BUREAU OF LAND MANAGEMENT

RED DEVIL MINE REMEDIATION PROPOSED PLAN
PUBLIC MEETING

Thursday, October 29, 2020

Virtual Community Meeting

ATTENDEES:

Lesli Ellis-Wouters, Communications Director, BLM
Bonnie Million, Anchorage Field Station Manager, BLM
Matt Varner, Presenter
Mike McCrum, Presenter
Maureen Clark
Anne Marie Palmieri
Mark Longtine
Natalie Travis
P. Jones
Courtney
Court Reporter, Betty Caudle, Metro Court Reporting

ABSENT:
Joy Huntington, Facilitator, Uqaqti Consulting

P R O C E D I N G S

(On record 1:00 p.m.)

THE REPORTER: On record, 1:00 o'clock.

MEETING OVERVIEW (FACILITATORS)

LESLI ELLIS-WOUTERS: Welcome to the community meeting on the Red Devil Mine Remediation Proposed Plan. My name is Lesli Ellis-Wouters, and I'm the communications director for the Bureau of Land Management in Alaska. And I want to thank you for taking the time to participate in this discussion. It is important to us to provide this information to you in such a way that does not compromise your health in these difficult times, but also allows us to move forward on this important process to your community.

Today, we are using the Zoom webinar platform, which I hope you find to be an interactive experience. You will be able to ask questions verbally by raising your hand, which is the hand icon at the bottom of your screen, or you can type your question into the Q & A box, which again is the icon at the bottom of your screen. I don't see that we have anybody attending right now on the phones, so I won't go over those instructions. Also, this presentation is being recorded for administrative purposes and a transcript will be made available on the project website as soon as it can be transcribed. I want you to note in the upper left-hand corner of your screen is an information icon. And if you click on that, I want you to write down the webinar ID. That is in case you do get disconnected, you can call in and type in that ID, and just hit pound and it should connect you back in.

The agenda is currently on the screen. And after I'm finished, you will hear from the Anchorage field office manager, followed by presentations, and a public testimony period.

You can ask questions anytime during the presentation by using the Q & A box, but we'll also be taking breaks during the presentation to allow you to verbally ask questions of the presenters. So with that, I will turn it over to Bonnie Million, BLM's Anchorage field office manager.

ANCHORAGE FIELD OFFICE MANAGER WELCOME

BONNIE MILLION: Great. Thank you so much, Lesli. And good afternoon, everyone. I'd like to kickoff this afternoon by thanking everybody for joining us in this virtual setting. I really would love nothing more than to be able to see each of you in person. If you're anything like me, I'm getting a little stir crazy here at home. But like Lesli mentioned, it is out of the sincerest respect for the health and safety of all Alaska communities and for our larger Alaska family that we are conducting these meetings virtually.

So one of the plus sides, right, or doing this virtually is that we are able to provide multiple opportunities for everyone to gain information and for us to receive your feedback on this very, very important remediation project that's been going on for quite some time now.

It kicked off way back in 2010 with the initial remedial investigation work. The BLM came out to communities in 2010 and 2011 to present that initial workplan associated with the investigation.

And then we came out again in 2012 to do a preliminary investigation report. And then I believe the initial fish tissue study results were presented at those meetings.

And then again, we came out in 2014 to seek some public comment on some of the early actions that were happening out there at Red Devil. And it was great. I think some of the feedback that we received from those meetings, we did some modifications to the temporary stream work that happened along Red Devil Creek, and that was to keep those tailings up out of the creek corridor itself and from moving down in to the Kuskokwim River. So that was really fantastic.

And then from there, the project moved into the feasibility study stage. Lots of modeling. Lots and lots of data. And it's complicated stuff, right? It's definitely a whole lot of information. And so as a group, as a team, we decided that because it's a lot of information and because it is so complicated that we should go out to communities again and summarize some of those results.

And so in 2017 and 2018, the team came out to communities and summarized some of that modeling information, some of that feasibility study phase information, in anticipation of this public comment period.

And based on feedback that we got in those visits, especially feedback from our partners with EPA and the State of Alaska's DEC, we had some extended analysis for the groundwater modeling and the repository modeling.

And that brings us to today with the official public process now. We had originally, right, plans to come out to communities back in March, with predictable results. And now we're moving on into this virtual setting so we can keep this moving forward, because we do understand how important the remediation of this site is to the communities that live up and down the Kuskokwim River corridor.

So if you have any specific concerns or comments, or if you have any general concerns or questions, this is a great forum to bring those up. If you're anything like me, I always think of my question about 20 to 30 minutes after the meeting has ended. There's contact information that we have on the Red

Devil Mine Project website. Mike will have that information posted in his presentation. Feel free to send an email, call, let us know. This is a really, really important time for us to hear back from everybody who is potentially going to be impacted by this cleanup process along the river corridor.

So with that, thank you all again for joining us today. And I will pass it off to Matt Varner, the fish biologist, for his presentation.

MERCURY CONCENTRATIONS IN THE ENVIRONMENT

MATT VARNER: All right. Good afternoon, everybody. Let me get my presentation started here. All right, very good. Again, as Bonnie mentioned, my name is Matt Varner. I'm a fish biologist with the BLM. And I'm going to talk today about a multi-year fish tissue study that I led where we examined the concentrations of mercury and metals in fish within a section of the Kuskokwim between Aniak and McGrath.

So I know a couple of you have sat through this presentation before, so I apologize for that. But hopefully, there's something you missed that you can get out of this next redo.

So during this presentation, I'm going to talk about mercury in the environment, why we focused on mercury for this particular fish tissue study, and the results of the project as it relates to the remediation of Red Devil Mine.

Cinnabar is the primary ore body that contains mercury, and it’s really common in western Alaska. This slide shows the number of known cinnabar deposits in the western portions of Alaska, and in particular as they related to the Yukon watershed, which is shown here in tan; as well as the Kuskokwim watershed, which is shown in orange. And you can see there’s an area that’s circled here, and there’s a large concentration of these known cinnabar deposits. And that concentration, in particular, of those known deposits is why we refer to this particular portion of Alaska as the mercury belt.

