

UTAH'S FIRST LANDFILL GAS-TO-ENERGY PROJECT – WEBER COUNTY

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ABSTRACT

The Stage: It was November 2001 and Weber County had just received responses to their Request for Proposals from developers for a landfill gas utilization project at the closed 69 acre Weber County Landfill in Ogden, UT. The hope was to put the landfill gas to beneficial use and the County would receive a royalty for use of the site and gas. Then the December 2001 Enron bankruptcy and February 2002 stock market collapse rocked the financial world. Shortly thereafter, in April 2002, Weber County accepted the LFG development proposal submitted by Blue Sky Energy (Vancouver, BC) and SCS Engineers (Bellevue, WA).

The Scene: Investor trust in energy projects was at an all time low. Investor capital had all but dried up. There were no Section 29 or 45 tax credits to help support the project financials. The greenhouse gas offset market was beleaguered providing no visible help for the project.

The Question: How could a landfill gas-to-energy project be developed under these adverse conditions?

The Answer: Persistence...creative financing....flexibility....a win-win attitude... and public-private cooperation. Weber County, Blue Sky Energy, and SCS Engineers teamed up to develop a 69 acre landfill gas collection system and a 950 kW electric generating plant to augment the County's adjacent park and redevelopment of the closed landfill. The project is in operation at this time.

PROJECT DATA

The Weber County Landfill began accepting waste in the mid sixties. The landfill closed in 1996 with approximately 3.4 million tons of waste in place. The landfill is approximately 69 acres in foot print, is unlined

and has an 18 inch thick 1×10^{-5} cm/sec clay amended soil cover. As part of the landfill closure, Weber County constructed vegetative plantings on the landfill and planned to develop an open use park on it as well.

A native soil landfill gas extraction system was installed along one side of the landfill in the seventies to control migration of gas into the adjacent neighborhood. There is no regulatory requirement to have additional landfill gas control for this landfill

From a regulatory perspective, the Weber County landfill is not subject to many requirements due to its age, size and closure date. The migration control system is monitored monthly as is the condition of the cover system. Upgradient and downgradient ground water wells are monitored monthly and reported to the state quarterly.

The landfill gas-to-energy (LFGTE) project consists of a 30 vertical well gas collection system and an SCFM Compression Systems suction scrubber/blower/air-cooled heat exchanger/discharge scrubber supplying up to 460 scfm of landfill gas at approximately 45% methane content to an engine-generator. The engine-generator is a Jenbacher JGS 320 - 20 cylinder reciprocating engine with a 1030 kW - 480 volt synchronous generator. The engine is cooled by an IEA two circuit radiator. The air cooled generator is connected to the Utah Power and Light utility through a 480/15,000 volt transformer and nearly 4,000 feet of underground transmission line. Due to Utilities and Trade Commission requirements, the facility is limited in gross output to less than 1,000 kW.

The total cost for the project is approximately \$1.8 million, including more than \$150,000 in required electric utility interconnection equipment. Annual net revenues are approximately \$54,000 on the average. The electricity price is set by the Utilities and Trade Commission at an average of approximately \$0.0525 per kW-hr.

Permitting for the project included obtaining an Approval Order from the Utah Department of Environmental Quality Division of Air Quality, a Utah Pollutant Discharge Elimination System General Permit for Storm Water Discharges from Construction Activity, a Conditional Use Permit from Ogden City, and a Building Permit from Ogden City.

Weber County, Utah (www1.co.weber.ut.us) is the project owner. Blue Sky Energy of Vancouver, British Columbia (www.blueskyenergy.us) is the project developer. SCS Engineers of Bellevue, Washington (www.scsengineers.com) provided project design, permitting, construction, operation and maintenance.

THE ANSWER

How could a landfill gas-to-energy project be developed under these adverse conditions? The Answer: Persistence...creative financing...flexibility....a win-win attitude... and public- private cooperation.

I attempt here to describe the issues that threatened to stall or kill the project along the way. To provide the best clarity for understanding the challenges a small LFGTE project developer may face I relate what was experienced without passing judgment on those involved.

