

Atigun Awards, Teamwork: Sag River project
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The Sagavanirktok, or “Sag River,” creates an annual nightmare for North Slope workers and infrastructure. Each spring, the river powerfully swells, surges and snakes across the landscape as its ice-and-aufeis build-up melts or bursts, creating a fast-flowing, havoc-causing web of waterways. In recent years, the Sag River’s dramatics have wiped out sections of the Dalton Highway, and stopped critical traffic to and from Deadhorse for days. It’s also eroded areas of the TAPS right of way.

The spring 2019 Sag River rampage included multiple high-water events that partially exposed more than 300 feet of mainline pipe, creating an integrity threat that needed to be addressed. TAPS teams said, enough is enough. They developed and executed an ambitious and enormous workplan to deal with the changing conditions on the Sag River: using an adaptive approach learned from previous floods, a series of massive spur dikes were upgraded with safeguards to protect 25 miles of TAPS’ areas most susceptible to the Sag’s antics.

The successful completion of this two-year project scored a hard-earned and well-deserved Atigun Award for Teamwork for numerous Alyeska groups and TAPS contractors like Ahtna, Houston and Merrick, as well as State and Federal partners.

From the number of people and variety of skillsets involved, to the magnitude of the work, to the level of coordination and communication that kept the work flowing, this project embodied TAPS teamwork. And all of the 2020 planned structures, as well as three 2019 carry-over scopes, were successfully installed without any recordable injuries or spills.

"This was a true example of great teamwork across multiple organizations to successfully accomplish the goal," wrote Hillary Schaefer, Pipeline Director, and Ann Marie White, Systemwide Maintenance Manager, in their Atigun Award nomination for the project. "The repair work in 2019 and improvements in 2020 added significant protection to the pipeline integrity and will adequately protect the pipeline and ROW from future flooding and aufeis events."

Chemetria "Sam" Spencer, Alyeska's Implementation Assurance Lead, added, "I'm so appreciative that this recognition is for Teamwork. I don't think a lot of people realize all of the pieces that have to come together, how early this kind of work has to start, and how everyone has to do their part for work like this to be successful."

The upgrades' first test arrived quickly, with breakup 2021. The design solutions and mountains of material that transformed the riverplain minimized the Sag River's might. Following breakup, TAPS and its right of way were practically unscathed.

"There were no issues this year with what was installed," said Chris Vaden, Ahtna Project Manager and Superintendent, and a 20-year veteran of Sag River repair work. "The Sag moved right along and we didn't need to address any of those areas. That was the whole idea of doing the upgrades – future protection for the pipeline and right of way."

Like Vaden, Alex Lai, Senior Integrity Engineer based in Fairbanks, along with the Alyeska System Integrity team, has kept his eyes focused on the Sag for more than 20 years. And he liked what he saw after the river's 2021 spring breakup challenged the new solutions.

"Last year, we had an above-normal breakup in some sections of the Sag and it did quite well," he said. "It was really tested as soon as it was built and the improvements did a good job withstanding the breakup."



Solving the Sag

The original TAPS river training and pipeline protective structures adequately served their purpose, protecting the pipeline for 40 years. But as conditions change, with winter arriving later and spring warmth

beginning earlier up north, the Sag River's frost point and auefis have moved further downstream to locations that were not protected by the original TAPS design.

Now, every year there's something of a routine: the Sag River shaking things up in the spring, followed by cleanup and repair by Alyeska teams like Baseline, System Integrity, Engineering, Legal, Environment, Regulatory, Compliance and more, along with Ahtna, Houston, Merrick and other contractors. Work could last all summer and even into the fall.

In 2019, the emergency response efforts and restoration of the mainline protection was colossal. Even after those repairs, concerns for future reoccurrences remained and an improvement to the original design basis was warranted to protect certain areas. By 2020, a multi-faceted technical team of Alyeska engineers and State of Alaska hydrologists had assembled to design structures to adequately protect the pipeline.

The plan, which covered a working area from TAPS Mileposts 22-47, included:

- The upgrade and enhancement of 19 spur dikes across three spur dike fields
- New structures like spur dike extensions and revetment, basically a barricade of earth
- A failsafe enhancement to existing spur dikes that raised their elevation near TAPS

How do you reroute a mighty river? With rock-and-gravel failsafe structures that average of an imposing 200-feet long, 75-feet wide at its base, and 16-feet wide at the top. The spur dikes are even longer.

Lai noted, "These are extensive upgrades to the structures, including adding an innovative failsafe structure design upgrade to reinforce the most critical areas of the dike nearest to the pipeline. So, if a structure does fail, it fails away from the pipeline and we would just need to repair the structure."

While the Sag might be unpredictable, it's still an environmentally sensitive river floodplain. That meant more than 50 permits covering approval for mineral mining, fish habitat disturbances, water and land use authorizations and more were needed to execute the designed work scopes. That required significant coordination between Alyeska's Environment, Lands and Legal teams, System Integrity engineers, State and Federal regulatory agencies, as well as surveyors, and the implementation team to understand those permits before the big-time building began.

"All this had to take place before the first shovel was even put in the ground," Lai said.



Rock 'n' roll: Changing the landscape and the playing field

With the plans and permits in place, and a group of 30 operators, Teamsters, project leaders and more ready to perform the work, next up was obtaining material. Lots of it. The spur dikes, structure repairs, barricade

upgrades and extensions required 65,000 cubic yards of gravel and 17,000 cubic yards of large rocks known as Class IV rip rap that's not exactly easy to find on the North Slope.

Cue more crews. The closest large rock quarry is south of Pump Station 4, near TAPS Milepost 153, but it wasn't ready for rock production to start 2020. Civil Maintenance Coordinators and several GMB baseline resources developed the pit for a contract mining crew to move quickly into rock production: building a road to the upper bench, removing overburden, and cleaning up the site. A significant cost savings was achieved by leveraging in-house resources which also increased efficiency and minimized crew downtime.

The rock was then hauled by another team of 20 to the worksites by a fleet of side dumps, which made over 1,000 trips and logged 245,000 miles. The gravel was gathered from a bar at TAPS Milepost 25 and delivered on-demand to crews reinforcing the failsafe structures.

A standard day in the bustling working area included tons of heavy material carried by even-heavier machinery, not-so-heavy vehicles and countless crews and visitors moving about, and working routines that addressed COVID concerns. The work was done safely, smoothly, and up to the highest standards. The teams established a convoy method to minimize equipment and production downtime, as well as enhance travel safety. A mechanic and tire repairman were part of the fleet, as well.

"It really takes a team that is fluid, and that likes the work; they're good at it, and they've put in a lot of hours up there," said Vaden of Ahtna. "It's basically the culture of Ahtna construction and how we structure our teams. We go out to do a job, do it as safely, organized, and efficient as possible."

"It was pretty impressive watching them," Lai added. "A lot of coordination goes into it, a lot of experience from the foremen of the crews, the right operators to do it, a lot of field experience moving a lot of dirt and rock, and they worked seamlessly. When teams work well like that, it almost seems effortless."

So, does this milestone of monumental work mark the end of the annual Sag River saga? Probably not. That's nature. That's Alaska. And that's the Sag River. But TAPS is in much better shape to face future challenges, Lai said. "Dealing with rivers, dealing with floods, you can never let your guard down. We still just have to stay prepared, have a good plan that reduces our risk, and proactively deal with these things as they come along."



