

We Believe in Our Youth Leaders

COMMUNITY INVESTMENT

In 2018, Teck renewed its agreement with the Northwest Arctic Borough School District (NWABSD) to continue support of the District's Youth Leaders Program. Red Dog Community Investment committed to a \$750,000, 3-year agreement. The NWABSD Youth Leaders is a student-led suicide prevention, anti-bullying program that is district-wide.

In 2008, the NWABSD developed the Youth Leader Program for its 11 villages. The Youth Leaders origins state: "The purpose of the Youth Leaders is to empower all students at all social and grade levels to lead the way in making healthy and safe choices to improve their lives and the lives of future generations. Youth, when faced with problems, will go to friends before they go to adults or service providers. Peer influence is an effective instructional strategy for the Alaska Native population. Youth Leaders practice strong boundaries and structures established by the Iñupiat Ilitqusiat."

The Iñupiat Ilitqusiat philosophy—the real people; that which makes us who we are—was developed over thousands of years and articulated by the Elders as part of the Spirit Movement of the 1980s and is taught in



2018 Youth Leaders representing 11 villages

Northwest and Northern Alaska. It consists of values such as Respect for Elders, Humor, Spirituality, Hard Work, and Responsibility to Tribe.

In 2010, Teck made its first supplemental contribution of \$150,000 to an existing successful Youth Leaders program. Following in 2011, Teck awarded a 5-year award to the program in the amount of \$1.25 million, becoming a main contributor.

Teck is honored to invest in the Youth Leaders Program of the region.

Message from the General Manager

By Les Yesnik



Happy New Year to you all! I always look forward to beginning a new year and appreciate the opportunity to reflect on lessons learned from past challenges.

The challenges overcome in 2018 reflect the spirit of the team here at Red Dog. In the last edition, I commented on the remarkable achievement to recover from snow storms last February and March that caused a setback on metal production. I am very pleased to report that we not only recovered fully three months ahead of plan but exceeded budgeted production by 44,600 tonnes of metal. Through this challenge, we gained more experience processing ore from the new Qanaiyaq pit that opened the previous year. We are getting a better understanding of the metallurgical behavior of that ore, and this enabled increased production rates. With the mill operating very

well, additional capacity allowed the processing of low-grade, potentially reactive material. This material would have previously been stored under water, but processing it added approximately 12,000 tonnes of metal to our final production.

There were a couple serious injuries early in the year but following these, over 1.4 million hours were worked without a serious injury. The slip and fall injury that occurred at year-end is a reminder that hazards are ever present at work. Remember, "no job is so important that we cannot take the time to do it safely." In 2019, we will work with all our employees to improve hazard awareness and will continue to advance Courageous Safety Leadership training to employees and contractors.

In this edition, there are several stories explaining aspects of our operation, including an excellent summary of the steps being taken to

Continued on page 11

There has been a lot of activity in the Red Dog Operations (RDO) Community Relations (CR) department this past year. Made up mostly of NANA shareholders, the CR department is the liaison between Red Dog and the eleven surrounding communities of the Northwest Arctic Region, as well as NANA and the Northwest Arctic Borough (NAB). In addition, the department engages with state government, political-entities, Non-Government Organizations (NGOs), media, and the public on Red Dog matters. The department is in three geographical areas: Red Dog, Kivalina and Anchorage.

Our vision for the Community Relations Department is to understand concerns and desires of our stakeholders and communities, be transparent, build awareness, invest in the communities and support positive community development. Our CR employees go to each community at least once a year to visit with residents and hear their comments and concerns. To strengthen our ties with the communities, in the past year, we have added three new members to our team, plus created a new department, Government Relations, to fulfill government and public relations role at RDO. If you see any of our CR staff in your community, please say hello and start up a conversation. We're here to listen!

Our Community Relations Staff

Wayne Iyagak Hall

Manager of Community and Public Relations



Wayne Iyagak Hall has worked in the mining industry for over 26 years. A local of Juneau, Alaska, Wayne has lived in the state for over 45 years. He has an extensive background in environmental management and has managed Red Dog Community and Public Relations since 2011. In talking about his work, Wayne said, "Red Dog's environmental performance is very important

to Red Dog and the communities of the region. Being able to be a bridge between Red Dog's performance and our closest neighbors is both challenging and rewarding."

Wayne began his career in the mining industry in 1991 at the Greens Creek Mine in Alaska. In 1996, he worked for the CR Briggs Gold Mine in California, located in the Mojave Desert. After coming to his senses (or maybe it was the heat of the desert), Wayne realized that Alaska was his true home and he joined Red Dog Mine in 1999. Wayne has a degree in Environmental Studies from Western Washington University.

Janine Bedford

Sr. Community Relations Coordinator II



Janine Bedford hails from Sorrento, BC, Canada. Janine has worked at Red Dog for three years but has 10 years of experience working with Native communities on socio-economic development and mining projects throughout Canada. She loves the water and enjoys kayaking, fishing and swimming. She is also an avid traveler and enjoys reading.

Janine's focus in CR is to improve the relationship between Teck and its closest communities. "The people I have met and work with in the region and on my team and the challenging nature of the work is why I like working at Red Dog," she said. Janine has a Bachelor's degree in Anthropology and Sociology and a Masters of Research.

