MINISTRY OF ENVIRONMENT AND PARKS
COMPLIANCE AND ENVIRONMENTAL ENFORCEMENT BRANCH

DETERMINATION OF ADMINISTRATIVE PENALTY

December 8, 2025 File: 2025-53
189

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Teck Metals Ltd.
Bag 2000
Kimberley, BC V1A 3E1

Attention: Teck Metals Ltd.

RE: Final Determination of Administrative Penalty

Further to the Notice Prior to Determination ("Notice") of Administrative Penalty ("AMP") and accompanying Penalty Assessment Form ("PAF") issued to you on November 13, 2025, I have now made a Determination of Administrative Penalty ("Determination") in this matter.

After reviewing the information available to me, I have concluded that Teck Metals Ltd. ("Teck") has failed to comply with Permit 189 Section 2.2, in respect of which an administrative penalty is being imposed pursuant to Section 115 of the *Environmental Management Act* ("EMA") and the Administrative Penalties (EMA) Regulation ("APR").

The detailed reasons for my decision are provided in the attached PAF.

Final Penalty Assessment

TOTAL: $8,500

Reasons for Decision

In making this Determination, I have considered all of the information available to me. I note that Teck declined to exercise its Opportunity to be Heard ("OTBH"). In reaching this Determination, I have carefully considered all the arguments, relevant documents, evidence, and submissions before me, whether they are specifically referred to or not. My reasons for decision include a consideration of the failures as well as the matters listed in Section 7(1) of the APR, as applicable.

The "Administrative Penalty Handbook: Version 2 – Ministry of Environment and Parks – *Environmental Management Act* and *Integrated Pest Management Act*" ("AMP Handbook") provides high level guidance to Ministry staff considering the assignment of administrative penalties. Statutory Decision Makers consider, and decisions are informed by, this document. I have considered the AMP Handbook in making this Determination.

Considering the AMP Handbook in making my Determination is consistent with the Environmental Appeal Board's ("EAB") findings in *United Concrete & Gravel Ltd. v Director, Environmental Management Act* (Decision No. EAB-EMA-21-A005(a), September 27, 2021)[1], at para. 72:

"Throughout my reasons, I have referred to the Handbook. After having reviewed the Handbook, I find it to be a reasonable guide for determining the appropriate quantum of an administrative penalty under the Act. It fosters consistency and predictability in decision-making. No other resources or authorities were provided to me. For these reasons, I have found the Handbook persuasive in my reasoning."

Due Date & Payment

Payment of this administrative penalty is due within thirty (30) calendar days after the date of service of this Determination. You will be sent an invoice, to be paid via cheque or money order made payable to the Minister of Finance. Payment can be mailed to Business Services at:

Financial Services Branch
Corporate Services for the Natural Resource Ministries
Ministry of Water, Land and Resource Stewardship
PO Box 9356 Stn Prov Govt
Victoria, BC V8W 9M2

Please do not mail cash. A $30 service fee will be charged for dishonoured payments.

If payment has not been received in the thirty (30) calendar day period, interest will be charged on overdue payments at a rate of 3% + the prime lending rate of the principal banker to the Province per month and the amount payable is recoverable as a debt due to the government. In the event of non-payment you will be ineligible for a permit or approval, or to amend a permit or approval, until the penalty is paid in full. Further, I am authorized by Section 18 of EMA to cancel or suspend your current authorization in the event of non-payment and if I decide to do so, you will be notified accordingly.

Right to Appeal

If you disagree with this Determination, Division 2 of Part 8 of EMA provides information for how to appeal my decision to the EAB. In accordance with EMA and with the EAB Procedures Regulation, the EAB must receive Notice of the Appeal no later than 30 calendar days after the date you receive this Determination of Administrative Penalty. The notice must include:

[1] EAB-EMA-21-A005a.pdf (bceab.ca)

a. Your name and address and the name of the person, if any, making the request on your behalf;
b. The address for serving a document to you or the person acting on your behalf;
c. The grounds for appeal;
d. A statement of the nature of the order requested; and
e. The notice of appeal shall be signed by you, or your counsel or agent if any, and be accompanied by a fee of $25, payable to the Minister for Finance by cheque, money order or bank draft.

The Notice of Appeal form is available online at https://www.bceab.ca/resources/forms-and-templates. It should be completed and filed by registered mail or by leaving a copy at the EAB office during normal business hours. The street address is 4th Floor, 747 Fort Street, Victoria, BC, and the office is open from 8:30 am – 4:30 pm Monday through Friday, excluding public holidays.

Notice may also be sent by email or fax, provided the original Notice of Appeal and the appeal fee follows by mail. The mailing address of the EAB is:

Environmental Appeal Board
PO Box 9425 Stn Prov Govt
Victoria, BC V8W 9M6

For further information, please consult the EAB website at https://www.bceab.ca. If the administrative penalty is appealed to the EAB and the penalty is upheld, payment is due within 30 calendar days after receiving a copy of the order or decision of the appeal board, or, if the EAB has sent the matter back to the decision maker, within 30 calendar days after a new Determination of Administrative Penalty is served.

Publication

Seven days after the date of service, this Determination will be published on the Natural Resource Compliance and Enforcement Database ("NRCED") Website: https://nrced.gov.bc.ca/

If you have any questions with regards to this Determination, please contact me at 778-622-6908 or Stephanie.Little@gov.bc.ca.

Sincerely,

Stephanie Little
for Director, *Environmental Management Act*

Attachments:
2025-53 Final Penalty Assessment Form

cc: Michaela Posella, Environmental Protection Officer
Michaela.Posella@gov.bc.ca

Kevin Vu, Environmental Protection Officer
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COS Zone Mailbox

Ministry of Environment and Parks

PENALTY ASSESSMENT FORM FILE: 2025-53

Name of Party

Teck Metals Ltd.

Contravention or Failure

Failure to comply with Permit 189 Section 2.2 (Bypass):

The Permittee must ensure that no waste is discharged without being processed through the authorized works.

Date of Contravention

- March 15, 2023 (bypassing Section 1.1.3)
- March 17, 2023 (bypassing Section 1.1.3)
- May 10, 2023 (bypassing Section 1.1.3)
- March 18, 2024 (bypassing Section 1.1.3)

Background

1. Teck is a Canadian resource company with mining operations internationally, including a number of operations in Canada. One of these is Sullivan Mine ("Mine"), located in Kimberly, British Columbia ("BC").

2. Operating from 1909 to 2001, the Mine produced lead zinc and silver. The Mine has been in care and maintenance since 2001.

