

Mine Closure: Reclamation, Reuse and Redevelopment

Robin Bullock
Environmental Engineering Dept.





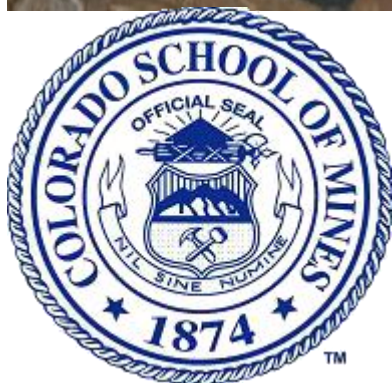
My Background.....

- Env Engineer
- Thirty years in three Major Extractive Industries
 - Pulp and Paper
 - Mining
 - Oil and Gas

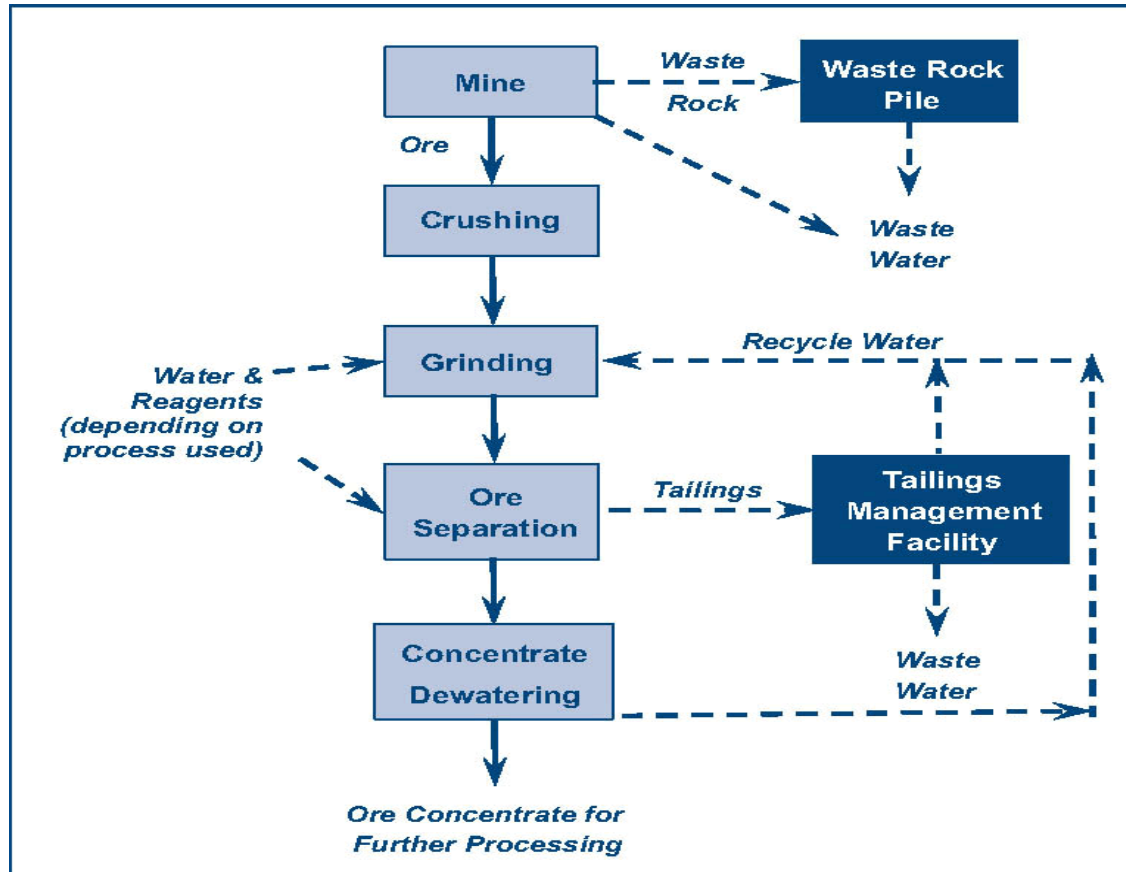
And for past ten years
in Academia



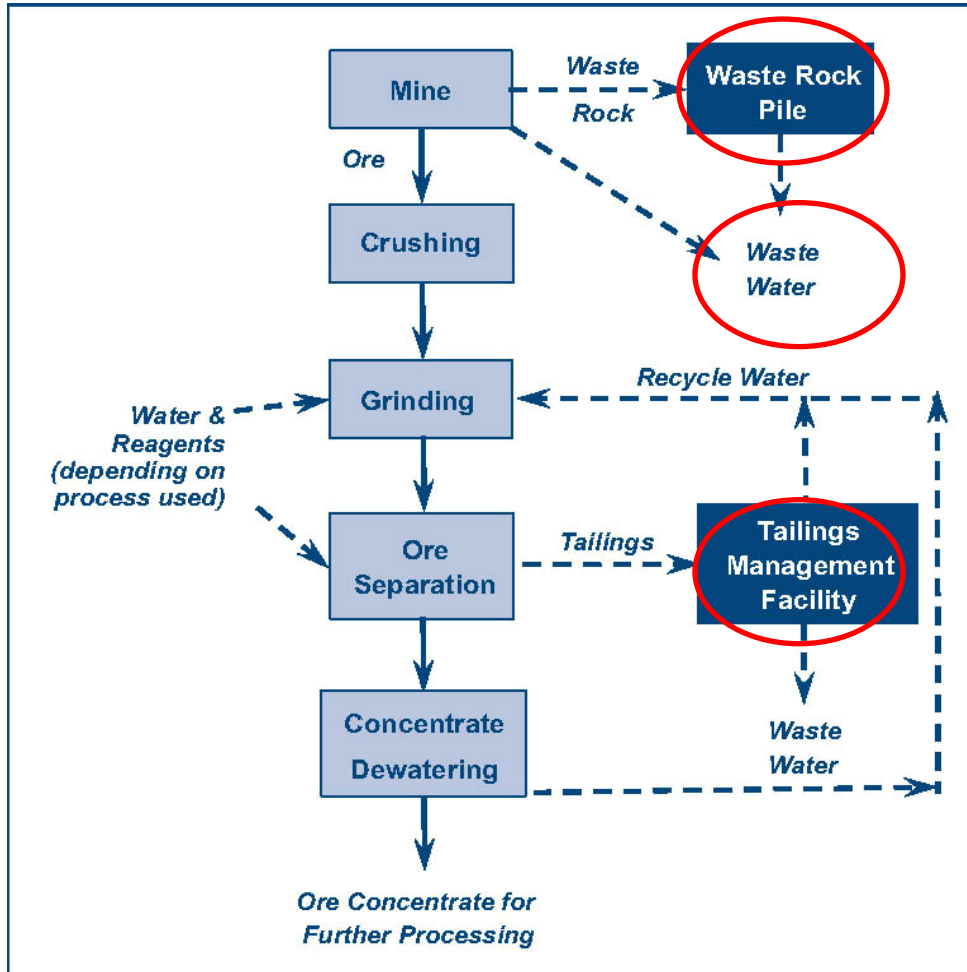
MontanaTech



Typical Mine Process



Typical Mine Waste



Reclamation Process Legal Requirements



Active Mining Company

Note- majority of environmental laws did not come into existence until the 1970s

- **Reclamation Bond/Financial Assurance**
 - Grading of the mine
 - Soil cover
 - Vegetation
 - Stormwater Management
 - Water Treatment

Most locations now adays- reclaim as they go

- **States can be more stringent than Federal Laws**
- **Generally to pre-mine conditions**
- **Sometimes to an alternate land use based on community input**

Reclamation Process Legal Requirements



Funding provided by companies, owners or Government

Abandoned Mines

- **Superfund**
 - Grading of the mine
 - Soil cover
 - Vegetation
 - Stormwater Management
 - Water Treatment
 - Hazardous substance management/treatment
 - May include restoration
- **State or Tribal Abandoned Mine Programs**
- **Generally to pre-mine conditions**
- **Sometimes to an alternate land use based on community input**

Abandoned Mines



Range of Options Based on Final Land Use, Types of Hazards/Risks and Community/Land Owner Desires



- **What types of Land Uses Might These Sites Be Used As?**

Some Possible Options



Remediation & recovery: Berkeley pit: critical water level, copper recovery, sludge, discharge, birds



