STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

CONSTRUCTION PERMIT

The Missouri Department of Natural Resources hereby issues a permit to:

TECK AMERICAN INCORPORATED
Magmont Operation
Magmont Mine Road
Bixby, MO 65439

for the construction of (described facilities):

See attached.

Permit Conditions:

See attached.

Construction of such proposed facilities shall be in accordance with the provisions of the Missouri Clean Water Law, Chapter 644, RSMo, and regulation promulgated thereunder, or this permit may be revoked by the Department of Natural Resources (department).

As the department does not examine structural features of design or the efficiency of mechanical equipment, the issuance of this permit does not include approval of these features.

A representative of the department may inspect the work covered by this permit during construction. Issuance of a permit to operate by the department will be contingent on the work substantially adhering to the approved plans and specifications.

This permit applies only to the construction of water pollution control components; it does not apply to other environmentally regulated areas.

October 24, 2024
Effective Date

October 23, 2026
Expiration Date

John Hoke, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

Magmont Operation is located along Magmont Mine Road, Bixby, in Iron County, Missouri. Teck American currently has a passive water treatment that allows for settling from the closed mining operations. Teck American is proposing to install two biochemical reactors (BCRs) in parallel to remove metals from the toe drain discharge, especially total recoverable zinc. The BCRs will be installed upstream of the existing water treatment system between the tailings dam toe drain and the passive water treatment system. Construction will include approximately 1,184 feet of 6-inch pipe from the toe drain to the new flow splitter, new flow splitter to divide flows between the 2 reactors, 2 biochemical reactors filled approximately 26,000 cubic feet of media each. Media includes manure, limestone, woodchips, and hay. The reactors will be lined with a geomembrane liner. From the reactor flows will go into a new plunge pool before flowing into the existing water treatment system.

The BCRS are sized to handle a design average flow of 46,000 gpd (32 gpm), which is based on the 90th percentile of flow of 20 years of data (January 2004 to January 2024) from the tailings dam toe drain.

This project will also include general site work appropriate to the scope and purpose of the project and all necessary appurtenances to make a complete and usable wastewater treatment facility.

II. COST ANALYSIS FOR COMPLIANCE

Pursuant to Section 644.145, RSMo, when issuing permits under this chapter that incorporate a new requirement for discharges from publicly owned combined or separate sanitary or storm sewer systems or publicly owned treatment works, or when enforcing provisions of this chapter or the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq., pertaining to any portion of a publicly owned combined or separate sanitary or storm sewer system or [publicly owned] treatment works, the Department of Natural Resources shall make a "finding of affordability" on the costs to be incurred and the impact of any rate changes on ratepayers upon which to base such permits and decisions, to the extent allowable under this chapter and the Federal Water Pollution Control Act. This process is completed through a cost analysis for compliance. Permits that do not include new requirements may be deemed affordable.

The department is not required to complete a cost analysis for compliance because the facility is not a combined or separate sanitary sewer system for a publically-owned treatment works.

III. CONSTRUCTION PERMIT CONDITIONS

The permittee is authorized to construct subject to the following conditions:

1. This construction permit does not authorize discharge.

2. All construction shall be consistent with plans and specifications signed and sealed by Lee Josselyn, P.E. with Linkan and as described in this permit.

3. The department must be contacted in writing prior to making any changes to the plans and specifications that would directly or indirectly have an impact on the capacity, flow, system layout, or reliability of the proposed wastewater treatment facilities or any design parameter that is addressed by 10 CSR 20-8, in accordance with 10 CSR 20-8.110(11).

4. State and federal law does not permit bypassing of raw wastewater, therefore steps must be taken to ensure that raw wastewater does not discharge during construction. If a sanitary sewer overflow or bypass occurs, report the appropriate information to the department's Southeast Regional Office per 10 CSR 20-7.015(9)(G).