3. Please refer to the Summary of Relevant Facts for further information related to this AMP, including Receiving Environment information.

Authorization for Environmental Discharge – Permit 189

4. The provincial regulatory authorization governing the discharge of effluent from the Mine is Permit 189 ("Permit") issued pursuant to EMA.

5. The Permit was issued and is administered by the BC Ministry of Environment and Parks ("Ministry").

6. The Permit authorizes the discharge of effluent to Kimberly Creek, the St. Mary River, and sludge to the land from an inactive base metals mine and concentrator.
7. The Permit was first issued on July 10, 1967, and was most recently amended on October 24, 2016.

PENALTY CALCULATION

2025-53: Section 2.2 (Bypass)

The Contravention or Failure – Findings:

8. Under Section 2.2, Teck must ensure that no waste is discharged without being processed through the authorized works.

9. Under Section 1.1.3, the authorized works for discharge of effluent from the Drainage Water Treatment Plant ("DWTP") are listed as "*drainage water treatment plant, pipelines, pumping stations, grit chambers, seepage collection works, effluent storage facilities, outfall and related appurtenances approximately located as shown on Site Plans A, and B."*

10. On the following dates, Teck discharged waste without being processed through the authorized works listed in Section 1.1.3:

    - March 15, 2023
    - March 17, 2023
    - May 10, 2023
    - March 18, 2024

11. Based on the information provided above, I find that Teck failed to comply with Section 2.2 on the following dates:

    - March 15, 2023
    - March 17, 2023
    - May 10, 2023
    - March 18, 2024

12. The maximum penalty allowable under the Administrative Penalty Regulation (EMA) ("APR") for failure to comply with Section 2.2 is $40,000.

Factors to be Considered in Penalty Calculation:

BASE PENALTY

The base penalty reflects the seriousness of the contravention or failure, based on the following two factors:

Factor a): Nature of the Contravention or Failure

13. **Moderate.** In the "Administrative Penalty Handbook: Version 2 – Ministry of Environment and Parks – *Environmental Management Act* and *Integrated Pest Management Act*" ("AMP Handbook"), a "**moderate**" contravention or failure includes "*Refers to failure to perform required tasks or actions such… meeting operational standards or requirements;*".

14. Teck failed to comply with Section 2.2 when it allowed effluent to bypass the authorized works listed in Sections 1.1.3 and 1.3.3. The bypass of authorized works caused effluent to

be discharged into the environment, bypassing the DWTP. The authorization of works by the Ministry is to ensure that the discharge of effluent meets the Ministry's standards and EMA. Bypassing these authorized works undermines the Ministry's ability to regulate and to protect the environment and human health.

15. After considering the relevant information above, I confirm the contravention is moderate

Factor b): Real or Potential Adverse Effect

16. Section 7(1)(b) of the APR requires that I must consider the real **or potential** adverse effect of the failures. A finding of potential adverse effect of the failures is enough to apply this factor.

17. **Medium**. Included in the AMP Handbook's description of "medium" actual or potential adverse effects is *"contravention interferes with the Ministry's capacity to protect the environment or human health, or has the potential to do so, but does not result in a significant adverse effect or the potential to do so is moderate."*

18. The purpose of the authorized works is to ensure that the discharge of effluent into the receiving environment, in this case, the St. Mary River, is done in such a way that the Ministry's goal of protecting human health and the environment is met. The bypassing of the DWTP results in untreated effluent being discharged at locations where it may have a higher potential for adverse effect on the receiving environment.

19. In response to the March 18, 2024 bypass, Teck carried out receiving environment monitoring to assess the impacts of the bypass on the receiving environment. The monitoring included groundwater well monitoring, surface water sampling, soil sampling and a benthic invertebrate community study. The surface water sampling showed levels of contaminants of concern (pH, sulphate, total aluminum, iron, and manganese, dissolved iron, cadmium, copper, and zinc*)* above British Columbia Water Quality Guidelines ("BC WQGs"). Concentrations of these contaminants of concern decrease to historic levels after the bypass event with the exception of increased zinc concentrations, which persisted through the sampling period.

20. Elevated concentrations of Zinc can adversely affect aquatic and terrestrial life. While background Zinc concentrations in B.C. are generally lower than the threshold for adverse effects to biota, anthropogonic activities such as mining can increase Zinc concentrations to levels that can be harmful.

21. Soil characterization and a benthic community study carried out near the spill location and downstream near St. Mary River concluded that no adverse effects to the benthic community were observed and surface soil was not impacted by the March 18, 2024 bypass.

22. The Permit authorizes the discharge of effluent to St. Mary River. St. Mary River has been known to bear the following fish species:

    - Brook Trout
    - Bull Trout
    - Burbot
    - Cutthroat/Rainbow cross

- Dolly Varden
- Kokanee
- Largemouth Bass
- Longnose Dace
- Longnose Sucker
- Mountain Whitefish
- Prickly Sculpin
- Rainbow Trout
- Redside Shiner
- Sculpin (General)
- Slimy Sculpin
- Westslope (Yellowstone) Cutthroat Trout

23. The evidence that contaminants of concern were above BC WQGs indicates that the bypasses did pose some risk of harm to the environment. This failure to comply with the bypass requirements has resulted in the potential for adverse effect to the environment.

24. After considering the relevant information above, I confirm that the real or potential adverse effects of the failures are medium.

25. The base penalty is confirmed at $10,000.

APPLICATION OF PENALTY ADJUSTMENT FACTORS

The following factors reflect the unique circumstances of this file, including what happened before, during, and after the failures.

Factor c): Previous contraventions or failures, penalties imposed, or orders issued (+/-):

26. I am guided by the AMP Handbook for this factor, to consider Teck's compliance history. This factor could increase or decrease the penalty.

27. In the five years prior to Inspection Report ("IR") 245140, the Ministry issued Teck one Warning IR. Teck was given the opportunity to respond to this failure.

[2025-53 Compliance History]

28. An increase of five percent of the base penalty (+ $500) was proposed for the previous failure.

29. After considering the relevant information above, I confirm that an increase of five percent of the base penalty (+ $500) is applied for the previous failure.

Factor d): Whether contravention or failure was repeated or continuous (+):

30. I am guided by the AMP Handbook for this factor, to consider whether there is any evidence indicating that the repeated or continuing nature of the failures should have alerted Teck to the failures and the need to take action. If I am persuaded that Teck failed to take action, this factor could increase the penalty.

31. The failure was repeated on four dates.

32. Separate penalties for each failure described in this administrative penalty are possible since there were multiple failures between March 13, 2023 and March 18 2024; however, for this administrative penalty, these failures will be treated as repeated.