Fritz Illaqsruqtuq Westlake

Community Relations Coordinator



Fritz Illaqsruqtuq Westlake was born and raised in Kiana. Fritz worked at Red Dog during the summers of 1998 and 1999, and joined and worked for the CR team in 2010-2012, and returned in 2015. Fritz is the son of Wayne and Sharon Westlake, both of Kiana. When he isn't working in the Anchorage office, Fritz loves to watch football with his 9-month-old son, Fritz Jr. He also coached the boys' basketball team in Kivalina last season.

When asked what he likes most about working with the communities, Fritz said, "I like being able to help the youth achieve their goals." Fritz holds a Bachelor's of Science in Business Administration from Eastern Oregon University.

Verna Tunuqataq Westlake

Community Relations Coordinator



Verna Tunuqataq Westlake was born and raised in Kiana. She is the daughter of the late Theodore Westlake, Jr. and Lillian Harvey. Verna first joined Red Dog in 2008 as a Business Improvement Analyst and joined the newly formed CR team in 2010. Prior to working at Red Dog, she was an independent grant writing consultant that worked with rural

Red Dog Community Relations

Alaska entities seeking funding in education and youth projects. Verna enjoys a subsistence hunting and fishing lifestyle and her hobbies include golfing, dancing, music and exercise.

"I am proud to say that I'm a 4th generation miner. Working here, I've come to realize the importance of the work we do for our people and for the organization. I tell people, 'I love my job!' all the time, because I really do." Verna enjoys working the rotation schedule at the site. "This schedule allows me to visit the many family and friends I have all over the nation!"

Laura Kayuqtuq Orenga de Gaffory Community Relations Coordinator



Laura Kayuqtuq Orenga de Gaffory is from Anchorage but has ties to the region. She is the great-granddaughter of Frederica (Reich) and Bert Beltz Sr, granddaughter of Laura (Beltz) and Neil Bergt, and daughter of Debra (Bergt) and Jerry Brossia. Laura is one of the three newest additions to the CR team, joining in August 2018. Prior to working for Teck, she worked at NANA

in their communications department. She shares, "I am excited to be working with Teck and have the opportunity to learn more about mining. I am also looking forward to advancing ways to communicate with the communities through new technologies and publications."

When Laura isn't at work, you can find her hiking on top of mountains with her dogs Potter and Cooper. She also enjoys cooking for friends, spending time in the communities and connecting with her heritage. Laura graduated from the University of Alaska Anchorage with a bachelor's degree in Sociology and a minor in Alaska Native Studies.

Sami Siqiññaġik Schaeffer Community Relations Coordinator



Sami Siqiññaġik Schaeffer is the daughter of Cole and Rachel Schaeffer of Kiana. Sami, one of three new additions to the CR team this year, started in July at the Teck Anchorage office. She previously worked at Red Dog in 2017 as the Community Relations Summer Intern and interned as an archaeological field tech during the summers of 2014-16.

When asked about her new position in CR, Sami said, "Each community is unique. CR allows me to help the people in my region so that they can benefit from Red Dog." When she isn't visiting communities or writing up reports, Sami enjoys hiking, crocheting, glass cane pulling (a form of glassblowing) and playing video games.

Sami graduated from Mt. Edgecombe and received an Anthropology degree from the University of Alaska Anchorage. A highlight for her about working at Teck — "The Red Dog community is family; it makes work enjoyable!"

Amanda Ikeyubausie Amisimaaq Nasuk Sage Community Relations Kivalina Community Liaison



Amanda Ikeyubausie Amisimaaq Nasuk Sage was born and raised in Kivalina. Amanda is the daughter of Mary Avaayak and Lowell Jr. Qalutchuq Sage, both of Kivalina. Amanda was hired in December 2018 and is the newest member of the CR team. She currently works out of Kivalina and is the liaison between the community and Red Dog. Previously, she worked at Red

Dog as a temporary Marine Mammal Observer and Warehouse Floor Person. She has also worked at Maniilaq Association, NAB, Alaska Airlines and Bering Air.

Amanda shares, "I enjoy working with the people at home and Teck. It's important to have a continuous dialogue between the two to make room for growth and opportunities not only for jobs, but to help the community [Kivalina] understand what Teck is all about. My goal is to give ease of mind of the repetitive concerns and questions residents have had over the years. I hope to be able to successfully build a bridge between my hometown and Teck by eloquently voicing both parties' concerns."

Amanda is an avid hunter and gatherer. She enjoys picking berries, fishing (ice, rod and reel, and seining) and butchering bearded seal. She relaxes by playing the bass, acoustic guitar and singing.

Greta Inuuraaq Schuerch Sr. Government and Public Relations Coordinator



Greta Inuuraaq Schuerch of Kiana is the daughter of Lorry and Nellie Schuerch. Greta joined the Red Dog team just over a year ago and is responsible for Government and Public Relations functions for RDO. Prior to joining Red Dog, Greta worked with the Alaska State legislature, the Inuit Circumpolar Council (ICC), the North Slope Borough, and NANA.

When asked what she enjoys most about working for Red Dog, Greta replied, "I enjoy working for a company and mine that has had such a positive economic impact in my home region and the State. I appreciate the opportunities that Teck offers to its employees." When she isn't working out of the Anchorage office, Greta enjoys all that Alaska has to offer—boating, hunting, fishing and traveling.