Persistence

Notwithstanding the 2001-2002 financial world chaos this project had a major complication from the very beginning. The project finances had to include paying for the gas collection system as well as the gas utilization system. For this project, the gas collection system cost was approximately \$600,000.

The proposal Blue Sky Energy (BSE) submitted to Weber County was for a project that would collect landfill gas (LFG) from the landfill, upgrade it by removing impurities and sell the remaining gas to the local natural gas utility, Questar. The project also proposed to derive revenue by removing carbon dioxide from the gas for sale to a major industrial gas company such as Praxair or Air Products, Inc. Preliminary commitments for purchase of the upgraded landfill gas and the carbon dioxide were secured prior to submitting the proposal.

Following award of the project BSE contacted Questar and several industrial air companies to solidify purchase agreements. While solidifying the carbon dioxide purchase agreements the industrial gas companies realized that they could experience customer relations problems if they were to attempt to sell landfill gas derived carbon dioxide. As a result, they withdrew their offers to purchase the carbon dioxide. Without the revenue from sale of carbon dioxide and only revenue from sale of the upgraded landfill gas the project was not feasible.

BSE then evaluated the project as an electricity generation project. In Blue Sky Energy's financial model they could see the project making a reasonable return on investment with revenue from electricity sales, renewable energy certificate sales and greenhouse gas offset sales. BSE set out to secure a power purchase agreement, a renewable energy certificate sales agreement, and a greenhouse gas offset sales agreement.

Power Purchase Agreement:

The local electric utility is Utah Power and Light (UP&L). UP&L is part of PacifiCorp. BSE began communicating with PacifiCorp and discovered after a number of communications that under their filing with the Utilities and Trade Commission the project would be either limited to less than 1,000 kW gross generation or would be subjected to the same power purchase negotiation process a multi-hundred megawatt power plant would undergo. The landfill is estimated to have the potential of generating approximately 1,200 kW initially. Believing both the limitation on gross generation and the negotiation process required for exceeding 1,000 kW were unworkable, BSE began investigating energy sales to local industry.

Adjacent to the landfill is an animal feed mill. They were contacted regarding interest in receiving energy from the project. A meeting was held with this mill in January 2003 to obtain their energy loads and connection requirements. The mill has energy demand for both electricity and heat. Following this meeting, BSE analyzed the mill's loads in light of the project financial model and concluded in March 2003 the mill project was not feasible.

BSE also investigated other nearby industry but concluded none were sufficiently close nor had sufficiently large energy loads to justify the expense of connecting to them.

It appeared that the only viable energy customer was UP&L/PacifiCorp.

BSE reinitiated communications with PacifiCorp to obtain a power purchase agreement. After months of communications between BSE and PacifiCorp a power purchase agreement negotiation meeting was held in November 2003. During that meeting PacifiCorp stated "We are not interested in your project nor power. We are only talking with you because we have to under law. Therefore, we will only consider changes to our standard power purchase agreement where we deem the changes to be of no consequence or of a benefit to PacifiCorp." This negotiation meeting was a revealing experience. In December 2004 the power purchase agreement was finally signed.

Renewable Energy Certificates:

In 2002 the Federal General Services Administration issued a request for proposals for purchase of green power. BSE submitted a proposal and was notified that once the project was in operation the GSA would be willing to entertain their proposal....the proverbial chicken and egg scenario.

In an effort to secure a revenue stream for the green power produced by the project BSE initiated a retail marketing program for renewable energy certificates produced by the project. Renewable energy certificates (RECs), also known as green certificates, green tags, or tradable renewable certificates, represent the environmental attributes of the power produced from renewable energy projects and are sold separate from commodity electricity. Renewable energy projects generally refer to projects that generate "green power" in whole or in part from renewable energy sources, such as wind and solar power, geothermal, hydropower, and various forms of biomass.

