

JOINT REVIEW PANEL PUBLIC HEARING

IN THE MATTER OF Application Nos. 1844520, 1902073,  
001-00403427, 001-00403428, 001-00403429, 001-00403430,  
001-00403431, MSL160757, MSL160758, and LOC160842  
to the Alberta Energy Regulator

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GRASSY MOUNTAIN COAL PROJECT - BENGA MINING LIMITED

VOLUME 27

VIA REMOTE VIDEO

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November 30, 2020

1	TABLE OF CONTENTS		
2			
3	Description		Page
4			
5	November 30, 2020	Morning Session	5762
6	Discussion		5765
7	GARY HOUSTON, MIKE BARTLETT, RANDY RUDOLPH,		5770
8	JANET BAUMAN, DANE MCCOY, STEVE BILAWCHUK,		
9	IAN MITCHELL, JOHN KANSAS, LINDSEY MOONEY,		
10	DAVID DEFOREST, Previously Affirmed		
11	(Dust, air quality, greenhouse gas emissions,		
12	noise, and light; wildlife, including migratory		
13	birds and species at risk, wildlife health,		
14	and human health risk assessment)		
15	Joint Review Panel Secretariat Staff		5770
16	Cross-examines Benga Mining Limited		
17	Alberta Energy Regulator Panel Questions		5812
18	Benga Mining Limited		
19			
20	November 30, 2020	Afternoon Session	5856
21	GARY HOUSTON, MIKE BARTLETT, RANDY RUDOLPH,		5859
22	JANET BAUMAN, DANE MCCOY, STEVE BILAWCHUK,		
23	IAN MITCHELL, JOHN KANSAS, LINDSEY MOONEY,		
24	DAVID DEFOREST, Previously Affirmed		
25	(Dust, air quality, greenhouse gas emissions,		
26	noise, and light; wildlife, including migratory		

1	birds and species at risk, wildlife health,	
2	and human health risk assessment)	
3	Alberta Energy Regulator Panel Questions	5860
4	Benga Mining Limited	
5	Discussion	5967
6	Certificate of Transcript	5970
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		

1 Proceedings Taken via Remote Video

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3 November 30, 2020 Morning Session

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5 A. Bolton The Chair

6 D. O'Gorman Hearing Commissioner

7 H. Matthews Hearing Commissioner

8

9 M. LaCasse AER Counsel

10 B. Kapel Holden AER Counsel

11

12 K. Lambrecht, QC Joint Review Panel Secretariat  
13 Counsel

14

15 T. Utting IAAC Staff

16 E. Arruda AER Staff

17 D. Campbell AER Staff

18 T. Turner AER Staff

19 T. Wheaton AER Staff

20 A. Shukalkina AER Staff

21

22 M. Ignasiak For Benga Mining Limited

23 C. Brinker

24

25 R. Warden For Ktunaxa Nation

26 T. Howard

1	K. Poitras	For Métis Nation of Alberta
2		Region 3
3		
4	Chief B. Cote	For Shuswap Indian Band
5		
6	B. Snow	For Stoney Nakoda Nations
7		
8	R. Drummond	For Government of Canada
9	S. McHugh	
10		
11	A. Gulamhusein	For Municipality of Crowsnest
12		Pass
13		
14	M. Niven, QC	For MD of Ranchland No. 66
15	R. Barata	
16	J. Nijjer (Student-at-Law)	
17		
18	B. McGillivray	For Town of Pincher Creek
19		
20	D. Yewchuk	For Canadian Parks and
21		Wilderness Society, Southern
22		Alberta Chapter
23		
24	R. Secord	For Coalition of Alberta
25	I. Okoye	Wilderness Association, Grassy
26		Mountain Group, Berdina Farms

1		Ltd., Donkersgoed Feeder
2		Limited, Sun Cured Alfalfa
3		Cubes Inc., and Vern Emard
4		
5	R. Cooke	For Crowsnest Conservation
6		Society
7		
8	G. Fitch, QC	For Livingstone Landowners
9	C. Agudelo	Group
10		
11	M. Sawyer	For Timberwolf Wilderness
12		Society and Mike Judd
13		
14	(No Counsel)	For Barbara Janusz
15		
16	(No Counsel)	For Jim Rennie
17		
18	S. Elmeligi	For Alberta Chapter of the
19	A. Morehouse	Wildlife Society and the
20	S. Milligan	Canadian Section of the
21	M. Boyce	Wilderness Society
22		
23	J. Gourlay-Vallance	For Eco-Elders for Climate
24		Action
25		
26	L. Peterson	For Trout Unlimited Canada

1 R. Campbell For Coal Association of Canada  
2  
3 (No Counsel) For Alistair Des Moulins  
4  
5 (No Counsel) For David McIntyre  
6  
7 (No Counsel) For Fred Bradley  
8  
9 (No Counsel) For Gail Des Moulins  
10  
11 (No Counsel) For Ken Allred  
12 (Not Present)  
13  
14 (No Counsel) For Monica Field  
15  
16 S. Frank For Oldman Watershed Council  
17 A. Hurly  
18  
19 C. Longacre, RPR, CSR(A) Official Court Reporter  
20 \_\_\_\_\_  
21 (PROCEEDINGS COMMENCED AT 9:03 AM)  
22 Discussion  
23 THE CHAIR: Good morning, everyone.  
24 Just a reminder that live audio and video streams  
25 and video recordings of this proceeding are available  
26 to the public through the AER's website and YouTube.

1 Anyone in the virtual hearing room with their camera or  
2 microphone turned on will be captured, and images and  
3 recordings of you and your surroundings will be  
4 broadcast to a publicly available YouTube video. If  
5 you have concerns about this, please contact counsel  
6 well in advance of the time you're scheduled to  
7 participate to explain your concerns. We'll make best  
8 efforts to try and accommodate your concerns  
9 considering the need for an open and transparent public  
10 process.

11 I have two preliminary matters before we get  
12 started, and then I'll open it up for others. First,  
13 just, Mr. Drummond, for your benefit, I know you have a  
14 witness that was not available this morning. I  
15 anticipate that we won't get to your panel till this  
16 afternoon, so I'm assuming that will resolve that  
17 issue.

18 The other item is with respect to final argument.  
19 Oops, just a minute. So the Panel has considered the  
20 submissions from the parties and Benga on the format  
21 and timing of final argument. With respect to format,  
22 Benga and the participants all expressed an interest in  
23 final -- sorry, written final argument, and the Panel  
24 supports a written final argument.

25 With respect to timing, the Panel agrees that  
26 final argument should occur in a timely manner. The



1 Panel also agrees that participants can make use of the  
2 time between the end of the hearing and the start of  
3 the Christmas/New Year period to work on their final  
4 argument. However the Panel does not believe it's  
5 appropriate to establish deadlines for written argument  
6 over the Christmas/New Year period and doesn't believe  
7 there's sufficient time to complete the submission of  
8 written argument from all participants prior to the  
9 Christmas break.

10 Further, the Panel does not accept Benga's  
11 contention that the participants have had time to and  
12 should've been working on their final argument while  
13 the evidentiary portion of the hearing was in progress.  
14 We note that the hearing schedule involved sitting six  
15 days a week for a number of weeks, and in addition to  
16 participating in or monitoring current hearing  
17 sessions, participants required time to prepare for  
18 upcoming hearing sessions. While they may have started  
19 their final argument, I don't think it's reasonable to  
20 expect that they would've had time to complete a lot of  
21 work on it.

22 The Panel understands Benga's desire for a timely  
23 decision on the project; however, completing final  
24 argument one or two weeks earlier will not have a  
25 material impact on the Panel's decisions and completion  
26 of its report. While the Panel will not be able to

1 make final decisions on the applications until final  
2 argument is complete, there is other work that the  
3 Panel can do during this time, and the time is not  
4 lost.

5         The Panel also recognized that the record for this  
6 proceeding is large and complex, including over 5,700  
7 pages of transcripts as of Friday. For these reasons,  
8 the Panel has established the following schedule for  
9 written final argument: Benga written argument due  
10 Friday, December the 11th; participant written argument  
11 due Friday, January the 8th; Benga reply submission due  
12 Friday, January the 15th.

13         Of course, this schedule is contingent on  
14 receiving the ACO hearing report on or before Tuesday,  
15 December the 8th, to ensure Benga has sufficient time  
16 to review it prior to filing their final argument. If  
17 it's not received by that date, then we may need to  
18 adjust the schedule, but for the interim, the schedule  
19 is as outlined. The Panel will post the schedule or  
20 send a note to participants just confirming the dates  
21 so everyone is aware.

22         Those were the two items I had. Are there any  
23 other preliminary matters that participants want to  
24 raise?

25         Hearing none, Mr. Lambrecht, do you have questions  
26 for the Benga panel?

1 MR. LAMBRECHT: Yes, Mr. Chair, the federal  
2 analysts do have questions for the -- this panel.

3 MR. BRINKER: Mr. Lambrecht and Mr. Chair,  
4 just one minor item before we begin.

5 THE CHAIR: Yeah, go ahead. Go ahead,  
6 Mr. Brinker.

7 MR. BRINKER: Yes, Mr. Chair. Benga advised  
8 over the weekend that Mr. David DeForest would be made  
9 available as a Benga witness today for the purposes of  
10 answering questions from the Panel that may touch upon  
11 aquatic and fish health. We thought that that might be  
12 helpful to make him available. So he is on the -- on  
13 the Zoom call this morning. Mr. DeForest previously  
14 appeared in the water topic block, so it would just be  
15 a matter of confirming that he is still under oath or  
16 affirmation, and I could do that right now, if you'd  
17 like, before we continue with the questions from  
18 Mr. Lambrecht and the Panel.

19 THE CHAIR: Sure. Let's just do that in  
20 case it's needed. Sure.

21 MR. BRINKER: Mr. DeForest, can you hear me?

22 MR. DEFOREST: Hello. Yes, I can.

23 MR. BRINKER: Okay. Mr. DeForest, do you  
24 confirm you're still bound by your oath or affirmation  
25 given in this proceeding?

26 MR. DEFOREST: Yes, I do.

1 MR. BRINKER: Thank you.

2 Thank you, Mr. Chair.

3 And I apologize, Mr. Lambrecht, for interrupting.

4 THE CHAIR: Okay. Thank you, Mr. Brinker.

5 MR. LAMBRECHT: Thanks, Mr. Brinker.

6 THE CHAIR: Okay. Go ahead.

7 MR. LAMBRECHT: Thanks, Mr. Brinker. No  
8 problem at all.

9 GARY HOUSTON, MIKE BARTLETT, RANDY RUDOLPH,  
10 JANET BAUMAN, DANE MCCOY, STEVE BILAWCHUK, IAN  
11 MITCHELL, JOHN KANSAS, LINDSEY MOONEY, DAVID DEFOREST,  
12 Previously Affirmed  
13 (Dust, air quality, greenhouse gas emissions, noise,  
14 and light; wildlife, including migratory birds and  
15 species at risk, wildlife health, and human health risk  
16 assessment)

17 Joint Review Panel Secretariat Staff Cross-examines  
18 Benga Mining Limited

19 Q MR. LAMBRECHT: Panel, my name is Kirk  
20 Lambrecht. I am one of the counsel to the Panel, and I  
21 am working with the federal analysts, and there are a  
22 few questions on wildlife and air topics that I'd like  
23 to pose to you from the federal analysts.

24 And the first of these is a question that was  
25 deferred from the vegetation topic, and it relates to  
26 the Clark's nutcracker bird. And I would like to -- we

1 deferred it from vegetation because the panel of the  
2 vegetation topic thought it would be best for the  
3 person who knew about the Clark's nutcracker to be  
4 available, and I think that person is on this panel  
5 today. And I begin my questions by asking who that  
6 might be on the panel that I could direct these  
7 questions to?

8 A MR. KANSAS: That's Mr. John Kansas, is the  
9 biologist.

10 Q Good morning, Mr. Kansas.

11 Would you be able to answer a few questions on the  
12 nutcracker?

13 A Good morning.

14 Yes, I -- I -- I will do my best.

15 Q Thank you, sir.

16 Now, I'm going to pose my questions to the panel  
17 generally. I would ask the witness with the best  
18 evidence to respond, but I leave it in the hands of the  
19 panel as to who that might be.

20 And so I begin -- Mr. Kansas, could I get some  
21 idea of your qualifications and -- just very briefly,  
22 your qualifications and role in the EIA as it affects  
23 the Clark's nutcracker?

24 A Yes. I -- I reviewed the environmental impact  
25 assessment -- or statement, as well as the -- the  
26 supplemental information requests pertaining to Clark's

1 nutcracker, and I'm prepared to speak to that.

2 Q Did you have a role in the preparation of the EIA  
3 yourself, sir, or --

4 A No, I -- I did not.

5 Q All right.

6 MR. LAMBRECHT: So, Zoom Host, I'll ask you to  
7 pull up CIAR 89. This is the eighth addendum to the  
8 EIA, and I'd like to begin at PDF 20, please. And if  
9 you could zoom in. It's the second paragraph -- the  
10 first sentence of the second paragraph I'd like to  
11 focus on.

12 Q MR. LAMBRECHT: Panel, are you able to see  
13 that paragraph there?

14 Panel, are you able to see that, or, Mr. Kansas,  
15 are you able to see that on your screen?

16 A MR. KANSAS: I am able to see that. Thank  
17 you.

18 Q All right. So the sentence that I want to focus on  
19 that kind of forms the theme of my presentation is this  
20 one: (as read)

21 The Government of Alberta notes that the  
22 Clark's nutcracker has a restricted  
23 distribution within the province and that its  
24 dependency on declining species, such as  
25 limber pine and whitebark pine, make it  
26 vulnerable to population declines.

1 MR. LAMBRECHT: If I can ask you, Zoom Host,  
2 then, to go to PDF 29, please. And if you could scroll  
3 down a little bit, please. Yes. It's the paragraph  
4 right there.

5 Q MR. LAMBRECHT: So, Mr. Kansas, the proponent  
6 proposes to cut down some whitebark pines, but proposes  
7 also to replant them. And this sentence -- the first  
8 sentence of the final paragraph, I believe, on this  
9 page says that: (as read)

10 While successful planting of whitebark pine  
11 and limber pine on reclaimed sites would  
12 mitigate habitat losses for Clark's  
13 nutcracker, benefits to the species would be  
14 delayed many years into the future.

15 And it goes on to explain that it takes many decades  
16 for the Clark's nutcracker -- or for the whitebark pine  
17 to develop cones that the Clark's nutcracker then  
18 accesses.

19 MR. LAMBRECHT: So you can take that down,  
20 Zoom Host.

21 Q MR. LAMBRECHT: Sir, my appreciation is that  
22 the re-establishment of the whitebark pine is partly  
23 dependent upon the Clark's nutcracker because that bird  
24 takes the seeds of the whitebark pine and plants them  
25 all over the landscape as a feature of the birds  
26 foraging. Is that your understanding as well?

1 A MR. KANSAS: Yes. The whitebark pine tree  
2 is almost fully reliant for plant -- for seedlings on  
3 the Clark's nutcracker.

4 Q And I understand the proponent did some surveys of the  
5 Clark's nutcracker during its preparation of the EIA.  
6 Could you summarize just very briefly what the result  
7 of those surveys were?

8 A Yes. The -- there were -- there were no specific  
9 surveys designed or implemented for Clark's nutcracker;  
10 however, 60 or 70 songbird call counts were conducted  
11 for other bird species in the area. And in one of  
12 those, a Clark's nutcracker call was -- was detected.

13 Q Did the EIA conclude anything about the numbers of  
14 Clark's nutcracker in the -- in the local study area or  
15 the regional study area for wildlife?

16 A Well, there's been a series of supplemental information  
17 requests on -- on that topic. Really, there's no --  
18 there's not enough information right now. The reason  
19 being, Mr. Lambrecht, is that the Clark's nutcracker  
20 nests and -- and -- is in their peak of breeding in  
21 late winter, so March-ish kind of thing. And the  
22 songbird surveys are in May -- late May and June. So  
23 that is my feeling why the -- that bird wasn't picked  
24 up more than just once.

25 And, also, the -- just so you know as well, the --  
26 the bird was picked up -- I actually saw the bird in



1 one of my field -- field trips. I saw two adults  
2 and -- and three fledgling young up and -- at the  
3 junction between the montane zone and the subalpine  
4 zone in the vicinity of whitebark pine in late July of  
5 this year. They were clearly a family group. So there  
6 is breeding going on up there.

7 But in terms of -- of a relative abundance index  
8 or a population index, no, there's not enough  
9 information to -- to come up with that.

10 Q All right. Thank you, Mr. Kansas.

11 Now, you mentioned just briefly the montane  
12 region, I believe. And could I ask you to describe  
13 just briefly what the montane region is?

14 A Yes. The montane natural subregion of Alberta is one  
15 of 21 -- 20, 21 subregions that frame the province  
16 ecologically. They're a broad -- these subregions  
17 are -- are broad repeating patterns of -- of topography  
18 and climate and land form and, ultimately, vegetation  
19 and wildlife that occur throughout the province.

20 Half of the project footprint in -- in  
21 approximately half of the wildlife local study area,  
22 the lower portion, southern portion occur in the  
23 montane zone. The northern half of the -- of the -- of  
24 the footprint and the study area occur in the subalpine  
25 natural subregion. The montane subregion is a -- I  
26 would say it -- it's an uncommon subregion from a area

1 point of view. It's one of the smaller subregions.  
2 It's also a very unique subregion in the province,  
3 especially in the -- in the -- in the southwest Alberta  
4 area where the natural regions tend to be compressed  
5 into a little -- little -- little area. You have  
6 foothills fescue, montane, subalpine, and alpine in a  
7 very short distance, 20, 30 kilometres. So it -- it  
8 makes for an interesting dynamic -- diversity dynamic.

9 MR. LAMBRECHT: Zoom Host, could I ask you to  
10 go back to CIAR 89, the eighth addendum, and display  
11 page 761. This should be a map of the whitebark and  
12 limber pine occurrence in the regional study area.

13 Q MR. LAMBRECHT: Are you able to see that,  
14 Mr. Kansas?

15 A MR. KANSAS: I am. Thank you.

16 Q All right. This is one of the maps that we discussed  
17 during the vegetation section, and it -- in general  
18 terms, it displays the distribution of whitebark pine  
19 in the area.

20 MR. LAMBRECHT: If I can ask the Zoom host to  
21 go to PDF page 760, please. And if you could zoom in  
22 just a little, Host, please, and down to the legend.

23 Q MR. LAMBRECHT: Mr. Kansas, while this is  
24 zooming, I want to draw your attention to the  
25 bright-green areas there, which in the legend are  
26 indicated as "forestry operations to 2032". And

1           there's also a darker-green colouration in the legend  
2           for forestry operations to 2045, all of which I think  
3           are within, generally speaking, the span of the mine  
4           through operations and decommissioning.

5           MR. LAMBRECHT:                    So, Zoom Host, if you could  
6           just adjust this map so that we could see more  
7           generally the area there.

8           Q   MR. LAMBRECHT:                    Mr. Kansas, my question is  
9           this: Assuming that Benga plants whitebark pine during  
10          the decommissioning phase -- phases of its -- or the  
11          reclamation phases of its project, what is the  
12          necessity of the Clark's nutcracker to the success of  
13          that revegetation, and where is the expected  
14          recruitment of Clark's nutcracker to the reclaimed  
15          project area to come from?

16          MR. LAMBRECHT:                    And, Zoom Host, you can take  
17          that down.

18          Q   MR. LAMBRECHT:                    But, Mr. Kansas, if you need  
19          to make reference to this, please --

20          A   MR. KANSAS:                        Okay.

21          Q   Please do so.

22          A   I can -- I can attempt to answer that question. If you  
23          could allow me to frame the topic a little bit,  
24          Mr. Lambrecht.

25          Q   Of course, sir.

26          A   Yes. So Benga intends to remove 208 hectares of

1 whitebark pine forest -- open-forest environment.  
2 The 208 hectares amounts to 3.4 percent of the  
3 6,019 hectares of whitebark pine that occur in that  
4 regional study area that you had just put up. So  
5 there's 6,000 hectares in that area. And that's the  
6 vegetation RSA, and it's also the grizzly bear RSA,  
7 same -- same area.

8 So 208 hectares really represents the size of a --  
9 of a small fire in this region. An average fire in the  
10 southwest Alberta area is around 1,800 hectares. So  
11 we're talking about a -- a very small -- almost like an  
12 initial attack kind of fire. You've got flames up,  
13 they attack it, they kill it, and you're left with a  
14 200- or 100-hectare fire.

15 So Benga, to mitigate, they're replacing the  
16 208 hectares with 305 or something hectares. So 3  
17 to -- 3-to-1 ratio approximately, and they're replacing  
18 the 21,000 trees with 63,000 trees.

19 So nutcracker's have -- like, a number of species  
20 in the regional study area of southwest Alberta here,  
21 the Grassy RSA are -- they've adapted through the  
22 millennia to fire. So for Benga to go in and -- and  
23 plant trees that they -- that they -- they take away is  
24 almost like an army of nutcrackers going in and driving  
25 their -- their beak into the -- into the ground and --  
26 and creating opportunities for -- for seedling

1 regrowth.

2 So the -- the nutcracker, to fight against this --  
3 this -- these natural disturbance regimes, like fire  
4 and -- and -- and insects, they -- they do things from  
5 a life-history point of view. One of them is that  
6 they -- rather than relying on the seeds of whitebark  
7 pine, they shift their diet in bad years -- bad-weather  
8 years, bad-climate years, weather mainly -- and they --  
9 they switch to an omnivorous diet. They'll be eating  
10 benthic -- terrestrial invertebrates, insects, even  
11 small birds and -- and mammals that they kill. You  
12 know, so -- so the food switching allows them to -- to  
13 fight their way through some bad times.

14 The other thing is that they disperse. Clark's  
15 nutcracker dispersal ranges as far as 32 kilometres.  
16 So if you centre the -- the -- the -- the regional  
17 study area is approximately 25 kilometres from the  
18 centre of the -- of the -- of the wildlife local study  
19 area out in each direction. So these animals are  
20 capable of dispersing and finding the remaining  
21 6,900 hectares of -- of whitebark pine forest that  
22 occur. Sorry to be so winded -- longwinded, but that's  
23 enough for now.

24 MR. LAMBRECHT: Zoom Host, can I ask you to  
25 pull up CIAR 89 at 760 again? That's the map.

26 A MS. BAUMAN: Mr. Lambrecht, it's Janet

1 Bauman here. I just wanted to jump in there and -- in  
2 response to your question, I think you asked if the  
3 Clark's nutcracker was required to re-establish  
4 whitebark pine. Am I -- am I correct?

5 Q MR. LAMBRECHT: I think the question was: To  
6 what extent would the prevalence of the Clark's  
7 nutcracker be a factor in the successful establishment  
8 of -- re-establishment of the whitebark pine through  
9 the reclamation phases that the proponent has  
10 proposed --

11 A Okay. So the --

12 Q -- given that it -- given that it may be displaced from  
13 the area by deforestation?

14 A Right. So they -- they don't have any effect on  
15 seedling establishment other than planting the seeds in  
16 the ground, and -- and Benga will be doing -- well,  
17 they won't be planting seeds. They'll be planting the  
18 seedlings. So in terms of those seedlings growing and  
19 establishing on the reclaimed landscape, the Clark's  
20 nutcracker is irrelevant to that.

21 Where the Clark's nutcracker becomes important to  
22 whitebark pine perpetuating on the landscape in the  
23 long-term is once the trees start producing seeds, is  
24 the Clark's nutcracker harvesting those seeds and then  
25 planting the seeds in the ground in their caches? And  
26 they'll be doing that in other stands. Like John said,

1           they'll be, you know, 32 -- up to 32 kilometres away in  
2           other whitebark pine stands that are already producing  
3           seeds. But in terms of the actual trees on the  
4           reclaimed landscape at the mine site, they -- they will  
5           have no effect on those seedlings that are planted  
6           establishing themselves.

7   Q       Yes, I believe I'd --

8   A       MR. KANSAS:                    If I could also comment --

9   Q       -- understood that.

10  A       Oh, sorry, Mr. Lambrecht.

11  Q       Sorry, Mr. Kansas. Go ahead.

12  A       Yes. If I could also comment, just helpful for -- for  
13       framing again, is that the montane region -- subregion  
14       is used by Clark's nutcracker during the winter, and  
15       then they -- as the summer progresses, they move up  
16       into the subalpine where the whitebark pine are. So  
17       they're -- they're essentially surviving on a -- on a  
18       food source that's not quite as good as the whitebark  
19       pine seeds, but this seems to be adequate for them to  
20       survive in the winter.

21       MR. LAMBRECHT:                   Zoom Host, can I ask you to  
22       display CIAR 89 at PDF 30, please?

23  Q       MR. LAMBRECHT:                   Now, there's a reference here  
24       to "monitoring", and I understand that the proponent  
25       proposes to monitor use of the reclaimed whitebark and  
26       limber pine areas by Clark's nutcracker and other

1 species as a part of its monitoring program.

2 Can I ask you, please, to clarify Benga's  
3 commitment to monitoring for Clark's nutcracker use of  
4 the reclaimed project area? And without meaning to  
5 limit your response in any way, can I ask you, please,  
6 to include within the scope of your response these two  
7 matters: First, when Benga expects to begin monitoring  
8 for Clark's nutcracker use of the reclaimed project  
9 areas, and how long Benga may expect to monitor for?

10 A MR. HOUSTON: So maybe I'll take that,  
11 Mr. Lambrecht. I -- I -- I think I understand the  
12 direction of your question here.

13 So Benga would expect to be monitoring the -- the  
14 project area through operations and through a few  
15 decades after reclamation, and -- and the -- the end  
16 point for the monitoring would be that we get  
17 reclamation certificates indicating that the -- the  
18 reclaimed areas are well-established and on a -- a good  
19 trajectory. I am doubtful that -- well, I -- I  
20 wouldn't think that the whitebark pine would have  
21 started producing seeds by that point, being that  
22 the -- the seed production is -- is not until after  
23 five or six or seven decades. So I wouldn't expect  
24 that we'd be monitoring for Clark's nutcracker at that  
25 point.

26 What we would be doing is we would be monitoring



1 for songbirds and -- during those first couple of  
2 decades after reclamation is complete and -- but I -- I  
3 wouldn't think that we'd be monitoring seven or eight  
4 decades out to see if the Clark's nutcracker had  
5 returned after the whitebark pine were mature.

6 Q So where is this expected recruitment of Clark's  
7 nutcracker to the reclaimed project area expected to  
8 come from given that there may be some uncertainty  
9 about the extent to which the bird being displaced from  
10 the mine area may be able to forage in other areas?

11 A MR. KANSAS: I would assume, Mr. Lambrecht,  
12 that it -- the -- the source of seedlings comes from  
13 Benga. Benga becomes the -- for a little while,  
14 becomes the Clark's nutcracker.

15 Q Yes, but where is the bird going to come from in future  
16 decades?

17 A Well, the birds will remain plastic with respect to  
18 dispersion. Birds will come from the outer western  
19 edge of the regional study area; they'll come from the  
20 north end and work their magic that way.

21 Janet, do you have a comment on that?

22 A MS. BAUMAN: No, I didn't have anything to  
23 add to that.

24 Q All right. Panel, I'd like to move on.

25 MR. LAMBRECHT: Zoom Host, you can take this  
26 page down. Thank you very much.

1 Q MR. LAMBRECHT: Panel, there has been some  
2 mention of the importance of this -- of the  
3 re-establishment of bison to this area from the Ktunaxa  
4 and some of the other Aboriginal groups. I appreciate  
5 that some of the landforms are taken up for other uses,  
6 but I wonder if anyone here on the panel is able to  
7 comment about the suitability of montane -- of the  
8 montane region for plains bison habitat?

9 A MR. KANSAS: Well, I suppose that lands on  
10 me here. I -- I'm -- as for many biologists, I'm --  
11 I'm not an expert with bison, especially with respect  
12 to reintroduction into a very busy ecosystem here.

13 I'll just -- a quick -- a quick anecdote. When I  
14 was just a young biologist, 22, in Jasper Park, they --  
15 this -- the -- I was there for a few years, and in my  
16 first year, Canadian Wildlife Service flew in 35 bison  
17 into the lower Athabasca River valley of Jasper  
18 National Park. Ultimately, they were all -- they were  
19 all killed, mainly by train accidents and by vehicle  
20 accidents. So I -- the montane -- all things being  
21 equal without the level of -- of the -- especially the  
22 trains and the trucks and the vehicle collision  
23 potential, it's good habitat -- well, it was good  
24 habitat 150 years ago or more, but right now, I -- I  
25 think it's a -- it would be a -- what we'd call a  
26 "primary sink". It would lead to unnecessary deaths.

1           Having said that, I -- I love the idea of bison  
2           in -- in -- in the mountains. They're doing it in  
3           Banff right now, and I intend to go into that ecosystem  
4           this winter and -- and check to see how it -- how it's  
5           looking. Anyways, that's -- that's all I can offer,  
6           really, in that.

7    Q    Thank you, Mr. Kansas.

8           MR. LAMBRECHT:                   Zoom Host, can I ask you,  
9           please, to pull up CIAR 503 and PDF 15.

10   Q   MR. LAMBRECHT:                   Panel, there are two passages  
11           from the proponent's documents I'm going to present  
12           here, and then I'll pose a question to you regarding  
13           them. And the first one is the second bullet from the  
14           top.

15           MR. LAMBRECHT:                   So, Zoom Host, if you can zoom  
16           into that a little bit, please.

17   Q   MR. LAMBRECHT:                   All right. This is about  
18           pre-disturbance surveys, and this bullet in this  
19           document, which is the -- I understand, the hearing  
20           submission filed by Benga, states that: (as read)

21                   Pre-disturbance surveys will be conducted  
22                   along the edges of all the areas to be  
23                   cleared during project development to  
24                   determine the occurrence of any important  
25                   wildlife habitat features.

26           MR. LAMBRECHT:                   Zoom Host, if I can ask you,

1           then, to pull up CIAR 360. This is, I understand,  
2           Benga's response to the Joint Review Panel request for  
3           additional information. It's Package 7, reference  
4           listed consolidated mitigation tables, Addendum 12, and  
5           specifically we're on PDF page 105, Item Number 7. So  
6           in the middle column, Item Number 7. If you could zoom  
7           into that, Zoom Host.

8    Q   MR. LAMBRECHT:           And this document says that:  
9           (as read)

10           Pre-disturbance surveys or wildlife sweeps  
11           will be conducted in the development area  
12           prior to any construction activities during  
13           project development to determine the  
14           occurrence of any important wildlife habitat  
15           features, such as migratory bird nests,  
16           et cetera.

17           So my question is --

18    MR. LAMBRECHT:           And you can take that down,  
19           Zoom Host.

20    Q   MR. LAMBRECHT:           -- can I ask this panel to  
21           clarify, please, whether the proponent will conduct  
22           wildlife surveys along the edges of the areas to be  
23           developed or within the -- the whole of the areas that  
24           may be developed during these wildlife sweeps or  
25           surveys? Thank you.

26    A   MR. HOUSTON:           Just to be clear on -- on the

1 question, Mr. Lambrecht. Are you asking whether we  
2 would limit our wildlife sweeps to the trees that are  
3 actually going to be cut down, the area that's going to  
4 be cleared, or are you asking if we would do a survey  
5 that extends beyond that immediate area to include  
6 maybe an area slightly larger that might be disturbed  
7 by noise and activity?

8 Q Let me clarify. Thank you, Mr. Houston. I'm sorry I  
9 wasn't clearer.

10 The first quote appeared to say that the wildlife  
11 surveys would be conducted along the edges of the areas  
12 to be cleared, and the second mitigation suggested that  
13 the whole of the area might be surveyed. So I'm  
14 asking, really, for clarification about the geographic  
15 extent of the wildlife survey area. Is it the edge or  
16 the area to be cleared?

17 A So -- so I'll -- I'll take that. No. We'll -- we'll  
18 do a sweep of the entire area to be cleared on a -- on  
19 a year-by-year basis. So it would be a progressive  
20 approach that would be looking ahead to the next batch  
21 of clearing and sweeping the entire area that would be  
22 cleared.

23 Q Mr. Kansas, can I come back to you for a moment,  
24 please?

25 A MR. KANSAS: Sure.

26 Q You may not be in a position to answer this, but a

1 follow-up question on the Clark's nutcracker. Will  
2 Benga conduct the surveys for the Clark's nutcracker  
3 during its breeding season that is in the late winter?

4 A I can't speak for Mr. Houston; however, my professional  
5 opinion is that it -- that should be done.

6 Q Now, let me interrupt you for a moment. I -- I'm  
7 not -- I -- I may have confused you because of  
8 juxtaposing this question on monitoring with the  
9 question about the pre-cleared surveys. So to be  
10 clear, this question relates to the monitoring that  
11 Benga indicated that it would do to monitor for  
12 re-establishment of Clark's nutcracker, and --

13 A I think --

14 Q -- I'm wondering --

15 A Go ahead. Go ahead. I'm sorry.

16 Q I'm wondering if these surveys will be conducted during  
17 the breeding season for that bird that you described  
18 earlier?

19 A Yes. It would be pointless to go again too late. You  
20 know, it needs to be done during the March/April  
21 period.

22 Q And, Mr. Houston, do you know if that would be the  
23 intent of Benga in its monitoring program for this  
24 specific species?

25 A MR. HOUSTON: Certainly. Up until now,  
26 access during the winter months has been a bit of an

1 issue. Once -- once we're in and especially when we're  
2 starting to reclaim areas of the mine, I would expect  
3 that we would have monitoring programs that would run  
4 year round, and not just for the Clark's nutcracker but  
5 other wildlife as well that we would want to be  
6 monitoring on a year-round basis around the perimeter  
7 of the site and -- and on -- on the newly reclaimed  
8 parts of the site as well.

9 Q Thank you, sir.

10 Panel, I'd like to move on to a question about  
11 carbon sink.

12 MR. LAMBRECHT: And perhaps I could ask the  
13 Zoom host to pull up CIAR 70. This is the response  
14 package dated April 2018 for additional information  
15 requested by the agency on February 28th, 2018. And I  
16 need to ask you, please, to go to PDF 527. Now, we  
17 have a chart here, and I need to ask you to go to the  
18 row for "Proposed Mitigation". And in that column --  
19 it's the fourth row down. So if you can just scroll up  
20 a bit. That's great.

21 Q MR. LAMBRECHT: Toward the bottom of that,  
22 panel, the statement is made that: (as read)

23 GHG [or greenhouse gas] sink losses are  
24 addressed by amending soil with woody debris  
25 or fertilizing and revegetating stockpiled  
26 soil and prompt reclamation and reforestation

1 of the project disturbance and the historical  
2 mine disturbance and minimizing lifetime of  
3 soil stockpiles.

4 So my question -- now, I appreciate --

5 MR. LAMBRECHT: You can take that -- Zoom  
6 Host, can you scroll over to the left a little bit so  
7 that we can see the valued component that is involved  
8 here? This is a -- so this is a proposed mitigation  
9 for greenhouse gas emissions. And, Zoom Host, you can  
10 take that down.

11 Q MR. LAMBRECHT: Is Benga able to provide a  
12 quantitative estimate of carbon sink loss over the  
13 planned duration of project operation prior to  
14 reclamation as well as a time estimate to regain the  
15 lost carbon sink?

16 A MR. HOUSTON: Mr. Chair, maybe we'll just  
17 take a minute to talk amongst ourselves to see who's  
18 best to answer this question. One minute.

19 So, Mr. Lambrecht, I don't think we have an answer  
20 for your question. We haven't quantified the -- the --  
21 the greenhouse gas sink that would be lost, and I would  
22 expect that full recovery would not occur until we had  
23 significant progress through the reclamation process.  
24 But we don't have a specific answer to your question.

25 Q All right. And so if I were to ask for an approximate  
26 timeline of carbon sink recovery from revegetation and



1 reforestation, I take it that -- that your answer would  
2 extend to that question as well?

3 A Yes, that's right.

4 Q All right.

5 A Don't -- don't have a good answer for you.

6 MR. LAMBRECHT: If I can ask the Zoom host to  
7 pull up CIAR 251. This is Response Package Addendum  
8 10, Package 1, "Air Quality and Noise". And go to  
9 PDF page 109.

10 Q MR. LAMBRECHT: Panel, this is the greenhouse  
11 gas management plan that the proponent has put forward,  
12 and it does not make any reference to "carbon sink loss  
13 or replacement".

14 I would like to ask: How will Benga update the  
15 greenhouse gas emission -- or greenhouse gas management  
16 plan to incorporate managing carbon sink loss and  
17 measure reclamation efficacy in terms of greenhouse gas  
18 sequestration?

19 MR. LAMBRECHT: Zoom Host, you can take that  
20 down. Thank you.

21 A MR. HOUSTON: So your question is how we  
22 would estimate the -- the loss of greenhouse gas sink  
23 due to the removal of the vegetation on the site and  
24 then how we would evaluate the efficacy of the  
25 reclamation in terms of returning the greenhouse gas  
26 sink? Is that the question?

- 1 Q MR. LAMBRECHT: Yes, sir. The chart that I  
2 had taken you to did propose a mitigation for the  
3 greenhouse gas sink, but the plan doesn't make  
4 reference to that. So I'm wondering how you would fit  
5 that mitigation into your plan, as you've described.
- 6 A I -- I think the -- the first -- the first step along  
7 those lines would be to evaluate the magnitude of the  
8 greenhouse gas sink loss and determine whether it was  
9 significant compared to the other greenhouse gas  
10 impacts of the project and -- and to proceed from  
11 there. We could commit to updating the greenhouse gas  
12 mitigation plan by -- by doing that, by making an  
13 estimation of the sink loss. The -- the recovery of  
14 that sink loss, however, I think, would depend on  
15 the -- the successful reclamation of the site.
- 16 Q All right. I'd like to move on to a question about  
17 diesel -- use of diesel.
- 18 MR. LAMBRECHT: And, Zoom Host, can I ask you,  
19 please, to pull up CIAR 55, Attachment 2. This is the  
20 fourth addendum to the environmental impact assessment.  
21 And can I ask you to go to PDF page 18. And I believe  
22 we're in the second paragraph from the top here.
- 23 Q MR. LAMBRECHT: Panel, are you able to see  
24 that page on your screens?
- 25 A MR. HOUSTON: Yes, we can.
- 26 Q Now, the question, really, here is: Can Benga provide

1 an update on the availability of lower carbon diesel  
2 fuel, as is described in this paragraph?

3 A Well, as you know, Mr. Lambrecht, the Sturgeon Refinery  
4 has -- has progressed and, I believe, is producing --  
5 producing diesel. So that -- these projections have  
6 come about in terms of general improvement in diesel  
7 availability from -- from other sources. I -- I --  
8 I am afraid I can't comment on that.

9 I wonder if Mr. Rudolph has any -- anything to add  
10 there.

11 A MR. RUDOLPH: I -- I don't have much to add.  
12 I think we're -- you know, we're aware of the new  
13 legislation from the federal government that would --  
14 that would somewhat reduce the carbon content in fuel.

15 I think, though, that the -- the estimate here of,  
16 perhaps, a 30 percent reduction in greenhouse gas  
17 emissions is probably an overstatement, and I think  
18 that's been pointed out in -- in more recent material,  
19 that this is probably not -- this would be more than an  
20 upper-end estimate to the improvement that we'd expect  
21 on-site as a result of -- of lower carbon fuel becoming  
22 available.

23 Q Panel, is the estimate of a potential 900 kilotons of  
24 greenhouse gas emission reduction still valid?

25 A I believe that's an overestimate of the -- of the  
26 reduction from this source.

1 Q Would you be able to offer a quantification of the  
2 reduction that may occur if diesel from this source  
3 were utilized?

4 A I don't know that I can do that without a bit more  
5 effort, but I would -- I would think it would be  
6 less -- that the fuel economy improvement would be  
7 probably less -- or around 5 percent, not 30 percent  
8 from the use of diesel.

9 MR. LAMBRECHT: Can I ask you to scroll down  
10 on this same page a little bit more, Zoom Host, please.  
11 That's good right there.

12 Q MR. LAMBRECHT: In the first paragraph, panel,  
13 under the heading "Electricity Consumption", the  
14 proponent states that: (as read)

15 If all coal were replaced with natural gas  
16 and assuming that natural gas emission  
17 intensity of GHG is about 55 percent of that  
18 of coal, that the overall GHG intensity of  
19 the grid and, therefore, Benga's share of  
20 that would be reduced by about 28 percent.

21 Does Benga have any updates at all to this assumption  
22 or statement?

23 A MR. HOUSTON: So I think the Alberta  
24 government has stated its intention to phase out  
25 coal-fired power over -- I -- I'm not sure what the --  
26 the current estimate for a time frame is, but during

1 the life of the project, we -- we would expect a  
2 migration from coal-fired power in Alberta to natural  
3 gas-fired power as an evolution in the -- in the power  
4 sector.

5 Q All right. Is the proponent in a position to provide  
6 an estimate of a potential indirect greenhouse gas  
7 emission reductions from coal phaseout in comparison to  
8 the existing projections of anticipated project  
9 greenhouse gas emissions?

10 A So our -- our -- our total emissions from electricity  
11 use are 120 kilotons per year. That -- and that's for  
12 the worst year, the 19th year of operations. And so we  
13 would suggest that an estimate could be taken by using  
14 this 28 percent times the 120 kilotons as an annual  
15 reduction.

16 Q Are you able to provide some definite calculations in  
17 that regard, and, if so, when might you be in a  
18 position to do so?

19 A One minute.

20 Q Thank you, sir.

21 A A little bit more than 30 kilotons a year,  
22 Mr. Lambrecht --

23 Q Thank you --

24 A -- reduction.

25 Q Thank you, Mr. Houston.

26 MR. LAMBRECHT: Zoom Host, this page can come

1 down.

2 I'd like to ask you to pull up CIAR 542 at PDF 63,  
3 under the Heading "Recommendation", 6.3. It might  
4 be ... Yes. There we are.

5 Q MR. LAMBRECHT: Panel, I'm drawing your  
6 attention to a recommendation made to Benga by  
7 Environment and Climate Change Canada. We are here at  
8 Recommendation 6.3, and Benga had recommended what I'm  
9 going to describe as a "BAT/BEP determination", which I  
10 think is "best available technology/best environmental  
11 practice". And I know that the Panel would have  
12 reviewed this recommendation.

13 So I'll ask the Zoom host to take it down and call  
14 up CIAR 571 at PDF 16. Under heading 3.9, Benga made  
15 some reference that -- to considering the issue of  
16 greenhouse gas emissions and reasonable mitigations  
17 through the life of the project. But from my review of  
18 this, I could not locate a specific reference to the  
19 Environment Canada -- and Climate Change Canada  
20 Recommendation 6.3.

21 So can Benga clarify if it is willing to commit to  
22 update its greenhouse gas management plan to  
23 incorporate the BAT/BEP determination and  
24 implementation as recommended by Environment and  
25 Canada -- Climate Change Canada in Recommendation 6.3?

26 MR. LAMBRECHT: Zoom Host, you can take this

1 down. Thank you.

2 A MR. HOUSTON: Okay. I'm talking to myself.

3 So, Mr. Chair, the answer is -- the short answer  
4 is yes. All of the plans and programs that Benga has  
5 committed to develop as a part of this project will be  
6 maintained in an evergreen state. That means a -- a --  
7 a -- a program or process for periodic review and --  
8 and updating.

9 I -- I think in our -- our -- our October 5th  
10 response evidence, we went through a number of the  
11 technologies that had been proposed or -- or pointed  
12 out by ECCC or, more appropriately, by their  
13 consultant, who had talked about some of the  
14 technologies that might be considered. And I think  
15 what's important is that we begin this project with  
16 what we consider to be the best available technology or  
17 the -- I -- I'm always confused by that term, whether  
18 it includes proven economically feasible, and -- and so  
19 those factors will be rolled in.

20 But we've -- we've reviewed a number of the  
21 technologies pointed out by ECCC and their consultant  
22 and believe that we're starting this project on the  
23 right foot. Obviously as technology changes and  
24 becomes available, Benga will continue to evaluate  
25 and -- and consider how to roll the -- the newer  
26 technology in -- into the project through our normal

1 turnover of equipment and -- and updating of the  
2 project infrastructure.

3 But the answer is, yes, that we would continue to  
4 maintain a greenhouse gas management plan and -- and  
5 keep that up to date.

6 Q MR. LAMBRECHT: During an earlier panel, I had  
7 some questions on the mining fleet equipment, and my  
8 understanding is that the proponent is proposing to use  
9 diesel mining fleet equipment that represents probably  
10 the largest single GHG source of emissions for the  
11 project at about 40 percent of project emissions. Is  
12 that a fair understanding of the proportion of GHG  
13 emissions from the project that originate from the  
14 diesel-powered mining fleet?

15 A That -- that would be about right. My information for  
16 Year 19, again -- again, the year where there's the  
17 most activity on-site, the diesel -- the emissions from  
18 the diesel fleet would be about 170 out of about 360.  
19 So your number of 40 percent is -- is pretty close.

20 Q Now, Environment and Climate Change Canada had  
21 recommended consideration of the replacement of the  
22 diesel engine equipment with electric or hydrogen fuel  
23 cell equipment in order to reduce that amount of  
24 emissions.

25 Does Benga have any plans to consider whether to  
26 utilize mobile off-road non-diesel mining fleet



1 equipment at any point during the life cycle of the  
2 project in order to reduce its greenhouse gas emissions  
3 from this project?

4 A Again, Mr. Chair, we have considered those technologies  
5 at -- at this important moment, the initiation of the  
6 project, and -- and we have determined that, either  
7 because of the terrain, because of the mine plan where  
8 we -- we're going to have many -- many faces open at  
9 once or -- or -- or -- or because of the state of the  
10 technology, we've -- and we've, again, reviewed this  
11 substantially in -- in our document 571. We've gone  
12 through each of those technologies to talk about our --  
13 our view of the technology at this point. And -- and,  
14 yes, of course, we would continue to follow those  
15 technologies through the life of the project and -- and  
16 at -- from time to time, consider adopting some of them  
17 as the technology matures or -- or as they become more  
18 suitable for our project.

19 Q Thank you, Mr. Houston.

20 MR. LAMBRECHT: Zoom Host, can I ask you to  
21 pull up CIAR 571 at page 17, I believe?

22 Q MR. LAMBRECHT: All right. Panel, are you  
23 able to see this on your screens?

24 A MR. HOUSTON: Yes, we can.

25 Q All right. What I want to refer you to specifically on  
26 this page are the last two bullets in that column of

1           bullets that appears in the first half of this page.  
2           This is a document from the proponent. It describes  
3           the proponent's greenhouse gas management plan as  
4           including many factors, and they're listed, some of  
5           them, in the bullets here. And the last two bullets  
6           are as follows: (as read)

7                     Requesting of Canadian Pacific Railway that  
8                     they dedicate their lowest emitting units to  
9                     the operations at the project to minimize  
10                    emissions from rail transportation and  
11                    encouraging the contractor to use large  
12                    fuel-efficient vessels to minimize emissions  
13                    from marine transportation.

14           MR. LAMBRECHT:                     Now, Zoom Host, if I can ask  
15           you to pull down that page and go to CIAR 907, please,  
16           at page 143.

17           Q           MR. LAMBRECHT:                     This is a transcript from the  
18           November 25th testimony, and at the bottom, beginning  
19           at line 19, I think -- Mr. Houston, I believe this is  
20           your response to some of the questioning from Barbara  
21           Janusz, and you indicated that -- beginning at line 19  
22           and going to 24, that: (as read)

23                     Benga will pursue additional greenhouse gas  
24                     emission reductions associated with rail and  
25                     marine transport by requesting Canadian  
26                     Pacific Railway to dedicate its lowest

1 emitting unit to the project and encouraging  
2 the marine contractor to use fuel-efficient  
3 vehicles.

4 So if Benga cannot -- my question --

5 MR. LAMBRECHT: You can take this down, Zoom  
6 Host.

7 Q MR. LAMBRECHT: My question to you, panel, is  
8 this: If Benga cannot secure these commitments from  
9 the rail and marine shipping contractors, how will the  
10 lack of these mitigations affect Benga's ability to  
11 meet the goals of its greenhouse gas management plan?

12 A MR. HOUSTON: So, Mr. Lambrecht, I think we  
13 can only manage what we can manage, and that is the  
14 greenhouse gas emitted within the project boundaries.  
15 Outside of the project boundaries where the coal is  
16 being transported by others, possibly not even -- the  
17 coal may not even be in the possession of -- of Benga  
18 at that point at -- outside of the project, all -- all  
19 we can do is encourage our partners to -- to use the  
20 most sensitive technologies possible to reduce their --  
21 their contribution to greenhouse gases. But we -- we  
22 have no control over those parts of the transportation  
23 chain.

24 MR. LAMBRECHT: Zoom Host, can I ask you,  
25 please, to pull up CIAR 251, tenth addendum to the  
26 environmental impact assessment, Package 1, "Air

1           Quality and Noise", at PDF page 116. And the heading  
2           "Fugitive Methane" is the heading that I'd like to ask  
3           you to zoom in to, please.

4    Q   MR. LAMBRECHT:               All right. Panel, I  
5           understand this is a part of the greenhouse gas  
6           management plan that Benga has prepared. And there's  
7           an indication here that Benga does not plan to use  
8           fugitive methane emissions or plan to measure --  
9           I'll -- I'll -- I will reread this again for clarity:  
10          (as read)

11                Benga does not plan to measure fugitive  
12                methane emissions from exposed seams or  
13                piles. Benga will continue to use IPCC  
14                emission factors based on production.

15           And so my question to you really relates to some of the  
16           fugitive methane emissions. Can I ask the panel to  
17           describe briefly what the IPCC emission factors based  
18           on productions are and how they relate to the  
19           measurement of fugitive methane emissions?

20   A   MR. HOUSTON:                One minute, Mr. Chair.

21                So, Mr. Lambrecht, the question was: Can we  
22                explain the IPCC emission factors? Is that the  
23                question?

24   Q   Yes, and how they may relate to the measurement of  
25           fugitive methane emissions from exposed seams or coal  
26           piles.

1 A Okay. Mr. Rudolph, can you respond to this one?

2 A MR. RUDOLPH: Mr. Lambrecht, I think in --  
3 in CR 1, that is CIAR 42, the air quality assessment,  
4 we've provided what the emission factors are that were  
5 used in the calculation. And in CIAR 55 at PDF -- let  
6 me look that up -- at PDF 16, we talk about the -- the  
7 potential ways in which methane is generated from  
8 surface mines.

9 So I think as -- as we would normally do for  
10 diesel emissions, for example, for the project, we  
11 would -- we would use an established emission factor  
12 and multi -- and -- and activity factor and base --  
13 and -- and track, as part of the greenhouse gas  
14 management plan, the volume of diesel used. I think we  
15 would do something similar -- or the plan is to do  
16 something similar for fugitive methane as well and link  
17 the potential emissions from fugitive methane from the  
18 mine surface and other -- other areas to the production  
19 of coal using IPCC emission factors.

20 MR. LAMBRECHT: You can take this down, Zoom  
21 Host.

22 Q MR. LAMBRECHT: Mr. Rudolph, is -- are you --  
23 or, panel, are you confident that the chosen emission  
24 factors are representative of the fugitive methane  
25 emissions from the project?

26 A MR. RUDOLPH: Mr. Lambrecht, the -- the IPCC

1 emission factors are based on -- on global emission  
2 factors, but we have no indication at this stage that  
3 the potential for emissions at the -- at the Grassy  
4 Mountain site is anything but average, let's say.

5 Q So, Mr. Rudolph, did I understand you to describe the  
6 plan to verify these emission estimates through  
7 monitoring or measurements in your prior answer?

8 A I -- I don't know that I used the word "verify". I  
9 think I -- I said that we would track emissions from  
10 the mine face based on the -- the coal production and  
11 a -- an activity factor or an emission factor based on  
12 the IPCC values.

13 Q All right. Thank you.

14 MR. LAMBRECHT: Can I ask you to go, Zoom  
15 Host, to CIAR 251, Package 1, "Air Quality and Noise",  
16 PDF page 42. And if you could scroll down there.  
17 That's good right there. Just a little bit up under  
18 the heading "Decommissioning and Reclamation Phase".

19 Q MR. LAMBRECHT: And, panel, I want to draw  
20 your attention to the paragraph that appears under the  
21 heading indicating that: (as read)

22 Reclamation activities at the mine occur  
23 concurrently with mining activities that have  
24 been accounted for in the GHG assessment for  
25 peak project's operations and that other  
26 closure activities such as deconstruction

1 of -- of plant facilities, environmental  
2 monitoring, et cetera, may not be included in  
3 these estimates but that it is expected that  
4 GHG emissions from all sources are expected  
5 to be insignificant when compared to those in  
6 operations.

7 And I look down at the table that measures some of  
8 these emissions, and I see during reclamation, at the  
9 bottom of the table there, that it says that it's  
10 included in operations.

11 Then, in particular, the -- on this table, the  
12 highest annual emissions appear to come from mine  
13 operations. So my question is --

14 MR. LAMBRECHT: And you can take this down,  
15 Zoom Host.

16 Q MR. LAMBRECHT: -- is Benga confident that the  
17 predicted operations phase emissions conservatively  
18 account for all earth-moving equipment required to  
19 achieve the proposed closure landscape?

20 A MR. HOUSTON: So the -- the operations  
21 estimate include all of the equipment that are planned  
22 to be used -- again, this is Year 19 -- on the site.  
23 So it includes all of the equipment, including the  
24 equipment removing rock, the equipment mining coal, and  
25 the equipment managing the reclamation activities. So  
26 we are confident, yes.

1 Q Thank you, Mr. Houston.

2 Is Benga able to provide any quantification of the  
3 greenhouse gas estimates of unaccounted -- that were  
4 not accounted for in reclamation or closure activities?

5 A I'm not sure what you're referring to, Mr. Lambrecht.  
6 And ...

7 Q The chart that I had taken to you [sic] earlier  
8 indicated that some emissions might not be accounted  
9 for in the measurement, and I'm just wondering if you  
10 might be in a position to take -- Benga quantification  
11 of those, sir.

12 A So it would -- it would involve some equipment, but a  
13 fraction of what we're -- was in place for the  
14 operation for one or two years after closure -- after  
15 closure to finalize the reclamation; and from that  
16 point forward, it would be mostly electric --  
17 electricity consumption. All the pumps used for the  
18 long-term water management would be electric. And I  
19 guess at that point -- and remember we're talking about  
20 2045 and onwards -- we would hope that the electric --  
21 the GHG component for electricity would be  
22 significantly smaller.

23 We don't have a quantification, Mr. Lambrecht, at  
24 this point, but it would be a small fraction of the  
25 annual GHGs during operations.

26 Q Panel, can I ask for clarification -- this question:



1 How has Benga accounted for the greenhouse gas  
2 emissions and re-establishment of carbon sinks for the  
3 proposed post-reclamation landscape?

4 A Is this the same question that we discussed half an  
5 hour ago, Mr. Lambrecht? We -- we -- we talked about  
6 not having an estimate of the -- the loss of carbon  
7 sinks or greenhouse gas sinks, and that could be done  
8 as part of the greenhouse gas management plan base --  
9 based on trees removed or acres cleared, and then  
10 re-establishment of those sinks would depend on a  
11 successful reclamation program.

12 Q All right. Thank you.

13 MR. LAMBRECHT: Mr. Chair, I think this might  
14 be an appropriate moment for me to take a break. There  
15 may be one or two questions I have after the break, but  
16 I would like to consult with the federal analysts to  
17 see if there's much more that I need to ask. I need to  
18 come back to one question on the Clark's nutcracker, I  
19 believe.

20 THE CHAIR: Okay. It's -- excuse me --  
21 10:20. We'll take a 15-minute break and resume at  
22 10:35.

23 MR. LAMBRECHT: Thank you, Mr. Chair.

24 (ADJOURNMENT)

25 THE CHAIR: Okay. Mr. Lambrecht, you can  
26 continue.

1 MR. LAMBRECHT: Thank you, Mr. Chair.

2 Q MR. LAMBRECHT: Panel, I have a few questions  
3 remaining, and so I would like to begin by going back  
4 to the wildlife topic, and I want to ask you a question  
5 about the phrase "wildlife sweeps" and the phrase  
6 "pre-disturbance surveys".

7 May I ask for clarification if these phrases are  
8 synonymous such that they might be used  
9 interchangeably? And if not, what is the distinction  
10 between them?

11 A MR. KANSAS: Okay. I'm sorry. I -- I -- I  
12 was zoned out for a second. If you could please repeat  
13 the question.

14 Q Yes, Mr. Kansas. No problem at all.

15 I want to go back to the wildlife topic and ask a  
16 question for clarification about the definition of the  
17 phrases "wildlife sweeps" and "pre-disturbance  
18 surveys". These phrases appear in the proponent's  
19 materials, and I'm wondering if we should interpret  
20 them as being synonymous with one another and  
21 interchangeable with one another when --

22 A Yes, they are synonymous.

23 Q All right. Thank you, sir.

24 A You're welcome.

25 Q For clarification, does the panel -- does Benga expect  
26 greenhouse gas emissions from some of the closure

1 components, such as the sediment pond and end-pit lake,  
2 and if so, has Benga estimated the potential emissions  
3 from those closure components?

4 A MR. HOUSTON: No, we wouldn't expect  
5 significant greenhouse gas emissions from either of  
6 those. They -- there is minimal organic material in  
7 either structure. They're -- they're ponds constructed  
8 on -- on mineral material, and so there would be very  
9 little organic material in those -- in those lakes or  
10 ponds to generate greenhouse gases.

11 Q Thank you, Mr. Houston.

12 MR. LAMBRECHT: For the final question, it  
13 might be helpful if I could ask the Zoom host to pull  
14 up CIAR 251, Package 1, "Air Quality and Noise"  
15 appendix, and go to PDF one -- let's start at PDF 115.

16 Q MR. LAMBRECHT: And, panel, this is a return  
17 to the question of fugitive methane emissions from  
18 exposed coal seams. I note in Table 4-1 that a  
19 potential source of greenhouse gas emissions is  
20 fugitive methane. A mitigation objective would be to  
21 reduce these emissions, but the -- nothing is planned  
22 at the moment.

23 MR. LAMBRECHT: And if I could ask the Zoom  
24 host to go to the previous page, I believe. Yeah.  
25 Just a little bit above, Zoom Host. Yes. Right there.  
26 Thank you.

1 Q MR. LAMBRECHT: And in the sentence above  
2 Table 4.1 [sic], panel, the statement of -- is made  
3 that: (as read)

4 Coal bed methane recovery is not ongoing or  
5 being considered on the Grassy Mountain site,  
6 as the coal is not considered gassy, and,  
7 therefore, methane recovery is not practical.

