To: Minoli, Kevin[Minoli.Kevin@epa.gov]
From: Benton, Donald
Sent: Mon 1/30/2017 2:52:34 PM
Subject: RE: Letter Re: CERCLA 108(b)

Thank you Kevin, I really appreciate your help on these.

Don

From: Minoli, Kevin
Sent: Sunday, January 29, 2017 2:37 PM
To: Benton, Donald <benton.donald@epa.gov>
Subject: Re: Letter Re: CERCLA 108(b)

Hi Don- Thanks for forwarding all of these. Believe it or not, there are even more coming in that are going to Catherine and me or just me. If you want to forward to me any others you receive from here on, I am happy to acknowledge that you have done that to the individual sending the request so you do not have to. If you prefer to send that yourself, of course that is absolutely fine too. Just please let me know what you prefer.

Thanks, Kevin

Kevin S. Minoli
Acting General Counsel
Office of General Counsel
US Environmental Protection Agency
Main Office Line: 202-564-8040

On Jan 29, 2017, at 2:24 PM, Benton, Donald <benton.donald@epa.gov> wrote:

> Please send formal requests for action to acting administrator Catherine McCabe. I will forward this request to our office of General Counsel but you should make a formal request of the acting administrator.
>
> Thank you,
>
> Don

Senator Don Benton

Senior White House Advisor

Sent from my iPad

On Jan 26, 2017, at 7:43 PM, Akis Gialopsos <Akis.Gialopsos@akleg.gov> wrote:

Mr. Benton,

Attached, please find the letter from State Senator Cathy Giessel, the Chair of the Alaska Senate Resources Committee.

Have a lovely day.

Respectfully,

Akis

Akis Gialopsos

Senate Resources Committee Aide

Office of Senator Cathy Giessel

District N

465-8181

Office 427

<Letter-EPA RE-CERCLA 108(b)-1-25-17.pdf>

To: Chris Ex. 5 - Personal Email
Cc: Minoli, Kevin[Minoli.Kevin@epa.gov]; Schnare, David[schnare.david@epa.gov]
From: Benton, Donald
Sent: Sun 1/29/2017 7:39:08 PM
Subject: Re: Request for 120-Day Extension of Comment Period Relating to Proposed "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," 82 Fed. Reg. 3388 (Jan. 11, 2017)

Chris thank you for your note but formal requests like these should be sent to the acting Administrator Catherine McCabe. I will forward your request to our office of General Counsel. Sincerely,
Don Benton

Sent from my iPad

> On Jan 26, 2017, at 12:51 PM, Chris Ex. 6 - Personal email wrote:
>
> Dear Honorable Donald Benton,
>
>
> Please see the attached Microsoft Word and PDF version of a request for an 120-Day Extension of Comment Period Relating to Proposed "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," 82 Fed. Reg. 3388 (Jan. 11, 2017).
>
> Thank you for your consideration.
>
> Christopher Dail
> CPG #10596
> CMD Consulting
> 1520 South Liberty Drive
> Liberty Lake, WA 99019
> Mobile: Ex. 6 - Personal Phone
> E-mail: Ex. 6 - Personal email
> <Request_for_120Day_Extension_Comment_Period_for_EPA_proposed_CERCLA108-b_rule_82FedReg3388.pdf>
> <Request_for_120-Day_Extension_Comment_Period_for_EPA_proposed_CERCLA108-b_rule_82FedReg3388.docx>

To: Andy O'Hare[aohare@tfi.org]
Cc: Breen, Barry[Breen.Barry@epa.gov]; Johnson, Barnes[Johnson.Barnes@epa.gov]; Minoli, Kevin[Minoli.Kevin@epa.gov]; Schnare, David[schnare.david@epa.gov]
From: Benton, Donald
Sent: Sun 1/29/2017 7:37:13 PM
Subject: Re: Request for Comment Deadline Extension

Andy thanks for your note but request like these should go to the acting administrator Catherine McCabe. I will forward a copy to our office of General Counsel but please make a formal request of the acting administrator.
Thank you,
Don Benton
Senior White House Advisor

Sent from my iPad

On Jan 26, 2017, at 12:54 PM, Andy O'Hare <aohare@tfi.org> wrote:

Mr. Benton,

Good afternoon.

Attached please find a request for an extension to the period for providing comments on a rule proposed by EPA on January 11, 2017. The rule in question is the Financial Responsibility Requirements Under CERCLA Section 108(b) for Classes of Facilities in the Hardrock Mining Industry (82 Fed. Reg. 3388, January 11, 2017). The comment period currently closes on March 13, 2017. As explained at length in the attached correspondence from The Fertilizer Institute, this is not of sufficient duration to provide meaningful comments. TFI respectfully requests that this period be extended by 120 days to at least July 11, 2017.

Please reach out with any questions.

Regards,

Andy O'Hare

Andrew T. O'Hare, CAE

Vice President, Public Policy

The Fertilizer Institute

425 Third Street, SW

Suite 950

Washington, DC 20024

(202) 515-2704 (work)

Ex. 6 - Personal Phone (cell)

aohare@tfi.org

<CERCLA 108 Comment Deadline Request.pdf>

To: Akis Gialopsos[Akis.Gialopsos@akleg.gov]
Cc: Sen. Cathy Giessel[Sen.Cathy.Giessel@akleg.gov]; Rena Miller[Rena.Miller@akleg.gov]; Randy Ruaro[Randy.Ruaro@akleg.gov]; Bruce Tangeman[Bruce.Tangeman@akleg.gov]; Minoli, Kevin[Minoli.Kevin@epa.gov]; Schnare, David[schnare.david@epa.gov]
From: Benton, Donald
Sent: Sun 1/29/2017 7:24:02 PM
Subject: Re: Letter Re: CERCLA 108(b)

Please send formal requests for action to acting administrator Catherine McCabe. I will forward this request to our office of General Counsel but you should make a formal request of the acting administrator.
Thank you,
Don

Senator Don Benton
Senior White House Advisor

Sent from my iPad

On Jan 26, 2017, at 7:43 PM, Akis Gialopsos <Akis.Gialopsos@akleg.gov> wrote:

Mr. Benton,

Attached, please find the letter from State Senator Cathy Giessel, the Chair of the Alaska Senate Resources Committee.

Have a lovely day.

Respectfully,

Akis

Akis Gialopsos

Senate Resources Committee Aide

Office of Senator Cathy Giessel

District N

465-8181

Office 427

<Letter-EPA RE-CERCLA 108(b)-1-25-17.pdf>

To: Minoli, Kevin[Minoli.Kevin@epa.gov]; Schnare, David[schnare.david@epa.gov]
From: Benton, Donald
Sent: Sun 1/29/2017 7:10:40 PM
Subject: Fwd: UMA Comment Extension Request - CERCLA Financial Responsibility
UMA Comment Extension Request - CERCLA FR.pdf
ATT00001.htm
ATT00001.html
ATT00002.htm

Sent from my iPad

Begin forwarded message:

From: Mark Compton <mcompton@utahmining.org>
Date: January 28, 2017 at 3:12:57 PM EST
To: <benton.donald@epa.gov>, <mccabe.catherine@epa.gov>, <minol.kevin@epa.gov>
Subject: UMA Comment Extension Request - CERCLA Financial Responsibility

Attached please find a request from the Utah Mining Association for an extension to the comment period for EPA's proposed rule on "Financial Responsibility Requirements under CERCLA 108(b) for Classes of Facilities in the Hardrock Mining Industry."
Thank you for your consideration.

Regards,

Mark D. Compton
President
Utah Mining Association
136 South Main St., Suite 408
Salt Lake City, UT 84101
Office: 801-364-1874
Cell: Ex. 6 - Personal phone

January 28, 2017

Mr. Donald Benton
White House Liaison
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 1101A
Washington, DC 20460

Ms. Catherine McCabe
EPA Acting Administrator
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 1101A
Washington, DC 20460

Mr. Kevin Minoli
EPA Acting General Counsel
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 2355A
Washington, DC 20460

Re: Request for 120-Day Extension of Comment Period Relating to Proposed "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," 82 Fed. Reg. 3388 (Jan. 11, 2017).

Dear Mr. Benton, Ms. McCabe, and Mr. Minoli:

The Utah Mining Association (UMA) respectfully requests an extension of 120 additional days, or until July 10, 2017, to the 60-day public comment period currently established by EPA for its proposed rule, "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," which was published in the *Federal Register* on Jan. 11, 2017. *See* 82 Fed. Reg. 3388.

UMA is a 102-year-old non-profit, non-partisan trade association representing the interests of the mining industry in Utah. UMA members are actively involved in exploration and mining

operations on public and private lands throughout the state. Our diverse membership includes every facet of the mining industry, including geology, exploration, mining, engineering, power generation, equipment manufacturing, legal and technical services, and sales of equipment and supplies. UMA's membership includes the classes of facilities targeted in the proposed rule.

The 60-day comment period provided by EPA, ending on March 13, 2017, is an unreasonably short period of time to review, evaluate, and prepare meaningful public comments on EPA's sweeping new regulatory proposal. EPA's proposed rule is a major rulemaking by any measure. EPA's Regulatory Impact Analysis estimates that the "financial responsibility amount for the regulated industry is $7.1 billion." 82 Fed. Reg. 3392. Based on EPA's own numbers, the proposed rule will require hardrock mining companies to incur up to $171 million *per year* in new financial assurance costs. *Id.* at 3440. Preliminary analysis by our members indicates that this estimate is far too low, and that the cost of compliance will likely lead to the loss of significant metals production and numerous jobs in the hardrock mining sector.

EPA's proposed rule is also extraordinarily lengthy and complex. First, the proposal spans 124 pages in the *Federal Register*. Second, the universe of relevant materials is far larger. As of Jan. 26, 2017, EPA has cross-referenced *824* documents in the index to the docket that total *87,814* more pages. Notably, since the publication of the proposed rule, EPA *added 320* documents that total *41,439* pages. While EPA released 12 of these documents on the agency website when it released the pre-publication version of the proposed rule on Dec. 2, 2016, those 12 documents comprise only 2,635 (3 percent) of the total universe of pages for review. Consequently, sharing these documents in advance of publication does not alleviate the need for the requested 120-day extension.

Expert analyses are required to evaluate many aspects of the proposed rule, especially the validity of the complex statistical model that EPA has used to generate a formula for determining financial assurance obligations, the appropriateness of the "credit" or reduction criteria EPA has proposed for its financial assurance formula, and the availability of financial instruments to satisfy the proposed requirements. Troubling, until recently EPA has refused to publicly disseminate the tool the agency used to calculate the estimated financial responsibility obligations for the 49 facilities in the modeled universe. *See* Regulatory Impact Analysis, Exhibit B-9 (Dec. 1, 2016). This tool is the cornerstone of this proposed rulemaking and is required for a complete understanding of EPA's intentions regarding the mechanics of the formula and verifying the economic analysis. Failure to provide it at the beginning of the public comment period is grounds alone to extend the comment period.

For all of these reasons, EPA quite correctly has designated this rulemaking as a "Tier 1" rule—a category reserved for "the most important, complex, precedent setting and scrutinized rules." Declaration of Barnes Johnson ¶ 34 ("Johnson Decl."), *In re Idaho Conservation League*, No. 14-1149, Doc. #1523367 (Nov. 19, 2014). Yet EPA has provided only 60 days for public comment on this major proposal that establishes an entirely new federal regulatory program. EPA typically provides such a limited comment window only for noncontroversial proposals on

revisions to existing programs that do not involve a significant number of background documents (if any).[1]

By contrast, EPA typically affords the public significantly more time to comment on major proposed rulemakings like this one, and has often granted liberal extensions. For example, EPA provided the public with 165 days to comment on its Clean Power Plan rule to regulate carbon emissions from power plants, granting a 45-day extension to a 120-day initial comment period.[2] EPA also recently "solicited comments for over 200 days" on a rulemaking to redefine "waters of the United States" for purposes of the Clean Water Act.[3]

In summary, far more than 60 days are required to comment on a proposal that: (1) is built on tens of thousands of pages of background documents; (2) has as its centerpiece a brand new, complex statistical model for calculating financial assurance; and (3) will unquestionably impose many hundreds of millions of dollars of new costs annually on the hardrock mining industry. EPA should therefore extend the comment period an additional 120 days until July 10, 2017, to allow for meaningful comment on its far-reaching proposal.

While the Utah Mining Association understands that EPA is currently under a court order in the U.S. Court of Appeals for the District of Columbia Circuit to finalize a rule by Dec. 1, 2017, that negotiated deadline should not deny the regulated community the right to meaningful review and comment on this economically significant rulemaking. As EPA is well aware, the agency has the authority per the court order to extend or modify the deadline. *See* Order, *In re: Idaho Conservation League*, No. 14-1149 (Jan. 29, 2016).

Thank you for your consideration of this request.

Sincerely,

Mark D. Compton
UMA President

---

[1] *See, e.g.*, Hazardous Waste Export-Import Revisions, 80 Fed. Reg. 63,284 (proposed Oct. 19, 2015) (providing 60 days for comment on proposed rule to update existing regulations concerning the import and export of hazardous wastes); Hazardous Waste Generator Improvements, 80 Fed. Reg. 57,918 (proposed Sept. 25, 2015) (providing 60 days for comment on a proposed rule to update existing hazardous waste generator regulations).

[2] Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,662, 64,707 (Oct. 23, 2015).

[3] Clean Water Rule: Definition of "Waters of the United States," 80 Fed. Reg. 37,054, 37,057 (Jun. 29, 2015).

To: Minoli, Kevin[Minoli.Kevin@epa.gov]; Schnare, David[schnare.david@epa.gov]
From: Benton, Donald
Sent: Sun 1/29/2017 7:05:56 PM
Subject: Fwd: Request for 120-Day Extension of Comment Period
WGS Letter to EPA 012717.pdf
ATT00001.htm

Sent from my iPad

Begin forwarded message:

From: "Shana Hilton" <shilton@formcap.com>
To: "Benton, Donald" <benton.donald@epa.gov>
Subject: Request for 120-Day Extension of Comment Period

Good Afternoon.

Please find attached letter in regards to "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry,"

Regards,

Shana Hilton

Administrative Director

Formation Capital Corp., U.S.

208-756-4578 ext. 27

FORMATION

Formation Capital Corporation, U.S.
812 Shoup Street
Salmon, ID 83467
Tel: 208.756.4578 Fx: 208.756.2573

January 27, 2017

Mr. Donald Benton
White House Liaison
Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Ave., NW
Mail Code:1101A
Washington, DC 20460

Benton.Donald@epa.gov

Re: Request for 120-Day Extension of Comment Period Relating to Proposed "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," 82 Fed. Reg. 3388 (Jan. 11, 2017).

Dear Mr. Benton:

Formation Capital Corporation, U.S. (FCC) respectfully requests an extension of 120 additional days, or until July 10, 2017, to the 60-day public comment period currently established by EPA for its proposal, "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," which was published in the Federal Register on January 11, 2017 (82 Fed. Reg. 3388). FCC's primary asset is the 100% owned **Idaho Cobalt Project**. It remains the only advanced stage, near term, environmentally permitted, primary cobalt deposit in the United States. The ICP will ethically produce, environmentally sound battery grade cobalt salts, made safely, responsibly, and transparently in the United States. More time is required to allow for meaningful public comment on EPA's sweeping regulatory proposal.

EPA's proposed rule is a major rulemaking by any measure. In its Regulatory Impact Analysis EPA estimates the proposed rule will require hardrock mining companies to incur up to $171 million *per year* in new financial assurance costs. Preliminary analysis by our members indicates that this estimate is far too low, and that the cost of compliance will likely lead to the loss of significant minerals production, thousands of jobs and substantial investment capital in the hardrock-mining sector for years to come.

EPA's proposed rule also is extraordinarily lengthy and complex. The proposal spans 124 pages in the Federal Register. Background documents in the docket for the rule comprise more than 2,000 additional pages, and the universe of relevant materials is far larger because EPA has cross-referenced additional documents in the index to the docket that now total *75,000* more pages (more than 20,000 were added today). Moreover, expert analyses are required to evaluate many aspects of the proposed rule, including the validity of the complex statistical model that EPA has used to generate a formula for determining financial assurance obligations, the appropriateness of the credit criteria EPA has proposed for its financial assurance formula, and the availability of financial instruments to satisfy the proposed

requirements. For all of these reasons, EPA quite correctly has designated this rulemaking as a "Tier 1" rule—a category reserved for "the most important, complex, precedent setting and scrutinized rules." Declaration of Barnes Johnson ¶ 34 ("Johnson Decl."), *In re Idaho Conservation League*, No. 14-1149, Doc. #1523367 (Nov. 19, 2014).

Yet EPA has provided only 60 days for public comment on this major proposal. EPA typically provides such a limited comment window only for noncontroversial proposals that do not involve a significant number of background documents (if any).[1] By contrast, EPA typically affords the public significantly more time to comment on major proposed rulemakings like this one, and has often granted liberal extensions. For example, EPA provided the public with 165 days to comment on its Clean Power Plan rule to regulate carbon emissions from power plants, granting a 45-day extension to a 120-day initial comment period.[2] And EPA recently "solicited comments for over 200 days" on a rulemaking to redefine "waters of the United States" for purposes of the Clean Water Act.[3]

Certainly, far more than 60 days are required to comment on a proposal that (1) is built on tens of thousands of pages of background documents, (2) has as its centerpiece a complex statistical model for calculating financial assurance, and (3) will unquestionably impose many hundreds of millions of new costs annually on the hardrock mining industry. EPA should therefore extend the comment period an additional 120 days until July 10, 2017, to allow for meaningful comment on its far-reaching proposal.

Sincerely,

William G. Scales
Project Manager
Formation Capital Corporation

---

[1] *See, e.g.*, Hazardous Waste Export-Import Revisions, 80 Fed. Reg. 63,284 (proposed Oct. 19, 2015) (providing 60 days for comment on proposed rule to update existing regulations concerning the import and export of hazardous wastes); Hazardous Waste Generator Improvements, 80 Fed. Reg. 57,918 (proposed Sept. 25, 2015) (providing 60 days for comment on a proposed rule to update hazardous waste generator regulations).

[2] Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,662, 64,707 (Oct. 23, 2015).

[3] Clean Water Rule: Definition of "Waters of the United States," 80 Fed. Reg. 37,054, 37,057 (Jun. 29, 2015).

To: Scott Pugrud[Scott.Pugrud@oer.idaho.gov]
Cc: John Chatburn[John.Chatburn@oer.idaho.gov]; Minoli, Kevin[Minoli.Kevin@epa.gov]; Schnare, David[schnare.david@epa.gov]
From: Benton, Donald
Sent: Sun 1/29/2017 7:05:13 PM
Subject: Re: CERCLA 108(b) Comment Extension Request

Thank you for your note. Please make formal requests to the Acting Administrator, Catherine McCabe. I will also forward to our Acting General Counsel.
Thanks,
Don Benton
Senior White House Advisor-EPA
Sent from my iPad

On Jan 27, 2017, at 5:25 PM, Scott Pugrud <Scott.Pugrud@oer.idaho.gov> wrote:

Mr. Benton,

Please see the attached letter regarding the state of Idaho's comment extension request for CERCLA 108(b). Please feel free to contact me if you have any questions.

Thank you,

Scott N. Pugrud | Deputy Administrator

Governor's Office of Energy and Mineral Resources

Phone (208) 332-1660 | Fax (208) 332-1661| Web: oemr.idaho.gov

Ease. Make formal requests to the acting administrator,Catherine McCabe

CONFIDENTIALITY NOTICE: This e-mail message is for the sole use of the intended recipient(s) and may contain information that is privileged, confidential and exempt from public disclosure under applicable law. If you are not the intended recipient, any review, disclosure, copying or distribution is strictly prohibited and may be unlawful. If you have received this e-mail in error, please notify the sender by reply, then immediately delete and destroy all copies of this e-mail. Thank you.

<Idaho CERCLA Extension Request.pdf>

To: Minoli, Kevin[Minoli.Kevin@epa.gov]
From: Mark Compton
Sent: Sat 1/28/2017 8:15:42 PM
Subject: UMA Comment Extension Request - CERCLA Financial Responsibility
UMA Comment Extension Request - CERCLA FR.pdf
ATT00001.htm

Attached please find a request from the Utah Mining Association for an extension to the comment period for EPA's proposed rule on "Financial Responsibility Requirements under CERCLA 108(b) for Classes of Facilities in the Hardrock Mining Industry."
Thank you for your consideration.

Regards,

Mark D. Compton
President
Utah Mining Association
136 South Main St., Suite 408
Salt Lake City, UT 84101
Office: 801-364-1874
Cell: Ex. 6 - Personal Phone

January 28, 2017

Mr. Donald Benton
White House Liaison
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 1101A
Washington, DC 20460

Ms. Catherine McCabe
EPA Acting Administrator
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 1101A
Washington, DC 20460

Mr. Kevin Minoli
EPA Acting General Counsel
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 2355A
Washington, DC 20460

Re: Request for 120-Day Extension of Comment Period Relating to Proposed "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," 82 Fed. Reg. 3388 (Jan. 11, 2017).

Dear Mr. Benton, Ms. McCabe, and Mr. Minoli:

The Utah Mining Association (UMA) respectfully requests an extension of 120 additional days, or until July 10, 2017, to the 60-day public comment period currently established by EPA for its proposed rule, "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," which was published in the *Federal Register* on Jan. 11, 2017. *See* 82 Fed. Reg. 3388.

UMA is a 102-year-old non-profit, non-partisan trade association representing the interests of the mining industry in Utah. UMA members are actively involved in exploration and mining

operations on public and private lands throughout the state. Our diverse membership includes every facet of the mining industry, including geology, exploration, mining, engineering, power generation, equipment manufacturing, legal and technical services, and sales of equipment and supplies. UMA's membership includes the classes of facilities targeted in the proposed rule.

The 60-day comment period provided by EPA, ending on March 13, 2017, is an unreasonably short period of time to review, evaluate, and prepare meaningful public comments on EPA's sweeping new regulatory proposal. EPA's proposed rule is a major rulemaking by any measure. EPA's Regulatory Impact Analysis estimates that the "financial responsibility amount for the regulated industry is $7.1 billion." 82 Fed. Reg. 3392. Based on EPA's own numbers, the proposed rule will require hardrock mining companies to incur up to $171 million *per year* in new financial assurance costs. *Id.* at 3440. Preliminary analysis by our members indicates that this estimate is far too low, and that the cost of compliance will likely lead to the loss of significant metals production and numerous jobs in the hardrock mining sector.

EPA's proposed rule is also extraordinarily lengthy and complex. First, the proposal spans 124 pages in the *Federal Register*. Second, the universe of relevant materials is far larger. As of Jan. 26, 2017, EPA has cross-referenced *824* documents in the index to the docket that total *87,814* more pages. Notably, since the publication of the proposed rule, EPA *added 320* documents that total *41,439* pages. While EPA released 12 of these documents on the agency website when it released the pre-publication version of the proposed rule on Dec. 2, 2016, those 12 documents comprise only 2,635 (3 percent) of the total universe of pages for review. Consequently, sharing these documents in advance of publication does not alleviate the need for the requested 120-day extension.

Expert analyses are required to evaluate many aspects of the proposed rule, especially the validity of the complex statistical model that EPA has used to generate a formula for determining financial assurance obligations, the appropriateness of the "credit" or reduction criteria EPA has proposed for its financial assurance formula, and the availability of financial instruments to satisfy the proposed requirements. Troubling, until recently EPA has refused to publicly disseminate the tool the agency used to calculate the estimated financial responsibility obligations for the 49 facilities in the modeled universe. *See* Regulatory Impact Analysis, Exhibit B-9 (Dec. 1, 2016). This tool is the cornerstone of this proposed rulemaking and is required for a complete understanding of EPA's intentions regarding the mechanics of the formula and verifying the economic analysis. Failure to provide it at the beginning of the public comment period is grounds alone to extend the comment period.

For all of these reasons, EPA quite correctly has designated this rulemaking as a "Tier 1" rule—a category reserved for "the most important, complex, precedent setting and scrutinized rules." Declaration of Barnes Johnson ¶ 34 ("Johnson Decl."), *In re Idaho Conservation League*, No. 14-1149, Doc. #1523367 (Nov. 19, 2014). Yet EPA has provided only 60 days for public comment on this major proposal that establishes an entirely new federal regulatory program. EPA typically provides such a limited comment window only for noncontroversial proposals on

revisions to existing programs that do not involve a significant number of background documents (if any).[1]

By contrast, EPA typically affords the public significantly more time to comment on major proposed rulemakings like this one, and has often granted liberal extensions. For example, EPA provided the public with 165 days to comment on its Clean Power Plan rule to regulate carbon emissions from power plants, granting a 45-day extension to a 120-day initial comment period.[2] EPA also recently "solicited comments for over 200 days" on a rulemaking to redefine "waters of the United States" for purposes of the Clean Water Act.[3]

In summary, far more than 60 days are required to comment on a proposal that: (1) is built on tens of thousands of pages of background documents; (2) has as its centerpiece a brand new, complex statistical model for calculating financial assurance; and (3) will unquestionably impose many hundreds of millions of dollars of new costs annually on the hardrock mining industry. EPA should therefore extend the comment period an additional 120 days until July 10, 2017, to allow for meaningful comment on its far-reaching proposal.

While the Utah Mining Association understands that EPA is currently under a court order in the U.S. Court of Appeals for the District of Columbia Circuit to finalize a rule by Dec. 1, 2017, that negotiated deadline should not deny the regulated community the right to meaningful review and comment on this economically significant rulemaking. As EPA is well aware, the agency has the authority per the court order to extend or modify the deadline. *See* Order, *In re: Idaho Conservation League*, No. 14-1149 (Jan. 29, 2016).

Thank you for your consideration of this request.

Sincerely,

Mark D. Compton
UMA President

---

[1] *See, e.g.*, Hazardous Waste Export-Import Revisions, 80 Fed. Reg. 63,284 (proposed Oct. 19, 2015) (providing 60 days for comment on proposed rule to update existing regulations concerning the import and export of hazardous wastes); Hazardous Waste Generator Improvements, 80 Fed. Reg. 57,918 (proposed Sept. 25, 2015) (providing 60 days for comment on a proposed rule to update existing hazardous waste generator regulations).

[2] Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,662, 64,707 (Oct. 23, 2015).

[3] Clean Water Rule: Definition of "Waters of the United States," 80 Fed. Reg. 37,054, 37,057 (Jun. 29, 2015).

To: Minoli, Kevin[Minoli.Kevin@epa.gov]
From: John Shively
Sent: Fri 1/27/2017 10:45:05 PM
Subject: FW: CERCLA 108b regulations

Dear Mr. Minoli,

Below is a letter which I sent to Donald Benton requesting a 120 day extension for the comment period on EPA's proposed "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry."

Thank you for your consideration.

Sincerely yours,

John Shively

Chairman

Pebble Limited Partnership

From: John Shively
Sent: Wednesday, January 25, 2017 1:25 PM
To: 'Benton.Donald@epa.gov'
Subject: CERCLA 108b regulations

Dear Mr. Benton:

Re: Request for 120-Day Extension of Comment Period Relating to Proposed "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," 82 Fed. Reg. 3388 (Jan. 11, 2017).

Dear Mr. Benton:

The Pebble Limited Partnership (PLP) respectfully requests an extension of 120 additional days, or until July 10, 2017, to the 60-day public comment period currently established by EPA for its proposal, "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," which was published in the Federal Register on January 11, 2017 (82 Fed. Reg. 3388). AEMA (*formerly Northwest Mining Association*) is a 122-year old, 2,000 member national association representing the minerals industry with members residing in 42 states. AEMA is the recognized national voice for exploration, the junior mining sector, and maintaining access to public lands, and represents the entire mining life cycle, from exploration to reclamation and closure. More than 80% of our members are small businesses or work for small businesses. Most of our members are individual citizens. AEMA participated as a Small Entity Representative (SER) in the highly flawed SBREFA SBAR Panel process for this proposed rule. More time is required to allow for meaningful public comment on EPA's sweeping regulatory proposal.

EPA's proposed rule is a major rulemaking by any measure. In its Regulatory Impact Analysis EPA estimates the proposed rule will require hardrock mining companies to incur up to $171 million *per year* in new financial assurance costs. Preliminary analysis by our members indicates that this estimate is far too low, and that the cost of compliance will likely lead to the loss of significant minerals production, thousands of jobs and substantial investment capital in the hardrock-mining sector for years to come.

EPA's proposed rule also is extraordinarily lengthy and complex. The proposal spans 124 pages in the Federal Register. Background documents in the docket for the rule comprise more than 2,000 additional pages, and the universe of relevant materials is far larger because EPA has cross-referenced additional documents in the index to the docket that now total *75,000* more pages (more than 20,000 were added today). Moreover, expert analyses are required to evaluate many aspects of the proposed rule, including the validity of the complex statistical model that EPA has used to generate a formula for determining financial assurance obligations, the appropriateness of the credit criteria EPA has proposed for its financial assurance formula, and the availability of financial instruments to satisfy the proposed requirements. For all of these reasons, EPA quite correctly has designated this rulemaking as a "Tier 1" rule—a category reserved for "the most important, complex, precedent setting and scrutinized rules." Declaration of Barnes Johnson ¶ 34 ("Johnson Decl."), *In re Idaho Conservation League*, No. 14-1149, Doc. #1523367 (Nov. 19, 2014).

Yet EPA has provided only 60 days for public comment on this major proposal. EPA typically provides such a limited comment window only for noncontroversial proposals that do not involve a significant number of background documents (if any).[1] By contrast, EPA typically affords the public significantly more time to comment on major proposed rulemakings like this one, and has often granted liberal extensions. For example, EPA provided the public with 165 days to comment on its Clean Power Plan rule to regulate carbon emissions from power plants, granting a 45-day extension to a 120-day initial comment period.[2] And EPA recently "solicited comments for over 200 days" on a rulemaking to redefine "waters of the United States" for purposes of the Clean Water Act.[3]

Certainly, far more than 60 days are required to comment on a proposal that (1) is built on tens of thousands of pages of background documents, (2) has as its centerpiece a complex statistical model for calculating financial assurance, and (3) will unquestionably impose many hundreds of millions of new costs annually on the hardrock mining industry. EPA should therefore extend the comment period an additional 120 days until July 10, 2017, to allow for meaningful comment on its far-reaching proposal.

Sincerely,

John Shively

Chairman

907 250 6281

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[1] *See, e.g.*, Hazardous Waste Export-Import Revisions, 80 Fed. Reg. 63,284 (proposed Oct. 19, 2015) (providing 60 days for comment on proposed rule to update existing regulations concerning the import and export of hazardous wastes); Hazardous Waste Generator Improvements, 80 Fed. Reg. 57,918 (proposed Sept. 25, 2015) (providing 60 days for comment on a proposed rule to update hazardous waste generator regulations).

[2] Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,662, 64,707 (Oct. 23, 2015).

[3] Clean Water Rule: Definition of “Waters of the United States,” 80 Fed. Reg. 37,054, 37,057 (Jun. 29, 2015).

