



Denali Commission  
510 L Street, Suite 410  
Anchorage, AK 99501

907.271.1414 tel  
907.271.1415 fax  
888.480.4321 toll free  
www.denali.gov

INSPECTOR GENERAL

January 2007

To: George Cannelos, Federal Co-Chair  
From: Mike Marsh, Esq., Inspector General  
Subject: Inspection of fuel storage tanks at Stony River

FINAL REPORT

FOR PUBLIC RELEASE

On September 13, 2006, I conducted a routine inspection of the two new fuel tank facilities in the settlement of Stony River. The purpose of this inspection was to confirm (1) activity at the project site and (2) the traceability of expenditures within the total reported to the Denali Commission on OMB Form 269A.

The Commission's implementing "program partner" is the Alaska Energy Authority (AEA). As of October 2006, AEA had reported total expenditures of around \$873,000 for the two inspected facilities.

#### PROJECT BACKGROUND

The tiny, unincorporated settlement of Stony River (estimated pop. 42) is located on the Kuskokwim River, one of Alaska's two main interior watercourses. No roads, railroads, or power grids lead to Stony River. A barge delivers fuel during the ice-free summer. Year-round access is generally by small "bush" aircraft suited for the gravel airstrip that is "bumpy with small dips and rocks up to 3" in diameter."<sup>1</sup> I had the luxury of visiting amidst scenic fall colors rather than the months of winter that can drop to -50° F.

The Denali Commission has built three facilities (total \$1.7 million) to serve Stony River's fuel and electricity needs. They consist of (1) a power plant, (2) the power plant's fuel tanks, and (3) a fuel tank for the local school. This inspection concerned the fuel storage tanks of the latter two facilities.



<sup>1</sup> Caution to pilots from the FAA's *Airport/Facility Directory, Alaska Supplement* (Sept. 28, 2006), page 223.

The state demographer estimated Stony River's population at just 42 people in 2005.<sup>2</sup> The U.S. Census showed 61 residents (19 households) there in 2000. The public school served a total of 18 students last year. Two phone books list four to seven residential telephone numbers for Stony River's prefix.

#### EXPENDITURE TRACEABILITY

The Stony River fuel tanks were funded as part of a "lump sum" award<sup>3</sup> to AEA for the Middle Kuskokwim Regional Energy Project. This project constructed facilities such as storage tanks and power plants in seven small communities along the Kuskokwim River.

Purchasing for many items was pooled, with actual expenditures often tracked for the group as a whole rather than for each individual facility. In my review of AEA's accounting records, these consolidated expenditures "rolled up" to the cumulative total reported to the Commission on OMB Form 269A.<sup>4</sup>

However, I judgmentally selected various procurements and payrolls that were directly chargeable to the fuel tanks at Stony River. The charges were appropriately recorded for those facilities, with payrolls documented by timesheets.

#### FACILITIES' PHYSICAL STATUS

My inspection verified that fuel tanks consistent with AEA's project records have been substantially completed at the two expected sites in Stony River.

The power plant's tank farm is now operating and consists of two new storage tanks: a 6,000 gallon tank and a 20,000-gallon tank that is subdivided into compartments holding 15,000 and 5,000 gallons.

While the school's new 20,000-gallon tank has been installed and filled with fuel, it will not be operational until the local utility connects it to electricity. The nearby "day tank" for the school's backup generator has not been installed (discussed below).

My observations were consistent with the photographs that AEA has previously submitted for public display on the Commission's online project database at [www.denali.gov](http://www.denali.gov).

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<sup>2</sup> See [www.commerce.state.ak.us/dca/commdb](http://www.commerce.state.ak.us/dca/commdb).

<sup>3</sup> Denali Commission award no. 148-DC-2005-11.

<sup>4</sup> As of the third quarter of federal fiscal year 2006.

CONCLUSIONS AND RECOMMENDATIONS

1. The Commission should convene semiannual “design summits” to publicly disseminate the “lessons learned” from its rural construction.