33. An increase of ten percent of the base penalty (+ $1,000) was proposed to account for the repeated nature of the failures.

34. After considering the relevant information above, I confirm that an increase of ten percent of the base penalty (+ $1,000) is applied to account for the repeated nature of the failures.

Factor e): Whether contravention or failure was deliberate (+):

35. I am guided by the AMP Handbook for this factor, to consider whether there is any evidence indicating that Teck deliberately bypassed authorized works. If I am persuaded that Teck deliberately authorized works, this factor could increase the penalty.

36. On January 5, 2023, Teck was warned of the non-compliance with Section 2.2 of the Permit for bypassing authorized works.

37. Teck has been aware of the requirements of Section 2.2 of the Permit since at least 2023. Despite this, Teck has continued to fail to comply with the requirement to ensure that no waste is discharged without being processed through the authorized works. However, the non-compliances would have been difficult to predict as they are the result of equipment malfunctions, and the cause of these malfunctions are not consistent.

38. Based on the information above, and considering the guiding concepts of standard of care, intent, source of the failures, and predictability outlined in the AMP Handbook, I find that Teck exhibited a no to low level of deliberateness.

39. No adjustment was proposed for this factor.

40. After considering the relevant information above, I confirm no adjustment for this factor.

Factor f): Economic benefit derived by the party from the contravention or failure (+):

41. I am guided by the AMP Handbook for this factor, to consider whether there is any evidence indicating that Teck obtained an economic benefit from the failures. If I am persuaded that Teck obtained an economic benefit from the failures, this could increase the penalty.

42. I am not aware of any economic benefit derived from the failures.

43. No adjustment was proposed for this factor.

44. After considering the relevant information above, I confirm no adjustment for this factor.

Factor g): Exercise of due diligence to prevent the contravention or failure (-):

45. I am guided by the AMP Handbook for this factor, to consider what Teck did **before** the failures to prevent the failures. If I am persuaded that Teck did take measures before to prevent the failures, this factor could decrease the penalty.

46. In response to the previous failures of Section 2.2, Teck implemented the following measures in an effort to prevent reoccurrence of the failure:

    - Upgrade of preventative maintenance to include annual full station electrical inspection and maintenance
    - Maintain inventory of spare pumps
    - Inspections and preventative maintenance activities expanded and include inspections of the upgraded system components (vault, piping, etc.), camera inspections, and system cleaning as required
    - Inspection, cleaning, and maintenance of the valve was increased from once annually (manufacture recommendation) to twice annually
    - Daily inspections of the vent station and similar vent stations along the line were initiated and are ongoing

47. A decrease of ten percent of the base penalty (- $1,000) was proposed for measures to prevent the failures.

48. After considering the relevant information above, I confirm a decrease of ten percent of the base penalty (- $1,000) is applied for measures to prevent the failures.

Factor h): Efforts to correct the contravention or failure (-):

49. I am guided by the AMP Handbook for this factor, to consider what Teck did **after** the failures to restore compliance or reverse or mitigate the impacts. If I am persuaded that Teck did take actions after the failures to restore compliance or reverse or mitigate the impacts, this factor could decrease the penalty.

50. After each failure, Teck submitted a Dangerous Goods Incident Report ("DGIR") in which Teck outlined its initial response and actions taken to correct the failure. In response to the March 15, 2023 bypass, Teck immediately closed the failed control valve, pooled effluent was recovered by hydrovac, and the top 10 cm of surface soil was removed and disposed of on site. After the March 17, 2023 bypass, Teck shut down the pumps and the remaining water from the pipes were emptied into the DWTP. Any remaining effluent contained by a concrete vault was hydrovacced and disposed of. After the May 10, 2023 bypass, Teck immediately closed the valve below the air release vent to stop the release of effluent. In response to the March 18, 2024 bypass, Teck immediately ceased pumping of the conveyance to the DWTP, and a portion of the spilled effluent was recovered.

51. A decrease of ten percent of the base penalty (- $1,000) was proposed for efforts made to correct the failures.

52. After considering the relevant information above, I confirm a decrease of ten percent of the base penalty (- $1,000) is applied for efforts made to correct the failures.

Factor i): Efforts to prevent reoccurrence of the contravention or failure (-):

53. I am guided by the AMP Handbook for this factor, to consider whether Teck has taken any action to avoid the failures happening again in the future. If I am persuaded that Teck has taken any action to avoid the failures happening again in the future, this factor could decrease the penalty.

54. On August 5, 2025, Teck submitted a response to IR 245140 and outlined all corrective actions taken in response to the bypasses to prevent reoccurrence of the failures. These actions include the following:

    - Visual confirmation of flow and valve positioning during start up
    - Enhanced monitoring procedures incorporated in both start-up and ongoing operations
    - Permanent repairs made on pipeline in January 2024
    - Developed and implemented a preventative maintenance program to repair or replace vent valves on an annual basis
    - Engineering assessment was completed on the pipelines to identify operational improvements to prevent further discharge from the vent valves
    - A 650-m replacement section of pipeline was designed and installed, with completion on May 3, 2024

55. A decrease of ten percent of the base penalty (- $1,000) was proposed for efforts made to prevent reoccurrence of the failures.

56. After considering the relevant information above, I confirm a decrease of ten percent of the base penalty (- $1,000) is applied for efforts made to prevent reoccurrence of the failures.

Factor j): Any other relevant factors (+/-):

57. I am guided by the AMP Handbook for this factor, to consider any additional factors which could increase or decrease the penalty. Such factors could include self-reporting, cost to government, cooperation, remorse and accountability, ability to pay, and financial impact of other obligations.

58. I am not aware of any additional factors.

59. No adjustment was proposed for this factor.

60. After considering the relevant information above, I confirm no adjustment for this factor.

Total Penalty:

61. After determining a base penalty of $10,000 for these failures and applying the mitigating and aggravating factors (- $1,500) discussed above, the penalty is established at $8,500.