Customers can buy RECs whether or not they have access to green power through their local utility or a competitive electricity marketer. And they can purchase RECs without having to switch electricity suppliers. Currently, more than 30 organizations market RECs at the wholesale or retail level nationally, including BSE at www.blueskyenergy.us.

Greenhouse Gas Offsets:

A greenhouse gas offset is a measure of the quantity of greenhouse gas prevented from entering the atmosphere. Offsets are created by developing a project that achieves measurable and verifiable net reductions of greenhouse gases as one of its explicit objectives. The offset is created when methane gas is collected and burned. As a greenhouse gas methane is 23 times more potent than carbon dioxide. As a result, by burning one ton of methane rich landfill gas the equivalent of 23 tons of carbon dioxide (CO₂e) is prevented from entering the atmosphere.

In early 2002 Natsource was contacted to market the greenhouse gas offsets created by the project. Natsource has developed one of the largest environmental commodities brokerages in the world, with brokers and policy experts in the United States, Canada, United Kingdom, and Japan. To date, they have brokered emissions transactions of greenhouse gas (GHG) emissions, sulfur dioxide (SO₂), oxides of nitrogen (NO_x) and renewable energy certificates (RECs) with a net market value of over \$5,000,000,000. Due to the immature GHG offset market Natsource was not able to identify buyers for the GHG offsets at an acceptable price.

In early 2003 Seattle City Light issued a request for proposals for purchase of greenhouse gas offsets. BSE submitted a proposal. BSE was notified they had been selected as one of the finalists in the selection process. In May 2003, Seattle City Light withdrew their request for proposals and cancelled their selection process. Needless to say, a disappointing development.

Similar to the approach BSE used to secure a revenue stream for the green power produced by the project, they also initiated a retail marketing program for greenhouse gas offsets created by the project. The offsets are available to retail purchasers at their web site www.blueskyenergy.us.

Creative Financing

As mentioned in the Abstract above, the 2001 Enron bankruptcy and ensuing 2002 stock market collapse caused investor trust in energy projects to be at an all time low. As a result, investor capital had dried up for all but the most financially attractive projects. This difficulty was further compounded by the inability to secure renewable

energy certificate and greenhouse gas offset sales agreements in advance of project completion.

In 2000 the County assumed responsibility for a former State Park adjacent to the landfill. In mid 2003, while investigating ways to blend the planned open use park on the closed landfill with the adjacent former State Park, the County discovered odor migration from the landfill toward the former State Park. The County asked BSE if the proposed project would resolve the odor migration. During discussion of the odor migration subject it became clear it would benefit the County to control the odor by participating in the financing of the project. The way it looked to the County, they could spend approximately \$600,000 to construct a landfill gas collection and flaring system to control the odors, or they could participate in the \$1.8 million project, receive annual revenue from the project and control the odor as well. After discussing several methods which the County could use to participate in the project, it was decided that the County would finance the entire project through issuance of a municipal bond and receive all of the project revenues in return.

Flexibility

When Weber County issued their request for proposals for utilization of landfill gas from their closed landfill their hope was to receive a royalty in return for allowing use of the site and gas. When BSE submitted their proposal to Weber County their hope was to develop, own and operate the landfill gas utilization project, and receive a long term flow of income. Due to circumstances beyond their control, neither the County nor BSE were able to realize their hopes. Believing that the project was worthwhile to pursue, both began searching for alternative development approaches. In the end, the County agreed to finance and own the project. BSE reduced their stake in the project and agreed to receive a development fee in return for providing development services. This outcome truly demonstrates a **Win-Win Attitude**.

Public-Private Cooperation

There are a number of ways the public and private sector can cooperate in developing a small LFGTE project. A few of them follow.

1. The landfill owner needs to recognize that a small landfill will not attract the well known and seasoned LFGTE developers. The owner must

therefore be flexible and wise in their proposal preparation, evaluation and contracting process. For this project Weber County was a model landfill owner in this regard.