Year in Review: Community Relations

What did the Red Dog Community Relations (CR) department accomplish in 2018?

State Lands Exploration Engagement

CR facilitated, presented or attended the following meetings:

- Community Meetings
 - Kivalina
 - Noatak
 - Kotzebue
 - Kiana
 - Selawik
 - Noorvik
 - Deering
 - Ambler
 - Shungnak
 - Buckland
 - Kobuk
- **Four** meetings with Kivalina Leadership (IRA & City Council)
- **Three** meetings with the Noatak IRA Leadership
- **Four** presentations at Subsistence Committee meetings
- **One** site tour helicopter overflight of State Lands Exploration site for Kivalina and Noatak Leadership
- **One** site visit and presentation for the Northwest Arctic Borough and Assembly
- **One** presentation to Regional Elders Council
- **One** presentation to Economic Development Commission

Red Dog Operation Engagement

CR facilitated, presented or attended the following meetings and events:

- Annual hunters meeting in Kivalina
- Meeting with Noatak IRA to discuss geological faults
- **Four** Siñgagmiut Working Group (SWG) meetings with Kivalina and NANA representatives
- **Four** Subsistence Committee meetings
- **Three** Village Improvement Commission (VIC) meetings
- **Four** Red Dog Management Committee meetings
- **Five** tours of Red Dog site:
 - U.S. Arctic Research Commission (USARC)
 - Kotzebue Mining Conference group
 - State of Alaska Governor Bill Walker, Dept. of Natural Resources Commissioner Andy Mack, Dept. of Natural Resources Deputy Commissioner Heidi Hansen, and Dept. of Health and Social Services Commissioner Valerie Davidson
 - Ktunaxa Tribe, BC, Canada, NANA, NAB
 - State of Alaska Department of Environmental Conservation & Environmental Protection Agency
- **Six** Northwest Arctic Borough (NAB) and Assembly meetings
- Community Celebration in Kivalina for the SWG
- Alaska Federation of Natives (AFN) convention
- Alaska State Fair Mining Day
- Attended Institute of the North's, Arctic Dialogue on Development Summit
- Western Arctic Caribou Herd Working Group

Community Development & Investment

Teck sponsored community development and educational opportunities such as Mining 101 courses in Kivalina and Noatak for youth and adults.

Teck Red Dog approved and funded **52** Community Investment requests in the region for a total of **\$493,000** for the year. Some examples of contributions are:

- Youth Leaders—Northwest Arctic Borough School District
- Winter Bear, an outreach play with a primary focus on suicide prevention delivered in Kivalina, Kiana and Kotzebue
- Elders & Youth Language Conference
- Katyaak Elders & Youth Cultural Camp
- Search and Rescue
- Red Dog NBA Program—a student incentive program that uses the National Basketball Association (NBA) as a reward for outstanding performance in school and the community
- Community cultural events and celebrations
- Sisaulik Cleanup Project—provided logistics and funding to clean and clear unauthorized dump at the Sisaulik summer camp site
- KOTZ Radio

Magnitude 7.0 Earthquake Shakes Southcentral Alaska

Last year's 7.0 earthquake will be on the minds of many Alaskans for months to come, especially since the aftershocks continue to keep Southcentral Alaskans on their toes.

On the morning of November 30th, the Anchorage Teck Alaska staff became a lot closer to each other as they rode out the earthquake under the conference meeting room table. Within hours, Teck Red Dog developed a plan to help employees, contractors and their families who reside in Southcentral Alaska. That day, two planes full of employees made it out of our remote mine site in northwest Alaska so employees could be with their families and to assess any damage to their homes.

Teck went one step further and donated \$100,000 to the American Red Cross Alaska. The Red Cross supports hundreds of Alaskans through programs such as the distribution of emergency supplies, emergency sheltering, disaster mental health services, damage assessments, recovery casework, and the disaster workforce.

An event like this reminds us of how strong we are when we work together.

For more information about American Red Cross' services, please visit: www.redcross.org/local/alaska

Employee Spotlight

By Mark Helms

My R&R began on the Tuesday following the big Anchorage earthquake. I had no major plans, and I wanted to be useful, so I put my name in the hat with American Red Cross as a volunteer.

At their request, I reported to the Anchorage Red Cross office Tuesday morning. They were elated to have a Teck representative join the Disaster Response effort, as Teck had just made a big donation.

The first day, I assisted in handling several pallets of donated bottled water for distribution amongst the community. The remainder of the week I helped with Damage Assessments. This is an investigative process whereby the families most impacted by the disaster are sought out. My role was to assess the damage to their home and their situation, then fill out a simple report via a mobile phone app. That information was then used by Red Cross to determine how to best allocate donated money for the maximum benefit to the community. The idea is to fill the gap which sometimes exists before state or federal assistance can be provided – focusing on immediate needs.

It was very rewarding to be a part of this process. One day, I had a case worker with me and we provided immediate financial assistance to a woman residing in Eagle River (arguably the hardest hit area). She burst into tears. The woman had major damage to her home and had spent the past five days cleaning up the mess. That was just the tip of the iceberg for her in sorting out her home, and she was so grateful for the support. Another couple we came across had been living in a home deemed unsafe by inspectors, but had nowhere else to go. Red Cross assisted these folks in getting temporary housing.