And it’s pretty clear -- based on the concentration, it’s pretty clear why the vast majority, about 99 percent of all mercury mined in Alaska, came from this particular area.

That last slide really hit the first two points here, the natural geology and then land use. Certainly if you have the geology there, the resource there, that’s why we had mercury mining in those particular areas.

These other two bullets, you may not be so familiar with. In respect to permafrost, I think most folks maybe don’t connect permafrost to mercury, but permafrost contains a substantial amount of mercury. And as that permafrost melts, mercury is released in the environment. And studies have already confirmed this in Alaska.

The last bullet, atmospheric deposition relates to mercury that gets in the atmosphere from sources like coal-fired power plants in Asia, wildfires, etcetera. And once that gets in the atmosphere, it’s carried away from that source and deposited elsewhere in the globe, including Alaska.

This slide illustrates how mercury moves and accumulates in the aquatic food web. And so as you move from left to right on this slide, you can see the small yellow dots. And that’s meant to represent mercury accumulation as you move from the bottom of the food web to the top of the food web.

And we focus here on methylmercury since it’s the most toxic form of mercury to humans. Methylmercury is created naturally when we have interactions of mercury in the water and sediment with bacteria that are typically found in swampy areas like slews and wetlands that are pretty common in the Middle Kuskokwim region. So once that methylmercury is available, it’s then easily taken up by things at the lowest level of the aquatic food web. So you can think about algae, the green stuff on the rocks in the creeks and the river. That’s the first link in the aquatic food chain. And so once that (indiscernible) algae consumes or ingests that mercury from the water and sediments then it becomes available to insects that are eating that algae. And then as you move further up the food web, forge fish are eating the insects, and then larger fish are eating those small fish, and so on. So those concentrations become magnified as you move to the top of the food web where you see species like Pike and Burbot, or Lush fish.

The goal of this particular study was to build upon work that had been completed by Fish and Wildlife Service in the Lower Kuskokwim, as well as work that had been completed by USGS. And the USGS study in particular had noted that mercury concentrations were elevated in fish downstream of mined area. The Fish and Wildlife Service study had noticed just elevated concentrations of mercury in the Lower Kuskokwim in Pike, so we wanted to build on those particular studies and expand them.

And the way we expanded those studies is we focused on not just a single species, but rather multiple levels of the food web, the very bottom to the top. And we integrated fish tracking as well so we could understand seasonal habitat use of fish, of individual fish in fact that we had taken tissue samples from. So we knew individual concentrations of mercury for a fish that we had sampled, and then we were also able to monitor its movements over the period of one to two years. And that was within about a 270-mile portion of the Kuskokwim, so a fairly large section of the Middle Kuskokwim. So that way kind of captures the goal of the setting.

I think this is a good time, Lesli, to pause for maybe any questions that might be out there.

LESLI ELLIS-WOUTERS: Sure, Matt. Let's see, we don't have any questions in the Q & A box, but I see we've got some more people who have joined in. And I'll just say if you have a question at this time, please raise your hand. There should be a hand icon at the bottom of your screen, and we'll open up your mic for questions. I don't see anybody raising their hand at this time. And again, if you want to ask a question at any time during the presentation, you can put it in the Q & A box, which is an icon at the bottom of your screen. With that, I guess we'll just continue on and take another break a little later.

MATT VARNER: Okay. The results of the study indicated that aquatic life, and that includes insects and fish, within Red Devil Creek had much higher mercury levels than most other creeks in the region, except possibly Cinnabar Creek which is in the headwaters of the Holitna River. However, when we sampled Pike throughout the region, we found some of the lowest concentrations of mercury in the section of the Kuskokwim associated with Red Devil Mine. Fortunately, with the help of radiotelemetry tracking, we were able to discern a pattern to those concentrations that we saw in Pike.

Burbot, on the other hand, the concentrations that saw were lower than what we found in Pike. And they were also fairly variable. And we couldn't really explain what we found in terms of concentrations in Burbot using telemetry. They were just too variable. But I'll focus -- as we dig into this presentation, I will turn and focus on Pike because those data were very revealing in terms of the concentrations we saw and where those individual fish spent most of their time throughout the year.

Our project area was essentially Aniak up to McGrath, focusing on the mainstem Kuskokwim, but also including many tributaries, both small and large. And our sampling program started in 2010 and essentially wrapped up in 2014. And you can see in this slide, Red Devil Creek is basically right in the center of our study area in this basically orange blob. And that was a real focal point, obviously, because of Red Devil Mine. We wanted to have that really the center of our study area and then sample extensively in the surrounding drainages and along the Kuskokwim.

We sampled nine small streams. And when I say small streams, I mean wadable streams. And most of those streams had pretty limited fish presence. The most common fish that we found was Slimy Sculpin, which is a small fish less than a few inches in length, it doesn't move around a lot throughout its life, a pretty good indicator of conditions within a particular stream because of that. Like I said, many of the small streams had limited fish presence. But when we first started this study, we assumed that several of the streams that we sampled would be fishless. However, we did find fish in every stream that we sampled, including Red Devil Creek. But those fish were typically limited to just the lower few hundred feet of a particular stream based on its connection to the Kuskokwim.

This map shows the location of eight of those small streams. And you can see that they essentially were located between the community of Crooked Creek to Sleetmute, with Red Devil being in kind of the upper, upper quadrant of the small tributary area that we sampled.

The ninth tributary that we sampled was in the upper Holitna. And it’s shown here, and you can see it’s in the extreme upper headwaters of the Holitna River system. And we included this stream because it had been sampled in the past by the USGS, and they had found elevated levels of mercury in fish there. Cinnabar Creek had a small mercury mining operation on it in the past and little evidence of that remains onsite today, but because of that previous sampling history, the fact that mercury had been detected in fish there, and also the fact that quite a bit of mercury had been produced from that mine, we wanted to sample it again and get a better understanding of concentrations associated with fish in and around Cinnabar

Creek.