8 And my question for you is: Has Benga identified --  
9 ruled out any potential mitigation to reduce fugitive  
10 methane emissions?

11 MR. LAMBRECHT: And you can take this down,  
12 Zoom Host, thank you.

13 A MR. HOUSTON: So -- so, again, in our  
14 submission -- our October 5th submission, we -- we  
15 talked about this a little bit more. Based on our --  
16 the -- the sampling that we've done and our evaluation  
17 of the deposits, we consider that the -- the rock  
18 and -- and the coal seams are already significantly  
19 exposed and that methane has -- has seeped from the --  
20 the site over -- over the millennia, and -- and our --  
21 our experience is that there is very low methane  
22 remaining in -- in the coal.

23 Nonetheless -- and -- and so during the handling  
24 of the coal, the exposure of the seams, and the  
25 stockpiling of coal, as -- as Mr. Rudolph mentioned, we  
26 will be assuming a -- a level of methane emissions

1 based on the IPCC coefficients. After closure, we will  
2 be -- we will be -- for -- for the majority of any  
3 remaining coal on-site, we will be reclaiming the site.  
4 So we will be covering the -- the seams and putting  
5 reclamation materials back. So that would be the final  
6 closure of the site to -- to reduce any long-term  
7 emissions from the remaining exposed coal seams.

8 Q MR. LAMBRECHT: Does Benga have any views,  
9 were the project to go forward, on a condition  
10 requiring Benga to develop and implement a plan to  
11 mitigate and minimize methane -- fugitive methane  
12 emissions?

13 A I -- I think the plan that we would propose would be,  
14 more or less, what I have just mentioned, Mr. Chair,  
15 that we could document that in a greenhouse gas  
16 management plan that -- absolutely we could do that.

17 Q Well, now, panel, I think I'm completed my questions.  
18 I'll just confer with the federal analysts for one  
19 moment.

20 All right. It appears that I have no further  
21 questions for you, panel. I'd like to thank you for  
22 your patience in responding to my questions and for  
23 your evidence to the Panel and your participation in  
24 the Joint Review Panel process. Thank you.

25 THE CHAIR: Okay. Thank you,  
26 Mr. Lambrecht.

1           So we'll now turn to Panel questions. We're going  
2 to switch it up a little bit. I've been working with  
3 the subject matter expert on questions related to the  
4 wildlife and human health risk assessment areas, so I'm  
5 going to ask my questions first, and then I'll turn to  
6 Mr. O'Gorman and Mr. Matthews to see if they have any  
7 further questions once I'm done.

8 Alberta Energy Regulator Panel Questions Benga Mining  
9 Limited

10 Q THE CHAIR:                   So my questions will focus on  
11 the wildlife health risk and human health risk  
12 assessments, and really the purpose is just to try and  
13 ensure the Panel understands what's been done and to --  
14 so it can understand the level of conservatism in those  
15 two assessments.

16           I anticipate that the majority of my questions  
17 will be for Mr. Mitchell or Ms. Mooney, but, obviously,  
18 anyone on the panel who has something to contribute can  
19 speak to them if needed.

20           In the interest of time, I don't plan to pull up  
21 every reference. I'm going to put certain statements  
22 to you from your evidence, but I do have the reference,  
23 so if at any point something doesn't sound right or you  
24 want to see the actual reference, please let me know,  
25 and I'll make sure it's brought up, and there are other  
26 exhibits that I will pull up so you can have a closer

1 look at them.

2 Just before I get -- kind of get to my questions,  
3 though, I just wanted to follow up on the one question  
4 Mr. Lambrecht asked and, Mr. Houston, you answered, and  
5 it had to do with, kind of, custody of the coal along  
6 its journey from the mine to the customer. And, you  
7 know, I think the Panel understands that, you know,  
8 it'll first get loaded onto railcars, and then it'll  
9 get unloaded at the port, and then it'll get loaded on  
10 a ship, and you don't fully control some of those  
11 activities.

12 But what I was curious about was: At what point  
13 in the journey does the ownership of the coal transfer  
14 from Benga to someone else? Is that when it's  
15 delivered at the far end, or is there some intermediate  
16 point where custody may be transferred?

17 A MR. HOUSTON: So thank you for that  
18 question, Mr. Chair.

19 The current business plan is that custody would  
20 transfer in -- at the port in Vancouver, that Benga  
21 would maintain custody through the train journey to the  
22 port, and that the end customer would contract the --  
23 the ship that would pick up the coal at the port.  
24 That's the current business plan. We don't envision it  
25 changing from that, but, of course, 25 years of  
26 operations is a long time, and -- and things can

1 change.

2 Q Okay. Thank you for that, Mr. Houston.

3 Okay. Turning to -- first, to human health risk,  
4 and the first series of questions deal with some of the  
5 calculations that were done and just trying to improve  
6 our understanding of some of those.

7 So in CIAR 360, Addendum 12, on pages PDF 10 and  
8 11, Benga acknowledged that there were errors in  
9 arsenic input variables which were discovered while  
10 producing the worked examples of risk calculations  
11 resulting in changes to estimates of the incremental  
12 lifetime cancer risks. So this raises a concern about  
13 the potential for other errors which may have occurred  
14 in the calculation of hazard quotients for other  
15 contaminants or chemicals of potential concern.

16 THE CHAIR: So, Zoom Host, if you could  
17 pull up CIAR 360 and PDF page 174. Thank you.

18 Q THE CHAIR: So this work example includes  
19 equations such as Equation 7 which Benga describes as:  
20 (as read)

21 The equation or contaminants of concern from  
22 air and surface water pathways were  
23 integrated to predict total surface water  
24 concentrations.

25 The worked example calculation for arsenic shown  
26 here using Equation 7 produced a concentration of



1 0.248 micrograms per litre in surface water.

2 Benga then presents surface water arsenic  
3 concentrations in CIAR 360, Table 7.1-2, on PDF  
4 page 13. So could we go to page 13 of this document?

5 And these documents are described elsewhere as:  
6 (as read)

7 The 95th percentile monthly concentrations  
8 from an upper case modelling scenario.  
9 That reference is on page 10 if anybody wants to look  
10 at it, but I don't think we need to go there.

11 These same concentrations also appear in CIAR 313  
12 on PDF page 1310, which is a table of concentrations of  
13 contaminants of potential concern used in the human and  
14 wildlife health risk assessments.

15 So the question is: Could Benga confirm that  
16 Equation 7 on PDF page 174 that we previously looked at  
17 is for calculation of concentrations in surface water  
18 resulting from air deposition to a lake?

19 A MR. MITCHELL: I believe that is the --  
20 sorry. Excuse me for a moment. Ian Mitchell here. I  
21 cannot hear what he says.

22 Mr. Chair, I believe that is accurate. I will  
23 just quickly confirm with the person that did those  
24 calculations. It'll just take me one moment here.

25 Q Sure.

26 A Yes. The short answer is: Yes, that equation is

1 related to the deposition from air to a lake.

2 Q Okay. So I think we're still on page 13 of CIAR 360.  
3 So could Benga confirm that the concentrations of  
4 contaminants of potential concern, including arsenic,  
5 used for the human health risk estimates are the ones  
6 presented in this table?

7 A Yes, I believe those -- that table incorporated not  
8 just the deposition from air but other sources as well.

9 Q Okay. So that kind of gets to my next question. Could  
10 Benga clarify whether the concentrations shown in  
11 Table 7.1-2 that we're looking at are a result of the  
12 combination of air deposition and waterborne pathways  
13 or if they are, instead, 95th percentile mean monthly  
14 concentrations produced by the SRK GoldSim water and  
15 load balance surface water quality model only without  
16 inclusion of air deposition?

17 A Give me one moment on that one.

18 Q Okay.

19 A So that includes the air deposition added to the -- the  
20 surface water calculations.

21 Q Okay. So let me carry on with a few follow-up  
22 questions. Could Benga confirm that if Benga's  
23 calculated surface water concentrations were, indeed,  
24 derived from the integrated air and surface pathways --  
25 surface water pathways, the concentration in  
26 Table 7.1-2 logically would be greater than that for

1 the air or water pathways alone?

2 A That seems logical.

3 Q Okay. That doesn't necessarily seem to be the case,  
4 but we'll get back to that in a future question.

5 Were the calculations for contaminants of  
6 potential concern, other than fluoranthene and arsenic,  
7 checked for errors and required adjustments in input  
8 parameters -- sorry, checked for errors and required  
9 adjustments in input parameters, and if they were, were  
10 these errors corrected?

11 A So when the issue with arsenic was discovered, a check  
12 was done of all the other chemicals to make sure that  
13 all the inputs were correct for those as well, and  
14 other than the ones that were identified, no other  
15 issues were noted.

16 Q Okay. So no adjustments were required to any of the  
17 others?

18 A No.

19 Q Okay. So if we could go to CIAR 313. And we're  
20 starting with Table 7-1, which appears on PDF 1258.  
21 And there's a series of tables here: 7-1, 7-2, 7-3, and  
22 7-4.

23 So the question is: Why are the hazard quotients  
24 for aluminum, cadmium, lead, manganese, and thallium  
25 identical or very close to identical for Blairmore  
26 Creek, Gold Creek, the Oldman reservoir, and the

1 end-pit lake, and the hazard quotients for cobalt  
2 within 0.01 of each other in all but the end-pit lake  
3 despite distinctly different concentrations of these  
4 contaminants of potential concern in the four receiving  
5 environments, as shown in these tables -- sorry, as  
6 shown in CIAR -- on PDF 1310?

7 A Again, just give me a moment to caucus. I wasn't very  
8 involved in the water calculations myself.

9 Q Sure. And if you need me to repeat any of the  
10 question, let me know.

11 A Okay. So it -- the hazards that were presented in  
12 those tables relate to the full multimedia assessment,  
13 so they -- it [sic] include not just the water but  
14 other exposure as well, and I think a lot of the  
15 hazards were actually driven by the vegetation  
16 ingestion as opposed to the water ingestion, which is  
17 why they're similar across the water bodies.

18 Q Okay. Thank you.

19 Sorry. I'm just waiting for my subject matter  
20 expert.

21 So my subject matter expert tells me that the  
22 water concentrations are higher than in vegetation. So  
23 why the identical hazard quotients?

24 A May need a moment more here, unless you want to come  
25 back to this one. Waiting to get an answer from the  
26 people that ran the multimedia model.

1 Q I can do either. If you want another moment, that's  
2 fine. If you want to carry on until they get back to  
3 you, that's also fine. What would you prefer?

4 A Give me one more minute to try to get some answers.

5 Q Okay.

6 A I think it would be better to move on, and we'll come  
7 back to this --

8 Q Okay.

9 A -- once I can get that --

10 Q Okay.

11 A -- information.

12 Q Okay. Thank you.

13 So the next set of questions relates to the level  
14 of conservatism used in the calculation of risk from  
15 exposure to concentrations of contaminants of potential  
16 concern in water. So I'm going to start by walking you  
17 through portions of Benga's evidence which are relevant  
18 for this topic, and we'll start with the predicted  
19 concentrations of contaminants of potential concern in  
20 Blairmore Creek and Gold Creek.

21 In CIAR 360, on page 8, Benga states that the risk  
22 assessment was based on the 95th percentile monthly  
23 water concentrations of the 23-year operations period  
24 and a 57-year postclosure period from the upper case  
25 model scenario. Benga states that the upper case model  
26 scenario for the GoldSim model used geochemical source

1 terms which were analogous to a boundary condition that  
2 is considered highly unlikely to be exceeded. Flow  
3 inputs to the GoldSim model were monthly averages.

4 In CIAR 313, on PDF page 250, in response to an --  
5 to Information Request 6.25, Benga stated that updated  
6 hydrology and modelled concentrations of contaminants  
7 of potential concern was conducted for Gold Creek and  
8 Blairmore Creek in order to reflect seasonal  
9 variability in flow and the effects of climate change  
10 in the postclosure period. Benga provided detailed  
11 results of the modelling in Appendix 6.25 of CIAR 313.

12 Appendix 6.25 of CIAR 313 includes a series of  
13 figures of predicted concentrations of contaminants of  
14 potential concern. For example, mean monthly arsenic  
15 concentrations are shown in Figure 3 on PDF page 1170.  
16 The results of this figure indicate that the maximum  
17 modelled mean monthly arsenic concentration in  
18 Blairmore Creek is about 0.65 micrograms per litre.  
19 The concentrations of contaminants of potential concern  
20 used in the human and wildlife health risk assessments  
21 are presented in CIAR 313, PDF page 1310, which is  
22 Appendix A to Addendum 1.

23 THE CHAIR: Sorry. You can just leave  
24 that up, Zoom Host. Don't try and follow all of these.

25 Q THE CHAIR: The Panel is interested in  
26 further clarification regarding the level of

1 conservatism in the assumed concentration of  
2 contaminants of potential concern which were used to  
3 estimate risk to human health.

4 So could Benga confirm that the primary difference  
5 between the original GoldSim modelling and the updated  
6 modelling in CIAR 313 is the use of monthly hydrographs  
7 which incorporate climate change and that both models  
8 used upper case geochemical source terms?

9 A MR. HOUSTON: Just -- we'll need one minute  
10 on that, Mr. Chair.

11 Q Sure.

12 A MS. MOONEY: Hello, Mr. Chairman. Lindsey  
13 Mooney here.

14 Q Yeah.

15 A So I'm aware that an older data set was presented in  
16 Appendix A that you have -- that's shown on the screen  
17 now for Blairmore Creek and Gold Creek. Notably, the  
18 concentrations for Blairmore Creek increased. We  
19 reevaluated with this updated data set. For eco we  
20 rescreened. It didn't change the conclusions -- the  
21 exposure ratios for eco. They went up very slightly,  
22 but there were no changes to conclusions. And the  
23 values that we have run in that reevaluation were the  
24 95th percentile of the upper case for Gold Creek.

25 I don't know if that answers part of your  
26 question, maybe.

1 Q Well, it anticipated where I was going with some of the  
2 questions. But a couple comments. We're currently  
3 asking questions about the human health risk assessment  
4 and the -- seems to be a different set of chemicals of  
5 potential concern in the health risk than for eco risk,  
6 so I'm not sure that answer totally addresses the  
7 question.

8 The question I just asked was really about the  
9 difference between the GoldSim modelling and the  
10 updated modelling, but I am kind of headed towards what  
11 you anticipated, which is: Was the updated modelling  
12 used in both the wildlife health and human health risk  
13 assessments? That's kind of where I'm headed with my  
14 questions.

15 So I think what I heard you tell me is that it was  
16 used in the wildlife health risk assessment --

17 A So --

18 Q -- the updated modelling?

19 A -- the updated -- what is presented in the most recent  
20 version is relying on the concentrations that are shown  
21 on the screen at the moment for eco. We recognized  
22 that that was on older data set and reevaluated with  
23 the updated data set, and it made a marginal change to  
24 exposure ratio and no change to conclusions.

25 For -- for human, I'll let -- I'll let Ian speak  
26 to that.



1 A MR. MITCHELL: Yeah. I don't believe the  
2 human health numbers were rerun afterwards, but similar  
3 to the wildlife, our expected results would be, you  
4 know, fairly small changes in -- in the risk levels and  
5 no -- no really anticipated changes in the conclusions.

6 Q Okay. So it wasn't -- it wasn't used for the human  
7 health assessment?

8 A No, I don't believe the human health numbers were  
9 updated after that.

10 Q Okay. I'm going to carry on with my questions just to  
11 probe this issue a bit more. But, Ms. Mooney, to go  
12 back to your point, the updated calculations were not  
13 provided in any of Benga's submissions?

14 A MS. MOONEY: That's correct.

15 Q Okay. So we might be looking for an undertaking to  
16 provide those, but I'll circle back to that a little  
17 farther on.

18 Okay. So just kind of carrying on with this line  
19 of questioning, then, and, again, this is specific to  
20 the health risk assessment at this point, but could  
21 Benga explain the apparent discrepancies between the  
22 concentrations of contaminants of potential concern in  
23 Blairmore Creek used for the human health risk  
24 assessment as summarized by CIAR 313 on PDF page 1310  
25 and the results of the modelled mean monthly  
26 concentrations in the creek presented in CIAR 313,

1 Appendix 6.25-1, Figures 1 to 54, with emphasis on  
2 issues where the concentrations used in the risk  
3 assessment are lower than what would be surmised as the  
4 likely 95th percentiles from the modelling results in  
5 Appendix 6.25-1? And so examples of this would be  
6 arsenic, copper, manganese, nickel, nitrite, silver,  
7 sulphate, and zinc concentrations in Blairmore Creek.

8 And I realize there's quite a few figures that I  
9 referenced there. There's 54 in total for each of the  
10 COPs. So I'm going to just give you an example to make  
11 it clear what the concern is and what we're talking  
12 about.

13 So if you -- if we turn to CIAR 313, page 1170.  
14 So this is an example of one of the figures. And  
15 according to Appendix A, Benga used an arsenic  
16 concentration of 0.437 micrograms per litre in  
17 Blairmore Creek for the assessment. This concentration  
18 is lower than the maximum mean monthly arsenic  
19 concentration of what appears to be about  
20 0.65 micrograms per litre illustrated in this figure.

21 So in similar -- our inability to reconcile the  
22 use of 95th percentile concentrations from the figures  
23 with the human health risk assessment occurs for other  
24 parameters. And, Mr. Mitchell, I think you've  
25 acknowledged that the human health assessment was not  
26 updated to reflect the more recent modelling, so that

1 perhaps explains some of the issues?

2 A MR. MITCHELL: Yeah. That's my  
3 understanding, is that the -- the modelling was updated  
4 and the concentrations were updated, but the human  
5 health risk assessment hasn't been updated since then.

6 Q Okay. So I'm just waiting on a message from my subject  
7 matter expert.

8 So one of the concerns the Panel has about not  
9 using the updated model results relates to arsenic  
10 because the incremental cancer risk using the old model  
11 was already 2.7 times the Health Canada target for  
12 incremental lifetime cancer risk, and if it has  
13 increased more, it may be even more -- even higher than  
14 that. So that's a potential concern. And that was  
15 specific to the end-pit lake.

16 So given some of the issues we've just talked  
17 about, so the identical hazard quotients for several  
18 contaminants of potential concern despite distinctly  
19 different concentrations in water, the current question  
20 we've just been talking about about the potential lack  
21 of conservatism in the concentrations of the COPs that  
22 were used in the water pathway, the Panel is wondering  
23 if Benga could provide an updated summary table of the  
24 recalculated hazard quotients for the contaminants of  
25 potential concern which have identical or near  
26 identical hazard quotients approaching or greater

1 than 1. So that would include aluminum, cadmium,  
2 cobalt, lead, manganese, thallium, zinc, and vanadium,  
3 as well as arsenic.

4 And in doing so, would Benga use the application  
5 case concentrations predicted by the updated modelling  
6 presented in CIAR Appendix 6.25-1 and ensure that both  
7 air deposition to the modelled water concentrations is  
8 included to produce the total concentrations?

9 And I guess, although I wasn't specifically  
10 talking about the wildlife health risk assessment at  
11 this point, if updated hazard quotients were not  
12 provided in any of Benga's submissions based on the  
13 updated water modelling, we would like a summary table  
14 of those as well.

15 A MR. HOUSTON: Can we just have a moment,  
16 Mr. Chair?

17 Q Sure.

18 A So, Mr. Chair, we've discussed what you've asked for,  
19 and I -- I think it's clear that some of the numbers  
20 used in the analyses are pulled from different points  
21 in time. The -- both the human health risk assessment  
22 and the wildlife risk assessment are based on very  
23 conservative assumptions in terms of consumptive  
24 habits, i.e., we've assumed that the individual or the  
25 animal involved is exclusively sourcing food or air  
26 from -- from the same location for an extended period

1 of time, which, of -- of course, is -- is very  
2 conservative.

3 We can rerun the models based on a -- that the --  
4 the numbers in 6.25 -- the response to 6.25, but it's  
5 not going to be a quick -- it's not going to be a quick  
6 process that -- the rerunning of the models takes  
7 considerable effort and time. And so I -- I'm not  
8 quite sure how to deal with that.

9 What -- what we can say is that, you know, we're  
10 very confident that with all the conservatism built in  
11 the model that the results will not change, but we  
12 recognize the Panel's desire to have a consistent set  
13 of numbers based on the last hydraulic model results.

14 So I'm not sure -- we're willing to do the work,  
15 but I think it's unreasonable to expect that the  
16 revised numbers would be available within the next few  
17 days. It would be more likely January, that -- that  
18 kind of time frame.

19 Q So the issue for the Panel is not so much the other  
20 conservative functions; it's really about -- it appears  
21 to us that the updated water modelling was not used in  
22 the assessment. It appears that the numbers are  
23 higher. So it's not clear to us how conservative the  
24 assessment is without kind of having the most recent  
25 updated numbers.

26 A M-hm.

1 Q So it makes it difficult for the Panel to assess that.  
2 And, you know, I think the Panel would agree that for  
3 some parameters that are -- you know, where the hazard  
4 quotient is well below .2 or 1, you know, we're not so  
5 concerned about those. It's the parameters where the  
6 hazard quotient is within that range of, you know, .2  
7 to 1, and if we were to increase further, does that  
8 have implications for the assessment of risk to health?  
9 That's the, kind of, Panel's concern.

10 A M-hm. Yeah. Understood. I -- I -- I think it -- I  
11 agree with you. It would be clearer for everybody if  
12 we had one consistent set of numbers that were run  
13 through to the end. The -- yeah. The running of the  
14 models just takes time. That's -- that's the -- that's  
15 the only concern we have.

16 Q Okay. Let's maybe park that momentarily, and I'll  
17 confer with my colleagues at the break.

18 A Okay.

19 Q But just flag that this -- we do see this as an issue  
20 in terms of our ability to interpret the human health  
21 risk assessment.

22 A Okay.

23 Q Okay. I'm going to carry on, then, with the next one.  
24 So now I'd like to turn to the level of  
25 conservatism in the derivation of concentrations of  
26 contaminants of potential concern in the Oldman

1 reservoir. So in CIAR 360, PDF 8, Benga states:  
2 (as read)

3 The risk assessment was based on the  
4 95th percentile monthly water -- monthly  
5 water concentrations of the 23-year  
6 operations period and a 57-year postclosure  
7 period from the upper case model scenario.

8 Could Benga confirm that the concentrations in the  
9 Oldman reservoir in Appendix A to Addendum 1 of  
10 CIAR 313, which were used in the estimate of risk to  
11 human health, were produced by the GoldSim model  
12 described in CIAR 42, Appendix 10? So, again, we're  
13 thinking about the human health risk assessment here,  
14 and this is not unrelated to the discussion we just  
15 had.

16 A So -- so, Mr. Chair, I believe we discussed this during  
17 the water panel, and those concentrations in the Oldman  
18 reservoir were, indeed, generated through the GoldSim  
19 model.

20 Q Okay. Thank you.

21 So given the discussion we've just had with  
22 respect to the level of conservatism in the GoldSim  
23 model compared to the updated model for Blairmore and  
24 Gold Creeks, and given that the project-related loading  
25 of the COPCs to the Oldman reservoir is from Blairmore  
26 and Gold Creeks, will the use of the updated model

1 results for Blairmore and Gold Creeks presented in  
2 CIAR 313, Appendix 6.25 change the predicted  
3 concentrations of contaminants of potential concern in  
4 the Oldman reservoir, and, if so, by how much?

5 A Mr. Chair, the -- the revised modelling of Blairmore  
6 and Gold Creek and the modelling for the Oldman  
7 reservoir concentrations were done at the same time;  
8 in -- in other words, the -- the model was -- the  
9 GoldSim model was revised to produce the outputs for  
10 6.25 and, at the same time, are -- are using the same  
11 values -- the estimations for the Oldman reservoir  
12 were -- were done. So I'm -- I'm saying it's -- it's  
13 the same model.

14 Q Okay. Just a moment.

15 Okay. Thanks.

16 So what is Benga's confidence that the predicted  
17 concentrations of contaminants of potential concern in  
18 the Oldman reservoir reflect hydrologic variability and  
19 climate change and are conservative?

20 A I -- I wish you had asked that question a week ago,  
21 Mr. Chair.

22 Q M-hm.

23 A It's really a question for Soren Jensen, who did the  
24 modelling. However, I -- I think the response he would  
25 give is that the seasonal variability that we -- we  
26 noted in our model was based on -- I -- I call it a



1 "Monte Carlo", but it's a -- it's a modelling technique  
2 that -- that looks at dry years, wet years, and -- and  
3 looks at the natural range of variability and inflows,  
4 and over the life of the project, we -- we would expect  
5 that that would encompass the marginal changes due to  
6 climate change.

7 Q Okay. Thanks for that, Mr. Houston.

8 Okay. I'm going to shift gears a little bit and  
9 ask some questions about predictions of concentration  
10 of contaminants of potential concern in the end-pit  
11 lake. There are several references related to the  
12 derivation of concentrations of selenium and other  
13 contaminants of potential concern in the end-pit lake.

14 In CIAR 42, Consultant Report 5, Benga states  
15 that: (as read)

16 The concentrations of contaminants of  
17 potential concern in the end-pit lake were  
18 derived using data collected from three  
19 historic pit lakes.

20 That reference is on PDF page 58. And Benga presents  
21 these historic pit lake concentrations in Table 13 on  
22 PDF page 61.

23 These concentrations are for winter only and range  
24 from 0.23 to 1.79 micrograms per litre. No details  
25 were provided with respect to how predicted  
26 concentrations in the end-pit lake were derived using

1 the historic pit lake data.

2 In CIAR 42, Appendix 10, Figure 7-16 to 7-20 on  
3 PDF pages 269 to 271, Benga presents sulphate, nitrate,  
4 cobalt, selenium, and zinc concentrations in the  
5 end-pit lake for the duration of the modelling period.  
6 There were no predicted concentrations of other  
7 contaminants of potential concern in the end-pit lake  
8 in Appendix 10B.

9 Benga presents the concentrations used for the  
10 assessment of risk to human health and wildlife health,  
11 including estimated concentrations in the end-pit lake  
12 in CIAR 313, Appendix A to Addendum 1, PDF page 1310.  
13 Some example concentrations of COPs in the Appendix A  
14 table include a selenium concentration of 30 micrograms  
15 per litre, and sulphate concentration of 190 milligrams  
16 per litre, and nitrate concentration of  
17 0.107 milligrams per litre, a cobalt concentration of  
18 0.045 milligrams per litre, and a zinc concentration of  
19 0.177 milligrams per litre.

20 Could Benga confirm the basis for prediction of  
21 the concentrations of contaminants of potential concern  
22 in the end-pit lake? Specifically what we're  
23 interested in is knowing if historic pit lake data were  
24 used and, if so, how they were used, and if modelling  
25 was used, whether the GoldSim modelling reported in  
26 CIAR 42, Appendix 10B was the basis for all of the

1 concentrations presented in CIAR 313, Appendix A, or  
2 whether another model was used.

3 A Just one minute, Mr. Chair.

4 Q Thank you.

5 A So -- so, Mr. Chair, the -- the estimates in Document  
6 Number 313, the most recent ones, were made using the  
7 GoldSim model, and they were made using the upper case  
8 values, so values that are boundary case. The intent  
9 of that exercise was to provide a screening-level  
10 assessment of -- of risk to -- to wildlife. And so  
11 our -- our interest was in generating numbers that were  
12 on the high end.

13 The modelling is not based on design of the  
14 end-pit lake. It's based on some assumptions around  
15 what the end -- end-pit lake might look like. And the  
16 idea was to identify where there is a potential risk to  
17 inform the future design of the end-pit lake and -- and  
18 any mitigation measures that need to be incorporated  
19 into that design.

20 Q Okay. Thank you, Mr. Houston. Just one minute.

21 Are you able to tell us whether or not the GoldSim  
22 modelling of the end-pit lake considered varying  
23 volumes of the lake with an emphasis on, kind of,  
24 dry/wet years?

25 A The current -- current thinking is that the end-pit  
26 lake, as we've discussed, will -- will maintain a

1 fairly steady volume because it will be designed to  
2 decant into the saturated backfill zone. I don't  
3 believe we've allowed for the end-pit lake to decrease  
4 in volume below that kind of maintenance elevation  
5 in -- in our modelling.

6 Q Okay. Thank you, Mr. Houston. One minute.

7 So can Benga provide and discuss the various  
8 conservative assumptions used in the prediction of  
9 end-pit lake water quality?

10 A So, Mr. Chair, that -- that would primarily relate to  
11 the use of the upper case source terms and a  
12 presumption around the ability of -- or the incoming  
13 water to contain -- to -- to have been in contact  
14 with -- with rock that is leaching the contaminants of  
15 concern. So some -- some high-level assumptions were  
16 made on both of those -- in both of those cases. I --  
17 I'm -- it's most easy to talk about the -- the upper  
18 case, that -- that being the highly unlikely case in  
19 terms of leaching values. In terms of how much water  
20 going into the end-pit lake is exposed to rock that has  
21 the potential to leach, I'm -- I'm less able to talk to  
22 that. But I -- I could reach out to Mr. Jensen to get  
23 a little bit more background on -- on that, if that is  
24 helpful.

25 Q So just to confirm what I think I heard you said, that  
26 the 95th percentile values were really related to the

1 geochemistry source terms, that those 95th percentile  
2 values are not related to the hydrology because you  
3 assumed that the lake would have, kind of, a constant  
4 volume. Do I have that correct?

5 A That's correct. And there would also be an assumption  
6 around how much of the water that arrives in the  
7 end-pit lake is subject to -- is exposed to rock that  
8 could leach the chemicals of potential concern and how  
9 much arrives directly as overland runoff.

10 Q Okay.

11 A All -- all of those things are based on a design that  
12 hasn't really happened yet as well, Mr. Chair. So  
13 there -- there's a lot of -- lot of assumptions in --  
14 in the model. And as we highlighted, the intent was to  
15 derive values that, you know, are conservative so that  
16 we could identify which chemicals of potential concern  
17 present risk and -- and use that as an input into the  
18 final end-pit lake design.

19 Q Okay. So given your answer with respect to the  
20 conservatism inherent in the derivation of  
21 concentrations of COPs in the end-pit lake, can you  
22 explain or justify why Benga considers the incremental  
23 lifetime cancer risk from arsenic exposure of 2.7 in  
24 10,000, which is 27 times the Health Canada target of  
25 1 in 100,000 to be conservative?

26 A MR. MITCHELL: There is a couple aspects

1 with -- with arsenic, and what -- one of those is a  
2 certain amount of conservatism built into that toxicity  
3 value to -- to -- to start with. The -- it's based on  
4 the assumption that there's basically a linear  
5 relationship between concentration and cancer risk.  
6 And there are quite a few researchers in the arsenic  
7 world that actually don't believe that's the case and  
8 there is actually a threshold below which those risks  
9 don't occur. But, you know, in the absence of  
10 conclusive information and, you know, regulatory  
11 acceptance, we -- we sort of work on that assumption.

12 The second is that the background risks on the --  
13 on the -- or the background concentrations of arsenic  
14 are already sort of in that 10 to the minus 4 range.  
15 Again, background concentrations of arsenic in water  
16 and food are already at that kind of level. So I  
17 believe there is a discussion of that. Just let me  
18 find the right place. So in CIAR 313 -- I'll pull that  
19 one up myself -- page 1063 PDF, I believe there is a  
20 discussion of that. Sorry. That doesn't look like the  
21 right PDF page. Just give me a moment to find where  
22 that is.

23 A MR. HOUSTON: Mr. Mitchell, you might want  
24 to look at Document 360, PDF 11.

25 A MR. MITCHELL: Thanks, Mr. Houston.

26 So -- so we do have a discussion of that issue

1 in -- in our report, and as there are quite a few  
2 locations, the risk -- the predicted risk was less than  
3 1 times 10 to the minus 5. Again, a lot of these  
4 concentrations, either where a risk above 1 times 10 to  
5 the minus 5 is predicted, the concentrations were  
6 actually below the drinking water guidelines, and that  
7 also base -- is built on some conservative assumptions  
8 that include that, you know, essentially, 100 percent  
9 of somebody's drinking water over their lifetime comes  
10 from that source, which, again, we believe,  
11 particularly for a source such as the end-pit lake, is  
12 an extremely conservative assumption.

13 Q Okay. Thank you, Mr. Mitchell.

14 Moving on to another question. In CIAR 313,  
15 Tables 7-1 to 7-4, which appear on pages 1259 to 1263,  
16 Benga presents hazard quotients and incremental  
17 lifetime cancer risks for the end-pit lake, Blairmore  
18 Creek, Gold Creek, and the Oldman reservoir. Hazard  
19 quotients greater than the target -- greater than the  
20 target HQ of 0.2 were noted for several contaminants of  
21 potential concern, including aluminum, barium, cadmium,  
22 cobalt, copper, lead, manganese, methylmercury,  
23 selenium, thallium, and zinc.

24 Benga then makes several statements with respect  
25 to the contribution of background concentrations of the  
26 COPCs which exceed an HQ of 0.2. On PDF page 1264 of

1 CIAR 313, last paragraph, Benga states that: (as read)

2 Due to low inherent toxicity of aluminum and  
3 the fact that measured concentrations are  
4 consistent with what would be expected to  
5 naturally occur in the background, aluminum  
6 is not considered to be a human health  
7 concern for the project.

8 On PDF page 1265, Section 7.2.1.2 of CIAR 313, Benga  
9 states that: (as read)

10 Antimony HQ results are driven primarily  
11 through background exposure estimates which  
12 are considered an artifact of the  
13 conservatism built into the human health  
14 exposure model.

15 On PDF page 1265, Section 7.2.1.3 of CIAR 313, Benga  
16 states that: (as read)

17 The HQ values for barium, cadmium, copper,  
18 lead, manganese, thallium, and zinc are a  
19 result of background measured concentrations  
20 and that in all cases project-case  
21 contribution predictions were less than 0.2.  
22 [Benga goes on to state that] The additional  
23 consideration of groundwater contribution to  
24 the human health risk model has had no  
25 material effects on the conclusions of the  
26 updated human health risk assessment.



1 In CIAR 313, Appendix A, PDF 1310, background and  
2 project-related concentrations of the contaminants of  
3 potential concern used in the risk assessment are  
4 presented.

5 So the question is: Can Benga explain why  
6 project-related concentrations of the contaminants of  
7 potential concern with hazard quotients greater than  
8 0.2 for exposure to Blairmore Creek in the application  
9 case are an order of magnitude above background for all  
10 but zinc despite Benga's statements which attribute  
11 hazard quotients greater than 0.2 to background  
12 exposure?

13 A Sorry. Could you repeat that question?

14 Q Sure. Can Benga explain why project-related  
15 concentrations of the contaminants of potential concern  
16 with hazard quotients greater than 0.2 for exposure to  
17 Blairmore Creek in the application case are an order of  
18 magnitude above background for all but zinc, despite  
19 Benga's statements which attribute hazard quotients  
20 greater than 0.2 to background exposure?

21 A Again, that relates to, Mr. Chair, the exposures and  
22 hazards that were calculated for the full multimedia  
23 model. So those concentrations in the last table you  
24 referenced are just the surface water concentration,  
25 but where those hazards are actually coming from is --  
26 is the rest of the multimedia assessment and, in

1 particular, the exposure through vegetation.

2 Q Okay. Just a moment.

3 So in that case, could you provide an explanation  
4 for a specific example? And so I'm thinking about  
5 lead. So you're suggesting that vegetation rather than  
6 drinking water is deriving -- is deriving those  
7 concentrations? And would that apply to something like  
8 lead?

9 A Yes, that's correct.

10 Q Okay. Thank you, Mr. Mitchell.

11 A We can't confirm specifically about lead, but in -- in  
12 general, that is the trend. We'd have to look at the  
13 detailed modelling results to talk about a specific  
14 chemical. But I could certainly ask the team to do  
15 that for lead.

16 Q No, that's fine, Mr. Mitchell. I think that's  
17 satisfactory.

18 So given that the relative contribution of the  
19 project to the hazard quotients in that multimedia  
20 assessment is greater than 0.2, what mitigation  
21 measures does Benga think are appropriate to reduce its  
22 contribution to risk to human health from these  
23 contaminants of potential concern? Or maybe a better  
24 way to ask it is: What mitigation measures, if any,  
25 has Benga proposed to reduce its contribution to  
26 incremental risk from these contaminants of concern?

1     A     MR. HOUSTON:                     One minute, Mr. Chair.

2             So, Mr. Chair, the mitigations are primarily  
3     related to the things we've been talking about in terms  
4     of air -- air contaminant reduction and treatment of  
5     water through the water management system of the  
6     project. Those are the primary mitigations.

7             When it comes to the end-pit lake, of course,  
8     we -- we still have a detailed design process to go  
9     through, and as we -- as we do that, that detailed  
10    design will be informed by learnings through the first  
11    years of operation and water treatment in terms of  
12    source -- source terms, in terms of our -- our ability  
13    to treat, and -- and especially, as we develop the mine  
14    plan in more detail, the -- the configuration of the  
15    end-pit lake. So there are mitigations to -- to come  
16    with respect to the end-pit lake. With respect to  
17    water that may be in Gold Creek or Blairmore Creek,  
18    we've talked extensively about the capture and  
19    treatment programs that we have put in place for the  
20    project or proposed for the project. And in terms of  
21    air contaminants, we've talked extensively about our  
22    modelling of contaminants of concern through the air  
23    models.

24             Does that answer your question, Mr. Chair?

25    Q     It does.

26             Maybe just one follow-up with regard to that.

1           Would Benga expect to have to restrict access to the  
2           end-pit lake for a prolonged period into the  
3           postclosure phase to manage the potential for exposure  
4           to human health?

5       A    Certainly that wouldn't be our objective as we go  
6           through the design, Mr. Chair, and -- and -- and we'd  
7           be looking for mitigations and alternatives through  
8           that end-pit lake design to avoid that -- that kind of  
9           mitigation, the -- the -- the restricted access -- need  
10          for restricted access.

11                 However, I think we do recognize that there may be  
12           a situation where the initial filling of the end-pit  
13           lake could -- could result in water quality that is not  
14           what we would like and the potential to have to take  
15           some post-filling measures to -- to treat the water  
16           down to a -- a sustainable and -- and acceptable water  
17           quality. So there may be some temporary measures  
18           required in terms of restricted access.

19       Q    Okay. Thank you, Mr. Houston.

20                 Okay. I'm going to shift gears a little bit here  
21           and talk -- ask some questions about the groundwater  
22           pathway. So human consumption of groundwater by way of  
23           a domestic use water well was not considered as a  
24           component of the human health risk assessment update  
25           provided in CIAR 313, Appendix 6.27-1, Addendum 1.

26           Benga stated: (as read)

1           There are no confirmed domestic wells within  
2           the proposed mine permit boundary and the  
3           potential for domestic wells to be drilled  
4           and completed within the mine permit boundary  
5           is low because the underlying bedrock units  
6           are not very permeable. Surficial deposits  
7           associated with Gold Creek or Blairmore Creek  
8           were identified as the primary unit to be  
9           considered regarding domestic water wells;  
10          however, Benga stated that groundwater  
11          quality in those aquifers would be similar to  
12          the quality of the associated surface water.  
13          Benga's baseline groundwater data indicates  
14          some exceedances of drinking water guidelines  
15          for aluminum, barium, chromium, iron, and  
16          manganese in samples of groundwater taken  
17          from surficial deposits; shallow, mid-depth,  
18          and deep-monitoring wells; springs and  
19          groundwater-dependent ponds in the local and  
20          regional study area.

21          THE CHAIR:                        So, Zoom Host, if you could  
22          pull up CIAR 42, Consultant's Report Number 3. And I'm  
23          interested in Table B8, which appears on PDF 137 and  
24          138. So we'll start with 137.

25          Q       THE CHAIR:                        So I just want to, first of  
26          all, draw Benga's attention to the concentrations of

1 aluminum and manganese in the samples from surficial  
2 deposits from the well MW15-12-7 which appears near the  
3 bottom of page 137. The geology of MW15-12-7 is  
4 described as "surficial deposits" in CIAR 42,  
5 Consultant's Report Number 3, PDF page 194.

6 And if we can turn to the next page, one page  
7 down, 138. If Benga could then also look at the  
8 concentrations for the springs which appear, and,  
9 again, particularly aluminum and manganese. And then  
10 if Benga could compare these values to the predicted  
11 concentrations in surface water bodies considered in  
12 the human health risk assessment, CIAR 313, PDF  
13 page 1310. And maybe we can pull that up.

14 So the question is: Could Benga confirm that the  
15 aluminum concentrations used in the risk assessment for  
16 Blairmore and Gold Creeks which range from 0.005 to  
17 0.03 milligrams per litre do not reflect the range of  
18 aluminum concentrations from the well in surficial  
19 deposits with the site location code MW15-12-7, which  
20 had a concentration of 8.83 milligrams per litre or the  
21 two concentrations measured in Spring 1, which were  
22 0.11 and 0.14 milligrams per litre?

23 A MR. HOUSTON: So, Mr. Chair, if I understand  
24 the question, you're asking us to confirm that the --  
25 the table in -- I think this came from 313, the one  
26 that's on the screen now, does not reflect the values

1 from Consultant Report Number 3 in those wells and  
2 springs that you identified? Do you --

3 Q That's correct, yeah.

4 A Just -- just one minute.

5 That -- that -- that's correct, Mr. Chair. The --  
6 the human health and wildlife health models are -- are  
7 reflecting values that are representative of -- of --  
8 of a larger spatial area and do not necessarily reflect  
9 specific samples that are taken from -- from the wells  
10 that were identified in Consultant Report Number 3.

11 Q Okay. Thank you, Mr. Houston. Just a similar  
12 question, then, for manganese. Could you confirm that  
13 the manganese concentrations used in the risk  
14 assessment, which range from 0.005 to 0.03 milligrams  
15 per litre -- oh, sorry. I might be reading the same  
16 question again. No, I'm not. Sorry. I'm going to  
17 start again.

18 Could you confirm that the manganese  
19 concentrations used in the risk assessment, which range  
20 from 0.005 to 0.03 milligrams per litre, do not reflect  
21 the range of manganese concentrations from the spring  
22 samples which range from less than 0.005 to 2.69 milligrams  
23 per litre?

24 A That -- that is correct, Mr. Chair.

25 Q Okay. So could Benga then comment on the potential for  
26 risk to human health from drinking water obtained from

1 surficial deposits in springs given the above results  
2 and given that the surface water concentrations in the  
3 two creeks do not reflect the range of groundwater  
4 quality in surficial deposits?

5 A MR. MITCHELL: A couple of things, Mr. Chair.  
6 One is, obviously, when you're looking at individual  
7 samples for manganese, for example, you -- you've done  
8 that at a range of, you know, less than .005 up to  
9 2.61, so it does vary both, you know, spatially and  
10 over time. And I -- I can't speak to how those samples  
11 were collected and whether they were filtered or not.  
12 I wasn't involved at all in the hydrogeology  
13 assessment.

14 But, also, a lot of those drinking water  
15 guidelines, for example, for -- and I don't have the --  
16 the supporting documents in front of me, but for  
17 manganese, I'm pretty sure, off the top of my head,  
18 it's actually not based on a -- on a human health end  
19 point. So I could be wrong. That's just off the top  
20 of my head. But -- so -- so, again, these  
21 concentrations that have been measured in -- in these  
22 baseline samples don't necessarily indicate a human  
23 health risk even if they do exceed the drinking  
24 guidelines.

25 Q Okay. Thank you, Mr. Mitchell. Just one moment.

26 If one were to drink water from a well or a spring



1 in the location that had those concentrations that were  
2 identified in Table B8, would there potentially be a  
3 risk to human health given that the concentrations are  
4 well -- well above --

5 A MR. HOUSTON: And to be clear --

6 Q -- (INDISCERNIBLE - OVERLAPPING SPEAKERS)

7 A Sorry, Mr. Chair.

8 To be clear, you're -- you're -- you're talking  
9 about an occasional drink of water, or you're talking  
10 about a lifetime supply from -- from those locations?  
11 I think you're talking about an occasional drink as  
12 opposed to a long-term usage of the water.

13 Q Potentially, I suppose. I'm going to ask you a  
14 question about Ms. Gilmar shortly that might fall into  
15 a category. But however you want to answer it,  
16 temporary --

17 A Okay.

18 Q -- or long-term.

19 A Okay. And that was specifically around aluminum and  
20 manganese; right?

21 Q Yeah.

22 A Okay. So, Mr. Mitchell, do you have --

23 A MR. MITCHELL: Yeah.

24 A MR. HOUSTON: -- a response?

25 A MR. MITCHELL: Could you potentially call up  
26 the table that actually had those numbers in it again?

1 Q Okay. Let me just back up a bit here. Sorry. I'm  
2 just trying to find the right reference.

3 THE CHAIR: CIAR 42, Consultant Report  
4 Number 3, PDF 137, and then 138 as well, but let's look  
5 at 137 first. Scroll to the bottom of that.

6 A MR. MITCHELL: So those concentrations, you  
7 know, they were -- the ones that really get flagged  
8 are, again, the aluminum, see some pyrene in some  
9 locations, be some -- some manganese, that are  
10 primarily based on aesthetic objectives. Again, I  
11 think the -- the manganese in particular, I know, is  
12 based on aesthetic objective. Aluminum and iron, we  
13 see high concentrations in groundwater all the time  
14 for -- for various reasons. And, again, not a lot of  
15 really stringent health -- health end points on those,  
16 and, you know, without having done a formal assessment  
17 on these particular groundwater sampling locations,  
18 the -- the numbers don't raise a whole lot of concern  
19 to me. And I think if -- concentrations in the actual  
20 springs, I think, were a bit lower, if I recall, on the  
21 next page.

22 Q Yeah, if you go to one -- next page.

23 A Yeah. So, again, in the springs, we see that manganese  
24 again that's above an aesthetic objective. And, again,  
25 I don't have the supporting document in -- in front of  
26 me. Just from the -- recollection, I think it might be

1 related to -- something related to -- to laundry stains  
2 or something like that, but don't -- I -- I can't say  
3 that for sure because I don't have that document in  
4 front of me.

5 Again, one sample with some low iron that we see,  
6 again, quite often. And, again, I don't know whether  
7 these samples have been filtered or whether that  
8 reflects a -- a total concentration or not. But those  
9 sort of numbers don't give me a whole lot of concern.

10 Q Okay. My risk assessment expert tells me that the  
11 aluminum objective is not based on esthetics only and  
12 that at higher concentrations, there may be a risk.  
13 Are these the kind of levels you would be concerned  
14 about?

15 A It -- it depends on whether -- whether the -- whether  
16 that's reflecting a dissolved concentration or a total  
17 concentration. Again, I don't know the background  
18 around these numbers. It's slightly above the -- the  
19 drinking water guideline within the same general  
20 magnitude. It's -- you're probably not a yield  
21 drinking water source, if it's -- if it's above that,  
22 but I -- I can't, without actually doing a proper  
23 assessment on it, you know, confirm what the level of  
24 health risk is.

25 Q Okay. I think that's -- that's good enough. I'm going  
26 to move on to the next question.

1           Is it possible that seepage from waste rock areas  
2           could affect groundwater in surficial deposits,  
3           springs, and bedrock deposits resulting in increases in  
4           concentrations of contaminants of potential concern,  
5           notably selenium but also other metals such as aluminum  
6           and manganese?

7    A   MR. HOUSTON:                So we have put in place a  
8           groundwater monitoring program, and we've identified  
9           that we're going to be monitoring water adjacent to  
10          the -- the ex-pit rock dumps and other structures and  
11          also adjacent to the -- the -- the creeks. And the  
12          idea would be to identify any -- any levels of  
13          contamination that are concerning and to use that to  
14          inform additional mitigation measures. So our --  
15          our -- our plan would be to -- to -- to mitigate to  
16          avoid that situation.

17   Q   Okay. Thank you, Mr. Houston.

18                Does Benga expect that people will not use water  
19                from surface -- surficial deposits or bedrock in the  
20                postclosure period, and if so, what's the basis for  
21                that opinion?

22   A   So we -- we -- again, we expect that mitigation  
23           measures will be in place as required postclosure to  
24           ensure that water quality is -- is adequate in -- in  
25           the vicinity of the -- the creeks. We -- in terms of  
26           postclosure of the mine site itself, I would expect

1           that we would have to deal with that based on -- based  
2           on the final circumstance of the site.

3           We -- we do expect to have to treat through the  
4           saturated backfill zone, for example, for an extended  
5           period of time, as we've discussed, and so within  
6           the -- the area of the mine pit itself, yes, we -- we  
7           would not expect to have folks drilling wells or doing  
8           something else that would disrupt that area.

9           Outside of that, we would continue with our -- our  
10          water monitoring program and continue with mitigation  
11          measures required to ensure that groundwater outside of  
12          the -- the mine site itself remains at acceptable  
13          quality standards.

14        Q    Okay. Thank you, Mr. Houston.

15          So we heard during the first week of the hearing  
16          that Fran Gilmar, whose lands are located on the east  
17          side of the project and within the currently proposed  
18          mine permit boundary, uses a spring on her property as  
19          a source of drinking water, and we heard other property  
20          owners on the east side of the project, across the  
21          creek may also use springs as a source of drinking  
22          water.

23          Has this been considered within Benga's human  
24          health risk assessment, and if not, why not?

25        A    Maybe I'll just start on that, Mr. Chair, and then we  
26          can -- we can let Mr. Mitchell add on, if -- if he

1 will -- if he wishes.

2 The -- the springs that Ms. Gilmar is talking  
3 about are points where seepage surfaces very close --  
4 in very close proximity to Gold Creek. And so we -- we  
5 would consider those to be essentially part of the base  
6 flow going into Gold Creek. We -- we do -- we will  
7 continue to monitor that -- that base flow for water  
8 quality, and we will continue to monitor at other  
9 points closer to the -- to the mine to ensure that the  
10 water is -- is of suitable quality, essentially, a  
11 quality that's suitable for entering into the creek  
12 itself.

13 Mr. Mitchell, is there anything to add to that?

14 A MR. MITCHELL: I -- I think you captured it  
15 fairly well, Mr. Houston.

16 We -- we did assess, based on the drinking water  
17 and based on the -- out of -- out of the -- the streams  
18 and the assumption that that would essentially provide  
19 a permanent, you know, long -- long-term drinking water  
20 supply for somebody, which I don't know how -- I don't  
21 know how these springs are used, but, you know, if the  
22 springs are associated with a surface water, then we  
23 would expect the risk to be generally similar.

24 Q Okay. Just a moment, please.

25 So just for clarity, then, Fran Gilmar's spring  
26 that she uses wasn't explicitly considered within the

1 human health risk assessment?

2 A No. I don't think we had any information about that  
3 when we were doing the human health risk assessment.  
4 So it wasn't explicitly considered separately from the  
5 surface water. Again, we did also assume a lifetime  
6 exposure there, and I -- my understanding is that  
7 that's not a full-time drinking water source.

8 Q Okay. Thank you, Mr. Mitchell. Just one moment.

9 If the project did result in elevated  
10 concentrations within groundwater, what are the  
11 mechanisms that would cause the project-related  
12 concentrations to diminish with time, and how much time  
13 would be needed to return to something resembling  
14 baseline?

15 A MR. HOUSTON: Of course, that's a question  
16 we've tried to wrestle with a few times during this --  
17 this hearing, Mr. Chair, and the -- the mechanisms for  
18 long-term reduction of seepage in -- into -- or into  
19 the water, whether it be groundwater or water that we  
20 extract from the ex-pit dumps, is -- is difficult to  
21 prescribe with any -- any precision.

22 We do hope to -- through the reclamation, through  
23 the structure of the dumps, through other mitigations  
24 to minimize the amount of water that is -- that -- that  
25 percolates through the -- the ex-pit dumps in -- in the  
26 first place and -- and then escapes to groundwater, and

1 we do anticipate operating seepage capture wells  
2 adjacent to those facilities for some time.

3 The -- the time frame to predict that the -- the  
4 ambient concentrations reduce below acceptable levels  
5 is -- is just something we -- we are not confident  
6 in -- in predicting at this moment, and so the best we  
7 can do there is to indicate that we will commit to  
8 maintaining all of those mitigations for -- for the  
9 long -- long term until they're no longer required.

10 Q Okay. Thank you, Mr. Houston.

11 So just a final question on this topic. So having  
12 regard for that discussion, what is Benga's level of  
13 confidence that drinking water obtained from  
14 groundwater sources would not be affected by the  
15 project, including during the postclosure period?

16 A So the groundwater source is bounded by Gold Creek and  
17 Blairmore Creek on either side of the project and --  
18 and Bluff Mountain in the -- in the south. Within  
19 those confines, we will be monitoring and testing  
20 groundwater quality, and we will have, as I've just  
21 mentioned, mitigation in place to capture that  
22 groundwater that does not meet drinking water -- or --  
23 or groundwater quality parameters.

24 So based on those factors, we have a high  
25 confidence that there won't be users of groundwater  
26 within the confines of the project that would be



1 exposed to a -- a health risk.

2 Q Okay. And just a moment, Mr. Houston.

3 Is your high confidence driven by your ability to  
4 control the source and capture contaminants, or is it  
5 based on monitoring?

6 A Both, Mr. Chair. We would be monitoring to ensure that  
7 the controls we put in place are -- are functioning  
8 properly and -- and to inform any additional mitigation  
9 measures that may be required.

10 Q Okay. Thank you, Mr. Houston.

11 THE CHAIR: I do have more questions, but  
12 I'm going to suggest we take our lunch break now. It's  
13 just about 12:15, so we'll resume at 1 PM. Thank you.

14

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15 PROCEEDINGS ADJOURNED UNTIL 1:00 PM

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1 Proceedings Taken via Remote Video

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3 November 30, 2020 Afternoon Session

4

5 A. Bolton The Chair

6 D. O'Gorman Hearing Commissioner

7 H. Matthews Hearing Commissioner

8

9 M. LaCasse AER Counsel

10 B. Kapel Holden AER Counsel

11

12 K. Lambrecht, QC Joint Review Panel Secretariat  
13 Counsel

14

15 T. Utting IAAC Staff

16 E. Arruda AER Staff

17 D. Campbell AER Staff

18 T. Turner AER Staff

19 T. Wheaton AER Staff

20 A. Shukalkina AER Staff

21

22 M. Ignasiak For Benga Mining Limited

23 C. Brinker

24

25 R. Warden For Ktunaxa Nation

26 T. Howard

1	K. Poitras	For Métis Nation of Alberta
2		Region 3
3		
4	Chief B. Cote	For Shuswap Indian Band
5		
6	B. Snow	For Stoney Nakoda Nations
7		
8	R. Drummond	For Government of Canada
9	S. McHugh	
10		
11	A. Gulamhusein	For Municipality of Crowsnest
12		Pass
13		
14	M. Niven, QC	For MD of Ranchland No. 66
15	R. Barata	
16	J. Nijjer (Student-at-Law)	
17		
18	B. McGillivray	For Town of Pincher Creek
19		
20	D. Yewchuk	For Canadian Parks and
21		Wilderness Society, Southern
22		Alberta Chapter
23		
24	R. Secord	For Coalition of Alberta
25	I. Okoye	Wilderness Association, Grassy
26		Mountain Group, Berdina Farms

1		Ltd., Donkersgoed Feeder
2		Limited, Sun Cured Alfalfa
3		Cubes Inc., and Vern Emard
4		
5	R. Cooke	For Crowsnest Conservation
6		Society
7		
8	G. Fitch, QC	For Livingstone Landowners
9	C. Agudelo	Group
10		
11	M. Sawyer	For Timberwolf Wilderness
12		Society and Mike Judd
13		
14	(No Counsel)	For Barbara Janusz
15		
16	(No Counsel)	For Jim Rennie
17		
18	S. Elmeligi	For Alberta Chapter of the
19	A. Morehouse	Wildlife Society and the
20	S. Milligan	Canadian Section of the
21	M. Boyce	Wilderness Society
22		
23	J. Gourlay-Vallance	For Eco-Elders for Climate
24		Action
25		
26	L. Peterson	For Trout Unlimited Canada

1 R. Campbell For Coal Association of Canada  
2  
3 (No Counsel) For Alistair Des Moulins  
4  
5 (No Counsel) For David McIntyre  
6  
7 (No Counsel) For Fred Bradley  
8  
9 (No Counsel) For Gail Des Moulins  
10  
11 (No Counsel) For Ken Allred  
12 (Not Present)  
13  
14 (No Counsel) For Monica Field  
15  
16 S. Frank For Oldman Watershed Council  
17 A. Hurly  
18  
19 C. Longacre, RPR, CSR(A) Official Court Reporter  
20 \_\_\_\_\_  
21 (PROCEEDINGS COMMENCED AT 1:02 PM)  
22 GARY HOUSTON, MIKE BARTLETT, RANDY RUDOLPH,  
23 JANET BAUMAN, DANE MCCOY, STEVE BILAWCHUK, IAN  
24 MITCHELL, JOHN KANSAS, LINDSEY MOONEY, DAVID DEFOREST,  
25 Previously Affirmed  
26 (Dust, air quality, greenhouse gas emissions, noise,

1 and light; wildlife, including migratory birds and  
2 species at risk, wildlife health, and human health risk  
3 assessment)

4 Alberta Energy Regulator Panel Questions Benga Mining  
5 Limited

6 Q THE CHAIR: Okay. Welcome back, everyone.

7 Before moving on to my next set of questions, I  
8 just wanted to kind of revisit that issue -- or that  
9 discussion we were having about the fact that the  
10 health risk assessment was not updated to include the  
11 updated water quality modelling, and I had kind of put  
12 a potential undertaking to you, and I think what I  
13 heard was it would require a significant amount of  
14 effort and work to do that, so --

15 A MR. HOUSTON: Mr. Chair.

16 Q Yeah. Yeah?

17 A So we -- we've also been discussing that during --  
18 during the lunch break, and I -- I think Mr. Mitchell,  
19 perhaps, has another pathway that we'd like to  
20 suggest --

21 Q Okay.

22 A -- for your consideration.

23 Q Sure. Go ahead, Mr. Mitchell.

24 A MR. MITCHELL: Yeah. So we took a look at  
25 the updated predictions for Blairmore Creek, and what  
26 we found is that almost all of those concentrations, at

1 least for the -- sort of the key contaminants that we  
2 were really looking at, were higher in the end-pit lake  
3 than they are in the revised Blairmore Creek numbers.  
4 So the risk predictions that were done for the end-pit  
5 lake are, therefore, you know, protective of Blairmore  
6 Creek.

7 So what we would propose is using those end-pit  
8 lake results to demonstrate kind of the -- you know,  
9 the worst-case for Blair Creek -- Blairmore Creek that  
10 we know -- we know Blairmore Creek will be lower than  
11 that. And, you know, again, we also do want to stress  
12 that these calculations are all based on these water  
13 bodies being a -- you know, sole source of water for  
14 somebody over a chronic period of time or -- or a  
15 lifetime. So there's that conservatism built in. But  
16 we did determine that the end-pit lake results are  
17 protective of Blairmore.