Funding for facilities such as these reflects the Commission’s aspiration that “[a]ll Alaska, *no matter how isolated*, will have the physical infrastructure necessary to protect health and safety and to support self-sustaining economic development.”<sup>5</sup>

The Commission uses its implementing program partner, the Alaska Energy Authority (AEA), to address rural electrification and fueling in some of the most challenging locations in America. The tiny settlement of Stony River lies deep in the interior of rural Alaska and is one of those places.<sup>6</sup>

Consistent with the Commission’s mission, AEA experiments with various design firms, technologies, and alternatives for delivering projects to remote settings. Sometimes these experiments work; sometimes they don’t. But the articulation of “lessons learned” is as much a part of this northern proving ground as breakthroughs and successes.

This report focuses upon the tanks at Stony River. However, certain recurring technology issues emerged in my discussions with the school district concerning these facilities and its Denali-funded tanks at other schools (e.g., Red Devil, Aniak). For instance, the head of the school district wrote the following to AEA:

*All sites have received electrical valves that fail at cold temperatures. At 10 below zero, they will not open. Our old valves did not have this cold weather problem.*

Exhibit 1 reflects the school district’s collective concerns, some of which also appear in the periodic contractor construction reports that I reviewed in AEA’s records.

<p>EXHIBIT 1</p> <p>KUSPUK SCHOOL DISTRICT’S PERCEIVED DEFICIENCIES IN FUEL STORAGE TANKS PROVIDED BY DENALI COMMISSION</p>
<p>Cold weather malfunctions of various plumbing components that link 1,000-gallon intermediate tanks to main storage tank (switches, valves, gauges, vents).</p> <p>Digital electronic 100-gallon day tanks left uninstalled due to incompatibility with climate and local skills.</p> <p>Tank plumbing that leaks fuel.</p> <p>Use of cork and paper gaskets (versus steel) with perceived greater risk of leakage.</p> <p>Use of threaded joints (versus welded) with perceived greater risk of leakage.</p> <p>Unpainted connections and pipes that rust.</p> <p>Restricted flow between barge and main tank that increases unloading time to over 12 hours.</p> <p>Delay in obtaining electrical hookup needed to operate fuel pump at main tank.</p>

<sup>5</sup> Denali Commission Five Year Strategic Plan (2005-2009), page 3 (emphasis added).

<sup>6</sup> Though sparsely populated, the social challenges of this isolated area were apparent from the current events of my one-day visit. An alcohol-related gunshot fatality occurred that evening, and the victim’s relatives attempted in vain to get him to Stony River in time for help. See Tataboline Brant, “Inebriated brothers’ fight ends with death,” *Anchorage Daily News*, Sept. 16, 2006, page B1. Alaska indeed remains the nation’s “last frontier.”

Some of the district's concerns were physically apparent during my inspections. I saw some fuel leaks of varying degrees in the tanks' plumbing. And I saw some unpainted piping and connections that had begun rusting.

The school district considers the "day tanks" (cost  $\approx$  \$6,000 each) as impractical at Stony River and Red Devil, given the complexity of operation and the susceptibility of digital electronics to cold temperatures. One of the new day tanks was left wrapped and uninstalled in the school's backup generator shed at Stony River. Another was simply left outside in its packaging along the road in Red Devil.

Other school district concerns were more a matter of engineering judgment or an attempt to balance local preferences with limited resources. While I have discussed these choices with AEA's engineers, I have not attempted to arbitrate such design issues as the comparative life spans and durability of various components (e.g., paper versus steel gaskets, welded versus threaded joints, painting as cosmetic or necessary).

Suffice it to say, my inspections of the tankage at Stony River, as well as at neighboring Red Devil, highlighted a variety of design solutions that were tried in — and challenged by — these tiny remote settings.

Given the Commission's role in rural innovation, the key is to learn from these efforts rather than condemn them. I thus recommend that the Commission convene a semi-annual "design summit" to publicly review what worked — and what didn't.

Engineers from the Commission's program partners should obviously be important players at these summits. However, the meetings should provide a wider forum for critical review and open dissemination of the experience acquired at public expense.

For instance, in the case of tank farms, an AEA engineer made the cogent observation that the Commission is essentially constructing arctic "gas stations." Thus, the oil companies that franchise the world's gas stations above 60° N should be encouraged to participate (and perhaps loan their experts to the Commission from time to time).

Similarly, fuel logistics have long been routine for northern military installations (e.g., Operation Cool Barge supplied coastal radar stations). The Defense Energy Support Center and the Office of Naval Research could no doubt share decades of hard lessons at the summits (and perhaps even detail an engineer to the Commission under the Intergovernmental Personnel Act).