5. In addition to the requirements for a construction permit, 10 CSR 20-6.200 requires land disturbance activities of one acre or more to obtain a Missouri state operating permit to discharge stormwater. The permit requires best management practices sufficient to control runoff and sedimentation to protect waters of the state. Land disturbance permits will only be obtained by means of the department's ePermitting system available online at https://dnr.mo.gov/data-e-services/missouri-gateway-environmental-management-mogem. See https://dnr.mo.gov/data-e-services/water/electronic-permitting-epermitting for more information.

6. A United States Army Corps of Engineers (USACE) Clean Water Act Section 404 Department of the Army permit and a Section 401 Water Quality Certification issued by the department may be required for the activities described in this permit. This permit is not valid until these requirements are satisfied or notification is provided that no Section 404 permit is required by the USACE. You must contact your local USACE district since they determine what waters are jurisdictional and which permitting requirements may apply. You may call the department's Water Protection Program, Operating Permits Section at 573-522-4502 for more information. See https://dnr.mo.gov/water/business-industry-other-entities/permits-certification-engineering-fees/section-401-water-quality for more information.

7. All construction must adhere to applicable 10 CSR 20-8 (Chapter 8) requirements listed below.
    - Flood protection shall apply to new construction and to existing facilities undergoing major modification. The wastewater facility structures, electrical equipment, and mechanical equipment shall be protected from physical damage by not less than the 100- year flood elevation. 10 CSR 20-8.140 (2) (B)
    - Unless another distance is determined by the Missouri Geological Survey or by the department's Public Drinking Water Branch, the minimum distance between wastewater treatment facilities and all potable water sources shall be at least 300 feet. 10 CSR 20-8.140 (2) (C) 1.

- Facilities shall be readily accessible by authorized personnel from a public right–of-way at all times. 10 CSR 20-8.140 (2) (D)
- Adequate provisions shall be made to effectively protect facility personnel and visitors from hazards. The following shall be provided to fulfill the particular needs of each wastewater treatment facility:
- The identification and hazard warning data included on chemical shipping containers, when received, shall appear on all containers (regardless of size or type) used to store, carry, or use a hazardous substance. 10 CSR 20-8.140 (9) (E)
- Manufactured media material shall—
  - Be used in accordance with all manufacturer's recommendations; 10 CSR 20-8.180 (4) (B) 3. A.
  - Be insoluble in wastewater and resistant to flaking, spalling, ultraviolet degradation, disintegration, erosion, aging, common acids and alkalis, organic compounds, and biological attack; 10 CSR 20-8.180 (4) (B) 3. B.
  - Be evaluated to determine the suitability based on experience with an installation treating wastewater under similar hydraulic and organic loading conditions (include a relevant case history involving the use of the synthetic media); 10 CSR 20-8.180 (4) (B) 3. C.
- Lagoon berms shall be constructed of relatively impervious material and compacted to at least 95 percent maximum dry density test method to form a stable structure. 10 CSR 20-8.200(4)(A)1.
- The minimum berm width shall be eight feet to permit access of maintenance vehicles. 10 CSR 20-8.200(4)(A)2.
- An emergency spillway shall be provided that—
  - Prevents the overtopping and cutting of berms; 10 CSR 20-8.200(4)(A)4.A.
  - Is compacted and vegetated or otherwise constructed to prevent erosion; 10 CSR 20-8.200(4)(A)4.B. and
  - Has the ability for a representative sample to be collected, if discharging. 10 CSR 20-8.200(4)(A)4.C.
- The soil of the lagoon bottom shall be compacted with the moisture content between 2 percent below and 4 percent above the optimum water content and compacted to at least 95 percent maximum dry density test method. 10 CSR 20-8.200(4)(B)
- The lagoon shall be sealed to ensure that seepage loss is as low as possible and has a design permeability not exceeding 1.0×10^{-7} cm/sec. 10 CSR 20-8.200(4)(C)1.
- Synthetic seals thickness may vary due to liner material but the liner thickness shall be no less than .02" or 20 mil and be the appropriate material to perform under existing conditions. 10 CSR 20-8.200(4)(C)3.
- Seep collars shall be provided on drainpipes where they pass through the lagoon seal. 10 CSR 20-8.200(4)(C)4.
- Unlined corrugated metal pipe shall not be used for influent lines due to corrosion problems. 10 CSR 20-8.200 (4) (D) 1.