Penalty Calculation Table:

Factors to be considered in penalty calculation:	Notice	Final Determination
Gravity Penalty		
a) Nature of contravention or failure	moderate	moderate
b) Real or potential adverse effect	medium	medium
Base Penalty:	$10,000	$10,000
c) Previous contraventions or failures, penalties imposed, or orders issued	+ $500	+ $500
d) Whether contravention or failure was repeated or continuous	+ $1,000	+ $1,000
e) Whether contravention or failure was deliberate	$0	$0
g) Exercise of due diligence to prevent the contravention or failure	- $1,000	- $1,000
h) Efforts to correct the contravention or failure	- $1,000	- $1,000
i) Efforts to prevent reoccurrence of the contravention or failure	- $1,000	- $1,000
j) Additional relevant factors	$0	$0
Total Gravity Penalty	$8,500	$8,500
Application of multiplier: No	N/A	N/A
Economic Benefit Penalty		
f) Economic benefit derived by the party from the contravention or failure	$0	$0
Gravity Penalty + Economic Penalty	$8,500	$8,500
Total Penalty:	$8,500	$8,500

Summary of Relevant Facts

62. On November 30, 2022, the Ministry conducted an inspection of the Mine to verify compliance with the Permit during the period of January 1, 2020, to October 31, 2022. On January 5, 2023, IR 194662 was issued and found Teck out of compliance with a number of requirements, including Section 2.2 for discharging waste without being processed through the authorized works. The outcome of IR 194662 was determined to be a Warning of Non-compliance.

[2023-01-05 IR194662 Warning]
[2023-01-05 IR194662 Delivery]

63. The "Details/Findings" in IR 194662, assessing compliance with Section 2.2 states:

"*Teck reported the following unauthorized bypasses to have occurred on the following dates:*

- January 30, 2020 - failure of a pump at the 969 pump station in the Site's seepage collection system resulted in a bypass of collection water around the pumping station which discharged to ground. The pump was down for approximately 15.5 hours and an estimated volume of 110,200 liters of mine-effected water would have been pumped in that time. Repairs started immediately after the failure was found. This was reported to the Ministry on January 31, 2020, in DGIR 193840 and in an NCR. An EOSR was submitted on February 21, 2020, with results from samples collected at receiving environment site MY- 16 on January 31, 2020, which were described by Teck's consultant from SNC-Lavalin to be "similar results from the latest routine receiving water sampling event in November 2019".

- April 1, 2020 - at the No.1 Shaft Waste Dump (N1SWD) and toe drain collection system, seepage was identified with characteristics of acid rock drainage (ARD) influenced groundwater. Teck reported that this seepage was suspected to be associated with the previously reported potential groundwater bypass of the seepage collection works at the N1SWD. This previously reported potential bypass was investigated by Teck between July 2018 and November 2019, and then as a result of investigations, Teck planned to upgrade the N1SWD toe drain. These upgrades began on September 28, 2020. This April 2020, bypass was reported to the Ministry on April 1, 2020, in DGIR 200003 and an NCR. A 30-day follow-up report was submitted on April 30, 2020, which stated that on April 2, 2020, Teck installed temporary infrastructure to collect and pump seepage into the drainage water collection system for treatment and eventual discharge. This report states that the total flow loss due to bypass is unknown, as extent of subsurface shallow groundwater flow remains unknown. Over 13 days, approximately 136,000 liters of contact water was relocated back into the collection system for treatment. In an email sent on November 30, 2022, Teck staff confirmed that this bypass occurred until May 4, 2020, when flow ceased.

- September 18, 2020 - a failure of a surface vent on a high point of the 3900 pipeline that conveys mine water drainage resulted in an overflow of the manhole with subsequent discharge to the surrounding ground, bypassing the treatment works. Teck immediately stopped the discharge and recovered spilled water from the manhole and adjacent area. The 2020 Fall Report states that a thorough investigation into the potential effects of the spill was underway involving soil sampling and the establishment of 3 monitoring wells to help determine if any further remedial measures were warranted. This was first reported to the Ministry on September 18, 2020, in DGIR 202179 and an NCR. On October 16, 2020, an EOSR was submitted which notes that daylighted contact water was found approximately 50 m southwest of the origin in a small ditch. Water in the ditch was not stained but had characteristics of contact water. The spill area was excavated to a depth of .30 m below the ground surface.

- November 27, 2020 - A leak from a valve associated with the No.1 Shaft Waste Dump collection system occurred. The leak was located within a concrete manhole with a concrete base, however, the manhole was reported to not be watertight and therefore Teck reported this as a potential bypass of mine contact water discharged to the manhole and possibly to the surrounding soil, without passing through the treatment works. This was reported in DGIR 203092 and an NCR, on November 27, 2020. An EOSR was submitted on December 17, 2020, which states that the valve was repaired and then monitored for two weeks following.

May 5, 2021 - a failure of a groundwater collection pump (969) in the Site's seepage collection system occurred resulting in a bypass of seepage collection water and discharge to ground. This was reported to the Ministry on May 5, 2021, in DGIR 210432 and an NCR. On June 1, 2021, an EOSR was submitted which stated that the pump was inoperable for 16

hours, before being replaced with a new pump. During the time the pump was down water normally collected at this pump station, and not intercepted by nearby pump 966 would have bypassed the station via groundwater to the downgradient area subsurface. Mark Creek is located approximately 45 m from the pump. Samples were also collected from the nearest routine downstream location (MY-16). Results for samples taken on May 5, 2021, and May 10, 2021, were summited alongside results for samples collected before the bypass. Dissolved aluminum was above the BC Water Quality Guidelines (BCWQG) for Aquatic Life Long-term Average limit for sample results after the bypass. Other parameters also exceeded the BCWQG for Aquatic Life Long-term Average limits; however, exceedances were present in sample data collected before the bypass date as well.

- May 20, 2021 - an estimated 10 L of seepage collection water leaked to Mark Creek resulting in a bypass of the treatment works, during routine maintenance work on a pipeline in the upper section of the 3900 mine line. When pressure on the pipe was relieved the leak was stopped. This was reported to the Ministry on May 20, 2021, in DGIR 210625 and an NCR. An EOSR was submitted on June 14, 2021, which reported that the pipe was repaired.

- May 29, 2021 - a malfunction of an air release vent in the tailings facility area caused mine contact water to discharge from the vent to the ground surface, bypassing the ARD pond and flowing across a road into a grassy area at the south portion of the Iron tailing storage facility. Teck estimated the discharge rate to be approximately 50 L/min, with discharge occurring for 45 minutes. This was reported to the Ministry on May 29, 2021, in DGIR 210727 and an NCR. An EOSR was submitted on June 23, 2021, which reported that debris in the vent caused the incident, and was repaired, and monitoring of the vent and surrounding area was conducted.