The FAA and the Coast Guard have also accumulated many years of northern experience in powering isolated, small-scale facilities, such as lighthouses and radio navigation aids.

Other key summit participants would be the barge lines and air cargo companies that must live with the finished facilities long after the Commission turns over the keys. In fact,

I recommend that the Commission's management at some point accompany these vendors on their rounds for insights as to the design that optimizes fuel delivery.<sup>7</sup>

The point is to systematically collect the lessons, share them among the Commission's program partners, and then send the accumulated wisdom forth into the public domain. In short, the public paid for these experiments — and the public is entitled to know, and use, the results.

*Response by Denali Commission's management:*

The full response of the Federal Co-Chair is attached as an appendix. He asserts that such a meeting occurs "at least once a year" and that "[w]e intend to work with AEA to broaden these discussions to include other interested parties and experts to determine major lessons learned."

The Federal Co-Chair defends the materials used. He indicates that "[a]ll the leaks have been fixed" and that the school tank has now been connected to electricity. He indicates that "Stony River is building a new generator facility that will incorporate the new day tank."

2. The Commission should coordinate technical support for a year after a community gets the keys to its new facility.

Though Stony River has less than 50 residents, the Denali Commission has provided local energy facilities for two separate owners. The regional power cooperative has a new, high-tech, modular power plant with associated tank farm. And the local school has its own fuel storage tank.

All but the simplest projects have a period of implementation adjustments. Aircraft have their flight-tests, and ships have their shakedown cruises. Computers and their software get "tweaked" and debugged. Engines have their break-in period. And construction has its punch lists.

At the time of my September inspection, the school's 20,000-gallon tank had been completed and even filled with fuel. However, with winter approaching, this facility was not yet usable due to the inability of the school and the electrical utility — both Commission grantees — to coordinate the necessary electrical hookup.

Another post-construction issue was the extent to which the school can remedy — or must live with — the restricted fuel flow that requires over half a day for the barge to unload.

Also pending was the potential salvage of \$12,000 in electronic "day tanks" that the school district considers impractical at Stony River and Red Devil. If the devices aren't desired at these locations, AEA may be able to transfer them to other projects.

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<sup>7</sup> Videos that document such fuel deliveries include *Alaska's River Highway: Supply Season of the Yukon* (KUAC, Univ. of Alaska Fairbanks) and *Flying Alaska's Kobuk River* (Rosser Graphics, Flint, Mich.).

Storage tanks by their nature require a trial period with flowing fuel to detect shortcomings. In my inspection, however, I noted some ambiguity as whether AEA's contractor — or the school district's own experienced staff — was responsible for correcting items such as minor leaks, troublesome valves, or the missing electrical hookup. Indeed, the head of the school district wrote to AEA, "*Last we heard, there was still no power to the controls.*"

The school district seems to implicitly expect the delivery of a perfected project. AEA, on the other hand, seems to assume a transferred tweaking.

The power plant is also having a less than idyllic honeymoon. AEA showed me pictures of unexpected smoke before I departed for my inspection of the associated tank farm. AEA's contractor noted the following in its earlier construction report:

*At 4:30 p.m., the generators ran out of fuel. [Local operator] tried to pump enough fuel from the bottom of the intermediate tank directly into the day tank to run the generators. Once he finally primed them, he threw the village switch on and immediately the shut down due to an overload spike. He could not figure how to reset the controls to fire them up. I cleared all of the alarms and reset them. (I think he burned up the starter relay on #1 while he was trying to start the generator earlier because it clicks but will not engage.) I started #2 and #3, turned the facility power on, then the village power, and all functions were normal.*

And AEA has cited the challenge of leaving technical documentation for the local operator who lacks literacy in the English language.

All of this underscores the need for a period of technical support in the year after tiny settlements get the keys to their new facilities. The most well-intentioned Commission projects can be a setup for waste and frustration if the Commission leaves such grantees to fend for themselves.

A variety of potential partners may be interested in Commission funding to provide onsite technical support during the critical, post-construction "year of disappointments." Some possibilities would be: (1) RUBA program for rural utilities; (2) USDA cooperative extension service; (3) Village Safe Water field staff; (4) state commerce department's local government specialists. The Commission's management should identify a willing and capable partner for this purpose.

