participants must be prepared to move forward with the initiative in a spirit of cooperation.

It must be recognized that this approach is a learning experience for both sides aimed at developing and an economically viable and environmentally effective plan which will benefit both parties.

It is important also that the company have access to experts on cleaner production that can assist with developing the pollution abatement plan. A sampling and monitoring capability is required for quantification of pollution loads both in process and for final discharges. In addition, the availability of local experts that can provide information on market costings are critical for completion of the economic analysis.

SIGNIFICANCE

The development and use of a Pollution Abatement Plan represents a sustainable tool set that can be effectively applied in the regulation of industry. Its focus on the reduction of pollution at source and the application of clean production techniques aims to move the industrial base to a more resource and cost efficient model, in line with our overall sustainability goals.

The approach focuses the regulatory model on sustainability, rather than compliance at any cost. It also embeds the concept of the use of best available technologies in industry throughout the process cycle and not solely related to abatement techniques.

REFERENCES

<https://kura-river.org>

KEYWORDS

- ◆ Cleaner production
- ◆ Tannery wastewater
- ◆ Water efficiency
- ◆ Industrial regulation
- ◆ Best Available Techniques

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