18 Q Okay. Just hold on a second.

19 So in thinking about that, did you look at the  
20 concentrations of the different COPCs, and can you  
21 confirm that all of the end-pit lake concentrations  
22 were greater than the concentrations in Blairmore  
23 Creek --

24 A Right.

25 Q -- for those that exceeded an HQ of 0.2?

26 A Not -- not all. There were a small number, and --

1 and -- and -- of the ones that came up of note, I think  
2 the -- the exception was aluminum, which I think had a  
3 concentration that was slightly higher in Blairmore  
4 Creek than predicted in the end-pit -- pit lake. You  
5 know, if the Panel did want an updated result for  
6 aluminum, I -- I think we could probably have that  
7 available for, perhaps, tomorrow.

8 There were a couple others that were also higher  
9 in Blairmore Creek, but they were substances like  
10 calcium and lithium and sodium, ones that haven't --  
11 they're not necessarily the -- the higher risk -- or  
12 those that were the higher risk for predicted.

13 Q Okay. And when you say that the concentrations in the  
14 end-pit lake were protective of Blairmore Creek, what  
15 do you mean by that?

16 A By that, I mean that we can take the results that we  
17 did for those risk calculations for the end-pit lake  
18 and, you know, essentially apply those to Blairmore  
19 Creek, and we know that the actual hazards for  
20 Blairmore Creek would be lower than that.

21 Q Okay. It was my understanding from our earlier  
22 conversation that the end-pit lake concentrations  
23 weren't derived using, kind of, the updated water  
24 quality modelling, or am I mistaken? Do I have that  
25 wrong?

26 A What I stated is the concentrations that we used for



1 the calculations for end -- the end-pit lake are higher  
2 than the concentrations --

3 Q Oh, okay.

4 A -- for revised modelling in Blairmore Creek so that we  
5 know that those calculations, therefore, are protective  
6 of Blairmore Creek, like I said, with the exception of  
7 aluminum.

8 Q Okay.

9 A MR. HOUSTON: So what we're proposing,  
10 Mr. Chair, if -- if this is acceptable, is we could  
11 rerun the human health evaluation for aluminum, and we  
12 could do that in short order, based on the aluminum  
13 concentration in 6.25. And we -- we could provide that  
14 to the Panel, you know, before the end of the  
15 evidentiary session -- section of this hearing.

16 Q Okay. Just hold on a minute.

17 A While I'm saying that, Mr. Chair, our eyeball  
18 evaluation is that there will be no essential  
19 difference, but we do recognize the numbers are -- are  
20 different, so that -- that will just close off the  
21 loop.

22 Q Okay. So we also gave some thought to maybe a  
23 different way to get at this issue over the lunch  
24 break, and so I'll kind of put that to you and see what  
25 you think about that.

26 So the concern, of course, is understanding the

1 hazard quotients for exposure to Blairmore Creek, and  
2 the concern is that by not using the updated modelling,  
3 you know, they might increase with the updated  
4 modelling, but we don't know by how much. That's kind  
5 of the issue. And we're not concerned about increases  
6 in HQs that are, you know, an order of magnitude below  
7 1 or more. We're most concerned about those ones that  
8 approach 1 and how much they might exceed the hazard  
9 quotients of 1 by.

10 So let me run this by you and see if this would be  
11 doable in a reasonable amount of time. So could Benga  
12 provide the results of recalculated incremental  
13 lifetime cancer risk from arsenic exposure for  
14 Blairmore Creek using the updated water quality  
15 modelling results and ensuring that air deposition is  
16 added to the modelled water concentrations to produce a  
17 total water concentration and using -- if there are any  
18 corrections of errors that you need to incorporate from  
19 that earlier calculation, those would be incorporated  
20 as well.

21 And then could you -- so doing that for arsenic,  
22 and then recalculating the hazard quotient for one  
23 other contaminant of potential concern which had the  
24 greatest increase in predicted concentrations in water  
25 relative to the original model predictions? And that  
26 might be aluminum. I'm not sure whether it would be or

1 not.

2 So, essentially, what we're saying is rather than  
3 doing it for a whole suite, could we do it for arsenic  
4 and one other that is likely to have the greatest  
5 potential increase? Is that an amount of work that  
6 would be doable in a short period of time?

7 A So to be clear, Mr. Chair, you're -- you're asking us  
8 if we could redo arsenic including a air deposition  
9 component and redo one other, and I -- I would suggest  
10 aluminum would be a good case study because we've --  
11 we've already discussed that it's -- it's higher in  
12 Blairmore Creek than the end-pit lake.

13 So let me just check with my team and see if that  
14 is something that we could do. And I think you're  
15 thinking of a time frame like tomorrow; right? That --

16 Q Yeah, soon, so that it won't delay final argument. So  
17 whether it's tomorrow or, you know, the day after.

18 A Okay.

19 Q We are still waiting for the ACO report, so the record  
20 will remain open for a brief period of time, of course.

21 A Okay. Let -- let me just check with my team and --

22 Q Oh, sorry. Sorry. I just got a note from my risk  
23 assessment specialist. Just let me read it.

24 Okay. So the suggestion was not to use aluminum  
25 as the other, so we still want arsenic, but to use the  
26 COPC that had the greatest increase between the

1 original modelling results and the revised modelling  
2 results for Blairmore Creek. That would help us  
3 understand the magnitude of a potential increase to the  
4 HQs.

5 A Okay. Let -- let me check with my team, Mr. Chair.  
6 One moment.

7 Q Okay. Thank you.

8 MR. IGNASIAK: Mr. Chair, it's Martin  
9 Ignasiak here. Just while Mr. Houston's checking that.  
10 Ms. Bauman has a previously scheduled appointment at  
11 1:30 she can't move. We didn't expect her to still be  
12 on, so to the extent there's questions for her -- I  
13 know it's only 20 minutes' notice, but Mr. Kansas will  
14 still be on the panel. But if we could have your  
15 leave, if she could depart for that appointment, that  
16 would be appreciated.

17 THE CHAIR: I think that should be fine.  
18 I think most of my questions will be either for  
19 Mr. Mitchell or Ms. Mooney or Mr. Houston.

20 MR. IGNASIAK: Thank you, sir.

21 A MR. HOUSTON: So, Mr. Chair, we -- we've  
22 been discussing, and that -- that should be doable. We  
23 should be able to get you something tomorrow or, at the  
24 latest, on -- on Wednesday. Yeah. That -- that works.

25 Q THE CHAIR: Okay. Yeah. So let me just  
26 kind of make sure we're all clear on what the

1           undertaking is.

2           So you'll conduct -- I'm going to kind of reread  
3           it, just because we've had a bit of back-and-forth,  
4           and try and capture what we discussed. So Benga will  
5           conduct a recalculation of the incremental lifetime  
6           cancer risk for arsenic exposure for Blairmore Creek  
7           using the updated water quality modelling results and  
8           ensure that both the air deposition and the water-based  
9           pathways are both included in the calculation -- 'cause  
10          there was a discussion about whether that had happened  
11          or not -- and using the same correction of the input  
12          error to the arsenic calculations that was previously  
13          identified by Benga if needed, and then recalculation  
14          of the hazard quotient for the contaminant of potential  
15          concern which had the greatest increase in predicted  
16          concentrations in water relative to the original  
17          GoldSim modelling, and was one of the ones that  
18          exceeded the risk quotient of 0.2, so if you could pick  
19          one from that. I think -- I think that captures it.

20        A    That -- that's agreeable, sir.

21        Q    Okay. So --

22        A    MR. MITCHELL:                I just have one more  
23              clarification just to a question that we kind of left  
24              hanging a bit this morning, and that was your -- your  
25              question about the hazard quotients for certain  
26              metals -- I think thallium was an example -- being the

1 same for the --

2 Q Right.

3 A -- three different water bodies.

4 So I did go back and -- and check our multimedia  
5 model, the original calculations, and confirmed that  
6 the reason for that -- and I -- I looked at thallium in  
7 particular and -- and lead as well. And in the case of  
8 thallium, the predicted exposures was -- were almost  
9 entirely arising from fruit and berry ingestion; in the  
10 case of lead, it was dominated by the soil ingestion.  
11 And that's why the hazards weren't different between  
12 the different water bodies for these substances.

13 Q Okay. Thank you for that clarification, Mr. Mitchell.

14 THE CHAIR: So let's get an undertaking  
15 number for that previous undertaking we were just  
16 discussing.

17 MS. UTTING: Mr. Chair, Tracy Utting, Panel  
18 manager. That would be Undertaking Number 27.

19 THE CHAIR: Okay. Thank you.

20 Q THE CHAIR: Okay. And thank you for your  
21 cooperation on that, Mr. Houston and Mr. Mitchell.

22 A MR. HOUSTON: Thank you, Mr. Chair.

23 Q Okay. So now we're going to change topics a little  
24 bit, and I'm going to be asking some questions about  
25 coal dust.

26 So risk from chronic exposure to coal dust was

1 assessed using a toxicity reference value for PM 4.  
2 All three locations where the hazard quotients were  
3 greater than 0.2 were within or at the mine permit  
4 boundary. Benga concluded that the potential risk of  
5 adverse health effects caused by chronic exposures to  
6 coal dust was negligible. This conclusion was based  
7 upon the use of a toxicity reference value for PM 4,  
8 restricted access to locations where predicted hazard  
9 quotients were greater than 0.2, and the fact that all  
10 predicted hazard quotients were less than 1, except for  
11 a location at the pit boundary. And I do have  
12 references for all those if you want to check any of  
13 them.

14 Benga states that: (as read)  
15 Changes in particulate matter, including  
16 PM 10, PM 2.5, and total suspended  
17 particulates can result in effects which  
18 include nuisance effects. Sources include  
19 fugitive dust emissions from mine vehicles,  
20 coal processing, and soil and coal handling.  
21 Benga is committed to a number of dust  
22 mitigation measures which are summarized in  
23 CIAR 360, Table 2-1, on PDF page 85. These  
24 measures focus on mitigation of road dust as  
25 well as dust generation from coal handling  
26 and rail loadout. Benga also commits to

1            progressive reclamation and revegetation to  
2            reduce windblown fugitive dust.

3            So the question -- first question is: Given that coal  
4            dust is a complex mixture of contaminants of potential  
5            concern associated with a wide range of particle sizes,  
6            how is the use of PM 10 as a surrogate for exposure and  
7            a toxicity reference value for PM 4 justified?

8            A    MR. MITCHELL:            Well, to be clear, while we --  
9            while we -- while we looked at coal dust using the --  
10           the PM 4 toxicity value and the PM 10 concentrations,  
11           we did also look at the individual constituents of the  
12           coal dust, including the polycyclic aromatic  
13           hydrocarbons and the metals, as well as looking at  
14           the -- you know, the PM 2.5 and the PM 10 data. So we  
15           kind of used multiple different lines of approach to  
16           look at coal dust rather than just treating it as a  
17           single number.

18           Q    Okay. Thank you.

19                    What is Benga's understanding of the current  
20           scientific opinion expressed in the peer-reviewed  
21           scientific literature regarding the appropriate  
22           surrogates for coal dust toxicity and risk,  
23           particularly to sensitive subpopulations?

24           A    Just give me a moment. I'll talk with one of our  
25           toxicologists on that.

26           Q    Sure.



1 A So we -- we didn't take a -- a surrogate on the --  
2 approach on the basis that a single surrogate was  
3 unlikely to capture the complexity of the -- of the  
4 matter. So, again, we used a value that was, you know,  
5 the best available number we could get for coal dust  
6 itself, but we also did look at all the individual  
7 constituents, including the polycyclic aromatic  
8 hydrocarbons, and, you know, we do -- we do have data  
9 to suggest that some of those constituents are likely  
10 to be of low bioavailability when associated with coal  
11 specifically, but, you know, we still looked at the  
12 calculations without trying to adjust that  
13 bioavailability down.

14 So the -- and the -- you know, again, for  
15 reference, there -- there is a tox profile for coal  
16 dust that was put into this report. It was in CIAR  
17 251, PDF page 665.

18 Q Sorry, Mr. Mitchell, did you want to pull that up or  
19 was that -- was that the end?

20 A (INDISCERNIBLE - OVERLAPPING SPEAKERS) I don't think I  
21 need to. I was really just pointing out that there is  
22 a -- an -- an assessment that sort of summarized the --  
23 the state of the data as -- as we understood it when we  
24 were doing this risk assessment, but, again, we didn't  
25 use a single surrogate but, rather, looked at the coal  
26 dust as a single substance but also considered the

1 other constituents as well.

2 Q Okay. Thank you for that, Mr. Mitchell.

3 So I think this just follows on from what you were  
4 just telling me, but is Benga confident that the  
5 toxicological risk associated with chronic exposure to  
6 coal dust has not been underestimated, and, if so, why?

7 A Again, I think to the -- you know, the -- the current  
8 state of the science and what -- and, in particular,  
9 the -- sort of the authoritative reviews and the  
10 regulatory reviews, we think we have assessed this  
11 conservatively, and, again, not -- because we did not  
12 just assess coal dust as a single substance but also  
13 looked at the pH, the metals, the smaller particulates,  
14 and got that -- got that big picture, so -- and -- and  
15 when you sort of combine in -- you know, the  
16 conservatism in the air modelling and the assumptions  
17 that go into that, I think we're confident that we've  
18 been protective.

19 Q Okay. Thank you, Mr. Mitchell. Just a minute.

20 Is your confidence based at all upon reviews of  
21 epidemiological evidence, such as that presented or  
22 referenced by the Livingstone Landowners Group?

23 A We -- we did look at epidemiological evidence, and  
24 that -- that feeds into all -- I mean, the -- the  
25 actual toxicity limits that we select are ones that  
26 have been, you know, developed or approved by -- by

1 regulators, but, you know, in the -- in the case of the  
2 epidemiological study that had been presented earlier,  
3 that -- that study actually concluded that they  
4 couldn't conclusively establish any health effects.

5 The challenge with the epidemiological studies is  
6 that there are, you know, often a lack -- a lack of  
7 controls, lack of accurate measurement of exposure.  
8 Different circumstances are different for different  
9 people, and the populations themselves are different,  
10 so there's things like differences in diet and genetics  
11 and the like that also affect a lot of the end points.

12 So, you know, the -- the conclusion of the  
13 particular study that had been referenced earlier was  
14 really that they -- they couldn't actually come up with  
15 a conclusive determination of -- of health effects  
16 because of those compounders and biases in the data,  
17 but we certainly do look at that as well.

18 Q Okay. Thank you, Mr. Mitchell.

19 Why did Benga not include an assessment of the  
20 nuisance effects of coal dust on health?

21 A MR. HOUSTON: Mr. Chair, nuisance effects of  
22 coal dust, are -- are -- are you referring to -- I  
23 don't know -- some kind of psychological effect on --  
24 on health?

25 Q Yeah. So let me -- let me -- I'll put that in my  
26 follow-up question to you, and that might help as well.

1 So is Benga aware of any published scientific  
2 literature on the nuisance effects of coal dust on  
3 human health?

4 And as you were kind of getting into, Mr. Houston,  
5 that could be a range of things that could be, you  
6 know, mental effects related to, you know, anxiety  
7 and -- and all of that that potentially manifest into  
8 physical effects as well.

9 So I was just curious as to what Benga -- first of  
10 all, why Benga didn't really talk about this issue in  
11 their assessment and, secondarily, what you know about  
12 what the literature currently says about these kinds of  
13 effects.

14 A So I'm not a human health specialist, Mr. Chair, but we  
15 did talk about a report that was done in Sparwood. I  
16 think it was Friday. Anyway, late last week we talked  
17 about a -- a kind of follow-up study that had been done  
18 by the community of Sparwood, funded by Teck, after  
19 having built four mines in -- in the region. And I  
20 recall in that study that qualitatively, coal dust or  
21 dust was a primary concern for the residents. And --  
22 and I'm not -- not sure of the psychological value of  
23 that, but certainly from a social concern level,  
24 that -- that was top of mind for the people in that  
25 community.

26 What we have offered, first of all, is a suite of

1 mitigation measures to -- to keep dust and coal dust  
2 down to levels that are acceptable, but, also, we've --  
3 we've committed to a community committee that would try  
4 to address these issues up front and -- and get them on  
5 the table early in the project so that if -- if there  
6 are impacts or perceived impacts due to coal dust, that  
7 those would be addressed between the company and -- and  
8 the community, and -- and we would also look to the  
9 community to help us identify potential solutions to  
10 some of those issues.

11 So I -- I think it is an issue in Sparwood. I  
12 don't know to what extent that affects health, but I --  
13 I can imagine that there is some impact at some level.  
14 Our -- our intent is to mitigate and to keep an open  
15 dialogue with the community to -- to identify if  
16 we're -- if we're going offtrack in that area.

17 Q Okay. Thanks for that, Mr. Houston.

18 Mr. Mitchell, are you aware of any kind of  
19 published scientific literature on this topic?

20 A MR. MITCHELL: I haven't personally looked at  
21 that topic. I can certainly talk to some of our dust  
22 experts what -- what their familiarity is, but --

23 Q That's fine. I was just interested in your  
24 perspective.

25 A No. I mean, I -- I think our -- our risk assessment  
26 was focused on the -- the -- the -- sort of the

1 physical toxicity side of things, and when it comes to  
2 nuisance, I don't claim expertise on nuisance, but I  
3 think nuisance can vary between different people, so  
4 it's a little bit trickier to assess, aside from  
5 looking at is dust concentration going to increase  
6 substantially over background based on the air  
7 modelling.

8 Q Okay. Thank you.

9 This is probably more for you, Mr. Houston, but  
10 what are the primary causes of conditions which may  
11 cause coal dust incidents and community complaints?  
12 And when you're providing your response, maybe you can  
13 think about operational conditions as well as  
14 weather-related conditions.

15 A MR. HOUSTON: Well, as you know, Mr. Chair,  
16 we've proposed -- and when we talk about the community,  
17 I'm thinking primarily of the -- the townsite. So in  
18 terms of the operation, we've proposed a cladded  
19 rail-loading structure. We've proposed a covered  
20 conveyer. We've proposed to top the railcars with a  
21 lacquer to keep dust from blowing about. And -- and so  
22 those -- those are some of the primary mitigations in  
23 the coal-handling, directly, facility.

24 So outside of an upset, and -- and by that, I mean  
25 coal, for some reason, spilling outside of that  
26 contained system, I would think those -- those measures

1           should be fairly -- fairly suitable and -- and should  
2           deliver the results.  If there were an upset, of  
3           course, it would depend upon our emergency response  
4           procedures to get in there early, clean it up, and --  
5           and get back to normal operation.

6           Aside from all of that, my understanding is that  
7           one of the primary causes of spread of coal dust is  
8           vehicular traffic that is on the mine and off the mine  
9           and -- and tracking dust down the road, which  
10          eventually gets everywhere.  And -- and so we've  
11          proposed two measures to mitigate that.  One -- one is  
12          that we'll try to keep vehicles in the mine, in the  
13          mine and vehicles not in the mine parked off-site.  So  
14          that -- that will help to minimize, to -- to a large  
15          extent, any dust being tracked down the road.

16          The other is we'll have a wash bay at the site, at  
17          the mine, and the intent there would be to wash  
18          equipment before it comes out of there to ensure that  
19          not only coal dust but weed seeds aren't -- aren't  
20          spread into the community.

21    Q       So in addition to traffic tracking from vehicles, are  
22           there other, kind of, operational issues that might  
23           require an unusually high amount of dust, or -- or is  
24           the tracking of vehicles the only one that you can kind  
25           of think of?

26    A       The only normal part of the operation that -- that I

1 can think of, Mr. Chair, that would -- would tend to  
2 track dust into the community. That -- that's -- yeah,  
3 I can't think of others.

4 Q Okay. Based on the experience of operating mines that  
5 you may be familiar with, do dust complaints received  
6 from the public generally correlate well with PM 2.5 or  
7 PM 10 monitoring data?

8 A I -- I can't really comment on that, Mr. Chair. I  
9 don't know.

10 Mr. Rudolph, do you have any thoughts on -- on  
11 that one?

12 A MR. RUDOLPH: I -- I've had some experience  
13 in other northern mines, I guess, in Alberta -- not  
14 northern mines, but mountain mines. And there, I  
15 think, complaints correlate relatively well with --  
16 with PM 10 monitoring which is conducted in there. I  
17 don't remember if TSP was -- is actually measured there  
18 or not. They do also correlate with -- with dustfall  
19 measurements as well. In my experience, though, PM 2.5  
20 isn't always the -- the right parameter for comparing  
21 monitor data to -- to community complaints.

22 Q Okay. Thank you, Mr. Rudolph.

23 Okay. I'm going to change topics a little bit  
24 away from dust. Again, back to this issue of  
25 conservatism in the health risk assessment. So Benga  
26 concluded that emissions from the project are not



1 predicted to pose a risk of adverse health effects at  
2 locations accessible to the general public. Benga  
3 acknowledged that hazard quotients greater than 1 were  
4 predicted; however, Benga noted that the hazard  
5 quotients greater than 1 typically occur within the  
6 mine permit boundary in an area with restricted road  
7 access and low likelihood of continuous public presence  
8 during construction and operations of the mine or were  
9 due to pre-existing baseline emissions or background  
10 concentrations with minimal contributions from the  
11 project or were a result of the conservatism built into  
12 the assessment, air-dispersion models, and derivation  
13 of water concentrations.

14 Benga stated that the predicted risks to human  
15 health from exposure to the end-pit lake were within  
16 acceptable limits in most cases; however, hazard  
17 quotients associated with the project's contributions  
18 from the end-pit high walls to surface water were a  
19 substantial contributor to the application hazard  
20 quotients results.

21 Benga stated that given consideration of  
22 apportionment to drinking water and the margins of  
23 safety built into the human health risk assessment, the  
24 results of the human health risk assessment are not  
25 considered indicative of a human health concern;  
26 however, management considerations of the EPL are

1 warranted, and actual measured concentrations at the  
2 time of EPL creation should be used to revisit the  
3 human health risk assessment.

4 So the first question: Could Benga comment on the  
5 overall level of conservatism and accompanying margins  
6 of safety in the health risk assessment having regard  
7 for the issues we've discussed so far, including some  
8 of the earlier calculation errors in the derivation of  
9 water concentrations of contaminants of potential  
10 concern, the use of predicted water concentrations  
11 produced by earlier modelling which are lower than  
12 produced by updated modelling, the degree to which  
13 predicted project air and water concentrations may  
14 exceed baseline concentrations for some contaminants of  
15 potential concern, the screening out of the  
16 groundwater -- some groundwater pathways, and the  
17 uncertainty inherent in the assessment of health  
18 effects of coal dust as a complex mixture, including  
19 consideration of the effects of nuisance dust levels on  
20 health?

21 So, again, looking for a comment on your  
22 confidence in the overall level of conservatism in the  
23 health risk assessment having regard for those things.

24 A MR. HOUSTON: That was a really long  
25 question, Mr. Chair.

26 Q It was. I apologize for that.

1 A So I -- I may be able to speak for a minute here, and  
2 then I'll ask Mr. Mitchell to -- to chime in.

3 To a large extent, we've used conservative  
4 modelling to predict the presence of chemicals of  
5 potential concern or contaminants of potential concern  
6 in both the water and the air. We were talking about  
7 the end-pit lake earlier and -- and the concentrations.

8 I've found out over the lunch hour, Mr. Chair,  
9 that the level of selenium and other chemicals in the  
10 end-pit lake, for example, were based on an assumption  
11 that 2 metres of the wall that forms the end-pit lake  
12 is -- is actively leaching. And, you know, that -- as  
13 an example, that -- that evidently is not true. It's  
14 not broken rock. It's solid rock. And so it won't  
15 have the surface area that rock in the ex-pit dumps  
16 does, for example.

17 And so when we look at the end-pit lake and the  
18 concentrations that we've predicted there, we clearly  
19 have taken a very conservative approach. We don't  
20 expect to -- to see that level of contaminant in the  
21 end-pit lake. Nonetheless, we've run our human health  
22 risk assessment on that end-pit lake. We've assumed  
23 that somebody drinks water out of the end-pit lake  
24 every day. Again, that is super conservative -- I -- I  
25 can understand somebody camping beside the lake and  
26 drinking water for a week, for example, but -- but to

1 drink water every day out of the end-pit lake, that's  
2 clearly a very, very conservative assumption.

3 And those are the same assumptions we've made for  
4 Blairmore Creek or Gold Creek, that somebody is  
5 drinking water untreated out of one of those creeks  
6 every day of their life.

7 The -- the same is true for the air vectors. And  
8 as Mr. Mitchell has pointed out, air -- we're -- we're  
9 assuming that somebody's breathing that air  
10 consistently over a long period of time or somebody is  
11 eating vegetation that the dust has fallen on, for  
12 example, from an area next to the -- the mining  
13 operation, and they're doing that repeatedly over a  
14 consistent period of time.

15 Those are all really conservative assumptions, not  
16 even realistic assumptions, in -- in my opinion. And  
17 so it's -- it's that kind of conservatism that gives us  
18 a high degree of confidence in what we've done.

19 So, Mr. Mitchell, I'd -- I'd invite you to chip in  
20 here, and if I've misconstrued anything, be -- be sure  
21 to correct me on the record.

22 A MR. MITCHELL: Thank you, Mr. Houston.

23 I -- Mr. Chair, I think Mr. Houston has  
24 summarized, you know, at least a few of the key areas  
25 where conservatism is built into the process, such as  
26 on -- on the water side, for example, assuming that the

1 water is somebody's, you know, sole source of drinking  
2 water over a chronic or possibly lifetime period of  
3 time. And, you know, another element is we -- we  
4 really tried to closely follow approved regulatory  
5 procedures or -- or approved -- or Health Canada  
6 methodologies that, again, we know have defensibility  
7 and conservatism built into them specifically for  
8 that -- that -- that same purpose.

9       Again, we've assumed for inhalation -- we looked  
10 at both short-term and long-term exposures. And those  
11 long-term exposures assume that somebody has been  
12 breathing air from a certain location over a very long  
13 period of time, years to -- to a lifetime. The acute  
14 exposures are assessed and using toxicity reference  
15 values that are protective of sensitive populations.  
16 For example, some of them have considered things like  
17 effects on an asthmatic who's undertaking heavy  
18 exercise and having, you know, effects on their lung --  
19 lung capacity. They are reversible and temporary, but  
20 we still want to make sure that we protect against that  
21 level of effect.

22       So there is -- there's sort of multiple levels of  
23 conservatism that are built into the risk assessment  
24 process throughout it, particularly following the  
25 methodologies that have been established by Health  
26 Canada and other -- other regulatory agencies and using

1 the toxicity limits that have been developed or  
2 endorsed by these agencies, which, again, are -- are  
3 levels at which -- you know, when we have exposure  
4 that's exceeding one of these -- these levels, it  
5 doesn't mean that there will be adverse effects,  
6 rather, there's conservatism built into these so that  
7 we're confident where we're under them, there won't be  
8 an adverse effect. So there's multiple levels of  
9 conservatism throughout.

10 And, you know, sometimes in risk assessment, we  
11 actually talk about a -- a -- a snowballing effect of  
12 conservatism where you have a conservatism -- a  
13 conservative assumption on one piece of the risk  
14 assessment that, in and of itself, is not unreasonable  
15 if it's within the realms of possibility, but then you  
16 add on another similar assumption on another aspect and  
17 a third aspect and a fourth aspect, and by the time you  
18 sort of combine all of these levels of conservatism  
19 in -- in some elements of the risk assessment,  
20 particularly around the multimedia model, we get  
21 conservatism on top of conservatism on top of  
22 conservatism. And a really high level of -- of  
23 protection gives us confidence that these levels are --  
24 that these predictions are conservative.

25 Q Okay. Thank you for that, Mr. -- Mr. Mitchell.

26 So having regard for those various levels of

1 conservatism that, as you say, can snowball, if you are  
2 approaching a hazard quotient of 0.2 or 1, what would  
3 your view be as to the overall level of conservatism,  
4 you know, in terms of magnitude? Like, are we talking,  
5 you know, those risk calculations are, you know, ten  
6 times, you know, what it's likely to be, five times, or  
7 is it a question you can even answer?

8 A It really depends on what aspect of the risk assessment  
9 we're talking about because some aspects have more  
10 levels of conservatism built in than others. And, you  
11 know, some of the water pathways or the multimedia  
12 exposure pathways, for example, have, you know,  
13 multiple calculations that have conservatism built into  
14 them, and, you know, the -- you know, a -- a predicted  
15 hazard of .2 or point -- or 1 would trigger us to more  
16 look at, you know, just how much conservatism is built  
17 into there. Is it -- is it a -- is it reasonable or  
18 not? But I don't think you can put a -- you know, a  
19 universal number that it's always five times or ten  
20 times.

21 When we get to the air side, you know the -- the  
22 side that's done on the risk assessment is maybe a  
23 little bit more straightforward 'cause it's really just  
24 based on toxicity limits and the air modelling. And,  
25 perhaps, you know, Mr. Rudolph can comment more on the  
26 level of conservatism that's built into the -- the air

1           modelling. But it -- but, again, we know that as long  
2           as we have a concentration in air that we're starting  
3           with that's a -- that's an upper bound and we're using  
4           a toxicity limit that has protection built into it to  
5           ensure that we're confident there won't be an adverse  
6           effect as long as we're under that, that we've got a --  
7           we've got a high level of conservatism. Again, I can't  
8           put a number on it -- is it -- is it five times, or is  
9           it ten times -- because some of these limits have  
10          uncertainty associated with them, and that's why we  
11          have these safety levels built into them, is to make  
12          sure that we're protective of that uncertainty.

13        Q    Okay. Thank you, Mr. Mitchell.

14                    Okay. Going to move on to something we did talk  
15                    about briefly already. So in CIAR 313, PDF page 1275,  
16                    Benga states that: (as read)

17                            Management considerations for the end-pit  
18                            lake are warranted, and actual measured  
19                            concentrations at the time of EPL creation  
20                            should be used to revisit the human health  
21                            risk assessment.

22                    And, Mr. Houston, you spoke to this a little bit  
23                    earlier.

24                            But what specific types of management  
25                            considerations or actions might be necessary to manage  
26                            risk to human or wildlife health?



1 A MR. HOUSTON: I -- I think that, you know,  
2 the key here is the leaching of chemical -- chemicals  
3 of potential concern in -- into the end-pit lake water.  
4 And I -- I think, first of all, we're going to learn a  
5 lot as we go through the mining based on our experience  
6 with the ex-pit dumps and based on a better  
7 understanding of the -- the -- the quality of the rocks  
8 that we're -- we're working with.

9 As I mentioned just now, the end-pit lake  
10 concentrations are based on leaching from 2 metres'  
11 thick of pit wall -- end -- end-pit lake wall in --  
12 into the water, which -- which is not really -- which  
13 is a very conservative assumption, considering that  
14 that would generally not be fractured rock.

15 Some of the things that we -- we may want to  
16 consider when we do the end-pit lake design is -- is,  
17 first of all, what is the quality of the rock where the  
18 end-pit lake will be? And if there are areas that  
19 potentially have a higher propensity to -- to leach  
20 into the water, is there something we can do to provide  
21 a -- a sealing surface or something to -- to minimize  
22 that? Or can we physically move the end-pit lake to --  
23 to a slightly different location to avoid some of  
24 those -- those things? So I -- I -- I -- again,  
25 it's -- it's difficult to provide specific answers  
26 until we understand what the specific concern is with a

1 design of the end-pit lake.

2 Q Okay. Thank you, Mr. Houston.

3 So your overall conclusion regarding no adverse  
4 effects on health -- on human health is for the  
5 construction and operation periods. What is your  
6 overall conclusion regarding the risk of adverse  
7 effects on health in the postclosure period, including  
8 but not limited to the exposure to the end-pit lake,  
9 and what's the basis for that conclusion?

10 A Again, we're -- we're going to have to defer, to a  
11 certain extent, a discussion around the end-pit lake.  
12 I think we were talking in a previous session that  
13 designing the end-pit lake a decade or 15 years out  
14 from when it's actually going to be formed is -- is  
15 probably of -- the appropriate time frame. And doing  
16 that design based on experience that we've gained  
17 through a pilot project, for example, to -- to assess  
18 in more detail the -- the potential for leaching of --  
19 of chemicals of potential concern into the end-pit  
20 lake.

21 So our intent would be to design an end-pit lake  
22 that eventually could be given over to multiple  
23 unsupervised uses, let me say. And -- and that would  
24 be the intent of that design process. A suboptimal  
25 solution, I would say, is -- is if somehow the use of  
26 the end-pit lake had to be restricted post --

1 postclosure, but that -- that is another alternative.

2 Q Okay. Thank you, Mr. Houston. I might have narrowed  
3 your answer a little unnecessarily there by my  
4 reference to the end-pit lake.

5 The water quality of Blairmore Creek is also  
6 expected to not return to baseline for a prolonged  
7 period after the project ends. With respect to human  
8 health risk associated with Blairmore Creek, are you  
9 similarly confident that -- that there won't be an  
10 unacceptable risk to human health?

11 A So the evaluation we've done for the operating phase  
12 would -- would apply through to the post --  
13 post-operation phase. We would be monitoring water  
14 quality in Blairmore Creek, and we would be responsible  
15 for treating water through the SBZ and the other water  
16 management structures until it was demonstrated that  
17 the site was able to be -- be left to -- to manage  
18 itself.

19 So monitoring would continue for the long-term.  
20 The health effects that we've analyzed for the  
21 operating phase would -- would also apply in the  
22 long-term if the water quality was -- remained the same  
23 or -- or better than during the operations phase.

24 Q Okay. Thank you.

25 So I do have some questions on monitoring in  
26 follow-up, so I'll kind of turn to those now.

1           So Benga's proposed aquatic monitoring plan  
2 doesn't make explicit reference to inclusion of  
3 contaminants of potential concern to human health nor  
4 does it include reference to drinking water quality  
5 guidelines.

6           Benga's proposed air quality monitoring and  
7 adaptive management plan references several  
8 regulations, many of which do incorporate protection of  
9 human health. Benga's proposed monitoring program  
10 focuses on fugitive dust, nitrogen oxides emissions,  
11 and PM 2.5 emissions.

12           Benga has committed to continuous monitoring of  
13 ambient air quality near the eastern edge of the mine  
14 lease and in Blairmore near the loadout facility and  
15 recommends the use of indicative monitoring rather than  
16 traditional regulatory monitoring at both sites.

17           Benga's proposed groundwater monitoring program  
18 will focus on the shallow to intermediate groundwater  
19 systems that have the potential to discharge near or  
20 into surface water receptors, including Blairmore Creek  
21 and Gold Creek. One set of monitoring wells to be  
22 installed have proposed locations which are similar to  
23 those proposed for the surface water monitoring plan as  
24 part of an integrated groundwater and surface water  
25 monitoring program. Water samples will be collected  
26 from toe springs associated with drainage from rock

1 dump areas as well.

2 So just a couple of questions. What is Benga's  
3 view of a potential condition of approval to monitor  
4 contaminants of potential concern in country foods if  
5 concentrations in air and water are shown to be  
6 increasing and approaching air or water quality  
7 guidelines related to human health?

8 A I -- I think that would be reasonable, Mr. Chair.  
9 Our -- our expectation, because of the conservative  
10 nature of our modelling to date, is that when we  
11 monitor the air quality and the -- the water quality,  
12 that we're going to be within the envelope we've --  
13 we've -- we've drawn in our application.

14 If -- if that were not the case, we -- we would  
15 expect that additional investigation into the source on  
16 the one hand to identify additional mitigation but also  
17 additional work on the monitoring side or the -- and,  
18 as you suggested, country foods monitoring, that --  
19 that would also be appropriate. I -- I'm not quite  
20 sure what that looks like, to be honest, Mr. Chair,  
21 and -- and how frequently it would be done. I would  
22 expect something like an annual program based on  
23 seasons, but I -- I think that would be appropriate.

24 Q Okay. And what constraints and challenges might Benga  
25 face if such a condition were included?

26 A To monitor country foods if we exceeded our air quality

1 guideline, that's --

2 Q Yeah.

3 A Yeah.

4 Q If contaminant levels were approaching health-based  
5 limits.

6 A Again, I -- I -- I'm not sure what constraints there  
7 would be on monitoring. We would need access to the --  
8 the -- the food -- the country-based foods that we were  
9 monitoring. So access on the land to gather would be a  
10 constraint, I -- I suppose. I can't think of anything  
11 else, Mr. Chair. Our -- our -- I -- I can tell you  
12 our -- our primary focus would be on additional  
13 mitigative measures to get us out of that situation  
14 if -- if we found ourselves there.

15 Q Okay. Thank you.

16 And would Indigenous communities be invited to  
17 participate in that type of monitoring, and would Benga  
18 pay for their participation -- well, pay for that  
19 monitoring?

20 A We -- we've already committed to pay for an  
21 Indigenous-based monitoring program, and -- and that  
22 would be directed by the Indigenous communities, but  
23 I -- I think it would be natural to include a component  
24 in that program to monitor country-based foods.

25 Q Okay. And what is Benga's view of a potential  
26 condition to increase the frequency and/or spatial

1 extent of monitoring when contaminants of potential  
2 concern are found at levels approaching or exceeding  
3 federal or provincial drinking water or air quality  
4 guidelines or risk-based benchmarks in order to confirm  
5 exceedances and in support of adaptive management?

6 A Would we agree to a condition that required us to  
7 double down on our monitoring or add to our monitoring  
8 program should we find ourselves close to limits?

9 Q Yes.

10 A Again, it's not very specific, but I can understand  
11 that additional monitoring might be a reasonable thing  
12 to do under those circumstances.

13 Q Okay. Thank you.

14 Given that background concentrations of some  
15 contaminants of potential concern already exceed  
16 drinking water quality or air quality guidelines, is  
17 Benga confident that there is a sufficient  
18 understanding of natural variability of background  
19 concentrations to distinguish project-related  
20 contributions from background contributions?

21 A When we're discussing water, Mr. Chair, I -- I would  
22 think that we would distinguish background from -- from  
23 project-related contributions simply by looking  
24 upstream of the project-affected zone and looking at  
25 water quality upstream as compared to water quality  
26 downstream of the project. I -- I would think that

1 would be the best way to differentiate between natural  
2 variability and -- and project-affected contamination.

3 Q And what about for air?

4 A Again, I -- I think that looking outside of -- of the  
5 immediate area of the project and -- and comparing air  
6 quality at some distance to air quality closer to the  
7 project would give us a good reference point.

8 Q Does Benga intend to collect additional baseline data  
9 before construction and operations commence to increase  
10 knowledge of air, surface, water, and groundwater  
11 baseline conditions and natural variability?

12 A We are -- we are continuing our air-monitoring program  
13 at Blairmore, and so that will continue, and continue  
14 right through the construction and into operations,  
15 that -- that particular station. We have done some  
16 dust collection monitoring closer to the site, and  
17 that's -- that's provided us with some baseline, but  
18 we'll continue to do -- to do that work.

19 In terms of water quality, we have taken spot  
20 samples, and we will continue to take spot samples of  
21 water quality up to and -- and right through operations  
22 and construction. So we -- we are collecting data,  
23 Mr. Chair, and we will continue to do so.

24 Q Okay. Thank you.

25 A MR. RUDOLPH: Mr. Chair, it's Mr. Rudolph.

26 Perhaps I could just add to what -- what



1 Mr. Houston said and specifically with respect to  
2 background monitoring. We -- we -- we are collecting  
3 continuous data at the -- at the monitoring site in  
4 Blairmore at this time, and I think the -- frankly, the  
5 easiest way and the best way to look at the effect of  
6 the project differentiated from background is simply to  
7 look at the data by wind direction. So at that current  
8 site, if that's what's chosen, you know, when winds are  
9 coming from the westerly portion, that will include a  
10 project effect. If it's coming from the southeast up  
11 the valley, that would be indicative of background at  
12 that location. So I don't think a -- a separate site  
13 is necessary to collect background data.

14 Q Okay. Thank you, Mr. Rudolph.

15 Maybe just a follow-up question for you,  
16 Mr. Rudolph. Can you comment on the available methods  
17 for monitoring levels of nuisance dust that don't rely  
18 on PM 10 or PM 2.5? I think earlier you spoke about  
19 dustfall monitoring. Does that serve that purpose, or  
20 is there -- are there other methods?

21 A Well, it's -- it's definitely a low-tech method, but it  
22 is, actually, I think, the most reflective of nuisance  
23 dust that is currently done. I -- I don't believe that  
24 PM 2.5 or PM 10 or even TSP really are -- collect large  
25 enough particle sizes that -- that reflect on the  
26 nuisance portion of the -- of the dust.

1           All of those -- all of the dust that we see -- the  
2 TSP is about 30 microns or so and smaller, and that is,  
3 you know, essentially invisible and perhaps would be  
4 visible if it collected on a surface, but it's pretty  
5 small to be termed "nuisance dust". I think dustfall  
6 is probably a better way of measuring it, actually.

7 Q   Okay. Thank you.

8           So just returning to something I asked about  
9 earlier. Does Benga think there is merit in attempting  
10 to correlate community dust complaints with  
11 dust-monitoring data, whether it's PM 10, 2.5, total  
12 suspended particulates, or dustfall, total dustfall?  
13 And if not, why not?

14 A   MR. HOUSTON:           I -- I -- I think there is  
15 merit, Mr. Chair, and -- and we have been collecting  
16 dustfall data at various points for some years now. So  
17 we would continue to do that, and -- and certainly it  
18 would be an interesting point of reference if there  
19 were complaints to -- to try to understand why those  
20 complaints are arising and if -- if they're based on  
21 actual increases in dust or just a perception of  
22 increase in dust. So I -- I think it's important to  
23 have that bit of evidence when you're -- when you're  
24 dealing with a complaint.

25 Q   Okay. Thank you, Mr. Houston.

26           Okay. I'm going to turn to some questions around

1 cumulative effects related to health. So Benga stated  
2 that people are potentially exposed to both individual  
3 chemicals and chemical mixtures originating from  
4 chronic inhalation exposure as well as multimedia  
5 exposure, so oral and dermal exposure. Benga goes on  
6 to state that additive risk is more -- is more than a  
7 chemical-by-chemical evaluation and specifically  
8 evaluates the potential for human health risk due to  
9 cumulative exposure to all COPCs from all pathways,  
10 including water-based pathways.

11 Benga stated that HQ and cumulative incremental  
12 lifetime cancer risk results were calculated assuming  
13 Indigenous receptor characteristics because they  
14 represent the most sensitive receptor group based on  
15 their assumed lifetime exposure within the LSA and RSA,  
16 and a higher assumed ingestion rate of traditional and  
17 country foods, such as local fish, wild game, and  
18 vegetation, than other receptor groups.

19 Benga explained that HQs and cumulative  
20 incremental lifetime cancer risk values for all other  
21 receptors at the same locations would inherently be  
22 lower. It was conservatively assumed that an  
23 Indigenous person would live and harvest food from all  
24 the human health risk assessment receptor locations,  
25 including the locations along the edge of the pit.

26 In CIAR 313 on PDF page 1272, Benga concluded that

1 when combined hazard quotients results for  
2 multimedia -- i.e., oral and dermal -- and chronic  
3 inhalation exposure routes with similar critical  
4 effects pathways, such as liver and kidney, were  
5 assessed, no change in predicted risks was predicted.

6 The Piikani Nation stated that Elders have been  
7 experiencing lung problems recently, with many  
8 resulting health issues. They said they are already  
9 experiencing this from other projects, including Turner  
10 Valley and the gas wells, related to the westerly wind  
11 from the mountains to the plains.

12 Jillian Lawson stated that inversions can trap  
13 contaminants for several days, allowing for the  
14 accumulation of particulate matter, sulphur oxides,  
15 nitrogen oxides, and other coal dust pollutants.  
16 Ms. Lawson expressed skepticism regarding coal dust  
17 being effectively mitigated, given limited water  
18 supplies for dust mitigation, low rainfall, limited  
19 snow cover, and drying winds.

20 So the question is: Given the naturally high  
21 background concentrations of some contaminants of  
22 potential concern, such as nitrogen oxides and dust in  
23 air, and aluminum, barium, cadmium, copper, lead,  
24 manganese, thallium, and zinc in water, the prevailing  
25 wind directions and other anthropogenic sources of  
26 contaminants, what is the likelihood that

1 simultaneously multimedia exposure to multiple  
2 contaminants will result in a measurable increase and  
3 risks to human health, particularly in sensitive  
4 subpopulations?

5 So, again, apology for the long question. I can  
6 repeat it if needed.

7 A MR. MITCHELL: A -- a complicated question,  
8 and, if you don't mind, I'll maybe take a quick moment  
9 to caucus with a couple of my peers, Mr. Chair.

10 Q Sure.

11 A MR. RUDOLPH: Mr. Chair, it's Mr. Rudolph.

12 Perhaps I could start off just by talking about  
13 some of the -- the issues relating to the air quality  
14 side. And, again, to -- you know, the -- the  
15 information that we present in the air quality  
16 assessment is based on the -- a combination of the --  
17 you know, the worst-case -- worst-case emissions and  
18 the worst-cased -- worst-case meteorology.

19 So to the extent that in our five-year data set  
20 those conditions occur simultaneously, they've been  
21 captured in our air quality assessment. And those are  
22 the -- that's the information that gets fed into the  
23 health risk assessment. So, again, to the extent that  
24 they occur at any time and not necessarily the dust at  
25 the same time as the NO<sub>2</sub>, for example, and to the  
26 extent that we've captured any upwind sources in our

1 background concentrations that we add to our modelling  
2 results, that -- that information is already captured  
3 in our assessment and in the information that goes into  
4 the health risk assessment.

5 Q Okay. Thank you, Mr. Rudolph.

6 Mr. Mitchell?

7 A MR. MITCHELL: Yeah. So -- and hopefully I  
8 didn't lose the thread of your question, but I -- I  
9 think a lot of what we spoke to on the conservatism  
10 still applies here. And, you know, you referenced the  
11 high -- high background levels, and in a lot of cases,  
12 we predicted hazard quotients exceeding 0.2 or even 1  
13 from background levels. That doesn't always actually  
14 mean that a background level is high. Again, it's a --  
15 an indication of the conservatism that's built into  
16 some of these calculations and -- and assumptions.

17 And, again, where we're showing that the  
18 concentrations that are predicted are, you know, often  
19 small compared to background, again, that supports  
20 the -- you know, the -- the minimal effects of -- of  
21 the project. So, again, we look at these -- these --  
22 these multiple lines of conservatism, and then, you  
23 know, and you sort of refer to the -- I guess the  
24 cumulative effect of -- of multiple chemicals. And --  
25 and, again, we take the assumption that if the end  
26 point of the chemical is even similar -- not

1 necessarily the same, but even similar, that we -- that  
2 we add the effects together to, again, add another  
3 level of -- of conservatism, even -- even though, in  
4 reality, it may be, you know, a less than additive  
5 effect. So I think we're -- we're quite confident in  
6 the level of conservatism that was built into this --  
7 this risk assessment.

8 Q Okay. Thank you, Mr. Mitchell.

9 So I'd now like to ask some questions about the  
10 circumstances where airborne contaminants of potential  
11 concern would be most likely to approach or exceed  
12 human health risk thresholds, particularly with respect  
13 to more sensitive subsets of people, such as people  
14 with preexisting respiratory conditions that could be  
15 downwind of the mine but beyond the mine permit  
16 boundary.

17 So probably for you, Mr. Rudolph, but what  
18 specific meteorological conditions would create maximum  
19 exposure of sensitive individuals to nitrogen dioxide,  
20 total suspended particulates, PM 10, or PM 2.5?

21 A In our -- in our modelling study, it was generally the  
22 light wind conditions that allowed -- and -- and  
23 certainly it -- it may depend a bit on the location of  
24 the individual, but if -- individuals in the community  
25 of Blairmore, for example, that would be under the  
26 conditions of relatively light winds, stable

1 conditions, the kinds of conditions that might allow  
2 the emissions to flow down the mountain toward the --  
3 toward the community. There will -- there will be  
4 emissions -- high emissions -- higher emissions as well  
5 of dust during windy conditions, but that will also be  
6 diluted by the higher wind speeds.

7 Q Okay. Thank you.

8 The follow-up's probably more for Mr. Mitchell.  
9 So we note that Benga did not predict a risk of adverse  
10 health effects via chronic inhalation through additive  
11 contaminants of potential concern. Would any  
12 combination of contaminants of potential concern  
13 predicted to individually exceed a hazard quotient of  
14 0.2 for multimedia exposure be expected to produce  
15 synergistic effects on human health when sensitive  
16 subpopulations of people are exposed to a combination  
17 of contaminants, such as nitrogen dioxide, coal dust,  
18 PM 10, and diesel particulate matter due to a  
19 combination of project and nonproject sources?

20 A MR. MITCHELL: Yeah. So the -- the Health  
21 Canada recommendation is to look at these combined  
22 effects through an additive approach. There have been  
23 various studies done on when synergistic effects occur.  
24 And by "synergistic", we mean, you know, really, I  
25 guess the -- a greater than additive effect. I -- you  
26 know, I've read study -- or reviews that have been put



1 together by the European Commission and the -- and the  
2 OECD, for example, and generally the conclusion has  
3 been that at these sort of environmentally relevant  
4 levels of exposure that the -- that treated them  
5 additively -- additively as -- is -- is reasonable,  
6 that we're not really seeing, in most studies,  
7 synergistic effects that are much greater and additive  
8 at that sort of relatively low level of exposure.

9 And --

10 Q Are there --

11 A -- the -- the additional factors, like using the target  
12 hazard quotient of 0.2 to start with as well -- as well  
13 as the -- the conservative way that we treat things  
14 additively when they're even similar or not necessarily  
15 the same.

16 Q Okay. Do you think there are plausible mechanisms for  
17 synergistic effects of this combination of airborne  
18 COPCs?

19 A I'm -- I -- I don't know if a lot of these combinations  
20 have been studied in enough detail in terms of the  
21 mechanism. A lot -- a lot of the mechanisms that we're  
22 dealing with for the particulate and the nitrogen  
23 dioxide, for example, I -- I don't think so, but, you  
24 know, often where we see the synergistic effects is  
25 where the effects are not the -- you know, those --  
26 those lung effects or -- or respiratory effects, but,

1           rather, when they're actually absorbed into the body  
2           and being metabolized and interfering with metabolic  
3           pathways. So you -- you might expect to see that more  
4           from, for example, organic chemical exposures. But  
5           from the -- from the main drivers here, I don't think  
6           there's a lot of indication that I'm aware of of  
7           mechanisms for synergistic effects.

8       Q    Okay. Thank you, Mr. Mitchell.

9                       Turning now to waterborne multimedia exposure  
10            pathways where additive contaminants of potential  
11            concern would be most likely to approach or exceed  
12            human health risk thresholds. I'm going to ask you a  
13            few questions.

14                      In CIAR 313 on PDF page 1256, Benga presented the  
15            toxicity end point groups, which are COP -- the COPCs  
16            which act upon the same organ groups. These include  
17            several metals, as well as polycyclic aromatic  
18            hydrocarbons, such as fluoranthene, pyrene, and the  
19            benzoate pyrene group.

20                      Benga stated that: (as read)

21                      All contaminants of potential concern within  
22                      a toxicity group were assumed to have  
23                      additive toxicity irrespective of their  
24                      exposure route, inhalation, oral, or dermal.

25                      In Table 7.5 to 7.8 in CIAR 313, PDF pages 1270 to  
26                      1271, Benga presented predictive additive hazard

1 quotients and incremental lifetime cancer risk results  
2 by toxicity groups for oral and dermal exposure.

3 On PDF page 1271 of CIAR 313, Benga states that:  
4 (as read)

5 No additive results for the project were  
6 greater than 1.

7 Could Benga explain the basis for this statement, given  
8 that -- and this is a long question -- given that the  
9 application case hazard quotients for oral and dermal  
10 exposure to end-pit lake water presented in CIAR  
11 Table 7.5, CIAR PDF page 1270, not only exceeds 0.2 but  
12 also exceeded 1 for the liver, kidney, and reproductive  
13 toxicity groups, and that these HQs were greater than  
14 the baseline case, albeit by a small margin.

15 And the application case hazard quotients for oral  
16 and dermal exposure to Blairmore Creek and Gold Creek  
17 water -- I'll dispense with the reference unless you  
18 want it -- also exceed 1 for the liver, kidney, and  
19 reproductive toxicity groups, and that these HQs were  
20 greater than the baseline case, albeit by a small  
21 margin?

22 So I don't know if you followed that, but I can  
23 distill it down for you if -- if you need me to.

24 A I -- I think I -- I -- I followed that, and I -- I  
25 believe what our statement was that the combined HQ  
26 results for the project, so that would be that -- that

1 first column in those Tables 77 and 78, did not exceed  
2 1, and for the application case where there were hazard  
3 quotients greater than 1, they are almost entirely a  
4 result of the -- of the background multimedia exposure,  
5 so a relatively small contribution to the project.  
6 And, again, I think we're dealing -- we're dealing with  
7 hazard quotients of 3, 4, or 5 based on background. A  
8 lot of it is probably reflective of the conservatism  
9 that's built into these multimedia calculations.

10 Q Okay. So if -- I think I understood your answer. It's  
11 if I added -- if we added the two together, they would  
12 exceed 1, but you're attributing the exceedance  
13 primarily to background concentrations? Is that what I  
14 heard?

15 A Yes.

16 Q Okay. Okay. So that leads to the follow-up question.  
17 On PDF page 1271, CIAR 313, Benga states that:  
18 (as read)

19 Application case exceedances were driven  
20 almost entirely as a result of the baseline  
21 case and therefore were driven by background  
22 concentrations through oral (multimedia)  
23 exposure.

24 Given that predicted project-related concentrations of  
25 contaminants of potential concern in CIAR 313, PDF  
26 page 1310 are substantially higher than background

1 concentrations, including for toxicity group  
2 contaminants, does Benga consider that a change to its  
3 statement regarding exposure being driven by background  
4 is required?

5 A Just to make sure I understand your question,  
6 Mr. Chair, you're talking about because the water  
7 concentrations to the project case were significantly  
8 higher than background, does that change our  
9 interpretation?

10 Q Well, you just -- you previously said in the -- in  
11 Benga's submissions it says that, you know, a lot of  
12 those exceedances are driven by baseline  
13 concentrations, but when we look at that -- that table  
14 in CIAR 313 on page 1310, if I got my numbers right,  
15 what we see are concentrations that sometimes are up to  
16 an order of magnitude higher than background. So we're  
17 kind of asking about the statement that the application  
18 case exceedances are driven almost entirely by baseline  
19 concentrations. It seems like that may not be correct.  
20 But that's what we're asking your opinion on.

21 A Yeah. And -- and that's because the -- the water  
22 concentrations are very small contributed to the --  
23 contributor to those hazards. It's -- it's the same as  
24 the -- the question we had this morning that I answered  
25 after lunch --

26 Q Okay.

1 A -- within the thallium, for example, and found out that  
2 the exposure was almost entirely predicted to be  
3 through, you know, vegetation ingestion. And similarly  
4 with the -- some of the others, it's due to baseline  
5 concentrations in soil.

6 So the -- the concentrations in water are having a  
7 relatively small contribution to the total predicted  
8 risk, and that's, you know, why those project-related  
9 risks and hazards are -- are less than 1.

10 Q Yeah. One minute, please.

11 So the question is whether the calculation of  
12 water-based pathway contributions to additive risk and  
13 the conclusion related to that would change. So you  
14 talked about vegetation -- the vegetation pathway. Is  
15 that pathway dominated by airborne deposition or  
16 exposure?

17 A I -- I think the -- the reason why that -- that -- the  
18 baseline hazards are so high is just based on the  
19 actual concentrations that have either been measured or  
20 predicted in vegetation and soil and other media.

21 Q Okay. In the existing --

22 A Yeah. So -- so the actual --

23 Q Okay.

24 A The -- the -- again, if -- if the contribution from air  
25 from the project was high, that would show up in  
26 those -- in those project hazards. But, again, those

1 are relatively small compared to the baseline. So  
2 it's -- it's the background concentrations that are  
3 generating these -- these high hazards, not  
4 contributions from the project, whether they be in --  
5 through air or water or other.

6 Q Okay. Okay. So just a follow-up question. Would any  
7 combination of contaminants of potential concern  
8 predicted to individually exceed hazard quotients of  
9 0.2 for multimedia exposure be expected to produce  
10 synergistic effects on human health when sensitive  
11 subpopulations of people are exposed?

12 A I think the answer is similar to air, that -- I -- I  
13 certainly haven't seen any compelling evidence of  
14 synergistic effects of the types of contaminants of  
15 concern that we have at this site at this type of  
16 exposure level. Again, where we typically see those  
17 synergistic effects from contaminants like this is when  
18 we have really high exposures that are much higher than  
19 what we see -- than what we're seeing here.

20 Q Okay. Thank you.

21 So Benga provided separate assessments of risks of  
22 additive effects to contaminants within toxicity groups  
23 for inhalation and for oral and dermal exposure. Benga  
24 did not provide an assessment of total additive risk  
25 from additive effects from inhalation plus oral and  
26 dermal exposure.

1           Could Benga comment on the potential for the total  
2 additive risk from inhalation, oral, and dermal  
3 exposure from all contaminants of potential concern in  
4 the liver and kidney toxicity groups in terms of how  
5 much higher the total risk might be?

6   A    Again, that -- that's part of why we use that target  
7 hazard quotient of 0.2. It's meant to reflect -- you  
8 do have potential exposure through different exposure  
9 routes.

10           I don't think we've done the -- the math and tried  
11 to add up, you know, inhalation hazard quotients and  
12 oral hazard quotients, and the end points might not be  
13 the same for those -- those types of exposure. But  
14 using that hazard quotients of 0.2 -- oh, I just got a  
15 message from one of our risk assessors that we did add  
16 them all.

17   Q    Okay. Could you just tell us where that is?

18   A    I will ask and find out.

19           I just found them. It's again in CIAR 313, PDF  
20 page 1272. There's predicted hazard -- hazard  
21 quotients, including oral plus dermal and inhalation,  
22 where there's similar critical effects.

23   Q    Okay. Thank you. We'll take a look at that.

24           Okay. So that brings me to the end of my  
25 questions on human health risk assessment. You'll be  
26 happy about that. I do have some questions about the



1 wildlife health risk assessment. Ms. Mooney, you'll be  
2 happy to know I have fewer questions than I did for  
3 Mr. Mitchell. But I'm going to propose we take our  
4 break now and pick this up when we come back from the  
5 break. So it's 2:23, so let's come back at 2:40.

