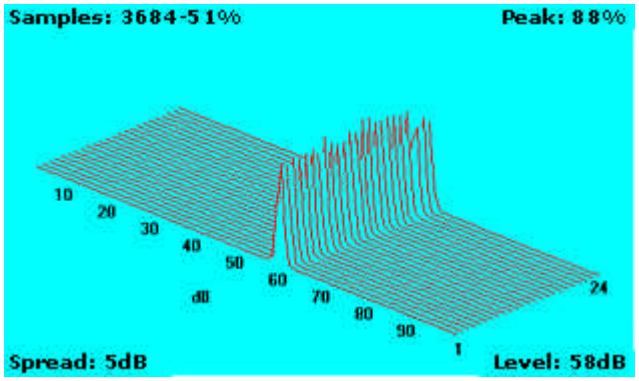
Leak Detection and Abatement in the Water Utility of Iasi



Project Title: Leak Detection and Abatement in Romania
Leader: Regia Autonoma Judeteana Apa-Canal Iasi (RAJAC), Romania
Partner: Cavanaugh & Associates, P.A., North Carolina, USA
Location: Iasi, Romania
Project Duration: August 1999–April 2000
EcoLinks Project Investment: Total Project Investment: $118,074 EcoLinks Grant Support: $46,820; Project Team Cost Share Contribution: $71,254.

Best Practice: Transferable Solution

In this Best Practice, modern leak detection technology was successfully transferred from the United States to Romania, and is suitable for application throughout Central and Eastern Europe. The testing of leak abatement technology in this project demonstrated the potential for a significant reduction in water loss at RAJAC, a Romanian water utility company. With implementation of this project, 60,000 m^3 of water were saved. The equipment provided accurate results and time saving benefits. A training program was conducted on how to use modern leak detection equipment. The training program and the equipment are highly transferable across sectors. The equipment, for example, can be used to improve water leak detection at water utility companies as well as district heating enterprises and other institutions that manage large water transportation networks. This project contributes to a larger effort to improve water efficiency throughout Iasi County that will ultimately reduce water loss by 8 million m^3 and provide a savings of $3 million per year.

Project Summary

RAJAC, a water utility company in Iasi, Romania supplies water to the city of Iasi and operates the municipal sewer system. It serves over 550,000 inhabitants and 2,100 institutions (mainly industrial). RAJAC's annual production of water is 56 million

m^3. Annual water consumption totals 40 million m^3. RAJAC loses 30 % of its water flow each day (a loss of 16 million m^3 of water annually) from leaks. The leaks result largely from deteriorating pipes and joints, poor pipe installation, and high-pressure fluctuations in the water distribution network. Leaks waste valuable water and energy resources and contribute to revenue losses. With an EcoLinks Challenge Grant, RAJAC partnered with a U.S. environmental technology provider, Cavanaugh & Associates, to develop a pilot leak detection and abatement program.

Before RAJAC was established, Iasi's water supply was unreliable and the quality of drinking water did not comply with Romanian standards. As RAJAC took ownership of the water distribution network for Iasi, it inherited several challenges. The equipment in the company's seven water treatment plants was obsolete and energy inefficient. Much of the 600 km of piping was outdated. The company's staff was not trained to operate the system efficiently and the company had an unfavorable public image.

RAJAC undertook many measures to improve this situation, including providing clients with a regular supply of drinking water. The water treatment plants were upgraded, and analytical laboratories were established at each plant. New water pipes were installed. The personnel were trained. The company became more transparent and established a Public Relations and Strategy Marketing Office for disseminating information about the company and water management issues. These efforts provide a savings of 60,000 m^3 of water per year.

This pilot leak detection project paves the way for implementing a $40 million program recommended by the European Bank of Reconstruction and Development to upgrade the water infrastructure system in Iasi, Romania. The project includes the following measures: 1) mapping of the water supply system; 2) modeling of water flows; 3) optimization of network operations based on automatic pressure control systems; 4) identification of leaks; and 5) repair or replacement of pipelines to eliminate leaks. EU grants are anticipated to finance a significant portion of this investment outlay. The ultimate objective is to reduce water losses by at least half, from 30% to 15%. Annual savings of 8 million of water and $3 million are anticipated.

Project Activities

The objectives of the project were: (1) to develop, implement, and evaluate a pilot leak detection and abatement program at a selected test site of Iasi county; (2) to expand the pilot project to the entire RAJAC Iasi network, and possibly to the entire province of Moldova; and (3) to raise public awareness of water conservation issues.

The project activities were as follows:

1. Identified the test site

Action: RAJAC provided maps of the Iasi water system. RAJAC and Cavanaugh selected Copou, a residential district in Iasi, as the pilot site for project activities.

Copou was selected as the pilot site for two reasons: 1) the Copou water supply system was known to have many leaks, and 2) most water consumers in Copou have water meters that could provide reliable data about the amount of water actually consumed by clients.

Product(s): Test site identification.