To: Benton, Donald[benton.donald@epa.gov]; Mccabe, Catherine[McCabe.Catherine@epa.gov]; Minoli, Kevin[Minoli.Kevin@epa.gov]
From: Flower, Jason
Sent: Fri 1/27/2017 8:57:19 PM
Subject: Monsanto Company/P4 Production - Request for extension for comment on Hardrock Mining FA Rule
SLC-8171271-2017.01.27 P4 Production - CERCLA Financial Assurance Comme....pdf

Mr. Benton, Ms. McCabe, and Mr. Minoli,

On behalf of Monsanto Company's subsidiary P4 Production, L.L.C., attached please find a request for a 120-day extension of the comment period on EPA's proposed rule, "Financial Responsibility

Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry."

Best,

Jason

Jason A. Flower
Partner

HUSCH **BLACKWELL LLP**
190 Carondelet Plaza, Suite 600
St. Louis, MO 63105-3433
Direct: 314.480.1769
Fax: 314.480.1505
Jason.Flower@huschblackwell.com
huschblackwell.com
View Bio | View VCard

Blog | Twitter | LinkedIn

HUSCH BLACKWELL

Jason A. Flower
Partner

190 Carondelet Plaza, Suite 600
St. Louis, MO 63105
Direct: 314.480.1769
Fax: 314.480.1505
Jason.Flower@huschblackwell.com

January 27, 2017

Via Electronic Mail & U.S. Mail

Mr. Donald Benton
White House Liaison
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 1101A
Washington, DC 20460

Ms. Catherine McCabe
EPA Acting Administrator
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 1101A
Washington, DC 20460

Mr. Kevin Minoli
EPA Acting General Counsel
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 2355A
Washington, DC 20460

Re: Request for 120-Day Extension of Comment Period Relating to Proposed "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," 82 Fed. Reg. 3388 (Jan. 11, 2017).

Dear Mr. Benton, Ms. McCabe, and Mr. Minoli:

I write on behalf of Monsanto Company's subsidiary, P4 Production, L.L.C. ("P4 Production") to seek an extension of 120 additional days, or until July 10, 2017, to the 60-day public comment

period currently established by EPA for its proposed rule, "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," which was published in the *Federal Register* on Jan. 11, 2017. *See* 82 Fed. Reg. 3388. P4 Production mines phosphate in southeastern Idaho and EPA made clear in the proposed rule that phosphate mines are expected to be included in the classes of facilities in the hardrock mining industry targeted by the proposed rule. Thus, if finalized as proposed, the rule would directly and substantially impact P4 Production's and Monsanto Company's financial interests and operations.

The 60-day comment period provided by EPA, which ends on March 13, 2017, is an unreasonably short period of time to review, evaluate, and prepare meaningful public comments on EPA's sweeping new regulatory proposal. EPA's proposed rule is a major rulemaking by any measure. EPA's Regulatory Impact Analysis estimates that the "financial responsibility amount for the regulated industry is $7.1 billion." 82 Fed. Reg. 3392. Based on EPA's own numbers, the proposed rule will require hardrock as well as other mining companies such as phosphate to incur up to $171 million *per year* in new financial assurance costs. *Id.* at 3440. Preliminary analysis by P4 Production indicates that this estimate is far too low, and that the cost of compliance will likely lead to the loss of significant metals production and numerous jobs in the hardrock-mining sector.

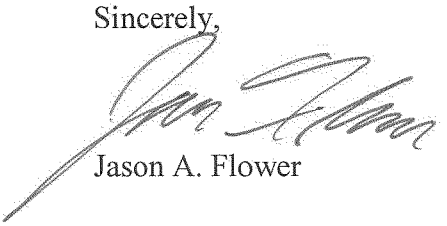
EPA's proposed rule is also extraordinarily lengthy and complex. First, the proposal spans 124 pages in the *Federal Register*. Second, the universe of relevant materials is far larger. As of Jan. 26, 2017, EPA has cross-referenced *824* documents in the index to the docket that total *87,814* more pages. Notably, since the publication of the proposed rule, EPA *added 320* documents that total *41,439* pages. While EPA released 12 of these documents on the agency website when it released the pre-publication version of the proposed rule on Dec. 2, 2016, those 12 documents comprise only 2,635 (3 percent) of the total universe of pages for review. Consequently, sharing these documents in advance of publication does not alleviate the need for the requested 120-day extension.

Expert analyses are required to evaluate many aspects of the proposed rule, especially the validity of the complex statistical model that EPA has used to generate a formula for determining financial assurance obligations, the appropriateness of the "credit" or reduction criteria EPA has proposed for its financial assurance formula, and the availability of financial instruments to satisfy the proposed requirements. Adding to these logistical difficulties, to date EPA has refused to publicly disseminate the tool the agency used to calculate the estimated financial responsibility obligations for the 49 facilities in the modeled universe. *See* Regulatory Impact Analysis, Exhibit B-9 (Dec. 1, 2016). This tool is the cornerstone of this proposed rulemaking and is required for a complete understanding of EPA's intentions regarding the mechanics of the formula and verifying the economic analysis. Failure to provide it at the beginning of the public comment period is grounds alone to extend the comment period.

For all of these reasons, EPA quite correctly has designated this rulemaking as a "Tier 1" rule—a category reserved for "the most important, complex, precedent setting and scrutinized rules." Declaration of Barnes Johnson ¶ 34 ("Johnson Decl."), *In re Idaho Conservation League*, No. 14-1149, Doc. #1523367 (Nov. 19, 2014). Yet EPA has provided only 60 days for public comment on this major proposal that establishes an entirely new federal regulatory program. EPA typically provides such a limited comment window only for noncontroversial proposals on revisions to existing programs that do not involve a significant number of background documents (if any).[1] By contrast, EPA typically affords the public significantly more time to comment on major proposed rulemakings like this one, and has often granted liberal extensions. For example, EPA provided the public with 165 days to comment on its Clean Power Plan rule to regulate carbon emissions from power plants, granting a 45-day extension to a 120-day initial comment period.[2] EPA also recently "solicited comments for over 200 days" on a rulemaking to redefine "waters of the United States" for purposes of the Clean Water Act.[3]

Certainly, far more than 60 days are required here to comment on a proposal that: (1) is built on tens of thousands of pages of background documents; (2) has as its centerpiece a brand new, complex statistical model for calculating financial assurance; and (3) will unquestionably impose many hundreds of millions of new costs annually on the hardrock and phosphate mining industry. EPA should therefore extend the comment period an additional 120 days until July 10, 2017, to allow for meaningful comment on its far-reaching proposal. While P4 Production understands that EPA is currently under a court order in the U.S. Court of Appeals for the District of Columbia Circuit to finalize a rule by Dec. 1, 2017, that negotiated deadline should not deny the regulated community the right to meaningful review and comment on this economically significant rulemaking. As EPA is well aware, the agency has the authority per the court order to extend or modify the deadline. *See* Order, *In re: Idaho Conservation League*, No. 14-1149 (Jan. 29, 2016).

Sincerely,



Jason A. Flower

---

[1] *See, e.g.*, Hazardous Waste Export-Import Revisions, 80 Fed. Reg. 63,284 (proposed Oct. 19, 2015) (providing 60 days for comment on proposed rule to update existing regulations concerning the import and export of hazardous wastes); Hazardous Waste Generator Improvements, 80 Fed. Reg. 57,918 (proposed Sept. 25, 2015) (providing 60 days for comment on a proposed rule to update existing hazardous waste generator regulations).

[2] Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,662, 64,707 (Oct. 23, 2015).

[3] Clean Water Rule: Definition of "Waters of the United States," 80 Fed. Reg. 37,054, 37,057 (Jun. 29, 2015).

To: Minoli, Kevin[Minoli.Kevin@epa.gov]; Schnare, David[schnare.david@epa.gov]
From: Benton, Donald
Sent: Fri 1/27/2017 8:57:03 PM
Subject: FW: Request for Extension
removed.txt
Extension Request to EPA January 26 2017.pdf

From: Cheryl Turner [mailto:cturner@hecla-mining.com]
Sent: Friday, January 27, 2017 11:55 AM
To: Benton, Donald <benton.donald@epa.gov>
Cc: Phillips S. Baker <pbaker@hecla-mining.com>; Paul Glader <pglader@hecla-mining.com>; Luke Russell <LRussell@hecla-mining.com>
Subject: Request for Extension

Mr. Benton,

Please see the attached letter from Luke Russell.

Best regards,

Cheryl Turner

Executive Assistant

Office: (208) 209-1261

Cell: Ex. 6 - Personal Phone

Hecla Limited | 6500 N. Mineral Dr., Suite 200 | Coeur d'Alene, ID 83815-9408

Hecla
MINING COMPANY

January 26, 2017

Mr. Donald Benton
White House Liaison
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue NW
Mail Code: 111A
Washington, DC 20460

Re: Request for 120-Day Extension of Comment Period Relating to Proposed "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," 82 Fed. Reg. 3388 (Jan. 11, 2017).

Dear Mr. Benton,

Hecla Mining Company (Hecla) seeks an extension of 120 additional days, or until July 10, 2017, to the 60-day public comment period currently established by EPA for its proposed rule, "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," which was published in the *Federal Register* on Jan. 11, 2017. *See* 82 Fed. Reg. 3388.

Hecla is the oldest NYSE-listed precious metals mining company and is a leading domestic producer of silver, lead, and zinc, and recently also a major supplier of gold. Hecla is a long-standing, important part of the communities where we live and work. We provide tremendous positive economic impacts to both the states of Idaho and Alaska. Hecla is the largest private-sector employer in Juneau, Alaska, and the second-largest private employer in Shoshone County, Idaho, contributing to a solid foundation for these economies. Hecla and its subsidiaries are responsible environmental stewards and we strive to minimize environmental effects and risk today and for future generations.

The 60-day comment period provided by EPA, which ends on March 13, 2017, is an unreasonably short period of time to review, evaluate, and prepare meaningful public comments on EPA's sweeping new regulatory proposal. EPA's proposed rule is a major rulemaking by any measure. EPA's Regulatory Impact Analysis estimates that the "financial responsibility amount for the regulated industry is $7.1 billion." 82 Fed. Reg. 3392. Based on EPA's own numbers, the proposed rule will require hardrock mining companies to incur up to $171 million *per year* in new financial assurance costs. The cost of compliance will likely lead to the loss of significant metals production and numerous jobs in the hardrock-mining sector.

6500 N. Mineral Drive, Suite 200 • Coeur d'Alene, Idaho 83815-9408 • 208.769.4100 • FAX 208.769.7612 • www.hecla-mining.com

EPA's proposed rule is also extraordinarily lengthy and complex. The proposal spans 124 pages in the *Federal Register*. Second, the universe of relevant materials is far larger. EPA has cross-referenced *708* documents in the index to the docket that total *75,593* additional pages. Notably, since the publication of the proposed rule, EPA *added 204* documents that total *29,218* pages. While EPA released 12 of these documents on the agency website when it released the pre-publication version of the proposed rule on Dec. 2, 2016, those 12 documents comprise only 2,635 (3.5 percent) of the total universe of pages for review. Consequently, sharing these documents in advance of publication does not alleviate the need for the requested 120-day extension.

Expert analyses are required to evaluate many aspects of the proposed rule, especially the validity of the complex statistical model that EPA has used to generate a formula for determining financial assurance obligations, the appropriateness of the "credit" or reduction criteria EPA has proposed for its financial assurance formula, and the availability of financial instruments to satisfy the proposed requirements. Troubling, to date EPA has refused to publicly disseminate the tool the agency used to calculate the estimated financial responsibility obligations for the 49 facilities in the modeled universe. *See* Regulatory Impact Analysis, Exhibit B-9 (Dec. 1, 2016). This tool is the cornerstone of this proposed rulemaking and is required for a complete understanding of EPA's intentions regarding the mechanics of the formula and verifying the economic analysis. Failure to provide it at the beginning of the public comment period is grounds alone to extend the comment period.

Certainly, far more than 60 days are required to comment on a proposal that: (1) is built on tens of thousands of pages of background documents; (2) has as its centerpiece a brand new, complex statistical model for calculating financial assurance; and (3) will unquestionably impose many hundreds of millions of new costs annually on the hardrock mining industry. EPA should therefore extend the comment period an additional 120 days until July 10, 2017, to allow for meaningful comment on its far-reaching proposal.

Sincerely,

Luke Russell
VP – External Affairs

6500 N. Mineral Drive, Suite 200 · Coeur d'Alene, Idaho 83815-9408 · 208.769.4100 · FAX 208.769.7612 · www.hecla-mining.com

To: Cheryl Turner[cturner@hecla-mining.com]
Cc: Phillips S. Baker[pbaker@hecla-mining.com]; Paul Glader[pglader@hecla-mining.com]; Luke Russell[LRussell@hecla-mining.com]; Minoli, Kevin[Minoli.Kevin@epa.gov]; Schnare, David[schnare.david@epa.gov]
From: Benton, Donald
Sent: Fri 1/27/2017 8:56:42 PM
Subject: RE: Request for Extension

Cheryl,

Thanks for your request. I am the Senior White House Advisor and your request should go to Acting Administrator Catherine McCabe.

I will forward your request to our office of General Counsel and my acting counsel, David Schnare, but please make the request of the Administrator.

Thank you,

Don

Don Benton

Senior White House Advisor

From: Cheryl Turner [mailto:cturner@hecla-mining.com]
Sent: Friday, January 27, 2017 11:55 AM
To: Benton, Donald <benton.donald@epa.gov>
Cc: Phillips S. Baker <pbaker@hecla-mining.com>; Paul Glader <pglader@hecla-mining.com>; Luke Russell <LRussell@hecla-mining.com>
Subject: Request for Extension

Mr. Benton,

Please see the attached letter from Luke Russell.

Best regards,

Cheryl Turner

Executive Assistant

Office: (208) 209-1261

Cell: Ex. 6 - Personal Phone

Hecla Limited | 6500 N. Mineral Dr., Suite 200 | Coeur d'Alene, ID 83815-9408

To: Benton, Donald[benton.donald@epa.gov]; Mccabe, Catherine[McCabe.Catherine@epa.gov]; Minoli, Kevin[Minoli.Kevin@epa.gov]
From: Payne, Kelly (HSE)
Sent: Fri 1/27/2017 6:17:30 PM
Subject: Request for 120-Day Extension of Comment Period Relating to Proposed "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry,"
20170127CERCLA108b_RequestCommentPeriodExtension_RioTinto_Final.pdf

Dear Mr. Benton, Ms. McCabe and Mr. Minoli:

Please see attached letter.

Regards,

Kelly Payne

Principal Advisor – Group Environment

Rio Tinto

4700 Daybreak Parkway, South Jordan, Utah, USA 84009

T: +1 801 569 7128 M: Ex. 6 - Personal Phone

kelly.payne@riotinto.com http://www.riotinto.com

Rio Tinto Health, Safety & Environment
4700 Daybreak Parkway
South Jordan, Utah 84009

January 27, 2017

Mr. Donald Benton
White House Liaison
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 1101A
Washington, DC 20460
By Electronic Delivery Benton.donald@Epa.gov

Ms. Catherine McCabe
EPA Acting Administrator
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 1101A
Washington, DC 20460
By Electronic Delivery McCabe.catherine@Epa.gov

Mr. Kevin Minoli
EPA Acting General Counsel
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 2355A
Washington, DC 20460
By Electronic Delivery Minoli.kevin@Epa.gov

Subject: Request for 120-Day Extension of Comment Period Relating to Proposed "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," 82 Fed. Reg. 3388 (Jan. 11, 2017).

Dear Mr. Benton, Ms. McCabe and Mr. Minoli:

I write on behalf of Rio Tinto to seek an extension of 120 additional days, or until July 10, 2017, to the 60-day public comment period currently established by EPA for its proposed rule, "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," which was published in the Federal Register on Jan. 11, 2017. See 82 Fed. Reg. 3388.

Rio Tinto is a leading mining and metals company with operations around the world. In the US, our operations have pioneered many aspects of modern mining and have provided essential materials to US manufacturers for over 100 years.

Our hard rock mining and processing operations in the United States include:

- Kennecott Utah Copper—a producer of copper, gold, silver, and molybdenum from an open pit mine with an integrated concentrator, smelter, and refinery located near Salt Lake City, Utah.

- Rio Tinto Borates—operator of an open pit mine and refining facilities in Boron, California which supplies nearly half the world's demand for refined borates.

- Resolution Copper Company—a prospective underground copper mine in Superior, Arizona that has the potential to supply nearly a quarter of US refined copper demand.

In addition, Rio Tinto has a number of US exploration projects, and has successfully closed and reclaimed mines in Wisconsin, Utah, Nevada, and South Carolina.

We have made clear in comments submitted previously and in numerous face to face meetings with both EPA management and the rule writing team that we strongly believe EPA has grossly mischaracterized the degree and duration of risk posed by our facilities and our industry. We operate under numerous, mature, and effective regulatory programs that obviate the need to undertake rulemaking under CERCLA § 108(b) targeting hard rock mining. After initial review of the rule and some of the supporting material, we continue to hold that EPA has failed to make a credible, fact-based finding that this rule is necessary.

Nevertheless, we now find ourselves looking at a proposed rule that is extraordinarily lengthy and complex. First, the proposal spans 124 pages in the Federal Register. Second, the universe of relevant materials is far larger. As of Jan. 26, 2017, EPA has cross-referenced 824 documents in the index to the docket that total 87,814 more pages. Notably, since the publication of the proposed rule, EPA added 320 documents that total 41,439 pages. While EPA released 12 of these documents on the agency website when it released the pre-publication version of the proposed rule on Dec. 2, 2016, those 12 documents comprise only 2,635 (3 percent) of the total universe of pages for review. Consequently, sharing these documents in advance of publication does not alleviate the need for the requested 120-day extension.

The 60-day comment period provided by EPA, which ends on March 13, 2017, is an unreasonably short period for Rio Tinto or any interested party to review, evaluate, and prepare meaningful public comments on this sweeping new regulatory proposal.

The proposed rule is a major rulemaking by any measure. EPA's Regulatory Impact Analysis estimates that the "financial responsibility amount for the regulated industry is $7.1 billion." 82 Fed. Reg. 3392. Based on EPA's own numbers, the proposed rule will require hardrock mining companies to incur up to $171 million per year in new financial assurance costs. Id. at 3440. Preliminary analysis by Rio Tinto indicates that this estimate is far too low, and that the cost of compliance is an undue financial burden on our industry.

Expert analyses are required to evaluate many aspects of the proposed rule, especially the validity of the complex statistical model that EPA has used to generate a formula for determining financial assurance obligations, the appropriateness of the "credit" or reduction criteria EPA has proposed for its financial assurance formula, and the availability of financial instruments to satisfy the proposed requirements. EPA has refused, and continues to refuse, to publicly disseminate the tool the agency used to calculate the estimated financial responsibility obligations for the 49 facilities in the modeled universe. See Regulatory Impact Analysis, Exhibit B-9 (December 1, 2016). For Rio Tinto to appropriately calculate the impact of this rule on our US facilities, this tool is the cornerstone of this proposed rulemaking and is

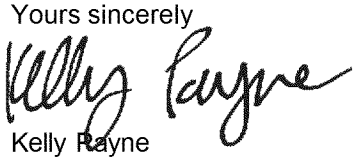
RioTinto

required for a complete understanding of EPA's intentions regarding the mechanics of the formula and verifying the economic analysis. Failure to provide it at the beginning of the public comment period is grounds alone to extend the comment period.

For all of these reasons, EPA quite correctly has designated this rulemaking as a "Tier 1" rule—a category reserved for "the most important, complex, precedent setting and scrutinized rules." Declaration of Barnes Johnson ¶ 34 ("Johnson Decl."), In re Idaho Conservation League, No. 14-1149, Doc. #1523367 (Nov. 19, 2014). Yet EPA has provided only 60 days for public comment on this major proposal that establishes an entirely new federal regulatory program. EPA typically provides such a limited comment window only for noncontroversial proposals on revisions to existing programs that do not involve a significant number of background documents (if any). [1] By contrast, EPA typically affords the public significantly more time to comment on major proposed rulemakings like this one, and has often granted liberal extensions. For example, EPA provided the public with 165 days to comment on its Clean Power Plan rule to regulate carbon emissions from power plants, granting a 45-day extension to a 120-day initial comment period. [2] EPA also recently "solicited comments for over 200 days" on a rulemaking to redefine "waters of the United States" for purposes of the Clean Water Act. [3]

Certainly, far more than 60 days are required here to comment on a proposal that: (1) has a controversial and poorly-is built on tens of thousands of pages of background documents; (2) has as its centerpiece a brand new, complex statistical model for calculating financial assurance; and (3) will unquestionably impose many hundreds of millions of new costs annually on the hardrock mining industry. EPA should therefore extend the comment period an additional 120 days until July 10, 2017, to allow for meaningful comment on its far-reaching proposal. While Rio Tinto understands that EPA is currently under a court order in the U.S. Court of Appeals for the District of Columbia Circuit to finalize a rule by Dec. 1, 2017, that negotiated deadline should not deny the regulated community the right to meaningful review and comment on this economically significant rulemaking. As EPA is well aware, the agency has the authority per the court order to extend or modify the deadline. See Order, In re: Idaho Conservation League, No. 14-1149 (Jan. 29, 2016).

Yours sincerely



Kelly Rayne
Principal Advisor – Group Environment & Closure

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[1] *See, e.g.*, Hazardous Waste Export-Import Revisions, 80 Fed. Reg. 63,284 (proposed Oct. 19, 2015) (providing 60 days for comment on proposed rule to update existing regulations concerning the import and export of hazardous wastes); Hazardous Waste Generator Improvements, 80 Fed. Reg. 57,918 (proposed Sept. 25, 2015) (providing 60 days for comment on a proposed rule to update existing hazardous waste generator regulations).

[2] Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,662, 64,707 (Oct. 23, 2015).

[3] Clean Water Rule: Definition of "Waters of the United States," 80 Fed. Reg. 37,054, 37,057 (Jun. 29, 2015).

ED_001780B_00018201-00003

To: Minoli, Kevin[Minoli.Kevin@epa.gov]
Cc: Schnare, David[schnare.david@epa.gov]
From: Benton, Donald
Sent: Fri 1/27/2017 5:35:48 PM
Subject: FW: Request for Extension of Comment Period - EPA Rule Published at 82 Fed. Reg. 3388
KGUSA 2017 01 27 EPA 108(b).pdf

From: Greg Etter [mailto:Greg.Etter@Kinross.com]
Sent: Friday, January 27, 2017 12:29 PM
To: Benton, Donald <benton.donald@epa.gov>; Mccabe, Catherine <McCabe.Catherine@epa.gov>; Minoli, Kevin <Minoli.Kevin@epa.gov>
Subject: RE: Request for Extension of Comment Period - EPA Rule Published at 82 Fed. Reg. 3388

Please replace prior attachment with this attachment, and delete and destroy prior attachment. It was sent in error. Apologies.

From: Greg Etter
Sent: Friday, January 27, 2017 11:16 AM
To: Benton.donald@Epa.gov; McCabe.catherine@Epa.gov; Minoli.kevin@Epa.gov.
Subject: Request for Extension of Comment Period - EPA Rule Published at 82 Fed. Reg. 3388

Please see the attached.

Thank you.

Greg V. Etter

KINROSS

KINROSS

Kinross Gold USA, Inc.
A Kinross company

5075 S. Syracuse Street, 8th Floor
Denver, Colorado 80111

January 27, 2017

Via email

Mr. Donald Benton
White House Liaison
U.S. Environmental Protection Agency

Ms. Catherine McCabe
EPA Acting Administrator
U.S. Environmental Protection Agency

Mr. Kevin Minoli
EPA Acting General Counsel
U.S. Environmental Protection Agency

Re: Request for 120-Day Extension of Comment Period Relating to Proposed "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," 82 Fed. Reg. 3388 (Jan. 11, 2017).

Dear Ms. McCabe and Messrs. Benton and Minoli:

I write to respectfully seek an extension of 120 additional days to the 60-day public comment period established by EPA for its proposed rule entitled *Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry*. Kinross Gold U.S.A., Inc. ("KGUSA") or its subsidiaries operate hardrock mines in multiple western States. KGUSA is also a member of the National Mining Association and other associations that plan to comment upon the proposed rule.

In our view, the comment period provided by EPA is an unreasonably short period of time in which to prepare meaningful comments. The proposed rule is extraordinarily lengthy and complex and contains a complicated statistical model that must be fully analyzed as a prerequisite to commenting intelligently.

Thank you for your time and attention.

Sincerely,

Greg V. Etter
President

To: Mccabe, Catherine[McCabe.Catherine@epa.gov]; Minoli, Kevin[Minoli.Kevin@epa.gov]
Cc: Benton, Donald[benton.donald@epa.gov]; tbridgeford@nma.org[tbridgeford@nma.org]; Dana Bennett (dana@nevadamining.org)[dana@nevadamining.org]; Laura Skaer (lskaer@miningamerica.org)[lskaer@miningamerica.org]
From: Tim Dyhr
Sent: Thur 1/26/2017 11:42:17 PM
Subject: Request for 120-Day Extension of Comment Period Relating to Proposed ???Financial Responsibility Requirements Under CERCLA ?? 108(b)
NevadaCopper-CERCLA108(b)DraftRule-ReqForExtension20170125tmd.pdf

Find attached our request for a 120-Day Extension of Comment Period Relating to Proposed "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," 82 Fed. Reg. 3388 (Jan. 11, 2017).

This letter was sent earlier today to Mr. Benton.

Tim

Timothy M. Dyhr

Vice President, Environment & External Relations

Pumpkin Hollow Office: 775-463-3510

Cell Direct: Ex. 6 - Personal phone

E-mail: tdyhr@nevadacopper.com

Mail to:

P.O. Box 1640

Yerington, NV 89447

Deliver to:

61 E Pursel Lane

Yerington, NV 89447

www.pumpkinhollowcopper.com

https://www.facebook.com/miningRbusiness

www.nevadacopper.com

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Pumpkin Hollow Project

January 25, 2017

Donald Benton (Benton.Donald@EPA.Gov)
White House Liaison
Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Ave., NW
Mail Code: 1101A
Washington, DC 20460

Re: Request for 120-Day Extension of Comment Period Relating to Proposed "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," 82 Fed. Reg. 3388 (Jan. 11, 2017).

Dear Mr. Benton:

I write on behalf of the Nevada Copper Inc., a mine developer. We respectfully request an extension of 120 additional days, or until July 10, 2017, to the 60-day public comment period currently established by EPA for its proposal, "Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry," which was published in the Federal Register on January 11, 2017. See 82 Fed. Reg. 3388 (Jan. 11, 2017).

Nevada Copper, Inc., a Nevada company ("Nevada Copper" or the "Company"), a wholly owned subsidiary of Nevada Copper Corp. is an approved Small Entity Representative (SER).

Nevada Copper owns 100% of the Pumpkin Hollow Copper Development Property located in Lyon County, Nevada, United States. Pumpkin Hollow is a large advanced stage development copper property with substantial reserves and resources including copper, gold, silver, as well as a large iron resource. Nevada Copper has been working on development of the Pumpkin Hollow Project since 2006. Since then, the company has been able to secure all necessary permits to build the mine.

Recently the City of Yerington, Lyon County and the Company collaborated to acquire 10,000 acres of federal land to facilitate and expedite development. As a result, Pumpkin Hollow is entirely on private land regulated by the Nevada Division of Environmental Protection. This also allowed the City of Yerington to annex the project into the City so that it could receive a portion of property and net proceeds of mines taxes. It also affords the City and the Company the opportunity to partner to integrate infrastructure and additional industrial, commercial and recreational development on this large parcel.

Since 2006 the company has invested over $100 million to explore and delineate the mineral resource, conduct engineering design, much of which is focused on environmental controls, secure permits and develop an environmental management plan to comply with all applicable local, state and federal permit requirements and regulatory standards. Included in the permit process was a detailed calculation of financial assurance for closure; reclamation; demolition of facilities no

■ Delivery: 61 E Pursel Lane ■ U.S. Mail: P.O. Box 1640 ■ Yerington ■ Nevada ■ 89447
Telephone: (775) 463-3510 ■ Facsimile: (775) 463-4130
Tim Dyhr (Cell): Ex. 6 - Personal Phone ■ E-mail: tdyhr@nevadacopper.com ■ Facsimile: (775)-463-4130

longer needed for mining and not converted to another post-mining land use; removal and disposal of all chemicals and hazardous materials; and post-closure site management and monitoring.

One of the most difficult aspects of mine development is the time and effort to comply with various federal, state and local regulatory requirements. Recently the Company compiled all the different regulatory requirements it needs to meet into a summary table for the City of Yerington to assure them that every aspect of the project is subject to numerous state and federal standards. need to be addressed in the Nevada Water Pollution Control Permit (WPCP) needed to prtect surface and ground water and control hazardous materials; a Reclamation Permit (including detailed calculations for and posting of financial assurance for *both* reclamation and removal and proper disposal of hazardous materials); Air Pollution Control Permit (including estimates of all chemical and hazardous emissions, and appropriate controls to meet National Ambient Air Quality Standards); Spill Prevention, Countermeasures and Control Plan (SPCC), Stormwater Pollution Prevention Plan (SWPP) and a Nevada Hazardous Materials Permit that must quantify and manage hazardous materials stored on site; notification of fire service workers as to quantities and locations of hazardous materials; collection of Safety Data Sheet (SDS) for all products stored on property; utilization of SDS to determine all hazardous components in all products stored on property; maintenance of an updated inventory of all products on site; updating online database with complete listing of all hazardous materials from all products on property; and including coordinates of locations of all products.

In particular, note the extensive requirements in the Reclamation Permit for calculation of the financial assurance for removal, disposal, demolition, stabilization, long term process fluid management and reclamation of the site. All of these actions and associated financial assurance are required to assure that the mine site does not cause pollution to air, water and land. The actions required by all these permits are intended to assure that the risks or release of pollutant's, chemicals or hazardous materials are eliminated or reduced and if they are not, sufficient financial assurance is in place to address them. Our mining operation is engineered and designed to eliminate or prevent release to the environment, as noted in the myriad of regulatory programs and standards listed above.

Nevada Copper has actively participated in the rulemaking process as a SER. Prior to publication of the draft rule, we found that there was not sufficient information to evaluate the effect of the rule. Now we are being asked to review 124 pages in the Federal Register, more than 2,000 additional pages of background documents, and 75,000 more pages relevant materials EPA has cross-referenced in additional documents in the index to the docket that now. Most importantly, we now must evaluate many aspects the validity of the complex statistical model that EPA has used to generate a formula for determining financial assurance obligations, the appropriateness of the credit criteria EPA has proposed for its financial assurance formula, and the availability of financial instruments to satisfy the proposed requirements.

As a mine developer, with no income yet, we have limited resources to fully evaluate the published rule in 60 days. This places and additional and unnecessary strain on our Company.

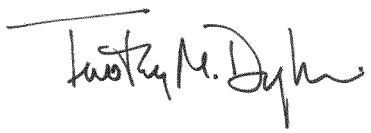
Nevada Copper has previously commented and inquired what specific aspects of our operation are not addressed? Specifically:

- Where are the gaps? Why are existing federal and state programs insufficient to address the concerns?
- EPA has not provided a detailed analysis of any conflicts in the proposed rule with state programs;
- Where are mining sites that EPA refers to justify the need for these financial assurance requirements? Were they subject to the same standards as our project or any other current active project? EPA should identify all specific projects that are subject to current regulatory and financial assurance requirements that have caused environmental damage or are high risk and why they are high risk.
- EPA has stated that the need for the rulemaking based on the "degree and duration of risk associated with the production, transportation, treatment, storage, or disposal of hazardous substances." Yet all the programs mining companies and other numerous state and federal regulators have provided to EPA as part of this review process are specially intended to eliminate and reduce risks. We do not believe that EPA has adequately consdiered these programs in their analysis to date.
- In EPA's "Identification of Priority Classes of Facilities for Development of CERCLA Section 108(b) Financial Responsibility Requirements; Priority Notice of Action" it cites a number of factors for the need for a rule. Yet every one of these is addressed by other state and federal programs. Again it is necessary for EPA to identify specifically and in detail here these existing programs do not address the potential and risk of *actual release* and not just the presence of these materials.