- September 25, 2021 - a faulty pipe flange caused an estimated 10,000 L of mine contact water to discharge to ground in the lower mine yard area; however, the leak was located within a groundwater interception system contained by a low permeability liner on the downgradient side. Teck reported that if enough water was released to saturate the soil and drain below, it would drain into the interception system for collection and treatment and not enter the environment; however, the discharge volume is unknown and estimated at the largest potential amount. Any mine contact water that was not captured would have bypassed the ARD pond. This was reported to the Ministry on September 26, 2021, in DGIR 212402 and NCR. An EOSR was submitted on October 21, 2021, which reported that a temporary repair was carried out immediately upon discovery on September 26, 2021, and the flange was permanently repaired the following day. Mark Creek is located approximately 15 m from the location, and monitoring was conducted at upstream and downstream locations. Monitoring results showed exceedances of the BCWQG for Aquatic Life for dissolved cadmium and total zinc, both upstream and downstream of the bypass."

64. The "Actions to be taken" in IR 194662 assessing compliance with Section 2.2 stated, "*Ensure that no waste is discharged without being processed through the authorized works."*

65. On January 27, 2023, Teck submitted a response letter to the findings of IR 194662. In this response letter, Teck outlies corrective measures it took for each bypass event identified in Section 2.2, Teck stated:

    - January 20, 2022:

        "1. The pump failure was suspected to be associated with insufficient fuse size as

such higher capacity fuses were installed as a corrective action to address the 969 pump failure. There has been no reoccurrence since.

2. Preventative maintenance activities have been upgraded to include annual full station electrical inspection and maintenance.

3. An inventory of spare pumps are maintained to expedite replacement timing, and Teck is assessing options for different styles/sizes of pumps for deep aquifer pumping locations that may extend pump life, and options for redundancy in the systems.

4. The communication system interruption was corrected by placing the PLC communication programming phone in a secure location with the receiver secured in place to prevent future disruption."

- April 1, 2020:

  "1. Temporary pumping was installed immediately to capture bypass.

  2. Long term infrastructure upgrades to the No.1 Shaft Toe Drain seepage collection system were completed in 2020 under EMLI and ENV approval processes.

  3. Groundwater and receiving water monitoring programs were expanded prior to the completion of the upgrades, and included installation of additional groundwater monitoring locations and increased frequency of downgradient receiving water to monitor the effectiveness of the upgraded system. These programs are ongoing and are reported in the PE-189 Annual Monitoring Report (component of the Sullivan's Annual Reclamation Report).

  4. Inspections and preventative maintenance activities expanded and include inspections of the upgraded system components (vault, piping, etc.), camera inspections, and system cleaning as required."

- September 18, 2020:

  "*1. The air release vent was immediately closed to stop leakage, and subsequently replaced with a new valve.*

  2. Inspection, cleaning, and maintenance of the valve was increased from once annually (manufacture recommendation) to twice annually. Spare valves maintained onsite for replacement as required.

  3. Daily inspections of the vent station and similar vent stations along the 3900 line were initiated and are ongoing.

  4. Remedial soil excavation was completed to recover stained soil resulting from the discharge, and groundwater investigation completed in the downgradient area."

- November 27, 2020:

  "1. Water collected in the system was temporarily diverted around the leaking flange while repairs were completed. The flange was repaired December 1 and monitored to ensure effective operation.

  2. Upgrades to the remainder of the system were completed prior to end of 2020. Upgrades allow for improved monitoring of the system components.

3. Groundwater and receiving water monitoring programs in the area were expanded associated with the upgrades and are ongoing.

4. Inspections and preventative maintenance activities were expanded and include inspections of the system components (piping), camera inspections, and system cleaning as required."

- May 5, 2021:

  "*1. The pump was replaced with a new pump (verified for operation) and the station put back into operation.*

  2. Preventative maintenance activities have been upgraded to include annual full station electrical inspection and maintenance in addition to pump removal/cleaning and inspection to help reduce potential for failure and serve as early detection.

  3. An inventory of spare pumps are maintained to expedite replacement timing, and Teck is assessing options for different styles/sizes of pumps for deep aquifer pumping locations that may extend pump life, and options for redundancy in the systems."

- May 20, 2021:

  "1. Pipe cleaning activities ceased until piping repairs completed and system tested.

  2. Options review in progress for potential piping re-alignment (to eliminate section of piping), piping upgrade and temporary water diversion planning, and/or flange upgrade and temporary water diversion to accommodate construction."

- May 29, 2021:

  "*1. The air release vent was immediately closed to stop leakage, and subsequently replaced with a new valve.*

  2. Inspection, cleaning, and maintenance of the valve was increased from once annually (manufacture recommendation) to twice annually.

  3. Daily inspections of the vent station, and similar vent stations along the 3900 line were initiated and are ongoing."

- September 25, 2021:

  "*1. Water re-routed upon discovery through an alternate conveyance system while temporary repair completed.*

  2. Monitoring completed in receiving environment downgradient from location to confirm no release from system.

  3. Permanent repair completed by removing upper 2m section of piping (containing compromised portion) and connecting new section of piping with a new flange.

  4. Inspections and preventative maintenance activities include routine inspections of the system components (e.g., piping), camera inspections, and system cleaning as required."

[2023-01-27 IR194662 Response]

66. On March 15, 2023, Teck submitted DGIR 230964 to the Ministry regarding a bypass of authorized works. In DGIR 230964 Teck stated:

"***Nature of Non-compliance:*** *A failure of a control valve setting due to a failed flow meter control resulted in a surge of inflow feed water during start up of the Drainage Water Treatment Plant resulted in the discharge of approximately 1200 liters of contaminated water onto frozen ground. The non-compliance is attributable to a condition that prevented "effective operation of authorized works" as per Section 2.3 of Permit 189.*

Initial Response/Actions taken: *The feed valve was immediately placed back into auto mode and was put into closed position. Pooled water was recovered by hydrovac and the top 10 cms of the impacted surface was scraped and disposed of on site. Reported to EMBC on 2023 03 15 12:49 (DGIR #230964)"*

[2023-03-15 DGIR 230964]

67. On March 17, 2023, Teck submitted DGIR 231006 to the Ministry regarding a bypass of authorized works. In DGIR 231006 Teck stated:

"***Nature of Non-compliance:*** *A leak in previously repaired section of the pipeline conveying ARD water to the Drainage Water Treatment Plant was discovered at 2023 03 17 10:00 am by a contract crew carrying out bi-weekly inspection of the line. The location of the leak was contained by a concrete vault structure accessible through an exposed manhole located approximately 200 meters East of the Drainage Water Treatment Plant. The leak was estimated at maximum approximately 1.5 liters per minute at the time of discovery. A previous inspection of the location conducted at 2023 03 15 12:00 pm showed no leak at the time of inspection. It is believed that the leak first occurred between the times of these two inspections, but the actual duration of the leak is unconfirmed. An estimate of the maximum possible volume of the spill was considered at between 300 and 5500 liters. The non-compliance is attributable to a condition that prevented "effective operation of authorized works" as per Section 2.3 of Permit 189.*