2. Trained RAJAC personnel in leak detection

Action: Cavanaugh trained RAJAC personnel in the use of Doppler leak detection equipment (manufactured by Fluid Conservation Systems), the data logging system, and data analysis. RAJAC employees received demonstrations of the equipment (i.e., installation protocol, data interrogation and transfer to a digital format using a laptop computer, and leak chart analysis and interpretation).

Cavanaugh and Fluid Conservation Systems provided supplementary information and training to RAJAC regarding the latest practices for leak detection and water conservation used in the US and promoted by the American Water Works Association (AWWA). Different types of U.S. leak detection equipment were analyzed and compared.

Product(s): Trained RAJAC personnel.

3. Implemented leak detection system

Action: The pilot leak detection project was developed and implemented in Copou. The data obtained from the detectors confirmed the location of known leaks, thus affirming the accuracy of the new equipment. Many additional leaks that were not previously known were also detected. RAJAC and Cavanaugh analyzed the data from the pilot project and prepared a technical and economic evaluation of the results. The basic tasks involved in leak abatement were identified as follows:

- Development of accurate mapping of the total water distribution system;
- Localization of leaks through identification of suspected leak-prone areas;
- Placement of acoustic, digital recording loggers at strategic points on the distribution system;
- Isolation of the detected leaks to a particular line segment;
- Establishment of exact location of each leak; and
- Categorization of leaks according to their magnitude.

Product(s): 1) Data on leakage sites in Copou 2) List of leak abatement tasks 3) Technical report including an economic analysis.

4. Developed water conservation program and public outreach campaign

Action: RAJAC and Cavanaugh prepared and disseminated a list of basic conservation measures to raise consumer awareness about water distribution and conservation and how to decrease water loss caused by leaks.

For individuals to decrease their water bill, conserve water, and avoid water shortages the following common conservation practices were introduced:

- Review of home or apartment fixtures for leaks and repairing them or replacing them with certified water saving devices;
- Conservation of water by making sure taps are shut off;
- Insulation of hot water lines; and
- Operating only fully loaded washing machines and dishwashers.

Client-oriented leak detection measures included consumer efforts to inform the water utility company about:

- Visible leaks from the system;
- Places where sounds of running water have no reasonable explanation;
- Cracks and water spots on the streets;
- Sudden or gradual increases in the amount of water use reported in a water bill; and
- Accidental or deliberate contamination of rivers, lakes, or ground water.

Other utility companies were informed of the project results and a seminar was organized to disseminate the project results and discuss the possibility of applying the technology throughout Romania.

Product(s): 1) Public awareness materials on conservation and leak detection measures 2) Seminar on project results 3) Media campaigns to promote water conservation measures.

Project Benefits

Multiple benefits were generated by this project. Due to the trainings, public awareness raising efforts and seminars, the opportunities to apply, benefit from, and share this new technology were significantly enhanced. Environmental and economic benefits were derived from the more efficient use of water and energy resources.

Capacity Building Benefits

Through trainings and the implementation of a public conservation strategy, this project built the capacity to improve water (and energy) conservation efforts. RAJAC staff was thoroughly trained to operate the leak detection equipment. The trainings on leak detection enhanced RAJAC's capacity to utilize and share Doppler leak detection technology. Using the Copou case study, it was discovered that limited staff and equipment would be needed to "scan" and detect leaks in the entire network of Iasi County. The company's public awareness-raising program encouraged and enhanced consumers' capacity to participate in water conservation efforts.

Environmental Benefits

This project reduces water loss by 60,000 m^3 of water per year. It, furthermore, provides the groundwork for follow-up funding of a larger infrastructure project with significant environmental benefits. The pilot leak detection and abatement study is a prerequisite for the implementation of a $40 million infrastructure program. When the infrastructure program is implemented across Iasi County, water loss will be reduced from approximately 30% to 15% of total RAJAC drinking water production. A 15% reduction in water loss would equal a savings of 8 million m^3 of water per year. Further, when water flow is more efficient, less energy is required to transport water to meet consumer demands.

Economic Benefits

The economic benefits generated by this project are positive in both the short-term and the long-term. In the short-term, it was estimated that three of the leaks identified in the pilot scheme were responsible for a water loss of 60,000 m^3/year and a revenue loss of $24,000. Since the equipment used during the pilot project cost approximately $20,000 and no further significant investments were needed to eliminate the leaks, the payback period for the equipment was less then one year. The potential savings in the long-term from reducing water loss by 8 million m^3 are approximately $3 million per year. This level of savings, however, requires significant investment in the infrastructure.

Lessons Learned

Several lessons were learned with the implementation of this project. They include:

- Proposed technology needs to be tested under local conditions to ensure it is transferable and suitable.

- It is imperative that local staff be thoroughly trained in how to operate the equipment under local conditions. This was especially important at RAJAC where the staff lacked the experience to use modern detection devices. In addition, the acoustic method requires practice in interpreting different sounds that vary according to the pipe diameter, the pipe material, type of soil, or the volume of noise from other sources.

- A baseline of current water loss must be established before potential water savings can be determined. Since there were a limited number of water meters in the RAJAC supply network, the project team had to start by installing general flow meters to estimate current water loss.

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