8. Upon completion of construction:

   A. TECK AMERICAN INCORPORATED will become the continuing authority for operation and maintenance of these facilities;

   B. Submit an electronic copy of the as builts if the project was not constructed in accordance with previously submitted plans and specifications; and

   C. Submit the Statement of Work Completed form to the department in accordance with 10 CSR 20-6.010(5)(N) (https://dnr.mo.gov/document-search/wastewater-construction-statement-work-completed-mo-780-2155).The modified operating permit includes an updated facility description and will be handled as an internal modification. No operating permit fee required. It is expected that the operating permit modification will not be issued and the construction will be incorporated into the 2025 renewal.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

Magmont Operation is adding to their existing passive water treatment to further reduce zinc loading and concentrations. Construction will include the installation of two biochemical reactors.

2. FACILITY DESCRIPTION

Magmont Operation is located along Magmont Mine Road, Bixby, in Iron County, Missouri. Teck American currently has a passive water treatment that allows for settling from the closed mining operations. No mining operations are occurring onsite, flows are generated from precipitation through the tailings ponds that is collected at the toe of the dam and currently discharges to a passive water treatment meander system before discharge. In reviewing the discharge monitoring reports for zinc at the facility over the last 5 years, the facility has recorded 5 zinc concentrations exceeding the permit effluent limit of 71 µg/L, which is approximately 23 percent of the reported values. The reported zinc concentrations have been between 4.2 µg/L to 249 µg/L. The average has been 64 µg/L, with the 95th percentile being 173 µg/L.

Teck American is proposing to install two biochemical reactors (BCRs) in parallel to remove metals from the toe drain discharge, especially total recoverable zinc. The BCRs will be installed upstream of the existing water treatment system between the tailings dam toe drain and the passive water treatment system. Bench scale testing conducted at the site in 2022 using water collected directly from the toe drain and demonstrative BCRs constructed in 55-gallon drums, indicted zinc removal rates of 95-97 percent from the toe drain discharge. The concentrations collected directly from the toe dam were significantly higher than the concentrations reported at the outfall, showing that the existing passive water treatment system is removing a significant amount of metals. Design removal

through the installed BCRs is 90 percent due to the fluctuations in precipitation, site conditions, and concentrations expected at full-scale installation.

BCRs are anaerobic reactors that use commonly available solid-phase organic media to provide organic carbon for biological sulfate reduction and metal removal as sulfides. The removed metals remain trapped within the BCR substrate. Substrate material includes wood chips, straw, limestone, and a manure inoculant. To scale up treatment of the toe drain water, the discharge will be intercepted near the existing drainpipes at the toe of the tailings and routed through an underground pipe using gravity drainage into the BCRs. From the BCRs, flow will go into the existing meander system for additional settling and removal prior to discharge.

Flows from this site are dependent on precipitation. The BCRS are sized to handle a design average flow of 46,000 gpd (32 gpm), which is based on the 90th percentile of flow of 20 years of data (January 2004 to January 2024) from the toe drain dam. Since 2012, only 1 flow event was recorded at higher than 32 gpm and it was approximately 35 gpm.

3. COMPLIANCE PARAMETERS

The proposed project is required to meet final zinc effluent limits of 71 µg/L, as established in Operating Permit MO-0001872, issued October 1, 2020, that became effective October 1, 2023.

4. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

Existing major components that will remain in use include the following:

- Passive water treatment system- The existing meander system known as Lower Lake that currently receives flows from the storm event spillway and groundwater discharge from the tailing material valley fill, and other surface water and groundwater discharges.
    - Previously flows from the tailings dam toe drain went through the system with no additional treatment.
    - The passive water treatment system is approximately 14.7 acres,
    - Treatment capacity of approximately 16 million gallons, with a depth of 10 ft through the system.