Due to a number of factors, including the significant efforts required to obtain permits and significant financial commitment, including and not limited to existing financial assurance requirements, and market conditions the project is still seeking financing, after almost 10 years of design and development work, to build it. For a company at this stage, all the regulatory obligations represent significant barriers to development and a major commitment of time and resources.

After 10 years of planning and 10's of thousands of man-hours to design a mine that meets all regulatory standards, we still have 2-5 years before the project will earn its first penny! Needless to say, developing a mine is a very arduous, complex and time-consuming process. Clearly, any new regulation and particularly this regulation would unnecessarily put a "significant economic impact" and burden on Nevada Copper and other small entities attempting to develop a mine.

Sincerely,

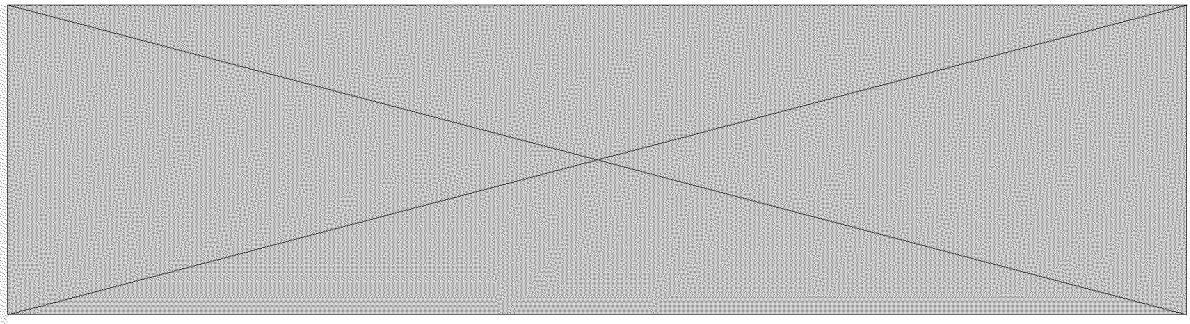


Timothy M. Dyhr

Vice President, Environment & External Relations
Nevada Copper Corp., Pumpkin Hollow Project

Cc: Barry Breen, Acting Assistant Administrator, EPA Office of Land and Emergency Management

To: Farber, Glenn[Farber.Glenn@epa.gov]
From: Small Business Administration
Sent: Thur 1/26/2017 5:39:22 PM
Subject: Advocacy Comment Letter on EPA's Proposed Hardrock Mining Financial Responsibility Rule



EPA's Proposed Hardrock Mining Financial Responsibility Rule

On January 11, 2017, EPA issued a proposed rule requiring development of financial responsibility instruments to provide coverage for potential liabilities for releases of hazardous substances from hardrock mines. On January 19, 2017, the Office of Advocacy (Advocacy) filed a comment letter requesting that EPA withdraw the proposal. The letter to EPA may be accessed at: https://www.sba.gov/advocacy/01-19-2017-financial-responsibility-requirements-hardrock-mining-industry-docket-id-epa-hq.

- Section 108(b) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 directs EPA to develop requirements for classes of facilities to establish evidence of financial responsibility for risks associated with the production, transportation, treatment, storage, or disposal of hazardous substances. EPA's proposal addresses only the hardrock mining industry with respect to this requirement.

- In Advocacy's view, however, these small mines are already highly regulated by robust state and Federal programs. Advocacy, the small business mining community and mining regulators believe that these programs effectively address the same issues at modern small mines. The office finds no significant evidence of a problem warranting federal regulation.

- EPA proposed this rule based upon a contrary belief that the existing state and Federal programs would not adequately address future CERCLA liabilities.

- Under the Regulatory Flexibility Act (RFA), EPA recognized that the rule will have a significant economic impact on a substantial number of small businesses. Consequently, a SBREFA panel was convened to examine and consider alternatives to

minimize the impacts on small businesses. The panel report is found at https://www.epa.gov/reg-flex/sbar-panel-cercla-108b-hard-rock-mining-financial-assurance-proposed-rule.

Based on information from the SBREFA panel and the rulemaking record, Advocacy is concerned that this rule would result in substantial costs for small businesses without significant environmental benefits. Advocacy urges EPA to withdraw this proposed rule.

For more information, visit Advocacy's website at http://www.sba.gov/advocacy, or contact Assistant Chief Counsel Kevin Bromberg by email at kevin.bromberg@sba.gov or by phone at 202-205-6964.

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This email was sent to farber.glenn@epa.gov by Small Business Administration (SBA) · 409 3rd St, SW · Washington DC 20416 · 1-800-827-5722

To: Farber, Glenn[Farber.Glenn@epa.gov]; Jenkins, Robin[Jenkins.Robin@epa.gov]
Cc: Corrales, Mark[Corrales.Mark@epa.gov]; Nickerson, William[Nickerson.William@epa.gov]; Rees, Sarah[rees.sarah@epa.gov]
From: Miles-McLean, Stuart
Sent: Mon 5/1/2017 4:34:38 PM
Subject: Greenwire, 04/28: Sandoval asks Pruitt to ice mine bonding rule

SUPERFUND

Sandoval asks Pruitt to ice mine bonding rule

Dylan Brown, E&E News reporter

Published: Friday, April 28, 2017

Nevada Gov. Brian Sandoval is pressing U.S. EPA to heed the concerns of his state and others about proposed changes to Superfund insurance requirements for hardrock mining.

The Republican, who represents a state deeply reliant on non-coal mining, met with EPA Administrator Scott Pruitt this week about various environmental issues.

And in a follow-up letter, the governor reiterated objections to the agency's proposed hardrock mining financial assurance requirements.

As part of a federal court order, EPA has until Dec. 1 to finalize the guidelines meant to protect taxpayers from having to foot the bill for cleaning up hardrock mining pollution.

In 2015, environmentalists convinced the U.S. Court of Appeals for the District of Columbia Circuit that EPA must act pursuant to Section 108(b) of the Superfund law — the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

EPA published a proposed rule last December, meeting a previous court deadline, and is now working toward finalizing it in the next seven months (*E&E News PM*, Jan. 11).

Sandoval's concerns echoed those of the mining industry, which has argued hundreds of millions of dollars in compliance costs won't result in any added benefit for taxpayers.

"The proposed EPA rule would duplicate these federal and state protections, and could even preempt our state program entirely," Sandoval wrote.

Nevada, which was the first state to adopt cleanup and financial assurance requirements in 1989, has also joined other states in complaining that EPA did not adequately consult them.

"There is still time for EPA to hear and act on these concerns, and I urge EPA to take the opportunity," Sandoval wrote. "Now is the time for EPA to consider whether the CERCLA financial assurance rule is really necessary for this industry."

Sandoval said he appreciated the "working relationship" he is developing with the new EPA.

"Gov. Sandoval and the people of Nevada are our partners, who know Nevada's environmental needs better than we do here in Washington," Pruitt said at Tuesday's meeting. "We will consult and meet with them often as we make decisions that impact their land, air and water."

To: Palmer, Scott[Palmer.Scott@epa.gov]
Cc: Foster, Barbara[Foster.Barbara@epa.gov]; Krueger, Anna[Krueger.Anna@epa.gov]
From: Pease, Michael
Sent: Wed 8/16/2017 9:27:11 PM
Subject: Re: Quick Question on Corr Action FA

Thanks for the additional information - that extra insight is helpful. How about the following? (note: the first paragraph is from the EPA website and is limited to RCRA

Ex. 5 - Deliberative Process

The Resource Conservation and Recovery Act (RCRA) requires all hazardous waste treatment, storage and disposal facilities (TSDFs) to demonstrate that they will have the financial resources to properly close the facility or unit when its operational life is over, or provide the appropriate emergency response in the case of an accidental release. These requirements place the costs of cleanups on owner/operators rather than taxpayers. Additionally, all owners and operators of hazardous waste TSDFs are required to maintain accident liability insurance during the active life of their hazardous waste management units or facilities. This liability coverage ensures that sufficient money will be available to compensate third-parties that are either physically harmed or have property damaged by an accidental release of hazardous constituents from a hazardous waste TSDF.

Ex. 5 - Deliberative Process

From: Palmer, Scott
Sent: Wednesday, August 16, 2017 5:07 PM
To: Pease, Michael
Cc: Foster, Barbara; Krueger, Anna
Subject: RE: Quick Question on Corr Action FA

Ex. 5 - Deliberative Process

Risks: *This description should include, if applicable, how the size of the risk addressed by the action (108b HRM in our case) relates to other risks within EPA's jurisdiction. You should include a description of the size of the risk the action addresses, the amount by which we expect the action to reduce this risk, and the relation of the risk and this risk reduction effort to other risk and risk reduction efforts within EPA's jurisdiction.*

Ex. 5 - Deliberative Process

Just an idea – I'll be working on this remotely to get it finished on Monday, and we can circle back with ideas…

Thx, Scott

From: Pease, Michael
Sent: Wednesday, August 16, 2017 3:38 PM
To: Palmer, Scott <Palmer.Scott@epa.gov>
Cc: Krueger, Anna <Krueger.Anna@epa.gov>; Foster, Barbara <Foster.Barbara@epa.gov>
Subject: Re: Quick Question on Corr Action FA

Hmm... this is an interesting and very open-ended request and I would be interested in any more details as well as their thinking in asking this if you have any other insights.

Ex. 5 - Deliberative Process

Ex. 5 - Deliberative Process

Any additional information you may be able to share would be very helpful. Thanks!

I am cc'ing Barbara too as she is officially the CA FA ORCR contact.

From: Palmer, Scott
Sent: Wednesday, August 16, 2017 2:16:17 PM
To: Pease, Michael
Subject: Quick Question on Corr Action FA

Hi Mike / Anna, Hope you are having a fun trip. I'm working on the Reg Plan and answering some questions from the OLEM AA's office.

Ex. 5 - Deliberative Process

Thx

To: Pease, Michael[pease.michael@epa.gov]
Cc: Foster, Barbara[Foster.Barbara@epa.gov]; Krueger, Anna[Krueger.Anna@epa.gov]
From: Palmer, Scott
Sent: Wed 8/16/2017 9:07:05 PM
Subject: RE: Quick Question on Corr Action FA

Hey Mike, Barbara and I talked and she did get where I was coming from. I've pasted in the exact question below for you to see. These question are not rule-specific and are required regardless of the topic/focus. But seeing the actual question might help you more context.

Risks: *This description should include, if applicable, how the size of the risk addressed by the action (108b HRM in our case) relates to other risks within EPA's jurisdiction. You should include a description of the size of the risk the action addresses, the amount by which we expect the action to reduce this risk, and the relation of the risk and this risk reduction effort to other risk and risk reduction efforts within EPA's jurisdiction.*

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To: Palmer, Scott <Palmer.Scott@epa.gov>
Cc: Krueger, Anna <Krueger.Anna@epa.gov>; Foster, Barbara <Foster.Barbara@epa.gov>
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To: Pease, Michael
Subject: Quick Question on Corr Action FA

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Ex. 5 - Deliberative Process

Thx

To: Mooney, Charlotte[Mooney.Charlotte@epa.gov]
Cc: Foster, Barbara[Foster.Barbara@epa.gov]; Vyas, Peggy[Vyas.Peggy@epa.gov]; Kline, Bill[Kline.Bill@epa.gov]; McMinimy, Chris[McMinimy.Chris@epa.gov]; Horton, Rachel[Horton.Rachel@epa.gov]; Sasseville, Sonya[Sasseville.Sonya@epa.gov]; Huff, Mark J[huff.markj@epa.gov]
From: Palmer, Scott
Sent: Mon 6/12/2017 8:40:29 PM
Subject: Files that help Summarize Prior Analyses that were Conducted for 108(b) Additional Classes
NAICS 324 and 325 bullets - summary of work as of 3-15-13 AN rev.docx
9-8-11-One Pager - Data & Analysis for Add Sectors_w ScottEdits-csh.docx
Rule Deadlines 1.docx

Charlotte, Per our discussions on Friday, and your efforts related to the Reg. Agenda,

Ex. 5 - Deliberative Process

Ex. 5 - Deliberative Process

Thanks, Scott

DEADLINES

Signature	Hardrock Mining	Class 1	Class 2	Class 3
Proposal	December 1, 2016	July 2, 2019	December 4, 2019	December 1, 2022
Final	December 1, 2017	December 2, 2020	December 1, 2021	December 4, 2024

To: Palmer, Scott[Palmer.Scott@epa.gov]
Cc: Krueger, Anna[Krueger.Anna@epa.gov]; Foster, Barbara[Foster.Barbara@epa.gov]
From: Pease, Michael
Sent: Wed 8/16/2017 7:37:36 PM
Subject: Re: Quick Question on Corr Action FA

Hmm... this is an interesting and very open-ended request and I would be interested in any more details as well as their thinking in asking this if you have any other insights.

Ex. 5 - Deliberative Process

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Subject: Quick Question on Corr Action FA

Hi Mike / Anna, Hope you are having a fun trip. I'm working on the Reg Plan and answering some questions from the OLEM AA's office.

Ex. 5 - Deliberative Process

Thx

To: Huff, Mark J[huff.markj@epa.gov]
Cc: Sasseville, Sonya[Sasseville.Sonya@epa.gov]; Foster, Barbara[Foster.Barbara@epa.gov]; Mooney, Charlotte[Mooney.Charlotte@epa.gov]
From: Palmer, Scott
Sent: Wed 6/7/2017 10:48:23 PM
Subject: RE: Request for info. regarding proposed project to conduct a Pilot Hardrock Mining Analyses to help make improvements to the formula
Reconciliation of FY17 ORCR Op Plan and Early Projection of FY18 Funding Needs.docx

Hi Mark,

Thanks for confirming this. That's as I expected. I would certainly know if I or one of the team

Ex. 5 - Deliberative Process This $101K project just somehow showed up in your list, but had never

Ex. 5 - Deliberative Process

I wanted you and Sonya to have this before we meet tomorrow. I'm going to get this out to the team in the morning so they can give me their feedback as well.

Thx again, Scott

From: Huff, Mark J
Sent: Wednesday, June 07, 2017 1:56 PM
To: Palmer, Scott <Palmer.Scott@epa.gov>
Cc: Shimeles, Taetaye <Shimeles.Taetaye@epa.gov>; Maid, Scott <Maid.Scott@epa.gov>; Foster, Barbara <Foster.Barbara@epa.gov>; Benware, Richard <Benware.Richard@epa.gov>
Subject: RE: Request for info. regarding proposed project to conduct a Pilot Hardrock Mining Analyses to help make improvements to the formula

Ex. 5 - Deliberative Process

Thanks!

Ex. 5 - Deliberative Process

Ex. 5 - Deliberative Process

From: Palmer, Scott
Sent: Wednesday, June 07, 2017 1:28 PM
To: Benware, Richard <Benware.Richard@epa.gov>
Cc: Shimeles, Taetaye <Shimeles.Taetaye@epa.gov>; Maid, Scott <Maid.Scott@epa.gov>; Foster, Barbara <Foster.Barbara@epa.gov>; Huff, Mark J <huff.markj@epa.gov>
Subject: Request for info. regarding proposed project to conduct a Pilot Hardrock Mining Analyses to help make improvements to the formula

Ex. 5 - Deliberative Process

Thx, Scott

To: Foster, Barbara[Foster.Barbara@epa.gov]; Huff, Mark J[huff.markj@epa.gov]; Stachowiak, Robert[Stachowiak.Robert@epa.gov]
Cc: Johnson, Barnes[Johnson.Barnes@epa.gov]; Radtke, Meghan[Radtke.Meghan@epa.gov]; Sasseville, Sonya[Sasseville.Sonya@epa.gov]; Huggins, Richard[Huggins.Richard@epa.gov]
From: Huggins, Richard
Sent: Tue 7/11/2017 5:33:59 PM
Subject: FW: Nevada DEP Comments on Proposed CERCLA 108(b) Rulemaking
NV DEP Cover Letter CERCLA 108b Comments.pdf
NDEP Cercla 108b Support Document.pdf

Richard Huggins Jr.

Senior Special Assistant

Office of Resource Conservation and Recovery

U.S. Environmental Protection Agency

Desk: 703-308-0017 iPhone: **Ex. 6 - Personal Phone**

From: Greg Lovato [mailto:glovato@ndep.nv.gov]
Sent: Tuesday, July 11, 2017 12:56 PM
To: Sasseville, Sonya <Sasseville.Sonya@epa.gov>
Cc: Wagner, Kenneth <wagner.kenneth@epa.gov>; Johnson, Barnes <Johnson.Barnes@epa.gov>; Strauss, Alexis <Strauss.Alexis@epa.gov>
Subject: Nevada DEP Comments on Proposed CERCLA 108(b) Rulemaking

Ms. Sasseville,

Please find attached a copy of the Nevada Division Environmental Protection (NDEP) comments on the proposed financial responsibility rule for hardrock mines. I have also submitted them to the EPA-HQ-SFUND-2015-0781 rulemaking docket at regulations.gov.

We appreciate the extra time afforded by EPA to comment on this complex rulemaking. I think we have used the time well by explaining in detail how Nevada regulates modern hardrock mining.

As your team reviews the attached cover letter and support document, please feel free to reach out to NDEP if you have any questions on our comments or would like to discuss.

Thank you,

Greg

Greg Lovato, Administrator

NV Division of Environmental Protection

P: 775-687-9373

E: glovato@ndep.nv.gov

NEVADA DIVISION OF
ENVIRONMENTAL
PROTECTION

NEVADA DIVISION OF
ENVIRONMENTAL PROTECTION

STATE OF NEVADA
Department of Conservation & Natural Resources
Brian Sandoval, Governor
Bradley Crowell, Director
Greg Lovato, Administrator

Comment Support Document

Nevada DEP Response to Proposed CERCLA 108(b) Rulemaking

July 10, 2017

Nevada DEP Response to Proposed CERCLA 108(b) Rulemaking

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SUMMARY TABLE OF CITATIONS FROM NEVADA PERMITS, REGULATIONS, AND GUIDANCE DOCUMENTS THAT ADDRESS EACH PROPOSED RULE RESPONSE CATEGORY

The following table is a crosswalk between each of the thirteen response categories and associated technical criteria listed in the proposed rule (see proposed 40 CFR 320.63(a) at 82 Fed. Reg. 3505 and 40 CFR 320.63(d) at 82 Fed. Reg. 3506 through 3509) and the regulatory structure of the Nevada mining regulatory programs. Several of the technical criteria for each of the response categories are addressed in either or both the Nevada mine water pollution control permitting program (Nevada Administrative Code [NAC] 445A. 350 et. seq.) and the Nevada mine reclamation financial assurance program (NAC 519A). Where provided for in the NAC and warranted based on program experience, NDEP outlines specific requirements in generic Water Pollution Control and Reclamation Permit template documents and additional guidance documents and procedures.

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
RESPONSE CATEGORY 1—OPEN PIT MINING [Proposed 40 CFR 320.63(a)(i)]			
(i) SAFETY AND PREVENTION OF PUBLIC ACCESS TO OPEN PITS	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.447 Reclamation NAC 519A.260.1 NAC 519A.270.16 NAC 519A.345.9(c) NAC 519A.315 Other NAC 513.390	Regulation and Closure Not Applicable Reclamation SRCE Program Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(ii) PREVENTION OF PONDING WITHIN OPEN PITS	Regulation and Closure WPCP Part I.I.	Regulation and Closure NAC 445A.359 NAC 445A.378	Regulation and Closure

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
		NAC 445A.429 NAC 445A.433 NAC 445A.447	Pit Lake Water Quality Characterization Program – NDEP Profile III
	Reclamation Not Applicable	Reclamation NAC 519A.190 NAC 519A.205 NAC 519A.275 NAC 519A.280 NAC 519A.325 NAC 519A.345	Reclamation Not Applicable
	Other Not Applicable	Other Not Applicable	Other Not Applicable
(iii) SEDIMENT AND STORM-WATER MANAGEMENT IN THE AREA OF OPEN PITS	Regulation and Closure WPCP Part I.I.	Regulation and Closure NAC 445A.429 NAC 445A.432 NAC 445A.433 NAC 445A.446	Regulation and Closure Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports
	Reclamation Not Applicable	Reclamation NAC 519A.270.12 NAC 519A.275.4	Reclamation SRCE Program
	Other Not Applicable	Other Not Applicable	Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(iv) PIT LAKES AND PIT LAKE MANAGEMENT	Regulation and Closure	Regulation and Closure	Regulation and Closure

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
	Not Applicable Reclamation Not Applicable Other Not Applicable	NAC 445A.359 NAC 445A.378 NAC 445A.429 NAC 445A.441 NAC 445A.447 Reclamation NAC 519A.325 NAC 519A.345 NAC 519A.360 Other Not Applicable	Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports Reclamation SRCE Program Other Not Applicable
(v) MANAGEMENT AND AVOIDANCE OF GEOCHEMICALLY ACTIVE MATERIALS; SAMPLING AND MONITORING	Regulation and Closure WPCP Part I.D. WPCP Part I.I WPCP Part II.A. to II.D. (inclusive) Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.396 NAC 445A.397 NAC 445A.398 NAC 445A.440 NAC 445A.429 Reclamation Not Applicable Other Not Applicable	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable
(vi) CONCURRENT OR SEQUENTIAL RECLAMATION OF OPEN PIT MINED AREAS	Regulation and Closure Not Applicable Reclamation Not Applicable	Regulation and Closure NAC 445A.446.1c Reclamation NAC 519A.010 - 519A.415 (inclusive) NAC 519A.250 NAC 519A.255 NAC 519A.270.6 NAC 519A.285	Regulation and Closure Not Applicable Reclamation SRCE Program

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
	Other Not Applicable	Other Not Applicable	Other Not Applicable
RESPONSE CATEGORY 2—UNDERGROUND MINING [Proposed 40 CFR 320.63(a)(ii)]			
(i) SAFETY AND PREVENTION OF PUBLIC ACCESS TO UNDERGROUND MINES	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure Not Applicable Reclamation NAC 519A.345 NAC 519A.260.1 NAC 519A.260.1 NAC 519A.345.9(c) NAC 519A.345.10 Other NAC 513.390 NAC 534.047 NAC 534.4371 30 CFR Part 56 30 CFR Part 57	Regulation and Closure Not Applicable Reclamation SRCE Program Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(ii) MANAGEMENT OF DISCHARGE AND SEEPAGE FROM UNDERGROUND MINES	Regulation and Closure Not Applicable Reclamation	Regulation and Closure NAC 445A.224 NAC 445A.447 NAC 445A.357 NAC 445A.359 NAC 445A.378 NAC 445A.424 NRS 445A.565 Reclamation	Regulation and Closure Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports Reclamation

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
	Not Applicable Other Not Applicable	NAC 519A.345.10 NAC 519A.360 Other NAC 513.390 NAC 534.4371	SRCE Program Other Not Applicable
(iii) MANAGEMENT AND AVOIDANCE OF GEOCHEMICALLY ACTIVE MATERIALS; SAMPLING AND MONITORING	Regulation and Closure WPCP Part I.D. WPCP Part I.I. WPCP Part II.A. to II.D. (inclusive) Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.393 NAC 445A.416 NAC 445A.417 NAC 445A.440 NAC 445A.424 NAC 445A.395 NAC 445A.396 Reclamation Not Applicable Other Not Applicable	Regulation and Closure Waste Rock, Overburden, and Ore Evaluation Reclamation SRCE Program Other Not Applicable
(iv) CONCURRENT OR SEQUENTIAL RECLAMATION OF UNDERGROUND MINE AREAS	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.446.1c Reclamation NAC 519A.270.6 NAC 519A.285 Other Not Applicable	Regulation and Closure Not Applicable Reclamation SRCE Program Caterpillar Equipment Cost Estimator Davis-Bacon Wage Rates Other Not Applicable

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
RESPONSE CATEGORY 3—WASTE ROCK [Proposed 40 CFR 320.63(a)(iii)]			
(i) SAFETY AND PREVENTION OF PUBLIC ACCESS TO WASTE ROCK DUMPS	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure Not Applicable Reclamation NAC 519A.260.1 NAC 519A.270.16 NAC 519A.345.9(c) Other 30 CFR Part 56 30 CFR Part 57	Regulation and Closure Not Applicable Reclamation SRCE Program Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(ii) MANAGEMENT AND AVOIDANCE OF GEOCHEMICALLY ACTIVE MATERIALS; SAMPLING AND MONITORING	Regulation and Closure WPCP Part I.D. WPCP Part I.I. WPCP Part I.N. WPCP Part II.A. to II.D. (inclusive) Reclamation Not Applicable	Regulation and Closure NAC 445A.359 NAC 445A.393 NAC 445A.395 NAC 445A.396 NAC 445A.397 NAC 445A.398 NAC 445A.416 NAC 445A.417 NAC 445A.424 NAC 445A.438 NAC 445A.440 NAC 445A.446 Reclamation NAC 519A.345.3	Regulation and Closure Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports Waste Rock, Overburden, and Ore Evaluation Reclamation SRCE Program

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
	Other Not Applicable	Other NAC 445A.336	Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(iii) CONCURRENT OR SEQUENTIAL RECLAMATION OF WASTE ROCK DUMP AREAS	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.446.1c Reclamation NAC 519A.270.6 NAC 519A.285 Other NAC 445A.336	Regulation and Closure Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports Reclamation SRCE Program Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(iv) WASTE ROCK DUMP STABILITY DURING AND FOLLOWING CLOSURE	Regulation and Closure Not Applicable Reclamation	Regulation and Closure NAC 445A.397 NAC 445A.433 Reclamation	Regulation and Closure Not Applicable Reclamation

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
	Not Applicable Other Not Applicable	NAC 519A.270 NAC 519A.325 NAC 519A.345.3 Other 30 CFR Part 56 30 CFR Part 57	SRCE Program Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(v) WASTE ROCK DUMP DESIGN AND STABILITY DURING ACTIVE OPERATIONS	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.397 NAC 445A.424 NAC 445A.433 Reclamation NAC 519A.270 Other 30 CFR Part 56 30 CFR Part 57	Regulation and Closure Reclamation SRCE Program Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(vi) WASTE ROCK DUMP STORM-WATER AND SEDIMENT MANAGEMENT DURING ACTIVE	Regulation and Closure Not Applicable	Regulation and Closure NAC 445A.359 NAC 445A.393 NAC 445A.396	Regulation and Closure Waste Rock Management Plan

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
OPERATIONS AND DURING AND FOLLOWING CLOSURE		NAC 445A.398 NAC 445A.378 NAC 445A.424 NAC 445A.432 NAC 445A.433 NAC 445A.441 NAC 445A.446 NAC 445A.447	Waste Rock, Overburden, and Ore Evaluation
	Reclamation Not Applicable	Reclamation NAC 519A.270 NAC 519A.275.4 NAC 519A.325	Reclamation SRCE Program
	Other General Mining Stormwater NPDES Permit NVR30000 Storm Water Pollution Prevention Plan	Other 40 CFR §122.26(b)14 40 CFR §122.26(b)15 33 USC 1251	Other Stormwater Pollution Prevention Plan State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(vii) WASTE ROCK DUMP SEEPAGE MANAGEMENT AND TREATMENT DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE	Regulation and Closure Not Applicable	Regulation and Closure NAC 445A.359 NAC 445A.378 NAC 445A.379 NAC 445A.424 NAC 445A.441 NAC 445A.447 NRS 445A.565	Regulation and Closure Not Applicable
	Reclamation	Reclamation	Reclamation

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
	Not Applicable Other Not Applicable	NAC 519A.345 Other Not Applicable	SRCE Program Other Not Applicable
RESPONSE CATEGORY 4—HEAP and DUMP LEACHING [Proposed 40 CFR 320.63(a)(iv)]			
(i) SAFETY AND PREVENTION OF PUBLIC ACCESS TO HEAP AND DUMP LEACH PADS	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.359 NAC 445A.378 NAC 445A.447 Reclamation NAC 519A.260 Other 30 CFR Part 56 30 CFR Part 57	Regulation and Closure Not Applicable Reclamation Not Applicable Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(ii) HEAP AND DUMP LEACH PAD STABILITY DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE	Regulation and Closure WPCP Part I.N Reclamation Not Applicable	Regulation and Closure NAC 445A.359 NAC 445A.378 NAC 445A.397 NAC 445A.398 NAC 445A.430 NAC 445A.433 NAC 445A.447 Reclamation NAC 519A.270 NAC 519A.345	Regulation and Closure Stability Requirements for Heap Leach Pads Preparation Requirements Guidelines for Permanent Closure Plans and Final Closure Reports Reclamation SRCE Program HLDE Program

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
	Other Not Applicable	Other 30 CFR Part 56 30 CFR Part 57	PFCE Program Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(iii) HEAP AND DUMP LEACH PAD STORMWATER AND SEDIMENT MANAGEMENT DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE	Regulation and Closure Not Applicable Reclamation Not Applicable Other General Mining Stormwater NPDES Permit NVR30000 Storm Water Pollution Prevention Plan	Regulation and Closure NAC 445A.359 NAC 445A.378 NAC 445A.379 NAC 445A.393 NAC 445A.396 NAC 445A.424 NAC 445A.432 NAC 445A.433 NAC 445A.441 NAC 445A.447 NRS 445A.565 Reclamation NAC 519A.270 NAC 519A.275 NAC 519A.325 NAC 519A.345 Other 40 CFR §122.26	Regulation and Closure Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports Reclamation Not Applicable Other Storm Water Pollution Prevention Plan State of Nevada Handbook of Best Manage-

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
			ment Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(iv) HEAP AND DUMP LEACH PAD SEEPAGE MANAGEMENT AND TREATMENT DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE	Regulation and Closure WPCP Part I.I. WPCP Part I.D. WPCP Part I.I. WPCP Part I.N. WPCP Part II.A. to II.E. (inclusive) Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.359 NAC 445A.378 NAC 445A.398 NAC 445A.424 NAC 445A.430 NAC 445A.440 NAC 445A.441 NAC 445A.447 NRS 445A.565 Reclamation NAC 519A.345 NAC 519A.360 Other Not Applicable	Regulation and Closure Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports Reclamation SRCE Program Other Not Applicable
(v) HEAP AND DUMP LEACH PAD LINER DESIGN	Regulation and Closure WPCP Part I.D. WPCP Part I.G.	Regulation and Closure NAC 445A.359 NAC 445A.378 NAC 445A.424 NAC 445A.430 NAC 445A.432 NAC 445A.433 NAC 445A.438 NAC 445A.439 NAC 445A.447 NRS 445A.565	Regulation and Closure Leak Detection Systems Leakage Detection Rates