Initial Response/Actions taken: *The pumps supplying water to the pipe were immediately shutdown and contents of the pipe were emptied via the Drainage Water Treatment Plant and processed as per Permit 189. All effluent released at E102672 met permit limits at all times during discharge. The contents of the concrete vault were emptied by means of hydrovac truck with contents disposed of on site. An estimated volume of 300 liters was hydrovacced and disposed of. Reported to EMBC on 2023 03 17 17:03 (DGIR #231006)"*

[2023-03-17 DGIR 231006]

68. On May 10, 2023, Teck submitted DGIR 231704 to the Ministry regarding a bypass of authorized works. In DGIR 231704 Teck stated:

"***Nature of Non-compliance:*** *During daily site surveillance completed by Teck's seepage collection monitors, inspection of an air release vent location on the 3900 mine line identified a malfunction of an air release vent resulting in mine contact water to discharge intermittently from the vent and into the manhole containing the vent (at location noted on attached drawing K100A3002). The non-compliance is attributed to a condition that prevented "effective operation of authorized works" as per Section 2.3 of Permit 189.*

Initial Response/Actions taken: *The seepage collection monitor immediately reported the occurrence to the mine manager and closed the valve below the air release vent, which immediately stopped the release of water. The mine manager attended the site to assess, and reported to EMBC on 2023 05 10 5:50 p.m. (DGR #231704)"*

[2023-05-10 DGIR 231704]

69. On March 18, 2024, Teck submitted DGIR 231704 to the Ministry regarding a bypass of authorized works. In DGIR 231704 Teck stated:

"***Nature of Non-compliance:*** *During filling of a pipeline conveying mine contact water to Teck's Drainage Water Treatment Plant (DWTP) initiated approximately 9:55 a.m. March 18, a condition preventing effective operation of the system resulted in an unauthorized discharge from the pipeline at two locations (referred as the Highway Manhole and Gypsum Release Pond) noted on Drawing excerpt K100A3002 attached, with co-ordinates provided above. The non-compliance is attributed to a condition that prevented effective operation of authorized works and leading to an unauthorized discharge as per Section 2.3 of Permit 189.*

Initial Response/Actions taken: *The pumping conveyance to the DWTP was ceased at 10:26 a.m. and response and investigation initiated immediately, including recovery of a portion of spilled water, further inspections of the line alignment and environmental monitoring. The locations were barricaded with signage while response is being completed. Reported to EMBC on 2024 05 24 1:25 p.m. (DGR #241189). Corrective action and repair planning, including permitting and regulatory approval requirements review, was initiated.*

[2024-03-18 DGIR 241189]

70. In the "Annual Reclamation Report for 2024" ("2024 Annual Report"), dated March 28, 2025, Teck summarized corrective actions taken after the bypass event that occurred on March 18, 2024. On page 14, of the 2024 Annual Report Teck stated:

"*An investigation into the cause was completed. The cause of the event was attributed to improper positioning of a valve that resulted in increased pressure in the pipeline that backed water up to the Highway Manhole release location and led to a pipeline failure at the Gypsum Release Pond location. Corrective remedial actions included recovery of water from release locations and the pipeline, and design and installation of a replacement section of pipeline approximately 650 m in length. The replacement pipe installation was completed on May 3, 2024. Environmental monitoring programs were also initiated, along with appropriate notifications and reporting to regulatory agencies and communities of interest. Preventative actions taken included procedural updates for treatment start-up and associated monitoring, and the installation of the upgraded piping. The actions implemented prior to resuming the spring campaign were successful in preventing reoccurrence. The end of spill report was issued on April 16, 2024."*

71. In addition to the corrective actions mentioned above, Teck carried out environmental monitoring which included surface soil sampling, surface water sampling, and groundwater quality sample collection, and a benthic invertebrate community study. Teck reports the results of the monitoring on page 15 of the 2024 Annual Report and stated:

"*Three groundwater sampling events of existing wells in the area were conducted on March 20, April 12, and June 4, 2024. Each event included site-wide depth-to-water level monitoring of 18 monitoring wells and sampling of four wells adjacent the spill area (MW18- 03, MW18-04, MW18-06 and MW18-08). A fall groundwater sampling event was conducted October 9 and 10, 2024. This event included a site-wide monitor of water levels and sampling of 17 wells across the site. Results from the groundwater sampling indicate that all analyzed parameters are within historical ranges for the samples collected from 18-03, 18- 04, 18-06 and 18-08 (3 events) as well as in the site- wide groundwater sampling event in November. Although there were concentrations of parameters elevated above applicable standards associated with the DWTP water, a comparison with historical sampling results in this area indicated that there was not a significant increase in the concentrations of these parameters in groundwater (AtkinsRéalis, 2025b).*

• Soil characterization occurred on March 20, 2024, and consisted of five surface samples collected at depths of 0.0 m to 0.05 m and 0.1 m to 0.2 m within the spill area. The sampling results indicated that concentrations of metals within the soil were below standards, apart from one test location where arsenic was marginally above standards. Arsenic has been noted to be above standards at other locations within the Gypsum Release Pond footprint (and outside of the inferred spill extent) during previous characterization of soil cover. As such, it was interpreted that the surface soil was not impacted by the spill event/incident (AtkinsRéalis, 2025b).

• Surface water samples were collected weekly between March 18 and June 18, 2024, from the inferred discharge location to the St. Mary River (SM-2), and at locations upstream (CT-01, CT-B, CT-C, SM-3) and downstream (SM-1, CT-D, SM-4, CT-G, CT-02). All CT-XX locations were established previously, sampled routinely and provide historical comparison to determine the spatial extent, magnitude, and duration of potential impacts. Initial response water sampling occurred from March 18 to April 2, 2024, at the inferred discharge location on the St. Mary River (SM-2), and at locations outlined above. The main parameters of interest were pH, sulphate, total aluminium, iron, and manganese, dissolved iron, cadmium, copper, and zinc based on the DWTP feed chemistry measured through time. The sampling results from the initial response at the inferred discharge location (SM-2) indicated that there were elevated concentrations of Contaminants of Interest (COIs) above British Columbia Water Quality Guidelines (BCWQG) in the river measured initially on March 18. Although there were elevated concentrations of COIs, the concentrations had returned to historic ranges observed in the St. Mary by the April 2 sampling event. One exception was on April 30 when an increase was noted at SM-2 for parameters outlined above. However, the concentrations did not reach levels of the initial March 18 sample and were not detected at the downstream CT-D location. The upstream and downstream sampling results confirmed that there was only a localized influence on the river. Zinc was the only parameter that remained above the BCWQG through the sampling period. Concentrations of COIs were within historical ranges during all sampling events at location CT-D, approximately 130m downstream of where the spill water was inferred to enter the river (AtkinsRéalis, 2025b).