6 (ADJOURNMENT)

7 THE CHAIR: Okay. Welcome back,  
8 everybody.

9 Apologies, Madam Court Reporter. I understand I  
10 was going a bit fast, and none of my colleagues were  
11 brave enough to jump in and stop me. So if I -- I will  
12 try and do better. If I start going too fast, I'll  
13 deputize Mr. O'Gorman to intervene on your behalf  
14 should it become necessary.

15 Q THE CHAIR: Okay. So some questions  
16 around the wildlife health risk assessment. So Benga  
17 states that it used highly conservative or very  
18 conservative assumptions in its wildlife health risk  
19 assessment, and it lists them in CIAR 313, PDF  
20 page 1301 and also in CIAR 360, PDF page 17: (as read)

21 The conservative assumptions include the use  
22 of maximum predicted air, soil, and surface  
23 water concentrations, and assumptions that  
24 wildlife would obtain 100 percent of food  
25 sources from habitat affected by the mine.

26 Benga initially concluded, on the basis of a

1 screening-level health risk assessment which did not  
2 include water-based exposure pathways except for  
3 atmospheric deposition to water bodies, that there is  
4 no potential risk of adverse effects associated with  
5 project emissions on the health of wildlife in the  
6 study areas.

7 Benga stated that because of the highly  
8 conservative assumptions used, the prediction  
9 confidence was high. A reassessment of risk to  
10 wildlife health, which included all water-based  
11 pathways, not just atmospheric deposition, concluded  
12 that except for selenium, the calculated exposure  
13 ratios for all contaminants of potential concern for  
14 all surrogate aquatic wildlife species in all habitats  
15 evaluated were below 1. Selenium exposure ratios of  
16 1.7 and 3.8 were calculated for insectivorous and  
17 omnivorous birds in the end-pit lake, respectively.

18 In CIAR 360, on PDF page 15, Benga indicated that  
19 in the course of providing worked examples of the  
20 calculation of risk from selenium and zinc, Benga  
21 discovered that corrections had to be made relative to  
22 sediment ingestion. The results of reworked examples  
23 of calculation of risk from selenium and zinc produced  
24 exposure ratios from 0.03 to 4.1 for all habitats.  
25 Benga stated that these results indicate that the  
26 prediction -- that the predicted exposures are lower or

1 slightly higher than acceptable.

2 So the question is: Issues associated with the  
3 level of conservatism associated with predicted  
4 concentrations of contaminants of potential concern in  
5 water have already been discussed during the human  
6 health risk questions. Given these issues, as well as  
7 the need to use corrected sediment ingestion  
8 parameters, which was identified when worked  
9 calculation of wildlife risk estimates were provided  
10 for selenium and zinc, what is Benga's level of  
11 confidence that the overall conclusion regarding low  
12 risk to wildlife health is still consistently and  
13 reliably conservative?

14 A MS. MOONEY: That was a long question.

15 Q It was.

16 A I'm going to do my best.

17 I think those levels that were listed -- the  
18 points that were listed in CIAR 313 are still  
19 applicable, despite the bulk density conversion change  
20 that was made in the edit, that we have applied what we  
21 believe to be are the upper bounds of possible  
22 exposure. We have assumed highly conservative receptor  
23 characteristics, assuming that receptors would receive  
24 all of their exposure from that higher nodal model  
25 output, as well as their food sources -- their food  
26 sources would exclusively be from those higher

1 concentration areas -- that those receptors don't  
2 forage in other parts of the range, that they stay  
3 there, and that they don't migrate. They get -- you  
4 know, they receive exposure daily, 365 days a year.

5 We know that some of the species evaluated -- like  
6 the great blue heron, they have very large home ranges.  
7 They're not going to be staying in the small nodal  
8 spatial area that's been evaluated -- evaluated and --  
9 so I -- I feel that we do have a pretty high level  
10 of -- of confidence in the conservative -- conservatism  
11 with respect to the receptor parameters that have been  
12 applied and the concentrations representing the upper  
13 possible distribution.

14 Q Okay. Kind of a follow-up question, then. The bulk  
15 density adjustment that you did that you had to  
16 correct, how big of a difference does that make in the  
17 results? And would the exposure ratios for the other  
18 parameters increase to a similar extent, as they did  
19 for selenium and zinc, or would it be different?

20 A It would be a -- a same relative change across  
21 compounds, but with respect to how the multimedia model  
22 accounts for the uptake into tissues is different,  
23 depending on the chemical-specific parameters. But the  
24 actual change in the sediment calculation would be  
25 relative across compounds.

26 Q Okay. Thank you.

1           In order to understand the consequences of  
2           assumptions used for predicted water quality more  
3           fully, could Benga confirm whether your overall  
4           conclusion that there would be low adverse health risks  
5           on wildlife health would still apply, given the  
6           exposure ratios for selenium exposure to Blairmore  
7           Creek water would increase if contact water capture is  
8           less than 95 percent and if the target selenium  
9           concentration of 15 micrograms per litre was not  
10          achieved?

11           And maybe just as a reminder -- sorry to add to  
12          the question, but -- so the predicted selenium exposure  
13          ratios for Blairmore Creek currently are 1 for northern  
14          river otter and 1.4 for great blue heron. So the  
15          concern is: If you didn't get the capture you're  
16          expected, how much might those increase?

17   A   MR. HOUSTON:           I -- I just want to jump in  
18          here for a minute, Mr. Chair. I -- 'cause it seems to  
19          me that we have other problems if we -- if we fail on  
20          the issues that you're talking about. So it -- it is a  
21          bit hypothetical. And I -- I think the answer's going  
22          to be, yes, the risk goes up, but, you know, we --  
23          we've -- we've been conservative to get to those  
24          numbers that we were talking about for our water  
25          quality calculations, and we've put in some -- we've  
26          committed to a number of backup plans, you know, to

1           increase the probability of that happening or -- or  
2           to -- well, to increase the probability of that  
3           happening. So, you know, I -- I -- I don't really  
4           think it's an option to miss those targets, I guess, is  
5           what I'm getting to.

6    A    MS. MOONEY:                    If I could just add to that.  
7           If the release -- the relative proportion of sulphate  
8           and selenium didn't change, it wouldn't have a  
9           significant change on the outputs for selenium due to  
10          the mitigating effect of sulphate. So it -- it  
11          would -- that -- that could influence the results as  
12          well.

13   Q    Okay. Thank you.

14                 What is the justification for Benga's statement  
15                 that trophic transfer values used in the exposure  
16                 modelling are thought to be very conservative? And  
17                 does this statement apply to all contaminants of  
18                 potential concern or just specific ones?

19   A    So this would specifically apply to selenium. So I can  
20          start by giving the example in the lotic system, the  
21          trophic transfer factor that was applied for fish. So  
22          a value of 1.48 was applied. Notably, the trophic  
23          transfer factor for westslope cutthroat trout that's  
24          been published by the USEPA is 1.12. So the value that  
25          we have applied is quite a bit higher. And -- and it's  
26          important to remember that when you're compounding

1 concentrations, a small change in the trophic transfer  
2 factor makes a relatively large change in the output.  
3 So that's one example.

4 I don't know if that satisfies the question  
5 enough.

6 Q Well, so I think the concern potentially -- so there's  
7 been a lot of discussion around selenium. I think we  
8 understand your evidence pretty well on selenium. It's  
9 more about the other contaminants of potential concern.  
10 How confident are you with respect to those trophic  
11 transfer values, that they're conservative?

12 A So the bioconcentration factors that have been applied  
13 within the multimedia model are generated from the  
14 guidance that the model was derived from, which is the  
15 office of special waste from the USEPA, and they are  
16 based on going from water into tissue, and they are  
17 chemical-specific. There -- there would be some, you  
18 know, small changes from a site-specific chemistry  
19 perspective that could modify those, but that model is  
20 pretty well-established, has been used in numerous  
21 EIAs, and is -- is well-known.

22 Q Okay. Thank you.

23 What's the likelihood that site-specific trophic  
24 transfer factors for Blairmore Creek, Gold Creek, the  
25 Oldman reservoir, or the end-pit lake could be higher  
26 than those used in the assessment, and what would

1 contribute to this occurring?

2 A There is always a -- a distribution within species of  
3 potential uptake. Our approach has been to review the  
4 available trophic transfer factors and apply a value  
5 that represents, you know, between the 80th and the  
6 95th confidence limit of those values. So we've tried  
7 to be very conservative in that application, but, you  
8 know, there is a distribution on either end. We feel  
9 that we've captured the conservative end of that  
10 distribution. Does that mean you've captured every  
11 single species? That -- that is a question I can't  
12 answer.

13 And the second part of your question, I think,  
14 was -- if I have it right -- what could influence the  
15 trophic transfer factors to be higher; is that correct?

16 Q Yes, that's right.

17 A So the site-specific water chemistry could have an  
18 influence, particularly at the base of the food chain.  
19 So, you know, small changes in the chemistry could  
20 modify the uptake. Also, the -- the speciation of the  
21 compound itself could also influence the uptake.

22 Q Okay. Thanks.

23 Did you use different trophic transfer factors for  
24 lentic, i.e., the Oldman reservoir and the end-pit  
25 lake, versus lotic, Blairmore and Gold Creek  
26 environments?



1 A We did. What we applied for the lotic environment was  
2 based on some site-specific data or as close to it as  
3 we could get. So, for instance, for invertebrates, we  
4 applied a regression equation that's been developed  
5 by -- in the Elk Valley, so that population was felt to  
6 be relatively similar in its invertebrate community  
7 assemblage.

8 But the -- in the end-pit lake, we didn't apply  
9 that because it was based on a lotic environment, and  
10 we -- I think there is some uncertainty with respect to  
11 the invertebrate community that would be present there,  
12 and so we have applied a more conservative value.

13 Q And that answer would apply to species other than  
14 selenium or just selenium, so other COPCs?

15 A Just for selenium.

16 Q Okay. Can you explain how the assumption that  
17 aquatic-dependent wildlife receptors were assumed to  
18 obtain 100 percent of food sources from the habitat  
19 evaluated is conservative for small home-range species,  
20 such as benthic invertebrates, or for individual or  
21 breeding pairs of a listed species which may occupy a  
22 specific habitat for the entire breeding season?

23 A So the American dipper was the avian species evaluated  
24 that had the smallest range, and it still has a range  
25 of .2 hectares. I think what -- one of the things  
26 that's noted about a bird like the American dipper is

1           that they will forage depending on habitat  
2           availability. So moving up and down within the system  
3           is noted in the literature for that receptor depending  
4           on, you know, ice cover and -- and what might happen.  
5           So although the .22 is their -- their listed range,  
6           they're going to be adapting to the changing conditions  
7           of the environment. So to assume that they would  
8           spend, you know, 100 percent of their time only in one  
9           area, I think, is relatively conservative. They might  
10          return to that area for parts of their -- you know,  
11          their life cycle, but that they would only be eating  
12          food sources exclusively from that small spatial area  
13          is pretty conservative.

14        Q    For a species, though, like a -- let's say a benthic  
15              invertebrate that lives in a small area the whole time,  
16              that wouldn't really be a conservative assumption; it  
17              would just be the way it is. Is that not correct?

18        A    That's correct, yeah. And that's how we've assumed the  
19              model is set up --

20        Q    Okay.

21        A    -- so that they would receive those consistent --  
22              consistently high concentrations.

23        Q    Okay. Thank you.

24                        Were the -- sorry. We may have covered this  
25                        already, but I'll ask it again 'cause I can't recall.  
26                        Were the risk calculations for contaminants of

1 potential concern, other than selenium and zinc, redone  
2 with the same adjustment to sediment ingestion made,  
3 and were the checks made for other errors?

4 A We did a reevaluation of the exposure ratios that were  
5 relatively higher in magnitude, and because that --  
6 that change is proportional, it -- it was determined  
7 that it wouldn't have a -- you know, make a change to  
8 the conclusions. But we didn't rerun all the  
9 compounds.

10 As I noted earlier this morning, we had  
11 reevaluated with the -- for our own purposes, the --  
12 updated data set, and that would have applied the  
13 correction that was made for bulk density, and there  
14 were no change to conclusions.

15 Q Okay. One moment.

16 So you indicated you kind of did a check with the  
17 new modelling data. Is that available in a format that  
18 could be provided to the Panel in terms of, you know, a  
19 summary table of the updated HQs?

20 A Just one moment, please.

21 Q Yeah.

22 A Yeah. We can -- we -- we can provide -- provide that.  
23 Just wanted to give some expectations on timeline. You  
24 know, would one to two days be sufficient?

25 Q I think that's probably workable, yeah.

26 A Okay.

1 Q Yeah. So just for clarity, then, we're looking for,  
2 you know, those recalculated HQs, you know, using the  
3 new modelling and incorporating any error checks you  
4 may have done. And if that is acceptable, we'll get a  
5 number.

6 A That's acceptable.

7 Q Okay.

8 THE CHAIR: And can we get a number for  
9 that?

10 MS. ARRUDA: Mr. Chair, Elaine Arruda. It  
11 would be Undertaking Number 28.

12 THE CHAIR: 28. Okay.

13 Q THE CHAIR: And my subject matter expert  
14 just wanted to clarify, those recalculated HQs would  
15 include both the air deposition pathway and the  
16 waterborne pathways; correct?

17 A Correct.

18 Q Okay. Thank you.

19 Okay. Okay. That eliminates a few questions, so  
20 I just need to figure out where to go next.

21 Okay. I'm going to ask a few questions just about  
22 migratory birds and listed species. So Benga  
23 identifies listed amphibian species, including the  
24 Columbia spotted frog, the long-toed salamander, and  
25 the western toad as being confirmed as present in the  
26 local study area. And Benga notes that these species

1 are rated as "sensitive" in the Alberta -- sorry, are  
2 rated as "sensitive" in Alberta and that the western  
3 toad is rated by the Committee on the Status of  
4 Endangered Wildlife in Canada, or COSEWIC, as "special  
5 concern".

6 In CIAR 334, the Canadian Parks and Wilderness  
7 Society stated that: (as read)

8 Risks to amphibians are not properly  
9 considered by the use of only mammalian or  
10 avian surrogates.

11 Benga identifies three listed bird species which feed  
12 on insects with aquatic egg larval, pupae, or nymph  
13 stages as being confirmed as present in the local study  
14 area. These species are barn swallows, common  
15 nighthawk, and olive-sided flycatcher.

16 Barn swallows and common nighthawk are listed as  
17 "sensitive" in Alberta, rated as Schedule 1 under the  
18 Species at Risk Act, and are rated as "threatened" by  
19 COSEWIC.

20 The olive-sided flycatcher is a Schedule 1 Species  
21 at Risk Act species and rated as "threatened" by  
22 COSEWIC.

23 Teck monitoring data provided in CIAR 313,  
24 Addendum 11, Appendix 6.19-3, page 1083 showed that of  
25 46 mine-exposed areas in 2018, five had mayfly, stone  
26 fly, or caddis fly abundances less than the normal

1 range observed in reference or non-mine exposed  
2 tributaries.

3 In CIAR 360, Table 7.1-5, PDF page 17, selenium  
4 exposure ratios greater than 1 were recorded for  
5 American dipper and mallard exposed to the end-pit lake  
6 and for mallard exposed to Gold Creek. American dipper  
7 and mallard can both be assumed to consume the aquatic  
8 forms of the same insect species which later emerge and  
9 are consumed as adults by barn swallows, common  
10 nighthawk, and olive-sided flycatcher.

11 Finally, Benga states that it will rely on the  
12 recovery strategies for species at risk that are  
13 developed by Environment and Climate Change Canada and  
14 departmental advice to develop mitigations and  
15 monitoring programs.

16 Benga notes that federal recovery strategies exist  
17 for olive-sided flycatcher and common nighthawk and  
18 that these strategies plus any future federal action  
19 plans will form the basis for project mitigation and  
20 monitoring plans.

21 So with that background, I'm going to ask a series  
22 of questions regarding the implications for Species At  
23 Risk and the Migratory Birds Convention Act.

24 THE CHAIR: So, Zoom Host, could we go to  
25 CIAR 89, PDF page 602? PDF 602.

26 Q THE CHAIR: So the first two paragraphs on

1 this page includes information based on literature  
2 citations regarding the potential of selenium, nitrate,  
3 and nitrite concentrations to negatively affect the  
4 Columbia spotted frogs and other amphibians, including  
5 larval deformities, hormonal abnormalities, increased  
6 mortality, reduced feeding, and increased  
7 susceptibility to predation.

8 If we could turn to page 604. In Section  
9 11.2.2.3, under the heading "Change in Mortality Risk",  
10 Benga includes information based on literature  
11 citations that includes -- that indicates that  
12 increased concentrations of selenium, nitrates, and  
13 nitrites in waterways downstream from the mine have the  
14 potential to cause mortality or deformities in western  
15 toad larvae.

16 THE CHAIR: And, finally, can we go to  
17 CIAR 313, PDF 1088? Looking for PDF 1088. Thank you.

18 Q THE CHAIR: And the information on this  
19 page includes information from Teck regarding recent  
20 studies of nitrate, sulphate, and selenium toxicity to  
21 amphibians.

22 So in light of the information that we just looked  
23 at, why did Benga feel it was not necessary to conduct  
24 an assessment of risk to amphibian species?

25 A MS. MOONEY: So guidance in the literature,  
26 including the USEPA's 2016 surface water criteria and

1 BC's 2014 water quality criteria for selenium, indicate  
2 that for wildlife, egg-laying vertebrates are the most  
3 sensitive receptor and, of those, birds.

4 Amphibians are important and certainly a receptor.  
5 Often, data limitations, specifically the daily  
6 threshold exposure dose that is required to quantify  
7 risk, are lacking for amphibians. And in this case,  
8 because the literature recognized that birds are the  
9 most sensitive, if birds are sufficiently protected, so  
10 too are amphibians, not to say that amphibians aren't  
11 receptors and -- and wouldn't be receiving exposure,  
12 but if -- if birds are protected, then so too are  
13 amphibians.

14 Q Okay. Thank you. One moment.

15 So the sensitivity is one thing. Then, of course,  
16 there's the degree of exposure. So would amphibians  
17 not be expected to have higher levels of exposure than  
18 birds?

19 A I think it would depend on their diet. So if the  
20 amphibian is consuming a large proportion of fish, they  
21 would receive higher levels of exposure, but so are the  
22 pescavorian birds. So -- and because the -- the daily  
23 threshold exposure dose for avians is well-studied and  
24 supported over numerous regulatory documents, and there  
25 just isn't that data right now to understand the -- the  
26 analogous daily threshold exposure dose for amphibians,



1           they -- they weren't able to be evaluated.  And if --  
2           and if that data, you know, was generated or comes --  
3           becomes available in the future, I think it -- it could  
4           be something that definitely adds value to the risk  
5           assessment.

6       Q    Okay.  Given that there is, apparently, from the  
7           record, available information for selenium, sulphate,  
8           nitrate, and nitrite, why did Benga not at least assess  
9           those specific COPCs for amphibians?

10      A    Again, because birds for selenium are defined as the  
11           critical receptor, and in -- recognized in the guidance  
12           as the most sensitive, they -- they were evaluated, and  
13           if they are protected, so too are amphibians.

14      Q    Okay.  Just one moment.

15                 Okay.  So just to clarify.  What I think I heard  
16           you say was that, you know, it's your opinion that even  
17           though amphibians may have potentially higher exposure  
18           than birds, if birds are protected, amphibians are --  
19           are protected as well.  Is that what I heard?

20      A    Sorry.  I was on mute.

21      Q    Yeah.

22      A    Based on our understanding currently of birds being the  
23           critical receptor, yes.

24      Q    Okay.  Thank you.

25                 So I'm going to move on to a different topic.  So  
26           can we pull up CIAR 313, and I'm looking for page 1342.

1           Okay. So there are two tables here that I just want to  
2           ask about. Before I ask my questions, I want to  
3           clarify whether there might be a mislabelling of the  
4           two tables.

5                     And so this is Table D4, and it indicates that  
6           it's "Predicted Exposure Ratio for the Multimedia  
7           Assessment for Gold Creek".

8                     And if we go to the next page, 1343, there's  
9           Table D5, and it indicates it's "Predicted Exposure  
10          Ratios for the Multimedia Assessment for Blairmore  
11          Creek".

12                    So my first question is: Should the table caption  
13          for D4 actually be "Blairmore Creek" and the table  
14          caption for D5 be "Gold Creek"? And the reason I ask  
15          is that it would seem that Blairmore Creek would have  
16          more hazard quotients greater than 1 than Gold Creek.  
17          But that's not the way the tables appear.

18    A       We're going to check on that and get back to you.

19    Q       Okay. So my question will depend on that, so I won't  
20          ask it. I'll just move on till you confirm that.

21                    Okay. Let's move to a different topic, then --  
22          or related topic. So in CIAR 42, Appendix 10, PDF  
23          pages 266 to 268, Benga indicates that three surge  
24          ponds that receive runoff from waste rock are predicted  
25          to have elevated water quality parameters and presents  
26          results for sulphate, nitrate, cobalt, selenium, and

1 zinc.

2 Could Benga confirm that the predicted  
3 concentrations of all five of these parameters, as  
4 illustrated in CIAR 42, Appendix 10, PDF pages 266 to  
5 268, are above water -- Alberta water quality  
6 guidelines and, if so, by how much for each parameter?

7 And if you want to pull up that reference again,  
8 it's CIAR 42, Appendix 10, pages 266 to 268.

9 A MR. HOUSTON: So, Mr. Chair, I can confirm  
10 that, and -- and they're orders of magnitude  
11 difference. For example, selenium, in some cases, is  
12 in -- in the order of 1 milligram per litre, so that  
13 would be a thousand -- or 500 times the -- the two  
14 micrograms or -- several hundred times the -- the  
15 site-specific limits we're talking about for Blairmore  
16 Creek. So these -- these are quite high numbers.

17 Q Okay. Thank you, Mr. Houston.

18 And so this relates to a matter that Mr. Yewchuk  
19 raised the other day, and we did talk a little bit  
20 about it when he was cross-examining you, but could  
21 Benga comment on the potential risk to amphibians from  
22 exposure to the surge ponds during operation as well as  
23 long-term exposure in the postclosure period?

24 A Yeah. So we -- we did discuss this with Mr. Yewchuk,  
25 and -- and absolutely exposure to these ponds would not  
26 be healthy for amphibians, and so we talked about

1 putting in place traps for the amphibians and -- and  
2 relocating them away from these -- these sites.

3 Mr. Kansas, can -- can you just talk a little bit  
4 more about that? You're on mute, John.

5 A MR. KANSAS: I -- I think -- I think we  
6 covered it with -- with Mr. Yewchuk. I -- I can't add  
7 to that.

8 Q Maybe just a follow-up question, then. You know, when  
9 you think about trapping, how would long-trap -- how  
10 would long-term trapping and relocating work?

11 A MR. HOUSTON: So we --

12 A MR. KANSAS: The -- oh, sorry. Go ahead,  
13 Gary.

14 A MR. HOUSTON: Yeah. No. We talked about  
15 pit traps, Mr. Chair. So -- and not being a frog  
16 expert, but my understanding is the frogs get caught in  
17 the -- in the pits, and it would require somebody to be  
18 monitoring them on a periodic basis to, you know,  
19 remove the frogs from the pits and -- and to relocate  
20 them to another site that was conducive.

21 We were asked about the frequency of checking,  
22 and -- and my answer to that was: Well, it would  
23 depend on the season, on -- and on the -- the number of  
24 times we checked and found actual frogs, or if -- if --  
25 you know, so we would -- we would vary that frequency  
26 depending on the situation.

1 A MR. KANSAS: I can add -- I can add that  
2 this won't stretch me out -- outside my expertise, but  
3 movement of adult frogs and amphibians in general is a  
4 standard practice. It's not something that's  
5 disadvantageous to the -- to the animals. It's -- it's  
6 pretty standard. I just haven't been involved in --  
7 in -- in -- in it very often.

8 Q Okay. Thank you.

9 So what are the implications of exposure ratios  
10 greater than 1 for American dipper and mallard  
11 regarding risks to the listed species with similar  
12 diets -- so we're thinking the barn swallow, common  
13 nighthawk, and olive-sided flycatcher -- given  
14 the level of protection appropriate to listed species?  
15 So, again, worried about potential contamination from  
16 the surge ponds affecting the diet of other listed  
17 species.

18 THE CHAIR: And, Zoom Host, you can take  
19 down that previous exhibit.

20 A MS. MOONEY: Lindsey here.

21 So for the surge ponds or the operating water  
22 habitats during the mine that are above criteria, there  
23 would be exposure control for birds to prevent contact  
24 with the water and hopefully to prevent ingestion of  
25 food sources from those habitats as well.

26 With respect to the listed species that you

1 provided, you know, risk is a function of the  
2 receptor-specific characteristics, and while we haven't  
3 evaluated those species in particular, we have  
4 evaluated a pretty close surrogate. So the American  
5 dipper is a small bird that eats also a lot of insects  
6 and has a -- relative to its body weight would likely  
7 have a similar food-ingestion rate. And we have a low  
8 magnitude of risk predicted in the end-pit lake. But  
9 the other habitats for those species were below the  
10 risk threshold.

11 Q Okay. Thank you. Just a moment.

12 So I specifically asked about the surge pond, but  
13 in terms of Blairmore Creek and the end-pit lake  
14 exposure as well, they have a close surrogate that also  
15 has an exposure ratio greater than 1. And given that  
16 the level of protection to listed species is not  
17 limited to populations but also includes individuals,  
18 how do you see that issue in terms of risk to those  
19 individuals?

20 A I'm not entirely sure about the -- some of the  
21 receptor-specific parameters for those listed species.  
22 But I think, again, the layered conservatism that we've  
23 applied for species that -- with -- that would be --  
24 that would be considered a similar surrogate, given  
25 that we have assumed that those similar surrogates  
26 would be expected to, you know, only receive food

1 foraged from a specific location under these  
2 conservative assumptions and sort of the numerous  
3 levels of conservatism that I noted earlier, that --  
4 that those listed species would likely be protected as  
5 well.

6 Again, risk is a function of the specific receptor  
7 characteristics, and I'd -- we'd have to evaluate those  
8 specific receptor characteristics. But I don't expect  
9 them to -- to change the conclusions.

10 Q Okay. Just a second.

11 So given that the -- I think I heard you say the  
12 American dipper is a close surrogate and that the ER is  
13 greater than 1. Wouldn't that trigger a particular  
14 concern for a listed species that have a stricter  
15 definition of "acceptable risk"?

16 A So receptor surrogates are partly chosen due to the  
17 availability of defensible receptor characteristics,  
18 and they're believed to be conservative across similar  
19 species, which is why they're run as -- for that  
20 specific feeding guild, which is why they're run as the  
21 surrogate. So, yeah, I think the answer to your  
22 question would be: No, I wouldn't expect that there  
23 would be significant differences for different birds  
24 within the same feeding guild.

25 Q Okay. My wildlife specialist wants to just return  
26 briefly to the issue of trapping and relocating of

1 amphibians. It seems that that would be required over  
2 a prolonged period of time and potentially into the  
3 postclosure period. Does Benga think that that's a  
4 workable solution over a long period of time?

5 A MR. HOUSTON: Yes, Mr. Chair, we -- we will  
6 have routine duties to perform to maintain the water  
7 management system in any case, and so I -- I think it  
8 will be workable to hire somebody, if that's what it  
9 takes, to monitor the -- the -- these traps, and -- and  
10 we -- we would also expect that at some point during  
11 the life of the, you know, monitoring after operations  
12 that we would be able to close those surge ponds. And  
13 so there -- you know, even though we may still be  
14 pumping water to the saturated backfill zone.

15 So there -- there would be some -- you know, there  
16 would be an end point where we would close the surge  
17 ponds and -- and not have to do that. But, in any  
18 case, having -- having somebody on a local contract to  
19 maintain these traps, I -- I don't think is, you know,  
20 unreasonable.

21 A MR. BARTLETT: Mr. Chair, it's Mike Bartlett.

22 Just to add to that, the -- the traps are just one  
23 of the mitigations that were in place. I think they  
24 would be supplemented, or the primary one would be  
25 exclusion fencing, and those are often used long term  
26 on industrial sites.



1 Q Okay. One moment.

2 A MS. MOONEY: I also have an answer about  
3 the D4 and D5 tables.

4 Q Okay. Yeah.

5 A And they are not flipped. And --

6 Q Okay.

7 A -- just to qualify that the Blairmore Creek values  
8 here, remember, they applied the older data set.

9 Q So if they applied the newer data set, would the  
10 numbers change substantively?

11 A They don't change substantively in terms of conclusion,  
12 no. That's the answer.

13 Q Okay. And what accounts for the higher number of  
14 HQs -- elevated HQs in Gold Creek versus Blairmore  
15 Creek?

16 A So there's two things. So the relative concentrations  
17 that were used for Gold Creek didn't change  
18 significantly from what has been applied in these  
19 tables in the updated data. The larger change was for  
20 Blairmore Creek. Specifically for selenium, the higher  
21 hazard quotients have to do with the lower contribution  
22 of sulphate to Gold Creek.

23 Q Okay. Thank you.

24 Okay. So this is the follow-up I was going to ask  
25 about following the clarification on the table. So  
26 we've covered a bit of this, but I'll ask it anyway.

1 So if risks to amphibians can be assumed to be similar  
2 to those for aquatic-dependent mammals and birds used  
3 in your risk assessment and given that selenium  
4 exposure ratios equal to or greater than 1 are  
5 predicted for American dipper and mallard duck in the  
6 end-pit lake, northern river otter, American dipper,  
7 great blue heron, and mallard duck in Gold Creek, and  
8 mallard duck in Blairmore Creek, could Benga comment on  
9 the potential risk to amphibians from exposure to  
10 end-pit lake, Blairmore Creek, or Gold Creek water  
11 based on the values in those tables?

12 A Yeah. I -- I think what's important to remember about  
13 the values that have been presented is, you know, they  
14 have been presented providing the upper distribution of  
15 possible exposure as a tool for us to better understand  
16 and -- where mitigation may be required.

17 With respect to the amphibians, the same answer  
18 holds, that we know we've got some exposure ratios for  
19 birds that are higher than -- than the threshold,  
20 and -- and it's not a line in the sand. You know, 1.1  
21 versus .9 is -- is not significantly different. But it  
22 is something that needs further evaluation and, you  
23 know -- yeah.

24 Q Okay. Thank you. Just a minute.

25 What specific mitigation would be required to  
26 reduce the risk of exposure to contaminants of

1 potential concern in listed bird species, again, barn  
2 swallow, common nighthawk, olive-sided flycatcher? Are  
3 there any specific mitigations required?

4 A MR. HOUSTON: So, Mr. Chair, again, the --  
5 the lens that Ms. Mooney's looking through is -- is  
6 a -- a screening lens, and so we've taken conservative  
7 assumptions that, and -- and that has driven our -- our  
8 understanding of where the risk lies.

9 In -- in terms of some of the project water  
10 bodies, like the surge ponds you mentioned, we -- we  
11 would employ mitigations like fencing pits for the  
12 amphibians and noisemakers or -- or flags or something  
13 to have the birds stay away. So that -- those are the  
14 kinds of mitigations.

15 But in terms of water quality in -- in the -- in  
16 the creeks, the -- the -- the same mitigations would  
17 apply; that is, water treatment, monitoring, and  
18 management -- active management of -- of those water  
19 bodies to -- to ensure that no harm is done.

20 Q Okay. Given the exposure ratio's greater than 1  
21 predicted for Gold and Blairmore Creeks, what are the  
22 implications of these results, given that there are  
23 species covered by the Migratory Birds Convention Act?

24 A Again, I'll -- I don't want to speak for Ms. Mooney,  
25 but we've talked about the conservatism that goes into  
26 these studies, and especially if you're talking about

1       migratory birds, they're not going to stay in one place  
2       and -- and drink the water for -- for a lifetime. So  
3       I -- I -- I think that the -- the screening-level study  
4       that we've done is -- is very conservative for -- for  
5       migratory birds.

6       Q    I guess the question was really more about: Given the  
7       potential impacts to migratory birds, is there a need  
8       for additional level of protection or mitigation?  
9       Like, I understand that the assessment is conservative.  
10      The assessment shows the potential for some effect,  
11      which may need to be considered, and so I guess what  
12      we're looking for was: Are there any specific  
13      mitigation measures as required by the Act to protect  
14      migratory bird species?

15      A    I -- I think the only mitigation that we would consider  
16      in that -- in that light would be the -- I'm sorry.  
17      I'm having trouble thinking of the word, but the -- the  
18      systems around the surge ponds to -- to disincent the  
19      birds to land -- from landing there, and -- and that's  
20      where the -- the levels of selenium and nitrates would  
21      be quite a bit higher than the -- than the guidelines  
22      for a natural water body. So we would have a  
23      disincentive system for -- for the migratory birds at  
24      those ponds.

25                But outside of that, I -- I -- I think that the  
26      actual risk, especially if we're talking about

1           Blairmore Creek and Gold Creek and a migratory bird  
2           that is spending a short time in that vicinity, I -- I  
3           think the risk is very, very small.

4    Q    Okay. Thank you, Mr. Houston.

5                    Just the last couple of questions now. So the  
6           guidelines for the preparation of Benga's environmental  
7           impact statement require that the cumulative effects of  
8           the project are assessed using the technical guidance  
9           for assessing cumulative environmental effects under  
10          the Canadian Environmental Assessment Act. The  
11          guidelines for Benga's EIS state on page 37 that:  
12          (as read)

13                   A cumulative effect on an environmental  
14           component may be important, even if the  
15           assessment of the project's effects on this  
16           component reveals that the effects of the  
17           project are minor.

18                   On the same page, the guideline requires  
19           that Benga consider surface water quality,  
20           fish and fish habitat, including westslope  
21           cutthroat trout, mountain whitefish, as well  
22           as other valued fish species; migratory  
23           birds, including habitat loss and contaminant  
24           exposure; and species at risk.

25          The CEAA, C-E-A-A, technical guidance for assessing  
26          cumulative environmental effects states that:

1 (as read)

2 With complex interactions, the whole does not  
3 necessarily correspond to the sum of the  
4 parts. [The guidance goes on to state that]  
5 Continuing environmental changes associated  
6 with past and existing activities may result  
7 in a worsening or improvement of VC  
8 conditions and that where there is evidence  
9 that effects are not simply additive, it  
10 should be noted.

11 So the first question is: According to CEAA technical  
12 guidance for cumulative effects assessment,  
13 consideration of simultaneous exposure to several  
14 stressors should be considered. This guidance is  
15 illustrated with an example at the bottom of the page,  
16 which is page 40 of the guidance document.

17 Could we pull up CIAR 313, PDF 1343? So these  
18 were the same tables we were referring to earlier.

19 Given the technical guidance regarding  
20 consideration of the effects of a combination of  
21 stressors on each valued component, could Benga comment  
22 on the risk to wildlife of exposure to all combined  
23 contaminants of potential concern? Could Benga include  
24 in the response specific consideration of effects of  
25 the combined exposure to contaminants where exposure  
26 ratios for each contaminant may approach or exceed 1

1 for long durations, for example, a combination of  
2 selenium, methylmercury, and thallium as indicated on  
3 PDF page 1343; and could Benga also include  
4 consideration of the level of protection required for  
5 species at risk and migratory bird species?

6 So, again, long question. The essence of it is  
7 considering the potential for being exposed to multiple  
8 contaminants approaching a hazard quotient of 1 and  
9 having regard for the at-risk nature of these species,  
10 what are Benga's comments on that potential combined  
11 effect?

12 A MS. MOONEY: One moment.

13 So when we look at these con -- or these, sorry,  
14 exposure ratios that have been produced, selenium has  
15 the end point of hatchability, but if we were to sum  
16 the others that you had mentioned, it doesn't actually  
17 change anything. We don't come close to exceeding the  
18 threshold. So I think selenium is its own COPC, based  
19 on its defined and specific end point for birds, but  
20 I -- I don't think that, you know, summing the  
21 remainder would make a significant change to the  
22 conclusions.

23 Q Okay. Thank you.

24 Could Benga comment on the potential risk from a  
25 combination of exposure to several contaminants as well  
26 as degradation or elimitation [phonetic] of -- sorry,

1 degradation or elimination of habitat? For example,  
2 which specific combinations of contaminant exposure and  
3 habitat effects are most likely to cause adverse  
4 effects, particularly listed species?

5 And you can consider amphibian species as well as  
6 bird species in the answer. So habitat loss combined  
7 with contaminant exposure.

8 A So my understanding is that there is a hundred-metre  
9 offset for the riparian habitat. So with respect to  
10 habitat loss, specifically for aquatic species, I -- I  
11 don't know if there is any habitat loss expected for  
12 the wildlife, including amphibians. So in terms of a  
13 cumulative assessment, I think it would be strictly  
14 relegated at that point to just the chemical exposure,  
15 which is what we've done.

16 Q So I think I understood from the discussion the other  
17 day there is a significant loss of a treed wetland,  
18 although it's a bit unclear about how many amphibians  
19 that it includes because an assessment was not done,  
20 but that's the kind we're looking at -- we're wondering  
21 about, loss of that kind of habitat with contaminant  
22 exposure to amphibians and how those two risks would  
23 combine.

24 A I can say that -- so for that wetland that was used as  
25 an example, it is -- it's not connected to the drainage  
26 of the creeks that were evaluated, and it would



1 primarily be receiving aerial deposition, which is, you  
2 know, less than 1 percent of the total concentration  
3 that we've evaluated.

4 So I think the cumulative effects would be very  
5 low in terms of, you know, air deposition and potential  
6 habitat loss. And what -- what we have evaluated is  
7 the surface water habitats, the creeks, where predicted  
8 concentrations are higher due to that connection with  
9 the -- the discharge. So -- and there is no habitat  
10 loss predicted in those areas. So, again, I think it  
11 would be in those spots related mainly to the chemical  
12 exposure.

13 Q Okay. Maybe just a follow-up question, then, for  
14 Mr. Kansas.

15 Mr. Kansas, do you see and has Benga considered,  
16 you know, any scenarios where wildlife might, I guess,  
17 be exposed to a number of different effects, so both  
18 habitat loss and contaminant exposure?

19 A MR. KANSAS: It's just really out of my  
20 area, the whole contaminant game. I -- I don't ever  
21 touch it, so it's throwing me off a little bit here,  
22 but I -- I think the wetland that you're referring to  
23 that we didn't sample, that -- yet it will be removed,  
24 that type of a wetland would probably have attracted  
25 dispersing Columbia spotted frogs to it. However, that  
26 could be deemed as a cumulative effect, but only if the

1 Columbia spotted frog was under pressure from a  
2 chemical -- a toxicology point of view at the same  
3 time, which I don't know we've -- we've determined.

4 However, the treed wetland that will be removed,  
5 as I understand it, is going to be replaced at the  
6 surge ponds or sediment ponds -- will -- will create  
7 additional treed wetland habitat. So there should be,  
8 in -- in essence, a -- a neutral effect on -- on that  
9 species from multiple stressors.

10 Q Okay. And what about a concern of habitat that may  
11 attract wildlife such as amphibians but has  
12 contaminants associated with it? Has Benga considered  
13 that in its assessment?

14 A I think we've been speaking to that, trying to keep  
15 animals off and away from the -- the toxic water  
16 through various means, radar-controlled cannons right  
17 through to flighting tape, just keeping them off the --  
18 off the sites.

19 Q Okay. So last question on this topic and last  
20 question, I think, totally. Has Benga considered  
21 situations where cumulative risks may require a change  
22 in mitigation strategy because of additives synergistic  
23 or antagonistic interactions among stressors and, if  
24 so, how?

25 A MS. MOONEY: So aligned with what I had  
26 said before that, you know, the end points that we've

1 evaluated really aren't appropriate for additive -- to  
2 be added, and if you had added the hazard quotients,  
3 other than selenium, we result in an exposure ratio  
4 that's still quite low.

5 And I don't know if there is a lot of documented  
6 information with respect to synergies as opposed to  
7 just being additive in the -- the toxicological data  
8 that we've applied for these species, mammalian and  
9 avian, but I -- I don't really expect so, and, you  
10 know, I think kind of based -- based on what I was  
11 saying before about, you know, even if we had added  
12 some of the exposure ratios, you know, it -- it doesn't  
13 change the conclusions. So I -- I think that addresses  
14 at least some of the question.

15 A MR. HOUSTON: Mr. Chair, if I could just add  
16 on a little bit. We have committed to a wildlife  
17 monitoring program, and we've also committed to an  
18 Indigenous-led monitoring program, which we expect will  
19 get -- lean heavily into the -- into the wildlife  
20 health area. And so, you know, we will be watching for  
21 unforeseen consequences, and should -- should those be  
22 detected through one or the other of those monitoring  
23 programs, then, yes, we would be looking for -- to --  
24 to apply other mitigations to prevent that from  
25 happening.

26 Q Okay. Sorry. One last follow-up question, then. Is

1           Benga aware of any cumulative effects modelling tools  
2           which allow for a consideration to both habitat-related  
3           stressors and contaminants?

4    A   MS. MOONEY:                    I am not personally. That  
5           doesn't mean they -- they don't exist. I just -- I'm  
6           not aware of them.

7    Q   Okay. Thank you.

8           Okay. Panel, thanks. Those are my questions.  
9           I'm just going to turn to Mr. Matthews and Mr. O'Gorman  
10          to see if they have any additional questions.

11   THE CHAIR:                        Mr. Matthews, do you have any  
12          questions for this panel?

13   Q   MR. MATTHEWS:                   Good afternoon, panel.

14          I have a few questions with regard to community  
15          health, more specifically, Indigenous health. I  
16          recall, I think, Mr. Mitchell talked about using  
17          Statistics Canada 2013 data. I think it's referenced  
18          to Zone 1 where I think he was -- there was mention  
19          that there were 300,000 people living there.

20          But just wondering if you -- if you had any  
21          statistics on community health -- or, sorry, Indigenous  
22          community health in that area.

23   A   MR. MITCHELL:                   Give me just one moment on  
24          that.

25   Q   Okay.

26   A   I don't think we're aware of any studies that are

1 specific enough to that sort of stale community and  
2 also include enough data to be -- to be meaningful.

3 Q Okay. 'Cause I was -- I was curious as to how Benga  
4 would -- or -- or how -- what tools they would use to  
5 monitor community health when they have no -- or very  
6 little baseline data on each of the communities and  
7 their mental and physical health.

8 A MR. HOUSTON: So I've spent a lot of time  
9 with the Indigenous communities in the area, and it's  
10 hard to -- from a health point of view, it -- it's hard  
11 to make a direct correlation between the project and --  
12 and the community health or -- or the health statistics  
13 within the community. There are so many other factors,  
14 you know, impacting on health that I think -- I think  
15 it's an area that we would like to get into more with,  
16 especially, our closest neighbours and -- and perhaps  
17 work with them to investigate, but it's -- it's -- it's  
18 difficult to incorporate into a formal study like this.

19 Q Okay. 'Cause I'm just -- you know, obviously it was  
20 mentioned that the environmental management committee  
21 would play a role or the stewardship committee would  
22 play a role, but how would you determine whether your  
23 project has -- is negatively affecting an Aboriginal  
24 community's health?

25 A I -- I think a big part of the -- the answer to that  
26 question is open communications with -- with the

1 community through the leadership and -- and through  
2 other -- other channels that are more at the base of  
3 the community. But it's -- it -- it is a difficult  
4 question to answer, so we would look more for -- not --  
5 not just complaints but comments, attitudes towards the  
6 project, and -- and combine that with, you know,  
7 information that comes out of a -- an Indigenous-led  
8 monitoring program. But it -- it -- it is a tough one  
9 to get a -- a handle on.

10 A MR. MITCHELL: Just a couple additional  
11 comments, if I may, related to that. And what we're  
12 talking about is sort of the -- I guess the physical  
13 health that the traditional human health risk  
14 assessment looks at and, you know, significant health  
15 effects.

16 I think the comment came up about the studies in  
17 the Appalachian region and how there's just so much  
18 noise in those studies that they couldn't really come  
19 up with anything -- anything conclusive, and we were  
20 talking about a -- about a smaller population again,  
21 unless you had a really significant health effect,  
22 there would probably be too much noise to actually  
23 detect it from, you know, measuring incidents of  
24 cardiovascular disease or -- or cancer and anything  
25 like that, and that's why we need to rely on the --  
26 things like the -- the air monitoring and the public

1 communication to make sure we don't get to the stage  
2 where there is a risk of that, because by the time you  
3 could detect it, it would be too late, really.

4 Q Yeah. 'Cause, I mean, just -- I'm just thinking out  
5 loud here, but if you did have the baseline data on,  
6 let's say, cancer rates, diabetes, mental health  
7 issues, as my colleague mentioned, potential toxicity  
8 of the kidneys, liver, and all these other elements, it  
9 would be very difficult to determine what kind of an  
10 impact your project is having on the community health.  
11 So I -- I'll just -- I'll just throw that out there and  
12 just -- just something to think about.

13 A Yeah. It is difficult. Even -- even if there is an  
14 observable change relating it to a specific cause as  
15 opposed to, say, a change in lifestyle, a change in  
16 diet, a change in the community composition, it -- it  
17 becomes very difficult, and, like I said, that's --  
18 that's why -- obviously when you get that information,  
19 it's -- it's important to -- to incorporate it, but  
20 it's -- it's very hard to actually get meaningful, good  
21 data on.

22 A MR. HOUSTON: I think the other thing,  
23 Mr. Matthews, that -- that is -- has to weigh in here  
24 is the nearest Indigenous community is, like, 50 or  
25 60 kilometres away, and so it's -- it's not like  
26 Fort McKay, that's, you know, right in the middle of

1 several projects and directly experiencing the -- the  
2 air -- our air models don't even go out that far. And  
3 so when you think about typical diseases that might be  
4 because of air pollution or water pollution, we don't  
5 have that effect on these communities.

6 We've modelled individuals that may choose to stay  
7 close to the project and do their foraging close to the  
8 project, so we've modelled them in, but it's not --  
9 it's not, you know, a -- a -- a general thing to -- to  
10 say that the community's exposed to the project in that  
11 way. It would be more a social, psychological,  
12 other -- other kinds of health that I think would be  
13 the vectors that would -- would have the biggest effect  
14 in the community.

15 Q Okay. Well, thanks -- thanks for your answers, and I  
16 have no other questions. Thank you.

17 THE CHAIR: Mr. O'Gorman?

18 MR. O'GORMAN: Thank you, Mr. Chair. I do  
19 just have a couple of areas of questions for this  
20 panel.

21 Q MR. O'GORMAN: So good afternoon, panel --

22 A MR. HOUSTON: Good afternoon.

23 Q -- Mr. Houston.

24 A Good afternoon.

25 Q So the first one is a question about greenhouse gas  
26 emissions. I'm guessing Mr. Rudolph might be your



1 expert for this, but -- is that right?

2 A MR. RUDOLPH: Possibly. I'll do my best to  
3 answer them, Mr. O'Gorman.

4 Q Okay. Thank you, Mr. Rudolph.

5 So not a hard question.

6 MR. O'GORMAN: I'll say the reference, but  
7 Zoom Host, you do not need to haul this up.

8 Q MR. O'GORMAN: So in Addendum 10, which was  
9 Registry Document 251, Package 1, near the end of that  
10 document --

11 MR. O'GORMAN: Don't haul that up, Zoom Host.

12 Q MR. O'GORMAN: Near the end of that document,  
13 final ten pages or so, in response to a request, you  
14 gave us -- Benga gave us a greenhouse gas management  
15 plan. In there, there were a couple of references to  
16 the -- Alberta's Carbon Competitiveness Incentive  
17 Regulation. Do you recall that?

18 A MR. RUDOLPH: I do, yes.

19 Q Okay. So I'm sure that you're aware that since the  
20 time that was submitted, there's a new provincial  
21 greenhouse gas regulatory framework, the carbon  
22 competitiveness -- Carbon Competitiveness Incentive  
23 Regulation has been replaced by the TIER program, the  
24 Technology Innovation and Emissions Reduction  
25 Regulation. You're aware of that; right?

26 A Yes, that's right.

1 Q Okay. So obviously the references, you know, in the  
2 greenhouse gas management plan presumably would be  
3 updated to reflect the new TIER program. That's not a  
4 huge issue.

5 We are interested, though, in whether or not you  
6 have calculated the -- for any year of the project's  
7 operating lifetime, some early years, Year 19 which was  
8 the year that, you know -- your highest GHG emissions  
9 estimated year, for example. Have you calculated what  
10 you anticipate the compliance obligation to be for your  
11 project, whether that be measured in tonnes or in  
12 dollars?

13 A No. I don't think we've done the benchmarking yet  
14 for -- for the project, Mr. O'Gorman.

15 Q Right.

16 A I did -- I did note, though, and I -- I probably  
17 should've mentioned it earlier in the -- in the  
18 conversation when Mr. Lambrecht was talking to  
19 Mr. Houston, that mine-face emissions of methane would  
20 likely be included as one of the sources under the TIER  
21 program. But they would not be considered a process  
22 source per se and, therefore, would not be subject to  
23 the 1-percent-a-year emission reduction requirement.  
24 And I -- and I know that -- you know, it's not  
25 necessarily the case that -- that Mr. Houston would not  
26 commit to some form of reduction, but I think it's a --

1 I just wanted to point that out.

2 Q Okay. Fair enough. Thank you.

3 So you haven't actually done an estimate of the  
4 compliance obligation. Do you have a sense of whether  
5 or not the compliance burden the project will face  
6 under this regulation is higher or lower than it would  
7 have been under the previous regulation?

8 A We haven't done that assessment at all, to my  
9 knowledge, Mr. O'Gorman.

10 Q Okay. Okay. And I'm assuming you don't have a -- you  
11 don't have a strategy yet for how you will satisfy your  
12 compliance obligation, i.e., payments into a fund  
13 versus offsets versus on-site emission reductions, or  
14 do you?

15 A MR. HOUSTON: So I guess all those options  
16 are -- are open to us at this -- at this point. The --  
17 roughly a third of the greenhouse gas emissions  
18 attributable to the project are for electricity  
19 generation. So one of the potential wins, I think, we  
20 see is to perhaps find a greener source of electricity  
21 to offset those -- those emissions associated with the  
22 electricity use. But no -- no concrete plans at this  
23 moment. Just a thought process.

24 Q Okay. That's good for that area. Thank you,  
25 gentlemen.

26 So my second area I want to ask questions about --

1 I will haul up a couple of references in a second.  
2 But, first of all, I'll ask you, Mr. Houston, who on  
3 your panel today -- I suspect I know the answer, but  
4 I'll put it to you. So who is the person most familiar  
5 with and can speak to the measure you folks have --  
6 like, the actual on-the-ground implementation of the  
7 road dust watering system that you would implement?

8 A I think it would be Mr. Rudolph that could speak to  
9 what -- what is incorporated in the air modelling.

10 Q Okay. I'm more talking about -- look, so Mr. -- I was  
11 guessing Mr. McCoy.

12 So what I'm wondering is which one of you or has  
13 anyone actually been on a mine site and watched road  
14 dust monitoring take place, and can you describe it to  
15 me?

16 A Mr. McCoy might be a good candidate for that, but I  
17 think Mr. Rudolph might also have that kind of  
18 experience.

19 Q Is that right, gentlemen?

20 A MR. MCCOY: Well, I -- I have been on a  
21 mine site, and -- and, you know, watched road watering  
22 occur. So, I mean, we can take that -- I can take a  
23 stab at it, Mr. O'Gorman.

24 Q Sure. Let's start with you, and you guys can figure  
25 out how best -- Mr. Houston, it might also fall back to  
26 you.

1           So let's start with -- I'm going to suggest that  
2           there -- you haven't provided us with a whole lot of  
3           information about what that measure would look like.  
4           You've implemented -- you've said you will do it as a  
5           mitigation measure to manage road dust, but can you  
6           describe it a bit to us, Mr. McCoy or Mr. Houston?  
7           Like, what does it look like? How -- it's -- is it big  
8           trucks? How big are they? How many are they -- are  
9           you using? Tell us a little bit about what that looks  
10          like, please.

11        A    So most of the mines -- well, there's a combination.  
12          You can use a -- a typical water truck that would,  
13          like, haul water to an acreage, for instance, but --  
14          but most of the mines have -- have modified or  
15          retrofitted some of their big coal haulers with big  
16          water tanks on them that actually can get more range  
17          out of it so when they're actually dispersing the  
18          water, they -- they could get, you know, from one end  
19          of the mine to the other then go back and sort of  
20          reload with water. So it's a -- it is a, you know,  
21          200-tonne truck capacity full of water that would be --  
22          would be spreading the water evenly out over the --  
23          over the haul road, so ...

24        Q    Okay. And what roads, to be clear, are we talking  
25          about? I think I know the answer, but I'll let -- I'll  
26          let you tell me.

1 A That -- that -- that would largely be a -- for the --  
2 for the coal haul road, so from the -- from the -- from  
3 the pit base area to the -- to the CHPP would be a few  
4 roads that would be watered, and also the -- the roads  
5 that go from the pit face up to the external rock  
6 disposal areas. So roads that are being traversed  
7 with -- with those waste haul trucks would -- would --  
8 would be watered as well. That -- those would be the  
9 ones that -- that would get the -- the lion's share of  
10 the -- of the watering and the attention, so ...

11 Q Okay. So a good -- a good amount of that water is  
12 being used in the pit along the roads back and forth  
13 between the CHPP and where you are mining at a  
14 particular point in time; right?

15 A I -- I -- I would say that, you know, wherever waste  
16 rock is being hauled or -- or coal hauled back to the  
17 plant, both of those probably get equal attention --

18 Q Okay.

19 A -- so ...

20 Q And I'm guessing not -- or correct me if I'm wrong --  
21 probably not a lot of watering, or -- or is there, of  
22 the mine access road from Blairmore up to the CHPP  
23 area? Or is that one also going to receive some lot --  
24 like, how much watering would that get?

25 A Well, I -- I -- I think the -- the -- the -- sort of  
26 the -- the mechanics of what I was just describing

1           would be for on the mine. For off the mine, I would  
2           suggest that -- that that equipment is -- is too large  
3           and wouldn't be capable or acceptable on a -- on a -- a  
4           sort of public road like that. That would be more of  
5           a -- a conventional water truck that would -- would --  
6           would be used in those instances.

7                        And I -- I -- I think it -- it really varies  
8           from -- from mine to mine. And -- and I do know that  
9           there has been some talk about -- about supplementing  
10          the dust suppression, and -- and there's various  
11          methods for doing that, and Mr. Houston has talked to  
12          that in -- in the -- some of the previous discussions,  
13          but -- so -- and, anyway, so on the mine, it would  
14          be -- be -- be the larger trucks that would be hauling  
15          water. On -- on -- off the mine, it would be a  
16          different sort of configuration.

17    Q       Okay. So thank you, Mr. McCoy.

18                   MR. O'GORMAN:                        Zoom Host, I'm going to ask  
19           you please to haul up the first of the two documents  
20           that I sent you, which was the transcript from Friday.  
21           I think it's -- I'm not sure what the CIAR number is,  
22           but the Volume 26, November 27 transcript. And the  
23           page number I'd like you to go to is 5641, please.  
24           Right.

25    Q       MR. O'GORMAN:                        So, Mr. Houston, you were  
26           having a conversation with Ms. Janusz, and this

1 exchange took place on Friday. She was talking  
2 about -- well, she was reading something you had said  
3 earlier. I didn't go back and look for the early  
4 reference, but she was reading, you'll see there. You  
5 talked about there being a wash bay to clean the  
6 equipment, as she was asking about water use. You said  
7 you're committed to doing a wash bay; that's something  
8 that's using water. You also then said down that  
9 line -- line 7, "Another --" sorry, starting at line 8:  
10 (as read)

11 Another one -- another use would be spreading  
12 water on the roads to keep dust down. [And  
13 you said] So that is, actually, you know, not  
14 an insignificant use of water.

15 You recall saying that, Mr. Houston?

16 A MR. HOUSTON: Yes, I do.

17 Q She was quoting you here, but I'm -- I'm didn't go back  
18 and -- I didn't do the double reference. It was too  
19 meta for me.

20 MR. O'GORMAN: So, Zoom Host, can we haul up  
21 the other document I sent you, which was Addendum 2,  
22 CIAR 53, Appendix 1E, and we're going to go -- well,  
23 when I see that up, we're going to go to PDF 8, please.  
24 Scan in on the table at the bottom, please, Zoom Host,  
25 so we can see it a bit better. And scroll down to the  
26 bottom.



1 Q MR. O'GORMAN: So you gave us an estimate in  
2 here -- in your water use application of wash -- I'm  
3 assuming wash -- the column that's "Wash Down Makeup  
4 Water" in cubic metres, the 2,000 cubic metres per  
5 year, that's notionally your wash bay water. Is that  
6 right, Mr. Houston?

7 A MR. HOUSTON: I -- I believe so, but I'm --  
8 I'm just going to check with Mr. McCoy to see if he  
9 knows anything different.

10 A MR. MCCOY: I -- I believe that's what  
11 that was meant to account for.

12 Q Yeah, which -- that would make sense. So 2,000 cubic  
13 metres per year. That's like 2 million litres; right?

14 A That's correct.

15 Q Okay. So we looked and did not find anywhere in your  
16 document where you have told us how much water you  
17 anticipate using for the wash -- the -- I'm sorry, the  
18 road dust spraying program. Based on -- now -- so I'll  
19 invite you to tell me if we missed it and where we  
20 could find that amount, and if you haven't, is there --  
21 can you give me an estimate of what that might look  
22 like? And the reason I hauled this up is, of course,  
23 you know, in the conversation you had, you -- you --  
24 you talked about the makeup -- the wash bay water and  
25 then the road dust water is -- you spoke about them in  
26 the same sentence, so is it the sort of thing where you

1 expect them to be about the same? I don't know. We  
2 don't have any estimate of how much water you're  
3 talking about for the road dust, unless you can show me  
4 where it is.

5 A I can -- in a -- in an earlier version of this, the --  
6 the -- the -- the assumption was that we would use  
7 about 60,000 cubic metres of water per year -- or per  
8 road watering, and I -- I don't know off the top of my  
9 head where that reference is, but I -- but I do know  
10 that in the initial water balance, that was the -- the  
11 estimated volume that was -- was proposed to be used,  
12 so ...

13 Q Okay. 60 million litres per year in road dust  
14 watering?

15 A Correct.

16 Q Okay. Is that the sort -- and, Mr. McCoy, in -- again,  
17 as I -- I'm -- I'm thinking you're the one who's seen  
18 this happening on mine sites. Is that sort of an  
19 amount that you would say is comparable to other  
20 mountain -- mountain -- you know, mountain coal mines?  
21 Is that the -- sort of the ballpark? Is that  
22 significantly higher, significantly lower based on your  
23 expert judgment?