2. The landfill owner needs also to recognize that with a small project there is a small revenue stream and not necessarily small expenses to go along with it. Thus the landfill owner needs to be reasonable in their expectations for royalty revenue. Again, Weber County was a model landfill owner in this regard.
3. The State solid waste and air quality regulatory agencies need to understand the benefit to the environment offered by a LFGTE project, the sensitive financial constraints of a small LFGTE project, and do what is in their power to minimize regulatory roadblocks. The state agencies we worked with on this project were very sensitive to the project constraints and did what they could to minimize roadblocks.
4. The federal and state governments need to recognize the benefit to the environment offered by a LFGTE project and provide incentives for their development. Toward that end, the U.S. Environmental Protection Agency (EPA) has a program called Landfill Methane Outreach Program. The U.S. EPA's Landfill Methane Outreach Program (LMOP) is a voluntary assistance and partnership program that promotes the use of landfill gas as a renewable, green energy source. In addition to the LMOP the federal government has put into place a number of project incentives. These incentives, as well as those implemented by the State of Utah, are described later in this paper.
5. The electric utility needs to be consistent in their words and actions. Specifically, if they say they support renewable, green power, their entire organization and process should support renewable, green power projects. This will require recognition of the benefit to the environment offered by a LFGTE project, the sensitive financial constraints of a small LFGTE project, and doing what is in their power to minimize regulatory/procedural roadblocks. For this project the electric utility could have cooperated and assisted the project to a much greater extent.

6. The project developer needs to recognize the constraints the landfill owner, state regulator, electric utility and designer/constructor are under. BSE showed themselves to be very understanding and cooperative throughout this project.
7. The engineer/constructor needs to recognize the constraints the landfill owner, state regulator, electric utility and developer are under. The designer/constructor needs to be willing to take some risk and push their limits so that the project benefits as much as possible while not exposing them to undue risk. We believe we demonstrated these traits during this project.
8. The equipment and material suppliers need to seek to understand the small LFGTE project and its participants so they become part of the team and not an impediment. For this project, the engine-generator supplier could have been much more sensitive to the project and the participants.

With the above dynamics in place true public-private cooperation exists and a small LFGTE project has the best chance of success.

PROJECT INCENTIVES

The Database of State Incentives for Renewable Energy (DSIRE) is a comprehensive source of information on state, local, utility, and selected federal incentives that promote renewable energy. Their internet site is www.dsireusa.org/index.cfm. A summary of the federal and Utah state incentives for small LFGTE projects follows. Details of each incentive may be found on the DSIRE internet site.

Federal Incentives for Renewable Energy

Corporate Depreciation:

- Modified Accelerated Cost Recovery System (MACRS) with 50% Bonus Depreciation

Corporate Tax Credit:

- As of October 2004 there is an I.R.C. section 45 tax credit for landfill gas. The credit is good for 5 years at 0.9 cents per kWh for facilities commencing operation after October 22, 2004 but before December 31, 2005.

Production Incentive:

- Renewable Energy Production Incentive (REPI)

Green Power Purchasing/Aggregation:

- Federal Government - Green Power Purchasing Goal

Utah State Incentives for Renewable Energy

Financial Incentives:

- Renewable Energy Systems Tax Credit - Corporate

Production Incentive:

- Mainstay Energy Rewards Program - Green Tag Purchase Program

Sales Tax Exemption:

- Renewable Energy Sales Tax Exemption

PROJECT PHOTOS

Photos of the project are included below for reference.