Range of Reclamation Techniques: community, >40 years & still ongoing



Butte Hill Reclamation



Recreate a Stream



Metals Recovery

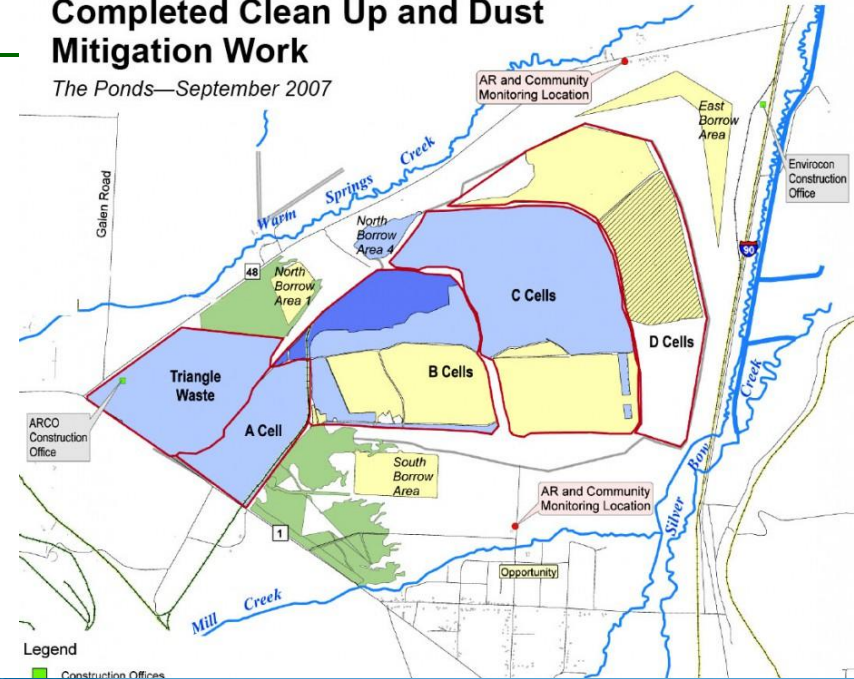


Recovery?- One tailings impoundment- >200 million tons



Completed Clean Up and Dust Mitigation Work

The Ponds—September 2007



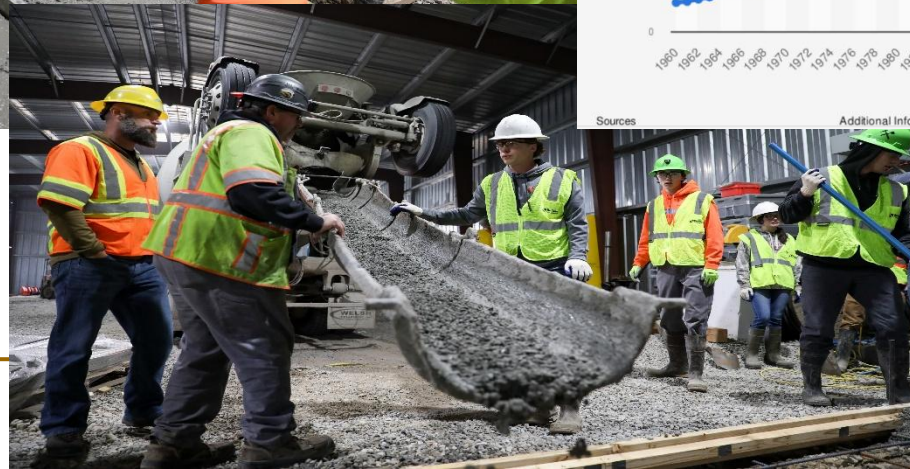
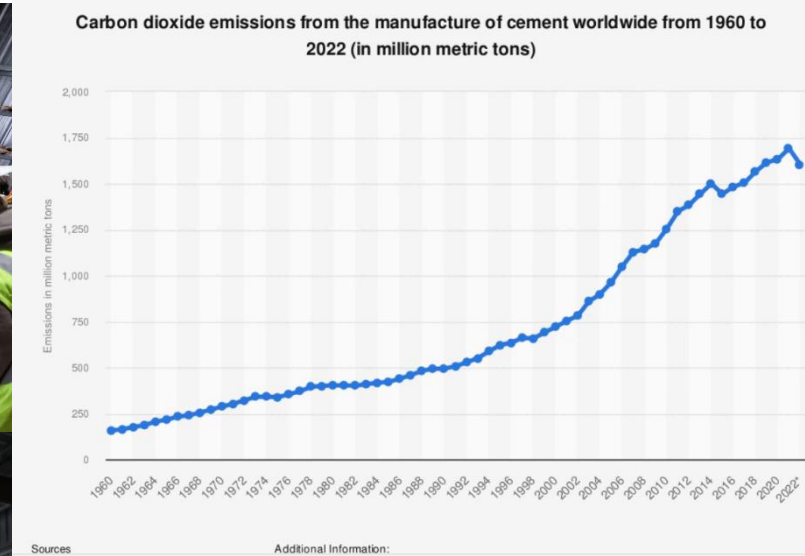
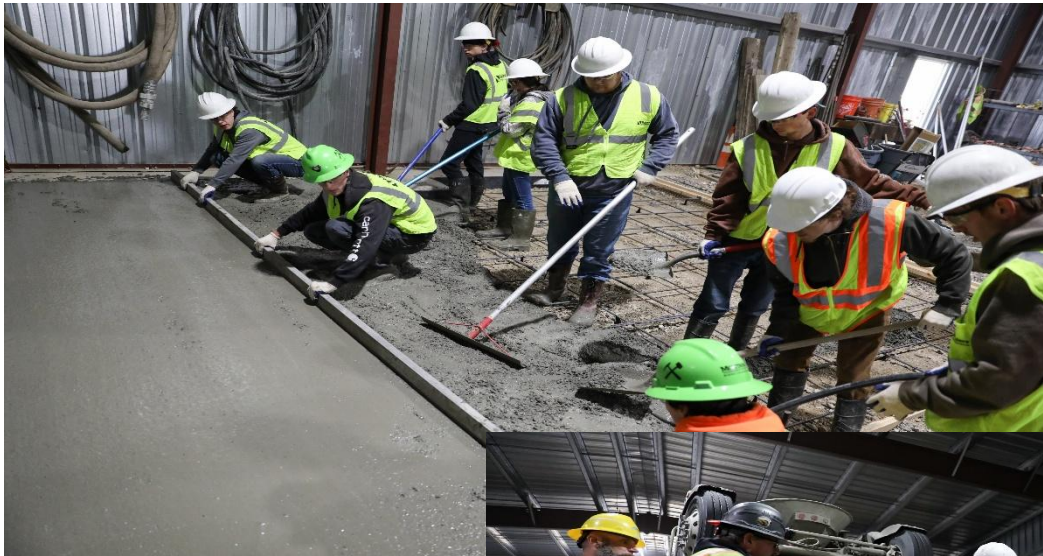
When does it make sense to recover metals?



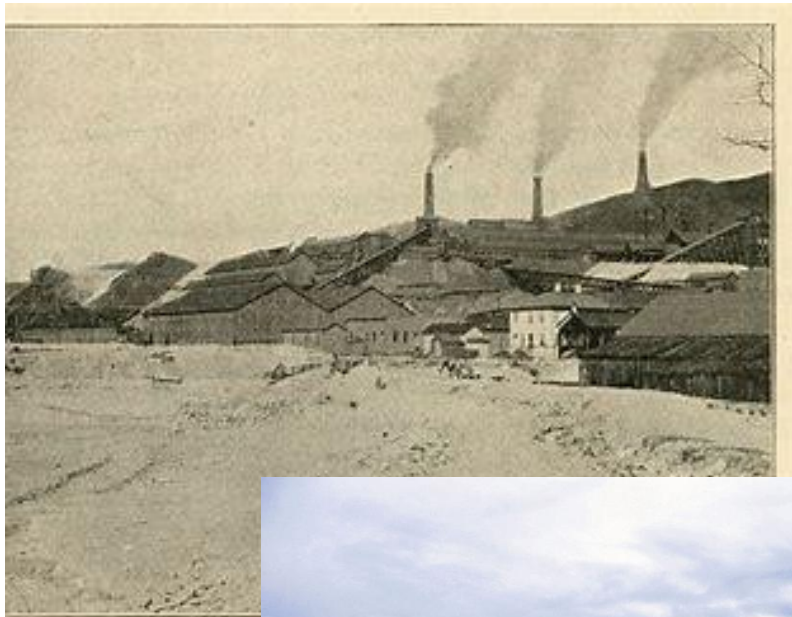
- **Reclaiming Value from Waste: Montana Tech Research Unveils Protocol to Mine Rare Earths from Abandoned Sites**
- <https://rareearthexchanges.com/news/reclaiming-value-from-waste-montana-tech-research-unveils-protocol-to-mine-rare-earth-from-abandoned-sites/>
- **Biggest take aways: easier if you have volume and proximity to an operating mine with similar ore characteristics**
- **Evaluate Critical minerals list- have multiple tests for metals to determine concentration range- understand your potential penalties and cost for excavation/transport**