"In my free time, I enjoy exploring the great outdoors, hanging out with my wee nephews, or ideally both!"—Mark

Just as rewarding was meeting the other volunteers and making new friends. I was surprised how many were volunteers were from rural parts of Alaska. It gave me an appreciation for how close the community in Alaska is despite the vastness of the state.

Editor's Note: Mark Helms is a Mine Engineer in the Mine Technical Department who lives in Anchorage. A coworker heard about Mark's volunteer efforts and nominated him to be spotlighted. Thank you, Mark, we're grateful for your work and we're very proud of you.

Suvisi (Sü-vĩ-see) in the Iñupiaq language means:

"What are the many people doing?"

All in One Place—Historical Red Dog Commemorative Plaques

Over the course of 30 years of operation, Red Dog Mine has acquired a few special commemorative plaques. Each plaque was displayed at different locations around the property. Ted Zigarlick, Superintendent of Training and Development and employee since the start of Red Dog, identified the opportunity to bring all these plaques together in a central location where they would be available for everyone on-site to view and enjoy.

Red Dog Maintenance department Machinist Robert Underwood was asked to reinstall all the plaques outside the entrance to the Personnel Accommodations Complex (PAC). Robert used his skills as a machinist to set up a system that would provide secure mounts as well as a pleasing aesthetic.

Robert took inspiration from a photo of the Kobuk River Delta, a 32-mile winding stretch of the Kobuk River, and began ordering materials. He replicated the land area with a black background and used polished aluminum to represent the river near Noorvik, as seen from the southeast. Careful placement of the plaques created an effect that allows a person walking up the stairs of the PAC to see the shape of the Kobuk River Delta.

The next time you are waiting for the airplane to head out for your R&R, take a moment to appreciate Robert's work, along with a bit of Red Dog's history and an interpretation of the rivers that the Iñupiat people have used to support their way of life.



Robert Underwood poses next to his completed work displayed outside the PAC. Robert was inspired by the 32-mile long Kobuk River Delta's many twists and turns.

Quyaana

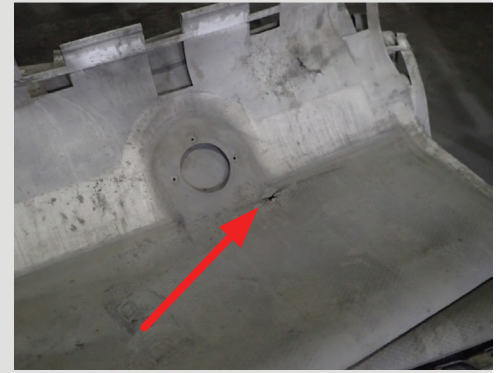
Thank you to all who contributed to our newsletter.

To submit topic ideas or an article about your work, a coworker spotlight, a special project or life at Red Dog, contact Managing Editor, Verna Westlake at verna.westlake@teck.com or communityrelationsRDOG@teck.com

It's a Cloth's Life

By Dalton Major

The filter presses went through refurbishments and improvements in the past few years to optimize the dewatering process. To further optimize the filter presses' performance, the zinc filter presses filter cloths were tested to determine if they could last longer before needing to be replaced. Before 2018, filter cloths were replaced at 3,600 cycles. The total cost of filter cloths when changed out at this rate is \$350,000 per year, with approximately 770 hours of operator time is spent replacing the filter cloths each year.



Blow-out in filter cloth.

In 2017, a project aimed at optimizing the life of the filter cloths was initiated to reduce costs without compromising concentrate moisture. Filter cloth samples were taken from the filter presses at various times throughout the cloth's life and brought to the metallurgical laboratory for a standard blinding test. This happens by cutting out a section of cloth and forcing three liters of water through the cloth using the laboratory's filter press and timing how long it takes for the water to filter through. A blinded cloth will generally take about one minute to filter the water through the cloth. When a filter cloth is blinded, the performance of the cloth decreases dramatically and the moisture content of the cake starts to rise, resulting in a concentrate that is too wet.

Using the results from the test, in 2018, the cycle counts between filter cloth changes on the zinc filter presses have been increased from 3,600 cycles to 5,400 cycles. Increasing the cycle count has resulted in saving over \$125,000 in filter cloth costs alone. Dewatering performance has not suffered and press availability has been excellent, allowing us to catch up with production lost from the "Snowmageddon" event in early 2018. Not only is there savings in material cost, but less frequent cloth changes also frees up operator time. When filter cloths were changed out at 3,600 cycles, operators performed 32 batch changes per year on the zinc filter presses. With cloths being changed out at 5,400 cycles, operators only need to perform 20 batch changes per year for all four zinc filter presses. This saves 290 hours of labor per year, allowing the operator additional time to fine tune the dewatering process and to keep the area clean.

Another improvement being considered is the testing of a thicker filter cloth to reduce the frequency of cloth blow-outs, as shown in the photo. The mill technical group will continue to optimize the cycle interval and type of cloth to minimize costs while maintaining good filter performance.

Flying with Drones



Mine Technicians Jon Hochendoner and Patrick Toms test-fly the drone in the Aqqaluk pit on November 13, 2018.