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
	Reclamation Not Applicable Other Not Applicable	Reclamation Not Applicable Other Not Applicable	Reclamation Not Applicable Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(vi) CONCURRENT OR SEQUENTIAL RECLAMATION OF HEAP AND DUMP LEACH PADS PRIOR TO FINAL CESSATION OF OPERATIONS AND CLOSURE	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.446 Reclamation NAC 519A.270 NAC 519A.285 NAC 519A.345 Other NAC 445A.336	Regulation and Closure Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports Reclamation Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
RESPONSE CATEGORY 5—TAILINGS [Proposed 40 CFR 320.63(a)(v)]			
(i) SAFETY AND PREVENTION OF PUBLIC ACCESS TO TAILINGS IMPOUNDMENTS	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.447 NAC 445A.378 NAC 445A.359 Reclamation NAC 519A.390 NAC 519A.260.1 NAC 519A.270.16 NAC 519A.345.9(c) Other Not Applicable	Regulation and Closure Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports Reclamation Not Applicable Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(ii) TAILINGS IMPOUNDMENT STABILITY DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE	Regulation and Closure WPCP Part I.G. WPCP Part I.I. WPCP Part II.B.2.E.	Regulation and Closure NAC 445A.397 NAC 445A.398 NAC 445A.432 NAC 445A.433 NAC 445A.440 NAC 445A.442 NAC 445A.437 NAC 445A.439 NAC 445A.446 NAC 445A.447 NAC 445A.359 NAC 445A.378	Regulation and Closure Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
	Reclamation Not Applicable Other Not Applicable	Reclamation NAC 519A.345.5(a) Other NAC 445A.336 NRS 535.010 NRS 535.030 NAC 535.200 NAC 535.210 NAC 535.210(3) NAC 535.220 NAC 535.250 NAC 535.280 NAC 535.290 NAC 535.320 NAC 535.360 NAC 535.370 NAC 535.380	Reclamation SRCE Program TIDE Program PFCE Program Other FEMA Federal Guidelines for Dam Safety: Emergency Action Planning for Dams (FEMA Publication No. P-64) State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(iii) TAILINGS IMPOUNDMENT STORMWATER AND SEDIMENT MANAGEMENT DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE	Regulation and Closure Not Applicable	Regulation and Closure NRS 445A.565 NAC 445A.393 NAC 445A.396 NAC 445A.398 NAC 445A.424 NAC 445A.379 NAC 445A.432 NAC 445A.433 NAC 445A.441 NAC 445A.447 NAC 445A.359 NAC 445A.378 NAC 445A.446	Regulation and Closure Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
	Reclamation Not Applicable Other General Mining Stormwater NPDES Permit NVR300000 Storm Water Pollution Prevention Plan	Reclamation Not Applicable Other NRS 535.010 NAC 535.240 NAC 535.220 40 CFR §122.26	Reclamation SRCE Program Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(iv) TAILINGS IMPOUNDMENT SEEPAGE AND MANAGEMENT AND TREATMENT DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure NRS 445A.565 NAC 445A.433 NAC 445A.424 NAC 445A.431 NAC 445A.441 NAC 445A.379 NAC 445A.437 Reclamation NAC 519A.345 NAC 519A.345.5 NAC 519A.345.5(d) Other Not Applicable	Regulation and Closure Not Applicable Reclamation SRCE Program TIDE Program PFCE Program Other Not Applicable
(v) TAILINGS IMPOUNDMENT LINER DESIGN	Regulation and Closure WPCP Part II.B.4	Regulation and Closure NRS 445A.565 NAC 445A.424 NAC 445A.379 NAC 445A.431 NAC 445A.432	Regulation and Closure Permit Limitations for Leak Detection Systems

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
	Reclamation Not Applicable Other Not Applicable	NAC 445A.433 to 445A.438 (inclusive) NAC 445A.437 NAC 445A.438 NAC 445A.441 NAC 445A.439 Reclamation Not Applicable Other Not Applicable	Reclamation Not Applicable Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(vi) MANAGEMENT AND AVOIDANCE OF GEOCHEMICALLY ACTIVE MATERIALS; SAMPLING AND MONITORING	Regulation and Closure WPCP Part II.B.2.E. Reclamation Not Applicable Other Not Applicable	Regulation and Closure NRS 445A.565 NAC 445A.393 NAC 445A.398 NAC 445A.416 NAC 445A.417 NAC 445A.424 NAC 445A.379 NAC 445A.440 NAC 445A.442 Reclamation Not Applicable Other Not Applicable	Regulation and Closure Waste Rock, Overburden, and Ore Evaluation Reclamation Not Applicable Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6)

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
			Local county and municipal ordinances Site-specific conditions
(vii) WET TAILINGS IMPOUNDMENTS	Regulation and Closure WPCP Part I.I. WPCP Part II.B.2.E. Reclamation Not Applicable Other Not Applicable	Regulation and Closure NRS 445A.565 NAC 445A.398 NAC 445A.424 NAC 445A.379 NAC 445A.432 NAC 445A.433 NAC 445A.440 NAC 445A.442 NAC 445A.447 NAC 445A.359 NAC 445A.378 NAC 445A.446 NAC 445A.446.1(c) Reclamation NAC 519A.345 NAC 519A.345.5 (a) NAC 519A.285 NAC 519A.270 (6) Other NRS 535.010 NRS 535.030 NAC 535.200 NAC 535.210 NAC 535.220 NAC 535.320 NAC 535.360 NAC 535.370	Regulation and Closure Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports Reclamation SRCE Program TIDE Program PFCE Program Other FEMA Federal Guidelines for Dam Safety: Emergency Action Planning for Dams (FEMA Publication No. P-64) State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6)

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
			Local county and municipal ordinances Site-specific conditions
(viii) CONCURRENT OR SEQUEN-TIAL RECLAMATION OF TAILINGS IMPOUNDMENTS PRIOR TO FINAL CESSATION OF OPERA-TION AND CLOSURE	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.446 NAC 445A.447 Reclamation Not Applicable Other NAC 445A.336	Regulation and Closure Not Applicable Reclamation Not Applicable Other State of Nevada Hand-book of Best Manage-ment Practices (Sec-tions 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
RESPONSE CATEGORY 6—PROCESS PONDS and RESERVOIRS [Proposed 40 CFR 320.63(a)(vi)]			
(i) SAFETY AND PREVENTION OF PUBLIC ACCESS TO PONDS AND RESERVOIRS	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure Not Applicable Reclamation NAC 519A.260.1 NAC 519A.270.16 NAC 519A.345.9(c) NAC 519A.390 Other 30 CFR 56 30 CFR 57	Regulation and Closure Not Applicable Reclamation Not Applicable Other State of Nevada Hand-book of Best Manage-ment Practices (Sec-tions 9-1 through 9-6)

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
			Local county and municipal ordinances Site-specific conditions
(ii) TAILINGS IMPOUNDMENT STABILITY DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE	Regulation and Closure WPCP Part II.B.4. WPCP Part II.B.2.E. WPCP Part I.I. Reclamation Not Applicable Other Not Applicable	Regulation and Closure NRS 445A.565 NAC 445A.424 NAC 445A.379 NAC 445A.397 NAC 445A.398 NAC 445A.432 NAC 445A.433 NAC 445A.435 NAC 445A.436 NAC 445A.438 NAC 445A.439 NAC 445A.440 NAC 445A.442 NAC 445A.447 NAC 445A.359 NAC 445A.378 Reclamation Not Applicable Other Not Applicable	Regulation and Closure Permit Limitations for Leak Detection Systems Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports Reclamation Not Applicable Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
(iii) POND LEAK DETECTION AND COLLECTION SYSTEM DESIGN AND OPERATION	Regulation and Closure WPCP Part II.B.2.E. WPCP Part I.I. Reclamation Not Applicable Other Not Applicable	Regulation and Closure NRS 445A.565 NAC 445A.397 NAC 445A.398 NAC 445A.424 NAC 445A.379 NAC 445A.433 NAC 445A.435 NAC 445A.436 NAC 445A.438 NAC 445A.439 NAC 445A.432 NAC 445A.440 NAC 445A.442 NAC 445A.447 NAC 445A.359 NAC 445A.378 Reclamation Not Applicable Other Not Applicable	Regulation and Closure Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports Reclamation Not Applicable Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(iv) CONCURRENT OR SEQUENTIAL RECLAMATION OF PROCESS PONDS AND RESERVOIRS PRIOR TO FINAL CESSATION OF OPERATIONS AND CLOSURE	Regulation and Closure Not Applicable	Regulation and Closure NAC 445A.446 NAC 445A.447 NAC 445A.359 NAC 445A.378	Regulation and Closure Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
	Reclamation Not Applicable Other Not Applicable	Reclamation NAC 519A.285 NAC 519A.345 NAC 519A.270.6 Other NAC 445A.336	Reclamation SRCE Program Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(v) PROCESS POND AND RESERVOIR STORMWATER AND SEDIMENT MANAGEMENT DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE	Regulation and Closure WPCP Part I.I. Reclamation Not Applicable Other	Regulation and Closure NRS 445A.565 NAC 445A.433 NAC 445A.359 NAC 445A.393 NAC 445A.396 NAC 445A.398 NAC 445A.424 NAC 445A.379 NAC 445A.432 NAC 445A.441 NAC 445A.447 NAC 445A.359 NAC 445A.378 NAC 445A.446 Reclamation NAC 519A.275 (4) NAC 519A.392 NAC 519A.390 NAC 519A.360 Other 40 CFR 122.26	Regulation and Closure Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports Reclamation Not Applicable Other

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
	General Mining Stormwater NPDES Permit NVR300000 Storm Water Pollution Prevention Plan		State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
RESPONSE CATEGORY 7—SLAG PILES [Proposed 40 CFR 320.63(a)(vii)]			
(i) SAFETY AND PREVENTION OF PUBLIC ACCESS TO SLAG PILES	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.447 NAC 445A.378 NAC 445A.359 Reclamation NAC 519A.390 Other Not Applicable	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable
(ii) MANAGEMENT AND AVOIDANCE OF GEOCHEMICALLY ACTIVE MATERIALS IN SLAG PILES; SAMPLING AND MONITORING OF SLAG PILES	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.398 NAC 445A.396 NAC 445A.397 NAC 445A.433 NAC 445A.447 NAC 445A.367 NAC 445A.379 Reclamation Not Applicable Other Not Applicable	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
(iii) CONCURRENT OR SEQUENTIAL RECLAMATION OF SLAG PILES PRIOR TO FINAL CESSATION OF OPERATIONS AND CLOSURE	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.446 NAC 445A.447 NAC 445A.367 NAC 445A.379 Reclamation NAC 519A.285 NAC 519A.270.6 Other Not Applicable	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable
(iv) SLAG PILE STABILITY DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.424 NAC 445A.432 NAC 445A.433 NAC 445A.435 NAC 445A.436 NAC 445A.437 NAC 445A.397 Reclamation Not Applicable Other Not Applicable	Regulation and Closure Stability Requirements Heap Leach Pads Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports Reclamation Not Applicable Other Not Applicable
(v) PREDICTIVE STABILITY ANALYSIS OF SLAG PILES	Regulation and Closure Not Applicable Reclamation Not Applicable	Regulation and Closure NAC 445A.392 NAC 445A.397 NAC 445A.433 Reclamation Not Applicable	Regulation and Closure Not Applicable Reclamation Not Applicable

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
	Other Not Applicable	Other Not Applicable	Other Not Applicable
(vi) SLAG PILE STORMWATER AND SEDIMENT MANAGEMENT DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 45A.359 NAC 445A.379 NAC 445A.393 NAC 445A.396 NAC 445A.398 NAC 445A.432 NAC 445A.433 NAC 445A.441 Reclamation NAC 519A.275 (4) Other NAC 445A.227 NAC 445A.22725	Regulation and Closure Preparation requirements and guidelines for permanent closure plans and final closure reports Reclamation SRCE Program Other Not Applicable
(vii) SLAG PILE SEEPAGE MANAGEMENT AND TREATMENT DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE	Regulation and Closure Not Applicable Reclamation WPCP Part II.B.3. WPCP Part II.B.4.b. WPCP Part II.B.4.c. Other Not Applicable	Regulation and Closure NRS 445A.675 NAC 445A.367 NAC 445A.379 NAC 445A.397 NAC 445A.398 NAC 445A.424 NAC 445A.433 NAC 445A.447 NAC 445A.441 Reclamation Not Applicable Other 40 CFR Part 302	Regulation and Closure Not Applicable Reclamation SRCE Program Other Not Applicable

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
		NAC 445A.2269 NAC 445A.227 NAC 445A.22725 NAC 445A.3456	
RESPONSE CATEGORY 8—SOLID and HAZARDOUS WASTE [Proposed 40 CFR 320.63(a)(viii)]			
(i) DISPOSAL OF ALL SOLID AND HAZARDOUS WASTES	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.350 to NAC 445A.447 NAC 445A.367 NAC 445A.378 NAC 445A.379 NAC 445A.430 NAC 445A.431 NAC 445A.446 NAC 445A.420 NAC 445A.429 NAC 445A.447 Reclamation NAC 519A.345.8(a) NAC 519A.345.8(c) Other NAC 444.570 to NAC 444.7499 NAC 444.636 NAC 444.731 NAC 445A.336 40 CFR Parts 257 and 258 40 CFR 261.4(b)	Regulation and Closure Not Applicable Reclamation SRCE program Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(ii) CONTAMINATED SOIL DISPOSAL	Regulation and Closure Not Applicable	Regulation and Closure NAC 445A.367 NAC 445A.378 NAC 445A.379	Regulation and Closure Guidance for Mine-Site Petroleum-Contaminated Soil

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
		NAC 445A.398 NAC 445A.420 NAC 445A.429 NAC 445A.430 NAC 445A.431 NAC 445A.441 NAC 445A.442 NAC 445A.443 NAC 445A.446 NAC 445A.447	(PCS) Management Plans
	Reclamation Not Applicable Other Not Applicable	Reclamation NAC 519A.345.8(c) Other NAC 444.570 to NAC 444.7499 NAC 445A.226 to NAC 445A.22755 NAC 445A.2269 to NAC 445A.2272 NAC 445A.22705 NAC 445A.336 40 CFR	Reclamation SRCE Program Other ASTM Method E1739-95 State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
(iii) DECONTAMINATION OF BUILDINGS AND STRUCTURES	Regulation and Closure Not Applicable	Regulation and Closure NAC 445A.367 NAC 445A.378 NAC 445A.379 NAC 445A.420 NAC 445A.429 NAC 445A.430 NAC 445A.431 NAC 445A.440 NAC 445A.441	Regulation and Closure Not Applicable

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
		NAC 445A.442 NAC 445A.443 NAC 445A.446 NAC 445A.447	
	Reclamation Not Applicable	Reclamation NAC 519A.345.8 NAC 519A.345.8(c) NAC 519A.345.8(a) NAC 519A.270.14	Reclamation SRCE Program
	Other Not Applicable	Other NAC 444.570 to NAC 444.7499 NAC 444.731 NAC 445A.336 40 CFR 261.4(b) 40 CFR	Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
RESPONSE CATEGORY 9—DRAINAGE [Proposed 40 CFR 320.63(a)(ix)]			
(i) MANAGEMENT OF ALL STORMWATER AND SEDIMENT DURING OPERATIONS AND DURING AND FOLLOW-ING CLOSURE	Regulation and Closure WPCP Part I.I. WPCP Part II.B.2.E.	Regulation and Closure NAC 445A.359 NAC 445A.378 NAC 445A.393 NAC 445A.396 NAC 445A.432 NAC 445A.433 NAC 445A.441 NAC 445A.446 NAC 445A.447	Regulation and Closure Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports
	Reclamation Not Applicable	Reclamation NAC 519A.260 NAC 519A.345	Reclamation SRCE Program
	Other	Other	Other

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
	General Mining Stormwater NPDES Permit NVR300000	40 CFR Part 122	State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
RESPONSE CATEGORY 10—SHORT-TERM OPERATIONS and MAINTENANCE [Proposed 40 CFR 320.63(a)(x)]			
(i) MANAGEMENT OF ALL STORMWATER AND SEDIMENT DURING OPERATIONS AND DURING AND FOLLOWING CLOSURE	Regulation and Closure WPCP Part I.A. WPCP Part I.D. WPCP Part II.B.3. WPCP Part II.B.4.b. WPCP Part II.B.4.c. Reclamation Not Applicable Other Not Applicable	Regulation and Closure NRS 445A.690 NAC 445A.393 NAC 445A.396 NAC 445A.398 NAC 445A.409 NAC 445A.416 NAC 445A.417 NAC 445A.420 NAC 445A.429 NAC 445A.430 NAC 445A.431 NAC 445A.440 NAC 445A.441 NAC 445A.442 NAC 445A.443 NAC 445A.446 NAC 445A.447 Reclamation Not Applicable Other NAC 445A.2269 NAC 445A.227 NAC 445A.22725 NAC 445A.336	Regulation and Closure Guidance Document for the Design and Construction of Groundwater Monitoring Wells Reclamation SRCE Program Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6)

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
			Local county and municipal ordinances Site-specific conditions
(ii) INSPECTION AND MONITORING OF EROSION, REVEGETATION, AND RECLAMATION	Regulation and Closure WPCP Part I.I. WPCP Part II.A.2. Reclamation Reclamation Permit Attachment B Other	Regulation and Closure NAC 445A.446 Reclamation NAC 519A.275 NAC 519A.190 NAC 519A.205 NAC 519A.315 NAC 519A.330 Other NAC 513.390	Regulation and Closure Not Applicable Reclamation Nevada Guidelines for Successful Revegetation for the NDEP, the BLM, and the USFS SRCE Program Other
(iii) MAINTENANCE AND REPAIRS	Regulation and Closure WPCP Part I.I. WPCP Part II.A.2. Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.446 Reclamation NAC 519A.190 NAC 519A.205 NAC 519A.275 NAC 519A.315 NAC 513.390 Other Not Applicable	Regulation and Closure Not Applicable Reclamation SRCE Program Other Not Applicable
RESPONSE CATEGORY 11—INTERIM OPERATIONS and MAINTENANCE [Proposed 40 CFR 320.63(a)(xi)]			
(i) INTERIM EMERGENCY WATER MANAGEMENT AND TREATMENT	Regulation and Closure Not Applicable	Regulation and Closure NAC 445A.382	Regulation and Closure Not Applicable

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
		NAC 445A.398 NAC 445A.427 NAC 445A.444 NAC 445A.445	
	Reclamation Reclamation Permit Attachment A	Reclamation NAC 519A.392	Reclamation Trust Fund for Short Term Fluid Management IFM Surety PFS Surety
	Other Not Applicable	Other Not Applicable	Other NDEP emergency environmental assessment, mitigation, and remediation (EMAR) contract
(ii) ENGINEERING DESIGNS RELATED TO INTERIM WATER MANAGEMENT AND TREATMENT	Regulation and Closure Not Applicable	Regulation and Closure NAC 445A.367 NAC 445A.379 NAC 445A.398 NAC 445A.433 NAC 445A.445 NAC 445A.447	Regulation and Closure Guidelines and Procedures for the Permanent Closure of Bioreactors, E and ET Cells
	Reclamation Not Applicable	Reclamation Not Applicable	Reclamation HLDE Program PFCE Program IFM Surety PFS Surety
	Other Not Applicable	Other NAC 445A.336	Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6)

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
			Local county and municipal ordinances Site-specific conditions BLM Nevada Locatable Minerals Hard Rock Mining webpage
RESPONSE CATEGORY 12—LONG-TERM OPERATIONS and MAINTENANCE [Proposed 40 CFR 320.63(a)(xii)]			
(i) GROUNDWATER AND SURFACE WATER MONITORING	Regulation and Closure WPCP Part I.A. WPCP Part I.D. WPCP Part I.G. WPCP Part I.I. WPCP Part II.B.1. WPCP Part II.B.2. WPCP Part II.B.2.E. WPCP Part II.E. Reclamation Not Applicable Other Not Applicable	Regulation and Closure NAC 445A.367 NAC 445A.378 NAC 445A.409 NAC 445A.440 NAC 445A.441 NAC 445A.442 NAC 445A.443 NAC 445A.447 Reclamation Not Applicable Other NAC 445A.336	Regulation and Closure Not Applicable Reclamation NDEP, BLM and USFS Joint Memorandum of Understanding (MOU) to establish Long-Term Trust Funds SRCE Program Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
(ii) INSPECTION AND MONITORING OF MASS STABILITY, EROSION, AND RECLAMATION	Regulation and Closure WPCP Part I.I. WPCP Part II.A.2. Reclamation Reclamation Permit Attachment B Other Not Applicable	Regulation and Closure NRS 445A.700 NAC 445A.433 Reclamation NAC 519A.190 NAC 519A.205 NAC 519A.275 NAC 519A.315 NAC 519A.330 Other NAC 513.390	Regulation and Closure BMRR Regulation and Closure Branch annual, semi-annual, or quarterly site inspections BMRR Civil Penalty Policy Reclamation SRCE Program BMRR Reclamation Branch annual site inspections Nevada Guidelines for Successful Revegetation for the NDEP, the BLM, and the USFS BMRR Civil Penalty Policy Other Not Applicable
(iii) MAINTENANCE OF ROADS, STORMWATER CONVEYANCES/COLLECTION DEVICES, COVER SYSTEMS, REVEGETATION, AND MONITORING WELLS	Regulation and Closure WPCP Part I.I. WPCP Part II.A.2. Reclamation Not Applicable	Regulation and Closure Not Applicable Reclamation NAC 519A.190 NAC 519A.205 NAC 519A.275 NAC 519A.315	Regulation and Closure Not Applicable Reclamation SRCE Program BMRR Reclamation Branch annual site inspections

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
	Other Not Applicable	Other NAC 513.390	Other Not Applicable
RESPONSE CATEGORY 13—WATER TREATMENT [Proposed 40 CFR 320.63(a)(xiii)]			
(i) WATER MANAGEMENT AND TREATMENT DURING CLOSURE	Regulation and Closure WPCP Part I.I. WPCP Part II.B.2.E. Reclamation Not Applicable Other Not Applicable	Regulation and Closure NRS 445A.565 NAC 445A.379 NAC 445A.397 NAC 445A.398 NAC 445A.424 NAC 445A.432 NAC 445A.433 NAC 445A.435 NAC 445A.436 NAC 445A.438 NAC 445A.439 NAC 445A.440 NAC 445A.442 Reclamation Not Applicable Other Not Applicable	Regulation and Closure Not Applicable Reclamation SRCE Program NDEP, BLM and USFS joint Memorandum of Understanding (MOU) to establish Long-Term Trust Funds Other Not Applicable
(ii) DISPOSAL OF WATER TREATMENT SLUDGES AND RESIDUES	Regulation and Closure WPCP Part I.I. WPCP Part II.B.2.E.	Regulation and Closure NRS 445A.565 NAC 445A.359 NAC 445A.378 NAC 445A.379	Regulation and Closure Preparation Requirements and Guidelines for Permanent Closure

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
		NAC 445A.397 NAC 445A.398 NAC 445A.424 NAC 445A.432 NAC 445A.433 NAC 445A.440 NAC 445A.442 NAC 445A.447	Plans and Final Closure Reports
	Reclamation Not Applicable	Reclamation NAC 519A.068 NAC 519A.270.18 NAC 519A.360.4(b) NAC 519A.360.4(c) NAC 519A.360.4(g)	Reclamation SRCE Program
	Other Not Applicable	Other Not Applicable	Other State of Nevada Handbook of Best Management Practices (Sections 9-1 through 9-6) Local county and municipal ordinances Site-specific conditions
INFORMATION SUBMISSION and RECORDKEEPING REQUIREMENTS			
(a) OWNERS OR OPERATORS MUST SUBMIT TO EPA INFORMATION THAT SUPPORTS THE COST CALCULATION	Regulation and Closure Not Applicable Reclamation Not Applicable	Regulation and Closure Not Applicable Reclamation NRS 519A NAC 519A.010 to NAC 519A.415 NAC 519A.230 NAC 519A.360 NAC 519A.360.1	Regulation and Closure Not Applicable Reclamation NDEP, BLM and USFS MOU for Approval of Reclamation Plans and Cost Estimates

Proposed Rule Response Category	Nevada Permit Reference	Nevada Regulatory Reference	Nevada Guidance Documents & Procedures
	Other Not Applicable	NAC 519A.365 NAC 519A.370 Other Not Applicable	Other Not Applicable
(b) OWNERS OR OPERATORS MUST RETAIN THE CALCULATION OF THE FINANCIAL RESPONSIBILITY AMOUNT	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure Not Applicable Reclamation NRS 519A.140 NAC 519A.380 NAC 519A.385 NAC 519A.415 Other Not Applicable	Regulation and Closure Not Applicable Reclamation SRCE Program Other State of Nevada Record Retention Policy
THIRD-PARTY CERTIFICATION			
THE FINANCIAL RESPONSIBILITY AMOUNT SUBMITTED BY OWNERS OR OPERATORS MUST BE CERTIFIED BY AN INDEPENDENT QUAL-IFIED PROFESSIONAL ENGI-NEER	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure Not Applicable Reclamation Not Applicable Other Not Applicable	Regulation and Closure Not Applicable Reclamation BMRR and BLM reviewers include licensed professional engineers SRCE Program Other Not Applicable

LIST OF ABREVIATIONS

µS/CM	MicroSiemens Per Centimeter
ALR	Allowable Leakage Flow Rate
AMSL	Above Mean Sea Level
ANP/AGP	Ratio of Acid Neutralization Potential to A cid Generation Potential
ASTM	American Society for Testing and Materials
BGS	Below Ground Surface
BLM	United States Bureau of Land Management
BMP	Best Management Practice
BMRR	Nevada Bureau of Mining Regulation and Reclamation
Bureau	Nevada Bureau of Mining Regulation and Reclamation
CERCLA	Comprehensive Environmental Response, Compen sation, and Liability Act
CFR	United States Code of Federal Regulations
CM/SEC	Centimeters Per Second
Department	State of Nevada Department of Conservati on and Natural Resources
Division	State of Nevada Division of Environmental Protection (aka "NDEP")
E Cell	Evaporation Cell
E/ET Cell	Evaporation/Evapotranspiration Cell
EPA	United States Environmental Protection Agency
ERP	Emergency Response Plan
ET Cell	Evapotranspiration Cell
FCM	Florida Canyon Mine
FEMA	Federal Emergency Management Agency
FOAV/Order	Finding of Alleged Violation and Order
FOS	Factor of Safety
FPPC	Final Plan for Permanent Closure
GPAD	Gallons Per Acre Per Day
GPD	Gallons Per Day
GPM	Gallons Per Minute
HDPE	High-Density Polyethylene
HLDE	Nevada Heap Leach Draindown Estimator
HLP	Heap Leach Pad
IFM	Interim Fluid Management
LCRS	Leakage Collection Recovery System
LLDPE	Linear Low-Density Polyethylene, a geosynthetic material used for liners.
MOU	Memorandum of Understanding
MW	Monitoring Well
MWMP	Meteoric Water Mobility Procedure
NAC	Nevada Administrative Code
NaCN	Sodium Cyanide
NDEP	State of Nevada Division of Environmental Protection (aka "Division")
NPDES	National Pollutant Discharge Elimination System

NRS	Nevada Revised Statutes
PCS	Petroleum-Contaminated Soil
PFCE	Nevada Process Fluids Cost Estimator
PFS	Process Fluid Stabilization
RDPC	Reclaimed Desired Plant Communities
SMP	Standard Mine Project
SRCE	Nevada Standardized Reclamation Cost Estimator
STATE	State of Nevada
SWPPP	Stormwater Pollution Prevention Plan
TCP	Trenton Canyon Project
TDS	Total Dissolved Solids
TIDE	Nevada Tailings Impoundment Draindown Estimator
TPPC	Tentative Plan for Permanent Closure
TSF	Tailings Storage Facility
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
WAD	Weak Acid Dissociable
WPC	Water Pollution Control
WPCP	Water Pollution Control Permit
WRMP	Waste Rock Management Plan
WSR	Water Storage Reservoir

DETAILED NEVADA RESPONSES TO THE 13 RESPONSE CATEGORIES

INTRODUCTION

In coordination with the US Bureau of Land Management and the US Forest Service, the Nevada Division of Environmental Protection (NDEP) manages a financial assurance program for operating Nevada hardrock mining facilities that is sufficiently protective to result in a minimum degree and duration of risk associated with the production, transportation, treatment, storage, or disposal of all hazardous substances present. As detailed in this supporting document, the Nevada hardrock mining regulatory programs, including its reclamation surety program administered by NDEP, meet or exceed necessary technical criteria in all thirteen response categories of the proposed rule. Accordingly, no additional federal financial assurance for hardrock mine operations in Nevada is warranted.

The Nevada mine regulation program is implemented by the State of Nevada Division of Environmental Protection (the Division), Bureau of Mining Regulation and Reclamation (the Bureau). Nevada's regulated hard rock mines are subject to, and in compliance with, requirements that will result in a minimum degree and duration of risk associated with the production, transportation, treatment, storage, and disposal of all hazardous substances present. A WPCP for a mining chemical processing facility is a zero discharge permit. Because evaporation exceeds precipitation at all mining locations in Nevada the zero discharge of process fluids is achievable through mine operations and final permanent closure. Nevada regulations require that all meteoric water that comes into contact with a process component must be contained within the system and treated as process water. Zero discharge of process fluids also requires that all process components be double-lined and include leak detection and recovery systems. Systems are designed to detect and control leaks from process components and must be located at the interface of the unit process components and the adjacent environment and be able to provide the first indication that pollutants or contaminants have escaped their primary containment. The State's program has the authority to impose all of the requirements necessary for the reductions described in the proposed CFR § 320.63(d) and would impose those requirements on the same regulated universe subject to the proposed rule. The program ensures that each facility obtains adequate financial assurance to ensure mine facilities are reclaimed and closed for the long-term per the approved Final Permanent Closure Plan.

The Nevada mine regulation program is adaptive. Since the program first began in 1989 the regulations have been revised and updated as needs are identified and solutions are found. For example, in 2015 the ability to bond for mine impacted waters was added to the Nevada mine regulations for private land. NDEP is currently evaluating facility operating and environmental data to determine whether changes to facility storm water design regulations for the long-term are warranted. Over the last ten years the regulatons regarding bonding have been updated and revised to strengthen the programs ability to estimate, manage and implement the financial guarantees necessary to ensure site reclamation and closure for the long-term.

The program has now had 28 years of experience regulating mines in Nevada for the purpose of protecting waters of the State. Currently the program, in cooperation with the U.S. Bureau of Land Management (BLM) and the U.S. Forest Service (USFS), manages over 2.6 billion dollars in financial instruments which cover over 266 thousand acres of land in Nevada. Elements of the Nevada program for permitting, monitoring, reclaiming and bonding for mine facilities have been modeled and used by other States and countries around the world. The Bureau employs a staff of 20 professionals who oversee the program and whose expertise cover a wide range of engineering and environmental backgrounds, including decades of experience in mining and mine regulation.

The Bureau first received authority to regulate mining activities in 1989. This authority derives from Nevada Administrative Code (NAC) 445A.350-NAC 445A.447 and NAC 519A.010 - NAC 519A.415, which were developed to implement the requirements of the Nevada Revised Statutes (NRS) 445A.300-NRS 445A.730 and NRS 519A.010 - NRS 519A.290. In addition to this direct regulatory authority, other State of Nevada regulations that apply to mining in Nevada include but are not limited to regulations adopted by the Bureau of Water Pollution Control, Bureau of Air Pollution Control, Bureau of Waste Management, Division of Water Resources and the Division of Minerals.