24 A I -- I would say that it seems reasonable, you know,  
25 just given the -- the -- the length of the haul roads  
26 and the amount of watering that would -- would likely

1           need to be done. I've also been on some mines that  
2           have, you know, 40, 50 kilometres of haul road that  
3           need -- there's a lot more road that needs to be  
4           watered than what -- that what we would have at -- at  
5           Grassy. So I -- I would say it's -- it seems like a  
6           reasonable amount of water --

7    Q    Okay.

8    A    -- (INDISCERNIBLE).

9    Q    So I wonder if you folks, whoever, can tell me how that  
10          water is managed? What happens to it once you spray it  
11          on the roads? Does it sit there and just evaporate?  
12          Does it run off? Where does it run off? Are you  
13          managing it in any way?

14   A    So the -- the idea is we're -- we're -- we would be  
15          spraying this on the haul road. So our -- our --  
16          our -- our retrofitted haul truck would have a -- a --  
17          a water tank on the back, and it would have a spray bar  
18          on the back of it that would, you know, drive down  
19          the -- drive down the haul road and -- and spread  
20          the -- the water sort of evenly across the -- across  
21          the road. And -- and once it's on the road, there  
22          would be -- it would be -- it would be left there to --  
23          to help. You know, we would -- we would put the  
24          appropriate volumes on, I guess, so that it would --  
25          would keep the dust down for a -- for an extended  
26          period of time, and then it would just -- it would just

1 go from, you know, across the -- the -- the roads that  
2 would need watering, and then once he was -- once the  
3 truck was empty, it would go back to -- to fill-up  
4 station and then carry on and continue, so ...

5 Q Right. Okay. I understand that. But I'm thinking  
6 once the truck has left. So the water has been sprayed  
7 on the road, it suppresses dust, and then what? Does  
8 any of that water -- does much of that water run off?  
9 Does it -- in interacting with the road dust to  
10 suppress it, does it essentially sort of evaporate  
11 later? Like, what happens to that water?

12 A Mr. O'Gorman, I -- I would say that that water  
13 essentially just -- it -- it would evaporate over time,  
14 and it -- I wouldn't -- I wouldn't think that it would  
15 run off. I think the -- the idea would be to put  
16 enough on so that it stayed on the road and not -- not  
17 to run off. So I guess if you put excessive watering,  
18 then -- then you -- you might get a small bit that  
19 would -- would leave the surface of the haul road.

20 Q Okay. So now I'm going to come to the big kicker of  
21 why I've asked you these questions. I'm guessing it  
22 might -- so remind us where that water is coming from.

23 A That -- that water is -- is likely coming from the --  
24 the raw water pond.

25 Q Right. The raw water pond, which is the one receiving  
26 all of the high-selenium runoff from the rock dump

1 areas before it gets fed into the SBZ for treatment;  
2 correct?

3 A That's correct, yeah.

4 Q Okay. So I guess on first blush -- and I could -- I  
5 could get a calculator out and do some estimates of --  
6 if you look at the concentration -- you've given us,  
7 and we discussed it back in the water section, the  
8 expected concentration -- I won't haul it up -- of  
9 selenium in the raw water pond. It was, as I recall,  
10 .7 milligrams per litre. Does that sound right? I  
11 think it was about -- you had an estimate in one table  
12 of, say, about .7 milligrams per litre. And you're  
13 looking at potentially spraying 16 million litres per  
14 year of that water over the roads. The water is going  
15 to potentially sit there and evaporate. And if water  
16 evaporates that's containing things like selenium,  
17 presumably the little molecules of selenium are just  
18 left there sitting on the roads after the water  
19 evaporates. Do you agree with that?

20 A MR. HOUSTON: I -- I -- I think that, you  
21 know, conceptually is right, Mr. O'Gorman. I'm not  
22 advanced enough in my chemistry to know if it would  
23 stay in the form of selenate or if there would be some  
24 kind of, you know, a reduction or oxidation process  
25 that would change it from -- from that form.

26 Q Okay. I mean, it seems that there's a potential for --

1 if there are molecules, potentially a whole lot of  
2 molecules of selenium left behind on the roads after  
3 watering, and then precipitation comes along, and some  
4 portion of that is washed into, for example, the pit  
5 where a lot of the dusty roads are that will be  
6 watered, and then some of it might make it out of the  
7 pit and make it into Gold or Blairmore Creek, or will  
8 all of that be captured somehow? Tell me what's going  
9 to happen -- the eventual fate of the selenium that  
10 you've sprayed onto your roads.

11 A All --

12 Q Because I'm going to suggest that it's not an  
13 insignificant amount of selenium.

14 A So -- so you raise -- raise an interesting point;  
15 however, all -- all of that -- you know, if -- if you  
16 consider the scenario where we have a -- say, a -- a  
17 storm and a -- a inundation washing some of that  
18 selenium off the road. It -- it would go into the  
19 groundwater system. It would not -- it would not run  
20 off the site. It would be captured on the site. And  
21 so it would end up either in the groundwater in the  
22 SBZ, if -- if it was in that area, or in the pit,  
23 and -- and it would manifest itself, I guess, in the  
24 water we extract from the pit.

25 Q Right. And the pit water, we recall, is supposed to be  
26 pumped to the sediment ponds; correct?

1 A It -- it will depend on -- on any selenium content in  
2 that water. So if -- if that pit water had high  
3 selenium content, we -- we would direct it towards a  
4 surge pond or to the --

5 Q Okay.

6 A -- raw water pond again.

7 Q Okay. And I'm guessing, if you could confirm, that the  
8 selenium that we're talking about now that was sprayed  
9 on roads and then either goes into the groundwater or  
10 washes off and ends up in the pit, water you're pumping  
11 out or, you know, some other -- in ditches around the  
12 site, I am guessing that you have not -- 'cause we  
13 incorporated that into your, you know, water quality  
14 modelling.

15 A No. And I -- okay. I'm -- I'm guessing here, but I --  
16 I would think that it would be small compared to the  
17 other sources of -- of selenium. If it was not, I  
18 would suggest we'd have to change our watering -- road  
19 watering strategy and -- and use treated water or at  
20 least water that's coming out of the SBZ.

21 Q Okay.

22 A No, no. I -- good -- good questions and certainly  
23 something we need to check quickly to make sure that  
24 it's not an issue for the project.

25 Q Yeah, that might be worth doing. I was even thinking  
26 about the ditches you have around site capturing site

1 runoff water, not the -- is supposed to, as I recall,  
2 be directed to the sediment ponds, and that's supposed  
3 to be your non-selenium-laden water, but if you have  
4 this extra selenium being potentially washed into it,  
5 yeah, it's --

6 A Yeah.

7 Q But there's -- but there's been no estimates of the  
8 impact of this? That's, I guess, what I wanted to  
9 confirm, and --

10 A No.

11 Q -- you agree with that? Okay.

12 A I -- I agree with that. It -- it's something we'll  
13 take away, though, Mr. O'Gorman, and take a look at.  
14 The -- the water in the sedimentation ponds, even if  
15 this water had selenium in it and got that far, will be  
16 tested before it's discharged to the environment. So  
17 if there is an incidence of high selenium, that water  
18 would then get redirected back to the -- the raw water  
19 surge -- surge ponds or the raw water pond for -- for  
20 further treatment through the SBZ.

21 But I'll -- I'll -- I'll get our guys to run a  
22 check on this to see if it's a significant amount  
23 compared to the other selenium loading we're -- we're  
24 calculating.

25 Q Okay. That's all my questions. Thank you, gentlemen,  
26 and thanks for this panel. I think I -- I -- I -- I



1 think I wrap us up, so my -- the chair will speak, but  
2 I'd like to say thank you to all of you for the last  
3 few days of the questions that you've all put --  
4 answered and -- to the best of your ability. We really  
5 appreciate it. So thank you.

6 A Thank you.

7 THE CHAIR: Okay. Thank you,  
8 Mr. O'Gorman.

9 So, yes, that is the end of the questions from the  
10 Panel. So another long slog.

11 Mr. Ignasiak, any re-direct?

12 MR. IGNASIAK: No, sir.

13 THE CHAIR: Okay. Well, with that, this  
14 panel's work is done, so thank you very much, Benga  
15 panel, for answering all of the questions of the  
16 participants and the secretariat and the Panel.

17 (WITNESSES STAND DOWN)

18 Discussion

19 THE CHAIR: So it is just about 4:30, and  
20 so it seems a bit late to start the Canada panel,  
21 particularly recognizing that many of the participants  
22 are probably in the Ontario, Quebec area, and it's  
23 later for them.

24 So, Mr. Drummond, if you are here, is it okay if  
25 we start your panel in the morning?

26 MR. DRUMMOND: I'm sure they're fine with

1 that, sir. Thank you.

2 THE CHAIR: Okay. And the other question  
3 I had was -- I'm just kind of doing the math to see if  
4 we can finish tomorrow, which depending on the answer  
5 to a few questions, it looks like we should be able to.  
6 So we have Canada available for cross-examination. I'm  
7 aware that between the secretariat and the Panel, we  
8 probably have about two hours of questions. I don't  
9 know how long Benga thinks it may be or if Mr. Ignasiak  
10 wants to provide an estimate.

11 MR. IGNASIAK: I think we would be fairly  
12 brief, Mr. Chair. I'd reserve 15 minutes, but I don't  
13 see anything beyond that.

14 THE CHAIR: Okay. Thank you.

15 And then in addition, we have direct from the  
16 Coalition, which is 45 minutes; and Livingstone  
17 Landowners Group, an hour and 30 minutes; and then, of  
18 course, any cross-examination resulting from them. And  
19 then the only other piece of business would be if Benga  
20 intends to do any reply evidence. That would be in  
21 addition to those things. So, subject to any comments  
22 from the participants, it looks like we should be able  
23 to finish tomorrow.

24 I did have a question about whether we wanted to  
25 start a bit earlier to ensure that we finish tomorrow.  
26 And by "earlier", maybe 8:30. I don't know that it's

1 necessary, but if we wanted some additional comfort, we  
2 could start a bit earlier. So I'll just put that to  
3 the participants and maybe hear particularly from  
4 Canada and Benga.

5 MR. DRUMMOND: Thank you, Mr. Chair. Robert  
6 Drummond here.

7 I think, just given -- because of the time  
8 difference for a few of the witnesses, I don't think an  
9 8:30 time is -- is problematic at all and actually  
10 might be preferred, in part.

11 THE CHAIR: Okay. Yeah, I thought that  
12 might be the case.

13 Mr. Ignasiak, any concerns about starting earlier?

14 MR. IGNASIAK: No, none, sir.

15 THE CHAIR: Okay. Any other participants  
16 have concern with an 8:30 start?

17 Okay. Hearing none, we'll start at 8:30 tomorrow  
18 morning just to hopefully ensure we can finish  
19 tomorrow.

20 And is there any other business we need to take  
21 care of before we break?

22 Okay. Thank you, everyone. We'll see you again  
23 in the morning.

24 \_\_\_\_\_

25 PROCEEDINGS ADJOURNED UNTIL 8:30 AM, DECEMBER 1, 2020

26 \_\_\_\_\_

1 CERTIFICATE OF TRANSCRIPT:

2

3 I, Christy Longacre, certify that the foregoing  
4 pages are a complete and accurate transcript of the  
5 proceedings, taken down by me in shorthand and  
6 transcribed from my shorthand notes to the best of my  
7 skill and ability.

8 Dated at the City of Calgary, Province of Alberta,  
9 this 30th day of November 2020.

10

11

<Original signed by>

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14 —————  
Christy Longacre, RPR, CSR(A)

15 Official Court Reporter

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<b>1</b>	<b>1</b> 5791:8 5801:26 5803:3 5804:15 5809:14 5820:22 5824:1 5826:1 5828:4,7 5829:9 5832:12 5835:25 5837:3,4 5842:25 5844:21 5855:13 5864:7,8,9 5869:10 5879:3,5 5885:2,15 5900:12 5905:6, 12,18 5906:2,3, 12 5908:9	<b>2</b> 5792:19 5828:4, 6 5881:11 5885:15 5887:10 5919:25 5958:21 5959:13 <b>2,000</b> 5959:4,12 <b>2-1</b> 5869:23 <b>2.5</b> 5869:16 5870:14 5878:6, 19 5890:11 5895:18,24 5896:11 5901:20 <b>2.61</b> 5846:9 <b>2.69</b> 5845:22 <b>2.7</b> 5825:11 5835:23 <b>20</b> 5772:8 5775:15 5776:7		

**28th** 5789:15**29** 5773:2**2:23** 5911:5**2:40** 5911:5

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**3**

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**3** 5778:16

5820:15 5843:22

5844:5 5845:1,10

5848:4 5857:2

5906:7

**3-to-1** 5778:17**3.4** 5778:2**3.8** 5912:16**3.9** 5796:14**30** 5776:7

5781:22 5793:16

5794:7 5795:21

5832:14 5856:3

5896:2 5968:17

**300,000** 5946:19**305** 5778:16**30th** 5970:9**313** 5815:11

5817:19 5820:4,

11,12,21 5821:6

5823:24,26

5824:13 5829:10

5830:2 5832:12

5833:1,6 5836:18

5837:14 5838:1,

8,15 5839:1

5842:25 5844:12,

25 5886:15

5897:26 5904:14,

25 5905:3

5906:17,25

5907:14 5910:19

5911:19 5913:18

5923:23 5925:17

5927:26 5940:17

**32** 5779:15

5781:1

**334** 5923:6**35** 5784:16**360** 5786:1

5798:18 5814:7,

17 5815:3 5816:2

5819:21 5829:1

5836:24 5869:23

5911:20 5912:18

5924:3

**365** 5914:4**37** 5939:11

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**4**

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**4** 5836:14 5869:1,

7 5870:7,10

5906:7

**4-1** 5809:18**4.1** 5810:2

5912:24

**40** 5798:11,19

5940:16 5961:2

**42** 5803:3

5804:16 5829:12

5831:14 5832:2,

26 5843:22

5844:4 5848:3

5928:22 5929:4,8

**45** 5968:16**46** 5923:25**4:30** 5967:19

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**5**

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**5** 5794:7 5831:14

5837:3,5 5906:7

**5,700** 5768:6**50** 5949:24

5961:2

**500** 5929:13**503** 5785:9**527** 5789:16**53** 5958:22**54** 5824:1,9**542** 5796:2**55** 5792:19

5794:17 5803:5

**5641** 5957:23**57-year** 5819:24

5829:6

**571** 5796:14

5799:11,21

**58** 5831:20**5th** 5797:9

5810:14

---

**6**

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**6,000** 5778:5**6,019** 5778:3**6,900** 5779:21**6.19-3** 5923:24**6.25** 5820:5,11,12

5827:4 5830:2,10

5863:13

**6.25-1** 5824:1,5

5826:6

**6.27-1** 5842:25**6.3** 5796:3,8,20,

25

**60** 5774:10

5949:25 5960:13

**60,000** 5960:7**602** 5924:25**604** 5925:8**61** 5831:22**63** 5796:2**63,000** 5778:18**66** 5857:14**665** 5871:17

---

**7**

---

**7** 5786:3,5,6

5814:19,26

5815:16 5958:9

5963:10,12

**7-1** 5817:20,21

5837:15

**7-16** 5832:2**7-2** 5817:21**7-20** 5832:2**7-3** 5817:21**7-4** 5817:22

5837:15

**7.1-2** 5815:3

5816:11,26

**7.1-5** 5924:3**7.2.1.2** 5838:8**7.2.1.3** 5838:15**7.5** 5904:25

5905:11

**7.8** 5904:25**70** 5774:10

5789:13

**760** 5776:21

5779:25

**761** 5776:11**77** 5906:1**78** 5906:1

---

**8**

---

**8** 5819:21 5829:1

5958:9,23

**8.83** 5844:20**80th** 5918:5**85** 5869:23**89** 5772:7

5776:10 5779:25

5781:22 5924:25

**8:30** 5968:26

5969:9,16,17,25

**8th** 5768:11,15

---

**9**

---

**9** 5936:21**900** 5793:23**907** 5800:15**95** 5915:8**95th** 5815:7

5816:13 5819:22

5821:24 5824:4,

22 5829:4

5834:26 5835:1

5918:6

**9:03** 5765:21

---

**A**

---

**ability** 5801:10

5828:20 5834:12

5841:12 5855:3

5967:4 5970:7

**abnormalities**

5925:5

**Aboriginal**

5784:4 5947:23

**absence** 5836:9**absolutely**

5811:16 5929:25

**absorbed** 5904:1**abundance**

5775:7

**abundances**

5923:26

**accept** 5767:10**acceptable**

5842:16 5851:12

5854:4 5863:10

5875:2 5879:16

5913:1 5922:4,6

5933:15 5957:3

**acceptance**

5836:11

**access** 5788:26

5842:1,9,10,18

5869:8 5879:7

5892:7,9 5956:22

**accesses** 5773:18

<b>accessible</b> 5879:2	5804:11	5946:10 5948:10	<b>adverse</b> 5869:5	5787:20 5788:15
<b>accidents</b> 5784:19,20	<b>actual</b> 5781:3	5969:1	5879:1 5884:5,8	5860:23 5930:12
<b>accommodate</b> 5766:8	5812:24 5848:19	<b>additive</b> 5897:6	5886:5 5888:3,6	<b>air</b> 5770:13,22
<b>accompanying</b> 5880:5	5862:19 5872:25	5901:4 5902:10,	5902:9 5912:4	5791:8 5801:26
<b>account</b> 5805:18	5880:1 5886:18	22,25 5903:7	5915:4 5942:3	5803:3 5804:15
5959:11	5896:21 5908:19,	5904:10,23,26	<b>advice</b> 5924:14	5809:14 5814:22
<b>accounted</b>	22 5914:24	5905:5 5908:12	<b>advised</b> 5769:7	5815:18 5816:1,
5804:24 5806:4,8	5930:24 5938:26	5909:22,24,25	<b>AER</b> 5856:9,10,	8,12,16,19,24
5807:1	5954:6	5910:2 5940:9	16,17,18,19,20	5817:1 5826:7,25
<b>accounts</b>	<b>acute</b> 5883:13	5945:1,7	<b>AER's</b> 5765:26	5841:4,21,22
5914:22 5935:13	<b>adapted</b> 5778:21	<b>additively</b>	<b>aerial</b> 5943:1	5859:26 5864:15
<b>accumulation</b>	<b>adapting</b> 5920:6	5903:5,14	<b>aesthetic</b>	5865:8 5867:8
5898:14	<b>adaptive</b> 5890:7	<b>additives</b>	5848:10,12,24	5872:16 5876:6
<b>accurate</b> 5815:22	5893:5	5944:22	<b>affect</b> 5801:10	5880:13 5881:6
5873:7 5970:4	<b>add</b> 5783:23	<b>address</b> 5875:4	5850:2 5873:11	5882:7,8,9
<b>achieve</b> 5805:19	5793:9,11	<b>addressed</b>	5925:3	5883:12 5885:21,
<b>achieved</b>	5851:26 5852:13	5789:24 5875:7	<b>affected</b> 5854:14	24,26 5886:2
5915:10	5884:16 5893:7	<b>addresses</b> 5822:6	5911:25	5890:6,13
<b>acknowledged</b>	5894:26 5900:1	5945:13	<b>affecting</b>	5891:5,6,11,26
5814:8 5824:25	5901:2 5910:11,	<b>adds</b> 5927:4	5931:16 5947:23	5893:3,16
5879:3	15 5915:11	<b>adequate</b>	<b>affects</b> 5771:22	5894:3,5,6,10
<b>ACO</b> 5768:14	5916:6 5930:6	5781:19 5850:24	5875:12	5898:23 5899:13,
5865:19	5931:1 5934:22	<b>adjacent</b> 5850:9,	<b>affirmation</b>	15,21 5908:24
<b>acreage</b> 5955:13	5945:15	11 5854:2	5769:16,24	5909:5,12
<b>acres</b> 5807:9	<b>added</b> 5816:19	<b>ADJOURNED</b>	<b>Affirmed</b>	5911:22 5922:15
<b>act</b> 5904:16	5864:16 5906:11	5855:15 5969:25	5770:12 5859:25	5943:5 5948:26
5923:18,21	5945:2,11	<b>ADJOURNME</b>	<b>afraid</b> 5793:8	5950:2,4 5954:9
5924:23 5937:23	<b>addendum</b>	<b>NT</b> 5807:24	<b>afternoon</b>	<b>air-dispersion</b>
5938:13 5939:10	5772:7 5776:10	5911:6	5766:16 5856:3	5879:12
<b>action</b> 5858:24	5786:4 5791:7	<b>adjust</b> 5768:18	5946:13 5950:21,	<b>air-monitoring</b>
5924:18	5792:20 5801:25	5777:6 5871:12	22,24	5894:12
<b>actions</b> 5886:25	5814:7 5820:22	<b>adjustment</b>	<b>agencies</b> 5883:26	<b>airborne</b>
<b>active</b> 5937:18	5829:9 5832:12	5914:15 5921:2	5884:2	5901:10 5903:17
<b>actively</b> 5881:12	5842:25 5923:24	<b>adjustments</b>	<b>agency</b> 5789:15	5908:15
<b>activities</b>	5951:8 5958:21	5817:7,9,16	<b>agree</b> 5828:2,11	<b>albeit</b> 5905:14,20
5786:12 5804:22,	<b>addition</b> 5767:15	<b>adopting</b>	5893:6 5963:19	<b>Alberta</b> 5772:21
23,26 5805:25	5877:21 5968:15,	5799:16	5966:11,12	5775:14 5776:3
5806:4 5813:11	21	<b>adult</b> 5931:3	<b>agreeable</b>	5778:10,20
5940:6	<b>additional</b>	<b>adults</b> 5775:1	5867:20	5794:23 5795:2
<b>activity</b> 5787:7	5786:3 5789:14	5924:9	<b>agrees</b> 5766:25	5812:8 5857:1,
5798:17 5803:12	5800:23 5838:22	<b>advance</b> 5766:6	5767:1	22,24 5858:18
	5850:14 5855:8	<b>advanced</b>	<b>Agudelo</b> 5858:9	5860:4 5878:13
	5891:15,16,17	5963:22	<b>ahead</b> 5769:5	5923:1,2,17
	5892:12 5893:11		5770:6 5781:11	5929:5 5970:8
	5894:8 5903:11			<b>Alberta's</b>
	5938:8 5944:7			5951:16

**Alfalfa** 5858:2  
**aligned** 5944:25  
**Alistair** 5859:3  
**allowed** 5834:3  
 5901:22  
**allowing** 5898:13  
**Allred** 5859:11  
**alpine** 5776:6  
**alternative**  
 5889:1  
**alternatives**  
 5842:7  
**aluminum**  
 5817:24 5826:1  
 5837:21 5838:2,5  
 5843:15 5844:1,  
 9,15,18 5847:19  
 5848:8,12  
 5849:11 5850:5  
 5862:2,6 5863:7,  
 11,12 5864:26  
 5865:10,24  
 5898:23  
**ambient** 5854:4  
 5890:13  
**amending**  
 5789:24  
**American**  
 5919:23,26  
 5924:5,6 5931:10  
 5932:4 5933:12  
 5936:5,6  
**amount** 5798:23  
 5836:2 5853:24  
 5860:13 5864:11  
 5865:5 5877:23  
 5956:11 5959:20  
 5960:19,26  
 5961:6 5964:13  
 5966:22  
**amounts** 5778:2  
**amphibian**  
 5922:23 5925:24  
 5926:20 5942:5

**amphibians**  
 5923:8 5925:4,21  
 5926:4,7,10,13,  
 16,26 5927:9,13,  
 17,18 5929:21,26  
 5930:1 5931:3  
 5934:1 5936:1,9,  
 17 5937:12  
 5942:12,18,22  
 5944:11  
**analogous**  
 5820:1 5926:26  
**analyses** 5826:20  
**analysts** 5769:2  
 5770:21,23  
 5807:16 5811:18  
**analyzed**  
 5889:20  
**and/or** 5892:26  
**anecdote**  
 5784:13  
**animal** 5826:25  
**animals** 5779:19  
 5931:5 5944:15  
**annual** 5795:14  
 5805:12 5806:25  
 5891:22  
**answer's**  
 5915:21  
**answering**  
 5769:10 5967:15  
**answers** 5819:4  
 5821:25 5887:25  
 5950:15  
**antagonistic**  
 5944:23  
**anthropogenic**  
 5898:25  
**anticipate**  
 5766:15 5812:16  
 5854:1 5952:10  
 5959:17  
**anticipated**  
 5795:8 5822:1,11  
 5823:5

**Antimony**  
 5838:10  
**anxiety** 5874:6  
**Apologies** 5911:9  
**apologize** 5770:3  
 5880:26  
**apology** 5899:5  
**Appalachian**  
 5948:17  
**apparent**  
 5823:21  
**apparently**  
 5927:6  
**appeared**  
 5769:14 5787:10  
**appears** 5800:1  
 5804:20 5811:20  
 5817:20 5824:19  
 5827:20,22  
 5843:23 5844:2  
**appendix**  
 5809:15 5820:11,  
 12,22 5821:16  
 5824:1,5,15  
 5826:6 5829:9,12  
 5830:2 5832:2,8,  
 12,13,26 5833:1  
 5839:1 5842:25  
 5923:24 5928:22  
 5929:4,8 5958:22  
**applicable**  
 5913:19  
**application**  
 5826:4 5839:8,17  
 5879:19 5891:13  
 5905:9,15  
 5906:2,19  
 5907:17 5918:7  
 5959:2  
**applications**  
 5768:1  
**applied** 5913:20  
 5914:12 5916:21,  
 22,25 5917:12  
 5919:1,4,12

5921:12 5932:23  
 5935:8,9,18  
 5945:8  
**applies** 5900:10  
**apply** 5840:7  
 5862:18 5889:12,  
 21 5915:5  
 5916:17,19  
 5918:4 5919:8,13  
 5937:17 5945:24  
**appointment**  
 5866:10,15  
**apportionment**  
 5879:22  
**appreciated**  
 5866:16  
**appreciation**  
 5773:21  
**approach**  
 5787:20 5864:8  
 5870:15 5871:2  
 5881:19 5901:11  
 5902:22 5904:11  
 5918:3 5940:26  
**approaching**  
 5825:26 5885:2  
 5891:6 5892:4  
 5893:2 5941:8  
**appropriately**  
 5797:12  
**approval** 5891:3  
**approved**  
 5872:26 5883:4,5  
**approximate**  
 5790:25  
**approximately**  
 5775:21 5778:17  
 5779:17  
**April** 5789:14  
**aquatic** 5769:11  
 5890:1 5912:14  
 5923:12 5924:7  
 5942:10

**aquatic-**  
**dependent**  
 5919:17 5936:2  
**aquifers** 5843:11  
**area** 5774:11,14,  
 15 5775:21,24,26  
 5776:4,5,12,19  
 5777:7,15  
 5778:4,5,7,10,20  
 5779:17,19  
 5780:13 5782:4,  
 14 5783:7,10,19  
 5784:3 5786:11  
 5787:3,5,6,13,15,  
 16,18,21 5843:20  
 5845:8 5851:6,8  
 5875:16 5879:6  
 5881:15 5882:12  
 5894:5 5914:8  
 5920:9,10,12,15  
 5922:26 5923:14  
 5943:20 5945:20  
 5946:22 5947:9,  
 15 5953:24,26  
 5956:3,23  
 5964:22 5967:22  
**areas** 5776:25  
 5781:26 5782:9,  
 18 5783:10  
 5785:22 5786:22,  
 23 5787:11  
 5789:2 5803:18  
 5812:4 5850:1  
 5882:24 5887:18  
 5891:1 5912:6  
 5914:1 5923:25  
 5943:10 5950:19  
 5956:6 5963:1  
**argument**  
 5766:18,21,23,  
 24,26 5767:4,5,8,  
 12,19,24 5768:2,  
 9,10,16 5865:16  
**arising** 5868:9  
 5896:20  
**army** 5778:24



<b>aromatic</b> 5870:12 5871:7 5904:17	26 5840:20 5842:24 5844:12, 15 5845:14,19 5846:13 5848:16 5849:10,23 5851:24 5853:1,3 5860:3,10 5865:23 5871:22, 24 5873:19 5874:11 5875:25 5878:25 5879:12, 23,24 5880:3,6, 17,23 5881:22 5883:23 5884:10, 14,19 5885:8,22 5886:21 5897:24 5899:16,21,23 5900:3,4 5901:7 5909:24 5910:25 5911:1,16,19 5912:1 5917:26 5925:24 5927:5 5928:7,10 5936:3 5938:9,10 5939:10,15 5940:12 5942:13, 19 5944:13 5948:14 5953:8	<b>assuming</b> 5766:16 5777:9 5794:16 5810:26 5882:9,26 5897:12 5913:23 5953:10 5959:3	<b>attracted</b> 5943:24	5958:3,17 5961:17,18 5962:3 5963:7 5966:18
<b>arrives</b> 5835:6,9		<b>assumption</b> 5794:21 5835:5 5836:4,11 5837:12 5852:18 5881:10 5882:2 5884:13,16 5887:13 5900:25 5919:16 5920:16 5960:6	<b>attributable</b> 5953:18	<b>back-and-forth</b> 5867:3
<b>Arruda</b> 5856:16 5922:10		<b>assumptions</b> 5826:23 5833:14 5834:8,15 5835:13 5837:7 5872:16 5882:3, 15,16 5900:16 5911:18,21,23 5912:8 5915:2 5933:2 5937:7	<b>attribute</b> 5839:10,19	<b>backfill</b> 5834:2 5851:4 5934:14
<b>arsenic</b> 5814:9, 25 5815:2 5816:4 5817:6,11 5820:14,17 5824:6,15,18 5825:9 5826:3 5835:23 5836:1, 6,13,15 5864:13, 21 5865:3,8,25 5867:6,12		<b>asthmatic</b> 5883:17	<b>attributing</b> 5906:12	<b>background</b> 5834:23 5836:12, 13,15 5837:25 5838:5,11,19 5839:1,9,11,18, 20 5849:17 5876:6 5879:9 5893:14,18,20,22 5895:2,6,11,13 5898:21 5900:1, 11,13,14,19 5906:4,7,13,21, 26 5907:3,8,16 5909:2 5924:21
<b>artifact</b> 5838:12	<b>assessments</b> 5812:12,15 5815:14 5820:20 5822:13 5909:21	<b>at-risk</b> 5941:9	<b>audio</b> 5765:24	<b>availability</b> 5793:1,7 5920:2 5933:17
<b>aspect</b> 5884:16, 17 5885:8	<b>assessors</b> 5910:15	<b>Athabasca</b> 5784:17	<b>authoritative</b> 5872:9	<b>average</b> 5778:9 5804:4
<b>aspects</b> 5835:26 5885:9	<b>Association</b> 5857:25 5859:1	<b>atmospheric</b> 5912:3,11	<b>availability</b> 5793:1,7 5920:2 5933:17	<b>averages</b> 5820:3
<b>assemblage</b> 5919:7	<b>assume</b> 5783:11 5853:5 5883:11 5920:7	<b>Attachment</b> 5792:19	<b>avian</b> 5919:23 5923:10 5945:9	<b>avians</b> 5926:23
<b>assess</b> 5828:1 5852:16 5872:12 5876:4 5888:17 5927:8	<b>assumed</b> 5821:1 5826:24 5835:3 5881:22 5883:9 5897:15,16,22 5904:22 5913:22 5919:17 5920:18 5924:7 5932:25 5936:1	<b>at-risk</b> 5941:9	<b>avoid</b> 5842:8 5850:16 5887:23	<b>avoid</b> 5842:8 5850:16 5887:23
<b>assessed</b> 5869:1 5872:10 5883:14 5898:5 5939:8		<b>Athabasca</b> 5784:17	<b>aware</b> 5768:21 5793:12 5821:15 5874:1 5875:18 5904:6 5946:1,6, 26 5951:19,25 5968:7	<b>backup</b> 5915:26
<b>assessing</b> 5939:9, 25		<b>at-risk</b> 5941:9	<b>aware</b> 5768:21 5793:12 5821:15 5874:1 5875:18 5904:6 5946:1,6, 26 5951:19,25 5968:7	<b>bad</b> 5779:7,13
<b>assessment</b> 5770:16 5771:25 5792:20 5801:26 5803:3 5804:24 5812:4 5818:12 5819:22 5822:3, 16 5823:7,20,24 5824:3,17,23,25 5825:5 5826:10, 21,22 5827:22,24 5828:8,21 5829:3,13 5832:10 5833:10 5838:26 5839:3,		<b>Athabasca</b> 5784:17	<b>avoid</b> 5842:8 5850:16 5887:23	<b>bad-climate</b> 5779:8
		<b>atmospheric</b> 5912:3,11	<b>aware</b> 5768:21 5793:12 5821:15 5874:1 5875:18 5904:6 5946:1,6, 26 5951:19,25 5968:7	<b>bad-weather</b> 5779:7
		<b>Attachment</b> 5792:19	<b>aware</b> 5768:21 5793:12 5821:15 5874:1 5875:18 5904:6 5946:1,6, 26 5951:19,25 5968:7	<b>balance</b> 5816:15 5960:10
		<b>attack</b> 5778:12, 13	<b>aware</b> 5768:21 5793:12 5821:15 5874:1 5875:18 5904:6 5946:1,6, 26 5951:19,25 5968:7	<b>ballpark</b> 5960:21
		<b>attempt</b> 5777:22	<b>aware</b> 5768:21 5793:12 5821:15 5874:1 5875:18 5904:6 5946:1,6, 26 5951:19,25 5968:7	<b>Band</b> 5857:4
		<b>attempting</b> 5896:9	<b>aware</b> 5768:21 5793:12 5821:15 5874:1 5875:18 5904:6 5946:1,6, 26 5951:19,25 5968:7	<b>Banff</b> 5785:3
		<b>attention</b> 5776:24 5796:6 5804:20 5843:26 5956:10,17	<b>aware</b> 5768:21 5793:12 5821:15 5874:1 5875:18 5904:6 5946:1,6, 26 5951:19,25 5968:7	<b>bar</b> 5961:17
		<b>attitudes</b> 5948:5	<b>aware</b> 5768:21 5793:12 5821:15 5874:1 5875:18 5904:6 5946:1,6, 26 5951:19,25 5968:7	<b>Barata</b> 5857:15
		<b>attract</b> 5944:11	<b>aware</b> 5768:21 5793:12 5821:15 5874:1 5875:18 5904:6 5946:1,6, 26 5951:19,25 5968:7	<b>Barbara</b> 5800:20 5858:14
			<b>aware</b> 5768:21 5793:12 5821:15 5874:1 5875:18 5904:6 5946:1,6, 26 5951:19,25 5968:7	<b>barium</b> 5837:21 5838:17 5843:15 5898:23
			<b>aware</b> 5768:21 5793:12 5821:15 5874:1 5875:18 5904:6 5946:1,6, 26 5951:19,25 5968:7	<b>barn</b> 5923:14,16 5924:9 5931:12 5937:1
			<b>aware</b> 5768:21 5793:12 5821:15 5874:1 5875:18 5904:6 5946:1,6, 26 5951:19,25 5968:7	<b>Bartlett</b> 5770:9

5859:22 5934:21	5924:19 5930:18	5800:23 5801:4, 8,17 5802:6,7,11, 13 5805:16	5927:8 5928:23	<b>bird</b> 5770:26
<b>base</b> 5803:12	<b>BAT/BEP</b>	5806:2,10 5807:1	5929:2,21 5934:3	5773:23 5774:11,
5807:8 5837:7	5796:9,23	5808:25 5809:2	5936:8 5939:19	23,26 5783:9,15
5852:5,7 5918:18	<b>batch</b> 5787:20	5810:8 5811:8,10	5940:21,23	5786:15 5788:17
5948:2 5956:3	<b>Bauman</b> 5770:10	5812:8 5813:14,	5941:3,24	5919:26 5923:11
<b>based</b> 5802:14,17	5779:26 5780:1	20 5814:8,19	5943:15 5944:12,	5932:5 5937:1
5804:1,10,11	5783:22 5859:23	5815:2,15	20 5946:1 5947:3	5938:14 5939:1
5807:9 5810:15	5866:10	5816:3,10,22	5951:14 5967:14	5941:5 5942:6
5811:1 5819:22	<b>bay</b> 5877:16	5819:21,25	5968:9,19 5969:4	<b>birds</b> 5770:14
5826:12,22	5958:5,7 5959:5,	5820:5,10 5821:4	<b>Benga's</b> 5767:10,	5773:25 5779:11
5827:3,13 5829:3	24	5823:21 5824:15	22 5782:2 5786:2	5783:17,18
5830:26 5833:13,	<b>BC's</b> 5926:1	5825:23 5826:4	5794:19 5801:10	5860:1 5912:17
14 5835:11	<b>beak</b> 5778:25	5829:1,8	5816:22 5819:17	5922:22 5924:23
5836:3 5846:18	<b>bear</b> 5778:6	5831:14,20	5823:13 5826:12	5926:3,8,9,12,18,
5848:10,12	<b>bed</b> 5810:4	5832:3,9,20	5830:16 5839:10,	22 5927:10,18,22
5849:11 5851:1	<b>bedrock</b> 5843:5	5834:7 5835:22	19 5843:13,26	5931:23 5933:23
5852:16,17	5850:3,19	5837:16,24	5851:23 5854:12	5936:2,19
5854:24 5855:5	<b>begin</b> 5769:4	5838:1,8,15,22	5870:19 5890:1,	5937:13,23
5861:12 5863:12	5771:5,20 5772:8	5839:5,14	6,9,17 5891:2	5938:1,5,7,19,23
5869:6 5872:20	5782:7 5797:15	5840:21,25	5892:25 5907:11	5939:23 5941:19
5876:6 5878:4	5808:3	5842:1,26	5913:10 5916:14	<b>bison</b> 5784:3,8,
5881:10 5885:24	<b>beginning</b>	5843:10 5844:7,	5939:6,11	11,16 5785:1
5887:5,6,10	5800:18,21	10,14 5845:25	5941:10	<b>bit</b> 5773:3
5888:16 5891:22	<b>behalf</b> 5911:13	5850:18 5856:22	<b>benthic</b> 5779:10	5777:23 5785:16
5896:20 5897:14	<b>believed</b> 5933:18	5860:4 5864:11	5919:20 5920:14	5788:26 5789:20
5899:16 5906:7	<b>benchmarking</b>	5867:4,13	<b>benzoate</b>	5790:6 5794:4,10
5908:18 5917:16	5952:13	5869:4,14,21,26	5904:19	5795:21 5804:17
5919:2,9 5925:1,	<b>benchmarks</b>	5872:4 5873:19	<b>Berdina</b> 5857:26	5809:25 5810:15
10 5927:22	5893:4	5874:1,9,10	<b>berry</b> 5868:9	5812:2 5823:11
5936:11 5941:18	<b>benefit</b> 5766:13	5878:25 5879:2,	<b>biases</b> 5873:16	5831:8 5834:23
5945:10 5959:18	<b>benefits</b> 5773:13	4,14,21 5880:4	<b>big</b> 5872:14	5842:20 5848:1,
5960:22	<b>Benga</b> 5766:20,	5886:16 5890:12	5914:16 5947:25	20 5867:3,24
<b>baseline</b> 5843:13	22 5768:9,11,15,	5891:24 5892:17	5955:7,8,15	5868:24 5876:4
5846:22 5853:14	26 5769:7,9	5893:17 5894:8	5962:20	5878:23 5885:23
5879:9 5880:14	5770:18 5777:9,	5896:9 5897:1,5,	<b>biggest</b> 5950:13	5886:22 5896:23
5889:6 5894:8,	26 5778:15,22	11,19,26 5902:9	<b>BILAWCHUK</b>	5901:23 5911:10
11,17 5905:14,20	5780:16 5782:7,	5904:14,20,26	5770:10 5859:23	5915:21 5916:25
5906:20 5907:12,	9,13 5783:13	5905:3,7 5906:17	<b>bioavailability</b>	5929:19 5930:3
18 5908:4,18	5785:20 5788:2,	5907:2 5909:21,	5871:10,13	5935:26 5938:21
5909:1 5947:6	11,23 5790:11	23 5910:1	<b>bioconcentratio</b>	5942:18 5943:21
5949:5	5791:14 5792:26	5911:16,26	<b>n</b> 5917:12	5945:16 5955:6,9
<b>basically</b> 5836:4	5794:21 5796:6,	5912:7,18,20,25	<b>biologist</b> 5771:9	5958:25 5962:18
<b>basis</b> 5787:19	8,14,21 5797:4,	5915:3 5922:22,	5784:14	5967:20 5968:25
5789:6 5832:20,	24 5798:25	26 5923:11	<b>biologists</b>	5969:2
26 5850:20		5924:11,16	5784:10	<b>Blair</b> 5861:9
5871:2 5888:9		5925:10,23		<b>Blairmore</b>
5905:7 5911:26				5817:25 5819:20

5820:8,18  
 5821:17,18  
 5823:23 5824:7,  
 17 5829:23,25  
 5830:1,5 5837:17  
 5839:8,17  
 5841:17 5843:7  
 5844:16 5854:17  
 5860:25 5861:3,  
 5,9,10,17,22  
 5862:3,9,14,18,  
 20 5863:4,6  
 5864:1,14  
 5865:12 5866:2  
 5867:6 5882:4  
 5889:5,8,14  
 5890:14,20  
 5894:13 5895:4  
 5901:25 5905:16  
 5915:6,13  
 5917:24 5918:25  
 5928:10,13,15  
 5929:15 5932:13  
 5935:7,14,20  
 5936:8,10  
 5937:21 5939:1  
 5956:22 5964:7  
**block** 5769:14  
**blowing** 5876:21  
**blue** 5914:6  
 5915:14 5936:7  
**Bluff** 5854:18  
**blush** 5963:4  
**bodies** 5818:17  
 5844:11 5861:13  
 5868:3,12 5912:3  
 5937:10,19  
**body** 5904:1  
 5932:6 5938:22  
**Bolton** 5856:5  
**bottom** 5789:21  
 5800:18 5805:9  
 5844:3 5848:5  
 5940:15 5958:24,  
 26

**bound** 5769:24  
 5886:3  
**boundaries**  
 5801:14,15  
**boundary** 5820:1  
 5833:8 5843:2,4  
 5851:18 5869:4,  
 11 5879:6  
 5901:16  
**bounded**  
 5854:16  
**bounds** 5913:21  
**Boyce** 5858:21  
**Bradley** 5859:7  
**brave** 5911:11  
**break** 5767:9  
 5807:14,15,21  
 5828:17 5855:12  
 5860:18 5863:24  
 5911:4,5 5969:21  
**breathing** 5882:9  
 5883:12  
**breeding**  
 5774:20 5775:6  
 5788:3,17  
 5919:21,22  
**briefly** 5771:21  
 5774:6 5775:11,  
 13 5802:17  
 5886:15 5933:26  
**bright-green**  
 5776:25  
**brings** 5910:24  
**Brinker** 5769:3,  
 6,7,21,23 5770:1,  
 4,5,7 5856:23  
**broad** 5775:16,17  
**broadcast**  
 5766:4  
**broken** 5881:14  
**brought** 5812:25  
**built** 5827:10  
 5836:2 5837:7  
 5838:13 5861:15

5874:19 5879:11,  
 23 5882:25  
 5883:7,23 5884:6  
 5885:10,13,16,26  
 5886:4,11  
 5900:15 5901:6  
 5906:9  
**bulk** 5913:19  
 5914:14 5921:13  
**bullet** 5785:13,18  
**bullets** 5799:26  
 5800:1,5  
**burden** 5953:5  
**business**  
 5813:19,24  
 5968:19 5969:20  
**busy** 5784:12

---

**C**

---

**C-E-A-A**

5939:25  
**caches** 5780:25  
**caddis** 5923:26  
**cadmium**  
 5817:24 5826:1  
 5837:21 5838:17  
 5898:23  
**calcium** 5862:10  
**calculated**  
 5816:23 5839:22  
 5897:12 5912:12,  
 16 5952:6,9  
**calculating**  
 5966:24  
**calculation**  
 5803:5 5814:14,  
 25 5815:17  
 5819:14 5864:19  
 5867:9 5880:8  
 5908:11 5912:20,  
 23 5913:9  
 5914:24  
**calculations**  
 5795:16 5814:5,

10 5815:24  
 5816:20 5817:5  
 5818:8 5823:12  
 5861:12 5862:17  
 5863:1,5 5867:12  
 5868:5 5871:12  
 5885:5,13  
 5900:16 5906:9  
 5915:25 5920:26

**calculator**

5963:5  
**Calgary** 5970:8  
**call** 5769:13  
 5774:10,12  
 5784:25 5796:13  
 5830:26 5847:25

**camera** 5766:1

**Campbell**

5856:17 5859:1

**camping** 5881:25

**Canada** 5796:7,

19,25 5798:20  
 5825:11 5835:24  
 5857:8 5858:26  
 5859:1 5883:5,26  
 5902:21 5923:4  
 5924:13 5946:17  
 5967:20 5968:6  
 5969:4

**Canadian**

5784:16 5800:7,  
 25 5857:20  
 5858:20 5923:6  
 5939:10

**cancer** 5814:12

5825:10,12  
 5835:23 5836:5  
 5837:17 5864:13  
 5867:6 5897:12,  
 20 5905:1  
 5948:24 5949:6

**candidate**

5954:16

**cannons** 5944:16

**capable** 5779:20

5957:3

**capacity** 5883:19  
 5955:21

**caption** 5928:12,  
 14

**capture** 5841:18  
 5854:1,21 5855:4  
 5867:4 5871:3  
 5915:7,15

**captured** 5766:2

5852:14 5899:21,  
 26 5900:2  
 5918:9,10  
 5964:8,20

**captures** 5867:19

**capturing**

5965:26

**carbon** 5789:11

5790:12,15,26  
 5791:12,16  
 5793:1,14,21  
 5807:2,6  
 5951:16,21,22

**cardiovascular**

5948:24

**care** 5969:21

**Carlo** 5831:1

**carry** 5816:21

5819:2 5823:10  
 5828:23 5962:4

**carrying** 5823:18

**case** 5769:20

5815:8 5817:3  
 5819:24,25  
 5821:8,24 5826:5  
 5829:7 5833:7,8  
 5834:11,18  
 5836:7 5839:9,17  
 5840:3 5865:10  
 5868:7,10 5873:1  
 5891:14 5905:9,  
 14,15,20 5906:2,  
 19,21 5907:7,18  
 5926:7 5934:7,18  
 5952:25 5969:12

**cases** 5834:16  
5838:20 5879:16  
5900:11 5929:11  
**category** 5847:15  
**caucus** 5818:7  
5899:9  
**caught** 5930:16  
**caused** 5869:5  
**CEAA** 5939:25  
5940:11  
**cell** 5798:23  
**centre** 5779:16,  
18  
**CERTIFICATE**  
5970:1  
**certificates**  
5782:17  
**certify** 5970:3  
**cetera** 5786:16  
5805:2  
**chain** 5801:23  
5918:18  
**chair** 5765:23  
5769:1,3,5,7,19  
5770:2,4,6  
5790:16 5797:3  
5799:4 5802:20  
5807:13,20,23,25  
5808:1 5811:14,  
25 5812:10  
5813:18 5814:16,  
18 5815:22  
5820:23,25  
5821:10 5826:16,  
18 5829:16  
5830:5,21  
5833:3,5 5834:10  
5835:12 5839:21  
5841:1,2,24  
5842:6 5843:21,  
25 5844:23  
5845:5,24 5846:5  
5847:7 5848:3  
5851:25 5853:17  
5855:6,11 5856:5

5860:6,15  
5863:10,17  
5865:7 5866:5,8,  
17,21,25  
5868:14,17,19,  
20,22 5873:21  
5874:14 5876:15  
5878:1,8 5880:25  
5881:8 5882:23  
5891:8,20  
5892:11 5893:21  
5894:23,25  
5896:15 5899:9,  
11 5907:6  
5911:7,15  
5915:18 5922:8,  
10,12,13  
5924:24,26  
5925:16,18  
5929:9 5930:15  
5931:18 5934:5,  
21 5937:4  
5945:15 5946:11  
5950:17,18  
5967:1,7,13,19  
5968:2,12,14  
5969:5,11,15  
**Chairman**  
5821:12  
**challenge** 5873:5  
**challenges**  
5891:24  
**change** 5796:7,  
19,25 5798:20  
5814:1 5820:9  
5821:7,20  
5822:23,24  
5827:11 5830:2,  
19 5831:6  
5868:23 5878:23  
5898:5 5907:2,8  
5908:13 5913:19  
5914:20,24  
5916:8,9 5917:1,  
2 5921:6,7,14  
5924:13 5925:9  
5933:9 5935:10,

11,17,19  
5941:17,21  
5944:21 5945:13  
5949:14,15,16  
5963:25 5965:18  
**changing**  
5813:25 5920:6  
**channels** 5948:2  
**Chapter** 5857:22  
5858:18  
**characteristics**  
5897:13 5913:23  
5932:2 5933:7,8,  
17  
**chart** 5789:17  
5792:1 5806:7  
**check** 5785:4  
5817:11 5865:13,  
21 5866:5 5868:4  
5869:12 5921:16  
5928:18 5959:8  
5965:23 5966:22  
**checked** 5817:7,8  
5930:24  
**checking** 5866:9  
5930:21  
**checks** 5921:3  
5922:3  
**chemical**  
5840:14 5887:2  
5897:3 5900:26  
5904:4 5942:14  
5943:11 5944:2  
**chemical-by-**  
**chemical** 5897:7  
**chemical-**  
**specific** 5914:23  
5917:17  
**chemicals**  
5814:15 5817:12  
5822:4 5835:8,16  
5881:4,9 5887:2  
5888:19 5897:3  
5900:24

**chemistry**  
5917:18 5918:17,  
19 5963:22  
**Chief** 5857:4  
**chime** 5881:2  
**chip** 5882:19  
**choose** 5950:6  
**chosen** 5803:23  
5895:8 5933:16  
**CHPP** 5956:3,13,  
22  
**Christmas**  
5767:9  
**Christmas/new**  
5767:3,6  
**Christy** 5970:3,  
14  
**chromium**  
5843:15  
**chronic** 5861:14  
5868:26 5869:5  
5872:5 5883:2  
5897:4 5898:2  
5902:10  
**CIAR** 5772:7  
5776:10 5779:25  
5781:22 5785:9  
5786:1 5789:13  
5791:7 5792:19  
5796:2,14  
5799:21 5800:15  
5801:25 5803:3,5  
5804:15 5809:14  
5814:7,17  
5815:3,11 5816:2  
5817:19 5818:6  
5819:21 5820:4,  
11,12,21 5821:6  
5823:24,26  
5824:13 5826:6  
5829:1,10,12  
5830:2 5831:14  
5832:2,12,26  
5833:1 5836:18  
5837:14 5838:1,

8,15 5839:1  
5842:25 5843:22  
5844:4,12 5848:3  
5869:23 5871:16  
5886:15 5897:26  
5904:14,25  
5905:3,10,11  
5906:17,25  
5907:14 5910:19  
5911:19,20  
5912:18 5913:18  
5923:6,23  
5924:3,25  
5925:17 5927:26  
5928:22 5929:4,8  
5940:17 5957:21  
5958:22  
**circle** 5823:16  
**circumstance**  
5851:2  
**circumstances**  
5873:8 5893:12  
5901:10  
**citations** 5925:2,  
11  
**City** 5970:8  
**cladded** 5876:18  
**claim** 5876:2  
**clarification**  
5787:14 5806:26  
5808:7,16,25  
5820:26 5867:23  
5868:13 5935:25  
**clarify** 5782:2  
5786:21 5787:8  
5796:21 5816:10  
5922:14 5927:15  
5928:3  
**clarity** 5802:9  
5852:25 5922:1  
**Clark's** 5770:26  
5771:3,23,26  
5772:22 5773:12,  
16,17,23 5774:3,  
5,9,12,14,19  
5777:12,14

5779:14 5780:3, 6,19,21,24 5781:14,26 5782:3,8,24 5783:4,6,14 5788:1,2,12 5789:4 5807:18	5803:19 5804:10 5805:24 5809:18 5810:4,6,18,22, 24,25 5811:3,7 5813:5,13,23 5859:1 5868:25, 26 5869:6,20,25 5870:3,9,12,16, 22 5871:5,10,15, 25 5872:6,12 5873:20,22 5874:2,20 5875:1,6 5876:11,25 5877:7,19 5880:18 5898:15, 16 5902:17 5955:15 5956:2, 16 5960:20	<b>collision</b> 5784:22 <b>colouration</b> 5777:1 <b>Columbia</b> 5922:24 5925:4 5943:25 5944:1 <b>column</b> 5786:6 5789:18 5799:26 5906:1 5959:3 <b>combination</b> 5816:12 5899:16 5902:12,16,19 5903:17 5909:7 5940:20 5941:1, 25 5955:11 <b>combinations</b> 5903:19 5942:2 <b>combine</b> 5872:15 5884:18 5942:23 5948:6 <b>combined</b> 5898:1 5902:21 5905:25 5940:22,25 5941:10 5942:6 <b>comfort</b> 5969:1 <b>commence</b> 5894:9 <b>COMMENCED</b> 5765:21 5859:21 <b>comment</b> 5781:8, 12 5783:21 5784:7 5793:8 5845:25 5878:8 5880:4,21 5885:25 5895:16 5910:1 5929:21 5936:8 5940:21 5941:24 5948:16 <b>comments</b> 5822:2 5941:10 5948:5,11 5968:21 <b>Commission</b> 5903:1	<b>Commissioner</b> 5856:6,7 <b>commit</b> 5792:11 5796:21 5854:7 5952:26 <b>commitment</b> 5782:3 <b>commitments</b> 5801:8 <b>commits</b> 5869:26 <b>committed</b> 5797:5 5869:21 5875:3 5890:12 5892:20 5915:26 5945:16,17 5958:7 <b>committee</b> 5875:3 5923:3 5947:20,21 <b>common</b> 5923:14,16 5924:9,17 5931:12 5937:2 <b>communication</b> 5949:1 <b>communications</b> 5947:26 <b>communities</b> 5892:16,22 5947:6,9 5950:5 <b>community</b> 5874:18,25 5875:3,8,9,15 5876:11,16 5877:20 5878:2, 21 5896:10 5901:24 5902:3 5919:6,11 5946:14,21,22 5947:1,5,12,13 5948:1,3 5949:10,16,24 5950:14 <b>community's</b> 5947:24 5950:10	<b>company</b> 5875:7 <b>comparable</b> 5960:19 <b>compare</b> 5844:10 <b>compared</b> 5792:9 5805:5 5829:23 5893:25 5900:19 5909:1 5965:16 5966:23 <b>comparing</b> 5878:20 5894:5 <b>comparison</b> 5795:7 <b>compelling</b> 5909:13 <b>competitiveness</b> 5951:16,22 <b>complaint</b> 5896:24 <b>complaints</b> 5876:11 5878:5, 15,21 5896:10, 19,20 5948:5 <b>complete</b> 5767:7, 20 5768:2 5783:2 5970:4 <b>completed</b> 5811:17 5843:4 <b>completing</b> 5767:23 <b>completion</b> 5767:25 <b>complex</b> 5768:6 5870:4 5880:18 5940:2 <b>complexity</b> 5871:3 <b>compliance</b> 5952:10 5953:4, 5,12 <b>complicated</b> 5899:7
<b>clean</b> 5877:4 5958:5 <b>clear</b> 5786:26 5788:10 5824:11 5826:19 5827:23 5847:5,8 5865:7 5866:26 5870:8 5955:24 <b>cleared</b> 5785:23 5787:4,12,16,18, 22 5807:9 <b>clearer</b> 5787:9 5828:11 <b>clearing</b> 5787:21 <b>climate</b> 5775:18 5796:7,19,25 5798:20 5820:9 5821:7 5830:19 5831:6 5858:23 5924:13 <b>close</b> 5798:19 5817:25 5852:3,4 5863:20 5893:8 5919:2 5932:4,14 5933:12 5934:12, 16 5941:17 5950:7 <b>closely</b> 5883:4 <b>closer</b> 5812:26 5852:9 5894:6,16 <b>closest</b> 5947:16 <b>closure</b> 5804:26 5805:19 5806:4, 14,15 5808:26 5809:3 5811:1,6 <b>coal</b> 5794:15,18 5795:7 5801:15, 17 5802:25	<b>coal-fired</b> 5794:25 5795:2 <b>coal-handling</b> 5876:23 <b>Coalition</b> 5857:24 5968:16 <b>cobalt</b> 5818:1 5826:2 5832:4,17 5837:22 5928:26 <b>code</b> 5844:19 <b>coefficients</b> 5811:1 <b>colleague</b> 5949:7 <b>colleagues</b> 5828:17 5911:10 <b>collect</b> 5894:8 5895:13,24 <b>collected</b> 5831:18 5846:11 5890:25 5896:4 <b>collecting</b> 5894:22 5895:2 5896:15 <b>collection</b> 5894:16			