Unmanned aerial vehicles (drones) have become extremely popular in the past five years in the private and public sectors. Drones are not just toys, they are extremely useful in collecting aerial footage of natural and artificial physical features of an area, also known as topography.

The Red Dog Mine Technical Department started using the Explore1 Drone High Precision package from Skycatch as part of a trial to evaluate drone applications in the mine department. Skycatch is a company based out of San Francisco, California that modifies DJI drones to carry GPS and camera systems. This package is already being utilized by the Line Creek Operation in the Teck Coal group in Canada.

This drone package captures data which can be transformed into 3-D data for mine engineers, geologists and mine technicians using the technique known as photogrammetry. Photogrammetry is the science of using photographs to measure distances between points, which creates detailed point cloud data used in mine planning and geology software applications.



Explore1 Drone High Precision package from Skycatch.

The purpose of this trial is to determine how effective this drone package will be at collecting mine topography data safely and more efficiently than current techniques used by the survey department. Current methods require moving heavy survey equipment around the targeted area multiple times, as well as exposing mine technicians to hazards in the mining area such as interaction with heavy equipment and geotechnical risks. Part of the trial includes testing the drone system in extreme temperature and wind conditions that Red Dog experiences.

The mine department asks that if you see this drone flying near your work area that you do not become distracted. Please keep your eyes on the task at hand and don't risk your safety to watch the drone.

What Are These Strange Pipes For?

By Willy Zawadzki

Some of you may have wondered what the strange-looking pipes and the unusual looking drill-rig are doing on the Aqqaluk's 775 Ramp. These pipes are sections of a well screen that is being installed in two wells on the 775 Ramp. These wells are not much different from water wells that some of you get water from at home, yet they are deeper (about 230 feet) and of larger diameter (14 inches).



Tuuq Drilling installing the Well Screens

This activity is part of the South Wall Mitigation Project that Red Dog Operations (RDO) initiated earlier in 2018. The goal of this work is to intercept seepage from the Main Pit before it reaches the Aqqaluk Pit, and lower the water levels in the rock behind the South Wall. As the Aqqaluk Pit gets deeper in the coming years, pumping from wells will eliminate seepage risk to the South Wall. To make sure that mining at the Aqqaluk Pit is safe, Mine Engineering, with support from Tailings and Water, monitors water pressure behind the South Wall with several pressure sensors (aka vibrating-wire piezometers) and continuously evaluate wall stability using prism and radar data.

By the end of 2018, we expect two wells to be fully operational. Once we start pumping from these wells, Red Dog will use data collected from the South Wall piezometers to decide how many additional wells are needed in 2019 (current estimate is four additional wells). This work is planned for Q2 of 2019, well before starting another phase of mining near the toe of the South Wall. The project has been a great success thanks to cooperation between NANA Construction, Tuuq Drilling, PAA River, and several of RDO's Departments (Mine Engineering, Mine Operation, Projects, and Tailings and Water). Enthusiasm and continuous involvement by Steve Rhodes of Projects has led us by example as a Courageous Safety Leader, allowed everybody on the team to go home safe and healthy every day.



Drilling on the Aqqaluk Pit 775 Ramp

Revenue Gains and Savings Through the AMP Process

By Randy Lewellen

The Teck Maintenance Improvement group in Teck's Sparwood property designed a process called AMP (Accelerated Maintenance Program) that has since been run at 10 Teck sites.

In 2017, Maintenance Superintendent, Matt Gee committed to providing the resources needed to support an AMP. Ken Ahrens (Maintenance General Supervisor – Mill) spent his summer at CDA to assist them in their program and learn how to manage an AMP.

The Red Dog AMP was kicked off in January 2018 with support from Senior Maintenance Management personnel from five Teck Sites. Ken managed the AMP with support from Ntam Baharanyi and Randy Lewellen.

Small Changes Can Equal Big Gains

The kickoff team quickly identified that \$8.5 million in potential lost revenue could be prevented through changes in maintenance practices and other improvements. Each identified loss was evaluated for financial impact and an initiative owner was identified to drive the changes. An idea generating session was held where knowledgeable people sat down to develop potential solutions and ranked them to determine which solutions to pursue.

To date, there have been eight initiatives completed, with 27 currently in progress. This will deliver about \$9.5 million in improved grinding mill availability and/or reduced operating costs.

Initiatives Supported by Teams in the Mill

- Reducing LTE durations: streamlining planned downtime of grinding mills—F. Maynard
- Courier Training: reducing dependence on a vendor to support critical analytical equipment—K. Ahrens
- Reducing Leaking Liner Bolts: reducing the largest cause of unplanned mill downtime in 2017—R. Lewellen
- Grinding Mill Lube Skid Maintenance Management: improvement of training, standardization, and troubleshooting guides—D. Garcia, E. Gamez

- Reducing #4 Belt Down time: improvement of belt splice clip selection and clarification of belt alignment procedures—D. Garcia
- Improving downtime reporting capabilities: to facilitate future improvement projects—L. Frasl

The team also identified opportunities in the heavy equipment shop. These opportunities don't have easily defined monetary value, but addressing them enabled the shop to provide better equipment availability.