In order to understand Nevada's program it is necessary to understand not just the regulations but how the Bureau manages the program which in addition to the regulations includes program guidance documents, boiler plate permit documents, the required level of site characterization and facility engineering evaluation, monitoring and inspection frequency, and standards of practice. While reviewing the responses below it is also important to note key elements of the Nevada mining regulation program. The following key elements cover the entire Nevada mining life cycle including but not limited to site exploration, site characterization, planning, engineering, construction, operation, reclamation, closure and post closure monitoring. Site characterization information is required to guide the facility design to include best engineering judgment and best management practices in order to protect waters of the State. Processing facilities are designed for zero discharge and a Nevada licensed Professional Engineer must design all components that include chemicals with plans approved by the Division. Prior to initiating any work on the ground, a project reclamation and closure cost estimate with financial assurance must be in place. During construction of process facilities, quality control and quality assurance is required and final facility approval is based on the review of as-built documents completed by a Nevada licensed Professional Engineer. During operations, quarterly monitoring and reporting, and adherence to permit limits and conditions are required. Facilities are inspected by the Division at a minimum on a quarterly basis for confirmation of compliance. Closure and reclamation planning is reviewed and approved by the Division prior to implementation. The closure and reclamation process is regulated and approved through the post-closure monitoring stage. Approved monitoring and emergency response plans are a permit requirement. The State maintains formal enforcement and compliance options if necessary to protect waters of the State and to ensure successful reclamation.

These key program elements all reduce environmental risks at Nevada mines. Monitoring, leak detection, and double containment at Nevada MiningFacilities are robust. Because of this, when releases occur and/or are discovered they tend to be small and easily managed during the course of normal facility operations. Often the permittee is able to manage releases with existing staff and equipment, augmented by confirmatory analyses at Nevada certified third-party laboratories. The system of monitoring, inspection, and reporting has been successful since the program's inception in 1989. The Division's assigned site compliance inspectors assist in the management of releases by reviewing and approving permittee-developed corrective action plans. Compliance inspectors make the final determination when a release has been adequately remediated. The program has demonstrated its ability to manage spills as they occur and minimizing any potential environmental liabilities. Therefore, an additional federal program is not necessary.

Reclamation and closure costs are estimated using the Nevada Standardized Reclamation Cost Estimator (SRCE) that allows for State control of the estimates and includes inputs for detailed site-specific information on a component by component basis. The SRCE model program performs numerous calculations using the mathematical principals of geometry, trigonometry, and general mathematics of time-distance, length-width-height, and etcetera to individually calculate and determine a specific reclamation cost for each type of mine component disturbance type. Each individual mine component module in the SRCE program includes the required reclamation equipment to perform a specific reclamation task as it relates to the type of mine component to be reclaimed. For example, the State requires mobilization-demobilization (Mob-Demob) costs to be included for the transportation of all of the reclamation equipment needed to and from in order to completely reclaim the site. A Mob-Demob SRCE supplemental User Page support document provides individual inputs for each type of reclamation equipment required as determined in the SRCE and provides a program module. The Mob-Demob User page summarizes the total cost for the transport of all equipment required to perform the entire mine site's reclamation including water trucks for dust controlduring the performance of a reclamation task. The Mob-Demob transportation costs are vetted usingCaterpillar Contractor quotes and updated yearly using Davis-Bacon labor rates, a R.S. Means determined labor crew size, and equipment contractor quotes to account for fuel consumption and wear maintenance for the transport equipment used to haul the reclamation equipment to the mine site and back. The SRCE program has a specific User Page input cell to account for placement of User Page total Mob-Demob cost, which becomes additive to the SRCE reclamation total subtotal cost summary page and is subject to the government administrative add on costs. The Nevada Heap Leach Draindown Estimator (HLDE) models and predicts heap leach stabilization rates. HLDE information is used in the Nevada Process Fluids Cost Estimator (PFCE) in order to estimate fluid stabilization costs though a three-phase process until the site can be closed and active evaporation is no longer required.

Public notice and comment periods are included in the WPC and Reclamation regulations for all new permits, major permit revisions, and permit renewals. During 30-day public notice periods, project information along with Division contacts are provided in a local newspaper nearest to the site. Permits and permit actions are appealable by the regulated community and the public.

Project mailing lists are maintained for interested parties to receive electronic copies of publicly noticed documents. The Division maintains a good relationship with interested Nongovernmental Organizations. All project files are available for public review. Any person or entity can request a public hearing on a proposed action.

The State works closely with its federal partners, the BLM and USFS when regulating projects on federal land. A Memorandum of Understanding (MOU) is maintained by the State, BLM and USFS for approval of reclamation plans and cost estimates. To assist with communication and minimize duplication, a BLM liaison works directly in the Division office under contract three days per week. All bonding actions on federal land are coordinated with the BLM and/or USFS as appropriate. In addition to the Division's joint bonding activities, the BLM holds and actively manages eight long-term trusts for monitoring and maintenance at eight Nevada hard rock mines.

Aside from the Division's contention that the proposed CERCLA 108(b) rule is unnecessarily duplicative of the Nevada program, the Division does not concur with the proposed use of a formula based on a minimum of site-specific parameters and averaged costs from potentially dissimilar facilities to calculate costs for an individual mine facility. For example, the use of a 5% infiltration value for closure covers, without taking into account whether the operator has proposed to use a permeable soil cover or a relatively impermeable cap with a synthetic geomembrane, will produce an erroneous water balance estimate and unreliable fluid management costs. Similarly, the use of area alone to calculate the cost for a leach pad, without taking into account the mass, thickness, porosity, storage capacity, degree of revegetation, etcetera, will produce unreliable cost estimates. Nevada's many years of experience indicate that cost estimates must be heavily based on site-specific data, or they are likely to be grossly in error. Furthermore, if the cost estimate is too simplistic, it becomes difficult even to determine reliably whether the cost estimate is an overestimate or an underestimate of real costs.

A description of how the Nevada program addresses CERCLA 108(b) Response Categories 1 through 13 for Hard Rock Mining and Nevada State responses is included below:

RESPONSE CATEGORY 1--OPEN PIT MINING [Proposed 40 CFR 320.63(a)(i)]

GENERAL COMMENTS

On a site-specific basis, the State of Nevada meets or exceeds all of the requirements listed for the open pit category as described below.

Nevada WPC regulations do not have specific factor of safety (FOS) requirements for non-process structures within open pits. However, if site-specific conditions warrant specifying stability requirements, then those requirements are included in the WPCP for the facility. The Nevada program uses site-specific information to develop reclamation and closure plans that meet the long-term needs of each individual open pit mine. Most of Nevada's mines are in isolated locations where stability requirements for non-process components are not necessary except for erosion and storm control components. During mining operations, the Federal Mine Safety and

Health Administration regulate mine stability requirements to maintain a safe working environment. An example of when Nevada may require pit stability requirements in post-closure would be for a pit wall that contained a mineralized material that would negatively affect a pit lake if it were to slide into the pit bottom. More likely, however, in that case the Division would simply require that the associated pit lake study assume that the mineralized pit wall material would eventually affect the pit lake and require appropriate water treatment or other mitigation to address the impacts. A second example where Nevada may require pit stability requirements would be to protect any critical stormwater controls for the long term.

Currently, process components at Nevada mine facilities must be constructed at a minimum to contain a 25-year, 24-hour storm event and to withstand a 100-year, 24-hour storm event. Per regulation, based on site-specific factors such as proximity to surface water bodies; depth to groundwater; and proximity to population the Division may require additional storm event capacity. In Nevada mine closure guidance, the Division recommends that facilities be constructed to withstand a 500-year, 24-hour event. The Division has been considering a change to Nevada closure regulations to require that closed facilities at a minimum are designed to contain the 500-year, 24-hour storm event if containment is necessary and withstand the erosional effects of a 500-year, 24-hour storm event.

Closure facilities for treatment are not set to a minimum 200-year design life, but are designed for the maximum projected need. The closure and stabilization requirements pertain to process and non-process components (solid and liquid process mine wastes) such as heap leach pads, tailings impoundments, pits, waste rock dumps, ore stockpiles, and any other associated mine components that, if not properly managed during operation and closure, could potentially lead to the degradation of waters of the State. A mining facility operator/permittee is required to submit a Tentative Plan for Permanent Closure at the time of application for a WPCP.

A Final Plan for Permanent Closure must be submitted to the Bureau at least two years prior to the anticipated closure of a mine component. This plan must provide closure goals and a detailed methodology of activities necessary to achieve a level of chemical stabilization of all known and potential contaminants at the site. The Final Plan for Permanent Closure must also include a detailed description of all proposed monitoring that will be conducted to demonstrate how the closure goals will be met.

Following the completion of all closure related activities; a Final Closure Report must be submitted to the Bureau summarizing all completed closure related activities. This document should contain all information necessary for the operator to demonstrate to this Bureau that the completed closure activities, per process and non-process component, will ensure that waters of the State will not be degraded. This report must include a proposal for post-closure monitoring for an initial period of time not less than five (5) years, and up to 30 years, in order to provide additional supporting data that stabilization has truly been achieved. If during the post-closure monitoring period it is determined that chemical stabilization has not been achieved, additional closure actions may be required, after which a new post-closure monitoring period will ensue.

The Request for Final Closure is made following the completion of the post-closure monitoring period. The request should contain all post-closure monitoring information and clearly demonstrate stabilization. Upon the successful demonstration of stabilization, the Bureau would consider the mine site to be permanently closed, retire the WPCP, and eliminate all NAC 445A fee requirements.

(i) SAFETY AND PREVENTION OF PUBLIC ACCESS TO OPEN PITS

A plan to address safety by prevention of public access by means of security fencing, or other effective methods.

Under NAC 519A.260(1), pre- and post-mining use of the land be considered in preparing a plan for reclamation. NAC 519A.270(16) requires a description of any necessary monitoring or maintenance of any fencing or signs, and NAC 519A.345.9(c) requires construction and maintaining berms fences or other means of restricting access.

NAC 519A.315 sets forth the requirements for abandonment of a site and selection of appropriate activities for reclamation of site. The abandonment of a site must be conducted in a manner that ensures public safety, encourages techniques to minimize adverse visual effects, and establishes a safe and stable condition suitable for the productive post-mining use of the land. In selecting appropriate activities for reclamation for a particular site, techniques which minimize adverse visual impact must be considered. Ensuring public safety requires minimizing hazards in areas which the public may have legal access by, if applicable: removing or burying structures, equipment, reagents or scrap; sealing or securing shafts, tunnels and adits pursuant to NAC 513.390; plugging drill holes; leaving slopes in a structurally stable condition; and restricting access to areas which cannot practicably be made safe. Achieving a "stable condition" requires conditions at the site to be resistant to excessive erosion and structurally competent to withstand normal geologic and climatic conditions without significant failure that would be a threat to public safety and the environment.

Not all mine pits or pit lakes pose risks to the public. Where risks exist, NAC 513.390 requires the use of a barricade, fence, permanently anchored seal, or backfill to secure dangerous conditions at a mine. This includes surface or underground mines as well as any development, beneficiation plant, mill, smelter, refinery or other facility used to treat or reduce any mineral commodity, whether or not contiguous to an area where exploitation or extraction of mineral commodities occurs.

NAC 445A.447 requires submittal of a Final Plan for Permanent Closure for any portion of a mining operation that may release pollutants, induding but not limited to open pits and pit lakes. See, NAC 445A.378 and 445A.359 Under such a plan, fencing is one accepted means of protecting humans and large animals from pit lakes that may otherwise pose a health risk to the public.

NAC 519A.345 outlines the authority of Division to require an operator of mining operation to perform certain types of reclamation. Open pit mines are required to perform activities that will provide for public safety; stabilize pitwalls or rock faces where required for public safety; construct and maintain berms, fences or other means of restricting access; implement measures to stabilize, manage, control or treat mine-impacted waters; create a lake for recreational use, wildlife or other uses; and revegetate the berms. Reclamation of open pits or rock faces does not require backfilling although backfilling in whole or in part with waste rock from an adjacent mining operation may be encouraged if backfilling is feasible and does not create additional negative environmental impacts.

The SRCE program has a specific calculation module, which determines the construction cost for the required pit perimeter safety berm and the associated revegetation cost for long-term soil stability. If determined to be necessary, the SRCE program has the ability to calculate fencing and/or signage costs. The Bureau's Reclamation Branch prefers pit safety berm of approximately 4-5 feet in height rather than the use of long-term maintenance items like fencing for public safety upon the pit closure.

Other authorities and resources that are considered in the Bureau's determination as to the most effective means for preventing public access include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

(ii) PREVENTION OF PONDING WITHIN OPEN PITS

Where ponding will occur, a plan that requires:

(A) Re-grading the bottom surface during closure to a stable configuration that prevents ponding and promotes the conveyance of surface water off the unit.

NAC 445A.429 requires a permittee to develop appropriate procedures to prevent release of contaminants that have the potential to degrade the State's surface and groundwater. To this end, open pit mines must, to the extent practicable, be free draining or left in a manner which minimizes the impoundment of surface drainage and the potential for contaminants to be transported and degrade the waters of the State. NAC 445A.429(2). Bodies of water which are a result of mine pits penetrating the water table must not create an impoundment which: has the potential to degrade the groundwater of the State, or has the potential to affect adversely the health of human, terrestrial or avian life. The holder of a permit may apply to the Commission to establish a beneficial use with a level of protection less than that required by paragraph (b) of subsection 3 for water impounded in a specific mine pit.

NAC 519A.325 requires a permittee, under certain circumstances, to remove and stockpile topsoil for reclamation and avoid creating depressions in land surfaces. The regulation provides that if practicable and necessary for the establishment of the post-mining use of the land, sufficient topsoil, if available, must be removed during the creation of a disturbance and stockpiled for use in future reclamation. NAC 519A.325(1). The stockpile must be posted to identify the material, and stabilized as necessary to prevent excessive losses from erosion Id. If topsoil is unavailable, any growth medium to be used that requires removal and stockpiling must be managed in the same manner as topsoil. Id. The creation of a depression during reclamation which may form a pond must be avoided unless the pond is part of the post-mining use of the land. NAC 519A.325(2). Stabilization is achieved when an area which has been reclaimed no longer exhibits a potential to impact adversely public safety or the environment. NAC 519A.325(3).

(B) Closure of all open pits where public access is not restricted.

Final closure requirements for pits and pit lakes are site-specific and based on existing and predicted future water quality along with any potential effects to possible receptors. NAC 445A.447, in conjunction with NAC 445A.359 and 445A.378, require submittal of a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of any portion of a mining operation that may release pollutants, including but not limited to open pits and pit lakes. NAC 445A.429 prohibits pit lakes that have the potential to affect adversely the health of human, terrestrial or avian life, or to degrade groundwater. NAC 519.345 requires open pit mines to perform activities that will provide for public safety; stabilization of pit walls or rock faces where required for public safety; and construction and maintenance of berms, fences or other means to restrict access. NAC 519A.345(a-c) The Nevada guidance document titled, "Pit Lake Water Quality Characterization Program – NDEP Profile III," requires evaluation of existing and predicted pit lake water quality using an ecological risk assessment methodology, augmented with approved mitigating actions as warranted to comply with NAC 445A.429.

NAC 519.345 requires performing activities that will provide for public safety; stabilizing pit walls or rock faces where required for public safety; constructing and maintaining berms, fences or other means of restricting access. Construction of the required pit safety berm also serves as a permanent structure to prevent stormwater inflow into the pit to provide better long-term pit wall stability and prevent impounding Waters of the State.

As part of its plan for reclamation, a permittee must provide for a productive post-mining use of the land. NAC 519A.275(1). NAC 519A.275 sets forth the requirements for productive post-mining use of land. The productive post-mining

use of the land must be submitted with a plan for reclamation and need not identify a use of the land or degree of productivity which is identical to the pre-mining use or degree of productivity. NAC 519A.275(2). Land which is returned to its pre-mining use or reclaimed after mining or exploration to a level of productivity which is generally consistent with the pre-mining level of productivity or the level of productivity of the surrounding land shall be deemed to be a productive post-mining use. Land which is reclaimed to a degree of productivity which is less productive than its pre-mining use shall be deemed to be productive if the operator takes reasonable measures to: ensure adequate fertilization of the soil; ensure the quantity and quality of the topsoil or growth medium; and establish a productive post-mining use of the land within site-specific economic and technical constraints of the area. NAC 519A.275(3). Land subject to excessive erosion will not be deemed to be reclaimed to a productive post-mining use unless excessive erosion existed before mining or exists on the adjacent land. NAC 519A.275(4). Evidence of the excessive erosion must be provided by the operator to the Division. Id. If the operator is not the owner of the surface of the affected lands, the Division shall consider any comments received from the landowner in making the final determination that the proposed plan for reclamation adequately provides for a productive post-mining use of the land. NAC 519A.275(5).

Pursuant to NAC 519A.280 approval is required for the proposed post-mining use of land. Notwithstanding any other provisions of NAC 519A.010 to 519A.415, inclusive, a proposed post-mining use of land must be approved by: if the land is subject to the jurisdiction of the BLM, the USFS, or another federal land management agency, the federal land manager; or if the land is privately owned and if required by law, a local governmental entity with the authority to approve the post-mining use of private land within its jurisdiction. NAC 519A.280(1),(2).

The SRCE program has a specific calculation module, which determines the construction cost for the required pit perimeter safety berm and the associated revegetation cost for long-term soil stability. If determined to be necessary, the SRCE program has the ability to calculate fencing and/or signage costs. The Bureau's Reclamation Branch prefers pit safety berm of approximately 4-5 feet in height rather than the use of long-term maintenance items like fencing for public safety upon the pit closure. Construction of the required pit safety berm also serves as a structure to prevent stormwater inflows.

(C) Structures that are considered to be critical structures to be designed for a long-term static factor of safety of 1.5 or greater.

Nevada WPC regulations do not have explicit FOS requirements for non-process structures within open pits. However, if site-specific conditions warrant initiating stability requirements for protection of waters of the State then those requirements can be included in the WPCP for the facility.

Pursuant to NAC 445A.397, the engineering design report for process components at a mine facility must include, among other things, an evaluation of structural stability. The Nevada guidance document, "Stability Requirements Heap Leach Pads," recommends minimum factors of safety of 1.3 (static) and 1.05 (pseudostatic), although lower factors of safety may be acceptable if the design engineer can demonstrate that the displacement from the design seismic event will not compromise the integrity of the fluid management system or cause a release of contaminants to waters of the State. The Division does not concur that a FOS of 1.5 is necessary for critical structures. Typically, mine pits in Nevada do not contain critical structures or a need for regulation of structural stability. However, the potential impact of pit wall failure on future pit lake quality may be a relevant concern, in which case the Division may require further characterization, evaluation, and appropriate treatment or other mitigation of future pit lake water, as part of the Final Plan for Permanent Closure and Pit Lake Study. Once approved by the Division, these plans are incorporated into the WPCP by reference, and become enforceable requirements.

Process components are subject to NAC 445A.433 Minimum design criteria: Universal requirements; areas where groundwater is near surface; proximity of new process components to dwellings; liability for degradation of water. Subsection 1(f): the design of the process components must take into consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material, which endangers primary or secondary containment integrity.

(D) Structures that are considered to be non-critical structures to be designed for a long-term static factor of safety of 1.3 or greater.

Nevada WPC regulations do not designate a FOS for non-process structures within open pits. However, if site-specific conditions warrant initiating stability requirements for protection of waters of the State then those requirements can be included in the WPCP for the facility.

NAC 445A.397 states that the engineering design report must include an evaluation of structural stability. Nevada WPC regulations do not formally designate structures as being critical or non-critical. Rather, the regulations focus on portions of a mining operation that have a potential to degrade waters of the State. Those portions of the operation are subject to more regulations to eliminate that potential. The Division objects to the proposed regulation's stability evaluation requirement for non-critical structures. If the Division determines that the stability of a component is important for protecting waters of the State or achieving other regulatory requirements, then that component would be regulated

accordingly on a site-specific basis. The design of the process components must take into consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material, which endangers primary or secondary containment integrity. See NAC 445A.433(1)(f).

(E) Units being closed be designed for a factor of safety of 1.1 or greater under pseudostatic analysis.

Nevada WPC regulations do not designate a FOS for non-process structures within open pits. However, if site-specific conditions warrant initiating stability requirements for protection of waters of the State then those requirements can be included in the WPCP for the facility.

The Nevada guidance document, "Stability Requirements Heap Leach Pads," recommends minimum factors of safety of 1.3 (static) and 1.05 (pseudostatic). Although lower factors of safety may be acceptable if a licensed professional design engineer can demonstrate that the displacement from the design seismic event will not compromise the integrity of the fluid management system or cause a release of contaminants to waters of the State. The seismic stability provision is more reasonable than a fixed pseudostatic FOS limit of 1.1, as proposed under CERCLA 108(b). Nevada's WPC regulations do not designate FOS requirements for non-process structures within open pits; however, the stability requirements for heap leach pads can be applied to other components if their potential to degrade waters of the State is dependent on their structural stability. As described in the two preceding sections above Nevada sets stability requirements based on site-specific needs and criteria. See NAC 445A.433(1)(f).

(F) A stability analysis to be conducted for the unit and include evaluation for static and seismic induced liquefaction.

As described in the open pit category initial comments and two preceding sections above Nevada sets stability requirements based on site-specific needs and criteria. Liquefaction is not generally a concern in hard rock mining in Nevada's arid climate and subsurface conditions; however, if it were a concern, the seismic stability assessment would need to evaluate it and provide appropriate mitigation as warranted.

(iii) SEDIMENT AND STORMWATER MANAGEMENT IN THE AREA OF OPEN PITS

A plan for the management of all stormwater and sediment generated during reclamation and following closure that includes permanent stormwater conveyances, ditches, channels, and diversions, as necessary, designed to convey the peak flow and

ponds and other collection devices, and that provides for controls designed to store the volume generated during a 24-hour period by a 200-year return interval storm event.

In Nevada, "…. [o]pen Pit mines must, to the extent practicable, be free draining or left in a manner which minimizes the impoundment of surface drainage and the potential for contaminants to be transported and degrade the wate rs of the State…." NAC 445A.429(2). NAC 445A.446 also, mine facilities m ust be monitored for up to 30 years following the completion of permanent closure actio ns to prevent degradation of waters of the State. NAC 445A.446(2). NAC 445A.433 establshes the minimum design criteria for process components at mine facilities. This regulat ion requires these components to remain fully functional and fully contain all process fluids including all accumulations from a 24-hour storm event with a 25-year recurrence int erval. NAC 445A.433(1)(d). The minimum design criteria for process components also require the ability to withstand a 24-hour storm event with a 100-year recurrence interval. NAC 445.433(1)(c). The Division has the discretion to require addition storm capacity based on site-specific factors such as proximity to surface water bodies, depth to groundw ater, and proximity to population. NAC 445A.433(d)(1-3) In exercising this discretion , the Division must use its best engineering judgment to determine whether more or less engineered containment must be provided than the established minimum design cri teria. NAC 445A.432. The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommend s that all closure components be designed to withstand run-off from a 24-hour storm event with a 500-year recurrence interval.

NAC 519A.270(12) provides that a plan for reclamati on must include a description of the best management practices employed during operation and reclamation to control erosion and minimize the transport and delivery ofsediment to surface water, which must be the best management practices described in the S tate of Nevada Handbook of Best Management Practices or practices equivalent theret o. Land subject to excessive erosion will not be deemed to be reclaimed to a productive post-mining use unless excessive erosion existed before mining or exists on the adja cent land. NAC 519A.275(4) Evidence of the excessive erosion must be provided by the operator to the Division. Id.

The SRCE program includes a specific Diversion Ditc h and Sediment pond calculation module to determine the construction costs for stor mwater diversions, conveyances, safety berms and sediment control ponds. This calc ulation takes into account the calculated disturbance size required to prevent surface water run on into a pit to meet the requirement to prevent impounding waters of the Sta te. Construction of the safety berm typically prevents stormwater from directly enterin g thru a pit high wall and therefore significantly reduces the opportunity for a pit wall stability failure.

A WPCP issued by the Division includes a standard provision that states as follows: (WPCP Part I.I): The Permittee shall inspect all control devices, systems, and facilities weekly (for closure permits consider relaxing frequency, but no t more than necessary, if site is not

continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system)., and drainage and containment systems shall also be inspected during (when possible), and after major storm events. These inspections are performed to detect evidence of deterioration, malfunction, or improper operation of control or monitoring systems; sudden changes in the level of the contents of data from any monitoring device; the presence of liquids in leak detection systems; and severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices.

(iv) PIT LAKES AND PIT LAKE MANAGEMENT

Where conditions at the open pit may allow a pit lake to form, or where meteoric water may percolate through the pit rock into groundwater below, and pit lake or any discharges may not meet water quality standards, a plan for the minimization, prevention, or collection and treatment of water in the pit lakes, discharges, and/or seepage, that factors in information on site hydrology, water quality characterization information, and pit lake ecological risk assessment information. The plan must address and provide for capture and treatment at closure consisting of a capture and treatment system that meets a minimum 200-yr life design criteria, and that is designed to either prevent pit lake formation or groundwater contamination exceeding applicable water quality standards to achieve at least a 95 percent capture efficiency of the affected groundwater, and to meet applicable water quality standards.

The Division requires mining and mineral production facilities to submit a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of any portion of a mining operation that may release pollutants, including but not limited to open pits and pit lakes. NAC 445A.447, 445A.359, 445A.378. A permittee is prohibited from impounding water in a pit lake which has the potential to affect adversely the health of human, terrestrial or avian life, or to degrade groundwater. NAC 445A.429(3). The Nevada guidance document titled, "Pit Lake Water Quality Characterization Program – NDEP Profile III," requires evaluation of existing and predicted pit lake water quality using an ecological risk assessment methodology, augmented with approved mitigating actions as warranted to comply with NAC 445A.429. Evaluation of pit lake water quality is accomplished using comprehensive data on groundwater and pit lake elevations, water quality analyses of pit lakes and groundwater, and representative analyses of rock exposed in pit walls. This data is incorporated into Hydrogeochemical models to predict long-term water quality, water elevations, and whether the pit lake will be a hydrological (evaporative) sink or include a flow-through component to groundwater. Approved mitigating actions may include capture and water treatment, pit backfill, and/or other preventative and remedial actions. The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure components used in such mitigating actions be designed to withstand the 24-hour, 500-year storm event.

NAC 519A.345 requires the Division to implement measures to stabilize, manage, control or treat mine-impacted waters. Also, NAC 519A.360 sets-forth the requirements for the amount of surety an operator must post to ensure reclamation of the area affected by the mining project or operation.

NAC 519A.325 requires a permittee, under certain circumstances, to remove and stockpile topsoil for reclamation and avoid creating depressions in land surfaces. The regulation provides that if practicable and necessary for the establishment of the post-mining use of the land, sufficient topsoil, if available, must be removed during the creation of a disturbance and stockpiled for use in future reclamation. NAC 519A.325(1). The stockpile must be posted to identify the material, and stabilized as necessary to prevent excessive losses from erosion. Id. If topsoil is unavailable, any growth medium to be used that requires removal and stockpiling must be managed in the same manner as topsoil. Id. The creation of a depression during reclamation which may form a pond must be avoided unless the pond is part of the post-mining use of the land. NAC 519A.325(2). Stabilization is achieved when an area which has been reclaimed no longer exhibits a potential to impact adversely public safety or the environment. NAC 519A.325(3).

If the Division determines that there has been a variation in a parameter or element monitored by the site-monitoring system as required in NAC 445A.440 which is caused by the facility and has the potential to degrade the waters of the State, there are two response actions. NAC 445A.441. First, the holder of the permit must conduct and submit an evaluation to the Department which: identifies the source and escape pathways of the elements of concern; determines the type, extent and ability of a system needed to contain or confine any migrating contaminant; and identifies methods which can be carried out to remediate the contamination during the continued operation of the facility or at permanent closure. NAC 445A.441(1)(a-c). Second, the Department must, based on the information provided by the permittee: require the immediate shut down of the process component and the immediate initiation of cleanup activities; allow continued operation of the process component which is the source of the elements of concern with concurrent cleanup activities; allow continued operation of the process component which is the source of the elements of concern while requiring the facility to continue to control the migration of the contaminant while cleanup activities are postponed; or determine that no remedial action is warranted at the present time. NAC 445A.441(2)(a-d).

The SRCE program has a supplemental User Tab module with the ability to implement supplemental User pages to provide for calculations and a surety amount as reclamation costs related to any pit lake water treatment, if the Division determines that such surety is required by the WPCP. The User page reclamation cost subtotal is linked to the SRCE summary page to be inclusive of the total reclamation surety subtotal reclamation amount and therefore becomes part of the calculated percentage government in-direct administration costs.

A WPCP issued by the Division includes a standard provision that states as follows: (WPCP Part I.N.1): The Permittee shall submit to the Division for review and approval an updated groundwater flow model, pit lake study, and ecological risk assessment with each Permit renewal and with any application to modify the Permit that could affect the pit lake predictive model. The study and assessment shall address, at a minimum, the requirements of NAC 445A.429, and shall include all available data, alternative pit lake or backfill scenarios, and mitigations to reduce ecological risk, as applicable. Approval may require modification of the Permit and payment of modification fees.

(v) MANAGEMENT AND AVOIDANCE OF GEOCHEMICALLY ACTIVE MATERIALS; SAMPLING AND MONITORING

If prevention/avoidance is relied on, a management plan that demonstrates geochemically active materials will effectively be avoided, and that includes provisions for sampling and monitoring documentation.

A final mine plan is approved based on site-specific information (NAC445A.396 Contents of Application: Assessment of Area of Review and NAC445A.396 Meteorological Report and Analysis of Samples) including but not limited to an overall site conceptual model, groundwater and surface water characteristics, evaluation of all subsurface materials for the potential to release contaminants and/or generate acid, and the chemical interaction of materials with meteoric water. Per NAC 445A.397 –Engineering Design Report Specifications for Fluid Management System–the final plan must address how the permittee will manage geochemically active materials. Also, per NAC 445A.398–Proposed Operating Plans–the effective management of potentially acid generating materials could include but not limited to avoidance on the mine plan or designing and implementing the construction of cells within waste rock facilities, lining waste rock facilities, blending with lime or other neutralizing material.

The program to monitor the site of a facility mustbe designed to monitor the quality of all ground and surface water which may be affected by the facility. NAC 445A.440(1). The type, number and location of the monitoring points must be described in the application as part of the monitoring plan and must be approved by the Department. Id. Final monitoring requirements must be established by the Department. NAC 445A.440(2). Baseline data must be collected before operation ofthe facility. NAC 445A.440(3). In areas where there is a substantial separation between the process components and the groundwater, a system for monitoring highly probable escape pathways in the unsaturated zone may be required by the Department. NAC 445A.440(4). The decision where to locate the monitoring points for the site must be made after considering the site's geology and hydrogeology. NAC 445A.440(5).

NAC 445A.429 requires prevention/avoidance of pit lakes to the extent practicable, which must be included in the fluid management and engineering design plans for a WPCP, the

contents of which are described in NAC 445A.398 and 445A.397, respectively. Periodic sampling and monitoring provisions for waste rock, groundwater, and any surface water present at the mine site are included in each WPCP. However, if prevention/avoidance is insufficient to protect waters of the State, other mitigating actions are required, possibly including but not necessarily limited to water treatment and pit backfill.