<b>component</b> 5790:7 5806:21 5842:24 5865:9 5892:23 5939:14, 16 5940:21	5828:25 5829:5, 8,17 5830:3,7,17 5831:12,16,21, 23,26 5832:4,6,9, 11,13,21 5833:1 5835:21 5836:13, 15 5837:4,5,25 5838:3,19 5839:2,6,15,23 5840:7 5843:26 5844:8,11,15,18, 21 5845:13,19,21 5846:2,21 5847:1,3 5848:6, 13,19 5849:12 5850:4 5853:10, 12 5854:4 5860:26 5861:20, 21,22 5862:13, 22,26 5863:2 5864:16,24 5867:16 5870:10 5879:10,13 5880:1,9,10,13, 14 5881:7,18 5886:19 5887:10 5891:5 5893:14, 19 5898:21 5900:1,18 5906:13,22,24 5907:1,7,13,15, 19,22 5908:5,6, 19 5909:2 5911:23 5913:4 5914:12 5917:1 5920:22 5925:3, 12 5929:3 5935:16 5943:8	5825:14,18,25 5828:9,15,26 5830:3,17 5831:10,13,17 5832:7,21 5834:15 5835:8, 16 5837:21 5838:7 5839:3,7, 15 5840:23,26 5841:22 5848:18 5849:9 5850:4 5863:26 5864:2, 23 5867:15 5870:5 5874:21, 23 5879:25 5880:10,15 5881:5 5887:3,26 5888:19 5890:3 5891:4 5893:2,15 5898:22 5901:11 5902:11,12 5904:11,21 5906:25 5909:7, 15 5910:3 5912:13 5913:4 5915:15 5916:18 5917:6,9 5921:1 5923:5 5933:14 5937:1 5940:23 5944:10 5969:16	5935:11 <b>conclusions</b> 5821:20,22 5822:24 5823:5 5838:25 5921:8, 14 5933:9 5941:22 5945:13 <b>conclusive</b> 5836:10 5873:15 5948:19 <b>conclusively</b> 5873:4 <b>concrete</b> 5953:22 <b>concurrently</b> 5804:23 <b>condition</b> 5811:9 5820:1 5891:3,25 5892:26 5893:6 <b>conditions</b> 5876:10,13,14 5894:11 5899:20 5901:14,18,22,26 5902:1,5 5920:6 5940:8 <b>conductive</b> 5930:20 <b>conduct</b> 5786:21 5788:2 5867:2,5 5925:23 <b>conducted</b> 5774:10 5785:21 5786:11 5787:11 5788:16 5820:7 5878:16 <b>cones</b> 5773:17 <b>confer</b> 5811:18 5828:17 <b>confidence</b> 5830:16 5854:13, 25 5855:3 5872:20 5880:22 5882:18 5884:23 5912:9 5913:11 5914:10 5918:6	<b>confident</b> 5803:23 5805:16, 26 5827:10 5854:5 5872:4,17 5884:7 5886:5 5889:9 5893:17 5901:5 5917:10 <b>configuration</b> 5841:14 5957:16 <b>confines</b> 5854:19,26 <b>confirm</b> 5769:24 5815:15,23 5816:3,22 5821:4 5829:8 5832:20 5834:25 5840:11 5844:14,24 5845:12,18 5849:23 5861:21 5893:4 5915:3 5928:20 5929:2,9 5965:7 5966:9 <b>confirmed</b> 5843:1 5868:5 5922:25 5923:13 <b>confirming</b> 5768:20 5769:15 <b>confused</b> 5788:7 5797:17 <b>connected</b> 5942:25 <b>connection</b> 5943:8 <b>consequences</b> 5915:1 5945:21 <b>Conservation</b> 5858:5 <b>conservatism</b> 5812:14 5819:14 5821:1 5825:21 5827:10 5828:25 5829:22 5835:20 5836:2 5838:13 5861:15 5872:16 5878:25 5879:11 5880:5,22
--	---	--	---	---

5882:17,25 5883:7,23 5884:6,9,12,18, 21,22 5885:1,3, 10,13,16,26 5886:7 5900:9, 15,22 5901:3,6 5906:8 5913:3 5914:10 5932:22 5933:3 5937:25	5820:2 5833:22 5838:6,12 5842:23 5843:9 5844:11 5851:23 5852:26 5853:4 5871:26 5879:25 5883:16 5923:9 5932:24 5938:11 5940:14 5943:15 5944:12,20 5952:21	<b>consumed</b> 5924:9 <b>consuming</b> 5926:20 <b>consumption</b> 5794:13 5806:17 5842:22 <b>consumptive</b> 5826:23 <b>contact</b> 5766:5 5834:13 5915:7 5931:23 <b>contained</b> 5876:26 <b>contaminant</b> 5841:4 5864:23 5867:14 5881:20 5892:4 5939:23 5940:26 5942:2, 7,21 5943:18,20 <b>contaminants</b> 5814:15,21 5815:13 5816:4 5817:5 5818:4 5819:15,19 5820:6,13,19 5821:2 5823:22 5825:18,24 5828:26 5830:3, 17 5831:10,13,16 5832:7,21 5834:14 5837:20 5839:2,6,15 5840:23,26 5841:21,22 5850:4 5855:4 5861:1 5870:4 5880:9,14 5881:5 5890:3 5891:4 5893:1,15 5898:13,21,26 5899:2 5901:10 5902:11,12,17 5904:10,21 5906:25 5907:2 5909:7,14,17,22	5910:3 5912:13 5913:4 5916:17 5917:9 5920:26 5936:26 5940:23, 25 5941:8,25 5944:12 5946:3 <b>contamination</b> 5850:13 5894:2 5931:15 <b>content</b> 5793:14 5965:1,3 <b>contention</b> 5767:11 <b>contingent</b> 5768:13 <b>continue</b> 5769:17 5797:24 5798:3 5799:14 5802:13 5807:26 5851:9, 10 5852:7,8 5889:19 5894:13, 18,20,23 5896:17 5962:4 <b>continuing</b> 5894:12 5940:5 <b>continuous</b> 5879:7 5890:12 5895:3 <b>contract</b> 5813:22 5934:18 <b>contractor</b> 5800:11 5801:2 <b>contractors</b> 5801:9 <b>contribute</b> 5812:18 5918:1 <b>contributed</b> 5907:22 <b>contribution</b> 5801:21 5837:25 5838:21,23 5840:18,22,25 5906:5 5908:7,24 5935:21	<b>contributions</b> 5879:10,17 5893:20,23 5908:12 5909:4 <b>contributor</b> 5879:19 5907:23 <b>control</b> 5801:22 5813:10 5855:4 5931:23 <b>controls</b> 5855:7 5873:7 <b>Convention</b> 5924:23 5937:23 <b>conventional</b> 5957:5 <b>conversation</b> 5862:22 5952:18 5957:26 5959:23 <b>conversion</b> 5913:19 <b>conveyer</b> 5876:20 <b>Cooke</b> 5858:5 <b>cooperation</b> 5868:21 <b>COP</b> 5904:15 <b>COPC</b> 5865:26 5941:18 <b>COPCS</b> 5829:25 5837:26 5861:20 5897:9 5903:18 5904:15 5919:14 5927:9 <b>copper</b> 5824:6 5837:22 5838:17 5898:23 <b>COPS</b> 5824:10 5825:21 5832:13 5835:21 <b>correct</b> 5780:4 5817:13 5823:14 5835:4,5 5840:9 5845:3,5,24 5882:21 5907:19 5914:16 5918:15
<b>conservative</b> 5826:23 5827:2, 20,23 5830:19 5834:8 5835:15, 25 5837:7,12 5881:3,19,24 5882:2,15 5884:13,24 5887:13 5891:9 5903:13 5911:17, 18,21 5912:8 5913:13,22 5914:10 5915:23 5916:16 5917:11 5918:7,9 5919:12,19 5920:9,13,16 5933:2,18 5937:6 5938:4,9 <b>conservatively</b> 5805:17 5872:11 5897:22 <b>considerable</b> 5827:7 <b>consideration</b> 5798:21 5838:23 5860:22 5879:21 5880:19 5940:13, 20,24 5941:4 5946:2 <b>considerations</b> 5879:26 5886:17, 25 <b>considered</b> 5766:19 5797:14 5799:4 5810:5,6	<b>considers</b> 5835:22 <b>consistent</b> 5827:12 5828:12 5838:4 5882:14 5920:21 <b>consistently</b> 5882:10 5913:12 5920:22 <b>consolidated</b> 5786:4 <b>constant</b> 5835:3 <b>constituents</b> 5870:11 5871:7,9 5872:1 <b>constraint</b> 5892:10 <b>constraints</b> 5891:24 5892:6 <b>constructed</b> 5809:7 <b>construction</b> 5786:12 5879:8 5888:5 5894:9, 14,22 <b>consult</b> 5807:16 <b>consultant</b> 5797:13,21 5831:14 5845:1, 10 5848:3 <b>Consultant's</b> 5843:22 5844:5 <b>consume</b> 5924:7			

5920:17,18 5922:16,17 5956:20 5959:14 5960:15 5963:2,3 5964:26 <b>corrected</b> 5817:10 5913:7 <b>correction</b> 5867:11 5921:13 <b>corrections</b> 5864:18 5912:21 <b>correlate</b> 5878:6, 15,18 5896:10 <b>correlation</b> 5947:11 <b>correspond</b> 5940:3 <b>COSEWIC</b> 5923:4,19,22 <b>Cote</b> 5857:4 <b>Council</b> 5859:16 <b>counsel</b> 5766:5 5770:20 5856:9, 10,13 5858:14,16 5859:3,5,7,9,11, 14 <b>country</b> 5891:4, 18,26 5897:17 <b>country-based</b> 5892:8,24 <b>counts</b> 5774:10 <b>couple</b> 5783:1 5822:2 5835:26 5846:5 5862:8 5891:2 5899:9 5939:5 5948:10 5950:19 5951:15 5954:1 <b>Court</b> 5859:19 5911:9 5970:15 <b>cover</b> 5898:19 5920:4 <b>covered</b> 5876:19 5920:24 5930:6	5935:26 5937:23 <b>covering</b> 5811:4 <b>CR</b> 5803:3 <b>create</b> 5901:18 5944:6 <b>creating</b> 5778:26 <b>creation</b> 5880:2 5886:19 <b>creek</b> 5817:26 5819:20 5820:7, 8,18 5821:17,18, 24 5823:23,26 5824:7,17 5830:6 5837:18 5839:8, 17 5841:17 5843:7 5851:21 5852:4,6,11 5854:16,17 5857:18 5860:25 5861:3,6,9,10,23 5862:4,9,14,19, 20 5863:4,6 5864:1,14 5865:12 5866:2 5867:6 5882:4 5889:5,8,14 5890:20,21 5905:16 5915:7, 13 5917:24 5918:25 5924:6 5928:7,11,13,14, 15,16 5929:16 5932:13 5935:7, 14,15,17,20,22 5936:7,8,10 5939:1 5964:7 <b>creeks</b> 5829:24, 26 5830:1 5844:16 5846:3 5850:11,25 5882:5 5937:16, 21 5942:26 5943:7 <b>criteria</b> 5925:26 5926:1 5931:22	<b>critical</b> 5898:3 5910:22 5927:11, 23 <b>cross-</b> <b>examination</b> 5968:6,18 <b>Cross-examines</b> 5770:17 <b>cross-examining</b> 5929:20 <b>Crowsnest</b> 5857:11 5858:5 <b>CSR(A)</b> 5859:19 5970:14 <b>Cubes</b> 5858:3 <b>cubic</b> 5959:4,12 5960:7 <b>cumulative</b> 5897:1,9,11,19 5900:24 5939:7, 9,13,26 5940:12 5942:13 5943:4, 26 5944:21 5946:1 <b>Cured</b> 5858:2 <b>curious</b> 5813:12 5874:9 5947:3 <b>current</b> 5767:16 5794:26 5813:19, 24 5825:19 5833:25 5870:19 5872:7 5895:7 <b>custody</b> 5813:5, 16,19,21 <b>customer</b> 5813:6, 22 <b>cut</b> 5773:6 5787:3 <b>cutthroat</b> 5916:23 5939:21 <b>cycle</b> 5799:1 5920:11	<hr/> <b>D</b> <hr/>	<b>D4</b> 5928:5,13 5935:3 <b>D5</b> 5928:9,14 5935:3 <b>daily</b> 5914:4 5926:5,22,26 <b>DANE</b> 5770:10 5859:23 <b>darker-green</b> 5777:1 <b>data</b> 5821:15,19 5822:22,23 5831:18 5832:1, 23 5843:13 5870:14 5871:8, 23 5873:16 5878:7,21 5894:8,22 5895:3,7,13 5896:11,16 5899:19 5919:2 5921:12,17 5923:23 5926:5, 25 5927:2 5935:8,9,19 5945:7 5946:17 5947:2,6 5949:5, 21 <b>date</b> 5768:17 5798:5 5891:10 <b>dated</b> 5789:14 5970:8 <b>dates</b> 5768:20 <b>David</b> 5769:8 5770:11 5859:5, 24 <b>day</b> 5865:17 5881:24 5882:1,6 5929:19 5942:17 5970:9 <b>days</b> 5767:15 5827:17 5898:13	5914:4 5921:24 5967:3 <b>deadlines</b> 5767:5 <b>deal</b> 5814:4 5827:8 5851:1 <b>dealing</b> 5896:24 5903:22 5906:6 <b>deaths</b> 5784:26 <b>debris</b> 5789:24 <b>decade</b> 5888:13 <b>decades</b> 5773:15 5782:15,23 5783:2,4,16 <b>decant</b> 5834:2 <b>December</b> 5768:10,15 5969:25 <b>decision</b> 5767:23 <b>decisions</b> 5767:25 5768:1 <b>declines</b> 5772:26 <b>declining</b> 5772:24 <b>decommissionin</b> <b>g</b> 5777:4,10 5804:18 <b>deconstruction</b> 5804:26 <b>decrease</b> 5834:3 <b>dedicate</b> 5800:8, 26 <b>deemed</b> 5943:26 <b>deep-monitoring</b> 5843:18 <b>defensibility</b> 5883:6 <b>defensible</b> 5933:17 <b>defer</b> 5888:10 <b>deferred</b> 5770:25 5771:1 <b>defined</b> 5927:10 5941:19
--	--	--	----------------------	--	--



<b>definite</b> 5795:16	8,12,16,19	<b>desire</b> 5767:22 5827:12	<b>diets</b> 5931:12	5912:21
<b>definition</b> 5808:16 5933:15	5826:7 5864:15 5865:8 5867:8 5908:15 5912:3, 11 5922:15 5943:1,5	<b>detail</b> 5841:14 5888:18 5903:20	<b>difference</b> 5821:4 5822:9 5863:19 5914:16 5929:11 5969:8	<b>discrepancies</b> 5823:21
<b>Deforest</b> 5769:8, 13,21,22,23,26 5770:11 5859:24	<b>deposits</b> 5810:17 5843:6,17 5844:2,4,19 5846:1,4 5850:2, 3,19	<b>detailed</b> 5820:10 5840:13 5841:8,9	<b>differences</b> 5873:10 5933:23	<b>discuss</b> 5834:7 5929:24
<b>deforestation</b> 5780:13	<b>deputize</b> 5911:13	<b>details</b> 5831:24	<b>differentiate</b> 5894:1	<b>discussed</b> 5776:16 5807:4 5826:18 5829:16 5833:26 5851:5 5865:11 5867:4 5880:7 5913:5 5963:7
<b>deformities</b> 5925:5,14	<b>derivation</b> 5828:25 5831:12 5835:20 5879:12 5880:8	<b>detect</b> 5948:23 5949:3	<b>differentiated</b> 5895:6	<b>discussing</b> 5860:17 5866:22 5868:16 5893:21
<b>degradation</b> 5941:26 5942:1	<b>derive</b> 5835:15	<b>detected</b> 5774:12 5945:22	<b>difficult</b> 5828:1 5853:20 5887:25 5947:18 5948:3 5949:9,13,17	<b>discussion</b> 5765:22 5829:14, 21 5836:17,20,26 5854:12 5860:9 5867:10 5888:11 5917:7 5942:16 5967:18
<b>degree</b> 5880:12 5882:18 5926:16	<b>derived</b> 5816:24 5831:18,26 5862:23 5917:14	<b>determination</b> 5796:9,23 5873:15	<b>diluted</b> 5902:6	<b>discussions</b> 5957:12
<b>delay</b> 5865:16	<b>deriving</b> 5840:6	<b>determine</b> 5785:24 5786:13 5792:8 5861:16 5947:22 5949:9	<b>diminish</b> 5853:12	<b>disease</b> 5948:24
<b>delayed</b> 5773:14	<b>des</b> 5859:3,9	<b>determined</b> 5799:6 5921:6 5944:3	<b>dioxide</b> 5901:19 5902:17 5903:23	<b>diseases</b> 5950:3
<b>deliver</b> 5877:2	<b>describe</b> 5775:12 5796:9 5802:17 5804:5 5954:14 5955:6	<b>develop</b> 5773:17 5797:5 5811:10 5841:13 5924:14	<b>dipper</b> 5919:23, 26 5924:5,6 5931:10 5932:5 5933:12 5936:5,6	<b>disincent</b> 5938:18
<b>delivered</b> 5813:15	<b>describes</b> 5800:2 5814:19	<b>developed</b> 5786:23,24 5872:26 5884:1 5919:4 5924:13	<b>direct</b> 5771:6 5947:11 5965:3 5968:15	<b>disincentive</b> 5938:23
<b>demonstrate</b> 5861:8	<b>describing</b> 5956:26	<b>determined</b> 5785:23 5786:11, 13	<b>directed</b> 5892:22 5966:2	<b>dispense</b> 5905:17
<b>demonstrated</b> 5889:16	<b>design</b> 5833:13, 17,19 5835:11,18 5841:8,10 5842:6,8 5887:16 5888:1,16,21,24	<b>development</b> 5785:23 5786:11, 13	<b>direction</b> 5779:19 5782:12 5895:7	<b>dispersal</b> 5779:15
<b>density</b> 5913:19 5914:15 5921:13	<b>designed</b> 5774:9 5834:1	<b>developed</b> 5786:23,24 5872:26 5884:1 5919:4 5924:13	<b>directions</b> 5898:25	<b>disperse</b> 5779:14
<b>depart</b> 5866:15	<b>designing</b> 5888:13	<b>diabetes</b> 5949:6	<b>directly</b> 5835:9 5876:23 5950:1	<b>dispersing</b> 5779:20 5943:25 5955:17
<b>departmental</b> 5924:14		<b>dialogue</b> 5875:15	<b>disadvantageous</b> 5931:5	<b>dispersion</b> 5783:18
<b>depend</b> 5792:14 5807:10 5877:3 5901:23 5926:19 5928:19 5930:23 5965:1		<b>diesel</b> 5792:17 5793:1,5,6 5794:2,8 5798:9, 17,18,22 5803:10,14 5902:18	<b>discharge</b> 5890:19 5943:9	<b>displaced</b> 5780:12 5783:9
<b>dependency</b> 5772:24		<b>diesel-powered</b> 5798:14	<b>discharged</b> 5966:16	<b>display</b> 5776:10 5781:22
<b>dependent</b> 5773:23		<b>diet</b> 5779:7,9 5873:10 5926:19 5931:16 5949:16	<b>discovered</b> 5814:9 5817:11	
<b>depending</b> 5914:23 5920:1,3 5930:26 5968:4				
<b>depends</b> 5849:15 5885:8				
<b>deposition</b> 5815:18 5816:1,				

**displays** 5776:18  
**disposal** 5956:6  
**disrupt** 5851:8  
**dissolved**  
 5849:16  
**distance** 5776:7  
 5894:6  
**distill** 5905:23  
**distinction**  
 5808:9  
**distinctly** 5818:3  
 5825:18  
**distinguish**  
 5893:19,22  
**distribution**  
 5772:23 5776:18  
 5914:13 5918:2,  
 8,10 5936:14  
**disturbance**  
 5779:3 5790:1,2  
**disturbed** 5787:6  
**ditches** 5965:11,  
 26  
**diversity** 5776:8  
**doable** 5864:11  
 5865:6 5866:22  
**document**  
 5785:19 5786:8  
 5799:11 5800:2  
 5811:15 5815:4  
 5833:5 5836:24  
 5848:25 5849:3  
 5940:16 5951:9,  
 10,12 5958:21  
 5959:16  
**documented**  
 5945:5  
**documents**  
 5785:11 5815:5  
 5846:16 5926:24  
 5957:19  
**dollars** 5952:12  
**domestic**  
 5842:23 5843:1,

3,9  
**dominated**  
 5868:10 5908:15  
**Donkersgoed**  
 5858:1  
**dose** 5926:6,23,  
 26  
**double** 5893:7  
 5958:18  
**doubtful** 5782:19  
**downstream**  
 5893:26 5925:13  
**downwind**  
 5901:15  
**drainage**  
 5890:26 5942:25  
**draw** 5776:24  
 5804:19 5843:26  
**drawing** 5796:5  
**drawn** 5891:13  
**drilled** 5843:3  
**drilling** 5851:7  
**drink** 5846:26  
 5847:9,11 5882:1  
 5938:2  
**drinking** 5837:6,  
 9 5840:6 5843:14  
 5845:26 5846:14,  
 23 5849:19,21  
 5851:19,21  
 5852:16,19  
 5853:7 5854:13,  
 22 5879:22  
 5881:26 5882:5  
 5883:1 5890:4  
 5893:3,16  
**drinks** 5881:23  
**drive** 5961:18,19  
**driven** 5818:15  
 5838:10 5855:3  
 5906:19,21  
 5907:3,12,18  
 5937:7

**drivers** 5904:5  
**driving** 5778:24  
**Drummond**  
 5766:13 5857:8  
 5967:24,26  
 5969:5,6  
**dry** 5831:2  
**dry/wet** 5833:24  
**drying** 5898:19  
**duck** 5936:5,7,8  
**due** 5768:9,11  
 5791:23 5831:5  
 5838:2 5875:6  
 5879:9 5897:8  
 5902:18 5908:4  
 5916:9 5933:16  
 5943:8  
**dump** 5891:1  
 5962:26  
**dumps** 5850:10  
 5853:20,23,25  
 5881:15 5887:6  
**duration**  
 5790:13 5832:5  
**durations** 5941:1  
**dust** 5770:13  
 5859:26 5868:25,  
 26 5869:6,19,21,  
 24,25 5870:2,4,9,  
 12,16,22 5871:5,  
 16,26 5872:6,12  
 5873:20,22  
 5874:2,20,21  
 5875:1,6,21  
 5876:5,11,21  
 5877:7,9,15,19,  
 23 5878:2,5,24  
 5880:18,19  
 5882:11 5890:10  
 5894:16 5895:17,  
 23,26 5896:1,5,  
 10,21,22  
 5898:15,16,18,22  
 5899:24 5902:5,  
 17 5954:7,14

5955:5 5957:10  
 5958:12 5959:18,  
 25 5960:3,13  
 5961:25 5962:7,9  
**dust-monitoring**  
 5896:11  
**dustfall** 5878:18  
 5895:19 5896:5,  
 12,16  
**dusty** 5964:5  
**duties** 5934:6  
**dynamic** 5776:8

---

**E**


---

**earlier** 5767:24  
 5788:18 5798:6  
 5806:7 5862:21  
 5864:19 5873:2,  
 13 5880:8,11  
 5881:7 5886:23  
 5895:18 5896:9  
 5921:10 5933:3  
 5940:18 5952:17  
 5958:3 5960:5  
 5968:25,26  
 5969:2,13  
**early** 5875:5  
 5877:4 5952:7  
 5958:3  
**earth-moving**  
 5805:18  
**easiest** 5895:5  
**east** 5851:16,20  
**eastern** 5890:13  
**easy** 5834:17  
**eating** 5779:9  
 5882:11 5920:11  
**eats** 5932:5  
**ECCC** 5797:12,  
 21  
**eco** 5821:19,21  
 5822:5,21  
**Eco-elders**

5858:23  
**ecologically**  
 5775:16  
**economically**  
 5797:18  
**economy** 5794:6  
**ecosystem**  
 5784:12 5785:3  
**edge** 5783:19  
 5787:15 5890:13  
 5897:25  
**edges** 5785:22  
 5786:22 5787:11  
**edit** 5913:20  
**effect** 5780:14  
 5781:5 5873:23  
 5883:21 5884:8,  
 11 5886:6  
 5895:5,10  
 5900:24 5901:5  
 5902:25 5916:10  
 5938:10 5939:13  
 5941:11 5943:26  
 5944:8 5948:21  
 5950:5,13  
**effectively**  
 5898:17  
**effects** 5820:9  
 5838:25 5869:5,  
 17,18 5873:4,15,  
 20,21 5874:2,6,8,  
 13 5879:1  
 5880:18,19  
 5883:17,18  
 5884:5 5888:4,7  
 5889:20 5897:1  
 5898:4 5900:20  
 5901:2 5902:10,  
 15,22,23 5903:7,  
 17,24,25,26  
 5904:7 5909:10,  
 14,17,22,25  
 5910:22 5912:4  
 5939:7,9,15,16,  
 26 5940:9,12,20,  
 24 5942:3,4

5943:4,17 5946:1  
5948:15  
**efficacy** 5791:17,  
24  
**effort** 5794:5  
5827:7 5860:14  
**efforts** 5766:8  
**egg** 5923:12  
**egg-laying**  
5926:2  
**EIA** 5771:22  
5772:2,8 5774:5,  
13  
**EIAS** 5917:21  
**eighth** 5772:7  
5776:10  
**EIS** 5939:11  
**Elaine** 5922:10  
**Elders** 5898:6  
**electric** 5798:22  
5806:16,18,20  
**electricity**  
5794:13 5795:10  
5806:17,21  
5953:18,20,22  
**element** 5883:3  
**elements**  
5884:19 5949:8  
**elevated** 5853:9  
5928:25 5935:14  
**elevation** 5834:4  
**eliminates**  
5922:19  
**elimination**  
5942:1  
**elimitation**  
5941:26  
**Elk** 5919:5  
**Elmeligi** 5858:18  
**Emard** 5858:3  
**emerge** 5924:8  
**emergency**  
5877:3

**emission** 5791:15  
5793:24 5794:16  
5795:7 5800:24  
5802:14,17,22  
5803:4,11,19,23  
5804:1,6,11  
5952:23 5953:13  
**emissions**  
5770:13 5790:9  
5793:17 5795:9,  
10 5796:16  
5798:10,11,13,  
17,24 5799:2  
5800:10,12  
5802:8,12,16,19,  
25 5803:10,17,25  
5804:3,9 5805:4,  
8,12,17 5806:8  
5807:2 5808:26  
5809:2,5,17,19,  
21 5810:10,26  
5811:7,12  
5859:26 5869:19  
5878:26 5879:9  
5890:10,11  
5899:17 5902:2,4  
5912:5 5950:26  
5951:24 5952:8,  
19 5953:17,21  
**emitted** 5801:14  
**emitting** 5800:8  
5801:1  
**emphasis** 5824:1  
5833:23  
**employ** 5937:11  
**empty** 5962:3  
**encompass**  
5831:5  
**encourage**  
5801:19  
**encouraging**  
5800:11 5801:1  
**end** 5767:2  
5782:15 5783:20  
5813:15,22  
5828:13 5833:12,

15 5846:18  
5848:15 5863:1,  
14 5871:19  
5873:11 5887:11  
5900:25 5904:15  
5910:12,24  
5918:8,9 5934:16  
5941:15,19  
5944:26 5951:9,  
12 5955:18  
5964:21 5967:9  
**end-pit** 5809:1  
5818:1,2 5825:15  
5831:10,13,17,26  
5832:5,7,11,22  
5833:14,15,17,  
22,25 5834:3,9,  
20 5835:7,18,21  
5837:11,17  
5841:7,15,16  
5842:2,8,12  
5861:2,4,7,16,21  
5862:14,17,22  
5863:1 5865:12  
5879:15,18  
5881:7,10,11,17,  
21,22,23 5882:1  
5886:17 5887:3,  
9,11,16,18,22  
5888:1,8,11,13,  
19,21,26 5889:4  
5905:10 5912:17  
5917:25 5918:24  
5919:8 5924:5  
5932:8,13  
5936:6,10  
**end-put** 5862:4  
**Endangered**  
5923:4  
**endorsed** 5884:2  
**ends** 5889:7  
5965:10  
**Energy** 5812:8  
5860:4  
**engine** 5798:22

**ensure** 5768:15  
5812:13 5826:6  
5850:24 5851:11  
5852:9 5855:6  
5867:8 5877:18  
5886:5 5937:19  
5968:25 5969:18  
**ensuring**  
5864:15  
**entering** 5852:11  
**entire** 5787:18,21  
5919:22  
**envelope**  
5891:12  
**environment**  
5778:1 5796:7,  
19,24 5798:20  
5919:1,9 5920:7  
5924:13 5966:16  
**environmental**  
5771:24 5792:20  
5796:10 5801:26  
5805:1 5939:6,9,  
10,13,26 5940:5  
5947:20  
**environmentally**  
5903:3  
**environments**  
5818:5 5918:26  
**envision** 5813:24  
**epidemiological**  
5872:21,23  
5873:2,5  
**EPL** 5879:26  
5880:2 5886:19  
**equal** 5784:21  
5936:4 5956:17  
**equation**  
5814:19,21,26  
5815:16,26  
5919:4  
**equations**  
5814:19  
**equipment**  
5798:1,7,9,22,23

5799:1 5805:18,  
21,23,24,25  
5806:12 5877:18  
5957:2 5958:6  
**ER** 5933:12  
**error** 5867:12  
5922:3  
**errors** 5814:8,13  
5817:7,8,10  
5864:18 5880:8  
5921:3  
**escapes** 5853:26  
**essence** 5941:6  
5944:8  
**essential** 5863:18  
**essentially**  
5781:17 5837:8  
5852:5,10,18  
5862:18 5865:2  
5896:3 5962:10,  
13  
**establish** 5767:5  
5873:4  
**established**  
5768:8 5803:11  
5883:25  
**establishing**  
5780:19 5781:6  
**establishment**  
5780:7,15  
**esthetics** 5849:11  
**estimate**  
5790:12,14  
5791:22 5793:15,  
20,23 5794:26  
5795:6,13  
5805:21 5807:6  
5821:3 5829:10  
5953:3 5959:1,21  
5960:2 5963:11  
5968:10  
**estimated** 5809:2  
5832:11 5952:9  
5960:11

<b>estimates</b> 5804:6 5805:3 5806:3 5814:11 5816:5 5833:5 5838:11 5913:9 5963:5 5966:7	<b>evidentiary</b> 5767:13 5863:15	5883:18	5960:23	5909:9,16,23,26 5910:3,8,13 5912:2,12,15,24 5913:22,24 5914:4,17 5915:6,12 5916:15 5921:4 5924:4 5926:6, 11,16,17,21,23,26 5927:17 5928:6,9 5929:22,23,25 5931:9,23 5932:14,15 5936:4,9,15,18, 26 5937:20 5939:24 5940:13, 22,25 5941:14,25 5942:2,7,14,22 5943:12,18 5945:3,12
<b>estimation</b> 5792:13	<b>evidently</b> 5881:13	<b>exhibit</b> 5931:19	<b>expertise</b> 5876:2 5931:2	<b>exposures</b> 5839:21 5868:8 5869:5 5883:10, 11,14 5904:4 5909:18 5912:26
<b>estimations</b> 5830:11	<b>evolution</b> 5795:3	<b>exhibits</b> 5812:26	<b>experts</b> 5875:22	<b>expressed</b> 5766:22 5870:20 5898:16
<b>European</b> 5903:1	<b>ex-pit</b> 5850:10 5853:20,25 5881:15 5887:6	<b>exist</b> 5924:16 5946:5	<b>explain</b> 5766:7 5773:15 5802:22 5823:21 5835:22 5839:5,14 5905:7 5919:16	<b>extend</b> 5791:2
<b>evaluate</b> 5791:24 5792:7 5797:24 5933:7	<b>examples</b> 5814:10 5824:5 5912:19,22	<b>existing</b> 5795:8 5908:21 5940:6	<b>explained</b> 5897:19	<b>extended</b> 5826:26 5851:4 5961:25
<b>evaluated</b> 5912:15 5914:5,8 5919:19,23 5927:1,12 5932:3,4 5942:26 5943:3,6 5945:1	<b>exceed</b> 5837:26 5846:23 5864:8 5880:14 5893:15 5901:11 5902:13 5904:11 5905:18 5906:1,12 5909:8 5940:26	<b>expect</b> 5767:20 5782:9,13,23 5789:2 5790:22 5793:20 5795:1 5808:25 5809:4 5827:15 5831:4 5842:1 5850:18, 22,26 5851:3,7 5852:23 5866:11 5881:20 5891:15, 22 5904:3 5933:8,22 5934:10 5945:9, 18 5960:1	<b>explains</b> 5825:1	<b>extends</b> 5787:5
<b>evaluates</b> 5897:8	<b>exceedance</b> 5906:12	<b>expectation</b> 5891:9	<b>explanation</b> 5840:3	<b>extensively</b> 5841:18,21
<b>evaluation</b> 5810:16 5863:11, 18 5889:11 5897:7 5936:22	<b>exceedances</b> 5843:14 5893:5 5906:19 5907:12, 18	<b>expectations</b> 5921:23	<b>explicit</b> 5890:2	<b>extent</b> 5780:6 5783:9 5787:15 5866:12 5875:12 5877:15 5881:3 5888:11 5893:1 5899:19,23,26 5914:18
<b>evaporate</b> 5961:11 5962:10, 13 5963:15	<b>exceeded</b> 5820:2 5861:25 5867:18 5891:26 5905:12	<b>expected</b> 5777:13 5783:6,7 5805:3,4 5823:3 5838:4 5889:6 5902:14 5909:9 5915:16 5926:17 5932:26 5942:11 5963:8	<b>explicitly</b> 5852:26 5853:4	<b>external</b> 5956:5
<b>evaporates</b> 5963:16,19	<b>exceeding</b> 5884:4 5893:2 5900:12 5941:17	<b>expects</b> 5782:7	<b>exposed</b> 5802:12, 25 5809:18 5810:19 5811:7 5834:20 5835:7 5855:1 5897:2 5902:16 5909:11 5924:1,5,6 5941:7 5943:17 5950:10	<b>extra</b> 5966:4
<b>evenly</b> 5955:22 5961:20	<b>exceeds</b> 5905:11	<b>experience</b> 5810:21 5878:4, 12,19 5887:5 5888:16 5954:18	<b>exposure</b> 5810:24 5818:14 5819:15 5821:21 5822:24 5835:23 5838:11,14 5839:8,12,16,20 5840:1 5842:3 5853:6 5864:1,13 5867:6 5868:26 5870:6 5872:5 5873:7 5879:15 5884:3 5885:12 5888:8 5897:4,5, 9,15 5898:3 5899:1 5901:19 5902:14 5903:4,8 5904:9,24 5905:2,10,16 5906:4,23 5907:3 5908:2,16	<b>extract</b> 5853:20 5964:24
<b>eventual</b> 5964:9	<b>exception</b> 5862:2 5863:6	<b>experiencing</b> 5898:7,9 5950:1	<b>explains</b> 5825:1	
<b>eventually</b> 5877:10 5888:22	<b>excessive</b> 5962:17	<b>expert</b> 5784:11 5812:3 5818:20, 21 5825:7 5849:10 5922:13 5930:16 5951:1	<b>explanation</b> 5840:3	
<b>evergreen</b> 5797:6	<b>exchange</b> 5958:1		<b>explicit</b> 5890:2	
<b>evidence</b> 5771:18 5797:10 5811:23 5812:22 5819:17 5872:21,23 5896:23 5909:13 5917:8 5940:8 5968:20	<b>exclusion</b> 5934:25		<b>exposed</b> 5802:12, 25 5809:18 5810:19 5811:7 5834:20 5835:7 5855:1 5897:2 5902:16 5909:11 5924:1,5,6 5941:7 5943:17 5950:10	

**extremely** 5837:12  
**eyeball** 5863:17

---

**F**

---

**face** 5804:10  
 5891:25 5953:5  
 5956:5  
**faces** 5799:8  
**facilities** 5805:1  
 5854:2  
**facility** 5876:23  
 5890:14  
**fact** 5838:3  
 5860:9 5869:9  
**factor** 5780:7  
 5803:11,12  
 5804:11 5916:21,  
 23 5917:2  
**factors** 5797:19  
 5800:4 5802:14,  
 17,22 5803:4,19,  
 24 5804:1,2  
 5854:24 5903:11  
 5917:12,24  
 5918:4,15,23  
 5947:13  
**fail** 5915:19  
**fair** 5798:12  
 5953:2  
**fairly** 5823:4  
 5834:1 5852:15  
 5877:1 5968:11  
**fall** 5847:14  
 5954:25  
**fallen** 5882:11  
**familiar** 5878:5  
 5954:4  
**familiarity**  
 5875:22  
**family** 5775:5  
**Farms** 5857:26

**farther** 5823:17  
**fast** 5911:10,12  
**fate** 5964:9  
**feasible** 5797:18  
**feature** 5773:25  
**features** 5785:25  
 5786:15  
**February**  
 5789:15  
**fed** 5899:22  
 5963:1  
**federal** 5769:1  
 5770:21,23  
 5793:13 5807:16  
 5811:18 5893:3  
 5924:16,18  
**feed** 5923:11  
**Feeder** 5858:1  
**feeding** 5925:6  
 5933:20,24  
**feeds** 5872:24  
**feel** 5914:9  
 5918:8 5925:23  
**feeling** 5774:23  
**felt** 5919:5  
**fencing** 5934:25  
 5937:11  
**fertilizing**  
 5789:25  
**fescue** 5776:6  
**fewer** 5911:2  
**field** 5775:1  
 5859:14  
**fight** 5779:2,13  
**figure** 5820:15,16  
 5824:20 5832:2  
 5922:20 5954:24  
**figures** 5820:13  
 5824:1,8,14,22  
**filed** 5785:20  
**filing** 5768:16  
**fill-up** 5962:3

**filling** 5842:12  
**filtered** 5846:11  
 5849:7  
**final** 5766:18,21,  
 23,24,26 5767:3,  
 12,19,23 5768:1,  
 9,16 5773:8  
 5809:12 5811:5  
 5835:18 5851:2  
 5854:11 5865:16  
 5951:13  
**finalize** 5806:15  
**finally** 5924:11  
 5925:16  
**find** 5836:18,21  
 5848:2 5893:8  
 5910:18 5953:20  
 5959:15,20  
**finding** 5779:20  
**fine** 5819:2,3  
 5840:16 5866:17  
 5875:23 5967:26  
**finish** 5968:4,23,  
 25 5969:18  
**fire** 5778:9,12,14,  
 22 5779:3  
**fish** 5769:11  
 5897:17 5916:21  
 5926:20 5939:20,  
 22  
**fit** 5792:4  
**Fitch** 5858:8  
**five-year**  
 5899:19  
**flag** 5828:19  
**flagged** 5848:7  
**flags** 5937:12  
**flames** 5778:12  
**fledgling** 5775:2  
**fleet** 5798:7,9,14,  
 18,26  
**few** 5784:16  
**fighting** 5944:17

**flipped** 5935:5  
**flow** 5820:2,9  
 5852:6,7 5902:2  
**fluoranthene**  
 5817:6 5904:18  
**fly** 5923:26  
**flycatcher**  
 5923:15,20  
 5924:10,17  
 5931:13 5937:2  
**focus** 5772:11,18  
 5812:10 5869:24  
 5890:18 5892:12  
**focused** 5875:26  
**focuses** 5890:10  
**folks** 5851:7  
 5954:5 5961:9  
**follow** 5799:14  
 5813:3 5820:24  
 5883:4  
**follow-up** 5788:1  
 5816:21 5841:26  
 5873:26 5874:17  
 5889:26 5895:15  
 5906:16 5909:6  
 5914:14 5930:8  
 5935:24 5943:13  
 5945:26  
**follow-up's**  
 5902:8  
**food** 5779:12  
 5781:18 5826:25  
 5836:16 5892:8  
 5897:23 5911:24  
 5913:25 5918:18  
 5919:18 5920:12  
 5931:25 5932:26  
**food-ingestion**  
 5932:7  
**foods** 5891:4,18,  
 26 5892:8,24  
 5897:17  
**foot** 5797:23  
**foothills** 5776:6

**footprint**  
 5775:20,24  
**forage** 5783:10  
 5914:2 5920:1  
**foraged** 5933:1  
**foraging** 5773:26  
 5950:7  
**foregoing** 5970:3  
**forest** 5778:1  
 5779:21  
**forestry** 5776:26  
 5777:2  
**form** 5775:18  
 5924:19 5952:26  
 5963:23,25  
**formal** 5848:16  
 5947:18  
**format** 5766:20,  
 21 5921:17  
**formed** 5888:14  
**forms** 5772:19  
 5881:11 5924:8  
**Fort** 5949:26  
**forward** 5791:11  
 5806:16 5811:9  
**found** 5860:26  
 5881:8 5892:14  
 5893:2 5908:1  
 5910:19 5930:24  
**fourth** 5789:19  
 5792:20 5884:17  
**fraction** 5806:13,  
 24  
**fractured**  
 5887:14  
**frame** 5775:15  
 5777:23 5794:26  
 5827:18 5854:3  
 5865:15 5888:15  
**framework**  
 5951:21  
**framing** 5781:13  
**Fran** 5851:16  
 5852:25

**Frank** 5859:16  
**frankly** 5895:4  
**Fred** 5859:7  
**frequency**  
 5892:26 5930:21,  
 25  
**frequently**  
 5891:21  
**Friday** 5768:7,  
 10,11,12 5874:16  
 5957:20 5958:1  
**frog** 5922:24  
 5930:15 5944:1  
**frogs** 5925:4  
 5930:16,19,24  
 5931:3 5943:25  
**front** 5846:16  
 5848:25 5849:4  
 5875:4  
**fruit** 5868:9  
**fuel** 5793:2,14,21  
 5794:6 5798:22  
**fuel-efficient**  
 5800:12 5801:2  
**fugitive** 5802:2,8,  
 11,16,19,25  
 5803:16,17,24  
 5809:17,20  
 5810:9 5811:11  
 5869:19 5870:2  
 5890:10  
**full** 5790:22  
 5818:12 5839:22  
 5955:21  
**full-time** 5853:7  
**fully** 5774:2  
 5813:10 5915:3  
**function** 5932:1  
 5933:6  
**functioning**  
 5855:7  
**functions**  
 5827:20

**fund** 5953:12  
**funded** 5874:18  
**future** 5773:14  
 5783:15 5817:4  
 5833:17 5924:18  
 5927:3

---

**G**

---

**Gail** 5859:9  
**gained** 5888:16  
**game** 5897:17  
 5943:20  
**Gary** 5770:9  
 5859:22 5930:13  
**gas** 5770:13  
 5789:23 5790:9,  
 21 5791:11,15,  
 17,22,25 5792:3,  
 8,9,11 5793:16,  
 24 5794:15,16  
 5795:6,9  
 5796:16,22  
 5798:4 5799:2  
 5800:3,23  
 5801:11,14  
 5802:5 5803:13  
 5806:3 5807:1,7,  
 8 5808:26  
 5809:5,19  
 5811:15 5859:26  
 5898:10 5950:25  
 5951:14,21  
 5952:2 5953:17  
**gas-fired** 5795:3  
**gases** 5801:21  
 5809:10  
**gassy** 5810:6  
**gather** 5892:9  
**gave** 5863:22  
 5951:14 5959:1  
**gears** 5831:8  
 5842:20  
**general** 5776:17  
 5793:6 5840:12

5849:19 5879:2  
 5931:3 5950:9  
**generally**  
 5771:17 5777:3,7  
 5852:23 5878:6  
 5887:14 5901:21  
 5903:2

**generate** 5809:10  
**generated**  
 5803:7 5829:18  
 5917:13 5927:2

**generating**  
 5833:11 5909:3

**generation**  
 5869:25 5953:19

**genetics** 5873:10

**gentlemen**  
 5953:25 5954:19  
 5966:25

**geochemical**  
 5819:26 5821:8

**geochemistry**  
 5835:1

**geographic**  
 5787:14

**geology** 5844:3

**GHG** 5789:23  
 5794:17,18  
 5798:10,12  
 5804:24 5805:4  
 5806:21 5952:8

**GHGS** 5806:25

**Gilmar** 5847:14  
 5851:16 5852:2

**Gilmar's**  
 5852:25

**give** 5816:17  
 5818:7 5819:4  
 5824:10 5830:25  
 5836:21 5849:9  
 5870:24 5894:7  
 5921:23 5946:23  
 5959:21

**giving** 5916:20

**global** 5804:1

**goals** 5801:11

**Gold** 5817:26  
 5819:20 5820:7  
 5821:17,24  
 5829:24,26  
 5830:1,6 5837:18  
 5841:17 5843:7  
 5844:16 5852:4,6  
 5854:16 5882:4  
 5890:21 5905:16  
 5917:24 5918:25  
 5924:6 5928:7,  
 14,16 5935:14,  
 17,22 5936:7,10  
 5937:21 5939:1  
 5964:7

**Goldsim** 5816:14  
 5819:26 5820:3  
 5821:5 5822:9  
 5829:11,18,22  
 5830:9 5832:25  
 5833:7,21  
 5867:17

**good** 5765:23  
 5771:10,13  
 5781:18 5782:18  
 5784:23 5791:5  
 5794:11 5804:17  
 5849:25 5865:10  
 5894:7 5946:13  
 5949:20 5950:21,  
 22,24 5953:24  
 5954:16 5956:11  
 5965:22

**Gourlay-  
 vallance** 5858:23  
**government**  
 5772:21 5793:13  
 5794:24 5857:8

**Grassy** 5778:21  
 5804:3 5810:5  
 5857:25 5961:5

**great** 5789:20  
 5914:6 5915:14  
 5936:7

**greater** 5816:26  
 5825:26 5837:19  
 5839:7,11,16,20  
 5840:20 5861:22  
 5869:3,9 5879:3,  
 5 5902:25 5903:7  
 5905:6,13,20  
 5906:3 5924:4  
 5928:16 5931:10  
 5932:15 5933:13  
 5936:4 5937:20

**greatest** 5864:24  
 5865:4,26  
 5867:15

**greener** 5953:20  
**greenhouse**

5770:13 5789:23  
 5790:9,21  
 5791:10,15,17,  
 22,25 5792:3,8,9,  
 11 5793:16,24  
 5795:6,9  
 5796:16,22  
 5798:4 5799:2  
 5800:3,23  
 5801:11,14,21  
 5802:5 5803:13  
 5806:3 5807:1,7,  
 8 5808:26  
 5809:5,10,19  
 5811:15 5859:26  
 5950:25 5951:14,  
 21 5952:2  
 5953:17

**grid** 5794:19

**grizzly** 5778:6

**ground** 5778:25  
 5780:16,25

**groundwater**  
 5838:23 5842:21,  
 22 5843:10,13,16  
 5846:3 5848:13,  
 17 5850:2,8  
 5851:11 5853:10,  
 19,26 5854:14,  
 16,20,22,23,25

5880:16 5890:17,  
18,24 5894:10  
5964:19,21  
5965:9

**groundwater-  
dependent**

5843:19

**group** 5775:5  
5857:26 5858:9  
5872:22 5897:14  
5904:19,22  
5907:1 5968:17

**groups** 5784:4  
5897:18 5904:15,  
16 5905:2,13,19  
5909:22 5910:4

**growing** 5780:18

**guess** 5806:19  
5826:9 5878:13  
5900:23 5902:25  
5916:4 5938:6,11  
5943:16 5948:12  
5953:15 5961:24  
5962:17 5963:4  
5964:23 5966:8

**guessing** 5950:26  
5954:11 5956:20  
5962:21 5965:7,  
12,15

**guidance**  
5917:14 5925:25  
5927:11 5939:8,  
25 5940:4,12,14,  
16,19

**guideline**  
5849:19 5892:1  
5939:18

**guidelines**  
5837:6 5843:14  
5846:15,24  
5890:5 5891:7  
5893:4,16 5929:6  
5938:21 5939:6,  
11

**guild** 5933:20,24

**Gulamhusein**  
5857:11

**guys** 5954:24  
5966:21

**H**

**habitat** 5773:12  
5784:8,23,24  
5785:25 5786:14  
5911:25 5919:18,  
22 5920:1

5939:20,23  
5942:1,3,6,9,10,  
11,21 5943:6,9,  
18 5944:7,10

**habitat-related**  
5946:2

**habitats** 5912:14,  
24 5931:22,25  
5932:9 5943:7

**habits** 5826:24

**half** 5775:20,21,  
23 5800:1 5807:4

**hand** 5891:16

**handle** 5948:9

**handling**  
5810:23 5869:20,  
25

**hands** 5771:18

**hanging** 5867:24

**happen** 5920:4  
5964:9

**happened**  
5835:12 5867:10

**happening**  
5916:1,3 5945:25  
5960:18

**happy** 5910:26  
5911:2

**hard** 5947:10  
5949:20 5951:5

**harm** 5937:19

**harvest** 5897:23

**harvesting**  
5780:24

**hatchability**  
5941:15

**haul** 5951:7,11  
5954:1 5955:13,  
23 5956:2,7  
5957:19 5958:20  
5960:25 5961:2,  
15,16,19 5962:19  
5963:8

**hauled** 5956:16  
5959:22

**haulers** 5955:15

**hauling** 5957:14

**hazard** 5814:14  
5817:23 5818:1,  
23 5825:17,24,26  
5826:11 5828:3,6  
5837:16,18

5839:7,11,16,19  
5840:19 5864:1,  
8,22 5867:14,25  
5869:2,8,10

5879:3,4,16,19  
5885:2,15 5898:1  
5900:12 5902:13  
5903:12 5904:26  
5905:9,15  
5906:2,7 5909:8  
5910:7,11,12,14,  
20 5928:16  
5935:21 5941:8  
5945:2

**hazards** 5818:11,  
15 5839:22,25  
5862:19 5868:11  
5907:23 5908:9,  
18,26 5909:3

**head** 5846:17,20  
5960:9

**headed** 5822:10,  
13

**heading** 5794:13  
5796:3,14

5802:1,2  
5804:18,21  
5925:9

**health** 5769:11  
5770:15 5812:4,  
11 5814:3  
5815:14 5816:5  
5820:20 5821:3  
5822:3,5,12,16  
5823:2,7,8,20,23  
5824:23,25  
5825:5,11  
5826:10,21  
5828:8,20  
5829:11,13

5832:10 5835:24  
5838:6,13,24,26  
5840:22 5842:4,  
24 5844:12

5845:6,26  
5846:18,23

5847:3 5848:15  
5849:24 5851:24  
5853:1,3 5855:1  
5860:2,10

5863:11 5869:5  
5873:4,15,20,24

5874:3,14  
5875:12 5878:25

5879:1,15,23,24,  
25 5880:3,6,17,  
20,23 5881:21  
5883:5,25

5886:20,26  
5888:4,7 5889:8,  
10,20 5890:3,9  
5891:7 5897:1,8,  
24 5898:8

5899:3,23 5900:4  
5901:12 5902:10,  
15,20 5904:12  
5909:10 5910:25

5911:1,16,18  
5912:1,5,10  
5913:6,12

5915:4,5 5945:20  
5946:15,21,22

5947:5,7,10,12,  
14,24 5948:13,  
14,21 5949:6,10  
5950:12

**health-based**  
5892:4

**healthy** 5929:26

**hear** 5769:21  
5815:21 5969:3

**heard** 5822:15  
5834:25 5851:15,  
19 5860:13  
5906:14 5927:15,  
19 5933:11

**hearing** 5766:1  
5767:2,13,14,16,  
18 5768:14,25  
5785:19 5851:15  
5853:17 5856:6,7  
5863:15 5969:17

**heavily** 5945:19

**heavy** 5883:17

**hectares** 5777:26  
5778:2,3,5,8,10,  
16 5779:21  
5919:25

**helpful** 5769:12  
5781:12 5809:13  
5834:24

**heron** 5914:6  
5915:14 5936:7

**high** 5833:12  
5848:13 5854:24  
5855:3 5877:23  
5879:18 5882:18

5884:22 5886:7  
5898:20 5900:11,  
14 5902:4  
5908:18,25

5909:3,18 5912:9  
5914:9 5920:22  
5929:16 5965:2  
5966:17

**high-level**  
5834:15

**high-selenium**

5962:26

**higher** 5818:22

5825:13 5827:23

5849:12 5861:2

5862:3,8,11,12

5863:1 5865:11

5887:19 5897:16

5902:4,6 5906:26

5907:8,16

5909:18 5910:5

5913:1,24,26

5916:25 5917:25

5918:15 5921:5

5926:17,21

5927:17 5935:13,

20 5936:19

5938:21 5943:8

5953:6 5960:22

**highest** 5805:12

5952:8

**highlighted**

5835:14

**highly** 5820:2

5834:18 5911:17

5912:7 5913:22

**hire** 5934:8**historic** 5831:19,

21 5832:1,23

**historical** 5790:1**hold** 5861:18

5863:16

**Holden** 5856:10**holds** 5936:18**home** 5914:6**home-range**

5919:19

**honest** 5891:20**hope** 5806:20

5853:22

**hormonal** 5925:5**host** 5772:6

5773:1,20

5776:9,20,22

5777:5,16

5779:24 5781:21

5783:25 5785:8,

15,26 5786:7,19

5789:13 5790:6,9

5791:6,19

5792:18 5794:10

5795:26 5796:13,

26 5799:20

5800:14 5801:6,

24 5803:21

5804:15 5805:15

5809:13,24,25

5810:12 5814:16

5820:24 5843:21

5924:24 5931:18

5951:7,11

5957:18 5958:20,

24

**hour** 5807:5

5881:8 5968:17

**hours** 5968:8**Houston** 5770:9

5782:10 5786:26

5787:8 5788:4,

22,25 5790:16

5791:21 5792:25

5794:23 5795:25

5797:2 5799:19,

24 5800:19

5801:12 5802:20

5805:20 5806:1

5809:4,11

5810:13 5813:4,

17 5814:2 5821:9

5826:15 5831:7

5833:20 5834:6

5836:23,25

5841:1 5842:19

5844:23 5845:11

5847:5,24

5850:7,17

5851:14 5852:15

5853:15 5854:10

5855:2,10

5859:22 5860:15

5863:9 5866:19,

21 5868:21,22

5873:21 5874:4

5875:17 5876:9,

15 5880:24

5882:22,23

5886:22 5887:1

5888:2 5889:2

5895:1 5896:14,

25 5915:17

5929:9,17

5930:11,14

5934:5 5937:4

5939:4 5945:15

5947:8 5949:22

5950:22,23

5952:19,25

5953:15 5954:2,

25 5955:6

5957:11,25

5958:15,16

5959:6,7 5963:20

**Houston's**

5866:9

**Howard** 5856:26**HQ** 5837:20,26

5838:10,17

5861:25 5897:11

5905:25

**HQS** 5864:6

5866:4 5897:19

5905:13,19

5921:19 5922:2,

14 5935:14

**huge** 5952:4**human** 5770:15

5812:4,11 5814:3

5815:13 5816:5

5820:20 5821:3

5822:3,12,25

5823:2,6,8,23

5824:23,25

5825:4 5826:21

5828:20 5829:11,

13 5832:10

5838:6,13,24,26

5840:22 5842:4,

22,24 5844:12

5845:6,26

5846:18,22

5847:3 5851:23

5853:1,3 5860:2

5863:11 5874:3,

14 5879:14,23,

24,25 5880:3

5881:21 5886:20,

26 5888:4

5889:7,10

5890:3,9 5891:7

5897:8,24 5899:3

5901:12 5902:15

5904:12 5909:10

5910:25 5913:5

5948:13

**hundred** 5929:14**hundred-metre**

5942:8

**Hurly** 5859:17**hydraulic**

5827:13

**hydrocarbons**

5870:13 5871:8

5904:18

**hydrogen**

5798:22

**hydrogeology**

5846:12

**hydrographs**

5821:6

**hydrologic**

5830:18

**hydrology**

5820:6 5835:2

**hypothetical**

5915:21

**I****i.e.** 5826:24

5898:2 5918:24

5953:12

**IAAC** 5856:15**Ian** 5770:10

5815:20 5822:25

5859:23

**ice** 5920:4**idea** 5771:21

5785:1 5833:16

5850:12 5961:14

5962:15

**identical** 5817:25

5818:23 5825:17,

25,26

**identified** 5810:8

5817:14 5843:8

5845:2,10 5847:2

5850:8 5867:13

5913:8

**identifies**

5922:23 5923:11

**identify** 5833:16

5835:16 5850:12

5875:9,15

5891:16

**Ignasiak** 5856:22

5866:8,9,20

5967:11,12

5968:9,11

5969:13,14

**illustrated**

5824:20 5929:4

5940:15

**images** 5766:2**imagine** 5875:13**impact** 5767:25

5771:24 5792:20

5801:26 5875:13

5939:7 5949:10

5966:8

**impacting**

5947:14

**impacts** 5792:10

5875:6 5938:7

**implement**

5811:10 5954:7

**implementation**

5796:24 5954:6



<b>implemented</b> 5774:9 5955:4	<b>including</b> 5768:6 5770:14 5800:4 5805:23 5816:4 5832:11 5837:21 5854:15 5860:1 5865:8 5869:15 5870:12 5871:7 5880:7,18 5888:7 5890:20 5897:10, 25 5898:9 5907:1 5910:21 5922:23 5925:4,26 5939:20,23 5942:12	12 5835:22 5837:16 5840:26 5864:12 5867:5 5897:11,20 5905:1	<b>inform</b> 5833:17 5850:14 5855:8	<b>insect</b> 5924:8
<b>implications</b> 5828:8 5924:22 5931:9 5937:22	<b>inclusion</b> 5816:16 5890:2	<b>index</b> 5775:7,8	<b>information</b> 5771:26 5774:16, 18 5775:9 5786:3 5789:14 5798:15 5819:11 5820:5 5836:10 5853:2 5899:15,22 5900:2,3 5925:1, 10,18,19,22 5927:7 5945:6 5948:7 5949:18 5955:3	<b>insectivorous</b> 5912:16
<b>importance</b> 5784:2	<b>incoming</b> 5834:12	<b>Indian</b> 5857:4	<b>instances</b> 5779:4,10 5923:12 5932:5	<b>insignificant</b> 5805:5 5958:14 5964:13
<b>important</b> 5780:21 5785:24 5786:14 5797:15 5799:5 5896:22 5916:26 5926:4 5936:12 5939:14 5949:19	<b>incorporate</b> 5791:16 5796:23 5821:7 5864:18 5890:8 5947:18 5949:19	<b>indicating</b> 5782:17 5804:21	<b>instance</b> 5919:3 5955:13	<b>installed</b> 5890:22
<b>improve</b> 5814:5	<b>incorporated</b> 5816:7 5833:18 5864:19 5954:9 5965:13	<b>indication</b> 5802:7 5804:2 5900:15 5904:6	<b>instances</b> 5957:6	<b>integrated</b> 5814:23 5816:24 5890:24
<b>improvement</b> 5793:6,20 5794:6 5940:7	<b>incorporating</b> 5922:3	<b>indicative</b> 5879:25 5890:15 5895:11	<b>integrated</b> 5814:23 5816:24 5890:24	<b>intend</b> 5785:3 5894:8
<b>inability</b> 5824:21	<b>increase</b> 5828:7 5864:3,24 5865:5,26 5866:3 5867:15 5876:5 5892:26 5894:9 5896:22 5899:2 5914:18 5915:7, 16 5916:1,2	<b>Indigenous</b> 5892:16,22 5897:13,23 5946:15,21 5947:9 5949:24	<b>informed</b> 5841:10	<b>intends</b> 5777:26 5968:20
<b>Incentive</b> 5951:16,22	<b>increased</b> 5821:18 5825:13 5925:5,6,12	<b>Indigenous-based</b> 5892:21	<b>infrastructure</b> 5798:2	<b>intensity</b> 5794:17,18
<b>incidence</b> 5966:17	<b>increases</b> 5850:3 5864:5 5896:21	<b>Indigenous-led</b> 5945:18 5948:7	<b>ingestion</b> 5818:16 5868:9, 10 5897:16 5908:3 5912:22 5913:7 5921:2 5931:24	<b>intent</b> 5788:23 5833:8 5835:14 5875:14 5877:17 5888:21,24
<b>incidents</b> 5876:11 5948:23	<b>interest</b> 5766:22 5812:20 5833:11	<b>Indiscernible</b> 5847:6 5871:20 5961:8	<b>inhalation</b> 5883:9 5897:4 5898:3 5902:10 5904:24 5909:23, 25 5910:2,11,21	<b>intention</b> 5794:24
<b>include</b> 5782:6 5787:5 5805:21 5818:13 5826:1 5832:14 5837:8 5860:10 5869:18 5873:19 5890:4 5892:23 5895:9 5904:16 5911:21 5912:2 5922:15 5940:23 5941:3 5947:2	<b>interested</b> 5820:25 5832:23 5843:23 5875:23 5952:5	<b>individual</b> 5826:24 5846:6 5870:11 5871:6 5897:2 5901:24 5919:20	<b>inherent</b> 5835:20 5838:2 5880:17	<b>interacting</b> 5962:9
<b>included</b> 5805:2, 10 5826:8 5867:9 5891:25 5912:10 5952:20	<b>interactions</b> 5940:2 5944:23	<b>individually</b> 5902:13 5909:8	<b>inherently</b> 5897:21	<b>interchangeable</b> 5808:21
<b>includes</b> 5797:18 5805:23 5814:18 5816:19 5820:12 5925:1,10,11,19 5932:17 5942:19	<b>interchangeably</b> 5808:9	<b>individuals</b> 5901:19,24 5932:17,19 5950:6	<b>initial</b> 5778:12 5842:12 5960:10	<b>interest</b> 5766:22 5812:20 5833:11
	<b>interest</b> 5766:22 5812:20 5833:11	<b>industrial</b> 5934:26	<b>initiation</b> 5799:5	<b>interested</b> 5820:25 5832:23 5843:23 5875:23 5952:5
	<b>interesting</b> 5776:8 5896:18 5964:14	<b>inflows</b> 5831:3	<b>Innovation</b> 5951:24	
		<b>influence</b> 5916:11 5918:14, 18,21	<b>input</b> 5814:9 5817:7,9 5835:17 5867:11	
			<b>inputs</b> 5817:13 5820:3	