*Response by Denali Commission's management:*

The full response of the Federal Co-Chair is attached as an appendix. He indicates that "*AEA does provide follow-up assistance during the early life of projects . . .*" He indicates that the owners of the inspected facilities "*are defined as sustainable entities,*" and they "*have a responsibility (and ability) to support the maintenance and operations of new and existing equipment.*"

#### ANCILLARY REPORTS

This is the first inspection of these facilities by the Commission's inspector general.

These facilities have not been the subject of any audit reports issued by Congress' Government Accountability Office (GAO) or the state's Division of Legislative Audit. AEA does not have an internal auditor.

Program partner AEA is a state agency and annually obtains a single audit for itself from a CPA firm. Neither the latest audit report (for the state's FY06) nor the associated management letter signal any matters of concern to the Denali Commission. The CPA firm considered AEA to be a low-risk auditee for purposes of federal OMB Circular A-133.

#### INSPECTION PROCESS

My inspection was conducted in accordance with section 2 of the Commission's standard grant assurances, section C(1) of the subgrantee's agreement with AEA, sections 4(a) and 6(a) of the Inspector General Act, and the *Quality Standards for Inspections* issued by the federal Executive Council on Integrity and Efficiency. An "inspection" is narrower in scope and procedures than the classic financial "audit."

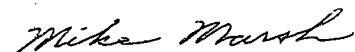
A maintenance specialist from the Kuspuk School District accompanied me during my inspection at Stony River. I visited the school and talked to its two teachers.

One of the Commission's prior inspector generals also accompanied me during my inspection, and I appreciated the insights derived from his many years of experience.

On November 28, 2006, the Federal Co-Chair was provided a draft of this report and invited to comment on my proposed conclusions and recommendations. He was encouraged to consult his staff, AEA, and any other parties as desired in the preparation of his response. AEA was provided a copy of my draft report for this purpose.

The Federal Co-Chair's response was received on January 16, 2007 and is attached as an appendix.

The Commission's implementation of recommendations will be summarized in my semiannual report filed with Congress under the Inspector General Act.



Mike Marsh, Esq.  
Inspector General

Appendix  
Federal Co-Chair's Response



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Anchorage, AK 99501

907.271.1414 tel  
907.271.1415 fax  
888.480.4321 toll free  
[www.denali.gov](http://www.denali.gov)

January 16, 2007

Mike Marsh  
Inspector General  
Denali Commission  
510 L Street, Suite 410  
Anchorage, Alaska 99501

Re: Response to draft inspection report of Stony River bulk fuel storage facility

Dear Mr. Marsh:

Thank you for the recent inspection report on the Denali Commission (Commission) funded Stony River bulk fuel storage facility. I appreciate the insightful and detailed review of this project. Stony River bulk fuel project construction was funded and completed under the Middle Kuskokwim Regional Energy Project (MKREP). You have provided separate reports on two other MKREP bulk fuel projects, Takotna and Red Devil. This letter is provided for your consideration in completing your final public report on the Stony River bulk fuel project.

In preparing this response we met with Alaska Energy Authority (AEA) staff to discuss the issues you raise, and to consider their response. We are proud to have the AEA as a partner agency to deliver the Energy Program. Your recent reviews of energy projects provide many recommendations that will further strengthen this partnership.

Facilities' Physical Status and Exhibit 1

You identified a number of deficiencies in the physical tank farm elements of this project. The Middle Kuskokwim Electric Utility (MKEU) has completed their connection to the school tank, making that portion of the project complete and functional. The plan you referenced showing fencing around only the pump box of the school's 20,000 gallon tank, was a preliminary drawing proposed to reduce overall costs on the MKREP, however State fire code requires fencing around the entire school tank, as you witnessed. All the leaks have been fixed. Some of the issues mentioned are simply matters of opinion or desire. The school district opted not to use the new day tanks for their old generators; however, Stony River is building a new generator facility that will incorporate the new day tank. The 'paper' gaskets the school challenges are those provided by the manufacturer of the equipment, and warranted as appropriate for that use. Threaded pipes are code-compliant, and more cost effective for the installation in this specific situation. The school district was afforded an opportunity to review the plans and specifications for the project, but did not provide comments or concerns on those issues until after the installation was nearly complete.



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Federal Co-Chair's Response

Stony River Bulk Fuel IG Inspection Response

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CONCLUSIONS AND RECOMMENDATIONS

1. The Commission should convene semi-annual "design summits" to publicly disseminate the "lessons learned" from its rural construction.