Moving to results. Here what you see is the total mercury concentrations in whole body samples for Slimy Sculpin and aquatic insects organized by the small streams that we sampled. And right off the bat for Slimy Sculpin, which is the upper graph, what you see is that concentrations were quite a bit higher than the other steams that we sampled that had Slimy Sculpin.

Cinnabar Creek also had fairly high levels compared to the other streams that we sampled.

One of the things you will note, though, is that very small amounts of mercury were detected in just about every stream that we sampled for Slimy Sculpin. And that’s not surprising given the geology. A very similar pattern for aquatic insects, which is the graph located in the lower right corner. Again, you see elevated levels in Red Devil Creek as well as Cinnabar Creek, and fairly low levels in aquatic insects in the other streams that we sampled.

Again, this is tributary sampling results for total mercury within the tributary systems that we sampled for two particular species. And this slide shows the results for Dolly Varden in the upper right-hand corner, and Arctic Graying in the lower right-hand corner. A similar pattern again. Elevated concentrations in Red Devil Creek, slightly elevated concentrations in Cinnabar Creek for Dolly Varden, and some degree of detections across Dolly Varden in all of the streams that we sampled. The same pattern again for Grayling. Although you will note that the Y access here, the concentrations are much lower than what you see above for Dolly Varden with the highest levels being 1/10th a part per million, so fairly low. But again, slightly higher concentrations in Red Devil and the other streams showing some degree of detection. The Arctic Grayling that we sampled across all these streams were fairly young Arctic Grayling. And Arctic Grayling being a fish that feeds primarily on insects, you would expect to have much lower levels than a species like a Dolly Varden which can also be known to eat other fish.

Lesli, this is probably -- before I jump into the main river component of the presentation, this is probably a good spot to ask for questions again.

LESLI ELLIS-WOUTERS: Again, if anybody out there has a question, feel free to raise your hand or you can type it into the Q & A block there. Give it a minute. If anybody -- don't be shy. We're here to answer questions and just feel free to raise your hand so we can unmute your mic, or you can go ahead and type it in the Q & A box. I don't see anybody raising their hands, Matt, so I guess you're good to go.

MATT VARNER: Okay. So, you know, given these results, they really weren't a surprise. Based on the geology of the region and the mining associated with Cinnabar Creek and Red Devil Creek, we certainly expected to see what we found in terms of elevated concentrations in fish and insects in Red Devil Creek as well as Cinnabar Creek. But we weren't -- one of the key questions that remained was how does Red Devil Creek in particular influence the larger aquatic environment of the Kuskokwim. To explore that particular question, we had to sample predatory fish. We wanted to look at Pike. We wanted to look at Burbot. And we also looked at Grayling within the larger Kuskokwim. But I'm going to focus in on Pike primarily and the tagging results, the telemetry tagging, because it was really, really informative, because we were able to sample tissue from individual fish, and at the same time, implant those fish with radiotelemetry tags and track their movements across multiple years.

Specifically from 2011 to 2013, we tagged hundreds of fish, about 150 Burbot, almost 250 Pike, and nearly 200 Grayling. The Burbot and Pike tags lasted about two years, while the Grayling tags lasted about a year, and that has to do with body size. But nonetheless, lots of fish tagged and lots of flights and lots of seasonal movements.

For the analysis, we divided the study area based on large tributary junctions with the Kuskokwim -- or simply by large tributaries like the Holitna. We were most interested in the residency of Pike and Burbot within these particular sections, but really in between George and the Holitna River since that's where Red Devil Mine is located.

This particular graph is specific to Pike, and it shows total mercury concentrations and the location where the Pike was tagged and remained throughout the study area. And so what you see here is that we found the highest concentrations in Pike from those fish that we sampled in the George, Holitna, and Takotna river systems. At the same time, what you'll note is we had relatively low concentrations within the Kuskokwim. And we also had fairly low sample numbers. You'll see the section here, the third bar from the left is the Kusko above the George, and then the Kusko above Sleetmute is next to it, and you see fairly low numbers. Five Pike were sampled in the Kuskokwim region above the George River. And then only one from the Kuskokwim above Sleetmute to Stony. And so fairly low numbers. And that has a lot to do with the habitat in that particular section of the Kuskokwim. The other thing that I think is important is fairly low concentrations of Pike there again where Red Devil is coming into the Kuskokwim. The key takeaway message here is that the elevated concentrations in

Pike within these key watersheds, the ones highlighted here in yellow, was significant when compared to the seasonal habitat use from the radio tags. And what I mean by that is that 90 percent of the Pike that we sampled within the Takotna, the Holitna, and the George stayed there. They didn't leave during any other season. So they were tagged in the summer. And then flights that we did during the subsequent fall, winter, spring, summer over the course of two years, those fish stayed there. So those concentrations that we had from the tissue samples were really indicative of what they were being exposed to within those particular watersheds. So it was very informative when we were able to couple tissue sampling with actual seasonal movements.

This slide is really just highlighting where we saw the highest average total mercury concentrations in Pike. Again, the George River, which comes into the Kuskokwim well down river of Red Devil Creek; Holitna, upriver of Red Devil Creek; and the Takotna River, which comes into the Kuskokwim at McGrath.

This graph shows regional mercury concentrations in Pike. And I think this is a really interesting slide, because what it does is it shows how our data from the Middle Kuskokwim compares to results from the Fish and Wildlife Service study on the Lower Kuskokwim as well as the Lower Yukon. And the Fish and Wildlife Service found higher concentrations in large Pike within the Lower Kuskokwim and Lower Yukon compared to smaller Pike. And, of course, that makes sense because we know that larger Pike would naturally have elevated concentrations because of their age compared to younger, smaller Pike. The key takeaway here is that the overall values that they found for the Lower Kuskokwim match very well with our data for the Middle Kuskokwim but were much lower than what we found for the George, Holitna, and Takotna. And, of course, this makes sense. The mercury belt concept, the national geology contributes to opportunities for fish to interact with mercury and to get that into their tissue concentrations.