PHOTO 1: DISCOVERY OF LANDFILL GAS MIGRATING TOWARD FORMER STATE PARK



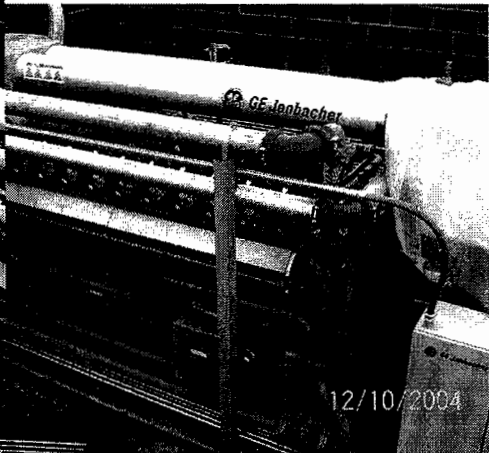
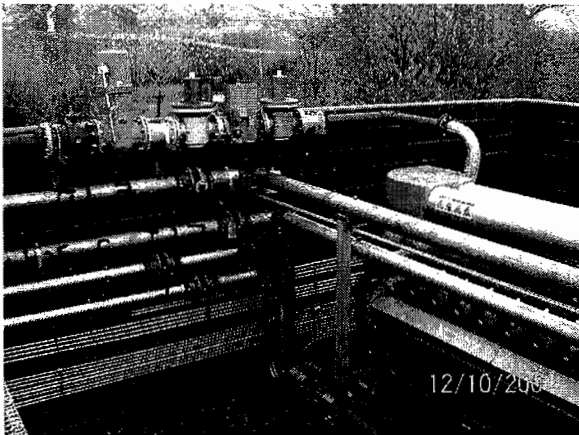
PHOTO 2: OGDEN RIVER, BETWEEN CLOSED LANDFILL AND FORMER STATE PARK



PHOTO 3: SITE OF LFGTE FACILITY



PHOTO 4: GROUND BREAKING FOR THE LFGTE FACILITY
(JACK BOYLE, PRESIDENT OF BSE ON THE LEFT AND ERIK COLVILLE OF SCS ENGINEERS ON THE RIGHT)