• A benthic invertebrate community study was scheduled for St. Mary River in 2024 to verify findings from previous studies that took place in 2018 and 2021. In response to the spill event, a new exposure area (SMR-3.5) was added adjacent to the inferred discharge location to assess potential effects of the inputs of mine impacted water to the benthic invertebrate community within the St. Mary River. The 2024 study (Azimuth, 2025) showed minimal

impairment of the benthic invertebrate community at most areas, with taxa richness similar at exposure and reference areas. Importantly, no adverse effects were detected downstream of the 2024 spill location. Risks within the area adjacent to the spill were characterized as low with low uncertainty and continue to meet provincial risk-based standards."

72. On June 12, 2025, the Ministry conducted an inspection of the Mine to verify compliance with the Permit during the period of November 1, 2022, until December 31, 2024. On July 2, 2025, IR 245140 was issued and found Teck out of compliance with a number of requirements, including Section 2.2 for discharging waste without being processed through the authorized works. The outcome of IR 245140 was determined to be a Referral for AMP. On July 10, 2025, Teck confirm receipt of IR 245140.

[2025-07-02 IR245140 AMP]
[2025-07-02 IR245140 Delivery]
[2025-07-10 IR245140 Delivery Confirmation]

73. In the "Details/Findings" of IR 245140 assessing compliance with Section 2.2, Teck states:

"*The Permittee reported the following unauthorized bypasses to have occurred on the following dates:*

• On March 15, 2023, Teck reported 'a failure of a control valve setting due to a failed flow meter control resulted in a surge of inflow feed water during startup of the Drainage Water Treatment Plant [DWTP],' leading to the discharge of approximately 1,200 litres of acid rock drainage (ARD) feed water 'onto frozen ground.', as documented in the NCR for Permit 189 and reported under DGIR #230964. The NCR states that 'a failure of a control valve setting due to a failed flow meter control resulted in a surge of inflow feed water […] onto frozen ground,' preventing the 'effective operation of authorized works' in violation of Section 2.3 of Permit 189. The spill occurred 'within the footprint of the Drainage Water Treatment Plant," on 'heavily compacted fine crushed gravel,' and was confined due to frozen ground conditions. 'The feed valve was immediately placed back into auto mode and was put into closed position. Pooled water was recovered by hydrovac and the top 10 cms of the impacted surface was scraped and disposed of on site' as reported in the NCR. According to the EOSR, 'the initial recovery efforts […] are expected to have recovered a majority of the contaminants released,' and further soil characterization is planned to assess residual impacts. The EOSR reported, that 'a short duration burst of infeed water occurred resulting in a sudden excessive flow rate that filled the receiving tank and overwhelmed the capacity of the launder connecting to the next sequential tank. The spill was from a short duration overflow from the launder.' This event bypassed the authorized works described in Section 1.1.3 of the Permit.

• On March 17, 2023, Teck reported via NCR and DGIR #231006 that an unauthorized discharge of mine contact water from a damaged pipeline supplying the DWTP. The NCR reported that 'a leak in previously repaired section of the pipeline conveying ARD water to the Drainage Water Treatment Plant was discovered at 2023 03 17 10:00 am by a contract crew carrying out bi-weekly inspection of the line. The location of the leak was contained by a concrete vault structure accessible through an exposed manhole located approximately 200 meters East of the Drainage Water Treatment Plant. The leak was estimated at maximum approximately 1.5 liters per minute at the time of discovery […] An estimate of the maximum possible volume of the spill was considered at between 300 and 5500 liters'.

Teck reported in the NCR that 'The pumps supplying water to the pipe were immediately shutdown and contents of the pipe were emptied via the Drainage Water Treatment Plant and processed as per Permit 189. All effluent released at E102672 met permit limits at all times during discharge. The contents of the concrete vault were emptied by means of hydrovac truck with contents disposed of on site. An estimated volume of 300 liters was hydrovacced and disposed of.' According to the EOSR, 'impact not detected based on monitoring completed in Mark Creek at locations interpreted to be upgradient and downgradient of spill location. Additional investigation to be completed during future repair work that will expose area around manhole (access currently limited based on active operations and utilities) and allow for further characterization.' The event bypassed the authorized works described in Section 1.1.3 of the Permit, which include the pipeline and associated infrastructure intended to convey mine contact water directly to the DWTP for treatment.

• On May 10, 2023, 'During daily site surveillance completed by Teck's seepage collection monitors, inspection of an air release vent location on the 3900 mine line identified a malfunction of an air release vent resulting in mine contact water to discharge intermittently from the vent and into the manhole containing the vent'. The NCR reported that 'the seepage collection monitor immediately reported the occurrence to the mine manager and closed the valve below the air release vent, which immediately stopped the release of water.' The incident was reported to the Ministry the same day under DGIR #231704. The EOSR notes that the 'Malfunction of combination air release valve resulting in intermittent bypass of the valve (0.5L/min when bypassing) and water released onto piping and ground within manhole' and that the cause of malfunction was 'equipment malfunction' but that 'based on the configuration of the vent and line and Teck's experience, it is suspected that debris temporarily affected the closing of the valve during operation which allowed water to release'. The spill was reported in the EOSR by Teck to be confined to the bottom of the manhole, with 'less than 20L estimated' to have accumulated, and no impact to nearby waterways such as Mark Creek, located 250 m away. This event bypassed the authorized works described in Section [1.1.3] of the Permit. The incident was reported to the Ministry on May 10, 2023, under DGIR 231704 and documented in an NCR.