Tailings Reuse

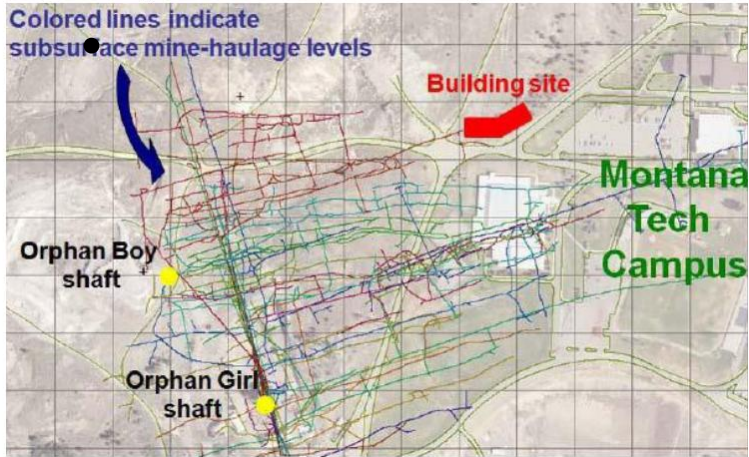
- Concrete- 8% of global GHG emissions
- Can tailings be used to reduce GHG emissions and natural resource consumption?



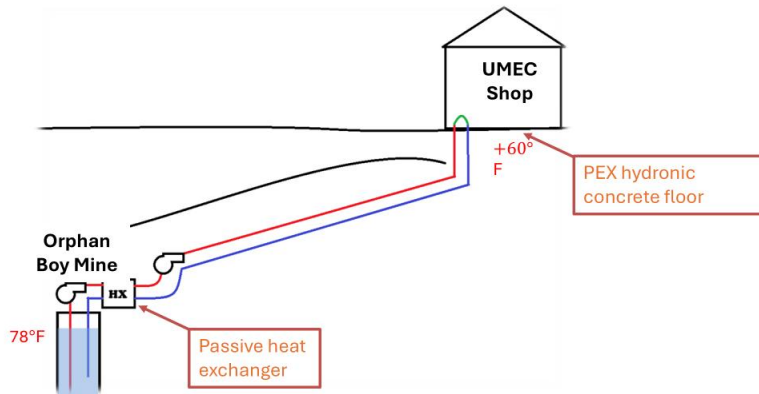
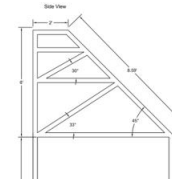
Old Works- First Smelter



Integrated Energy: note end user and take off agreements



Concept Exploration – Headframe Design





Diversity in Reclamation

- **Few final thoughts**
- **All currently operating mines MUST have a reclamation bond [uranium, coal, hardrock]**
- **Reclamation is final closure requirement**
 - Options exist to establish alternative land values as part of post closure
 - But must be protective of the underlying remedy/reclamation



Closing - Continued

- **Abandoned mines- with no existing owner**
 - Obligations for closure falls to the Government or the underlying land owner
 - Majority are relatively small, however, they can still have significant human or environmental impact
 - Priorities for work on these mines are
 1. Safety from access/entry/cave ins
 2. Human health- proximity to people
 3. Environmental impacts- proximity to sensitive locations



Closing - Continued

- **Abandoned mines- new Opportunity- Good Sam**
 - Premise- conduct clean up, but without long term obligations
 - Entity can not be a potential responsible party- have the obligation for clean up
 - Process is currently being established- though will include
 1. Have been successful in the past [ie TU]
 2. Have funding to conduct the work
 3. Have a site(s) selected, have access, agreement with landowner and opportunity to move forward with limited obstacles

Things to consider....



Thank you & Questions?



- Thank you for your time
- rbullock@mtech.edu
- Questions?