To wrap up, through this multi-year study, we found elevated levels of mercury in fish and aquatic insects on streams that had a history of mercury mining, such as Red Devil Creek. Not much of a surprise there. And although we did find those elevated concentrations in Red Devil Creek, we didn’t see similar concentrations in the fish community in the Kuskokwim near the mine site. And again, this is likely due to the limited quality of habitat for Pike. And we didn’t have a huge sample size there. But the samples that we collected had fairly low levels, some of the lowest for the entire sampling of Pike that we did. And we sampled hundreds of Pike. The other factor to consider is Red Devil Creek is very small, and the Kuskokwim has a huge volume of water in comparison to Red Devil Creek, and so that’s likely a factor as well.

But based on the tissue samples and the telemetry data, it appears that underlying geology in these large tributaries within the Middle Kuskokwim like the Holitna, the George and the Takotna, coupled with the fact that they provide year-round habitat for species like Pike, have much more of an influence on fish tissue concentrations than mercury.

I focused on Pike primarily and kind of the results as they relate to Red Devil Creek. However, the report documents all of our results and goes into much more detail, and it can be found on the web at the link at the bottom of the slide. It’s also on our Red Devil Project website. And so I think that’s another -- if you have lots more questions or want to know more about the study and some of our findings, certainly dig into that report. The link at the very bottom of this slide will take you to the Alaska Department of Health and Human Services page where they have information specific to fish consumption in Alaska, including the Kuskokwim, because we do get a lot of questions oftentimes with this presentation focusing on are Pike safe to eat, for example, which they certainly are. But there are some guidelines that the State has put out for various regions of Alaska, including the Kuskokwim.

Lastly, my contact information is shown here, as well as the contact information for Dr. Angela Matz who works for Fish and Wildlife Service. And she’s an environmental toxicologist.

So the questions related to contaminants and metals and the environment and within animals and plants and fish, those are all things that she really focuses on as part of her job. And Angela assisted me with the development of this study, design, and the analysis, so she's just a great resource in general for questions related to both mercury as well as the results from this study. And so with that, any last questions that you might have before we move to the next presentation?

LESLI ELLIS-WOUTERS: Matt, we do have a question.

MATT VARNER: Great.

LESLI ELLIS-WOUTERS: And the question is, is there any way we can put the contact info and links from -- oh, I can answer this. I just would like to let you know that both of these presentations are available on the BLM Alaska website. And that's BLM.gov/Alaska. And if you navigate to planning, it will be in the upper right-hand corner. There's a link that will take you to these presentations and more information on the Red Devil project. I can go ahead and put Matt's -- I don't know if I can actually put stuff into the chat box, but I will give it a whirl and try to put the contact info in there for you.

Are there any other questions? Anybody want to raise their hand, ask something verbally? Well, thanks for the presentation, Matt. That was really good. And now I guess we will transition over to Mike. And I apologize, everybody, Mike will not be able to turn on his camera. As everybody knows, we all have different bandwidth issues. And Mike comes across great, just not with the camera on. So take it away, Mike.

RED DEVIL MINE PLAN PROPOSAL, MIKE McCRUM

MIKE McCRUM: Okay, thanks, Lesli. Let me share my screen real quick here. Okay.

LESLI ELLIS-WOUTERS: And you're looking good.

MIKE McCRUM: Okay. You can see the coverage of the presentation? That's good.

LESLI ELLIS-WOUTERS: Yes.

MIKE McCRUM: So I'm here today to talk about the Red Devil Mine project. As Bonnie mentioned before, this project has been ongoing for quite some time. We have finished the investigation phase. And we finished a phase in which we worked on a feasibility study looking at different technologies that we could use to address the issues that we discovered through the investigation, and we have selected a preferred cleanup alternative.

What I'm going to talk about today is kind of the next step in that process. It's called the proposed plan. And it is designed to support presentation of that preferred alternative and public comment, which is a very important step in this overall process, and one that we need to pursue before we can make a final decision on what to do with this mine site.

So I just want to spend a little bit of time talking about the results of the investigation, because they certainly inform what we're planning to do. And then I will talk a little bit about the results of the feasibility study and the alternatives that we evaluated in detail. And then I'm going to spend some time talking about the alternative that we consider to be preferred based upon how it compares to eight different criteria that the EPA has setup.

So beginning with the investigation. This slide really summarizes a massive amount of data in a very few words. But this was, for most of the life of this mine, it was an underground mine. In other words, they extracted ore through shafts and tunnels and brought that material to the surface. And the ore was processed onsite. And by processed, I mean it was heated up, and the mercury was driven off, and the material that was left are called tailings. It's the ore that had kind of been cooked, if you will, but not melted. And the tailings, once they had finished that process, the tailings were pushed outside of the process building onto the ground, and over time they accumulated into a pretty sizable pile right next to Red Devil Creek.

The contaminants of concern, which are the contaminants we identified through the investigation of that we're most concerned about are the three metals that are associated with the ore itself, mercury and arsenic and antimony. Those metals are contained in the minerals that were mined. Mercury is part of the mineral called cinnabar. Arsenic is found on this site as part of a mineral called realgar. And antimony is found in stibnite. And those three minerals were enriched in the bedrock here and they were mined and processed for the mercury.

As I mentioned, the tailings, the remnants of that process, were pushed out onto the ground and accumulated in very large piles. Over time, the interaction between those tailings and snowmelt and rain led to leaching. And some of those metals moved out of the tailings and into the soil underneath the tailings piles, as well as into Red Devil Creek where they've had a significant effect on the sediment in the creek. Groundwater emerges from the ground in the vicinity of Red Devil Creek. That's kind of a normal phenomenon. But in this particular case, the groundwater is emerging right into those tailings piles, so we have direct contact with the groundwater, and we have a chemical effect from the tailings leachate. And then finally, the material that made its way into the creek, some of it has migrated down the creek and into the Kuskokwim River and has affected the sediments in the river in the vicinity of the mine. So those media, the soil, the Red Devil Creek sediment, the groundwater, and the river sediment have all been affected by the processing of those tailings sitting there for a long period of time.