AEA conducts meetings at least once a year to discuss design and lessons learned from rural energy projects. They are regularly attended by the Commission Energy Program Manager, design and construction management engineers, Alaska Village Electric Cooperative (AVEC) and AEA project and procurement managers.

We intend to work with AEA to broaden these discussions to include other interested parties and experts to determine major lessons learned. I expect to also expand the Denali Commission website to include examples of lessons learned from our major programs and examples of projects. The Commission should take a larger role in disseminating lessons learned to a wide audience.

The Denali Commission, since inception, has been a careful steward of federal funding and has taken the lead among government agencies by creating policies to foster sustainability, cost containment, and proper investment of federal funding pursuant to our authorizing legislation. I believe the portion of your report "All Alaska, no matter how isolated, will have the physical infrastructure necessary to protect the health and safety and to support self sustaining economic development" places undue emphasis on a single criteria of our process for determining Commission investment in a project. "No matter how isolated" is only one of many factors used to select projects, and is a topic under review that we will clarify in our new strategic plan to be developed this year

While I acknowledge that the Commission and our partners are carrying out innovative experiments in trying to provide infrastructure efficiently and effectively, I do not agree that our partners are freely experimenting with new technologies and alternatives: the installed technologies are all proven, commercial items.

One issue that will require follow-up over the course of the winter is the fuel delivery rate. If accurate, the 12 hours referenced to fill the 20,000 gallon tank is extraordinarily slow. No other participants in the MKREP have reported such problems, there may be an installation or equipment problem not previously identified. AEA has committed to reviewing this issue and implementing a correction if needed.

2. The Commission should coordinate technical support for a year after a community gets the keys to its new facility.

There is always a learning curve for properly operating and maintaining new infrastructure, and new equipment may look intimidating when compared to more familiar, existing equipment. AEA does provide follow-up assistance during the early life of projects: both they and their contractor have been back to Stony River more than once to fix or adjust equipment. They do not "leave the keys and hope for the best." It should be noted that the MKEC and the Kuspuk School District are defined as sustainable entities, and have their own engineering and maintenance staff and procedures. They too have a responsibility (and ability) to support the maintenance and operations of new and

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existing equipment. Contracting for the specific individual support you recommend may be possible. We will consider the merits on a case-by-case basis for future projects.

3. The Commissioners should carefully evaluate this experience with open-ended construction management ("time and materials") versus the traditional competitive "hard bid."

This project was completed as part of the MKREP, an innovative approach to regionally combine projects to reach a more cost effective solution for each community overall. It should not be taken out of context as if it was a stand-alone project, and it is difficult, if not impossible to compare against a hard bid for a single project. Your description of the project as 100% time and materials is inaccurate; it was in fact a hybrid. The major material (tanks, valves, fittings, valves and controls, piping, etc.), equipment and transportation components of the project, were competitively solicited and provided to the construction manager, essentially as government furnished equipment.

The construction manager (CM) had authority to buy materials only up to \$5000. Approximately 85% of the materials and services (non CM labor) costs of this project were acquired by competitive processes. Furthermore, AEA, as our partner, has established contracting mechanisms and safeguards to implement a time and material type contract within applicable regulations. Exhibit 2 implies a hard bid contract would have had fewer layers of oversight, and therefore lowers costs, than the five identified. In fact, the hard bid has at least the same number of layers, and has potential for an additional layer for quality assurance.

Exhibit 3 questions the high pay rates recorded in Stony River (although shown at overtime, rather than straight time rates, which is not an accurate reflection of pay). Hourly rates for these skilled workers are low compared to some urban areas and especially low for a remote location. The straight time rate for an inexperienced laborer working on a fuel station in Anchorage is \$85/hour. A hard bid contract would have reflected similar rates or higher.

Nevertheless, the Commission has implemented hard bid contracts on large, stand-alone bulk fuel projects such as Kwethluk and Unalakleet, and will continue to do so as appropriate projects are presented.

Thank you for your continued review and inspection of Commission projects. I appreciate your attention to detail, and the opportunity for the Commission to respond to your findings. We will continue to refine our processes to make them more efficient and effective, and your suggestions will undoubtedly contribute to our success.

Sincerely,



George Canelos  
Federal Co-Chair