**interfering**  
5904:2

**interim** 5768:18

**intermediate**  
5813:15 5890:18

**interpret**  
5808:19 5828:20

**interpretation**  
5907:9

**interrupt** 5788:6

**interrupting**  
5770:3

**intervene**  
5911:13

**inundation**  
5964:17

**inversions**  
5898:12

**invertebrate**  
5919:6,11  
5920:15

**invertebrates**  
5779:10 5919:3,  
20

**investigate**  
5947:17

**investigation**  
5891:15

**invisible** 5896:3

**invite** 5882:19  
5959:19

**invited** 5892:16

**involve** 5806:12

**involved** 5767:14  
5790:7 5818:8  
5826:25 5846:12  
5931:6

**IPCC** 5802:13,  
17,22 5803:19,26  
5804:12 5811:1

**iron** 5843:15  
5848:12 5849:5

**irrelevant**  
5780:20

**irrespective**  
5904:23

**issue** 5766:17  
5789:1 5796:15  
5817:11 5823:11  
5827:19 5828:19  
5836:26 5860:8  
5863:23 5864:5  
5874:10 5875:11  
5878:24 5932:18  
5933:26 5952:4  
5965:24

**issues** 5817:15  
5824:2 5825:1,16  
5875:4,10  
5877:22 5880:7  
5898:8 5899:13  
5913:2,6 5915:20  
5949:7

**item** 5766:18  
5769:4 5786:5,6

**items** 5768:22

---

## J

---

**Janet** 5770:10  
5779:26 5783:21  
5859:23

**January**  
5768:11,12  
5827:17

**Janusz** 5800:21  
5858:14 5957:26

**Jasper** 5784:14,  
17

**Jensen** 5830:23  
5834:22

**Jillian** 5898:12

**Jim** 5858:16

**John** 5770:11  
5771:8 5780:26  
5859:24 5930:4

**Joint** 5770:17  
5786:2 5811:24  
5856:12

**journey** 5813:6,  
13,21

**Judd** 5858:12

**judgment**  
5960:23

**July** 5775:4

**jump** 5780:1  
5911:11 5915:17

**junction** 5775:3

**June** 5774:22

**justification**  
5916:14

**justified** 5870:7

**justify** 5835:22

**juxtaposing**  
5788:8

---

## K

---

**Kansas** 5770:11  
5771:8,10,20  
5772:14,16  
5773:5 5774:1  
5775:10 5776:14,  
15,23 5777:8,18,  
20 5781:8,11  
5783:11 5784:9  
5785:7 5787:23,  
25 5808:11,14  
5859:24 5866:13  
5930:3,5,12  
5931:1 5943:14,  
15,19

**Kapel** 5856:10

**keeping** 5944:17

**Ken** 5859:11

**key** 5861:1  
5882:24 5887:2

**kicker** 5962:20

**kidney** 5898:4  
5905:12,18  
5910:4

**kidneys** 5949:8

**kill** 5778:13  
5779:11

**killed** 5784:19

**kilometres**  
5776:7 5779:15,  
17 5781:1  
5949:25 5961:2

**kilotons** 5793:23  
5795:11,14,21

**kind** 5772:19  
5774:21 5778:12  
5813:2,5 5816:9  
5822:10,13  
5823:18 5827:18,  
24 5828:9  
5833:23 5834:4  
5835:3 5836:16  
5842:8 5849:13  
5860:8,11 5861:8  
5862:23 5863:24  
5864:4 5866:26  
5867:2,23  
5870:15 5873:23  
5874:4,17  
5875:18 5877:22,  
24 5882:17  
5889:26 5907:17  
5914:14 5921:16  
5942:20,21  
5945:10 5949:9  
5954:17 5963:24  
5968:3

**kinds** 5874:12  
5902:1 5937:14  
5950:12

**Kirk** 5770:19

**knew** 5771:3

**knowing** 5832:23

**knowledge**  
5894:10 5953:9

**Ktunaxa** 5784:3  
5856:25

---

## L

---

**Lacasse** 5856:9

**lack** 5801:10  
5825:20 5873:6,7

**lacking** 5926:7

**lacquer** 5876:21

**lake** 5809:1  
5815:18 5816:1  
5818:1,2 5825:15  
5831:11,13,17,  
21,26 5832:1,5,7,  
11,22,23  
5833:14,15,17,  
22,23,26 5834:3,  
9,20 5835:3,7,18,  
21 5837:11,17  
5841:7,15,16  
5842:2,8,13  
5861:2,5,8,16,21  
5862:4,14,17,22  
5863:1 5865:12  
5879:15 5881:7,  
10,11,17,21,22,  
23,25 5882:1  
5886:18 5887:3,  
9,11,16,18,22  
5888:1,8,11,13,  
20,21,26 5889:4  
5905:10 5912:17  
5917:25 5918:25  
5919:8 5924:5  
5932:8,13  
5936:6,10

**lakes** 5809:9  
5831:19

**Lambrecht**  
5768:25 5769:1,  
3,18 5770:3,5,7,  
19,20 5772:6,12  
5773:1,5,19,21  
5774:19 5776:9,  
13,20,23 5777:5,  
8,16,18,24  
5779:24,26

5780:5 5781:10, 21,23 5782:11 5783:11,25 5784:1 5785:8, 10,15,17,26 5786:8,18,20 5787:1 5789:12, 21 5790:5,11,19 5791:6,10,19 5792:1,18,23 5793:3 5794:9,12 5795:22,26 5796:5,26 5798:6 5799:20,22 5800:14,17 5801:5,7,12,24 5802:4,21 5803:2,20,22,26 5804:14,19 5805:14,16 5806:5,23 5807:5,13,23,25 5808:1,2 5809:12,16,23 5810:1,11 5811:8,26 5813:4 5856:12 5952:18	<b>largely</b> 5956:1 <b>larger</b> 5787:6 5845:8 5935:19 5957:14 <b>largest</b> 5798:10 <b>larvae</b> 5925:15 <b>larval</b> 5923:12 5925:5 <b>late</b> 5774:21,22 5775:4 5788:3,19 5874:16 5949:3 5967:20 <b>latest</b> 5866:24 <b>laundry</b> 5849:1 <b>Lawson</b> 5898:12, 16 <b>layered</b> 5932:22 <b>leach</b> 5834:21 5835:8 5887:19 <b>leaching</b> 5834:14,19 5881:12 5887:2, 10 5888:18 <b>lead</b> 5784:26 5817:24 5826:2 5837:22 5838:18 5840:5,8,11,15 5868:7,10 5898:23 <b>leadership</b> 5948:1 <b>leads</b> 5906:16 <b>lean</b> 5945:19 <b>learn</b> 5887:4 <b>learnings</b> 5841:10 <b>lease</b> 5890:14 <b>leave</b> 5771:18 5820:23 5866:15 5962:19 <b>left</b> 5778:13 5790:6 5867:23 5889:17 5961:22 5962:6 5963:18	5964:2 <b>legend</b> 5776:22, 25 5777:1 <b>legislation</b> 5793:13 <b>length</b> 5960:25 <b>lens</b> 5937:5,6 <b>lentic</b> 5918:24 <b>level</b> 5784:21 5810:26 5812:14 5819:13 5820:26 5828:24 5829:22 5836:16 5849:23 5854:12 5874:23 5875:13 5880:5, 22 5881:9,20 5883:21 5884:22 5885:3,26 5886:7 5900:14 5901:3,6 5903:8 5909:16 5913:3,10 5914:9 5931:14 5932:16 5938:8 5941:4 <b>levels</b> 5823:4 5849:13 5850:12 5854:4 5875:2 5880:19 5883:22 5884:3,4,8,18,23, 26 5885:10 5886:11 5892:4 5893:2 5895:17 5900:11,13 5903:4 5913:17 5926:17,21 5933:3 5938:20 <b>lies</b> 5937:8 <b>life</b> 5795:1 5796:17 5799:1, 15 5831:4 5882:6 5920:11 5934:11 <b>life-history</b> 5779:5 <b>lifestyle</b> 5949:15 <b>lifetime</b> 5790:2 5814:12 5825:12	5835:23 5837:9, 17 5847:10 5853:5 5861:15 5864:13 5867:5 5883:2,13 5897:12,15,20 5905:1 5938:2 5952:7 <b>light</b> 5770:14 5860:1 5901:22, 26 5925:22 5938:16 <b>likelihood</b> 5879:7 5898:26 5917:23 <b>limber</b> 5772:25 5773:11 5776:12 5781:26 <b>limit</b> 5782:5 5787:2 5886:4 5918:6 <b>limitations</b> 5926:5 <b>limited</b> 5770:18 5812:9 5856:22 5858:2 5860:5 5888:8 5898:17, 18 5932:17 <b>limits</b> 5872:25 5879:16 5884:1 5885:24 5886:9 5892:5 5893:8 5929:15 <b>Lindsey</b> 5770:11 5821:12 5859:24 5931:20 <b>linear</b> 5836:4 <b>lines</b> 5792:7 5870:15 5900:22 <b>link</b> 5803:16 <b>lion's</b> 5956:9 <b>listed</b> 5786:4 5800:4 5913:17, 18 5919:21 5920:5 5922:22,	23 5923:11,16 5931:11,14,16,26 5932:16,21 5933:4,14 5937:1 5942:4 <b>lists</b> 5911:19 <b>literature</b> 5870:21 5874:2, 12 5875:19 5920:3 5925:1, 10,25 5926:8 <b>lithium</b> 5862:10 <b>litre</b> 5815:1 5820:18 5824:16, 20 5831:24 5832:15,16,17, 18,19 5844:17, 20,22 5845:15, 20,23 5915:9 5929:12 5963:10, 12 <b>litres</b> 5959:13 5960:13 5963:13 <b>live</b> 5765:24 5897:23 <b>liver</b> 5898:4 5905:12,18 5910:4 5949:8 <b>lives</b> 5920:15 <b>living</b> 5946:19 <b>Livingstone</b> 5858:8 5872:22 5968:16 <b>load</b> 5816:15 <b>loaded</b> 5813:8,9 <b>loading</b> 5829:24 5966:23 <b>loadout</b> 5869:26 5890:14 <b>local</b> 5774:14 5775:21 5779:18 5843:19 5897:17 5922:26 5923:13 5934:18
--	---	---	---	---

**locate** 5796:18  
**located** 5851:16  
**location** 5826:26  
 5844:19 5847:1  
 5869:11 5883:12  
 5887:23 5895:12  
 5901:23 5933:1  
**locations** 5837:2  
 5847:10 5848:9,  
 17 5869:2,8  
 5879:2 5890:22  
 5897:21,24,25  
**logical** 5817:2  
**logically** 5816:26  
**long** 5782:9  
 5813:26 5852:19  
 5854:9 5880:24  
 5882:10 5883:12  
 5886:1,6 5899:5  
 5905:8 5913:14  
 5934:4,25  
 5941:1,6 5967:10  
 5968:9  
**long-term**  
 5780:23 5806:18  
 5811:6 5847:12,  
 18 5852:19  
 5853:18 5883:10,  
 11 5889:19,22  
 5929:23 5930:10  
**long-toed**  
 5922:24  
**long-trap** 5930:9  
**Longacre**  
 5859:19 5970:3,  
 14  
**longer** 5854:9  
**longwinded**  
 5779:22  
**looked** 5815:16  
 5868:6 5870:9  
 5871:11,25  
 5872:13 5875:20  
 5883:9 5925:22  
 5959:15

**loop** 5863:21  
**lose** 5900:8  
**loss** 5790:12  
 5791:12,16,22  
 5792:8,13,14  
 5807:6 5939:23  
 5942:6,10,11,17,  
 21 5943:6,10,18  
**losses** 5773:12  
 5789:23  
**lost** 5768:4  
 5790:15,21  
**lot** 5767:20  
 5818:14 5835:13  
 5837:3 5846:14  
 5848:14,18  
 5849:9 5873:11  
 5887:5 5900:9,11  
 5903:19,21  
 5904:6 5906:8  
 5907:11 5917:7  
 5932:5 5945:5  
 5947:8 5955:2  
 5956:21,23  
 5961:3 5964:1,5  
**lotic** 5916:20  
 5918:25 5919:1,9  
**loud** 5949:5  
**love** 5785:1  
**low** 5810:21  
 5838:2 5843:5  
 5849:5 5871:10  
 5879:7 5898:18  
 5903:8 5913:11  
 5915:4 5932:7  
 5943:5 5945:4  
**low-tech** 5895:21  
**lower** 5775:22  
 5784:17 5793:1,  
 21 5824:3,18  
 5848:20 5861:10  
 5862:20 5880:11  
 5897:22 5912:26  
 5935:21 5953:6  
 5960:22

**lowest** 5800:8,26  
**LSA** 5897:15  
**lunch** 5855:12  
 5860:18 5863:23  
 5881:8 5907:25  
**lung** 5883:18,19  
 5898:7 5903:26

---

**M**


---

**M-HM** 5827:26  
 5828:10 5830:22  
**Madam** 5911:9  
**made** 5769:8  
 5789:22 5796:6,  
 14 5810:2  
 5822:23 5833:6,7  
 5834:16 5882:3  
 5912:21 5913:20  
 5921:2,3,13  
**magic** 5783:20  
**magnitude**  
 5792:7 5839:9,18  
 5849:20 5864:6  
 5866:3 5885:4  
 5907:16 5921:5  
 5929:10 5932:8  
**main** 5904:5  
**maintain** 5798:4  
 5813:21 5833:26  
 5934:6,19  
**maintained**  
 5797:6  
**maintaining**  
 5854:8  
**maintenance**  
 5834:4  
**majority** 5811:2  
 5812:16  
**make** 5766:7  
 5767:1 5768:1  
 5769:12 5772:25  
 5777:19 5791:12  
 5792:3 5812:25  
 5817:12 5824:10

5866:26 5883:20  
 5886:11 5890:2  
 5907:5 5914:16  
 5921:7 5941:21  
 5947:11 5949:1  
 5959:12 5964:6,7  
 5965:23  
**makes** 5776:8  
 5828:1 5837:24  
 5917:2  
**makeup** 5959:3,  
 24  
**making** 5792:12  
**mallard** 5924:5,  
 6,7 5931:10  
 5936:5,7,8  
**mammalian**  
 5923:9 5945:8  
**mammals**  
 5779:11 5936:2  
**manage** 5801:13  
 5842:3 5886:25  
 5889:17 5955:5  
**managed**  
 5961:10  
**management**  
 5791:11,15  
 5796:22 5798:4  
 5800:3 5801:11  
 5802:6 5803:14  
 5806:18 5807:8  
 5811:16 5841:5  
 5879:26 5886:17,  
 24 5889:16  
 5890:7 5893:5  
 5934:7 5937:18  
 5947:20 5951:14  
 5952:2  
**manager**  
 5868:18  
**managing**  
 5791:16 5805:25  
 5961:13  
**manganese**  
 5817:24 5824:6

5826:2 5837:22  
 5838:18 5843:16  
 5844:1,9  
 5845:12,13,18,21  
 5846:7,17  
 5847:20 5848:9,  
 11,23 5850:6  
 5898:24  
**manifest** 5874:7  
 5964:23  
**manner** 5766:26  
**map** 5776:11  
 5777:6 5779:25  
**maps** 5776:16  
**March-ish**  
 5774:21  
**March/april**  
 5788:20  
**margin** 5905:14,  
 21  
**marginal**  
 5822:23 5831:5  
**margins** 5879:22  
 5880:5  
**marine** 5800:13,  
 25 5801:2,9  
**Martin** 5866:8  
**material** 5767:25  
 5793:18 5809:6,  
 8,9 5838:25  
**materials**  
 5808:19 5811:5  
**math** 5910:10  
 5968:3  
**matter** 5769:15  
 5812:3 5818:19,  
 21 5825:7  
 5869:15 5871:4  
 5898:14 5902:18  
 5922:13 5929:18  
**matters** 5766:11  
 5768:23 5782:7  
**Matthews**  
 5812:6 5856:7

5946:9,11,13 5949:23	24 5842:15,17 5850:14,23 5851:11 5855:9 5869:22,24 5875:1 5876:26 5877:11 5892:13 5938:13	<b>methane</b> 5802:2, 8,12,16,19,25 5803:7,16,17,24 5809:17,20 5810:4,7,10,19, 21,26 5811:11 5952:19	<b>Milligan</b> 5858:20	<b>minimizing</b> 5790:2
<b>mature</b> 5783:5	<b>measuring</b> 5896:6 5948:23	<b>method</b> 5895:21	<b>milligram</b> 5929:12	<b>mining</b> 5770:18 5798:7,9,14,26 5804:23 5805:24 5812:8 5856:22 5860:4 5882:12 5887:5 5956:13
<b>matures</b> 5799:17	<b>mechanics</b> 5956:26	<b>methodologies</b> 5883:6,25	<b>milligrams</b> 5832:15,17,18,19 5844:17,20,22 5845:14,20,22 5963:10,12	<b>minus</b> 5770:18 5798:7,9,14,26 5804:23 5805:24 5812:8 5856:22 5860:4 5882:12 5887:5 5956:13
<b>maximum</b> 5820:16 5824:18 5901:18 5911:22	<b>mechanism</b> 5903:21	<b>methods</b> 5895:16,20 5957:11	<b>million</b> 5959:13 5960:13 5963:13	<b>minor</b> 5769:4 5939:17
<b>mayfly</b> 5923:25	<b>mechanisms</b> 5853:11,17 5903:16,21 5904:7	<b>methylmercury</b> 5837:22 5941:2	<b>mind</b> 5874:24 5899:8	<b>minus</b> 5836:14 5837:3,5
<b>Mccoy</b> 5770:10 5859:23 5954:11, 16,20 5955:6 5957:17 5959:8, 10 5960:16	<b>media</b> 5908:20	<b>metres</b> 5881:11 5959:4,13 5960:7	<b>mine</b> 5777:3 5781:4 5783:10 5789:2 5790:2 5799:7 5803:18 5804:10,22 5805:12 5813:6 5841:13 5843:2,4 5850:26 5851:6, 12,18 5852:9 5869:3,19 5877:8,12,13,17 5879:6,8 5890:13 5901:15 5911:25 5925:13 5931:22 5954:13,21 5955:19 5956:22 5957:1,8,13,15 5960:18	<b>minute</b> 5766:19 5790:17,18 5795:19 5802:20 5819:4 5821:9 5833:3,20 5834:6 5841:1 5845:4 5863:16 5872:19 5881:1 5908:10 5915:18 5936:24
<b>Mcgillivray</b> 5857:18	<b>meet</b> 5801:11 5854:22	<b>micrograms</b> 5815:1 5820:18 5824:16,20 5831:24 5832:14 5915:9 5929:14	<b>mine-exposed</b> 5923:25	<b>minutes</b> 5968:12, 16,17
<b>Mchugh</b> 5857:9	<b>mental</b> 5874:6 5947:7 5949:6	<b>microns</b> 5896:2	<b>mine-face</b> 5952:19	<b>minutes'</b> 5866:13
<b>Mcintyre</b> 5859:5	<b>mention</b> 5784:2 5946:18	<b>microphone</b> 5766:2	<b>mineral</b> 5809:8	<b>misconstrued</b> 5882:20
<b>Mckay</b> 5949:26	<b>mentioned</b> 5775:11 5810:25 5811:14 5854:21 5887:9 5937:10 5941:16 5947:20 5949:7 5952:17	<b>mid-depth</b> 5843:17	<b>mines</b> 5803:8 5874:19 5878:4, 13,14 5955:11,14 5960:20 5961:1	<b>mislabelling</b> 5928:3
<b>MD</b> 5857:14	<b>merit</b> 5896:9,15	<b>middle</b> 5786:6 5949:26	<b>minimal</b> 5809:6 5879:10 5900:20	<b>missed</b> 5959:19
<b>meaning</b> 5782:4	<b>message</b> 5825:6 5910:15	<b>migrate</b> 5914:3	<b>minimize</b> 5800:9, 12 5811:11 5853:24 5877:14 5887:21	<b>mistaken</b> 5862:24
<b>meaningful</b> 5947:2 5949:20	<b>meta</b> 5958:19	<b>migration</b> 5795:2	<b>minimize</b> 5800:9, 12 5811:11 5853:24 5877:14 5887:21	<b>Mitchell</b> 5770:11 5812:17 5815:19, 20 5823:1 5824:24 5825:2 5835:26 5836:23, 25 5837:13 5840:10,16 5846:5,25 5847:22,23,25 5848:6 5851:26 5852:13,14 5853:8 5859:24 5860:18,23,24 5866:19 5867:22
<b>means</b> 5797:6 5944:16	<b>metabolic</b> 5904:2	<b>middle</b> 5786:6 5949:26		
<b>meant</b> 5910:7 5959:11	<b>metabolized</b> 5904:2	<b>migratory</b> 5770:14 5786:15 5860:1 5922:22 5924:23 5937:23 5938:1,5,7,14,23 5939:1,22 5941:5		
<b>measurable</b> 5899:2	<b>metals</b> 5850:5 5867:26 5870:13 5872:13 5904:17	<b>Mike</b> 5770:9 5858:12 5859:22 5934:21		
<b>measure</b> 5791:17 5802:8,11 5954:5 5955:3,5	<b>meteorological</b> 5901:18	<b>millennia</b> 5778:22 5810:20		
<b>measured</b> 5838:3,19 5844:21 5846:21 5878:17 5880:1 5886:18 5908:19 5952:11	<b>meteorology</b> 5899:18			
<b>measurement</b> 5802:19,24 5806:9 5873:7				
<b>measurements</b> 5804:7 5878:19				
<b>measures</b> 5805:7 5833:18 5840:21,				

5868:13,21 5870:8 5871:18 5872:2,19 5873:18 5875:18, 20 5881:2 5882:8,19,22 5884:25 5886:13 5899:7 5900:6,7 5901:8 5902:8,20 5904:8 5911:3 5946:16,23 5948:10	<b>mixture</b> 5870:4 5880:18 <b>mixtures</b> 5897:3 <b>mobile</b> 5798:26 <b>model</b> 5816:15 5818:26 5819:25, 26 5820:3 5825:9,10 5827:11,13 5829:7,11,19,23, 26 5830:8,9,13, 26 5833:2,7 5835:14 5838:14, 24 5839:23 5864:25 5868:5 5884:20 5913:24 5914:21 5917:13, 14,19 5920:19 <b>modelled</b> 5820:6, 17 5823:25 5826:7 5864:16 5950:6,8 <b>modelling</b> 5815:8 5820:11 5821:5,6 5822:9, 10,11,18 5824:4, 26 5825:3 5826:5,13 5827:21 5830:5, 6,24 5831:1 5832:5,24,25 5833:13,22 5834:5 5840:13 5841:22 5860:11 5862:24 5863:4 5864:2,4,15 5866:1 5867:7,17 5872:16 5876:7 5880:11,12 5881:4 5885:24 5886:1 5891:10 5900:1 5901:21 5916:16 5921:17 5922:3 5946:1 5954:9 5965:14 <b>models</b> 5821:7	5827:3,6 5828:14 5841:23 5845:6 5879:12 5950:2 <b>modified</b> 5955:14 <b>modify</b> 5917:19 5918:20 <b>molecules</b> 5963:17 5964:1,2 <b>moment</b> 5787:23 5788:6 5799:5 5807:14 5809:22 5811:19 5815:20, 24 5816:17 5818:7,24 5819:1 5822:21 5826:15 5830:14 5836:21 5840:2 5846:25 5852:24 5853:8 5854:6 5855:2 5866:6 5870:24 5899:8 5921:15, 20 5926:14 5927:14 5932:11 5935:1 5941:12 5946:23 5953:23 <b>momentarily</b> 5828:16 <b>Monica</b> 5859:14 <b>monitor</b> 5781:25 5782:9 5788:11 5852:7,8 5878:21 5891:3,11,26 5892:24 5934:9 5947:5 <b>monitoring</b> 5767:16 5781:24 5782:1,3,7,13,16, 24,26 5783:3 5788:8,10,23 5789:3,6 5804:7 5805:2 5850:8,9 5851:10 5854:19 5855:5,6 5878:7, 16 5889:13,19,25 5890:1,6,9,12,15,	16,17,21,23,25 5891:17,18 5892:7,9,17,19, 21 5893:1,7,11 5894:16 5895:2, 3,17,19 5923:23 5924:15,20 5930:18 5934:11 5937:17 5945:17, 18,22 5948:8,26 5954:14 <b>montane</b> 5775:3, 11,13,14,23,25 5776:6 5781:13 5784:7,8,20 <b>Monte</b> 5831:1 <b>monthly</b> 5815:7 5816:13 5819:22 5820:3,14,17 5821:6 5823:25 5824:18 5829:4 <b>months</b> 5788:26 <b>Mooney</b> 5770:11 5812:17 5821:12, 13 5823:11,14 5859:24 5866:19 5911:1 5913:14 5916:6 5925:25 5931:20 5935:2 5937:24 5941:12 5944:25 5946:4 <b>Mooney's</b> 5937:5 <b>Morehouse</b> 5858:19 <b>morning</b> 5765:23 5766:14 5769:13 5771:10,13 5867:24 5907:24 5921:10 5967:25 5969:18,23 <b>mortality</b> 5925:6,9,14 <b>Moulins</b> 5859:3, 9 <b>mountain</b> 5804:4 5810:5 5854:18	5857:26 5878:14 5902:2 5939:21 5960:20 <b>mountains</b> 5785:2 5898:11 <b>move</b> 5781:15 5783:24 5789:10 5792:16 5819:6 5849:26 5866:11 5886:14 5887:22 5927:25 5928:20, 21 <b>movement</b> 5931:3 <b>moving</b> 5837:14 5860:7 5920:2 <b>multi</b> 5803:12 <b>multimedia</b> 5818:12,26 5839:22,26 5840:19 5868:4 5884:20 5885:11 5897:4 5898:2 5899:1 5902:14 5904:9 5906:4,9, 22 5909:9 5914:21 5917:13 5928:6,10 <b>multiple</b> 5870:15 5883:22 5884:8 5885:13 5888:22 5899:1 5900:22, 24 5941:7 5944:9 <b>Municipality</b> 5857:11 <b>mute</b> 5927:20 5930:4 <b>MW15-12-7</b> 5844:2,3,19 <b>Métis</b> 5857:1
<hr/> <b>N</b> <hr/>				
<b>Nakoda</b> 5857:6				

**narrowed** 5889:2  
**Nation** 5856:25  
 5857:1 5898:6  
**National** 5784:18  
**Nations** 5857:6  
**natural** 5775:14,  
 25 5776:4 5779:3  
 5794:15,16  
 5795:2 5831:3  
 5892:23 5893:18  
 5894:1,11  
 5938:22  
**naturally** 5838:5  
 5898:20  
**nature** 5891:10  
 5941:9  
**nearest** 5949:24  
**necessarily**  
 5817:3 5845:8  
 5846:22 5862:11  
 5899:24 5901:1  
 5903:14 5940:3  
 5952:25  
**necessity**  
 5777:12  
**needed** 5769:20  
 5812:19 5853:13  
 5867:13 5899:6  
**negatively**  
 5925:3 5947:23  
**negligible** 5869:6  
**neighbours**  
 5947:16  
**nests** 5774:20  
 5786:15  
**neutral** 5944:8  
**newer** 5797:25  
 5935:9  
**newly** 5789:7  
**nickel** 5824:6  
**nighthawk**  
 5923:15,16  
 5924:10,17  
 5931:13 5937:2

**Nijjer** 5857:16  
**nitrate** 5832:3,16  
 5925:2,20 5927:8  
 5928:26  
**nitrites** 5925:12  
 5938:20  
**nitrite** 5824:6  
 5925:3 5927:8  
**nitrites** 5925:13  
**nitrogen** 5890:10  
 5898:15,22  
 5901:19 5902:17  
 5903:22  
**Niven** 5857:14  
**NO2** 5899:25  
**nodal** 5913:24  
 5914:7  
**noise** 5770:13  
 5787:7 5791:8  
 5802:1 5804:15  
 5809:14 5859:26  
 5948:18,22  
**noisemakers**  
 5937:12  
**non-diesel**  
 5798:26  
**non-mine** 5924:1  
**non-selenium-  
 laden** 5966:3  
**Nonetheless**  
 5810:23 5881:21  
**nonproject**  
 5902:19  
**normal** 5797:26  
 5877:5,26  
 5923:26  
**north** 5783:20  
**northern**  
 5775:23 5878:13,  
 14 5915:13  
 5936:6  
**notably** 5821:17  
 5850:5 5916:22

**note** 5767:14  
 5768:20 5809:18  
 5862:1 5865:22  
 5902:9 5952:16  
**noted** 5817:15  
 5830:26 5837:20  
 5879:4 5919:26  
 5920:3 5921:10  
 5933:3 5940:10  
**notes** 5772:21  
 5922:26 5924:16  
 5970:6  
**notice** 5866:13  
**notionally**  
 5959:5  
**November**  
 5800:18 5856:3  
 5957:22 5970:9  
**nuisance**  
 5869:18 5873:20,  
 21 5874:2  
 5876:2,3 5880:19  
 5895:17,22,26  
 5896:5  
**number** 5767:15  
 5778:19 5786:5,6  
 5797:10,20  
 5798:19 5833:6  
 5843:22 5844:5  
 5845:1,10 5848:4  
 5861:26 5868:15,  
 18 5869:21  
 5870:17 5871:5  
 5885:19 5886:8  
 5915:26 5922:5,  
 8,11 5930:23  
 5935:13 5943:17  
 5957:21,23  
**numbers**  
 5774:13 5823:2,8  
 5826:19 5827:4,  
 13,16,22,25  
 5828:12 5833:11  
 5847:26 5848:18  
 5849:9,18 5861:3  
 5863:19 5907:14

5915:24 5929:16  
 5935:10  
**numerous**  
 5917:20 5926:24  
 5933:2  
**nutcracker**  
 5770:26 5771:3,  
 12,23 5772:1,22  
 5773:13,16,17,23  
 5774:3,5,9,12,14,  
 19 5777:12,14  
 5779:2,15  
 5780:3,7,20,21,  
 24 5781:14,26  
 5782:3,8,24  
 5783:4,7,14  
 5788:1,2,12  
 5789:4 5807:18  
**nutcracker's**  
 5778:19  
**nutcrackers**  
 5778:24  
**nymph** 5923:12

---

**O**

---

**O'GORMAN**  
 5812:6 5856:6  
 5911:13 5946:9  
 5950:17,18,21  
 5951:3,6,8,11,12  
 5952:14 5953:9  
 5954:23 5957:18,  
 25 5958:20  
 5959:1 5962:12  
 5963:21 5966:13  
 5967:8  
**oath** 5769:15,24  
**objective**  
 5809:20 5842:5  
 5848:12,24  
 5849:11  
**objectives**  
 5848:10  
**obligation**  
 5952:10 5953:4,

12  
**observable**  
 5949:14  
**observed** 5924:1  
**obtain** 5911:24  
 5919:18  
**obtained**  
 5845:26 5854:13  
**occasional**  
 5847:9,11  
**occupy** 5919:21  
**occur** 5766:26  
 5775:19,22,24  
 5778:3 5779:22  
 5790:22 5794:2  
 5804:22 5836:9  
 5838:5 5879:5  
 5899:20,24  
 5902:23 5954:22  
**occurred**  
 5814:13  
**occurrence**  
 5776:12 5785:24  
 5786:14  
**occurring** 5918:1  
**occurs** 5824:23  
**October** 5797:9  
 5810:14  
**OECD** 5903:2  
**off-road** 5798:26  
**off-site** 5877:13  
**offer** 5785:5  
 5794:1  
**offered** 5874:26  
**office** 5917:15  
**Official** 5859:19  
 5970:15  
**offset** 5942:9  
 5953:21  
**offsets** 5953:13  
**offtrack** 5875:16  
**Okoye** 5857:25

**older** 5821:15  
5822:22 5935:8  
**Oldman** 5817:26  
5828:26 5829:9,  
17,25 5830:4,6,  
11,18 5837:18  
5859:16 5917:25  
5918:24  
**olive-sided**  
5923:15,20  
5924:10,17  
5931:13 5937:2  
**omnivorous**  
5779:9 5912:17  
**on-site** 5793:21  
5798:17 5811:3  
5953:13  
**on-the-ground**  
5954:6  
**ongoing** 5810:4  
**Ontario** 5967:22  
**onwards** 5806:20  
**Oops** 5766:19  
**open** 5766:9,12  
5799:8 5865:20  
5875:14 5947:26  
5953:16  
**open-forest**  
5778:1  
**operating** 5854:1  
5878:4 5889:11,  
21 5931:21  
5952:7  
**operation**  
5790:13 5806:14  
5841:11 5876:18  
5877:5,26  
5882:13 5888:5  
5929:22  
**operational**  
5876:13 5877:22  
**operations**  
5776:26 5777:2,4  
5782:14 5795:12  
5800:9 5804:25

5805:6,10,13,17,  
20 5806:25  
5813:26 5819:23  
5829:6 5879:8  
5889:23 5894:9,  
14,21 5934:11  
**opinion** 5788:5  
5850:21 5870:20  
5882:16 5907:20  
5927:16  
**opportunities**  
5778:26  
**opposed** 5818:16  
5847:12 5945:6  
5949:15  
**option** 5916:4  
**options** 5953:15  
**oral** 5897:5  
5898:2 5904:24  
5905:2,9,15  
5906:22 5909:23,  
25 5910:2,12,21  
**order** 5798:23  
5799:2 5820:8  
5839:9,17  
5863:12 5864:6  
5893:4 5907:16  
5915:1 5929:12  
**orders** 5929:10  
**organ** 5904:16  
**organic** 5809:6,9  
5904:4  
**original** 5821:5  
5864:25 5866:1  
5867:16 5868:5  
**originate**  
5798:13  
**originating**  
5897:3  
**otter** 5915:14  
5936:6  
**outer** 5783:18  
**outlined** 5768:19  
**output** 5913:25

5917:2  
**outputs** 5830:9  
5916:9  
**overestimate**  
5793:25  
**overland** 5835:9  
**OVERLAPPIN**  
**G** 5847:6 5871:20  
**overstatement**  
5793:17  
**owners** 5851:20  
**ownership**  
5813:13  
**oxidation**  
5963:24  
**oxides** 5890:10  
5898:14,15,22

---

**P**

---

**Pacific** 5800:7,26  
**package** 5786:3  
5789:14 5791:7,8  
5801:26 5804:15  
5809:14 5951:9  
**pages** 5768:7  
5814:7 5832:3  
5837:15 5904:25  
5928:23 5929:4,8  
5951:13 5970:4  
**pairs** 5919:21  
**panel** 5766:15,19,  
23,25 5767:1,4,  
10,22,26 5768:3,  
5,8,19,26 5769:2,  
10,18 5770:17,  
19,20 5771:1,4,6,  
16,19 5772:12,14  
5783:24 5784:1,6  
5785:10 5786:2,  
20 5789:10,22  
5791:10 5792:23  
5793:23 5794:12  
5796:5,11 5798:6  
5799:22 5801:7

5802:4,16  
5803:23 5804:19  
5806:26 5808:2,  
25 5809:16  
5810:2 5811:17,  
21,23,24 5812:1,  
8,13,18 5813:7  
5820:25 5825:8,  
22 5827:19  
5828:1,2 5829:17  
5856:12 5860:4  
5862:5 5863:14  
5866:14 5868:17  
5921:18 5946:8,  
12,13 5950:20,21  
5954:3 5966:26  
5967:10,15,16,  
20,25 5968:7  
**panel's** 5767:25  
5827:12 5828:9  
5967:14  
**paragraph**  
5772:9,10,13  
5773:3,8 5792:22  
5793:2 5794:12  
5804:20 5838:1  
**paragraphs**  
5924:26  
**parameter**  
5878:20 5929:6  
**parameters**  
5817:8,9 5824:24  
5828:3,5 5854:23  
5913:8 5914:11,  
18,23 5928:25  
5929:3 5932:21  
**park** 5784:14,18  
5828:16  
**parked** 5877:13  
**Parks** 5857:20  
5923:6  
**part** 5782:1  
5797:5 5802:5  
5803:13 5807:8  
5821:25 5852:5  
5877:26 5890:24

5910:6 5918:13  
5947:25 5969:10  
**participant**  
5768:10  
**participants**  
5766:22 5767:1,  
8,11,17 5768:20,  
23 5967:16,21  
5968:22 5969:3,  
15  
**participate**  
5766:7 5892:17  
**participating**  
5767:16  
**participation**  
5811:23 5892:18  
**particle** 5870:5  
5895:25  
**particulate**  
5869:15 5898:14  
5902:18 5903:22  
**particulates**  
5869:17 5872:13  
5896:12 5901:20  
**parties** 5766:20  
**partly** 5773:22  
5933:16  
**partners** 5801:19  
**parts** 5789:8  
5801:22 5914:2  
5920:10 5940:4  
**Pass** 5857:12  
**passages** 5785:10  
**past** 5940:6  
**pathway** 5825:22  
5842:22 5860:19  
5908:12,14,15  
5922:15  
**pathways**  
5814:22 5816:12,  
24,25 5817:1  
5867:9 5880:16  
5885:11,12  
5897:9,10 5898:4



5904:3,10 5912:2,11 5922:16	5897:2 5901:13 5902:16 5909:11 5946:19	<b>permit</b> 5843:2,4 5851:18 5869:3 5879:6 5901:15	<b>piles</b> 5802:13,26 <b>pilot</b> 5888:17 <b>Pincher</b> 5857:18 <b>pine</b> 5772:25 5773:10,11,16, 22,24 5774:1 5775:4 5776:12, 18 5777:9 5778:1,3 5779:7, 21 5780:4,8,22 5781:2,16,19,26 5782:20 5783:5	<b>plans</b> 5797:4 5798:25 5915:26 5924:19,20 5953:22 <b>plant</b> 5774:2 5778:23 5805:1 5956:17 <b>planted</b> 5781:5 <b>planting</b> 5773:10 5780:15,17,25 <b>plants</b> 5773:24 5777:9 <b>plastic</b> 5783:17 <b>plausible</b> 5903:16 <b>play</b> 5947:21,22 <b>PM</b> 5855:13,15 5859:21 5869:1, 7,16 5870:6,7,10, 14 5878:6,7,16, 19 5890:11 5895:18,24 5896:11 5901:20 5902:18 <b>point</b> 5776:1 5779:5 5782:16, 21,25 5799:1,13 5801:18 5806:16, 19,24 5812:23 5813:12,16 5823:12,20 5826:11 5846:19 5885:15 5894:7 5896:18 5900:26 5904:15 5934:10, 16 5941:15,19 5942:14 5944:2 5947:10 5953:1, 16 5956:14 5964:14 <b>pointed</b> 5793:18 5797:11,21 5882:8 <b>pointing</b> 5871:21 <b>pointless</b>
<b>patience</b> 5811:22 <b>patterns</b> 5775:17 <b>pay</b> 5892:18,20 <b>payments</b> 5953:12 <b>PDF</b> 5772:8 5773:2 5776:21 5781:22 5785:9 5786:5 5789:16 5791:9 5792:21 5796:2,14 5802:1 5803:5,6 5804:16 5809:15 5814:7, 17 5815:3,12,16 5817:20 5818:6 5820:4,15,21 5823:24 5829:1 5831:20,22 5832:3,12 5836:19,21,24 5837:26 5838:8, 15 5839:1 5843:23 5844:5, 12 5848:4 5869:23 5871:17 5886:15 5897:26 5904:14,25 5905:3,11 5906:17,25 5910:19 5911:19, 20 5912:18 5924:3,25 5925:17 5928:22 5929:4 5940:17 5941:3 5958:23 <b>peak</b> 5774:20 5804:25 <b>peer-reviewed</b> 5870:20 <b>peers</b> 5899:9 <b>people</b> 5818:26 5850:18 5873:9 5874:24 5876:3	<b>perceived</b> 5875:6 <b>percent</b> 5778:2 5793:16 5794:7, 17,20 5795:14 5798:11,19 5837:8 5911:24 5915:8 5919:18 5920:8 5943:2 <b>percentile</b> 5815:7 5816:13 5819:22 5821:24 5824:22 5829:4 5834:26 5835:1 <b>percentiles</b> 5824:4 <b>perception</b> 5896:21 <b>percolates</b> 5853:25 <b>perform</b> 5934:6 <b>perimeter</b> 5789:6 <b>period</b> 5767:3,6 5788:21 5819:23, 24 5820:10 5826:26 5829:6,7 5832:5 5842:2 5850:20 5851:5 5854:15 5861:14 5865:6,20 5882:10,14 5883:2,13 5888:7 5889:7 5929:23 5934:2,3,4 5961:26 <b>periodic</b> 5797:7 5930:18 <b>periods</b> 5888:5 <b>permanent</b> 5852:19 <b>permeable</b> 5843:6	<b>perpetuating</b> 5780:22 <b>person</b> 5771:3,4 5815:23 5897:23 5954:4 <b>personally</b> 5875:20 5946:4 <b>perspective</b> 5875:24 5917:19 <b>pertaining</b> 5771:26 <b>pescevorian</b> 5926:22 <b>Peterson</b> 5858:26 <b>ph</b> 5872:13 <b>phase</b> 5777:10 5794:24 5804:18 5805:17 5842:3 5889:11,13,21,23 <b>phaseout</b> 5795:7 <b>phases</b> 5777:10, 11 5780:9 <b>phonetic</b> 5941:26 <b>phrase</b> 5808:5 <b>phrases</b> 5808:7, 17,18 <b>physical</b> 5874:8 5876:1 5947:7 5948:12 <b>physically</b> 5887:22 <b>pick</b> 5813:23 5867:18 5911:4 <b>picked</b> 5774:23, 26 <b>picture</b> 5872:14 <b>piece</b> 5884:13 5968:19 <b>Piikani</b> 5898:6	<b>pines</b> 5773:6 <b>pit</b> 5831:19,21 5832:1,23 5851:6 5862:4 5869:11 5887:11 5897:25 5930:15 5956:3, 5,12 5964:4,7,22, 24,25 5965:2,10 <b>pits</b> 5930:17,19 5937:11 <b>place</b> 5806:13 5836:18 5841:19 5850:7,23 5853:26 5854:21 5855:7 5930:1 5934:23 5938:1 5954:14 5958:1 <b>plains</b> 5784:8 5898:11 <b>plan</b> 5791:11,16 5792:3,5,12 5796:22 5798:4 5799:7 5800:3 5801:11 5802:6, 7,8,11 5803:14, 15 5804:6 5807:8 5811:10,13,16 5812:20 5813:19, 24 5841:14 5850:15 5890:1, 7,23 5951:15 5952:2 <b>planned</b> 5790:13 5805:21 5809:21	

5788:19	<b>possession</b>	5870:4 5875:9	<b>predation</b> 5925:7	<b>preparation</b>
<b>points</b> 5826:20	5801:17	5880:9,15 5881:5	<b>predict</b> 5814:23	5772:2 5774:5
5848:15 5852:3,9	<b>possibility</b>	5887:3 5888:18,	5854:3 5881:4	5939:6
5873:11 5896:16	5884:15	19 5890:3,19	5902:9	<b>prepare</b> 5767:17
5910:12 5913:18	<b>possibly</b> 5801:16	5891:3,4 5892:25	<b>predicted</b>	<b>prepared</b> 5772:1
5944:26	5883:2 5951:2	5893:1,15 5897:8	5805:17 5819:18	5802:6
<b>Postras</b> 5857:1	<b>post</b> 5768:19	5898:22 5901:10	5820:13 5826:5	<b>prescribe</b>
<b>pollutants</b>	5888:26 5889:12	5902:11,12	5830:2,16	5853:21
5898:15	<b>post-filling</b>	5904:10,21	5831:25 5832:6	<b>presence</b> 5879:7
<b>pollution</b> 5950:4	5842:15	5906:25 5909:7	5837:2,5 5844:10	5881:4
<b>polycyclic</b>	<b>post-operation</b>	5910:1,3,8	5862:4,12	<b>present</b> 5785:11
5870:12 5871:7	5889:13	5912:4,13 5913:4	5864:24 5867:15	5835:17 5859:12
5904:17	<b>post-</b>	5916:18 5917:9	5868:8 5869:8,10	5899:15 5919:11
<b>pond</b> 5809:1	<b>reclamation</b>	5918:3 5921:1	5879:1,4,14	5922:25 5923:13
5932:12 5962:24,	5807:3	5925:2,14	5880:10,13	<b>presentation</b>
25 5963:9	<b>postclosure</b>	5929:21 5931:15	5881:18 5885:14	5772:19
5965:4,6 5966:19	5819:24 5820:10	5936:9 5937:1	5898:5 5900:12,	<b>presented</b> 5816:6
<b>ponds</b> 5809:7,10	5829:6 5842:3	5938:7,10	18 5902:13	5818:11 5820:21
5843:19 5928:24	5850:20,23,26	5940:23 5941:7,	5906:24 5908:2,	5821:15 5822:19
5929:22,25	5854:15 5888:7	10,24 5943:5	7,20 5909:8	5823:26 5826:6
5931:16,21	5889:1 5929:23	5949:7 5953:19	5910:20 5911:22	5830:1 5833:1
5934:12,17	5934:3	5963:26	5912:26 5913:3	5839:4 5872:21
5937:10 5938:18,	<b>potential</b>	<b>potentially</b>	5915:2,12	5873:2 5904:14,
24 5944:6	5784:23 5793:23	5847:2,13,25	5928:6,9,24	26 5905:10
5964:26 5966:2,	5795:6 5803:7,17	5874:7 5887:19	5929:2 5932:8	5936:13,14
14,19	5804:3 5809:2,19	5897:2 5917:6	5936:5 5937:21	<b>presents</b> 5815:2
<b>population</b>	5810:9 5814:13,	5927:17 5934:2	5943:7,10	5831:20 5832:3,9
5772:26 5775:8	15 5815:13	5963:13,15	<b>predicting</b>	5837:16 5928:25
5919:5 5948:20	5816:4 5817:6	5964:1 5966:4	5854:6	<b>pressure</b> 5944:1
<b>populations</b>	5818:4 5819:15,	<b>power</b> 5794:25	<b>prediction</b>	<b>presumption</b>
5873:9 5883:15	19 5820:7,14,19	5795:2,3	5832:20 5834:8	5834:12
5932:17	5821:2 5822:5	<b>practical</b> 5810:7	5912:8,26	<b>pretty</b> 5798:19
<b>port</b> 5813:9,20,	5823:22 5825:14,	<b>practice</b> 5796:11	<b>predictions</b>	5846:17 5896:4
22,23	18,20,25 5828:26	5931:4	5831:9 5838:21	5914:9 5917:8,20
<b>portion</b> 5767:13	5830:3,17	<b>pre-cleared</b>	5860:25 5861:4	5920:13 5931:6
5775:22 5895:9,	5831:10,13,17	5788:9	5864:25 5884:24	5932:4
26 5964:4	5832:7,21	<b>pre-disturbance</b>	<b>predictive</b>	<b>prevailing</b>
<b>portions</b> 5819:17	5833:16 5834:21	5785:18,21	5904:26	5898:24
<b>pose</b> 5770:23	5835:8,16	5786:10 5808:6,	<b>preexisting</b>	<b>prevalence</b>
5771:16 5785:12	5837:21 5839:3,	17	5901:14	5780:6
5879:1	7,15 5840:23	<b>pre-existing</b>	<b>prefer</b> 5819:3	<b>prevent</b> 5931:23,
<b>position</b> 5787:26	5842:3,14 5843:3	5879:9	<b>preferred</b>	24 5945:24
5795:5,18	5845:25 5850:4	<b>precipitation</b>	5969:10	<b>previous</b> 5809:24
5806:10	5860:12 5864:23	5964:3	<b>preliminary</b>	5868:15 5888:12
	5865:5 5866:3	<b>precision</b>	5766:11 5768:23	5931:19 5953:7
	5867:14 5869:4	5853:21		

5957:12	5963:24	<b>project</b> 5767:23	5906:24 5908:8	<b>proposing</b>
<b>previously</b>	<b>processing</b>	5775:20 5777:11,	<b>projections</b>	5798:8 5863:9
5769:13 5770:12	5869:20	15 5782:4,8,14	5793:5 5795:8	<b>protect</b> 5883:20
5815:16 5859:25	<b>produce</b> 5826:8	5783:7 5785:23	<b>projects</b> 5898:9	5938:13
5866:10 5867:12	5830:9 5864:16	5786:13 5790:1,	5950:1	<b>protected</b>
5907:10	5902:14 5909:9	13 5792:10	<b>prolonged</b>	5926:9,12
<b>primarily</b>	<b>produced</b>	5795:1,8 5796:17	5842:2 5889:6	5927:13,18,19
5834:10 5838:10	5814:26 5816:14	5797:5,15,22,26	5934:2	5933:4
5841:2 5848:10	5829:11 5880:11,	5798:2,11,13	<b>prompt</b> 5789:26	<b>protection</b>
5876:17 5906:13	12 5912:23	5799:2,3,6,15,18	<b>propensity</b>	5884:23 5886:4
5943:1	5941:14	5800:9 5801:1,	5887:19	5890:8 5931:14
<b>primary</b> 5784:26	<b>producing</b>	14,15,18	<b>proper</b> 5849:22	5932:16 5938:8
5821:4 5841:6	5780:23 5781:2	5803:10,25	<b>properly</b> 5855:8	5941:4
5843:8 5874:21	5782:21 5793:4,5	5811:9 5831:4	5923:8	<b>protective</b>
5876:10,22	5814:10	5838:7 5840:19	<b>property</b>	5861:5,17
5877:7 5892:12	<b>production</b>	5841:6,20	5851:18,19	5862:14 5863:5
5934:24	5782:22 5802:14	5851:17,20	<b>proponent</b>	5872:18 5883:15
<b>prior</b> 5767:8	5803:18 5804:10	5853:9 5854:15,	5773:5 5774:4	5886:12
5768:16 5786:12	<b>productions</b>	17,26 5875:5	5780:9 5781:24	<b>proven</b> 5797:18
5790:13 5804:7	5802:18	5878:26 5879:11	5786:21 5791:11	<b>provide</b> 5790:11
<b>probability</b>	<b>professional</b>	5880:13 5888:17	5794:14 5795:5	5792:26 5795:5,
5916:1,2	5788:4	5889:7 5893:26	5798:8 5800:2	16 5806:2
<b>probe</b> 5823:11	<b>profile</b> 5871:15	5894:5,7 5895:6,	<b>proponent's</b>	5823:16 5825:23
<b>problem</b> 5770:8	<b>program</b> 5782:1	10 5900:21	5785:11 5800:3	5833:9 5834:7
5808:14	5788:23 5797:7	5902:19 5905:5,	5808:18	5840:3 5852:18
<b>problematic</b>	5807:11 5850:8	26 5906:5 5907:7	<b>proportion</b>	5863:13 5864:12
5969:9	5851:10 5890:9,	5908:25,26	5798:12 5916:7	5887:20,25
<b>problems</b> 5898:7	17,25 5891:22	5909:4 5912:5	5926:20	5909:24 5921:22
5915:19	5892:21,24	5924:19 5937:9	<b>proportional</b>	5968:10
<b>procedures</b>	5893:8 5894:12	5939:8,17	5921:6	<b>provided</b> 5803:4
5877:4 5883:5	5945:17,18	5947:11,23	<b>propose</b> 5792:2	5820:10 5823:13
<b>proceed</b> 5792:10	5948:8 5951:23	5948:6 5949:10	5811:13 5861:7	5826:12 5831:25
<b>proceeding</b>	5952:3,21	5950:7,8,10	5911:3	5842:25 5894:17
5765:25 5768:6	5959:18	5952:11,14	<b>proposed</b>	5909:21 5913:9
5769:25	<b>programs</b> 5789:3	5953:5,18	5780:10 5789:18	5921:18 5923:23
<b>proceedings</b>	5797:4 5841:19	5965:24	5790:8 5797:11	5932:1 5955:2
5765:21 5855:15	5924:15 5945:23	<b>project's</b>	5805:19 5807:3	<b>providing</b>
5856:1 5859:21	<b>progress</b> 5767:13	5804:25 5879:17	5840:25 5841:20	5876:12 5912:19
5969:25 5970:5	5790:23	5939:15 5952:6	5843:2 5851:17	5936:14
<b>process</b> 5766:10	<b>progressed</b>	<b>project-affected</b>	5876:16,18,19,20	<b>province</b>
5790:23 5797:7	5793:4	5893:24 5894:2	5877:11 5890:1,	5772:23 5775:15,
5811:24 5827:6	<b>progresses</b>	<b>project-case</b>	6,9,17,22,23	19 5776:2 5970:8
5841:8 5882:25	5781:15	5838:20	5960:11	<b>provincial</b>
5883:24 5888:24	<b>progressive</b>	<b>project-related</b>	<b>proposes</b> 5773:6	5893:3 5951:20
5952:21 5953:23	5787:19 5870:1	5829:24 5839:2,	5781:25	<b>proximity</b>
		6,14 5853:11		5852:4
		5893:19,23		

**psychological**

5873:23 5874:22  
5950:11

**public** 5765:26

5766:9 5878:6  
5879:2,7 5948:26  
5957:4

**publicly** 5766:4**published** 5874:1

5875:19 5916:24

**pull** 5772:7

5779:25 5785:9  
5786:1 5789:13  
5791:7 5792:19  
5796:2 5799:21  
5800:15 5801:25  
5809:13 5812:20,  
26 5814:17  
5836:18 5843:22  
5844:13 5871:18  
5927:26 5929:7  
5940:17

**pulled** 5826:20**pumped** 5964:26**pumping**

5934:14 5965:10

**pumps** 5806:17**pupae** 5923:12**purpose** 5812:12

5883:8 5895:19

**purposes** 5769:9

5921:11

**pursue** 5800:23**put** 5778:4

5791:11 5812:21  
5841:19 5850:7  
5855:7 5860:11  
5863:24 5871:16  
5873:25 5885:18  
5886:8 5902:26  
5915:25 5954:4  
5961:23 5962:15,  
17 5967:3 5969:2

**putting** 5811:4

5930:1

**pyrene** 5848:8

5904:18,19

---

**Q**


---

**QC** 5856:12

5857:14 5858:8

**qualifications**

5771:21,22

**qualify** 5935:7**qualitatively**

5874:20

**quality** 5770:13

5791:8 5802:1  
5803:3 5804:15  
5809:14 5816:15  
5834:9 5842:13,  
17 5843:11,12  
5846:4 5850:24  
5851:13 5852:8,  
10,11 5854:20,23  
5859:26 5860:11  
5862:24 5864:14  
5867:7 5887:7,17  
5889:5,14,22  
5890:4,6,13  
5891:6,11,26  
5893:3,16,25  
5894:6,19,21  
5899:13,15,21  
5915:2,25 5926:1  
5928:25 5929:5  
5937:15 5939:19  
5965:13

**quantification**

5794:1 5806:2,  
10,23

**quantified**

5790:20

**quantify** 5926:6**quantitative**

5790:12

**Quebec** 5967:22**question** 5770:24

5777:8,22

5780:2,5 5782:12

5785:12 5786:17

5787:1 5788:1,8,

9,10 5789:10

5790:4,18,20,24

5791:2,21,26

5792:16,26

5801:4,7

5802:15,21,23

5805:13 5806:26

5807:4,18

5808:4,13,16

5809:12,17

5810:8 5813:3,18

5815:15 5816:9

5817:4,23

5818:10 5821:26

5822:7,8 5825:19

5830:20,23

5837:14 5839:5,

13 5841:24

5844:14,24

5845:12,16

5847:14 5849:26

5853:15 5854:11

5867:23,25

5870:3 5873:26

5880:4,25 5885:7

5895:15 5898:20

5899:5,7 5900:8

5905:8 5906:16

5907:5,24

5908:11 5909:6

5913:2,14

5914:14 5915:12

5917:4 5918:11,

13 5928:12,19

5930:8 5933:22

5938:6 5940:11

5941:6 5943:13

5944:19,20

5945:14,26

5947:26 5948:4

5950:25 5951:5

5968:2,24

**questioning**

5800:20 5823:19

**questions**

5768:25 5769:2,  
10,17 5770:22  
5771:5,7,11,16  
5798:7 5807:15  
5808:2 5811:17,  
21,22 5812:1,3,5,  
7,8,10,16 5813:2  
5814:4 5816:22  
5819:13 5822:2,  
3,14 5823:10  
5831:9 5842:21  
5855:11 5860:4,7  
5866:12,18  
5868:24 5889:25  
5891:2 5896:26  
5901:9 5904:13  
5910:25,26  
5911:2,15 5913:6  
5922:19,21  
5924:22 5928:2  
5939:5 5946:8,  
10,12,14  
5950:16,19  
5953:26 5962:21  
5965:22 5966:25  
5967:3,9,15  
5968:5,8