- Redefining the strategy for schedule building to make sure the shop can balance scheduled work with breakdown needs—T. Farr
- Introducing a new synthetic oil for hydraulic systems to prevent seasonal changes and provide longer oil life—K. Shuster
- Developing a triage system to balance between operational requirements and asset protection—B. Vermeulen
- Creating new engine break-in maintenance tasks to ensure the equipment is operating as designed and to start it off on the right track—K. Shuster

New Software Provides Hard Analysis

As part of the AMP kickoff, Ntam utilized new-to-Teck software (Microsoft PowerBI) for data mining in many initiatives to develop valuations. This tool provides real-time indication of maintenance needs and maintenance performance, which enables us to focus on areas most in need. Since then, PowerBI has spread throughout the property to help teams better understand their data, and is quickly spreading throughout Teck.

AMP was originally designed to be a 40-week process, and 40 weeks have come and gone. The team is still hard at work, and have identified a further \$10 million in potential gains. With support from motivated people across the property, they will continue to pursue these initiatives as long as there are opportunities to improve.

Did You Know?

Throwing away a single aluminum can wastes energy equivalent to the same can filled with gasoline.

Don't Trash the Cash!

Please help!

Sorting Recyclables is Super Important!

If the trash is intermingled with recyclables, the total contents of the recycle bin then becomes trash.

Please do not put trash in the recycle bins. There is usually a trash can near the recycle bins, use that instead.



Have you "liked" us on Facebook?

Follow [@TeckResourcesLtd](https://www.facebook.com/TeckResourcesLtd)

Bringing Mining Sustainability to Red Dog Operations

By Johanna Salatas

Employees at Red Dog Mine are accustomed to difficulties and logistical challenges. Because we are located 100 miles north of the Arctic Circle, with no roads into or away from the site, it is not uncommon for our workers to “live” on-site for weeks at a time on rotational shifts, arriving and leaving only by chartered aircraft. Weather delays here are common, sometimes stranding workers on-site and delaying food shipments for days. Major projects must be planned one to two years in advance because supplies can only be barged to the site during the few summer months when Chukchi Sea ice is melted.

Successful in the Face of Challenges

To say Red Dog poses logistical challenges is an understatement, and yet Red Dog remains very successful at producing high quality zinc and lead concentrate and shipping it to the world market. However, material recycling is always at the bottom of the importance barrel. Recycling happens because workers in the warehouse make it happen. In 2018, you may have noticed a huge shift in recycling at Red Dog, and that’s just the tip of the iceberg.

Discussions held with crews from different departments indicated frustration about how waste was dealt with, because the options are few—either incinerate or send it to the landfill. Neither option is sustainable, but there are no other options available, and waste problems are mounting.

The mine landfill is projected to meet the operation’s needs through 2031. However, unanticipated changes in mine processes, the possibility of mine expansion to an untapped underground deposit, and the waste generated from the current mill expansion project may reduce landfill capacity much sooner.

Reducing waste to the landfill would meet a sustainability objective for Teck, because despite Red Dog’s location in a vast Arctic environment, preserving landfill space conserves biodiversity by keeping our footprint as small as possible. The other option, incinerating garbage, poses a different set of challenges to sustainability.

Working to Slow the Burn

Burning garbage is energy intensive, and despite control devices installed on incinerators powered by diesel fuel, greenhouse gas and metals emissions still occur. Red Dog Operation is powered by diesel. More than 18 million gallons were delivered in 2018. This diesel arrives on fuel barges during the summer months and is doled out to the operation for the rest of the year when the Arctic Ocean is frozen. Any action taken to reduce reliance on diesel for incineration, such as removing trash from the incinerators, is preferred.

Red Dog’s Sustainability Goals involve reducing reliance on diesel for incineration, thereby reducing the generation of greenhouse gas and metals emissions from incineration, and the preservation of valuable landfill space for biodiversity conservation. A strong need to recycle as much and as often as possible was identified, but the logistics involved and the space available at our active operation was limited.

To address these sustainability goals, a Waste Characterization Study at Red Dog was conducted in summer 2017, to identify reuse, recycling, and disposal options, especially for large volume wastes that take up space in the landfill. This study meant picking through and cataloging bagged trash destined for the incinerator and combing through the landfill. The study was done over two weeks, creating temporary employment for a team of eight amazing locals from the region.

Using results from the study, a plan was formulated with Aidan Vasquez at Waste Management International, Inc. to start collecting the recyclables at Red Dog camps and work sites.

Recycling Brings Multiple Benefits

The most lucrative part of the new sustainability effort is to implement a scrap metal collection program. In summer 2018, more than 20 container bins were shipped to the site on the first barge. The containers are set up around the site to collect scrap iron, tin, aluminum, stainless steel, and exotic metals such as magnesium, scandium, and tungsten carbide. Once filled, the containers will be shipped off-site in summer 2019 and replaced with empty containers.

Separating the metals into distinct categories, as opposed to lumping them together, will fetch a top-market price from metal recyclers. Also, the cost to back-haul waste products away from Red Dog is minimal, compared to the costs of bringing products to the site. As a result, there is a built-in incentive to recycle as much and as often as possible!