We did a risk assessment. We actually did two different risk assessments. One was one the mine site itself, and the second one was on the sediment in the river. In a risk assessment, you look at exposure scenarios. For this mine, we looked at a scenario in which people would actually move back onto the mine site and build homes and drill wells for groundwater for their water supply. We looked at a scenario where someone was to open a mine again, so that nobody would be living there but people would be working 10 hours a day in the area. And then we also looked at a scenario in which subsistence hunters would move across the property and perhaps drink out of the creek. And so based upon those three different scenarios, we calculated cumulative risk due to direct and indirect exposure to these three metals, and we found at a pretty level of risk, which is the basis for the action that we had planned through the feasibility study.

Recognizing that the material in the creek, that had eroded into the creek, the tailings, and the waste rock, were moving into the river and moving offsite, in 2014 we took some action. We regraded the tailings piles to make them not so steep. We put in some gabion walls, which are walls made of river rock and wire, to prevent that material from eroding into the creek. And then we put in a weir, or a little dam, downstream and created a pond so that any of that material that would continue to move down the creek would be caught up in that pond and not make its way into the river. So that was a significant part of what we did kind of in the middle of the investigation phase.

So I want to spend the next few slides just summarizing very, very quickly the data that we collected as part of the investigation. It certainly informs what we did at the feasibility study and, you know, the work that we will have to do where we ultimately remediate the site.

What you're looking at here is a plan view aerial photo of the mine site itself. The river is off to the right. Red Devil Creek runs right through the center of the slide. This black line more or less outlines the area of the Red Devil Creek valley. On either side of the north and the south outside of that black line, the ground surface slopes up quite steeply. What we found is that that topography really limits the extent of those tailings piles. Most all of the material that was mined was brought to the surface at this location where the main shaft was. Initially, it was processed on this side of the creek. And then that initial processing facility burned in the 1940s. In the early 1950s, they built a new larger processing facility here. And so the tailings that were the remanent to the process that they pursued in this building were placed on the ground here. And so we have tailings on both sides of the creek that are limited to the area within the Red Devil Creek valley for the most part.

The red dots that you see here are soil borings that we drilled as part of the investigation. We sampled soil both at the surface and at depth. Many of these borings have been turned into monitoring well. But we have soil data vertically integrated over most all of these locations. And you can see that we have analytical data for those soil. These purple circles indicate that we found high concentrations of those three contaminants at that location. And the extent of the concentration, the magnitude of the concentration is proportional to the circles. So big circle means high concentration. Small circles mean low concentration. And yellow circles mean that we really didn't detect those contaminants of concern at that location. So what this confirms is that the highest concentrations of those metals are found in the immediate vicinity of where the tailings were piled up. And also even though the tailings piles more or less halt at about this part of the valley, over time that material was either pushed or washed downstream through the action of the creek. And so the original barge landing that was constructed right on the edge of the Kuskokwim River is now covered with tailings and high concentrations of materials that have made their way down the creek. So this area outlined in black is our primary area of concern.

Looking at water. We did a lot of water sampling in Red Devil Creek. We also obviously sampled the sediment. This is a similar look of the mine site. This is the river. Here is the creek going through it. You can see these little red triangles. Those were fixed sampling stations that we setup on Red Devil Creek itself. Again, the size of the circle is proportional to concentration. The pattern here that you can see is in the sampling station upstream of the mine. The circle is small, the concentrations are low. As the creek moves downstream and emerges to the zone where the mine was active and the tailings piles are present, you can see the concentrations jump significantly, and they stay more or less at that concentration all the way to the mouth of the creek. So this confirms that those tailings are having an impact on the water quality in the creek as well as the sediment in the creek bottom.

This is a little bit different view, but it’s also a view of the mine site. Again, the river is on the right. The creek runs through the middle here. These green and yellow lines are a projection from the subsurface of the underground workings. As I mentioned, there was an underground mine. By the time they finished mining in the late 1960s, they had quite a network of shafts and tunnels and adits that they had excavated to extract the ore. What I want to show with this, though, is the effect of the presence of those tailings and other material on groundwater concentrations. Again, the size of the circle is proportional to concentration. Most of the monitoring wells that we put into place early in the investigation were down in the vicinity of the creek where the tailings are most prevalent. And you can see in that location, we have the largest circles indicating the highest concentration of those contaminants in groundwater that we found on the site. Not surprising. The water is moving through those tailings piles and emerging into the creek. And as a result of that direct contact over time, you get leaching and pretty high concentrations.

As you move to the north of slope, we also have some elevated concentrations. However, we did a lot of soil sampling up in this part of the mine site as well, but we never found any indication that there were tailings. The area had been mined and there was some ore there, some raw ore there, but there were no tailings. In some of the wells from this sub slope, you can see the circle are small. Those concentrations are relatively low. As you move into the area where the underground workings are most prevalent, which would be the area where the natural mineralization was most prevalent, we see concentrations getting pretty high. This is the result of the interaction between the groundwater and that in-place naturally occurring ore. So what that means is we do have impacts from the tailings down low in the watershed. Further up in the watershed, we have, in some locations, quite significant impacts to groundwater concentrations based on the presence of natural ore. As you can see from these circles, it's not everywhere. And that kind of complexity is one of the things we're going to have deal with in the future because I'm quite sure we're going to have to do some monitoring here.

Lesli, this might be a good place to stop and see if anybody has any questions before I move on.

LESLI ELLIS-WOUTERS: Thanks, Mike. Anybody have any questions on anything that they've seen to this point, feel free to raise your hand. Just the little hand icon at the bottom of your screen or type a question into the Q & A box. Don't be shy. We welcome any and all questions. And I don't see anybody raising their hand, Mike, so I guess we'll just go ahead and continue.