Construction will cover the following items:

- Surface diversion will be installed to reduce precipitation entering the reactors.
- From the tailings dam toe drain, approximately 1,184 ft of 6-inch SDR17 HDPE pipe will be installed with cleanouts located approximately every 100 ft.
- From the drainage capture system, flows will enter the new flow splitter structure through a 6-inch gate valve. Flows will be split between the two reactors through 4-inch lines.
    - Flows through a 45° V-notch weir will split between the two biochemical reactors within the new earthen basin.

- Designed to handle 32 gpm (46,080 gpd), which is the 90th percentile of flows from the tailings dam toe drain over the last 20 years. The facility elected to design the treatment system based on the actual flows seen rather than a storm event, as this is only a component of the treatment train and is allowed to discharge.
  - There will be an emergency bypass line to the outlet structure if flows are too high, but that would only be used during extreme precipitation events.
    - In the last 12 years of flow monitoring, only 1 flow event exceeded the design flow of 32 gpm.

- Earthen basin- The new earthen basin is being constructed to hold the two biochemical reactors that will operate in parallel.
  - Earthen basin will be 98 ft by 322 ft, including 12 ft berms from the biochemical reactors.
  - There will be 2 emergency spillways, one for each reactor.
    - The emergency spillway will be 4 ft wide and 0.5 ft deep concrete and lined riprap channel down the embankment to the passive water treatment system.
      - It will be approximately 17.5 feet from the reactor to the outside of the basin.
- Biochemical Reactors-The two biochemical reactors will be constructed within the new basin.
  - This is an upward flow system that uses Pascal's principle to drive the fluid through the system by gravity.
  - The untreated water percolates upward through the gravel to the anoxic microbial reaction zone where sulfate is reduced and zinc is precipitated as zinc sulfide or the mineral sphalerite.
  - The treated water continues to migrate upward through the secondary reaction zone. Continued sulfate reduction may result in the formation of colloidal elemental sulfur that would be microbially changed back into dissolved sulfate in the standing water atop each BCR.
  - The peak design flow in one BCR would be 16 gpm (23,040 gpd).
  - There is approximately 26,000 CF of media in each BCR.
    - The mixed media is estimated to exhibit a pore space of 60 percent.
  - The water volume in each BCR's media would be approximately about 117,300 gallons.
    - Using the pore volume calculated of approximately 117,300 gallons, the expected detention time in the media would be at peak flow of 16 gpm is about 5.1 days at startup.
    - The average flow is assumed to be about 18 gpm for both BCRs or 9 gpm per cell.
      - Using the pore volume calculated of approximately 117,300 gallon), the expected detention time in the media is about 9 days at startup.

- As the media is consumed (from the bottom upwards), estimated to be from 20 to 25 years, the detention time in the microbial reaction zone should remain the same for the life the media.

- Each reactor is approximately 137 ft by 74 ft at the surface and 63 ft by 126 ft at the operational area, Depth is approximately 5.5 ft, with an operating volume of 4 ft.
- The bioreactors will be lined with a geotextile liner, followed by geomembrane, and topped with a second non-woven geotextile liner.
  - The geomembrane will be HDPE and Reinforced Polyethylene Geomembranes specified have permeabilities ranging from 1.0 $x10^{-11}$ cm/sec to $1.0x10^{-14}$ cm/sec, exceeding the permeability requirement of 1.0 $x10^{-7}$ cm/sec.
    - The geomembrane will be 60 mil HDPE or the reinforced geotextile polyethylene liner between 30-40 mil or approved equal that is thicker than 20 mil and achieves the specified permeability.
  - Anchor trenches would be installed in the berm approximately 3 feet into the berm with a depth of 2 ft.
- There will be 6-inches of drainage pea gravel and distribution piping
  - Approximately 300 cubic yards of drainage pea gravel.
  - Anti-seep collar on the lines into the BCR from the flow splitter
  - Main distribution piping will be 4-inch SDR 17 HPDE piping with 4-inch cleanouts at the edge of each bioreactor
  - 2-inch Schedule 80 PVC perforated piping within the bioreactor will ensure the entire reactor is dosed.
  - The feed distribution zone consists of a network of perforated pipes arranged in a herringbone pattern (perforated lateral pipes extending in parallel from header pipes arranged in a “double-X” pattern).
    - The pattern was selected to divide and distribute the flow of untreated water at the bottom of the media in a way that the pipe headlosses in each of the eight zones were equal to avoid short-circuiting.
- One (1) foot of biochemical media with manure to facilitate additional removal, with a volumetric ratio of 49 parts wood chips to 1 part limestone to 14 parts hay.
  - Approximately 679 cubic yards of oak and pine wood chips
  - Approximately 14 cubic yards of limestone
  - Approximately 196 cubic yards of hay
  - Manure material containing primarily a medium- to coarse grained material easily excavated. To the extent possible, it should be a mixture of Aged (more than a year old) and Fresh (less than a year old) Manure with approximate proportions of three parts Aged Manure to one-part Fresh Manure. Approximately 10.4 cubic yards of manure.