**quick** 5784:13

5827:5 5899:8

**quickly** 5815:23

5965:23

**quote** 5787:10**quotient** 5828:4,

6 5864:22

5867:14,18

5885:2 5902:13

5903:12 5910:7

5941:8

**quotients**

5814:14 5817:23

5818:1,23

5825:17,24,26

5826:11 5837:16,

19 5839:7,11,16,

19 5840:19

5864:1,9 5867:25

5869:2,9,10

5879:3,5,17,20

5898:1 5900:12

5905:1,9,15

5906:3,7 5909:8

5910:11,12,14,21

5928:16 5935:21

5945:2

**quoting** 5958:17

---

**R**


---

**radar-controlled**

5944:16

**rail** 5800:10,24

5801:9 5869:26

**rail-loading**

5876:19

**railcars** 5813:8

5876:20

**Railway** 5800:7,

26

**rainfall** 5898:18**raise** 5768:24

5848:18 5964:14

**raised** 5929:19**raises** 5814:12**ran** 5818:26**Ranchland**

5857:14

**RANDY** 5770:9

5859:22

**range** 5828:6

5831:3,23

5836:14 5844:16,

17 5845:14,19,

21,22 5846:3,8

5870:5 5874:5

5914:2 5919:24

5920:5 5924:1

5955:16

**ranges** 5779:15

5914:6

**rate** 5897:16

5932:7

**rated** 5923:1,2,3, 17,18,21  
**rates** 5949:6  
**ratio** 5778:17  
 5822:24 5928:6  
 5932:15 5945:3  
**ratio's** 5937:20  
**ratios** 5821:21  
 5912:13,15,24  
 5914:17 5915:6,  
 13 5921:4 5924:4  
 5928:10 5931:9  
 5936:4,18  
 5940:26 5941:14  
 5945:12  
**raw** 5962:24,25  
 5963:9 5965:6  
 5966:18,19  
**re-direct**  
 5967:11  
**re-establish**  
 5780:3  
**re-establishment**  
 5773:22 5780:8  
 5784:3 5788:12  
 5807:2,10  
**reach** 5834:22  
**read** 5772:20  
 5773:9 5785:20  
 5786:9 5789:22  
 5794:14 5800:6,  
 22 5802:10  
 5804:21 5810:3  
 5814:20 5815:6  
 5829:2 5831:15  
 5838:1,9,16  
 5842:26 5865:23  
 5869:14 5886:16  
 5902:26 5904:20  
 5905:4 5906:18  
 5911:20 5923:7  
 5939:12 5940:1  
 5958:10  
**reading** 5845:15  
 5958:2,4

**realistic** 5882:16  
**reality** 5901:4  
**realize** 5824:8  
**realms** 5884:15  
**reason** 5774:18  
 5868:6 5876:25  
 5908:17 5928:14  
 5959:22  
**reasonable**  
 5767:19 5796:16  
 5864:11 5885:17  
 5891:8 5893:11  
 5903:5 5960:24  
 5961:6  
**reasons** 5768:7  
 5848:14  
**reassessment**  
 5912:9  
**recalculated**  
 5825:24 5864:12  
 5922:2,14  
**recalculating**  
 5864:22  
**recalculation**  
 5867:5,13  
**recall** 5848:20  
 5874:20 5920:25  
 5946:16 5951:17  
 5958:15 5963:9  
 5964:25 5966:1  
**receive** 5913:23  
 5914:4 5920:21  
 5926:21 5928:24  
 5932:26 5956:23  
**received** 5768:17  
 5878:5  
**receiving**  
 5768:14 5818:4  
 5926:11 5943:1  
 5962:25  
**recent** 5793:18  
 5822:19 5824:26  
 5827:24 5833:6  
 5925:19

**recently** 5898:7  
**receptor**  
 5897:13,14,18,24  
 5913:22 5914:11  
 5920:3 5926:3,4  
 5927:11,23  
 5933:6,8,16,17  
**receptor-specific**  
 5932:2,21  
**receptors**  
 5890:20 5897:21  
 5913:23 5914:1  
 5919:17 5926:11  
**reclaim** 5789:2  
**reclaimed**  
 5773:11 5777:14  
 5780:19 5781:4,  
 25 5782:4,8,18  
 5783:7 5789:7  
**reclaiming**  
 5811:3  
**reclamation**  
 5777:11 5780:9  
 5782:15,17  
 5783:2 5789:26  
 5790:14,23  
 5791:17,25  
 5792:15 5804:18,  
 22 5805:8,25  
 5806:4,15  
 5807:11 5811:5  
 5853:22 5870:1  
**recognize**  
 5827:12 5842:11  
 5863:19  
**recognized**  
 5768:5 5822:21  
 5926:8 5927:11  
**recognizing**  
 5967:21  
**recollection**  
 5848:26  
**recommendatio**  
**n** 5796:3,6,8,12,  
 20,25 5902:21

**recommended**  
 5796:8,24  
 5798:21  
**recommends**  
 5890:15  
**reconcile**  
 5824:21  
**record** 5768:5  
 5865:19 5882:21  
 5927:7  
**recorded** 5924:4  
**recordings**  
 5765:25 5766:3  
**recovery**  
 5790:22,26  
 5792:13 5810:4,7  
 5924:12,16  
**recruitment**  
 5777:14 5783:6  
**redirected**  
 5966:18  
**redo** 5865:8,9  
**redone** 5921:1  
**reduce** 5793:14  
 5798:23 5799:2  
 5801:20 5809:21  
 5810:9 5811:6  
 5840:21,25  
 5854:4 5870:2  
 5936:26  
**reduced** 5794:20  
 5925:6  
**reduction**  
 5793:16,24,26  
 5794:2 5795:15,  
 24 5841:4  
 5853:18 5951:24  
 5952:23,26  
 5963:24  
**reductions**  
 5795:7 5800:24  
 5953:13  
**reevaluated**  
 5821:19 5822:22  
 5921:11

**reevaluation**  
 5821:23 5921:4  
**refer** 5799:25  
 5900:23  
**reference**  
 5777:19 5781:23  
 5786:3 5791:12  
 5792:4 5796:15,  
 18 5812:21,22,24  
 5815:9 5831:20  
 5848:2 5869:1,7  
 5870:7 5871:15  
 5883:14 5889:4  
 5890:2,4 5894:7  
 5896:18 5905:17  
 5924:1 5929:7  
 5951:6 5958:4,18  
 5960:9  
**referenced**  
 5824:9 5839:24  
 5872:22 5873:13  
 5900:10 5946:17  
**references**  
 5831:11 5869:12  
 5890:7 5951:15  
 5952:1 5954:1  
**referring** 5806:5  
 5873:22 5940:18  
 5943:22  
**Refinery** 5793:3  
**reflect** 5820:8  
 5824:26 5830:18  
 5844:17,26  
 5845:8,20 5846:3  
 5895:25 5910:7  
 5952:3  
**reflecting** 5845:7  
 5849:16  
**reflective**  
 5895:22 5906:8  
**reflects** 5849:8  
**reforestation**  
 5789:26 5791:1  
**regain** 5790:14

**regard** 5795:17  
5841:26 5854:12  
5880:6,23  
5884:26 5941:9  
5946:14  
**regimes** 5779:3  
**region** 5775:12,  
13 5778:9  
5781:13 5784:8  
5857:2 5874:19  
5948:17  
**regional** 5774:15  
5776:12 5778:4,  
20 5779:16  
5783:19 5843:20  
**regions** 5776:4  
**Registry** 5951:9  
**regression**  
5919:4  
**regrowth** 5779:1  
**regulation**  
5951:17,23,25  
5953:6,7  
**regulations**  
5890:8  
**Regulator**  
5812:8 5860:4  
**regulators**  
5873:1  
**regulatory**  
5836:10 5872:10  
5883:4,26  
5890:16 5926:24  
5951:21  
**reintroduction**  
5784:12  
**relate** 5802:18,24  
5818:12 5834:10  
**related** 5812:3  
5816:1 5831:11  
5834:26 5835:2  
5841:3 5849:1  
5874:6 5891:7  
5897:1 5898:10  
5908:13 5928:22

5943:11 5948:11  
**relates** 5770:25  
5788:10 5802:15  
5819:13 5825:9  
5839:21 5929:18  
**relating** 5899:13  
5949:14  
**relationship**  
5836:5  
**relative** 5775:7  
5840:18 5864:25  
5867:16 5912:21  
5914:20,25  
5916:7 5932:6  
5935:16  
**release** 5916:7  
**relegated**  
5942:14  
**relevant** 5819:17  
5903:3  
**reliably** 5913:13  
**reliant** 5774:2  
**reload** 5955:20  
**relocate** 5930:19  
**relocating**  
5930:2,10  
5933:26  
**rely** 5895:17  
5924:11 5948:25  
**relying** 5779:6  
5822:20  
**remain** 5783:17  
5865:20  
**remainder**  
5941:21  
**remained**  
5889:22  
**remaining**  
5779:20 5808:3  
5810:22 5811:3,7  
**remains** 5851:12  
**remember**  
5806:19 5878:17  
5916:26 5935:8

5936:12  
**remind** 5962:22  
**reminder**  
5765:24 5915:11  
**Remote** 5856:1  
**removal** 5791:23  
**remove** 5777:26  
5930:19  
**removed** 5807:9  
5943:23 5944:4  
**removing**  
5805:24  
**Rennie** 5858:16  
**repeat** 5808:12  
5818:9 5839:13  
5899:6  
**repeatedly**  
5882:13  
**repeating**  
5775:17  
**replaced** 5794:15  
5944:5 5951:23  
**replacement**  
5791:13 5798:21  
**replacing**  
5778:15,17  
**replant** 5773:7  
**reply** 5768:11  
5968:20  
**report** 5767:26  
5768:14 5831:14  
5837:1 5843:22  
5844:5 5845:1,10  
5848:3 5865:19  
5871:16 5874:15  
**reported**  
5832:25  
**Reporter**  
5859:19 5911:9  
5970:15  
**represent**  
5897:14  
**representative**  
5803:24 5845:7

**representing**  
5914:12  
**represents**  
5778:8 5798:9  
5918:5  
**reproductive**  
5905:12,19  
**request** 5786:2  
5820:5 5951:13  
**requested**  
5789:15  
**requesting**  
5800:7,25  
**requests** 5771:26  
5774:17  
**require** 5860:13  
5877:23 5930:17  
5939:7 5944:21  
**required**  
5767:17 5780:3  
5805:18 5817:7,  
8,16 5842:18  
5850:23 5851:11  
5854:9 5855:9  
5893:6 5907:4  
5926:6 5934:1  
5936:16,25  
5937:3 5938:13  
5941:4  
**requirement**  
5952:23  
**requires** 5939:18  
**requiring**  
5811:10  
**reread** 5802:9  
5867:2  
**rerun** 5823:2  
5827:3 5863:11  
5921:8  
**rerunning**  
5827:6  
**rescreened**  
5821:20  
**researchers**  
5836:6

**resembling**  
5853:13  
**reserve** 5968:12  
**reservoir**  
5817:26 5829:1,  
9,18,25 5830:4,7,  
11,18 5837:18  
5917:25 5918:24  
**residents**  
5874:21  
**resolve** 5766:16  
**respect** 5766:18,  
21,25 5783:17  
5784:11 5829:22  
5831:25 5835:19  
5837:24 5841:16  
5889:7 5895:1  
5901:12 5914:11,  
21 5917:10  
5919:10 5931:26  
5936:17 5942:9  
5945:6  
**respiratory**  
5901:14 5903:26  
**respond** 5771:18  
5803:1  
**responding**  
5811:22  
**response** 5780:2  
5782:5,6 5786:2  
5789:13 5791:7  
5797:10 5800:20  
5820:4 5827:4  
5830:24 5847:24  
5876:12 5877:3  
5940:24 5951:13  
**responsible**  
5889:14  
**rest** 5839:26  
**restrict** 5842:1  
**restricted**  
5772:22 5842:9,  
10,18 5869:8  
5879:6 5888:26

**result** 5774:6  
5793:21 5816:11  
5838:19 5842:13  
5853:9 5862:5  
5869:17 5879:11  
5899:2 5906:4,20  
5940:6 5945:3

**resulting**  
5814:11 5815:18  
5850:3 5898:8  
5968:18

**results** 5820:11,  
16 5823:3,25  
5824:4 5825:9  
5827:11,13  
5830:1 5838:10  
5840:13 5846:1  
5861:8,16  
5862:16 5864:12,  
15 5866:1,2  
5867:7 5877:2  
5879:20,24  
5897:12 5898:1  
5900:2 5905:1,5,  
26 5912:22,25  
5914:17 5916:11  
5928:26 5937:22

**resume** 5807:21  
5855:13

**retrofitted**  
5955:15 5961:16

**return** 5809:16  
5853:13 5889:6  
5920:10 5933:25

**returned** 5783:5

**returning**  
5791:25 5896:8

**reveals** 5939:16

**revegetating**  
5789:25

**revegetation**  
5777:13 5790:26  
5870:1

**reversible**  
5883:19

**review** 5768:16  
5770:17 5786:2  
5796:17 5797:7  
5811:24 5856:12  
5918:3

**reviewed**  
5771:24 5796:12  
5797:20 5799:10

**reviews** 5872:9,  
10,20 5902:26

**revised** 5827:16  
5830:5,9 5861:3  
5863:4 5866:1

**revisit** 5860:8  
5880:2 5886:20

**reworked**  
5912:22

**riparian** 5942:9

**risk** 5770:15  
5812:4,11  
5814:3,10  
5815:14 5816:5  
5819:14,21  
5820:20 5821:3  
5822:3,5,12,16  
5823:4,20,23  
5824:2,23  
5825:5,10,12  
5826:10,21,22  
5828:8,21  
5829:3,10,13  
5832:10 5833:10,  
16 5835:17,23  
5836:5 5837:2,4  
5838:24,26  
5839:3 5840:22,  
26 5842:24  
5844:12,15  
5845:13,19,26  
5846:23 5847:3  
5849:10,12,24  
5851:24 5852:23  
5853:1,3 5855:1  
5860:2,10 5861:4  
5862:11,12,17  
5864:13 5865:22

5867:6,18  
5868:26 5869:4  
5870:22 5871:24  
5872:5 5875:25  
5878:25 5879:1,  
23,24 5880:3,6,  
23 5881:22  
5883:23 5884:10,  
13,19 5885:5,8,  
22 5886:21,26  
5888:6 5889:8,10  
5897:6,8,12,20,  
24 5899:23  
5900:4 5901:7,12  
5902:9 5904:12  
5905:1 5908:8,12  
5909:24 5910:2,  
5,15,25 5911:1,  
16,18 5912:1,4,9,  
20,23 5913:6,9,  
12 5915:22  
5920:26 5923:18,  
21 5924:12,23  
5925:9,24 5926:7  
5927:4 5929:21  
5932:1,8,10,18  
5933:6,15  
5936:3,9,26  
5937:8 5938:26  
5939:3,24  
5940:22 5941:5,  
24 5948:13  
5949:2

**risk-based**  
5893:4

**risks** 5814:12  
5836:8,12  
5837:17 5879:14  
5898:5 5899:3  
5908:9 5909:21  
5915:4 5923:8  
5931:11 5936:1  
5942:22 5944:21

**river** 5784:17  
5915:14 5936:6  
**road** 5869:24  
5877:9,15 5879:6

5954:7,13,21  
5955:5,23  
5956:2,22 5957:4  
5959:18,25  
5960:3,8,13  
5961:2,3,15,19,  
21 5962:7,9,16,  
19 5964:18  
5965:18

**roads** 5955:24  
5956:4,6,12  
5958:12 5960:25  
5961:11 5962:1  
5963:14,18  
5964:2,5,10  
5965:9

**Robert** 5969:5

**rock** 5805:24  
5810:17 5834:14,  
20 5835:7  
5850:1,10  
5881:14,15  
5887:14,17  
5890:26 5928:24  
5956:5,16  
5962:26

**rocks** 5887:7

**role** 5771:22  
5772:2 5947:21,  
22

**roll** 5797:25

**rolled** 5797:19

**room** 5766:1

**roughly** 5953:17

**round** 5789:4

**route** 5904:24

**routes** 5898:3  
5910:9

**routine** 5934:6

**row** 5789:18,19

**RPR** 5859:19  
5970:14

**RSA** 5778:6,21  
5897:15

**Rudolph** 5770:9  
5793:9,11  
5803:1,2,22,26  
5804:5 5810:25  
5859:22 5878:10,  
12,22 5885:25  
5894:25 5895:14,  
16 5899:11  
5900:5 5901:17  
5950:26 5951:2,  
4,18 5954:8,17

**ruled** 5810:9

**run** 5789:3  
5821:23 5828:12  
5864:10 5881:21  
5933:19,20  
5961:12 5962:8,  
15,17 5964:19  
5966:21

**running** 5828:13

**runoff** 5835:9  
5928:24 5962:26  
5966:1

---

## S

---

**safety** 5879:23  
5880:6 5886:11

**salamander**  
5922:24

**sample** 5849:5  
5943:23

**samples** 5843:16  
5844:1 5845:9,22  
5846:7,10,22  
5849:7 5890:25  
5894:20

**sampling**  
5810:16 5848:17

**sand** 5936:20

**satisfactory**  
5840:17

**satisfies** 5917:4

**satisfy** 5953:11

<b>saturated</b> 5834:2 5851:4 5934:14	<b>seasons</b> 5891:23	5916:8,9,19	<b>set</b> 5819:13	5899:14
<b>Sawyer</b> 5858:11	<b>secondarily</b> 5874:11	5917:7,8	5821:15,19	<b>significant</b>
<b>SBZ</b> 5889:15	<b>Secord</b> 5857:24	5919:14,15	5822:4,22,23	5790:23 5792:9
5963:1 5964:22	<b>secretariat</b>	5921:1 5924:3	5827:12 5828:12	5809:5 5860:13
5965:20 5966:20	5770:17 5856:12	5925:2,12,20	5860:7 5890:21	5916:9 5933:23
<b>Scan</b> 5958:24	5967:16 5968:7	5926:1 5927:7,10	5899:19 5920:19	5941:21 5942:17
<b>scenario</b> 5815:8	<b>section</b> 5776:17	5928:26 5929:11	5921:12 5935:8,9	5948:14,21
5819:25,26	5838:8,15	5935:20 5936:3	<b>shallow</b> 5843:17	5966:22
5829:7 5964:16	5858:20 5863:15	5938:20 5941:2, 14,18 5945:3	5890:18	<b>significantly</b>
<b>scenarios</b>	5925:8 5963:7	5963:9,16,17	<b>share</b> 5794:19	5806:22 5810:18
5943:16	<b>sector</b> 5795:4	5964:2,9,13,18	5956:9	5907:7 5935:18
<b>schedule</b> 5767:14	<b>secure</b> 5801:8	5965:1,3,8,17	<b>shift</b> 5779:7	5936:21 5960:22
5768:8,13,18,19	<b>sediment</b> 5809:1	5966:4,15,17,23	5831:8 5842:20	<b>silver</b> 5824:6
5923:17,20	5912:22 5913:7	<b>send</b> 5768:20	<b>ship</b> 5813:10,23	<b>similar</b> 5803:15, 16 5818:17
<b>scheduled</b>	5914:24 5921:2	<b>sense</b> 5953:4	<b>shipping</b> 5801:9	5823:2 5824:21
5766:6 5866:10	5944:6 5964:26	5959:12	<b>short</b> 5776:7	5843:11 5845:11
<b>science</b> 5872:8	5966:2	<b>sensitive</b> 5801:20	5797:3 5815:26	5852:23 5884:16
<b>scientific</b>	<b>sedimentation</b>	5870:23 5883:15	5863:12 5865:6	5890:22 5898:3
5870:20,21	5966:14	5897:14 5899:3	5939:2	5900:26 5901:1
5874:1 5875:19	<b>seed</b> 5782:22	5901:13,19	<b>short-term</b>	5903:14 5909:12
<b>scope</b> 5782:6	<b>seedling</b> 5778:26	5902:15 5909:10	5883:10	5910:22 5914:18
<b>screen</b> 5772:15	5780:15	5923:1,2,17	<b>shorthand</b>	5919:6 5931:11
5821:16 5822:21	<b>seedlings</b> 5774:2	5926:3,9 5927:12	5970:5,6	5932:7,24,25
5844:26	5780:18 5781:5	<b>sensitivity</b>	<b>shortly</b> 5847:14	5933:18 5936:1
<b>screening</b>	5783:12	5926:15	<b>should've</b>	<b>similarly</b> 5889:9
5880:15 5937:6	<b>seeds</b> 5773:24	<b>sentence</b>	5767:12 5952:17	5908:3
<b>screening-level</b>	5779:6 5780:15, 17,23,24,25	5772:10,18	<b>show</b> 5908:25	<b>simply</b> 5893:23
5833:9 5912:1	5781:3,19	5773:7,8 5810:1	5960:3	5895:6 5940:9
5938:3	5782:21 5877:19	5959:26	<b>showed</b> 5923:24	<b>simultaneous</b>
<b>screens</b> 5792:24	<b>seepage</b> 5850:1	<b>separate</b> 5895:12	<b>showing</b> 5900:17	5940:13
5799:23	5852:3 5853:18	5909:21	<b>shown</b> 5814:25	<b>simultaneously</b>
<b>scroll</b> 5773:2	5854:1	<b>separately</b>	5816:10 5818:5,6	5899:1,20
5789:19 5790:6	<b>seeped</b> 5810:19	5853:4	5820:15 5821:16	<b>single</b> 5798:10
5794:9 5804:16	<b>select</b> 5872:25	<b>sequestration</b>	5822:20 5891:5	5870:17 5871:2, 25,26 5872:12
5848:5 5958:25	<b>selenate</b> 5963:23	5791:18	<b>shows</b> 5938:10	5918:11
<b>sealing</b> 5887:21	<b>selenium</b>	<b>series</b> 5774:16	<b>Shukalkina</b>	<b>sink</b> 5784:26
<b>seams</b> 5802:12,25	5831:12 5832:4, 14 5837:23	5814:4 5817:21	5856:20	5789:11,23
5809:18 5810:18, 24 5811:4,7	5850:5 5881:9	5820:12 5924:21	<b>Shuswap</b> 5857:4	5790:12,15,21,26
<b>season</b> 5788:3,17	5912:12,15,20,23	<b>serve</b> 5895:19	<b>sic</b> 5806:7 5810:2	5791:12,16,22,26
5919:22 5930:23	5913:10 5914:19	<b>Service</b> 5784:16	5818:13	5792:3,8,13,14
<b>seasonal</b> 5820:8	5915:6,8,12	<b>session</b> 5856:3	<b>side</b> 5851:17,20	<b>sinks</b> 5807:2,7,10
5830:25		5863:15 5888:12	5854:17 5876:1	<b>sir</b> 5771:15
		<b>sessions</b> 5767:17, 18	5882:26 5885:21, 22 5891:17	5772:3 5773:21



5777:25 5789:9 5792:1 5795:20 5806:11 5808:23 5866:20 5867:20 5967:12 5968:1 5969:14 <b>sit</b> 5961:11 5963:15 <b>site</b> 5781:4 5789:7,8 5791:23 5792:15 5804:4 5805:22 5810:5, 20 5811:3,6 5844:19 5850:26 5851:2,12 5877:16 5889:17 5894:16 5895:3, 8,12 5909:15 5930:20 5954:13, 21 5964:20 5965:12,26 <b>site-specific</b> 5917:18,23 5918:17 5919:2 5929:15 <b>sites</b> 5773:11 5890:16 5930:2 5934:26 5944:18 5960:18 <b>sitting</b> 5767:14 5963:18 <b>situation</b> 5842:12 5850:16 5892:13 5930:26 <b>situations</b> 5944:21 <b>size</b> 5778:8 <b>sizes</b> 5870:5 5895:25 <b>skepticism</b> 5898:16 <b>skill</b> 5970:7 <b>slightly</b> 5787:6 5821:21 5849:18 5862:3 5887:23	5913:1 <b>slog</b> 5967:10 <b>small</b> 5778:9,11 5779:11 5806:24 5823:4 5861:26 5896:5 5900:19 5905:14,20 5906:5 5907:22 5908:7 5909:1 5914:7 5917:1,18 5918:19 5919:19 5920:12,15 5932:5 5939:3 5962:18 5965:16 <b>smaller</b> 5776:1 5806:22 5872:13 5896:2 5948:20 <b>smallest</b> 5919:24 <b>snow</b> 5857:6 5898:19 <b>snowball</b> 5885:1 <b>snowballing</b> 5884:11 <b>social</b> 5874:23 5950:11 <b>Society</b> 5857:21 5858:6,12,19,21 5923:7 <b>sodium</b> 5862:10 <b>soil</b> 5789:24,26 5790:3 5868:10 5869:20 5908:5, 20 5911:22 <b>sole</b> 5861:13 5883:1 <b>solid</b> 5881:14 <b>solution</b> 5888:25 5934:4 <b>solutions</b> 5875:9 <b>somebody's</b> 5837:9 5882:9 5883:1 <b>songbird</b> 5774:10,22	<b>songbirds</b> 5783:1 <b>Soren</b> 5830:23 <b>sort</b> 5836:11,14 5849:9 5861:1 5871:22 5872:9, 15 5875:26 5883:22 5884:18 5900:23 5903:3,8 5933:2 5947:1 5948:12 5955:19 5956:25 5957:4, 16 5959:26 5960:16,18,21 5961:20 5962:10 <b>sound</b> 5812:23 5963:10 <b>source</b> 5781:18 5783:12 5793:26 5794:2 5798:10 5809:19 5819:26 5821:8 5834:11 5835:1 5837:10, 11 5841:12 5849:21 5851:19, 21 5853:7 5854:16 5855:4 5861:13 5883:1 5891:15 5952:22 5953:20 <b>sources</b> 5793:7 5805:4 5816:8 5854:14 5869:18 5898:25 5899:26 5902:19 5911:25 5913:25,26 5919:18 5920:12 5931:25 5952:20 5965:17 <b>sourcing</b> 5826:25 <b>south</b> 5854:18 <b>southeast</b> 5895:10 <b>southern</b> 5775:22 5857:21 <b>southwest</b> 5776:3 5778:10,	20 <b>span</b> 5777:3 <b>Sparwood</b> 5874:15,18 5875:11 <b>spatial</b> 5845:8 5892:26 5914:8 5920:12 <b>spatially</b> 5846:9 <b>speak</b> 5772:1 5788:4 5812:19 5822:25 5846:10 5881:1 5937:24 5954:5,8 5967:1 <b>SPEAKERS</b> 5847:6 5871:20 <b>speaking</b> 5777:3 5944:14 <b>special</b> 5917:15 5923:4 <b>specialist</b> 5865:23 5874:14 5933:25 <b>speciation</b> 5918:20 <b>species</b> 5770:15 5772:24 5773:13 5774:11 5778:19 5782:1 5788:24 5860:2 5912:14 5914:5 5918:2,11 5919:13,19,21,23 5920:14 5922:22, 23,26 5923:11, 14,18,20,21 5924:8,12,22 5925:24 5931:11, 14,17,26 5932:3, 9,16,21,23 5933:4,14,19 5937:1,23 5938:14 5939:22, 24 5941:5,9 5942:4,5,6,10 5944:9 5945:8	<b>specific</b> 5774:8 5788:24 5790:24 5796:18 5823:19 5825:15 5840:4, 13 5845:9 5886:24 5887:25, 26 5893:10 5901:18 5916:18 5919:22 5927:9 5933:1,6,8,20 5936:25 5937:3 5938:12 5940:24 5941:19 5942:2 5947:1 5949:14 <b>specifically</b> 5786:5 5799:25 5826:9 5832:22 5840:11 5847:19 5871:11 5883:7 5895:1 5897:7 5916:19 5926:5 5932:12 5935:20 5942:10 5946:15 <b>speeds</b> 5902:6 <b>spend</b> 5920:8 <b>spending</b> 5939:2 <b>spent</b> 5947:8 <b>spilling</b> 5876:25 <b>spoke</b> 5886:22 5895:18 5900:9 5959:25 <b>spot</b> 5894:19,20 <b>spots</b> 5943:11 <b>spotted</b> 5922:24 5925:4 5943:25 5944:1 <b>spray</b> 5961:10,17 <b>sprayed</b> 5962:6 5964:10 5965:8 <b>spraying</b> 5959:18 5961:15 5963:13 <b>spread</b> 5877:7,20 5961:19
--	--	--	--	---

<b>spreading</b> 5955:22 5958:11	5886:2 5958:9 5969:13	<b>step</b> 5792:6	<b>study</b> 5774:14,15 5775:21,24 5776:12 5778:4, 20 5779:17,18 5783:19 5843:20 5865:10 5873:2, 3,13 5874:17,20 5901:21 5902:26 5912:6 5922:26 5923:13 5938:3 5947:18	<b>substantial</b> 5879:19
<b>spring</b> 5844:21 5845:21 5846:26 5851:18 5852:25	<b>state</b> 5797:6 5799:9 5838:22 5871:23 5872:8 5897:6 5939:11 5940:4	<b>STEVE</b> 5770:10 5859:23	<b>Sturgeon</b> 5793:3	<b>substantially</b> 5799:11 5876:6 5906:26
<b>springs</b> 5843:18 5844:8 5845:2 5846:1 5848:20, 23 5850:3 5851:21 5852:2, 21,22 5890:26	<b>stated</b> 5794:24 5820:5 5842:26 5843:10 5862:26 5879:14,21 5897:1,11 5898:6,12 5904:20 5912:7, 25 5923:7	<b>stewardship</b> 5947:21	<b>subalpine</b> 5775:3,24 5776:6 5781:16	<b>substantively</b> 5935:10,11
<b>SRK</b> 5816:14	<b>statement</b> 5771:25 5789:22 5794:22 5810:2 5905:7,25 5907:3,17 5916:14,17 5939:7	<b>stockpiled</b> 5789:25	<b>subject</b> 5812:3 5818:19,21 5825:6 5835:7 5922:13 5952:22 5968:21	<b>success</b> 5777:12
<b>stab</b> 5954:23	<b>statements</b> 5812:21 5837:24 5839:10,19	<b>stockpiles</b> 5790:3	<b>submission</b> 5767:7 5768:11 5785:20 5810:14	<b>successful</b> 5773:10 5780:7 5792:15 5807:11
<b>stable</b> 5901:26	<b>states</b> 5785:20 5794:14 5819:21, 25 5829:1 5831:14 5838:1, 9,16 5869:14 5886:16 5905:3 5906:17 5911:17 5924:11 5939:26	<b>stockpiling</b> 5810:25	<b>submissions</b> 5766:20 5823:13 5826:12 5907:11	<b>sufficient</b> 5767:7 5768:15 5893:17 5921:24
<b>Staff</b> 5770:17 5856:15,16,17, 18,19,20	<b>station</b> 5894:15 5962:4	<b>stop</b> 5911:11	<b>submitted</b> 5951:20	<b>sufficiently</b> 5926:9
<b>stages</b> 5923:13	<b>statistics</b> 5946:17,21 5947:12	<b>storm</b> 5964:17	<b>suboptimal</b> 5888:24	<b>suggest</b> 5795:13 5855:12 5860:20 5865:9 5871:9 5955:1 5957:2 5964:12 5965:18
<b>stains</b> 5849:1	<b>Status</b> 5923:3	<b>straightforward</b> 5885:23	<b>subpopulations</b> 5870:23 5899:4 5902:16 5909:11	<b>suggested</b> 5787:12 5891:18
<b>stale</b> 5947:1	<b>stay</b> 5914:2 5937:13 5938:1 5950:6 5963:23	<b>strategies</b> 5924:12,16,18	<b>subregions</b> 5775:15,16 5776:1	<b>suggesting</b> 5840:5
<b>STAND</b> 5967:17	<b>stayed</b> 5962:16	<b>strategy</b> 5944:22 5953:11 5965:19	<b>subregions</b> 5775:15,16 5776:1	<b>suggestion</b> 5865:24
<b>standard</b> 5931:4, 6	<b>staying</b> 5914:7	<b>streams</b> 5765:24 5852:17	<b>subregions</b> 5775:15,16 5776:1	<b>suitability</b> 5784:7
<b>standards</b> 5851:13	<b>steady</b> 5834:1	<b>stress</b> 5861:11	<b>subsets</b> 5901:13	<b>suitable</b> 5799:18 5852:10,11 5877:1
<b>stands</b> 5780:26 5781:2		<b>stressors</b> 5940:14,21 5944:9,23 5946:3	<b>substances</b> 5871:26 5872:12	<b>suite</b> 5865:3 5874:26
<b>start</b> 5767:2 5780:23 5809:15 5819:16,18 5836:3 5843:24 5845:17 5851:25 5899:12 5903:12 5911:12 5916:20 5954:24 5955:1 5967:20,25 5968:25 5969:2, 16,17		<b>stretch</b> 5931:2	<b>substances</b> 5862:9 5868:12	<b>sulphate</b> 5824:7 5832:3,15 5916:7,10 5925:20 5927:7 5928:26 5935:22
<b>started</b> 5766:12 5767:18 5782:21		<b>stricter</b> 5933:14		<b>sulphur</b> 5898:14
<b>starting</b> 5789:2 5797:22 5817:20		<b>strictly</b> 5942:13		<b>sum</b> 5940:3 5941:15
		<b>stringent</b> 5848:15		<b>summarize</b> 5774:6
		<b>structure</b> 5809:7 5853:23 5876:19		
		<b>structures</b> 5850:10 5889:16		
		<b>Student-at-law</b> 5857:16		
		<b>studied</b> 5903:20		
		<b>studies</b> 5873:5 5902:23 5903:6 5925:20 5937:26 5946:26 5948:16, 18		

**summarized**  
5823:24 5869:22  
5871:22 5882:24  
**summary**  
5825:23 5826:13  
5921:19  
**summer** 5781:15  
**summing**  
5941:20  
**Sun** 5858:2  
**super** 5881:24  
**supplemental**  
5771:26 5774:16  
**supplemented**  
5934:24  
**supplementing**  
5957:9  
**supplies** 5898:18  
**supply** 5847:10  
5852:20  
**support** 5893:5  
**supported**  
5926:24  
**supporting**  
5846:16 5848:25  
**supports**  
5766:24 5900:19  
**suppose** 5784:9  
5847:13 5892:10  
**supposed**  
5964:25 5966:1,2  
**suppress**  
5962:10  
**suppresses**  
5962:7  
**suppression**  
5957:10  
**surface** 5803:8,  
18 5814:22,23  
5815:1,2,17  
5816:15,20,23,  
24,25 5839:24  
5843:12 5844:11  
5846:2 5850:19

5852:22 5853:5  
5879:18 5881:15  
5887:21 5890:20,  
23,24 5894:10  
5896:4 5911:22  
5925:26 5939:19  
5943:7 5962:19  
**surfaces** 5852:3  
**surficial** 5843:6,  
17 5844:1,4,18  
5846:1,4 5850:2,  
19  
**surge** 5928:23  
5929:22 5931:16,  
21 5932:12  
5934:12,16  
5937:10 5938:18  
5944:6 5965:4  
5966:19  
**surmised** 5824:3  
**surrogate** 5870:6  
5871:1,2,25  
5912:14 5932:4,  
14,24 5933:12,21  
**surrogates**  
5870:22 5923:10  
5932:25 5933:16  
**surroundings**  
5766:3  
**survey** 5787:4,15  
**surveyed**  
5787:13  
**surveys** 5774:4,7,  
9,22 5785:18,21  
5786:10,22,25  
5787:11 5788:2,  
9,16 5808:6,18  
**survive** 5781:20  
**surviving**  
5781:17  
**susceptibility**  
5925:7  
**suspect** 5954:3  
**suspended**  
5869:16 5896:12

5901:20  
**sustainable**  
5842:16  
**swallow** 5931:12  
5937:2  
**swallows**  
5923:14,16  
5924:9  
**sweep** 5787:18  
**sweeping**  
5787:21  
**sweeps** 5786:10,  
24 5787:2  
5808:5,17  
**switch** 5779:9  
5812:2  
**switching**  
5779:12  
**synergies** 5945:6  
**synergistic**  
5902:15,23,24  
5903:7,17,24  
5904:7 5909:10,  
14,17 5944:22  
**synonymous**  
5808:8,20,22  
**system** 5841:5  
5876:26 5916:20  
5920:2 5934:7  
5938:23 5954:7  
5964:19  
**systems** 5890:19  
5938:18

---

**T**

---

**table** 5805:7,9,11  
5809:18 5810:2  
5815:3,12  
5816:6,7,11,26  
5817:20 5825:23  
5826:13 5831:21  
5832:14 5839:23  
5843:23 5844:25  
5847:2,26

5869:23 5875:5  
5904:25 5905:11  
5907:13 5921:19  
5924:3 5928:5,9,  
12,13 5935:25  
5958:24 5963:11  
**tables** 5786:4  
5817:21 5818:5,  
12 5837:15  
5906:1 5928:1,4,  
17 5935:3,19  
5936:11 5940:18  
**takes** 5773:15,24  
5827:6 5828:14  
5934:9  
**talk** 5790:17  
5799:12 5803:6  
5834:17,21  
5840:13 5842:21  
5870:24 5874:10,  
15 5875:21  
5876:16 5884:11  
5886:14 5929:19  
5930:3 5957:9  
**talked** 5797:13  
5807:5 5810:15  
5825:16 5841:18,  
21 5874:16  
5908:14 5929:26  
5930:14 5937:25  
5946:16 5957:11  
5958:5 5959:24  
**talking** 5778:11  
5797:2 5806:19  
5824:11 5825:20  
5826:10 5841:3  
5847:8,9,11  
5852:2 5881:6  
5885:4,9 5888:12  
5899:12 5907:6  
5915:20,24  
5929:15 5937:26  
5938:26 5948:12,  
20 5952:18  
5954:10 5955:24  
5958:1 5960:3  
5965:8

**tank** 5961:17  
**tanks** 5955:16  
**tape** 5944:17  
**target** 5825:11  
5835:24 5837:19,  
20 5903:11  
5910:6 5915:8  
**targets** 5916:4  
**team** 5840:14  
5865:13,21  
5866:5  
**technical** 5939:8,  
25 5940:11,19  
**technique** 5831:1  
**technologies**  
5797:11,14,21  
5799:4,12,15  
5801:20  
**technology**  
5797:16,23,26  
5799:10,13,17  
5951:24  
**technology/best**  
5796:10  
**Teck** 5874:18  
5923:23 5925:19  
**telling** 5872:4  
**tells** 5818:21  
5849:10  
**temporary**  
5842:17 5847:16  
5883:19  
**ten** 5885:5,19  
5886:9 5951:13  
**tend** 5776:4  
5878:1  
**tenth** 5801:25  
**term** 5797:17  
5854:9 5934:25  
**termed** 5896:5  
**terms** 5775:7  
5776:18 5780:18  
5781:3 5791:17,  
25 5793:6 5820:1

5821:8 5826:23	5965:25	5899:24,25	5808:4,15	<b>tracked</b> 5877:15
5828:20 5834:11, 19 5835:1	<b>thinks</b> 5968:9	5920:8,15	5819:18 5854:11	<b>tracking</b> 5877:9, 21,24
5841:3,11,12,20	<b>thought</b> 5769:11	5934:2,4 5939:2	5875:19,21	<b>Tracy</b> 5868:17
5842:18 5850:25	5771:2 5863:22	5944:3 5947:8	5927:25 5928:21, 22 5944:19	<b>traditional</b>
5876:18 5885:4	5916:16 5953:23	5949:2 5951:20	5956:14 5961:26	5890:16 5897:16
5894:19 5903:20	5969:11	5962:13 5969:7,9	5962:13 5969:7,9	5948:13
5910:4 5921:18	<b>thoughts</b>	<b>timeline</b> 5790:26	<b>topics</b> 5770:22	<b>traffic</b> 5877:8,21
5932:13,18	5878:10	5921:23	5868:23 5878:23	<b>train</b> 5784:19
5935:11 5937:9, 15 5942:12	<b>thousand</b>	<b>timely</b> 5766:26	<b>topography</b>	5813:21
5943:5	5929:13	5767:22	5775:17	<b>trains</b> 5784:22
<b>terrain</b> 5799:7	<b>thread</b> 5900:8	<b>times</b> 5779:13	<b>total</b> 5795:10	<b>trajectory</b>
<b>terrestrial</b>	<b>threatened</b>	5795:14 5825:11	5814:23 5824:9	5782:19
5779:10	5923:18,21	5835:24 5837:3,4	5826:8 5849:8,16	<b>transcribed</b>
<b>tested</b> 5966:16	<b>threshold</b> 5836:8	5853:16 5885:6, 19,20 5886:8,9	5864:17 5869:16	5970:6
<b>testimony</b>	5926:6,23,26	5929:13,14	5896:11,12	<b>transcript</b>
5800:18	5932:10 5936:19	5930:24	5901:20 5908:7	5800:17 5957:20, 22 5970:1,4
<b>testing</b> 5854:19	5941:18	<b>timing</b> 5766:21, 25	5909:24 5910:1,5	<b>transcripts</b>
<b>thallium</b> 5817:24	<b>thresholds</b>	5766:21, 25	5943:2	5768:7
5826:2 5837:23	5901:12 5904:12	<b>tissue</b> 5917:16	<b>totally</b> 5822:6	<b>transfer</b> 5813:13, 20 5916:15,21,23
5838:18 5867:26	<b>throw</b> 5949:11	<b>tissues</b> 5914:22	5944:20	5917:1,11,24
5868:6,8 5898:24	<b>throwing</b>	<b>toad</b> 5922:25	<b>touch</b> 5769:10	5918:4,15,23
5908:1 5941:2	5943:21	5923:3 5925:15	5943:21	<b>transferred</b>
<b>theme</b> 5772:19	<b>TIER</b> 5951:23	<b>today</b> 5769:9	<b>tough</b> 5948:8	5813:16
<b>thick</b> 5887:11	5952:3,20	5771:5 5954:3	<b>Town</b> 5857:18	<b>transparent</b>
<b>thing</b> 5774:21	<b>till</b> 5766:15	<b>toe</b> 5890:26	<b>townsite</b> 5876:17	5766:9
5779:14 5893:11	5928:20	<b>told</b> 5959:16	<b>tox</b> 5871:15	<b>transport</b>
5926:15 5949:22	<b>Timberwolf</b>	<b>tomorrow</b>	<b>toxic</b> 5944:15	5800:25
5950:9 5959:26	5858:11	5862:7 5865:15, 17 5866:23	<b>toxicity</b> 5836:2	<b>transportation</b>
<b>things</b> 5779:4	<b>time</b> 5766:6	5862:7 5865:15, 17 5866:23	5838:2 5869:1,7	5800:10,13
5784:20 5813:26	5767:2,7,11,17, 20 5768:3,15	5968:4,23,25	5870:7,10,22	5801:22
5835:11 5841:3	5790:14 5794:26	5969:17,19	5872:25 5876:1	<b>transported</b>
5846:5 5873:10	5799:16 5812:20	<b>tonnes</b> 5952:11	5883:14 5884:1	5801:16
5874:5 5876:1	5813:26 5826:21	<b>tool</b> 5936:15	5885:24 5886:4	<b>trap</b> 5898:12
5880:23 5883:16	5827:1,7,18	<b>tools</b> 5946:1	5904:15,22,23	<b>trapping</b> 5930:9, 10 5933:26
5887:15,24	5828:14 5830:7, 10 5846:10	5947:4	5905:2,13,19	<b>traps</b> 5930:1,15 5934:9,19,22
5903:13 5919:25	5848:13 5851:5	<b>top</b> 5785:14	5907:1 5909:22	<b>traversed</b> 5956:6
5935:16 5948:26	5853:12 5854:2,3	5792:22 5846:17, 19 5874:24	5910:4 5925:20	<b>treat</b> 5841:13
5963:16 5968:21	5861:14 5864:11	5876:20 5884:21	5949:7	5842:15 5851:3
<b>thinking</b> 5829:13	5865:6,15,20	5960:8	<b>toxicological</b>	5903:13
5833:25 5840:4	5880:2 5882:10, 14 5883:3,13	<b>topic</b> 5769:14	5872:5 5945:7	
5861:19 5865:15	5884:17 5886:19	5770:25 5771:2	<b>toxicologists</b>	
5876:17 5931:12	5888:15 5895:4	5774:17 5777:23	5870:25	
5938:17 5949:4			<b>toxicology</b>	
5960:17 5962:5			5944:2	
			<b>track</b> 5803:13	
			5804:9 5878:2	

**treated** 5903:4  
5965:19  
**treating** 5870:16  
5889:15  
**treatment**  
5841:4,11,19  
5937:17 5963:1  
5966:20  
**tree** 5774:1  
**treed** 5942:17  
5944:4,7  
**trees** 5778:18,23  
5780:23 5781:3  
5787:2 5807:9  
**trend** 5840:12  
**tributaries**  
5924:2  
**trickier** 5876:4  
**trigger** 5885:15  
5933:13  
**trips** 5775:1  
**trophic** 5916:15,  
21,22 5917:1,10,  
23 5918:4,15,23  
**trouble** 5938:17  
**trout** 5858:26  
5916:23 5939:21  
**truck** 5955:12,21  
5957:5 5961:16  
5962:3,6  
**trucks** 5784:22  
5955:8 5956:7  
5957:14  
**true** 5881:13  
5882:7  
**TSP** 5878:17  
5895:24 5896:2  
**Tuesday** 5768:14  
**turn** 5812:1,5  
5824:13 5828:24  
5844:6 5889:26  
5896:26 5925:8  
5946:9

**turned** 5766:2  
**Turner** 5856:18  
5898:9  
**Turning** 5814:3  
5904:9  
**turnover** 5798:1  
**type** 5892:17  
5909:15 5943:24  
**types** 5886:24  
5909:14 5910:13  
**typical** 5950:3  
5955:12  
**typically** 5879:5  
5909:16

---

**U**

---

**ultimately**  
5775:18 5784:18  
**unacceptable**  
5889:10  
**unaccounted**  
5806:3  
**uncertainty**  
5783:8 5880:17  
5886:10,12  
5919:10  
**unclear** 5942:18  
**uncommon**  
5775:26  
**underestimated**  
5872:6  
**underlying**  
5843:5  
**understand**  
5774:4 5781:24  
5782:11 5785:19  
5786:1 5802:5  
5804:5 5812:14  
5844:23 5866:3  
5881:25 5887:26  
5893:10 5896:19  
5907:5 5911:9  
5915:1 5917:8  
5926:25 5936:15

5938:9 5944:5  
5962:5  
**understanding**  
5773:26 5798:8,  
12 5814:6 5825:3  
5853:6 5862:21  
5863:26 5870:19  
5877:6 5887:7  
5893:18 5927:22  
5930:16 5937:8  
5942:8  
**understands**  
5767:22 5812:13  
5813:7  
**understood**  
5781:9 5828:10  
5871:23 5906:10  
5942:16  
**undertaking**  
5823:15 5860:12  
5867:1 5868:14,  
15,18 5883:17  
5922:11  
**unforeseen**  
5945:21  
**unique** 5776:2  
**unit** 5801:1  
5843:8  
**units** 5800:8  
5843:5  
**universal**  
5885:19  
**Unlimited**  
5858:26  
**unloaded** 5813:9  
**unnecessarily**  
5889:3  
**unnecessary**  
5784:26  
**unreasonable**  
5827:15 5884:14  
5934:20  
**unrelated**  
5829:14

**unsupervised**  
5888:23  
**untreated** 5882:5  
**unusually**  
5877:23  
**upcoming**  
5767:18  
**update** 5791:14  
5793:1 5796:22  
5842:24  
**updated** 5820:5  
5821:5,19  
5822:10,11,18,  
19,23 5823:9,12  
5824:26 5825:3,  
4,5,9,23 5826:5,  
11,13 5827:21,25  
5829:23,26  
5838:26 5860:10,  
11,25 5862:5,23  
5864:2,3,14  
5867:7 5880:12  
5921:12,19  
5935:19 5952:3  
**updates** 5794:21  
**updating**  
5792:11 5797:8  
5798:1  
**upper** 5815:8  
5819:24,25  
5821:8,24 5829:7  
5833:7 5834:11,  
17 5886:3  
5913:21 5914:12  
5936:14  
**upper-end**  
5793:20  
**upset** 5876:24  
5877:2  
**upstream**  
5893:24,25  
**uptake** 5914:22  
5918:3,20,21  
**upwind** 5899:26

**usage** 5847:12  
**USEPA** 5916:24  
5917:15  
**USEPA's**  
5925:26  
**users** 5854:25  
**utilize** 5798:26  
**utilized** 5794:3  
**Utting** 5856:15  
5868:17

---

**V**

---

**valid** 5793:24  
**valley** 5784:17  
5895:11 5898:10  
5919:5  
**valued** 5790:7  
5939:22 5940:21  
**values** 5804:12  
5821:23 5830:11  
5833:8 5834:19,  
26 5835:2,15  
5838:17 5844:10,  
26 5845:7  
5883:15 5897:20  
5916:15 5917:11  
5918:6 5935:7  
5936:11,13  
**vanadium**  
5826:2  
**Vancouver**  
5813:20  
**variability**  
5820:9 5830:18,  
25 5831:3  
5893:18 5894:2,  
11  
**variables** 5814:9  
**varies** 5957:7  
**vary** 5846:9  
5876:3 5930:25  
**varying** 5833:22

<b>VC</b> 5940:7	<b>vulnerable</b> 5772:26	19 5835:6	5956:11 5957:5, 15 5958:6,8,12, 14 5959:2,4,5,16, 24,25 5960:2,7, 10 5961:6,10,17, 20 5962:6,8,11, 12,22,23,24,25 5963:7,9,14,15, 18 5964:24,25 5965:2,6,10,13, 19,20 5966:1,3, 14,15,17,18,19	<b>weight</b> 5932:6
<b>vectors</b> 5882:7 5950:13		5836:15 5837:6,9 5839:24 5840:6 5841:5,11,17 5842:13,15,16,23 5843:9,12,14 5844:11 5845:26 5846:2,14,26 5847:9,12 5849:19,21 5850:9,18,24 5851:10,19,22 5852:7,10,16,19, 22 5853:5,7,19, 24 5854:13,22 5860:11 5861:12, 13 5862:23 5864:14,16,17,24 5867:7,16 5868:3,12 5879:13,18,22 5880:9,10,13 5881:6,23,26 5882:1,5,26 5883:1,2 5885:11 5887:3,12,20 5889:5,13,15,22 5890:4,20,23,24, 25 5891:5,6,11 5893:3,16,21,25 5894:10,19,21 5898:17,24 5905:10,17 5907:6,21 5908:6 5909:5 5911:23 5912:3 5913:5 5915:2,7,24 5917:16 5918:17 5925:26 5926:1 5928:25 5929:5 5931:21,24 5934:6,14 5936:10 5937:9, 15,17,18 5938:2, 22 5939:19 5943:7 5944:15 5950:4 5955:12, 13,16,18,20,21,22		<b>well-established</b> 5782:18 5917:20
<b>vegetation</b> 5770:25 5771:1,2 5775:18 5776:17 5778:6 5791:23 5818:15,22 5840:1,5 5882:11 5897:18 5908:3, 14,20	<b>W</b>			<b>well-known</b> 5917:21
<b>vehicle</b> 5784:19, 22	<b>waiting</b> 5818:19, 25 5825:6 5865:19			<b>well-studied</b> 5926:23
<b>vehicles</b> 5801:3 5869:19 5877:12, 13,21,24	<b>walking</b> 5819:16			<b>wells</b> 5843:1,3,9, 18 5845:1,9 5851:7 5854:1 5890:21 5898:10
<b>vehicular</b> 5877:8	<b>wall</b> 5881:11 5887:11			<b>westerly</b> 5895:9 5898:10
<b>verify</b> 5804:6,8	<b>walls</b> 5879:18			<b>western</b> 5783:18 5922:25 5923:2 5925:14
<b>Vern</b> 5858:3	<b>wanted</b> 5780:1 5813:3 5860:8 5921:23 5922:14 5953:1 5966:8 5968:24 5969:1			<b>westslope</b> 5916:23 5939:20
<b>version</b> 5822:20 5960:5	<b>Warden</b> 5856:25			<b>wet</b> 5831:2
<b>versus</b> 5918:25 5935:14 5936:21 5953:13	<b>warranted</b> 5880:1 5886:18			<b>wetland</b> 5942:17, 24 5943:22,24 5944:4,7
<b>vertebrates</b> 5926:2	<b>wash</b> 5877:16,17 5958:5,7 5959:2, 3,5,17,24			<b>Wheaton</b> 5856:19
<b>vessels</b> 5800:12	<b>washed</b> 5964:4 5966:4			<b>whitebark</b> 5772:25 5773:6, 10,16,22,24 5774:1 5775:4 5776:11,18 5777:9 5778:1,3 5779:6,21 5780:4,8,22 5781:2,16,18,25 5782:20 5783:5
<b>vicinity</b> 5775:4 5850:25 5939:2	<b>washes</b> 5965:10			<b>whitefish</b> 5939:21
<b>video</b> 5765:24,25 5766:4 5856:1	<b>washing</b> 5964:17			<b>wide</b> 5870:5
<b>view</b> 5776:1 5779:5 5799:13 5885:3 5891:3 5892:25 5944:2 5947:10	<b>waste</b> 5850:1 5917:15 5928:24 5956:7,15			<b>wild</b> 5897:17
<b>views</b> 5811:8	<b>watched</b> 5954:13,21			<b>Wilderness</b> 5857:21,25 5858:11,21 5923:6
<b>virtual</b> 5766:1	<b>watching</b> 5945:20			<b>wildlife</b> 5770:14, 15,22 5774:15 5775:19,21
<b>visible</b> 5896:4	<b>water</b> 5769:14 5806:18 5814:22, 23 5815:1,2,17 5816:14,15,20, 23,25 5817:1 5818:8,13,16,17, 22 5819:16,23 5825:19,22 5826:7,13 5827:21 5829:4, 5,17 5834:9,13,			
<b>volume</b> 5803:14 5834:1,4 5835:4 5957:22 5960:11				
<b>volumes</b> 5833:23 5961:24				
			<b>water-based</b> 5867:8 5897:10 5908:12 5912:2, 10	
			<b>waterborne</b> 5816:12 5904:9 5922:16	
			<b>watered</b> 5956:4,8 5961:4 5964:6	
			<b>watering</b> 5954:7, 21 5956:10,21,24 5960:8,14,26 5962:2,17 5964:3 5965:18,19	
			<b>Watershed</b> 5859:16	
			<b>waterways</b> 5925:13	
			<b>ways</b> 5803:7	
			<b>weather</b> 5779:8	
			<b>weather-related</b> 5876:14	
			<b>website</b> 5765:26	
			<b>Wednesday</b> 5866:24	
			<b>weed</b> 5877:19	
			<b>week</b> 5767:15 5830:20 5851:15 5874:16 5881:26	
			<b>weekend</b> 5769:8	
			<b>weeks</b> 5767:15,24	
			<b>weigh</b> 5949:23	

5779:18 5784:16  
 5785:25 5786:10,  
 14,22,24 5787:2,  
 10,15 5789:5  
 5808:4,5,15,17  
 5812:4,11  
 5815:14 5820:20  
 5822:12,16  
 5823:3 5826:10,  
 22 5832:10  
 5833:10 5845:6  
 5858:19 5860:1,2  
 5886:26 5911:1,  
 16,18,24 5912:5,  
 10,14 5913:9,12  
 5915:5 5919:17  
 5923:4 5926:2  
 5933:25 5940:22  
 5942:12 5943:16  
 5944:11 5945:16,  
 19  
**wind** 5895:7  
 5898:10,25  
 5901:22 5902:6  
**windblown**  
 5870:2  
**winded** 5779:22  
**winds** 5895:8  
 5898:19 5901:26  
**windy** 5902:5  
**wins** 5953:19  
**winter** 5774:21  
 5781:14,20  
 5785:4 5788:3,26  
 5831:23  
**wishes** 5852:1  
**witnesses**  
 5967:17 5969:8  
**wondering**  
 5788:14,16  
 5792:4 5806:9  
 5808:19 5825:22  
 5942:20 5946:20  
 5954:12  
**woody** 5789:24

**word** 5804:8  
 5938:17  
**words** 5830:8  
**work** 5767:3,21  
 5768:2 5783:20  
 5814:18 5827:14  
 5836:11 5860:14  
 5865:5 5891:17  
 5894:18 5930:10  
 5947:17 5967:14  
**workable**  
 5921:25 5934:4,8  
**worked** 5814:10,  
 25 5912:19  
 5913:8  
**working** 5767:12  
 5770:21 5812:2  
 5887:8  
**works** 5866:24

**world** 5836:7  
**worried** 5931:15  
**worsening**  
 5940:7  
**worst** 5795:12  
**worst-case**  
 5861:9 5899:17,  
 18  
**worst-cased**  
 5899:18

**worth** 5965:25  
**would've**  
 5767:20  
**wrap** 5967:1  
**wrestle** 5853:16  
**written** 5766:23,  
 24 5767:5,8  
 5768:9,10  
**wrong** 5846:19  
 5862:25 5956:20

---

## Y

---

**year** 5767:3,6  
 5775:5 5784:16

5789:4 5795:11,  
 12,21 5798:16  
 5805:22 5914:4  
 5952:6,7,8,9  
 5959:5,13  
 5960:7,13  
 5963:14  
**year-by-year**  
 5787:19  
**year-round**  
 5789:6  
**years** 5773:14  
 5779:7,8  
 5784:15,24  
 5806:14 5813:25  
 5831:2 5833:24  
 5841:11 5883:13  
 5888:13 5896:16  
 5952:7

**Yewchuk**  
 5857:20 5929:18,  
 24 5930:6

**yield** 5849:20  
**young** 5775:2  
 5784:14

**Youtube** 5765:26  
 5766:4

---

## Z

---

**zinc** 5824:7  
 5826:2 5832:4,18  
 5837:23 5838:18  
 5839:10,18  
 5898:24 5912:20,  
 23 5913:10  
 5914:19 5921:1  
 5929:1  
**zone** 5775:3,4,23  
 5834:2 5851:4  
 5893:24 5934:14  
 5946:18  
**zoned** 5808:12  
**zoom** 5769:13  
 5772:6,9 5773:1,

20 5776:9,20,21  
 5777:5,16  
 5779:24 5781:21  
 5783:25 5785:8,  
 15,26 5786:6,7,  
 19 5789:13  
 5790:5,9 5791:6,  
 19 5792:18  
 5794:10 5795:26  
 5796:13,26  
 5799:20 5800:14  
 5801:5,24 5802:3  
 5803:20 5804:14  
 5805:15 5809:13,  
 23,25 5810:12  
 5814:16 5820:24  
 5843:21 5924:24  
 5931:18 5951:7,  
 11 5957:18  
 5958:20,24  
**zooming** 5776:24