Also in 2018, three full-sized cardboard balers were purchased and delivered by barge. Baled cardboard waste will fetch commercial prices, thereby turning another waste into profit. Additional recycling throughout the Red Dog camp stated in 2018, with bins set up to receive plastic bottles, aluminum cans, and plastic shrink wrap (LDPE and LLDPE). This will result in additional recycling revenue streams. By using two older, smaller balers that were already on-site, these materials can be baled for removal. And finally, used cooking oil that was previously burned in the incinerator which caused recurring maintenance issues, is now collected and shipped to an off-site vendor for recycling. Additional waste reduction opportunities were identified in the Waste Characterization Study, and hopefully, these can start to be implemented in the coming years.

In 2019, a dedicated Red Dog Recycling Center will streamline these recycling efforts, and the staffing needed to run this program will likely create new jobs for people in the region. Profits realized from this recycling program can fund additional sustainability initiatives for this beautiful Arctic Region.

More Than Doing the Right Thing

Red Dog strives to become a beacon for sustainability in one of the most remote regions in the Arctic. Even without profits from recycling, the environmental benefits such as reducing pollution and greenhouse gas emissions, have economic value as well—many more when compared to landfilling. At Red Dog, sustainability is more than just doing the right thing. Sustainability is necessary. And when logistical challenges make it seem impossible, Red Dog employees find solutions to prevail.

Home Alarm Safety—Savings Lives and Property



Working smoke and carbon monoxide (CO) alarms are one of the most effective and least expensive ways to avoid fire and CO related deaths and injuries. It is very important to keep your home alarms clean

of dust, paint, and clutter and to replace the battery annually. If you have a newer type of smoke detector with an internal battery, check the date on your alarm. This type of alarm has a life span of ten years. If your home smoke/CO alarm is older than ten years, it is time to replace it.

Along with smoke detectors, CO detectors are important to have in your home. Carbon monoxide is an odorless, colorless, poisonous gas produced by incomplete burning of carbon-based fuel burning appliances or engines. This alarm is extremely important during winter months due to the use of fuel burning heaters and stoves.

Most smoke detectors sold today are combination smoke and CO detectors. These detectors sample the air for smoke and CO. If you are unsure what type of alarm you have, check the back of the detector. It will tell you what type of detector you have and if it is a combination detector or not.

It is also a good idea to remind your loved ones to check the alarms in their homes. Many people remove batteries in their alarms because of beeping due to dying batteries and then do not replace them. If you are aware

of an Elder or person in need in your community that may need help in checking their alarms, be sure to ask them and offer assistance. Many community fire stations have assistance programs and can assist you if you have any questions.

Smoke Alarm Tips:

Test smoke alarms once a month by pushing the “test” button.

- Install new batteries at least once a year.
- Add a reminder in your calendar to change your battery. Choose a holiday such as New Year or daylight savings time, for example.
- Clean smoke alarms using a vacuum cleaner without removing the cover of the alarm.
- Replace smoke alarms every 10 years.

CO alarm tips:

- Place the CO alarm adjacent to the room containing the boiler, water heater, furnace or other carbon-based heating appliance. Include alarms on the level above and below the appliance.
- Place a CO alarm inside the dwelling near the door to an attached garage or car port.
- Install a CO alarm in the hallway outside sleeping rooms in each area of the dwelling.
- Install a CO alarm outside the kitchen area if there is a carbon-based fuel appliance present.

For more alarm safety tips, visit the Alaska Department of Public Safety, Fire and Life Safety site www.alaska.gov/fire/home

2018 Sealift Season—That’s a Lot of Freight

By David Marshall



A fully-loaded barge with approximately 102 million pounds of cargo on deck.

I don’t know about you, but the process of sealift still amazes me—five container barges, over 1,800 containers, 160 PAC expansion modules—deck cargo weighing over 51,000 tons. That’s over 102 million pounds! This requires forklifts, trucks and about two dozen people all working together! When you watch it from a distance, it’s like a beautifully choreographed ballet.

October 2018, marked the end of another successful delivery season at Red Dog. As is normal for Red Dog, we faced our fair share of challenges. Numerous weather delays and unloading the PAC Expansion Module barge presented its own set of unique challenges.

Our fuel delivery season ended with Red Dog receiving 18.4 million gallons of diesel fuel from three separate fuel barges.

All of this was done safely, with zero spills and without any serious incidents. This is a testament to the men and women who participate and contribute to a safe and successful sealift season.

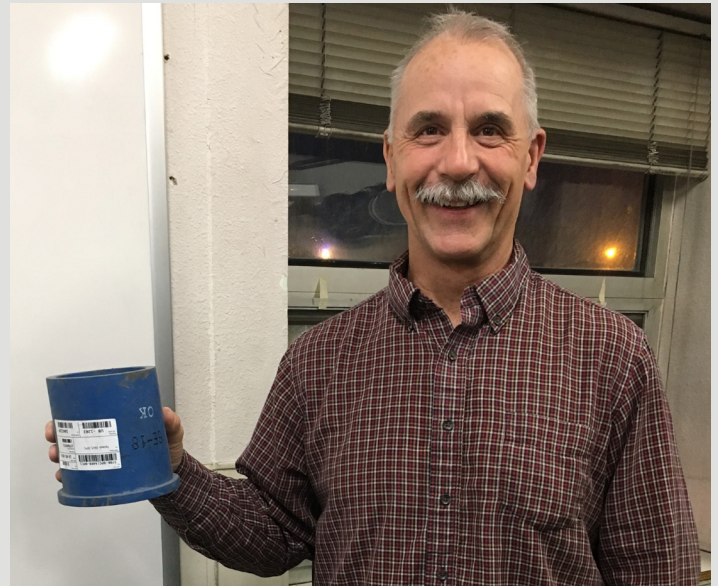
Skirts... for Cyclones?