MIKE McCRUM: Okay, thanks. This slide is a little bit different look of the mine site. It's an oblique aerial photo taken from a couple of hundred feet in the air. In this case, you can see the river in the foreground. This is the mine site here. Red Devil Creek runs right through here, and those tailings piles that I was talking about are pretty much right in this area. We did a lot of sampling in the river in this area and further downstream, and we found some relatively high concentrations of that material either in the shallow water or on the shore next to the shallow water at this location. What this slide summarizes, though, are the, in very general terms, the results of the risk assessments that I mentioned. First, the risk assessment that we did on the mine site. I mentioned the exposure scenarios, the residential, the mine worker, and the subsistence hunter scenarios. Based upon those scenarios, we calculated, as I mentioned, high levels of risk. The risk takes two forms. One is toxic risk and the other is cancer risk. Now mercury, as we all know, is toxic. But the only one of the three contaminants of concern that presents both a cancer and a toxic risk is arsenic. And what we found was that although the mercury does contribute to the risk on the toxic side, most of the risk, both through the toxicity and cancer risk, is presented by the arsenic. And the accumulative levels of risk that we calculated exceeded the standards considered acceptable by both the EPA and the DEC. So it's that high estimated level of risk that is what's triggering our decision to move forward with remediation on this site.

As I mentioned, we did a second risk assessment focusing on the sediment in the river, because we know that some of the tailings and waste rock have moved down the creek and into the river and are moving down the river. The results of the risk assessment for the river were a little bit different. Again, we looked at the, you know, exposure scenarios based upon in looking at those three contaminants, mercury and arsenic and antimony. In the case of the river, though, what we found was that the level of cumulative risk was acceptable with regard to EPA standards, but it was above the level of acceptable for DEC. So certainly elevated risk but a little bit more gray than what we found for the mine site.

So taking those risk results and turning them into objectives for a cleanup action, we know that we need to, in order to bring those levels of risk down to a level that is acceptable everywhere, we need to prevent both direct and indirect exposure to people with the tailings, but also with the soil and the sediment in the river and in the creek. We need to eliminate the effects of those tailings on the water in the creek and also on the groundwater that's emerging from the ground near Red Devil Creek and flowing ultimately into the river.

And then as I mentioned, any action that we take, we're going to have to do some extensive monitoring to verify that the action that we're taking is effective.

So I want to now talk a little bit about the feasibility study that we did. According to this process, it's the CERCLA process. Once you've investigated a site and you understand the nature of the contaminants that you're working with and how they are distributed and what kinds of receptors, people, and wildlife could be affected, you need to use that information and look at different methods that you could use to clean it up. And by combing through those methods, you identify which technologies or methods you think might work, and you combine them into site-wide cleanup alternatives. We developed four alternatives for this site, and they're summarized here.

The first one, SW1, is the no action alternative. It's simply done as part of the process to estimate a baseline condition so that moving into the future, if we took no action, we would know what to expect.

The second one is also a fairly simple approach that would involve encircling the mine site. The mine site has been surveyed. It's about 190 acres. And we would encircle that entire 190 acres with a 12-foot fence. The idea being it would prevent humans and animals from getting onto the mine site. And while that might be effective in preventing some of that direct contact, there are other issues associated with material in the water and maybe material that has moved offsite already, that fence would not really address. So alternative two, it would really only be partially effective at best.

Alternatives three and four are similar in that they both involve excavating a significant quantity of material. Essentially all of the tailings and waste rock in the vicinity of Red Devil Creek, as well as the soil underneath and the sediment in the creek would all be excavated. And that's the same for both alternative three and for alternative four.

Where those two alternatives differ is what happens to that material once it's been excavated. Under alternative three, it would be consolidated in a repository on the mine site itself. And under alternative four that material would be placed in containers and barged off the site to a permanent disposal facility in eastern Oregon. So I've added the estimated costs for the different alternatives to the right just by way of providing you with some understanding of the level of involvement or complexity of these, each of the different alternatives. This is not the only criteria that we use to decide which is preferred. There are other technical criteria such as whether it's going to be effective, is it consistent with regulations, is it effective both long-term and short-term, is it acceptable to the State, you know, does it address mobility. There are all those kinds of things that went into the decision on the preferred alternative.

Again, this is a shot of the mine site. It's kind a bit of a low elevation oblique photograph. It graphically illustrates some of the areas most affected by the different alternatives that we have that I've just described.

Alternative two, the fencing, virtually everything that's colored in here will be encircled by a 12-foot fence. That encompasses, like I said, about 190 acres.

Under alternatives three and four, the material, the tailings, the waste rock, the soil, the sediment within this yellow area would all be excavated. It would be excavated quite deeply, really down to bedrock, up in the vicinity of these tailings piles. As you move down Red Devil Creek and onto the barge landing, the excavation would not be as deep because we found that most of the contamination is really in the upper few feet, three to five feet, and so the excavation would not go to bedrock at all of these locations.

As I mentioned, we found some elevated concentration material on the edge of the river downstream of Red Devil Creek. And so we would excavate several hundred cubic yards of material from these locations. Again, this is in the interest of reducing that overall level of risk down to an acceptable level.

One thing I haven't mentioned yet. Under both alternatives three and four, there's a monofill, which is like a small landfill, right here that would be deconstructed and incorporated into whatever disposal option is chosen under either three or four. This monofill was constructed on the location where that newer, larger processing facility was -- the building was demolished, and the equipment was set aside. We laid out a giant piece of Hypalon, which is very thick plastic, rubbery material. And we placed the building material and the equipment on top of the Hypalon. We filled around it with tailings and then we sealed that Hypalon, and then we covered it with more tailings and soil. That material, that entire structure would be deconstructed. The Hypalon, the building materials, and the equipment would all be transported offsite for disposal. The soil and the tailings associated with that would be consolidated with the rest of this material.