A WPCP issued by the Division includes a standard provision that states as follows: (WPCP Part I.I.): The Permittee shall inspect all control devices, systems, and facilities weekly (for closure permits consider relaxing frequency, but no t more than necessary, if site is not continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system), and duri ng (when possible) and after major storm events. These inspections are performed to d etect evidence of, deterioration, malfunction, or improper operation of control or mo nitoring systems; sudden changes in the data from any monitoring device; the presence o f liquids in leak detection systems; and severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices.

(vi) CONCURRENT OR SEQUENTIAL RECLAMATION OF OPEN P IT MINED AREAS

Requirements for concurrent or sequential reclamation of mined areas as they become available prior to final cessation of operations and closure.

NAC 445A.446(1)(c) states that the permanent closure of a facility must be initiated when the end of the design life of that process component is reached.

NAC 519A.285 describes the time when reclamation must be initiated and completed and the process for requesting an extension of time. If affected land cannot practicably be reclaimed concurrently with an exploration projector mining operation, reclamation must be initiated within two years after completion or abandonment of the exploration project or mining operation; within 3 years after a temporary closure of an exploration project or mining operation; or as required by the BLM, the US FS or another federal land management agency. NAC 519A.285(1)(a-c). The Divisi on may grant the operator one or more extensions of the time to initiate reclamation if the operator of an exploration project or mining operation demonstrates that a rea sonable likelihood exists that the project or operation will resume, based on a consid eration of factors including, but not limited to: the presence of additional mineralizati on of the commodity being mined or other commodities in commerce; historical fluctuati ons in the value of the commodity being mined or other commodities present if they ca n be mined using the same disturbances; the design life of any beneficiation process components existing at a mining operation; and if the closure was caused because of litigation. NAC 519A.285(2)(a-d). Each extension is for a 3-year period. NAC 519.285(2). Once initiated, final reclamation activities must be completed as set forth in an app roved plan for reclamation, unless the exploration project or mining operation is reactivated. NAC 519A.285(3). The contents of

plan for reclamation for mining operation requires a proposed schedule of the time for initiation and completion of activities for reclamation. NAC 519A.270(6).

NAC 519A.250 provides certain exemptions from these requirements for open pits and rock faces. Under that statute, the Division may grant an operator of open pits or rock faces an exception from the reclamation requirements under NAC 519A.010 to 519A.415 if reclamation is not feasible. NAC 519A.250(1-2). The Division shall base its determination of the feasibility of reclaiming open pits and rock faces on the technological and economic practicability of achieving a safe and stable condition suitable for a productive post-mining land use. NAC 519A.250(3). The Division shall consider, without limitation, the: topography of the site; geology and stability of the site; time required to complete reclamation; consumption of resources required to complete reclamation; potential adverse environmental impacts to the quality of the air and water associated with the activities for reclamation; and future access to mineral resources. NAC 519A.250(3)(a-f). Upon request by the applicant, the return of material to the open pit from which it was extracted shall be considered not feasible for the purposes of reclamation. NAC 519A.250(4). If an open pit or rock face is exempted from reclamation, public safety must be provided for by means other than reclamation, including, but not limited to, restrictions on access to the site or restrictions on the deed to the property. NAC 519A.250(5).

Pursuant to NAC 519A.255, reclamation is not required beyond what is approved by federal agency. Specifically, if an operator can establish to the satisfaction of the Division that reclamation was approved by the BLM, the USFS or another federal land management agency, further reclamation is not required on affected land. NAC 519A.255.

The Nevada program for bonding uses the SRCE program, which bases costs on Davis Bacon wages and rental equipment rates, the Caterpillar Equipment Performance handbook and contractor/government markups. It is an incentive for operators to begin concurrent reclamation scheduled with operations and existing equipment and labor. The potential for completing the work at a cost much lower than the SRCE model is great enough to make it an attractive option and allows for concurrent release of bond funds as the work is completed or shifting of those released funds to future disturbance activities.

RESPONSE CATEGORY 2--UNDERGROUND MINING [Proposed 40 CFR 320.63(a)(ii)]

GENERAL COMMENTS

On a site-specific basis The State of Nevada meets or exceeds all of the requirements listed for the underground mine category.

Nevada WPC regulations do not have specific FOS requirements for non-process structures within and adjacent to underground mines. However, if site-specific conditions warrant initiating stability requirements, then those requirements are included in the WPCP for the facility. The Nevada program uses site-specific information to develop reclamation and closure plans that

meet the long-term needs of each individual undergr ound mine. Most of Nevada's mines are in isolated locations where stability requirements for non-process components other than erosion and storm control components are not necessary. Du ring mine operations the Federal Mine Safety and Health Administration regulate mine stability requirements to maintain a safe working environment. An example of when Nevada may requirestability requirements post closure for an underground mine would be to protect any critical stormwater controls.

Currently, process components at Nevada mine facili ties at a minimum must be constructed to contain a 25-year, 24-hour storm event and to withs tand a 100-year, 24-hour storm event. Per regulation, based on site-specific factors such as proximity to surface water bodies; depth to groundwater; and proximity to population the Divisi on may require additional storm event capacity. In Nevada mine closure guidance, the Div ision recommends that facilities be constructed to withstand a 500-year, 24-hour event. The Division has been considering a change to Nevada closure regulations to require that close d facilities at a minimum are designed to contain the 500-year, 24-hour storm event if contai nment is necessary and withstand the erosional effects of a 500-year, 24-hour storm event.

(i) SAFETY AND PREVENTION OF PUBLIC ACCESS TO UNDERGROUND MINES

A plan to address public safety by prevention of pu blic access by means of security fencing, or other effective methods.

NAC 513.390 requires the use of a barricade, fence,permanently anchored seal, or backfill to secure dangerous conditions at a mine, which inc ludes surface or underground mines as well as any development, beneficiation plant, mi ll, smelter, refinery or other facility used to treat or reduce any mineral commodity, whet her or not contiguous to an area where exploitation or extraction of mineral commodities occurs. An underground mine is considered a borehole under NAC 534.047, and boreholes must be plugged in accordance with NAC 534.4371.

NAC 519A.345 describes the authority of Division to require operator of mining operation to perform certain types of reclamation. The Divisi on may, if appropriate, require an operator of a mining operation to reclaim undergrou nd mines by: sealing shafts, adits, portals and tunnels to prevent access; constructing and maintaining berms, fences or other means of restricting access; and implementing measures to stabilize, manage, control or treat mine-impacted waters. NAC 519A.345(10)(a-c).

NAC 519A.260(1) requires the pre- and post-mining u se of the land be considered in preparing a plan for reclamation. NAC 519A.270(16) requires a description of any necessary monitoring or maintenance of any fencing or signs. 519A.345(9)(c) requires construction and maintaining berms fences or other means of restricting access.

In addition, 30 CFR Part 56 "Safety and Health Standards—Surface Metal and Non-Metal Mines", Section 56.20011 and Part 57 "Safety and Health Standards –Underground Metal and Non Metal Mines" Section 57.20011 both require mine operators to install barricades (e.g., fencing, concrete barriers, barrels, etc.) and erect warning signs at active mine sites for employee and public safety.

Other authorities and resources that are considered in the Bureau's determination as to the most effective means for preventing public access include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

The SRCE program has a specific calculation module for the reclamation cost of closing both vertical shafts and horizontal declines (adits) to provide for public safety. The primary method for adit closure is the construction use of rock backfill, concrete plug or an expanding foam type plug. The program accounts for the option of bat gates if the State of Nevada Division of Wildlife makes a determination they are necessary. Vertical shafts costs are primarily calculated for a concrete steel reinforced cap with 10 feet of backfill material over the cap. An expanding foam plug is also another cost option for vertical shaft closure.

(ii) MANAGEMENT OF DISCHARGE AND SEEPAGE FROM UNDERGROUND MINES

A plan for the minimization, prevention or collection and treatment of discharges and or seepage based on site hydrology and water quality characterization information that provides for necessary additional source controls and/or capture and treatment at closure, all of which meet a minimum 200-year life design criteria, and includes:

NAC 445A.447(1) requires submittal of a final plan for permanent closure to prevent degradation of waters of the State by any portion of a mining operation that may release pollutants, including but not limited to underground mines. See, NAC 445A.378 and 445A.359. The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," requires that a final plan for permanent closure clearly demonstrate through the use of credible source, pathway and fate evaluations, modeling, or other projections that the underground mine does not have the potential to degrade waters of the State. NAC 445A.357 defines degradation of waters of the State as any alteration or change in concentration in violation of the water quality standards established at NAC 445A.424.

The aforementioned guidance document also recommends that closure components be designed to withstand the 24-hour, 500-year storm event.

(A) If seepage and/or discharge water quality is not expected to meet applicable water quality standards, requirements for a capture and treatment system

designed to achieve at least a 95 percent capture efficiency and to meet applicable water quality standards.

NAC 445A.424(1)(b) prohibits a mine facility from degrading groundwater to the extent that a state or federal drinking water standard is exceeded, the weak acid dissociable (WAD) cyanide concentration exceeds 0.2 mg/L, or from degrading surface water to the extent that the quality of surface water of higher quality is lowered below that allowed by NRS 445A.565. If seepage and/or a discharge does not, or is not expected to, meet applicable water quality standards, the permittee must implement an approved plan to eliminate the degradation and meet the standards per NAC 445A.424 which states that a facility regardless of size or type, may not degrade waters of the State. Such a plan may include a capture and treatment system (however, the capture efficiency is not dictated by regulation; only the resultant water quality is), or another method, such as elimination of influent water or chemical stabilization of the source material per NAC 445A.379, which defines stabilization as a condition which results when contaminants in a material are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may reasonably be expected to exist at a site.

NAC 519A.345(10) requires a mine operator to implement measures to stabilize, manage, control or treat mine-impacted waters. Also, NAC 519A.360 sets-forth the requirements for the amount of surety an operator must post to ensure the continuation of post-reclamation stabilization, management, control and treatment of mine-impacted waters to protect the waters of the State.

The SRCE program includes a specific calculation module to determine construction costs for stormwater diversions, conveyances and sediment control ponds based upon the calculated disturbance size required to control surface water discharge. The SRCE program has the ability to implement a supplemental SRCE User page to provide calculations and a surety amount for reclamation costs as they relate to any surface water discharge and treatment required by a WPCP. The User page reclamation subtotal cost is linked to the SRCE summary page to be inclusive of the total reclamation surety amount and therefore any water treatment costs become part of the calculated percentage government in-direct administration costs.

(B) If there will be a pressurized plug as a permanent feature controlling a discharge from underground mine workings at moderate to high heads (100-1,000+ kPa), a requirement to maintain the plug as a permanent feature.

NAC 513.390 requires "[p]ermanently anchored seals constructed of material not subject to rapid decomposition and, if used to secure a vertical opening, strong enough to support the weight of any person or animal." NAC 534.4371 also

requires plugging of underground mine portals (boreholes) where a hydraulic head was encountered using neat cement across the water-confining formations so that the plugging fluid penetrates the geologic formation to prevent the vertical movement of water. Pursuant to NAC 445A.367 and 445A.447 all potential pollutant sources at a mine facility must be permanently closed to prevent degradation of waters of the State.

The SRCE program has a specific calculation module to account for the reclamation cost for a permanent concrete re-bar reinforced portal closure plug. If a mining engineer determines that a more robust structure is required, SRCE contains a User page to account for any additional engineer calculations and adjust for any additional reclamation costs.

(iii) MANAGEMENT AND AVOIDANCE OF GEOCHEMICALLY ACTIVE MATERIALS; SAMPLING AND MONITORING

If prevention/avoidance is relied on, a management plan that demonstrates geochemically active materials will effectively be avoided, and that includes provisions for sampling and monitoring documentation.

The program to monitor the site of a facility must be designed to monitor the quality of all ground and surface water which may be affected by the facility. NAC 445A.440(1). The type, number and location of the monitoring points must be described in the application as part of the monitoring plan and must be approved by the Department. Id. Final monitoring requirements must be established by the Department. NAC 445A.440(2). Baseline data must be collected before operation of the facility. NAC 445A.440(3). In areas where there is a substantial separation between the process components and the groundwater, a system for monitoring highly probable escape pathways in the unsaturated zone may be required by the Department. NAC 445A.440(4) The decision where to locate the monitoring points for the site must be made after considering the site's geology and hydrogeology. NAC 445A.440(5).

NAC 445A.424(1) prohibits degradation of waters of the State. Each WPCP includes provisions for periodic sampling and monitoring of waste rock, groundwater, and any surface water present at the mine site. However, if prevention/avoidance is insufficient to protect waters of the State, other mitigating measures are required and possibly include but are not limited to water treatment, backfill, or source elimination.

A permit application must include an assessment of the area or review, as required by NAC 445A.395, and a meteorological report and results of testing samples representative of the overburden, waste rock, and ore at the proposed site, as required by NAC 445A.396. A through site assessment is completed to develop a site conceptual model which includes detail assessment of the subsurface soils, rocks and groundwater hydrology. This information is used to guide the development of the mine plans for containment and

protection of waters of the State. The Division requires plans for management of process fluids, monitoring the facility, and emergency response. The WPCP also establishes permit monitoring requirements, which include sample locat ions and analytical and reporting frequency requirements.

The SRCE program has a specific reclamation cost ca lculation Monitoring module for calculating each monitoring well and surface water- sampling interval, including labor hours required for collecting samples per requiredapproved time intervals. Water analysis costs are included for a minimum of five years post mine closure or more years as determined by the WPCP. The calculation also includes a well closure cost based upon the depth to the ground water table.

(iv) CONCURRENT OR SEQUENTIAL RECLAMATION OF UNDERGROUND MINE AREAS

Requirements for concurrent or sequential reclamation of mined areas as they become available prior to final cessation of operations and closure.

NAC 445A.446.1c States that the Permanent closure o f a facility must be initiated when the end of the design life of that process component is reached.

NAC 519A.285 describes the time when reclamation must be initiated and completed and the process for requesting an extension of time. If affected land cannot practicably be reclaimed concurrently with an exploration projector mining operation, reclamation must be initiated within 2 years after completion or abandonment of the exploration project or mining operation; within 3 years after a temporary closure of an exploration project or mining operation; or as required by the BLM, the US FS or another federal land management agency. NAC 519A.285(1)(a-c). The Divisi on may grant one or more extensions of the time to initiate reclamation if t he operator of an exploration project or mining operation demonstrates that a reasonable lik elihood exists that the project or operation will resume, based on a consideration of factors including, but not limited to: the presence of additional mineralization of the co mmodity being mined or other commodities in commerce; historical fluctuations in the value of the commodity being mined or other commodities present if they can be m ined using the same disturbances; the design life of any beneficiation process compon ents existing at a mining operation; and if the closure was caused because of litigation NAC 519A.285(2)(a-d). Each extension is for a 3-year period. NAC 519.285(2). Once initiated, final reclamation activities must be completed as set forth in an approved plan for reclamation, unless the exploration project or mining operation is reactivated. The contents of plan for reclamation for mining operation requires a proposed schedule of the time for initiation and completion of activities for reclamation. NAC 519A.270 (6).

The SRCE program bases costs on Davis Bacon wage ra tes, rental equipment, the Caterpillar Equipment Performance handbook and cont ractor/government markups. It incentivizes operators to begin concurrent reclamat ion scheduled with operations and

existing equipment and labor, which reduces reclamation costs and allows for concurrent release of bond funds as the work is completed or transfer of those released funds to future disturbance activities.

RESPONSE CATEGORY 3—WASTE ROCK [Proposed 40 CFR 320.63(a)(iii)]

GENERAL COMMENTS

On a site-specific basis the State of Nevada meets or exceeds all of the requirements listed for the waste rock category.

Nevada WPC regulations do not have specific FOS requirements for non-process structures within and adjacent to waste rock facilities. However, if site-specific conditions warrant initiating stability requirements, then those requirements are included in the WPCP for the facility. The Nevada program uses site-specific information to develop reclamation and closure plans that meet the long-term needs of each individual waste rock facility. Most of Nevada's mines are in isolated locations where stability requirements for non-process components other than erosion and storm control components are not necessary. During mine operations the Federal Mine Safety and Health Administration regulate mine stability requirements to maintain a safe working environment. Nevada may, for example, require stability requirements post closure of a waste rock facility to protect any critical stormwater and erosion controls.

Currently, process components at Nevada mine facilities must be constructed, at a minimum, to contain a 25-year, 24-hour storm event and to withstand a 100-year, 24-hour storm event. Per regulation, based on site-specific factors such as proximity to surface water bodies; depth to groundwater; and proximity to population the Division may require additional storm event capacity. In Nevada mine closure guidance, the Division recommends that facilities be constructed to withstand a 500-year, 24-hour event. The Division has been considering a change to Nevada closure regulations to require that closed facilities at a minimum are designed to contain the 500-year, 24-hour storm event if containment is necessary and withstand the erosional effects of a 500-year, 24-hour storm event.

(i) SAFETY AND PREVENTION OF PUBLIC ACCESS TO WASTE ROCK DUMPS

A plan to address public safety by prevention of public access by means of security fencing, or other effective methods.

NAC 519A.260(1) requires that a plan for reclamation consider the pre and post-mining use of the land. NAC 519A.270(16) requires that the plan for reclamation include a description of any necessary monitoring or maintenance of any fencing or signs. 519A.345(9)(c) requires construction and maintaining berms fences or other means of restricting access.

Other authorities and resources that are considered in the Bureau's determination as to the most effective means for preventing public access include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; WPCP requirements and limitations; and Approved Final Plan for Permanent Closure.

In addition, 30 CFR Part 56 "Safety and Health Standards—Surface Metal and Non-Metal Mines", Section 56.20011 and Part 57 "Safety and Health Standards –Underground Metal and Non Metal Mines" Section 57.20011 both require mine operators to install barricades (e.g., fencing, concrete barriers, barrels, etc.) and erect warning signs at active mine sites for employee and public safety.

The SRCE program has a specific calculation module which lists each waste rock facility for reclamation using an "as-built" input to reflect the existing waste rock slopes and an input for the final slope stability topography, which typically ranges from 2.5:1 to 3.0:1 to achieve final slope stability. The program calculates the total volume of re-graded cubic yards of material to be pushed down for each facility to achieve the final slope stability. The program also calculates the reclamation cost based upon the dozer(s) productivity timeframe and the associated hourly labor cost based upon the equipment's productivity to perform the reclamation activity. The dozer(s) time includes rental rate hours, fuel consumption and the wear maintenance costs as detemined by the Caterpillar Handbook. The waste rock module also calculates a volume and cost for placement of salvaged growth medium based on the required depth, the final acreage of re-graded topography, the distance from the growth medium stockpile source and the scarification and re-seeding of both the top and the side slopes. The regrading and revegetation requirements as adjusted for a waste rock facility provides for the final slope topography to establish long-term stability and to meet the required productive post-mining land use. Therefore, restricting of public access is not required.

(ii) MANAGEMENT AND AVOIDANCE OF GEOCHEMICALLY ACTIVE MATERIALS; SAMPLING AND MONITORING

If prevention/avoidance is relied on, a management plan that demonstrates geochemically active materials will effectively be avoided, and that includes provisions for sampling and monitoring documentation.

NAC 445A.398, NAC 445A.416, and NAC 445A.417 requires that a permit application or any modification to an existing permit include the proposed operating plans (or changes to the proposed operating plans) for the facility. The plan must include a description and the range of operating conditions for which the components were designed; and a plan for the management of process fluids, which describes the methods to be used for the monitoring and controlling of all process fluids. NAC 445A.396 requires that a permit application must include the results from testing samples from the facility's mine site

which are representative of the overburden, waste rock, and ore at the mine site and that these samples must be evaluated for their potential to release pollutants and degrade waters of the State. When there is potential to degrade, NAC 445A.393 allows the Division the authority to require a higher standard of containment or monitoring or both. This is accomplished with a Division-approved waste rock management plan, which details the placement and management of benign and chemically reactive waste rock. This is described in greater detail in the Division Guidance Document "Waste Rock, Overburden, and Ore Evaluation". The operating plan must include the following: a description of the means to evaluate the conditions in the fluid management system so as to be able to quantify the available storage capacity for meteoric waters and to define when and to what extent the designed containment capacity has been exceeded; a plan for monitoring the facility which describes the water quality in the area; the monitoring locations the applicant proposes to sample routinely in order to evaluate surface and groundwater at the site that may be affected by the operation of the facility; an analytical profile of each surface and groundwater that may be affected by the operation of the facility; and the locations of the leak detection systems, the frequency for sampling these systems and the analytical profile to be used for evaluation of the samples. NAC 445A.398(2-3).

The program or methodology utilized to monitor the site of a facility must be designed such that the quality of all ground and surface water which may be affected by the facility is monitored. NAC 445A.440(1). The type, number and location of the monitoring points must be described in the application as part of the monitoring plan and must be approved by the Department. Id. Final monitoring requirements must be established by the Department. NAC 445A.440(2). Baseline data must be collected before operation of the facility. NAC 445A.440(3). In areas where there is a substantial separation between the process components and the groundwater, a system for monitoring highly probable escape pathways in the unsaturated zone may be required by the Department. NAC 445A.440(4). The decision where to locate the monitoring points for the site must be made after considering the site's geology and hydrogeology. NAC 445A.440(5).

A WPCP issued by the Division includes a standard provision that states as follows: (WPCP Part I.N.): states that the Permittee shall submit to the Division for review and approval an updated waste rock management plan (WRMP) with each Permit renewal and with any application to modify the Permit that could affect the WRMP. A revised WRMP must also be approved prior to initiating mining or in-pit backfill activities not previously approved. The WRMP must include representative characterization data for all anticipated waste rock and overburden in accordance with the current version of the Division guidance document "Waste Rock, Overburden, and Ore Evaluation," in addition to a detailed description of how, when, and where the materials will be managed and monitored, and appropriate controls to eliminate any potential to degrade waters of the State, if applicable. Approval may require modification of the Permit and payment of modification fees.

NAC 445A.395 and NAC 445A.396 require completion of a thorough site assessment to develop a site conceptual model. The assessment will include but is not limited to a detailed assessment of the subsurface soils, rocks and groundwater hydrology. This information is used to guide the development of the mine plans for containment and protection of waters of the State.

For any kind of permitting action (e.g., new permit, renewal, or modification/revision), an engineering design report must be prepared and submitted to the Department by a professional engineer registered in Nevada. Pursuant to NAC 445A.397(1), the report must include engineering plans, specifications, and calculations for the waste rock dumps; topographic maps showing the location of all waste rock dumps at the facility; drawings indicating the layout of the structures and devices for controlling process fluids; methods for the control of storm flow runoff; maps indicating the existing geological and hydrogeological conditions beneath and adjacent to the site of the fluid management system and waste rock disposal sites and the degree to which these conditions provide natural containment, preferential flow pathways and structural stability; a description of the liner material utilized in the construction of the waste rock dump (if utilized) and installation procedures, including a description of the subbase preparation; details of site-monitoring systems ; and process schematics of the facility.

NAC 445A.397(1)(a-h) Specifications for constructing the fluid management system and for the material to be used must be submitted to the Department with the application for a permit, and must include, but not be limited to,the methods to be utilized for inspecting, testing, and quality assurance and control. NAC 445A.397(2). The information provided to the Division must be of sufficient detail to allow it to make factual determinations that the designs and monitoring systems for the waste rock dumps are sufficient to protect the waters of the State from degradation. NAC 445A.397(3)(b),(c).

NAC 445A.424(1) prohibits degradation of waters of the State. Each WPCP includes provisions for periodic sampling and monitoring provisions for waste rock, groundwater, and any surface water present at the mine site. However, if prevention/avoidance is insufficient to protect waters of the State, other mitigating measures are required and possibly include but are not limited to water treatment, backfill, or source elimination.

NAC 445A.432 and NAC 445A.433 set-forth the minimum design criteria and universal requirements for process components. These statutes establish minimum contaminant control technologies and require consideration of the site and operating conditions in designing individual process components. See generally, Id. Based on site characterization, best engineering judgment must be used to determine the degree to which designs must provide more or less protection through engineered containment. Id. However, the application of minimum design criteria does not release the holder of a permit from liability for degradation to waters of the State caused by the facility. NAC 445A.433(4).

In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State. NAC 445A.433(1)(a),(b). Process components must be designed to withstand the runoff from a 24-hour storm event with a 100-year recurrence interval, and the primary fluid management system must be designed to be able to remain fully functional and fully contain all process fluids including all accumulations resulting from a 24-hour storm event with a 25-year recurrence interval. NAC 445A.433(1)(c),(d). In addition, the Division may require additional storm event capacity based on site-specific factors such as proximity to surface water bodies, depth to groundwater, and proximity to population the Division may require additional storm event capacity. NAC 445A.393 states that the failure or inability to define adequately site conditions, process materials, and the probable characteristics of waste in the application of a permit may result in the Division requiring a higher standard of engineered containment or monitoring or both. This is further expanded upon in NAC 445A.397(3) which states that information [designs, etc.] submitted to the Division must be of sufficient detail to demonstrate the design of process components is sufficient to protect waters of the State.

The Division also has the option of requiring additional containment based on the proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(1)(d)(1-3). Contingency plans for managing process contaminated flows in excess of the design quantity must be described in the appropriate operating plans. NAC 445A.433(1).

The fluid management system must be designed to be functional for 5 years after the projected operating life of the process component and permanent closure period. NAC 445A.433(1)(e). The engineering designs must take into consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity. NAC 445A.433(1)(f). Additional containment may be required in areas where groundwater is considered to be near the surface. NAC 445A.433(2).

When a liner is included as part of the waste rock facility design, soil liners must have a minimum thickness of 12 inches and be compacted in lifts which are no more than 6 inches thick. NAC 445A.438(1). A soil liner must have a permeability of not more than that exhibited by 12 inches of $1x10^{-7}$ centimeters per second (cm/sec) material. Id. Synthetic liners must be rated as having a resistance to the passage of process fluids equal to a coefficient of permeability of $1x10^{-11}$ cm/sec. NAC 445A.438(2). The Division is required to review for completeness the applicant's evaluation of the following design parameters, where applicable, for a liner including the type of foundation, slope and stability; the over liner protection and provisions for hydraulic relief; the load and means of applying load;

the compatibility of a liner with waste rock drainage; the complexity of the leak detection and recovery systems (if present); the depth from the surface to all groundwater; and the liner's ability to remain functionally competent until permanent closure has been completed. NAC 445A.438(3)(a-g).

The program or methodology used to monitor the site of a facility must be designed to monitor the quality of all ground and surface water which may be affected by the facility. NAC 445A.440(1). The type, number and location of the monitoring points must be described in the application as part of the monitoring plan and must be approved by the Division. Id. The Division establishes final monitoring requirements. NAC 445A.440(2). Baseline data must be collected before operation of the facility. NAC 445A.440(3). The Division may require a system for monitoring highly probable escape pathways in the unsaturated zone in areas where there is a substantial separation between the process components and the groundwater. NAC 445A.440(4) The decision where to locate the monitoring points for the site must be made after considering the site's geology and hydrogeology. NAC 445A.440(5).

With respect to monitoring ore and waste rock, a WPCP issued by the Division includes a standard provision that states as follows: (WPCP Part I.D (Footnotes subsection)) states that the when static testing characterization of Mined Materials shows the potential for acid generation as set forth in the current version of the Division guidance document "Waste Rock, Overburden, and Ore Evaluation," the Permittee shall, as applicable, notify the Division in writing and initiate kinetic testing within 10 days.

If the kinetic test results indicate acid generation conditions exist, the Permittee shall submit in writing, within 30 days, the methods proposed for providing containment of these materials and the anticipated impact this acid generation potential may have on final stabilization of all components affected as defined in NAC 445A.359.

The Meteoric Water Mobility Procedure (MWMP) shall be performed by a Nevada-approved laboratory, in accordance with American Society for Testing and Materials (ASTM) Method E 2242 (or the most current method).

Acid Neutralizing Potential/Acid Generating Potential (ANP/AGP, also known as static testing or acid-base accounting) shall be performed by a Nevada-approved laboratory, using a LECO-type analysis, with full sulfur speciation, in accordance with the 2015 Update Nevada Modified Sobek Procedure.

Kinetic testing (humidity cell testing) shall be performed by a Nevada-approved laboratory, in accordance with ASTM Method D 5744-07 Option 'A' (or the most current approved method); tests shall be run for a minimum of 20 weeks and for a longer duration if warranted or recommended by the analytical laboratory or required by the Division; samples shall be collected weekly (all weeks) and measurements shall be recorded for

redox potential, pH, specific conductance (µS/cm), acidity and/or alkalinity (as deemed appropriate by the laboratory), sulfate, iron (total, plus ferric and ferrous speciation if total iron > 0.6 mg/L and pH < 5 SU), and dissolved calcium and magnesium; weekly filtered extracts per the method will be digested and analyzed for total recoverable concentrations during week 0, 1, 2, 4, 8, 12, 16, and 20; 4-week extracts thereafter (i.e., week 24, 28, 32, etc.) shall be analyzed by a Nevada-certified analytical laboratory for Profile I parameters, and specific conductance (µS/cm) and acidity and/or alkalinity shall be recorded as recommended by the analytical laboratory; final results reported shall include initial and final static test results, a Profile I analysis of the final leachate, all kinetic test results above, and any additional analyses required by the Division.

WPCP boilerplate excerpt (WPCP Part II.B.2.E.) provides a regulatory mechanism for the Permittee to submit to the Division for review and approval of revised monitoring plan and sampling protocols annually. Changes in monitoring frequency or the incorporation of additional monitoring points may require modification of the Permit and payment of modification fees.

A WPCP issued by the Division also includes a standard provision that states as follows (WPCP Part I.I.) requires the Permittee to inspect all control devices, systems, and facilities weekly (for closure permits consider relaxing frequency, but not more than necessary, if site is not continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system), and during (when possible) and after major storm events. These inspections are performed to detect evidence of: Deterioration, malfunction, or improper operation of control or monitoring systems; sudden changes in the data from any monitoring device; the presence of liquids in leak detection systems; and severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices.

The closure and stabilization requirements pertain to process and non-process components (solid and liquid process mine wastes) such as heap leach pads, tailings impoundments, pits, waste rock dumps, ore stockpiles, and any other associated mine components that, if not properly managed during operation and closure, could potentially lead to the degradation of waters of the State. NAC 445A.446. A mining facility operator/permittee is required to submit a Tentative Permanent Closure Plan at the time of application for a WPCP. NAC 445A.398(5). Sources which have not been classified as process components such as waste rock disposal facilities, must be evaluated at the end of their operating life to determine the potential for pollutants from these sources to migrate and degrade the waters of the State under the final proposed site conditions and must be closed in accordance with the State Handbook of Best Management Practices (Sections 9-1 through 9-6) prepared pursuant to NAC 445A.336. NAC 445A.447(3).

A Final Permanent Closure Plan must be submitted to the Department two years prior to the anticipated closure of a mine site. NAC 445A.447(2). The Division has prepared a

guidance document "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports" which delineates a permittees responsibilities and Division requirements with respect to permanent closure. This plan must provide closure goals and a detailed methodology of activities necessary to achieve a level of stabilization of all known and potential contaminants at the site. The Final Permanent Closure Plan must include a detailed description of all proposed monitoring that will be conducted to demonstrate how the closure goals are being met. Following the completion of all closure related activities; a Final Closure Report must besubmitted to the Bureau summarizing all completed closure related activities. This document should contain all information necessary for the operator to demonstrate to the Department that the completed closure activities, per process and non-process component, will ensure that waters of the State will not be degraded. This report must include a proposal for post-closure monitoring for an initial period of time not less than five (5) years in order to provide additional supporting data that stabilization has truly been achieved.