• On March 18, 2024, Teck reported via NCR that 'during filling of a pipeline conveying mine contact water to Teck's Drainage Water Treatment Plant (DWTP) initiated approximately 9:55 a.m. March 18, a condition preventing effective operation of the system resulted in an unauthorized discharge from the pipeline at two locations (referred as the Highway Manhole and Gypsum Release Pond)'. 'A portion of the water released flowed overland and into the St. Mary River (80 m from release point) and a portion was released to ground/subsurface' was reported in the EOSR. In the EOSR it was reported that 'based on preliminary information the improper positioning of an isolation valve is suspected to the cause for the pressurization.' And 'Pressurization of the pipeline that resulted in water backing up in the line to the highway manhole location where a portion was released, and pipeline damage in the historic Gypsum Release area where the remaining water was released.', resulting in an unauthorized bypass. The event was reported under DGIR #241189, and pumping was reported by Teck to be stopped at 10:26 AM the same day. The EOSR reported that 'the total maximum estimated volume released is 460 m³,' and notes that "environmental investigation is ongoing and remedial work including installation of a replacement section of pipeline is in progress. The replacement is anticipated to be complete by April 24, 2024'. Sampling at the GRP area and St. Mary River was completed by AtkinsRéalis. As noted in the EOSR, 'March 18–20 water monitoring results indicate an

increase in select constituents near the release point into the St. Mary River.' Upstream and downstream samples 'confirmed localized influence,' but downstream levels 'were consistent with historical results.' Weekly follow-up monitoring showed 'stable conditions' and concentrations "within historical ranges." Soil sampling on March 20 in the historic Gypsum Release area found "impacts limited to visual staining,' with no effect on soil quality. Teck reported that Further soil testing is planned at the Highway Manhole site. This incident bypassed the authorized works outlined in Section 1.1.3 of the Permit. Compared to previous years, this event marks a significant increase in both the volume of discharge and the severity of environmental exposure.

Teck is out of compliance for bypassing the authorized works listed in Permit Sections 1.1.3 on March 15, 2023, March 17, 2023, and March 18, 2024, and Section 1.3.3 on May 10, 2023."

74. On August 5, 2025, Teck submitted a response to IR 245140. In Teck's response to the findings of Section 2.1 in IR 245140 it outlines all corrective actions taken in response to the bypasses. Teck stated:

"As acknowledged in the Inspection Report, Teck has completed repairs to all related pipelines and appurtenances to restore their intended function. A summary of these corrective actions, as previously reported to the Ministry, is provided below:

March 15, 2023

...Preventative measures now include visual confirmation of flow and valve position during start-up, along with enhanced monitoring procedures incorporated in both start-up and ongoing operations. Operators were trained on the updated procedures, and competency was verified by the supervisor, water treatment during subsequent facility start-up events.

March 17, 2023

... A temporary repair was carried out, along with a monitoring program to ensure the system operated effectively during the spring treatment campaign. The temporary repair successfully stopped the leak during operations. A permanent repair was completed in January 2024. To prevent recurrence, a new pipeline monitoring procedure has been developed and implemented. This procedure focuses on early detection during the initial filling of the pipeline.

May 10, 2023

... To prevent recurrence, Teck has developed and implemented a preventative maintenance program to repair or replace vent valves on an annual basis. Additionally, an engineering assessment was completed on the pipelines to identify operational improvements to prevent further discharge from the vent valves. The assessment was completed in 2025 and the operational recommendations from the engineer have since been implemented.

...

March 18, 2024

...Corrective remedial actions included recovering water from the release locations and the pipeline. A 650-m replacement section of pipeline was designed and installed, with

completion on May 3, 2024. Preventative actions taken included updates to treatment start-up procedures, enhanced monitoring, and the installation of the upgraded piping. These actions were implemented prior to the 2025 spring campaign and were successful in preventing reoccurrence. Additionally, Teck has undertaken investigation of non-destructive pipeline integrity options to further improve pipeline reliability."

[2025-07-02 IR 245140 Response]

75. On November 13, 2025, the Ministry issued a Notice and accompanying Penalty Assessment Form ("PAF") to Teck Metals via email. The Notice recommended AMP 2025-53 for $8,500 for failure to comply with Section 2.2.

76. In the Notice, Teck Metals was offered an Opportunity to be Heard ("OTBH") and given thirty (30) days to request an OTBH.

77. On November 13, 2025, Teck Metals confirmed receipt of the Notice and PAF via email.

78. On December 3, 2025, the Ministry emailed Teck Metals a courtesy reminder of the upcoming due date (December 13, 2025) to request an OTBH.

79. On December 3, 2025, Teck Metals declined an OTBH.

Receiving Environment

80. The Permit authorizes the discharge of effluent to St. Mary River. St. Mary River has been known to bear the following fish species:

- Brook Trout
- Bull Trout
- Burbot
- Cutthroat/Rainbow cross
- Dolly Varden
- Kokanee
- Largemouth Bass
- Longnose Dace
- Longnose Sucker
- Mountain Whitefish
- Prickly Sculpin
- Rainbow Trout
- Redside Shiner
- Sculpin (General)
- Slimy Sculpin
- Westslope (Yellowstone) Cutthroat Trout

[St. Mary River Stream Report]

81. Bull Trout and Westslope Cutthroate Trout are blue listed species (i.e., a species of concern) in BC. Westslope Cutthroat Trout are also designated as a species of "Special Concern" under the Federal Species at Risk Act.

[BC Species and Ecosystems Explorer]
[Westslope Cutthroat Trout]

Contaminants of Concern

82. Elevated concentrations of Zinc can adversely affect aquatic and terrestrial life. While background Zinc concentrations in B.C. are generally lower than the threshold for adverse effects to biota, anthropogonic activities such as mining can increase Zinc concentrations to levels that can be harmful.

[Zinc Water Quality Guidelines - Freshwater Aquatic Life]

83. In the Zinc Water Quality Guidelines for Fresh Aquatic Life the effects of Zinc are described as the following,

"*At higher concentrations, however, zinc produces adverse chronic and acute effects on reproduction, biochemical and physiochemical reactions, and behavioural effects in aquatic organisms (WHO 2001). In fish, zinc interferes with gill uptake of calcium (Hogstrand et al. 1994; Spry and Wood 1985). Because calcium is also an essential element, this reduction in uptake causes calcium deficiency (Spry and Wood 1985). Zinc also disrupts calcium homeostasis in invertebrates (Muyssen et al. 2006) due to competition between zinc and calcium for the same uptake sites on the gill epithelium (Hogstrand et al. 1994; Hogstrand et al. 1998). Zinc also disturbs, to a lesser extent, sodium and chloride fluxes (Spry and Wood 1985). At higher zinc concentrations, lethal toxicity of zinc to aquatic organisms is caused by the irreversible destruction of the gill epithelium, which causes tissue hypoxia, osmoregulatory failure, acidosis and low oxygen tensions in the arterial blood (Hiltibran 1971; Skidmore 1970; Skidmore and Tovell 1972). In general, salmonids were found to be more sensitive than other types of fish in short-term studies."*

[Zinc Water Quality Guidelines - Freshwater Aquatic Life]

Dated this 8th day of December, 2025.