So as I mentioned under alternative three, all of that excavated material would be placed on an onsite repository, which is proposed to be placed at approximately this location here. If that were to be the case, as I mentioned, we would have to do extensive monitoring. That monitoring would include groundwater monitoring more or less in the area covered by the blue here, from the repository location down to and including Red Devil Creek. And we would also be monitoring sediment in the Kuskokwim River essentially from the mouth of Red Devil Creek downstream as part of that.

Under alternative four, obviously this repository would not be constructed, and all this material would be taken offsite.

This is a little bit different look at that repository, and it’s kind of a Photoshopped view. It would be about five acres, I believe, the footprint would be. It would sit on the top of a ridge, which is essentially a drainage divide. It’s about 300 feet above the river, so it would be a high enough elevation that it wouldn’t be affected by things like flooding or other kinds of water events. The idea here is to take that material with those high concentrations of those metals and put it in a place where it no longer comes into contact with water. It's when water comes into contact with that stuff and it begins to leach those metals that we start to have problems. So a repository would be a way of isolating that material from the environment and from water.

So I want to spend the next couple of slides talking about that repository. It’s been the subject of quite a little bit of discussion and analysis. What we see here is a cross-sectional view of the repository. The water table and the bedrock between the ground surface and the water table. The repository would essentially be a big pile of the tailings and sediment and soil. We estimate that it would be at its final configuration about 50 feet tall. And then it would be covered with soil and a low permeability cap and more soil and grass.

Notice that we’re not proposing a bottom liner here. We believe that this, through some analysis that we did, that the cap will be effective in achieving the objectives that we setup for cleanup.

But I do want to talk a little bit more about that cap design and why we think it’s effective. And I also want to talk about some analysis that we did that we believe demonstrates that that cap will be effective. So this is a detail of the repository around kind of the outer edge where it meets with the ground surface. Again, it’s a profile view of the bedrock here. We have the tailings and the soil that would be consolidated in a pile here. This is on the edge, so it's a little bit thinner. It would be the middle where it would be 50 feet thick. On top of that, we would place some soil or loess. Loess is a very fine grain, silty soil. There's a lot of it available on the mine site itself. On top of that loess, we would place this geomembrane liner. It's a heavy, heavy plastic material. It comes in very large rolls. And we would roll it out over the top of this loess and seal the seams. And then we would key that material into a ditch on the outer edge of the repository in a manner that's illustrated here where we would dig a trench and we would put it along one wall and along the bottom, and then backfill material in to hold it in place. And we do this so this liner, which is really the thing that protects these tailings from water, stays in place. It doesn't wrinkle, it doesn't move, so that it becomes an effective barrier. And then as I mentioned, we would put more soil on top of that and plant it with grass to help protect it, to stabilize it. It also helps to remove some of the rainfall through transpiration. The grass would transpire some of that moisture back out into the atmosphere. The side slopes of this, there would be a relatively flat top, but the side slopes would be at about a three-to-one slope. So there is some gradient to it, but it's not so steep that the facility would become unstable.

And then finally, there really aren't any surface water bodies right now out in the vicinity of where this repository would be proposed. But there are times, like during spring when snow melts and things can get a little bit wet, and so we would excavate trenches around the outside of the thing, and they would capture any water that pond in the area and direct it away. Again, in an attempt to try to keep the contents of the repository dry.

This is another cross-sectional view of the repository. It's kind of general if you will. Again, we have the groundwater table. We have the bedrock. We would place this and construct it such that we would maintain a minimum separation from the bottom of the tailings to the water table of 10 feet. The water table -- we have a lot of data that shows that the water table in that area of the watershed fluctuates quite a bit from summer to fall to winter. And so we would construct it so that the seasonal high, which usually occurs right after breakup in May or June, would get no closer than 10 feet to the bottom of the tailings. But through much of the year, it would actually be a greater separation than 10 feet.

So as I mentioned, there's been a lot of discussion about whether this design would protect the environment, specifically the groundwater, from any leachate that would be formed by these tailings. So what we did was we simulated water movement through the system using two different models.

The first one was called the Help model and it was developed by the EPA, and it was specifically designed to look at snowmelt and rainfall as it enters, you know, the top of the cap and infiltrates through this material and ponds at the bottom. We simulated Help for 50 years. For the first two years of the simulation, we assumed that the facility was under construction and that there was no top cap, there was only growing pile of tailings and soil and sediment as we continued to excavate and transport it up the hill to create the pile. So in our simulation, from minute one, the tailings pile as final configuration. And again, no cap for two years. And then magically at the end of the second year, the geomembrane and the soil would appear. And so we looked at what would happen. And obviously, most of the water that makes it into this would come in the first years when there is no cap. So we looked at how that would move through the tailings pile to the bottom, and then how it would move as unsaturated flow through that soil and bedrock and down to the water table.

The Help model doesn't really consider chemistry. And so we had to come up with a different way to estimate what the concentration of these three metals would be in the water at the base of the repository in what would then be called leachate. So we have data that we collected either from monitoring wells that are installed in the tailings piles down by Red Devil Creek, or we did some leaching analysis of the tailings themselves. And we used that body of data, and we came up with these concentrations, the antimony and arsenic and mercury, in this water that would be at the bottom of this pile. These are really quite high concentrations, and we believe pretty accurately reflects what you could expect if water were to migrate vertically through this 50-foot pile to the bottom.

This table here, very briefly, very succinctly provides the results of that analysis. I might mention that the second step of the analysis after Help, we looked at unsaturated movement of that water from the bottom of the pile down to the water table. What we found was that none of the three contaminants actually made it as far as 10 feet to that water table. These are the maximum depths of penetration of that leachate as it moved through the five feet of loess at the bottom of the pile and into the bedrock. The concentration of antimony approached zero as the leachate got down to somewhere between three and three and a half feet below the bottom of the pile. Arsenic concentration approached zero within a foot of the bottom of the pile. And the mercury concentration approached zero at well less than a foot. And this is after a 50-year simulation period. So what the results of this simulation indicates is that even if there is some leachate that forms with high concentrations of material and makes its way to the bottom of the pile, the cap will be effective in preventing that leachate from moving very deeply into the subsurface below the pile.