The Request for Final Closure is made following the completion of the post-closure monitoring period. The request should contain all post-closure monitoring information and clearly demonstrate stabilization. Upon the successful demonstration of stabilization, the Department would consider the mine site to be in final closure, retire the WPCP, and eliminate all NAC 445A fee requirements.

Finally, local county and municipal ordinances and site-specific conditions may require that an operator/permittee to implement additional management practices.

NAC 519A.345(3) requires reclamation of waste rock piles to enhance stability, minimize erosion, and facilitate revegetation by diverting run on and control mine impacted waters.

To minimize and eliminate any potential detrimental environmental effect of a geochemically active waste rock facility as determined by the WPCP, the SRCE program has a specific cost Generic Haulage calculation module based on the acreage, the volume, and costs for transporting the required cubic yards of material for the placement of a 10 ft. oxide cover/growth medium evapotranspiration cover. The SRCE program has the ability to implement a User Tab to determine the reclamation cost for a synthetic liner cover placement with an 18-inch growth medium cover for sites short on borrow source material.

To contain a geochemically active waste rock as determined by the WPCP, the SRCE program Waste Rock module calculates the cover material volume required based upon acreage and a 10 ft. oxide cover/growth medium depth. SRCE has a specific Generic Haulage module to calculate the transportation costs for the volume of cover material based upon the distance from the borrow source. The SRCE program has the ability to implement a supplemental User Tab to determine the reclamation cost(s) for a synthetic

liner cover placement and an 18-inch growth medium cover for sites short on borrow source material.

The SRCE program has a specific reclamation cost Mo nitoring calculation module listing each for monitoring well and Surface water sampling which includes the labor hours required for each water sample time interval, and w ater analysis for a minimum of five years or more as determined by the WPCP requirements. The calculation includes the well closure based upon the depth to the ground water ta ble. Surface water sampling requirements can also be introduced into the program as required by the WPCP.

(iii) CONCURRENT OR SEQUENTIAL RECLAMATION OF WASTE ROCK DUMP AREAS

Requirements for concurrent or sequential reclamation of mined areas as they become available prior to final cessation of operations and closure.

NAC 519A.285 describes the time when reclamation must be initiated and completed and the process for requesting an extension of time. If affected land cannot practicably be reclaimed concurrently with an exploration projector mining operation, reclamation must be initiated within 2 years after completion or abandonment of the exploration project or mining operation; within 3 years after a temporary closure of an exploration project or mining operation; or as required by the BLM, the US FS or another federal land management agency. NAC 519A.285(1)(a-c). The Divisi on may grant one or more extensions of the time when reclamation must begin if the operator of an exploration project or mining operation demonstrates that a rea sonable likelihood exists that the project or operation will resume, based on a consid eration of factors including, but not limited to: The presence of additional mineralizati on of the commodity being mined or other commodities in commerce; Historical fluctuati ons in the value of the commodity being mined or other commodities present if they ca n be mined using the same disturbances; The design life of any beneficiationprocess components existing at a mining operation; and If the closure was caused because oflitigation. NAC 519A.285(2)(a-d). Each extension is for a 3-year period. NAC 519.285(2). Once initiated, final reclamation activities must be completed as set forth in an app roved plan for reclamation, unless the exploration project or mining operation is reactivated. NAC 519A.285(3).

The contents of plan for reclamation for mining ope ration requires a proposed schedule of the time for initiation and completion of activi ties for reclamation. NAC 519A.270(6). In the experience of the Bureau's Reclamation Branch, waste rock facilities are commonly the first mine components to be concurrently reclai med during mine operations. The Bureau does not grant a surety bond release until a minimum of three years of growing season has elapsed since the re-seeding effort, the mining operator submits a formal Attachment A and B document(s) documenting both the completed earthworks and revegetation tasks and the Bureau has performed a final inspection and provided a report confirming completion of this reclamation effort.

The closure and stabilization requirements pertain to process and non-process components (solid and liquid process mine wastes) such as heap leach pads, tailings impoundments, pits, waste rock dumps, ore stockpiles, and any other associated mine components that, if not properly managed during operation and closure, could potentially lead to the degradation of waters of the State. NAC 445A.446. A mining facility operator/permittee is required to submit a Tentative Permanent Closure Plan at the time of application for a WPCP. NAC 445A.398(5). Sources which have not been classified as process components such as waste rock disposal facilities, must be evaluated at the end of their operating life to determine the potential for pollutants from these sources to migrate and degrade the waters of the State under the final proposed site conditions and must be closed in accordance with the State Handbook of Best Management Practices (Sections 9-1 through 9-6) prepared pursuant to NAC 445A.336. NAC 445A.447(3)

NAC 445A.446(1)(c) states that the permanent closure of a facility must be initiated when the end of the design life of that process component is reached.

A Final Permanent Closure Plan must be submitted to the Department two years prior to the anticipated closure of a mine site. NAC 445A.447(2). The Division has prepared a guidance document "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports" which delineates a permittees responsibilities and Division requirements with respect to permanent closure. This plan must provide closure goals and a detailed methodology of activities necessary to achieve a level of stabilization of all known and potential contaminants at the site. The Final Permanent Closure Plan must include a detailed description of all proposed monitoring that will be conducted to demonstrate how the closure goals are being met.

Following the completion of all closure related activities; a Final Closure Report must be submitted to the Bureau summarizing all completed closure related activities. This document should contain all information necessary for the operator to demonstrate to the Department that the completed closure activities, per process and non-process component, will ensure that waters of the State will not be degraded. This report must include a proposal for post-closure monitoring for an initial period of time not less than five (5) years in order to provide additional supporting data that stabilization has truly been achieved.

The Request for Final Closure is made following the completion of the post-closure monitoring period. The request should contain all post-closure monitoring information and clearly demonstrate stabilization. Upon the successful demonstration of stabilization, the Department would consider the mine site to be in final closure, retire the WPCP, and eliminate all NAC 445A fee requirements.

The Nevada program for bonding uses the SRCE program, which bases costs on Davis Bacon wage rates, rental equipment, the Caterpillar Equipment Performance handbook and contractor/government markups. It is an incentivizes operators to begin concurrent

reclamation scheduled with operations and existing equipment and labor, which reduces reclamations costs and allows for concurrent release of bond funds as the work is completed or a transfer of those released funds to future disturbance activities.

Finally, local county and municipal ordinances and site-specific conditions may require that an operator/permittee to implement additional closure practices or methodologies.

(iv) WASTE ROCK DUMP STABILITY DURING AND FOLLOWING CLOSURE

Requirements to regrade the surface during closure to a stable configuration that prevents ponding and promotes the conveyance of surface water off the unit, that requires closure of all waste rock piles considered to be critical structures to be designed for a long-term static factor of safety of 1.5 or greater, that requires all non-critical structures to be designed for a long-term static factor of safety of 1.3 or greater; and that requires that the units being closed be designed for a factor of safety of 1.1 or greater under pseudostatic analysis.

Nevada WPC regulations do not have specific FOS requirements for non-process structures such as waste rock disposal facilities. However, if site-specific conditions warrant initiating stability requirements then those requirements are included in the WPCP for the facility. Most of Nevada's mines are in isolated locations where stability requirements for non-process components other than erosion and storm control components are not necessary. During mine operations, the Federal Mine Safety and Health Administration regulate mine stability requirements to maintain a safe working environment. Final reclaimed slopes are typically set a 3:1, which are well below the angle of repose.

NAC 519A.345.3 requires reclamation of waste rock piles to enhance stability, minimize erosion, and facilitate revegetation by diverting run on and control mine impacted waters.

NAC 519A.325 requires a permittee, under certain circumstances, to remove and stockpile topsoil for reclamation and avoid creating depressions in land surfaces. The regulation provides that if practicable and necessary for the establishment of the post-mining use of the land, sufficient topsoil, if available, must be removed during the creation of a disturbance and stockpiled for use in future reclamation. NAC 519A.325(1). The stockpile must be posted to identify the material, and stabilized as necessary to prevent excessive losses from erosion. Id. If topsoil is unavailable, any growth medium to be used that requires removal and stockpiling must be managed in the same manner as topsoil. Id. The creation of a depression during reclamation which may form a pond must be avoided unless the pond is part of the post-mining use of the land. NAC 519A.325(2). Stabilization is achieved when an area which has been reclaimed no longer exhibits a potential to impact adversely public safety or the environment. NAC 519A.325(3).

NAC 445A.397 requires that the engineering design report must include an evaluation of structural stability of waste rock disposal facilities and the fluid management system.

Nevada WPC regulations do not distinguish between critical and non-critical structures at mine facilities. Nevada does not differentiate between critical and non-critical structures on a site-specific basis and sets stability requirements based on site-specific needs and criteria.

As described in the two preceding sections above, Nevada sets stability requirements based on site-specific needs and criteria. Liquefaction is not generally a concern in hard rock mining in Nevada's arid climate and subsurface conditions.

NAC 445A.433 set-forth the minimum design criteria and universal requirements for process components. Specifically, states that the design of the process components must take into consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity. NAC 445A.433(1)(f)

NAC 519A.270 requires that a plan for reclamation for a mining operation include: the technical criteria used to determine the final gradient and stability of slopes created or affected by the mining operation.

The SRCE program has a specific calculation module to list each waste rock facility for reclamation using an "as-built" input and the mid-slope perimeter length input and a final slope input (2.5:1 or 3.0:1) to determine the volume of material required to be re-graded to meet the final slope stability topography. The waste rock module calculates the volume of growth medium required based upon the re-sloped acres for both scarification and re-seeding costs. The reclamation costs are determined by the dozer(s) and/or scraper productivity timeframes and the associated labor hours to perform the reclamation task to include the seed and re-seeding labor costs. The equipment timeframe includes rental rate hours, fuel consumption and the wear maintenance costs as determined by the Caterpillar Handbook. The re-grading and revegetation requirements minimize erosion to achieve long-term stability of the facility and meet the required productive post-mining land use and therefore the restricting of public access for safety is not required.

Finally, local county and municipal ordinances and site-specific conditions may dictate that an operator/permittee implement additional closure practices or methodologies.

(v) WASTE ROCK DUMP DESIGN AND STABILITY DURING ACTIVE OPERATIONS

Requirements to provide for a stability analysis to be conducted for the unit as part of the original design and as part of mine modifications during the active life of the mine.

Nevada WPC regulations do not have specific FOS requirements for non-process structures such as waste rock disposal facilities. However, if site-specific conditions warrant

initiating stability requirements then those requirements are included in the WPCP for the facility. Most of Nevada's mines are in isolated locations where stability requirements for non-process components other than erosion and storm control components are not necessary during mine operations; the Federal Mine Safety and Health Administration regulate mine stability requirements to maintain a safe working environment.

NAC 445A.397 requires that the engineering design report include an evaluation of structural stability for waste rock disposal facilities and the fluid management system. Nevada WPC regulations do not distinguish between critical and non-critical structures at mine facilities. However, pursuant to NAC 445A.424 (1), a mine facility may not degrade waters of the State; therefore, any portion of a mine facility that has the potential to degrade waters of the State is subject to WPC regulatory requirements. Stability requirements are based on site-specific needs and criteria.

NAC 445A.433 establishes minimum design criteria and universal requirements for process components. The design of the process components must take into consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity. NAC 445A.433(1)(f)

NAC 519A.270 requires the plan for reclamation for a mining operation include the technical criteria used to determine the final gradient and stability of slopes created or affected by the mining operation.

Local county and municipal ordinances and site-specific conditions may require that an operator/permittee implement additional closure practices or methodologies.

(vi) WASTE ROCK DUMP STORMWATER AND SEDIMENT MANAGEMENT DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE

A plan for the management of all stormwater and sediment generated during operations and during and following closure. For existing units, the plan must provide for permanent stormwater conveyances, ditches, channels and diversions designed to convey the peak flow and ponds and other collection devices designed to store the volume generated during a 24-hour period by a 100-year return interval storm event. For unit that become authorized to operate after [insert the effective date of the Final Rule], the plan must provide for controls designed to store the volume generated during a 24-hour period by a 200-year return interval storm event.

NAC 445A.398 requires that a permit application include the proposed operating plans for the facility. The plan must include a description and the range of operating conditions for which the components were designed and a plan for the management of process fluids which describes the methods to be used for the monitoring and controlling of all process

fluids. NAC 445A.396 requires that a permit application must include the results from testing samples from the facility's mine site which are representative of the overburden, waste rock, and ore at the mine site and that these samples must be evaluated for their potential to release pollutants and degrade waters of the State. When there is potential to degrade, NAC 445A.393 allows the Division the authority to require a higher standard of containment or monitoring or both. This is accomplished with a Division-approved waste rock management plan, which details the placement and management of benign and chemically reactive waste rock. This is described in greater detail in the Division Guidance Document "Waste Rock, Overburden, and Ore Evaluation".

NAC 445A.398(1-2). The operating plan must include the following: a description of the means to evaluate the conditions in the fluid management system so as to be able to quantify the available storage capacity for meteoric waters and to define when and to what extent the designed containment capacity has been exceeded; a plan for monitoring the facility which describes the water quality in the area; the monitoring locations the applicant proposes to sample routinely in order to evaluate surface and groundwater at the site that may be affected by the operation of the facility; an analytical profile of each surface and groundwater that may be affected by the operation of the facility; and the locations of the leak detection systems, the frequency for sampling these systems and the analytical profile to be used for evaluation of the samples. NAC 445A.398(2-3).

NAC 445A.424(1)(b) prohibits a mine facility from degrading groundwater to the extent that a state or federal drinking water standard is exceeded or the WAD cyanide concentration exceeds 0.2 mg/L, or from degrading surface water to the extent that the quality of surface water of higher quality is lowered below that allowed by NRS 445A.565. Pursuant to NAC 445A.441, if the Division determines if seepage and/or a discharge does not, or is not expected to, meet applicable water quality standards, the Division has the authority to require the Permittee to implement an approved plan to eliminate the degradation and meet the water quality standards per NAC 445A.424. Such a plan may include a capture and treatment system (however, the capture efficiency is not dictated by regulation; only the resultant water quality is), or another method, such as elimination of influent water or chemical stabilization of the source material. NAC 445A.379 defines stabilization as the condition that results from contaminants in a material are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may be reasonably expected to exist at a site.

NAC 445A.432 and NAC 445A.433 define the minimum design criteria and universal requirements for process components. These provisions establish minimum contaminant control technologies and define the site and operating conditions which must be evaluated. Based on site characterization, best engineering judgment will be applied to determine the degree to which designs must provide more or less protection through engineered containment. The application of minimum design criteria does not release the

holder of a permit from liability for degradation t o waters of the State caused by the facility.

In areas where annual evaporation exceeds annual pr ecipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migrati on pathways so that any release from the facility will not degrade waters of the St ate. NAC 445A.433(1)(a),(b). Process components must be designed to withstand the runoff from a 24-hour storm event with a 100-year recurrence interval; and the primary fluidmanagement system must be designed to be able to remain fully functional and fully con tain all process fluids including all accumulations resulting from a 24-hour storm event with a 25-year recurrence interval. NAC 445A.433(1)(c),(d). The Department has the opti on of requiring additional containment based on the proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(1)(d)(1-3). C ontingency plans for managing process contaminated flows in excess of the design quantity must be described in the appropriate operating plans. NAC 445A.433(1).

The fluid management system must be designed to be functional for 5 years after the projected operating life of the process component a nd permanent closure period. NAC 445A.433(1)(e). The engineering designs must takeinto consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or s hifting of the subbase, liner or contained material which endangers primary or secon dary containment integrity. NAC 445A.433(1)(f). Additional containment may be requ ired in areas where groundwater is considered to be near the surface. NAC 445A.433(2).

The General Mining Stormwater Permit (NVR300000) is sued by the Department authorizes stormwater discharges associated with Standard Industrial Classification (SIC) 10 as derived from Category iii (shown above), defi ned under 40 CFR §122.26(b)(14) and all construction-related activities as defined by 4 0 CFR § 122.26 (b)(14)(x) and (b)(15) at mine sites (including exploration, development and reclamation activities).

Facilities that are authorized under National Pollu tant Discharge Elimination System (NPDES) Permit NVR300000 must submit a new or updated Storm Water Prevention Plan (SWPPP) to the Department within 60 days of the eff ective date of the permit or for new dischargers within 30 days of the submitted Notice of Intent to discharge. This is defined in greater detail in 33 U.S.C. 1251; 40 CFR §122.26(b)(14) and (b)15; Chapter 445A of the Nevada Revised Statutes (NRS); and in the Mining SWPPP NVR300000. SWPPPs are to be made available for inspection at the project site o r operation covered by this permit. The purpose of the SWPPP is to guide the identification of stormwater pollution sources and the reduction of their impacts, and otherwise lead to compliance with the conditions of this permit. Each of the SWPPP elements must be rev ised as necessary to maintain

accuracy if there are changes in design or construction of the project or if the SWPPP is found to be insufficient.

The Permittee is required to make SWPPPs available upon request to the State or local agency approving sediment and erosion plans, grading plans, and stormwater management plans; local government officials; and the operator of a municipal separate storm sewer receiving discharges from the site. The copy of the SWPPP that is required to be kept on the mining site or locally available must be made available to the Department for review at the time of an on-site inspection.

The conditions set in the General Mining Stormwater Permit language are the minimum requirements to maintain and implement an effective stormwater program consistent with U. S. EPA rules (Title 40 of the Code of Federal Regulations Part 122). BMPs are approved by the U.S. EPA for use in stormwater permits.

NAC 445A.447 requires submittal of a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of any portion of a mining operation that may release pollutants, including but not limited to open pits and pit lakes. See also, NAC 445A.359 and 445A.378, The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure components used in such mitigating actions be designed to withstand the 24-hour, 500-year storm event.

Local county and municipal ordinances and site-specific conditions may require that an operator/permittee implement additional closure practices or methodologies.

NAC 519A.325 requires a permittee, under certain circumstances, to remove and stockpile topsoil for reclamation and avoid creating depressions in land surfaces. The regulation provides that if practicable and necessary for the establishment of the post-mining use of the land, sufficient topsoil, if available, must be removed during the creation of a disturbance and stockpiled for use in future reclamation. NAC 519A.325(1). The stockpile must be posted to identify the material, and stabilized as necessary to prevent excessive losses from erosion. Id. If topsoil is unavailable, any growth medium to be used that requires removal and stockpiling must be managed in the same manner as topsoil. Id. The creation of a depression during reclamation which may form a pond must be avoided unless the pond is part of the post-mining use of the land. NAC 519A.325(2). Stabilization is achieved when an area which has been reclaimed no longer exhibits a potential to impact adversely public safety or the environment. NAC 519A.325(3).

Mine facilities must be monitored for up to 30 years following the completion of permanent closure actions to prevent degradation of waters of the State. NAC 445A.446(2). NAC 445A.433 establishes the minimum design criteria for process components at mine facilities. This regulation requires these components to remain fully

functional and fully contain all process fluids including all accumulations from a 24-hour storm event with a 25-year recurrence interval. NAC445A.433(1)(d). The minimum design criteria for process components also require the ability to withstand a 24-hour storm event with a 100-year recurrence interval. NAC 445.433(1)(c). The Division has the discretion to require addition storm capacity based on site-specific factors such as proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(d)(1-3) In exercising this discretion, the Division must use its best engineering judgment to determine whether more or less engineered containment must be provided than the established minimum design criteria. NAC 445A.432. The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that all closure components be designed to withstand run-off from a 24-hour storm event with a 500-year recurrence interval.

NAC 519A.270(12) requires the use of best management practices during operation and reclamation to control erosion and minimize the transport and delivery of sediment to surface water. The best management practices are provided in the State of Nevada Handbook of Best Management Practices or are practices equivalent thereto. Id.

Under NAC 519A.275(4) land that is subject to excessive erosion will not be deemed to be reclaimed to a productive post-mining use unless excessive erosion existed before mining or exists on the adjacent land. The operator must provide evidence of the excessive erosion to the Division. Id.

The SRCE program includes a Diversion Ditch and Sediment pond calculation module for site-specific construction inputs that can account for a 24-hour period, 200-year storm event. The module incorporates the reclamation costs based upon the required design dimensions using an excavator for diversions and a dozer to build sediment control ponds and the re-seeding costs for long-term stability. The module has the ability meet design criteria changes based upon an engineer's professional judgment or any regulatory change.

(vii) WASTE ROCK DUMP SEEPAGE MANAGEMENT AND TREATMENT DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE

A plan for the minimization, prevention, or collection and treatment of discharges and/or seepage, based on site hydrology and water quality characterization information, that provides for a cover system of, at a minimum, a store and release earthen cover system with a thickness of at least twelve inches and, if necessary, additional source controls or capture and treatment at closure, all of which meet a minimum 200-year life design criteria. If seepage water quality is not expected to meet applicable Federal and state groundwater and surface water quality standards at the point of compliance, the plan must provide for:

In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State.

(A) Implementation of a containment system that immobilizes hazardous substances to meet applicable water quality standards (e.g., an engineered cover system designed to achieve, at a minimum, a 95 percent reduction in annual net-percolation based on the long-term average to reduce seepage discharges to meet applicable water quality standards;

(B) A capture and treatment system designed to achieve at least a 95 percent capture efficiency and meet applicable water quality standards; or a combination of an engineered cover system and a capture and treatment system to achieve at least a 95 percent reduction in discharged load and meet applicable water quality standards at the point of compliance, or

(C) A solution containment system to assure seepage flows are collected, contained, conveyed, and treated to achieve at least a 95 percent reduction to meet applicable water quality standards.

NAC 445A.424(1)(b) prohibits a mine facility from degrading groundwater to the extent that a state or federal drinking water standard is exceeded or the WAD cyanide concentration exceeds 0.2 mg/L, or from degrading surface water to the extent that the quality of surface water of higher quality is lowered below that allowed by NRS 445A.565. Pursuant to NAC 445A.441, if the Division determines if seepage and/or a discharge does not, or is not expected to, meet applicable water quality standards, the Division has the authority to require the Permittee to implement an approved plan to eliminate the degradation and meet the water quality standards pursuant to NAC 445A.424. Such a plan may include a capture and treatment system (however, the capture efficiency is not dictated by regulation; only the resultant water quality), or another method, such as elimination of influent water or chemical stabilization of the source material. NAC 445A.379 defines stabilization as the condition that results from contaminants in a material are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may be reasonably expected to exist at a site.

NAC 445A.447 requires submittal of a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of any portion of a mining operation that may release pollutants. See also, NAC 445A.359 and 445A.378. The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure

components used in such mitigating actions be designed to withstand the 24-hour, 500-year storm event.

NAC 519A.345(10) requires a mine operator to implement measures to stabilize, manage, control or treat mine-impacted waters. Also, NAC 519A.360 sets-forth the requirements for the amount of surety an operator must post to ensure the continuation of post-reclamation stabilization, management, control and treatment of mine-impacted waters to protect the waters of the State.

NAC 519A.345(3)(a) requires the reclamation of waste rock piles to enhance stability, minimize erosion, and facilitate revegetation by diverting run on and control mine impacted waters.

NAC 519A.345(3) describes the requirements for managing waste rock piles. According to that statute, waste and development rock piles must be reclaimed by completing the following: regrading to round off sharp edges, enhance the stability, reduce susceptibility to erosion and facilitate efforts for revegetation; revegetation; diverting run-on; and implementing measures to stabilize, manage, control or treat mine-impacted waters. Id.

NAC 519A.345(3)(d) requires measures to minimize and eliminate any potential detrimental environmental effect of a geochemically active waste rock facility as determined by the WPCP.

The SRCE program has a specific Generic Hauling module that calculates the total volume of material required based on the cover depth and acreage of a facility, the equipment used, and the transport cost of material based upon the distance from a defined borrow source. SRCE has the ability to calculate the placement of a 10 foot. oxide evapotranspiration cover over a defined acid generating waste rock facility to isolate meteoric water from entering the facility and thus eliminate the potential for mine impacted waters. For a mine site with limited borrow source to meet a required cover depth, SRCE has an established synthetic liner material and placement costs based on the square footage of liner required and the SRCE User Page can be used by a mine engineer to calculate the total cost of this reclamation activity. The total cost will be listed as a line item cost in the SRCE summary page which will have agency in-direct costs added.

Local county and municipal ordinances and site-specific conditions may require a facility to implementation additional closure practices or methodologies.

RESPONSE CATEGORY 4--HEAP and DUMP LEACHING [Proposed 40 CFR 320.63(a)(iv)]

GENERAL COMMENTS

On a site-specific basis the State of Nevada meetsor exceeds all of the requirements listed for the heap and dump leach category.

Nevada WPC regulations do not have specific FOS requirements for heap and dump leach facilities. The Department has relied on site-specific conditions and best engineering judgement regarding FOS. The Department has developed a guidance document titled "Stability Requirements for Heap Leach Pads" which identifies the information to be included in a stability analysis submittal and evaluation. Based on that guidance document, the Department recommends a minimum FOS of 1.3 for static conditions and a minimum FOS of 1.05 for pseudostatic conditions, utilizing a peak ground acceleration with a defined seismic event with a maximum 10% probability of exceedance in 50 years. However, if site-specific conditions warrant higher minimum stability requirements, these requirements can be incorporated into the WPCP for the facility. Although not specifically stated, during mine operations, the slopes of dumps, stacks, and stockpiles are required to be graded in accordance with 30 CFR Part 56 to ensure worker safety at the site.

Currently, process components at Nevada mine facilities must be constructed, at a minimum, to contain a 25-year, 24-hour storm event and to withstand a 100-year, 24-hour storm event. The Division may require additional storm event capacity based on site-specific factors such as proximity to surface water bodies; depth to groundwater; and proximity to population. In Nevada mine closure guidance, the Division recommends that facilities are constructed to withstand a 500-year, 24-hour event. The Division has been considering a change to Nevada closure regulations to require that closed facilities are designed to contain, at a minimum, the 500-year, 24-hour storm event if containment is necessary and to withstand at a minimum the erosional effects of a 500-year, 24-hour storm event.

(i) SAFETY AND PREVENTION OF PUBLIC ACCESS TO HEAP AND DUMP LEACH PADS

A plan to address public safety by prevention of public access by means of security fencing, or other effective methods.

NAC 445A.447(1) requires submittal of a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of anyportion of a mining operation that may release pollutants. See also, NAC 445A.359 and 445A.378.

The Nevada guidance document titled "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure components used in such mitigating actions be designed to withstand the 24-hour, 500-year storm event.

NAC 519A.260(1) requires a plan for reclamation consider the pre and post-mining use of the land. NAC 519A.270(16) requires a description of any necessary monitoring or

maintenance of any fencing or signs.519A.345.9(c) requires construction and maintaining berms fences or other means of restricting access.

Other authorities and resources that are considered in the Bureau's determination as to the most effective means for preventing public acce ss include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditio ns; and WPCP requirements and limitations.

(ii) HEAP AND DUMP LEACH PAD STABILITY DURING ACTIVE OPE RATIONS AND DURING AND FOLLOWING CLOSURE

A plan to regrade surface during closure to a stable configuration that prevents ponding and promotes the conveyance of surface water off th e unit, and that requires closure of all heap leach and dump leach piles considered to be critical structures to be designed for a long-term static factor of safety of 1.5 or g reater and all non-critical structures to be designed for a long-term static factor of safety of 1.3 or greater; and requires that the units being closed be designed for a factor of safety of 1.1 or greater under pseudostatic analysis. The plan must also provide for a stability analysis to be conducted for the unit and include evaluation for static and seismic induced liquefaction.

Nevada WPC regulations do not specifically state a minimum FOS for heap leach pads, however pursuant to the guidance document "Stabilit y Requirements for Heap Leach Pads", the Department recommends a minimum FOS of 1 .3 for static conditions and a minimum FOS of 1.05 for pseudostatic conditions, ut ilizing a peak ground acceleration with a defined seismic event with a maximum 10% pro bability of exceedence in 50 years. However, if site-specific conditions warrant higher minimum stability requirements, these requirements are incorporated into the WPCP for the facility. Although not specifically stated, during mine operations, the slopes of dumps , stacks, and stockpiles are required to be graded in accordance with 30 CFR Part 56 to ensure the safety of workers at the site.

NAC 445A.397 requires that the engineering design r eport include an evaluation of structural stability. Nevada WPC regulations do not distinguish between critical and non-critical structures at mine facilities. Nevada doe s not differentiate between critical and non-critical structures on a site-specific basis and sets stability requirements based on site-specific needs and criteria.

As described in the two preceding sections above, Nevada sets stability requirements based on site-specific needs and criteria. Liquefaction is not generally a concern in hard rock mining due to Nevada's arid climate and subsurface conditions as well as the moisture content present in heap leach pads.

NAC 445A.433 establishes the minimum design criteri a and universal requirements for process components. Specifically, NAC 445A.433(1)(f) states that the design of the process

components must consider the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity

NAC 445A.398 requires that a permit application include the proposed operating plans for the facility. The plan must include a description and the range of operating conditions for which the components were designed and a plan for the management of process fluids which describes the methods to be used for the monitoring and controlling of all process fluids. NAC 445A.398(1-2). NAC 445A.396 requires that a permit application must include the results from testing samples from the facility's mine site which are representative of the overburden, waste rock, and ore at the mine site and that these samples must be evaluated for their potential to release pollutants and degrade waters of the State. When there is potential to degrade, NAC 445A.393 allows the Division the authority to require a higher standard of containment or monitoring or both. This is accomplished with a Division-approved waste rock management plan, which details the placement and management of benign and chemically reactive waste rock. This is described in greater detail in the Division Guidance Document "Waste Rock, Overburden, and Ore Evaluation". The operating plan must include the following: a description of the means to evaluate the conditions in the fluid management system so as to be able to quantify the available storage capacity for meteoric waters and to define when and to what extent the designed containment capacity has been exceeded; a plan for monitoring the facility which describes the water quality in the area; the monitoring locations the applicant proposes to sample routinely in order to evaluate surface and groundwater at the site that may be affected by the operation of the facility; an analytical profile of each surface and groundwater that may be affected by the operation of the facility; and the locations of the leak detection systems, the frequency for sampling these systems and the analytical profile to be used for evaluation of the samples. NAC 445A.398(2-3).

NAC 445.430 requires that spent ore which has been left on pads or which will be removed from a pad must first demonstrate stability of the discharge effluent from the pads or from the spent ore such that WAD cyanide levels in the effluent are less than 0.2 mg/l; the pH level of the effluent is between 6.0 and 9.0; and contaminants in any effluent from the processed ore which would result from meteoric waters would not degrade waters of the State. If these requirements cannot be achieved, the Department may grant a variance to those conditions if the holder of the permit can demonstrate that the remaining solid material, when representatively sampled, does not contain levels of contaminants that are likely to become mobile and degrade the waters of the State under the conditions that will exist at the site; or the spent ore is stabilized in such a fashion as to inhibit meteoric waters from migrating through the material and transporting contaminants that have the potential to degrade the waters of the State. NAC 445A.430(2)(a-b). Also, the Department may approve an alternate method for stabilizing ore that has been leached if the holder of the permit can clearly demonstrate that the condition in which the materials will be left will not create a potential for the waters of the State to be degraded. NAC 445A.430(3).