Thank
You



TAB
Technical Assistance
to Brownfields

KANSAS STATE
UNIVERSITY

Break

1:45-2:00

If you had a magic wand, what brownfield-related issue would you wish away?



CALCULATING RETURN ON INVESTMENT FOR BROWNFIELD PROJECTS

GREG DAVIS
EPA REGION 8

CORT WALSH & JASON SEYLER
DEQ BROWNFIELDS

April 10, 2026





811

properties
assessed



162

properties
cleaned up



\$636

million
leveraged



4,461

jobs created



MT Brownfields Program Impact

Welcome, Gregor

WORK PACKAGES

6 Work Packages to Review

Additional Actions

[Update RLF Form](#)

TECHNICAL ASSISTANCE REPORTS

- [Regional CTA Summary Report](#)
- [K7 TA Communities Summary Report](#)
- [K7 TA Multi-Community Summary Report](#)

- QUARTERLY REPORTS (QRS)**
 - [Review QRS](#)
 - [View Past QRS](#)
- MANAGEMENT REPORTS**
 - [Regional Status Report](#)
 - [Regional CA Summary Report](#)
 - [Regional Resiliency Summary Report](#)
 - [Regional-Genus Tract Summary Report \(Archived\)](#)
 - Program Accomplishment Report (PAR)**
 - [Progress on Accomplishment Targets \(PAT\)](#)
- TECHNICAL ASSISTANCE REPORTS**
 - [Regional CTA Summary Report](#)
 - [K7 TA Community Summary Report](#)
 - [K7 TA Multi-Community Summary Report](#)
- STATE/TRIBAL REPORTS**
 - [Review PALs Reports](#)
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 - [Review State Reports](#)
 - [View State Brownfields and Voluntary Response Programs](#)

1454 Projects
(associated with your account)

QUARTERLY REPORTS

0 Quarterly Reports to Review

Due 04/30/2026 (22 days)

Additional Actions

[View Past Quarterly Reports](#)

[When should I submit a Quarterly Report? >](#)

TARGETED BROWNFIELDS ASSESSMENT (TBA)

0 Open TBA Work Packages

Additional Actions

[Manage TBA Properties](#)

[What is a TBA? >](#)

RLF ANNUAL POST-CLOSEOUT REPORT (APCR)

0 APCR's to Review

Additional Actions

[View Past APCR's](#)

[When should CARS submit their APCR? >](#)

KNOWLEDGE CENTER

- ACRES is updated approximately every 4 weeks. View a summary of the most recent changes in the [Release Notes](#)
- [ACRES Training, Tips and Tools](#) **EXIT**
- [Document Repository of ACRES Resource Materials](#)

PROPERTY ACCOMPLISHMENTS

Region: 8 Accomplishment Fiscal Year (FY): FY26

Type	Pending (Current FY)	Pending (All FYs)	Approved (Current FY)	Approved (All FYs)
Properties Assessed	16	27	209	4,309
Properties Cleaned Up	18	19	46	555
Properties RAU	14	16	123	1,258
Jobs Leveraged	92	380	428	21,600
Leveraged \$	\$0.00	\$91,619,739.83	\$291,015,126.25	\$3,193,412,929.49

[For a full list, run a Program Accomplishment Report](#) [Flip to JT Accomplishments >](#)



LEARN

General Information
[Grant Recipient Reporting](#) **EXIT**

ASK

ACRES Help Desk for Technical Support
acres_help@epa.gov or 703-284-8212

Programmatic Questions
Consult with your assigned Project Officer

NOTE

Browser Compatibility
For security reasons, ACRES 6 is only compatible with the most commonly used and currently supported browsers, including Google Chrome, Mozilla Firefox, Microsoft Edge, and Apple Safari.