We've added the EPA's drinking water standards here for comparison so that you can see that all of these very low numbers are met within these depths below the bottom of the pile.

That analysis, the hydrologic analysis using those two different models, is the primary basis for BLM to conclude that removing material from these locations and consolidating in an onsite capped repository will be effective, and therefore is our preferred alternative.

I just wanted to kind of go back to those objectives. We think that we will meet the direct and indirect contact objectives, as well as eliminating the impacts on groundwater and creek water through the excavation process. Simply by removing that material from the bottom of Red Devil Creek valley, it's not going to be in contact with the water anymore, it won't be able to migrate down the valley and into the river. So the excavation itself will meet those objectives. We believe that, again, by removing this material from the shore of the river, it will eliminate that contact and meet those objectives.

As I've described through the analysis that we did and the design work that we've done, we think that a repository placed at this location will be stable. And that the cap, that very low permeability cap, will be effective in preventing leachate from forming in large volumes and moving vertically down to the water table.

Part of the alternative would involve monitoring. As I mentioned before, we have upwards to 60 monitoring wells on this site at this point between Red Devil Creek valley and up the hill. We certainly wouldn't monitor all 60 wells, but we would monitor a significant portion of those over an extended period of time to verify that there is no leachate that would be moving out of the repository and into the subsurface and affecting those groundwater concentrations.

And then finally, we would continue to monitor sediment in the Kuskokwim River. We believe that the action of the river over time will diminish those concentrations and push the concentrations back in the direction of what we see upstream of the mine, which is kind of a baseline condition.

So once this action is taken, we would monitor probably at the same frequency that we have been monitoring, which is once in the spring and once in the fall, kind of the beginning and the end of the non-winter season, if you will. And we would do that every year. According to this process, every five years, we need to compile that monitoring data. The monitoring wells will include inspection of the cap to make sure that it is in good condition. And if something were to happen, we would have to repair it to make sure that it's effective. But at the end of a five-year period, we would compile all that information into a document, share it with the DEC. And we would, as we have done through the investigation and the feasibility study, coordinate with the DEC, review those data, make a determination as to whether or not the process that we put in place is effective. If it's not, we would have to, based on those data, make a determination as to what we think the problem is and fix it. And if it looks like things are working well then, we would continue to monitor. And we would repeat that five-year review process as long as we needed to, to ensure that the process that we put in place through a remediation approach we put in place is effective.

So that's a pretty quick summary of what we've done and what we hope to be able to do. As I mentioned at the beginning of this presentation, our purpose today is to describe what we'd like to do for you and seek your input on that preferred alternative.

So this slide presents my contact information, as well as that of Bonnie Million, the Anchorage field office manager. You can provide comments at this meeting. You can email comments, or you can write a letter and send it to us, but we would very much like to hear from you.

LESLI ELLIS-WOUTERS: Thanks, Mike. If you have any questions for Mike or Matt, feel free to raise your hand, type them in the question block. I've also been asked, for the administrative record, if we could get first and last names. And you can do that if you hover over your name, there should be a button that says more, and you can rename yourself. This is an ask for our recordkeeping purposes. And after this, if there's no questions, I'll just give it a few minutes if people want to raise their hand or type in some questions, write down some contact information. Again, all of this is on our website, and I pasted that website into the Q & A block. If you can look at the answered queries there, the website is in there. And at this time, I guess if we don't have any questions then this is where we transition to the public testimony part.

PUBLIC COMMENTS

LESLI ELLIS-WOUTERS: If anybody has any statements they would like to read or would like to talk at this time, please raise your hand and we will open up your mic. And feel free if -- I'll give you a few minutes if you want to gather your thoughts. If you have questions, too, feel free and raise your hand, type it in the block. Comments? Concerns? Suggestions?

Feel free. And again for recordkeeping purposes, we'd ask if everybody could use first and last names if you could please. And just hover over your name and hit the more block and you should be able to rename yourself. Just give it a few more minutes to see if there's anybody who would like to provide any testimony or ask questions, provide some feedback. We're open to any and all questions, feedback. And if anybody knows of others that would like to get these presentations or would like to host a meeting, we're more than welcome to those, too. If somebody would like to setup a meeting for their community or if they know of other communities that would like a meeting, please just get with Bonnie Million, the Anchorage field office manager, and I'm sure she'd be more than happy to accommodate that. I don't see anybody's hands going up, and there are no questions in the Q & A block. I suppose we could give it a few more minutes.

BONNIE MILLION: So, yeah, I think we'll go ahead and call it then. Thank you again to everybody who has logged on and participated today. Really, really appreciate it. It's always difficult to carve time out of the middle of the day, so it is much appreciated. Like I said during the intro, if you're anything like me, you're going to think of a killer question about 20 minutes after we hang up here. So our contact information, Lesli's got that in the question and answer area. Feel free to send me an email anytime. Give me a ring anytime. We are all teleworking, but we are all still working. So we're here and available to answer any questions, setup additional meetings, like Lesli mentioned, if that's something that you or a community might be interested in. And, yeah, we'll go from there. Thank you again so much, everybody. We really, really appreciate the participation.

LESLI ELLIS-WOUTERS: And with that, I'll end the meeting. Have a good day, everybody.

THE REPORTER: Off record, 2:17.

(The meeting adjourned at 2:17 p.m.)

TRANSCRIBER'S CERTIFICATE

I, Gloria Schein, certify that the foregoing pages numbered 2 through 47 are a true, accurate and completed transcript of the proceedings in the October 29, 2020, Bureau of Land Management Red Devil Mine Remediation Proposed Plan, transcribed by me from a copy of the electronic sound recording to the best of my knowledge and ability.

______________________ ___________________________________

Date Gloria Schein, Transcriptionist