A-90 R: 9/03 SCS



OWNERSHIP MAKES A DIFFERENCE

PHOTO 5: JENBACHER JGS 320 ENGINE-GENERATOR



PHOTO 6: IEA TWO CIRCUIT RADIATOR

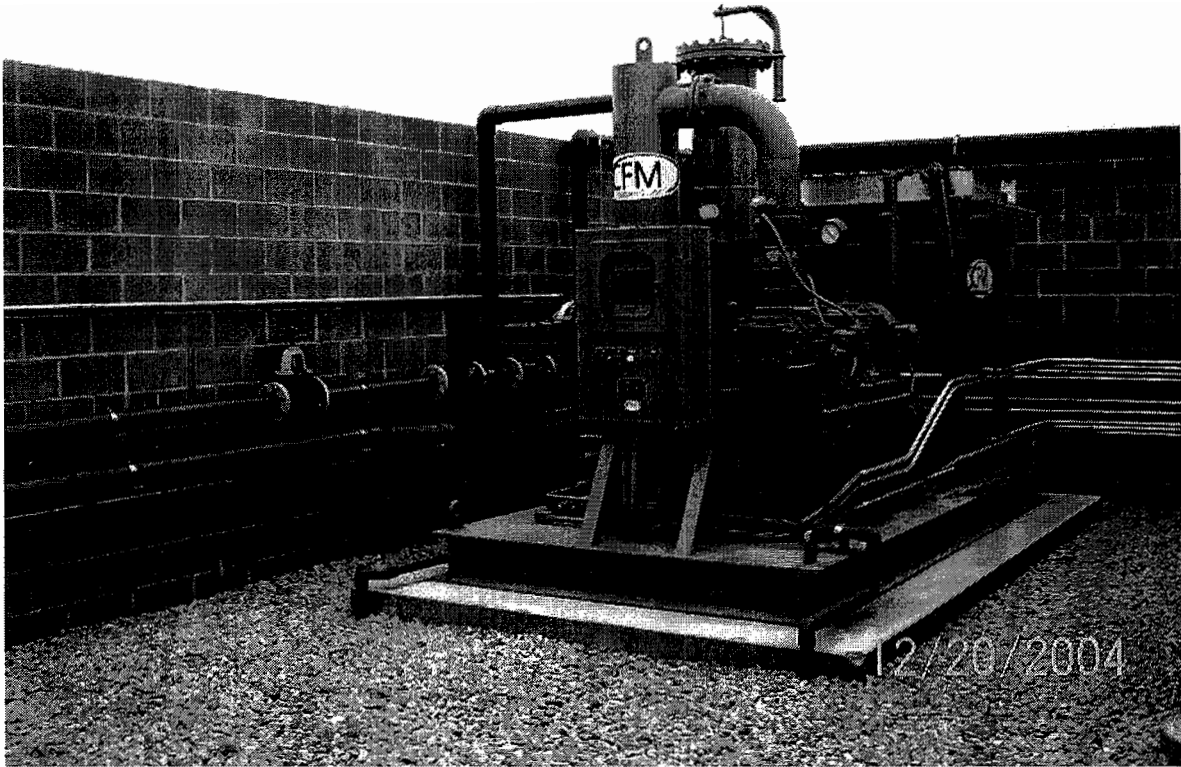


PHOTO 7: SCFM COMPRESSION SYSTEMS SUCTION SCRUBBER/BLOWER/AIR-COOLED HEAT EXCHANGER/DISCHARGE SCRUBBER