By Matt Hercun

Cyclones can be a messy business here at Red Dog, but it doesn't have to be that way. Particle separation performed by cyclones is essential to the process plant. It is one of the steps after the ore is taken from the ground to become zinc and lead concentrates that we sell on the world market. The cyclones are used to classify solid particles that are suspended in a slurry based on the particle mass and shape. Typically, smaller particles exit out of the top of the cyclone and pass on to the next stage in the process plant. Larger particles exit out of the apex at the bottom of the cyclone to go back into the mill for further grinding. The stream coming out of the bottom of the cyclone is guilty of creating a mess that causes headaches for both mill maintenance and mill operations. That began to change the day Rick Frost knocked on my office door and started talking about skirts. You read that right: skirts.

Rick has worked extensively on cyclones as a mill maintenance millwright. He told me he had a couple of ideas that could potentially solve longstanding issues with tertiary cyclones—the apexes and splash skirts. The apex is the liner at the bottom of the cyclone, and the splash skirt directs the stream exiting the apex downwards rather than spraying everywhere in a conical manner. When the rubber splash skirts fail, not only does slurry spray everywhere, it also causes damage to the cyclone underflow tub, forcing mill operations to take that cyclone off-line until mill maintenance can replace the splash skirt (and occasionally repair holes in the underflow tub). A failed apex will cause some of the small particles that are supposed to exit the top of the cyclone to exit out of the apex instead and go back to the mill, increasing the circulating load.

Due to changes in ore type and operating strategy, splash skirts and apexes have been failing ahead of regularly scheduled preventative maintenance (PM). As a result, over the last five years, PM intervals have been reduced from 1,000 operating hours down to 600 hours. This led to an increase in parts consumption and maintenance labor, and reduced cyclone availability. The rubber splash skirts (and apexes, to a lesser extent) that we have in stock are still failing prematurely, even with the PM



Rick Frost holding a rubber splash skirt.

intervals reduced to 600 hours. A solution to this problem was to test trial a ceramic splash skirt and a harder ceramic apex, each with better wear resistance.

While slightly more expensive, the ceramic splash skirt and harder ceramic apex trialed in the tertiary cyclones lasted almost four times longer than the parts currently in use. An inventory change request has been created to make the trial splash skirt and apex stock items. This will phase out the old apex and rubber splash skirt. Due to the longer wear life of the new cyclone parts, mill maintenance can increase the PM interval from 600 hours to 1,200 hours. In the end, we will save money on parts, perform less maintenance and increase the availability of our cyclones—and of course—have less mess.

Continued from page 1

Message from the General Manager

ensure our mining is sustainable for the long term. Part of this work is underway to reduce our environmental footprint through increased recycling efforts. We will be able to send scrap metal, tires, used glycol, cardboard and cooking oil off site. Revenue received from these efforts will partially offset the cost of the recycling program.

On November 30 at 8:30 a.m., a 7.0 magnitude (Richter scale) earthquake occurred with its epicenter approximately 16 km (about 10 miles) northeast of the city of Anchorage. This impacted the lives of several Red Dog employees and contractors who live in the Mat-Su valley and in Anchorage. As a management team, we worked hard to get these impacted people home to support their families. Teck Resources showed

its support by providing a \$100,000 donation to the Red Cross who were actively working in the community. This edition of the newsletter includes a story from Mark Helms recounting his volunteer experience in the relief effort. Thanks, Mark for your community service during this time of need.

Thank you to everyone for your efforts through 2018. As we enter a new year, please focus on improving your skills to recognize and mitigate hazards at work and home, so injuries are avoided. We have many challenges ahead this year and we need "Everyone going home safe and healthy every day" so we can achieve our new targets for the year. Let's work together to have a safe and productive 2019.

Teck Alaska Incorporated
3105 Lakeshore Drive, Building A, Suite 101
Anchorage, AK 99517

Invest in success! Teck offers a \$5,000 grant to a woman entrepreneur in the Northwest Alaska region who has an existing business at any stage. Included is three days of targeted education in Vancouver, Canada, plus one year of 1:1 mentorship following the training series. Applications are due by March 7.

Apply now at www.fwe.ca/programs/e-series

Questions? Contact Verna Westlake at verna.westlake@teck.com
or Erika Thomas at erika@fwe.ca



For Current Job Vacancies (or opportunities)

Please go to www.teck.com and/or
www.nana.com and apply on-line.
(Paper applications or letters of interest
are no longer accepted.)

Red Dog Newsletter

Text
REDDOGMINE
to **22828** to get started.



Message and data rates may apply.

Join our mailing list.

Online www.reddogalaska.com/subscribe

Red Dog Operations | Teck Alaska Incorporated
3105 Lakeshore Drive - Building A, Suite 101 - Anchorage, AK 99517 - Phone: 907-754-5168 | Email: reddog.info@teck.com
Website: www.reddogalaska.com