Brownfields and Land Revitalization

About

Accomplishments

Frequently Asked Questions

Program History

Contact Us

Laws & Regulations

Grants and Funding

Technical Assistance

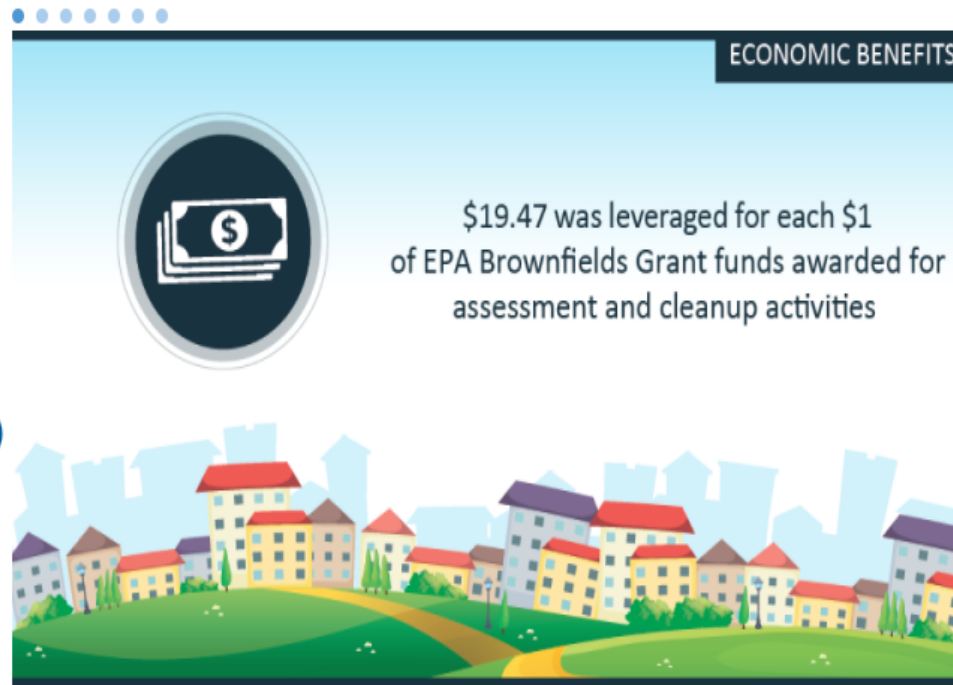
Brownfields and Land Revitalization Newsroom

Land Revitalization

Brownfields Near You

Supporting

Accomplishments



Through fiscal year 2025, on average, \$19.47 was leveraged for each EPA Brownfields Grant dollar awarded through multipurpose, assessment, revolving loan fund and cleanup cooperative agreements. Note: Figure includes data associated with grants awarded in FY23 and earlier to account for the fact that leveraging typically occurs several years after award.

On this page

[Brownfields and Land Revitalization Accomplishments](#)

[State and Tribal Partner Accomplishments](#)

[Environmental and Economic Benefits](#)