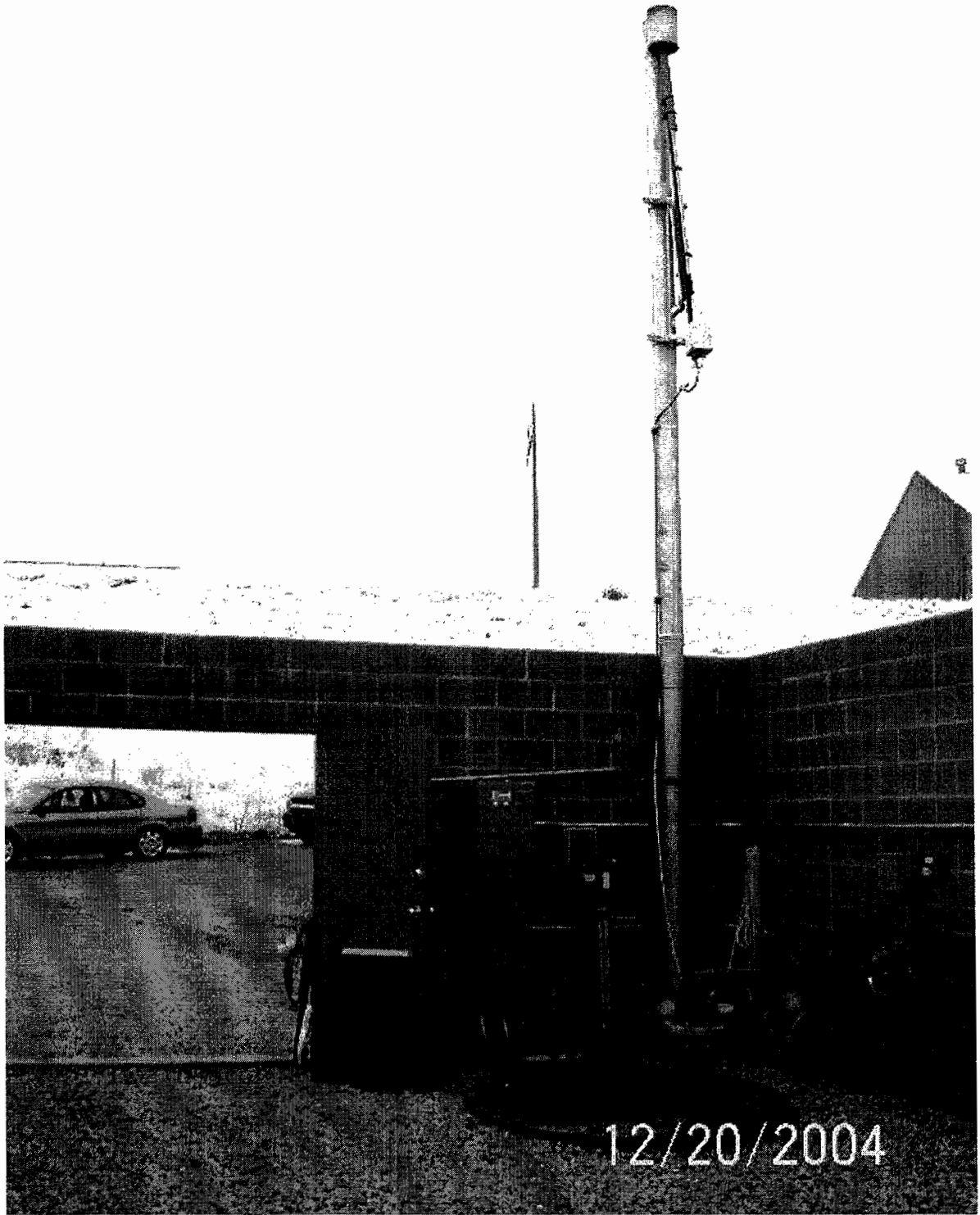


PHOTO 8: START-UP AND MAINTENANCE FLARE, AND CONDENSATE PUMP STATION

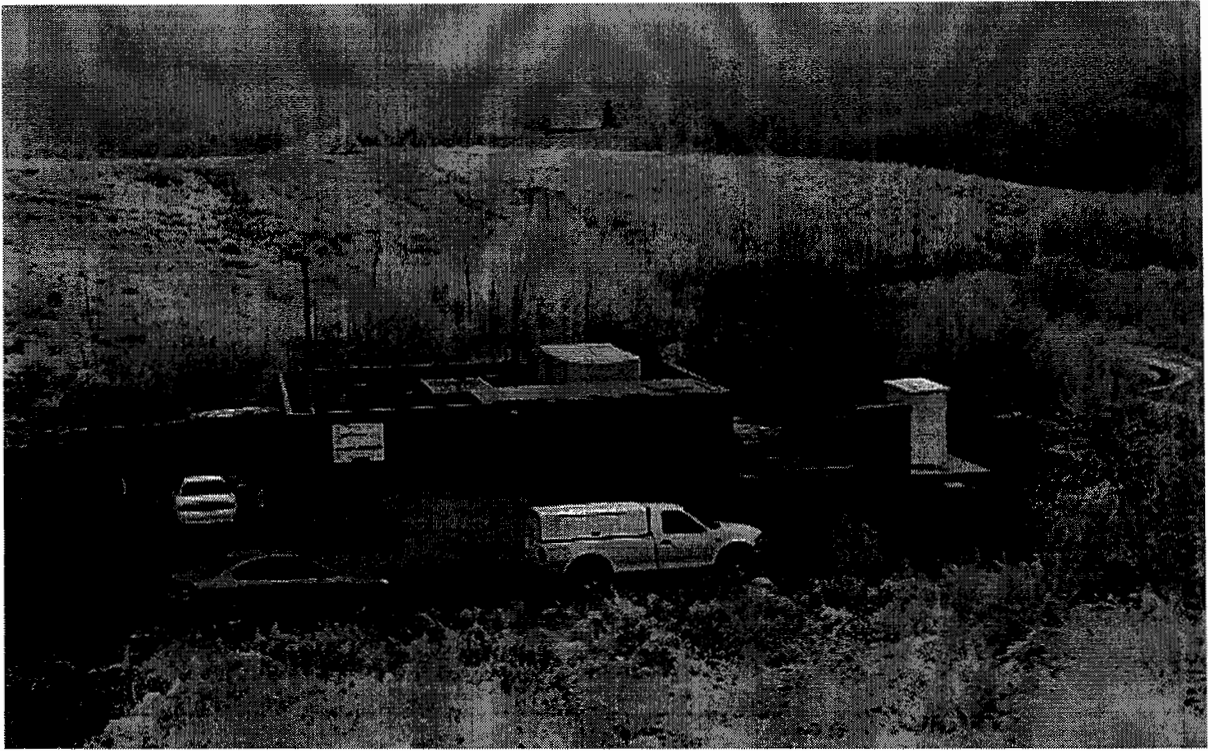


PHOTO 8: COMPLETED FACILITY FOR THE GRAND OPENING CEREMONY