- 2 feet of biochemical media, with a volumetric ratio of 49 parts wood chips to 1 part limestone to 14 parts hay.
  - Approximately 1,455 cubic yards of oak and pine wood chips, ranging in size from 0.25 inches to 1.5 inches
  - Approximately 30 cubic yards of agricultural limestone ranging from powder size to less than ¼ inch size.
  - Approximately 420 cubic yards of hay
- 0.5 feet of free water on top of the media at design conditions of 40,000 gpd.
  - Each BCR is designed to maintain about 6 inches of standing water atop the media, which is approximately 35,000 gallons (70,000 gallons between the 2 reactors, or approximately 1.1 days of detention time).
- 1.5 feet of freeboard
  - As this is not the final part of the treatment train, the 2 feet of freeboard is not required, as the system goes from the BCRs into the plunge pool and then into the existing passive water treatment system.
- There is the option to add a floating tile cover about 6 inches above the top of the biochemical media to help reduce air into the system and stormwater flows into the basin.
  - The floating Hex-Tiles planned for this use are ballasted for wind resistance, not requiring trenching.

- Flows from the anaerobic biochemical reactors will flow through a 10-inch SDR 17 HDPE line through outlet structure to the plunge pool flowing into the passive water treatment meander system in Clearwater Pond that provides additional settling prior to discharge at Outfall #001 into Left Fork Neal's Creek.
  - Plunge pool will have 4:1 side slopes entering from the biochemical reactor, but will be sloped on the outlet side to allow water to flow into the existing passive water treatment system.
    - The bottom of the plunge pool will have approximately 18 inches of 6-inch rip rap.

5. OPERATING PERMIT

Operating permit MO-0001872 will require a modification to reflect the construction activities. The modified Magmont Operations permit is currently on public notice to update the facility description to include the updated facility description (September 27-October 28, 2024). Submit the Statement of Work Completed to the department in accordance with 10 CSR 20-6.010(5)(N). It is expected that the operating permit modification currently on public notice will not be issued and the construction will be incorporated into the 2025 renewal.

An operating permit modification was submitted for public notice to reflect the change in your operating permit. Your operating permit application for renewal will be due before your CP expires. The modification action does not fulfill the renewal application obligation. A renewal application must be filed before January 1, 2025. If

you have questions on completing the renewal application, please contact the NPDES permitting section by email at cleanwaterpermits@dnr.mo.gov or by phone at 573-522-4502.

V. NOTICE OF RIGHT TO APPEAL

If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to Section 621.250 RSMo. To appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Any appeal should be directed to:

Administrative Hearing Commission
U.S. Post Office Building, Third Floor
131 West High Street, P.O. Box 1557
Jefferson City, MO 65102-1557
Phone: 573-751-2422
Fax: 573-751-5018
Website: https://ahc.mo.gov

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APPENDIX A- PROCESS DIAGRAM