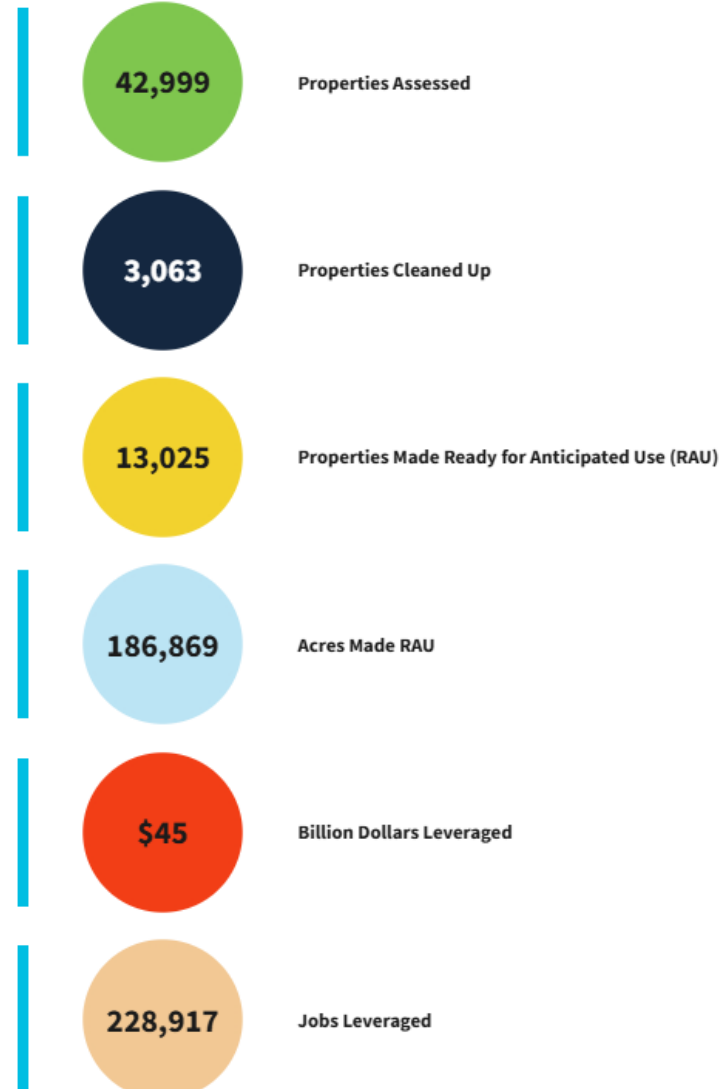
[Supporting Communities](#) ▼

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[Grant Recipient Reporting](#) ▼

[Contact Us about Brownfields and Land Revitalization](#)

Brownfields and Land Revitalization Accomplishments



On this page

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DEQ'S MBRA RETURN ON INVESTMENT EFFORTS



DEQ'S MBRA PRE-AWARD CHECKLIST



[PROJECT NAME]
PRE-AWARD AND DOCUMENT CHECKLIST

APPLICANT: _____
 PROPERTY NAME: _____
 LOCATION: _____
 SIZE OF PROPERTY (ACRES): _____
 EXPECTED CLEANUP START DATE: _____
 EXPECTED REDEVELOPMENT START DATE: _____

PROJECTED OUTCOMES*
 NO. OF HOUSING UNITS / BUILDINGS: _____ / _____
 REDEVELOPMENT SQUARE FOOTAGE / ACRES OF GREENSPACE: _____ / _____
 EXPECTED CLEANUP JOBS / CONSTRUCTION JOBS CREATED: _____ / _____
 EXPECTED REDEVELOPMENT JOBS CREATED: _____

*Upon completion of redevelopment, the applicant agrees to provide final updated return on investment numbers to DEQ.

CLEANUP FUNDING TYPE and AWARD DATE

\$ _____ Amount of MBRA Funding Requested
 \$ _____ Additional Cleanup Grant/Resource: _____
 \$ _____ Additional Cleanup Grant(s)/Resource(s): _____

REDEVELOPMENT FINANCING TYPE and AWARD DATE

\$ _____ Grants (HUD, DNRC, EPA, etc) _____
 \$ _____ Grants (HUD, DNRC, EPA, etc) _____
 \$ _____ Grants (HUD, DNRC, EPA, etc) _____
 \$ _____ Grants (HUD, DNRC, EPA, etc) _____
 \$ _____ OTHER PERM FUNDING _____
 \$ _____ 1ST CONSTRUCTION LOAN _____
 \$ _____ 2ND CONSTRUCTION LOAN _____



DEQ'S ROI EFFORTS



- Short term economic impact = temp cleanup jobs * average salary
- Short term economic impact = temp construction jobs * average salary
- Long term annual economic impact = permanent jobs * average salary
- Source of additional cleanup funding
- Source of additional redevelopment funding
- Changes in land use (e.g. from industrial to residential)
- Ratio of time spent vacant to time between cleanup and redevelopment (can average from urban to rural)
- Demolition costs
- Miles of trails
- Number of housing units
- Number of new businesses or tenants
- Increase in property value
- Number and type of contaminants remediated
- Exposure pathways eliminated
- Number of phase I or II ESAs completed as a program
- Public participation (community meeting numbers)

AROUND THE ROOM



Describe your organizations:

- ROI Collection Efforts
- Marketing Successes
- Any Metric You Find Most Useful





TAB
Technical Assistance
to Brownfields

KANSAS STATE
UNIVERSITY

Final Questions and Wrap-Up

Thank You to Our Sponsors!



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ERM

Hydrometrics, Inc.

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and engineers



TETRA TECH

AWS
AIR WATER SOIL



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Contact Info

Kate Lucas

Assistant Director for EPA Region 8,
KSU TAB Program
katelucas@ksu.edu

817-565-2885

Maggie Belanger

CHSR Senior Director & TAB Regional
Director in EPA Regions 7 & 8, KSU TAB
Program
maggiejessie@ksu.edu

785-532-0782

Jason Seyler

Brownfields Coordinator
Montana Department of Environmental Quality
jseyler@mt.gov

406-444-6447

Greg Davis

Brownfields Project Officer
EPA Region 8
Davis.Gregory@epa.gov

303-243-2705

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