NAC 445A.447(1) requires submittal of a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of any portion of a mining operation that may release pollutants. See also, NAC 445A.359 and 445A.378,

The Nevada guidance document titled "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure components used in such mitigating actions be designed to withstand the 24-hour, 500-year storm event.

Local county and municipal ordinances and site-specific conditions may require that an operator/permittee implement additional closure practices or methodologies.

A WPCP issued by the Division also includes a standard provision (Part I.N.) that can be revised to provide a regulatory mechanism for the Permittee to submit to the Division for review and approval an updated stability analysis of the heap leach pad with each Permit renewal and with any application to modify the Permit that could affect the heap leach pad. The revised heap leach pad stability analysis must include but is not limited to, representative characterization data for all ore, cover, and fluids, changes in heap lead pad configuration or cover thickness, and any updates to the predictive stability numeric model(s) utilized for the stability determination, in accordance with the current version of the Division guidance document "Stability Requirements for Heap leach Pads," in addition to a detailed description of the changes to the heap leach pad, and appropriate methods to eliminate any potential to degrade waters of the State, if applicable. Approval may require modification of the Permit and payment of modification fees.

NAC 519A.345(6)(d) requires an operator to perform certain types of reclamation related to process fluid management of a leach pad.

NAC 519A.345(6) requires Regrading to enhance structural stability, promote runoff, reduce infiltration and control erosion; Covering with waste rock, topsoil or growth medium; Revegetation; Process fluid stabilization; and Diverting run-on.

NAC 519A.270 requires that the plan for reclamation for a mining operation include the technical criteria used to determine the final gradient and stability of slopes created or affected by the mining operation.

The SRCE program has a specific leach pad calculation module to list each leach pad facility for reclamation using an "as-built" input for the existing leach pad slope(s), the mid-slope perimeter length, and a final regrade input of 2.5: 1 or 3.0:1 to determine the volume of material to be re-graded to achieve final slope stability while maintaining the ore on lined containment. The leach pad module calculates evapotranspiration (ET) cover volume accounting for both the increased acres of the re-sloped leach pad and the State policy requirement of a minimum of 2.0 foot earth cover depth for passive closure of a process

facility. Nevada's very arid climate combined with the ET cover depth has demonstrated to be very effective in reducing meteoric infiltration rates to 3% or less. The ET cover is salvaged growth medium material (suitable overburden) which has been stockpiled during the construction phase as required in the reclamation plan. The leach pad module ET cover input calculates the total volume of hauled material required, the average travel distance from the borrow source, the type of equipment required and the equipment productivity timeframes to place the ET cover and the associated labor hours to complete the ET cover. The time and labor for the dozer(s) are calculated based upon the downslope distances involved to place cover onto the re-graded slope face.

The equipment productivity timeframes determine the associated labor hours to perform the reclamation task(s). The equipment timeframe determines the rental rate hours, fuel-oil consumption and wear maintenance costs as determined by the Caterpillar Handbook.

The SRCE leach pad module provides labor costs for both scarification and re-seeding. The seed cost is based upon the pound of seed/acre required and seed species as determined by baseline vegetation studies performed on undisturbed native land and takes into account species differences for the elevations of a specific mine site.

A designated environmental scientist, in cooperation with the Bureau's Reclamation Branch Professional Engineer, review the 6-month Interim Fluid Management (IFM) cost estimate, evaluate the HLDE program and the associated PFCE program. The IFM is a required 6-month period using site-specific requirements to calculate the reclamation cost for 6 months of 24/7 labor, rental pumps and electrical power costs for re-circulation of process solution to prevent pond overflows. IFM provides a conservative timeframe until such time that the government agency can secure the posted surety bond amount in the case an operator fails to perform.

The HLDE program provides site-specific user inputs to account for a leach pad acreage and height, the process solution application rate per acre, the hydraulic conductivity parameter based upon the ore pore space, and the total volume of process solution to be actively evaporated based upon the solution application rate/acre and the remaining drain down solution of the leached acre portions of the leach pad. The combined HLDE inputs generate a solution drain down curve to determine the months-years of 24/7 labor coverage required for active pumping and evaporation periods to reach a passive closure solution volume rate.

The PFCE uses the HLDE timeframe to determine the input labor hours for pumping and evaporating the solution volume to achieve passive closure of the facility. PFCE provides for the pump(s) rental, new evaporator(s) and the associated electrical costs during the determined timeframe. The PFCE also includes the cost of a closure plan in the case that an operator has not developed an approved plan.

(iii) HEAP AND DUMP LEACH PAD STORMWATER AND SEDIMENT MANAGEMENT DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE

A plan for the management of all stormwater and sediment generated during operations and during and following closure. For existing units, the plan must provide for permanent stormwater conveyances, ditches, channels and diversions designed to convey the peak flow and ponds and other collection devices designed to store the volume generated during a 24-hour period by a 100-year return interval storm event. For unit that becomes authorized to operate after [insert the effective date of the Final Rule], the plan must provide for controls designed to store the volume generated during a 24-hour period by a 200-year return interval storm event.

Currently there is no requirement in Nevada for the implementation of controls designed to store the volume generated during a 24-hour period by a 200-year return. Rather, process components at Nevada mine facilities must be constructed, at a minimum, to contain a 25-year, 24-hour storm event and to withstand a 100-year, 24-hour storm event. In addition, the Division may require additional storm capacity based on site-specific factors such as proximity to surface water bodies, depth to groundwater and proximity to population. In Nevada's mine closure guidance, the Division recommends that facilities be constructed to withstand a 500-year, 24-hour event. The Division has been considering a change to its closure regulations to require that closed facilities are designed, at a minimum, to contain the 500-year, 24-hour storm event if containment is necessary and withstand the erosional effects of a 500-year, 24-hour storm event.

NAC 445A.398 requires that a permit application include the proposed operating plans for the facility. The plan must include a description and the range of operating conditions for which the components were designed and a plan for the management of process fluids which describes the methods to be used for the monitoring and controlling of all process fluids; NAC 445A.396 requires that a permit application must include the results from testing samples from the facility's mine site which are representative of the overburden, waste rock, and ore at the mine site and that these samples must be evaluated for their potential to release pollutants and degrade waters of the State. When there is potential to degrade, NAC 445A.393 allows the Division the authority to require a higher standard of containment or monitoring or both. This is accomplished with a Division-approved waste rock management plan, which details the placement and management of benign and chemically reactive waste rock. This is described in greater detail in the Division Guidance Document "Waste Rock, Overburden, and Ore Evaluation". NAC 445A.398(1-2). The operating plan must include the following: a description of the means to evaluate the conditions in the fluid management system so as to be able to quantify the available storage capacity for meteoric waters and to define when and to what extent the designed containment capacity has been exceeded; a plan for monitoring the facility which describes the water quality in the area; the monitoring locations the applicant proposes to sample routinely in order to evaluate surface and groundwater at the site that may be

affected by the operation of the facility; an analytical profile of each surface and groundwater that may be affected by the operation of the facility; and the locations of the leak detection systems, the frequency for sampling these systems and the analytical profile to be used for evaluation of the samples. NAC 445A.398(2-3).

NAC 445A.424(1)(b) prohibits a mine facility from degrading groundwater to the extent that a state or federal drinking water standard is exceeded or the WAD cyanide concentration exceeds 0.2 mg/L, or from degrading surface water to the extent that the quality of surface water of higher quality is lowered below that allowed by NRS 445A.565. Pursuant to NAC 445A.441, if the Division determines if seepage and/or a discharge does not, or is not expected to, meet applicable water quality standards, the Division has the authority to require the Permittee to implement an approved plan to eliminate the degradation and meet the water quality standards per NAC 445A.424. Such a plan may include a capture and treatment system (however, the capture efficiency is not dictated by regulation; only the resultant water quality is), or another method, such as elimination of influent water or chemical stabilization of the source material. NAC 445A.379 defines stabilization as the condition that results from contaminants in a material are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may be reasonably expected to exist at a site.

NAC 445A.432 and NAC 445A.433 set-forth the minimum design criteria and universal requirements for process components. These statutes establish minimum contaminant control technologies and require consideration of the site and operating conditions in designing individual process components. See generally, Id. Based on site characterization, best engineering judgment must be used to determine the degree to which designs must provide more or less protection through engineered containment. Id. However, the application of minimum design criteria does not release the holder of a permit from liability for degradation to waters of the State caused by the facility. NAC 445A.433(4).

In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State. NAC 445A.433(1)(a),(b). Process components must be designed to withstand the runoff from a 24-hour storm event with a 100-year recurrence interval; and the primary fluid management system must be designed to be able to remain fully functional and fully contain all process fluids including all accumulations resulting from a 24-hour storm event with a 25-year recurrence interval. NAC 445A.433(1)(c),(d). The Department has the option of requiring additional containment based on the proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(1)(d)(1-3). Contingency plans for managing process contaminated flows in excess of the design quantity must be described in the appropriate operating plans. NAC 445A.433(1).

The fluid management system must be designed to be functional for 5 years after the projected operating life of the process component and permanent closure period. NAC 445A.433(1)(e). The engineering designs must takeinto consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity. NAC 445A.433(1)(f). Additional containment may be required in areas where groundwater is considered to be near the surface. NAC 445A.433(2).

General Mining Stormwater Permit (NVR300000) issued by the Department authorizes stormwater discharges associated with Standard Industrial Classification (SIC) 10 as derived from Category iii (shown above), defined under 40 CFR §122.26(b)(14) and all construction-related activities as defined by 40 CFR § 122.26 (b)(14)(x) and (b)(15) at mine sites (including exploration, development and reclamation activities). Facilities that are authorized under NPDES Permit NVR300000 must submit a new or updated SWPPP to the Department within 60 days of the effective date of the permit or for new dischargers within 30 days of the submitted Notice of Intent to discharge. SWPPPs are to be made available for inspection at the project site or operation covered by this permit. The purpose of the SWPPP is to guide the identification of stormwater pollution sources and the reduction of their impacts, and otherwise lead to compliance with the conditions of the permit. Each of the SWPPP elements must be revised as necessary to maintain accuracy if there are changes in design or construction of the project or if the SWPPP is found to be insufficient.

The Permittee shall make SWPPPs available upon request to the State or local agency approving sediment and erosion plans, grading plans, and stormwater management plans; local government officials; and the operator of a municipal separate storm sewer receiving discharges from the site. A copy of the SWPPP that is kept on the mining site or made locally available must be provided to the Department for review at the time of an on-site inspection.

The conditions set in the General Mining Stormwater Permit are the minimum requirements to maintain and implement an effective stormwater program consistent with U. S. EPA rules (Title 40 of the Code of Federal Regulations Part 122). BMPs are approved by the U.S. EPA for use in stormwater permits.

NAC 445A.447 requires submittal of a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of any portion of a mining operation that may release pollutants. See also, NAC 445A.359 and 445A.378. The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure components used in such mitigating actions be designed to withstand the 24-hour, 500-year storm event.

Local county and municipal ordinances and site-specific conditions may require that an operator/permittee to implement additional closure practices or methodologies.

Mine facilities must be monitored for up to 30 years following the completion of permanent closure actions to prevent degradation of waters of the State. NAC 445A.446(2). NAC 445A.433 establishes the minimum design criteria for process components at mine facilities. This regulation requires these components to remain fully functional and fully contain all process fluids including all accumulations from a 24-hour storm event with a 25-year recurrence interval. NAC445A.433(1)(d). The minimum design criteria for process components also require the ability to withstand a 24-hour storm event with a 100-year recurrence interval. NAC 445.433(1)(c). The Division has the discretion to require addition storm capacity based on site-specific factors such as proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(d)(1-3) In exercising this discretion, the Division must use its best engineering judgment to determine whether more or less engineered containment must be provided than the established minimum design criteria. NAC 445A.432. The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that all closure components be designed to withstand run-off from a 24-hour storm event with a 500-year recurrence interval.

NAC 519A.325 requires a permittee, under certain circumstances, to remove and stockpile topsoil for reclamation and avoid creating depressions in land surfaces. The regulation provides that if practicable and necessary for the establishment of the post-mining use of the land, sufficient topsoil, if available, must be removed during the creation of a disturbance and stockpiled for use in future reclamation. NAC 519A.325(1). The stockpile must be posted to identify the material, and stabilized as necessary to prevent excessive losses from erosion. Id. If topsoil is unavailable, any growth medium to be used that requires removal and stockpiling must be managed inthe same manner as topsoil. Id. The creation of a depression during reclamation which may form a pond must be avoided unless the pond is part of the post-mining use of the land. NAC 519A.325(2). Stabilization is achieved when an area which has been reclaimed no longer exhibits a potential to impact adversely public safety or the environment. NAC 519A.325(3).

NAC 519A.270(12) requires the use of best management practices during operation and reclamation to control erosion and minimize the transport and delivery of sediment to surface water. The best management practices are provided in the State of Nevada Handbook of Best Management Practices or are practices equivalent thereto. Id.

Under NAC 519A.275(4) land that is subject to excessive erosion will not be deemed to be reclaimed to a productive post-mining use unless excessive erosion existed before mining or exists on the adjacent land. The operator must provide evidence of the excessive erosion to the Division. Id.

The SRCE program includes a Diversion Ditch and Sed iment pond calculation module for site-specific construction inputs that can account for a 24 hour period, 200-year storm event. The module incorporate the reclamation costs based upon the required design dimensions using an excavator for diversions and a dozer to build sediment control ponds and the re-seeding costs for long-term stability. The module has the ability to account for design criteria changes based upon an engineer's pr ofessional judgment or meet any regulatory change.

(iv) HEAP AND DUMP LEACH PAD SEEPAGE MANAGEMENT AND TREA TMENT DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE

A plan for the minimization, prevention, or collect ion and treatment of discharges and/or seepage, based on site hydrology and water q uality characterization information, that provides for a cover system of, a t a minimum, a store and release earthen cover system with a thickness of at least t welve inches and, if necessary, additional source controls or capture and treatment at closure, all of which meet a minimum 200-year life design criteria. If seepage water quality is not expected to meet applicable water quality standards, the plan must provide for:

Currently, Nevada does not require engineered cover designs and treatment systems to meet a minimum 200-year life design criteria. There are no specific requirements for such design to meet 95% reduction in annual net precipit ation, capture efficiency, or load reduction. Currently, process components at Nevada mine facilities at a minimum must be constructed to contain a 25-year, 24-hour storm eve nt and to withstand a 100-year, 24-hour storm event. The Division may require additio nal storm event capacity, based on site-specific factors such as proximity to surface water bodies, depth to groundwater, and proximity to population. In Nevada's mine closure guidance, the Division recommends that facilities be constructed to withstand a 500-y ear, 24-hour event. The Division has been considering a change to Nevada's closure regulations to require that closed facilities are designed, at a minimum, to contain the 500-year, 24-hour storm event if containment is necessary and to withstand the erosional effects of a 500-year, 24-hour storm event.

(A) Implementation of an engineered cover system d esigned to achieve at least a 95 percent reduction in annual net-percolation based on the long-term average and reduce seepage discharges to meet applicable water quality standards;

In areas where annual evaporation exceeds annual pr ecipitation, a process component must achieve zero discharge and all sourc es must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State. NAC 445A.433(1)(a),(b).

(B) A capture and treatment system designed to ach ieve at least a 95 percent capture efficiency and meet applicable water quality standards; or combination

of an engineered cover system and a capture and treatment system to achieve at least a 95 percent reduction in discharged load and meet applicable water quality standards; or

In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State. NAC 445A.433(1)(a),(b).

(C) A solution containment system to assure seepage flows are collected, contained, conveyed, and treated to achieve at least a percent reduction to meet applicable water quality standards.

In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State. NAC 445A.433(1)(a),(b).

NAC 445A.398 requires that a permit application include the proposed operating plans for the facility. The plan must include a description and the range of operating conditions for which the components were designed; a plan for the management of process fluids which describes the methods to be used for the monitoring and controlling of all process fluids; NAC 445A.396 requires that a permit application must include the results from testing samples from the facility's mine site which are representative of the overburden, waste rock, and ore at the mine site and that these samples must be evaluated for their potential to release pollutants and degrade waters of the State. When there is potential to degrade, NAC 445A.393 allows the Division the authority to require a higher standard of containment or monitoring or both. This is accomplished with a Division-approved waste rock management plan, which details the placement and management of benign and chemically reactive waste rock. This is described in greater detail in the Division Guidance Document "Waste Rock, Overburden, and Ore Evaluation". NAC 445A.398(1-2). The operating plan must include the following: a description of the means to evaluate the conditions in the fluid management system so as to be able to quantify the available storage capacity for meteoric waters and to define when and to what extent the designed containment capacity has been exceeded; a plan for monitoring the facility which describes the water quality in the area; the monitoring locations the applicant proposes to sample routinely in order to evaluate surface and groundwater at the site that may be affected by the operation of the facility; an analytical profile of each surface and groundwater that may be affected by the operation of the facility; and the locations of the leak

detection systems, the frequency for sampling these systems and the analytical profile to be used for evaluation of the samples. NAC 445A.398(2-3).

NAC 445A.424(1)(b) prohibits a mine facility from degrading groundwater to the extent that a state or federal drinking water standard is exceeded or the WAD cyanide concentration exceeds 0.2 mg/L, or from degrading surface water to the extent that the quality of surface water of higher quality is lowered below that allowed by NRS 445A.565. Pursuant to NAC 445A.441, if the Division determines if seepage and/or a discharge does not, or is not expected to, meet applicable water quality standards, the Division has the authority to require the Permittee to implement an approved plan to eliminate the degradation and meet the water quality standards per NAC 445A.424. Such a plan may include a capture and treatment system (however, the capture efficiency is not dictated by regulation; only the resultant water quality is), or another method, such as elimination of influent water or chemical stabilization of the source material. NAC 445A.379 defines stabilization as the condition that results from contaminants in a material are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may be reasonably expected to exist at a site.

NAC 445.430 requires that spent ore which has been left on pads or which will be removed from a pad must first demonstrate stability of the discharge effluent from the pads or from the spent ore such that WAD cyanide levels in the effluent are less than 0.2 mg/l; the pH level of the effluent is between 6.0 and 9.0; and contaminants in any effluent from the processed ore which would result from meteoric waters would not degrade waters of the State. If these requirements cannot be achieved, the Department may grant a variance to those conditions if the holder of the permit can demonstrate that the remaining solid material, when representatively sampled, does not contain levels of contaminants that are likely to become mobile and degrade the waters of the State under the conditions that will exist at the site; or the spent ore is stabilized in such a fashion as to inhibit meteoric waters from migrating through the material and transporting contaminants that have the potential to degrade the waters of the State. NAC 445A.430(2)(a-b). Also, the Department may approve an alternate method for stabilizing ore that has been leached if the holder of the permit can clearly demonstrate that the condition in which the materials will be left will not create a potential for the waters of the State to be degraded. NAC 445A.430(3).

The program to monitor the site of a facility must be designed to monitor the quality of all ground and surface water which may be affected by the facility. NAC 445A.440(1). The type, number and location of the monitoring points must be described in the application as part of the monitoring plan and must be approved by the Department. Id. Final monitoring requirements must be established by the

Department. NAC 445A.440(2). Baseline data must be collected before operation of the facility. NAC 445A.440(3). In areas where there is a substantial separation between the process components and the groundwater, a system for monitoring highly probable escape pathways in the unsaturated zone may be required by the Department. NAC 445A.440(4). The decision where to locate the monitoring points for the site must be made after considering the site's geology and hydrogeology. NAC 445A.440(5).

A WPCP issued by the Division also includes a standard provision (Part I.N.) that provides a regulatory mechanism for the Permittee to submit to the Division for review and approval an updated heap leach pad cover study with each Permit renewal and with any change to the heap leach pad or cover that could alter the performance of the heap leach pad cover and draindown. The revised study must include but is not limited to, representative characterization data for all ore, cover, and fluids, changes in heap lead pad configuration or cover thickness, and any updates to the predictive draindown numeric model(s). In addition, a detailed description of the changes and appropriate methods to eliminate any potential to degrade waters of the State must also be provided. Approval may require modification of the Permit and payment of modification fees.

A WPCP issued by the Division also includes a standard provision (Part II.B.2.E.) that provides a regulatory mechanism for the Permittee to submit to the Division for review and approval of revised monitoring plan and sampling protocols annually. Changes in monitoring frequency or the incorporation of additional monitoring points may require modification of the Permit and payment of modification fees.

A WPCP issued by the Division also includes a standard provision (Part I.I.) that requires the Permittee to inspect all control devices, systems, and facilities weekly (for closure permits consider relaxing frequency, but not more than necessary, if site is not continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system), and during (when possible) and after major storm events. These inspections are performed to detect evidence of, deterioration, malfunction, or improper operation of control or monitoring systems; sudden changes in the data from any monitoring device; the presence of liquids in leak detection systems; and severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices.

NAC 445A.447 requires submittal of a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of any portion of a mining operation that may release pollutants. See also, NAC 445A.359 and 445A.378. The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure

components used in such mitigating actions be designed to withstand the 24-hour, 500-year storm event.

Local county and municipal ordinances and site-specific conditions may require a facility to implementation additional closure practices or methodologies.

NAC 519A.345 states that the Division may, if appropriate, require an operator of a mining operation to reclaim heaps from leaching by regrading to enhance structural stability, promote runoff, reduce infiltration and control erosion; covering with waste rock, topsoil or growth medium; revegetation; process fluid stabilization; and diverting run-on.

NAC 519A.360 sets-forth the requirements for the amount of surety an operator must post to ensure the continuation of post-reclamation stabilization, management, control and treatment of mine-impacted waters to protect the waters of the State.

The SRCE program has a module to calculate the closure costs of leach pad process ponds to include liner cutting and folding with backfill with the appropriate equipment and labor costs. To ensure containment of the passive drain down solution rate, the use of double lined process ponds are converted to Evapotranspiration (ET) Cells or Evaporation (E) Cells. The Bureau has developed a User page Closure pond module to calculate the cost of converting an existing process pond to an ET or E Cells to contain seepage drain down of a leach pad at approximately $100,000 per acre pond. The Bureau has developed a SRCE supplemental Closure Pond User module which may be inputted into the SRCE reclamation cost subtotal summary page to be included in the total reclamation amount. It therefore becomes part of the calculated percentage government in-direct administration costs.

The SRCE program has a specific Tailings module to calculate the ET cover volume, placement and revegetation costs (including the impoundment slope). A designated environmental scientist, in cooperation with the BMRR Reclamation Branch Professional Engineer, review the 6-month IFM cost estimate for the facility, and the use of the Division's newly developed Nevada Tailings Impoundment Draindown Estimator (TIDE) to evaluate the Tailings solution drain down rate period and the associated PFCE program. The PFCE uses the TIDE timeframe to determine inputs for labor while pumping and evaporating solution and the electrical costs for the pumps and evaporators to provide for process fluid management reduction to achieve passive closure of the facility. The cost for rental pumps and the purchase of evaporator(s) are included along with the cost to develop a closure plan in the case that an operator does not have an approved plan submitted.

The IFM is a required 6-month period using site-specific requirements to calculate a 6-month cost for 24/7 labor, rental pumps and electrical power costs for the re-circulation of process solution to prevent a reclaim pond overflow. IFM provides a conservative timeframe until such time that a government agency can secure the posted surety bond amount in the case an operator fails to perform.

Currently, Nevada does not require the engineered cover designs and treatment systems to meet a minimum 200-year life design criteria. Also, Nevada does not require such design to meet 95% reduction in annual net precipitation, capture efficiency, or load reduction. Rather, process components at Nevada mine facilities must be constructed, at a minimum, to contain a 25-year, 24-hour storm event and to withstand a 100-year, 24-hour storm event. The Division may require additional storm event capacity based on site-specific factors such as proximity to surface water bodies, depth to groundwater and proximity to population. In Nevada's mine closure guidance, the Division recommends that facilities be constructed to withstand a 500-year, 24-hour event. The Division is considering a change to Nevada closure regulations to require that closed facilities are designed, at a minimum, to contain the 500-year, 24-hour storm event if containment is necessary and to withstand the erosional effects of a 500-year, 24-hour storm event.

(v) HEAP AND DUMP LEACH PAD LINER DESIGN

For heap leach, a liner designed to minimize/eliminate releases from the unit based on site specific conditions.

NAC 445A.424(1)(b) prohibits a mine facility from degrading groundwater to the extent that a state or federal drinking water standard is exceeded or the WAD cyanide concentration exceeds 0.2 mg/L, or from degrading surface water to the extent that the quality of surface water of higher quality is lowered below that allowed by NRS 445A.565. Pursuant to NAC 445A.441, if the Division determines if seepage and/or a discharge does not, or is not expected to, meet applicable water quality standards, the Division has the authority to require the Permittee to implement an approved plan to eliminate the degradation and meet the water quality standards per NAC 445A.424. Such a plan may include a capture and treatment system (however, the capture efficiency is not dictated by regulation; only the resultant water quality is), or another method, such as elimination of influent water or chemical stabilization of the source material. NAC 445A.379 defines stabilization as the condition that results from contaminants in a material are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may be reasonably expected to exist at a site.

NAC 445.430 requires that spent ore which has been left on pads or which will be removed from a pad must first demonstrate stability of the discharge effluent from the pads or from the spent ore such that WAD cyanide levels in the effluent are less than 0.2 mg/l; the pH level of the effluent is between 6.0 and 9.0; and contaminants in any effluent from the processed ore which would result from meteoric waters would not degrade waters of the State. If these requirements cannot be achieved, the Department may grant a variance to those conditions if the holder of the permit can demonstrate that the remaining solid material, when representatively sampled, does not contain levels of contaminants that are likely to become mobile and degrade the waters of the State under the conditions that will exist at the site; or the spent ore is stabilized in such a fashion as to inhibit meteoric waters from migrating through the material and transporting contaminants that have the potential to degrade the waters of the State. NAC 445A.430(2)(a-b). Also, the Department may approve an alternate method for stabilizing ore that has been leached if the holder of the permit can clearly demonstrate that the condtion in which the materials will be left will not create a potential for the waters of the State to be degraded. NAC 445A.430(3).

NAC 445A.432 and NAC 445A.433 set-forth the minimum design criteria and universal requirements for process components. These statutes establish minimum contaminant control technologies and require consideration of the site and operating conditions in designing individual process components. See generally, Id. Based on site characterization, best engineering judgment must be used to determine the degree to which designs must provide more or less protection through engineered containment. Id. However, the application of minimum design criteria does not release the holder of a permit from liability for degradation to waters of the State caused by the facility. NAC 445A.433(4).

In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State. NAC 445A.433(1)(a),(b). Process components must be designed to withstand the runoff from a 24-hour storm event with a 100-year recurrence interval; and the primary fluid management system must be designed to be able to remain fully functional and fully contain all process fluids including all accumulations resulting from a 24-hour storm event with a 25-year recurrence interval. NAC 445A.433(1)(c),(d). The Department has the option of requiring additional containment based on the proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(1)(d)(1-3). Contingency plans for managing process contaminated flows in excess of the design quantity must be described in the appropriate operating plans. NAC 445A.433(1).

The fluid management system must be designed to be functional for 5 years after the projected operating life of the process component and permanent closure period. NAC 445A.433(1)(e). The engineering designs must take into consideration the proposed range of operating conditions for each component and the history of seismic events at the site

in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity. NAC 445A.433(1)(f). Additional containment may be required in areas where groundwater is considered to be near the surface. NAC 445A.433(2).

The Division has established permit limitations for leak detection rates for double lined systems, which are allowable leakage rates for process fluids that pass through the primary liner and are collected in an internal sump or drain between the double liner systems. The process fluid evacuates the system between the primary and secondary liners and is placed back into full containment. This allows the head pressure on the secondary liner to remain at a minimal level, therefore significantly reducing the potential for a release to occur from the secondary liner. If allowable leakage rates are exceeded, the permittee must develop a corrective action plan and complete repairs to the containment in order to comply with permitted levels.

The Division guidance document "Permit Limitations for Leak Detection Systems" establishes the following limitations for leak detection systems:

	Quarterly	Annually
DOUBLE-LINED PONDS	150 gallons per day	50 gallons per day
LEACH PADS and OTHER NON-IMPOUNDING SURFACES		
Sub-base permeability		
1.0×10^{-7} cm/sec	150 gallons per day	50 gallons per day
1.0×10^{-6} cm/sec	75 gallons per day	25 gallons per day
1.0×10^{-5} cm/sec	20 gallons per day	10 gallons per day
CONVEYANCE CHANNELS		
Sub-base permeability		
1.0×10^{-7} cm/sec	150 gallons per day	50 gallons per day
1.0×10^{-6} cm/sec	45 gallons per day	15 gallons per day

For synthetically lined ponds, the EPA and most state regulatory agencies utilize an allowable leakage flow rate (ALR) based on gallons per acre per day (gpad). For a lined process pond at a mine site, the ALR ranges from 200 to 500 gpad, depending on the state or regulatory authority. For a 1-acre process pond (208 feet by 208 feet by 30 feet deep) and a 200-gpad ALR rate, this would equate to an ALR of 200 gallons per day (gpd) every day. For a 5-acre process pond (1,040 feet by 208 feet by 30 feet deep) and a 200 gpad ALR, this would equate to an ALR of 1,000 gpd every day.

Nevada's mining program uses a more restrictive leakage rate, which is not dependent on the size of the pond. For either situation, the allowable leakage rate is 150 gpd, averaged quarterly and 50 gpd, averaged annually. It should be noted that in spite of the

more restrictive Nevada ALRs, the Nevada-permitted facilities continue to meet the regulatory limits.

In the event that permit limitations are exceeded, a site-specific evaluation must be conducted by the permittee to assess the need for additional process components or site monitoring. Depending upon site-specific conditions, the permittee may be required to institute a mitigation procedure(s) to bring the process component into compliance with the permit limitation. If the permittee can demonstrate that the permit violation will not result in degradation to the waters of the State and the permittee complies with new monitoring levels and mitigation procedures, the Bureau may allow the continued use of the non-compliant process component. If a permit limitation for a leak detection system is exceeded, the Bureau does not intend to use the permit limitation as a means of halting beneficiation or assessing penalties, except in cases where the design criteria is no longer reasonably met, the permittee has been negligent, or the permittee is not responsive in taking proper corrective action.

When a liner is included as part of the waste rock facility design, soil liners must have a minimum thickness of 12 inches and be compacted in lifts which are no more than 6 inches thick. NAC 445A.438(1). A soil liner must have a permeability of not more than that exhibited by 12 inches of $1x10^{-7}$ centimeters per second (cm/sec) material. Id. Synthetic liners must be rated as having a resistance to the passage of process fluids equal to a coefficient of permeability of $1x10^{11}$ cm/sec. NAC 445A.438(2). The Division is required to review for completeness the applicant's evaluation of the following design parameters, where applicable, for a liner including the type of foundation, slope and stability; the over liner protection and provisions for hydraulic relief; the load and means of applying load; the compatibility of a liner with waste rock drainage; the complexity of the leak detection and recovery systems (if present); the depth from the surface to all groundwater; and the liner's ability to remain functionally competent until permanent closure has been completed. NAC 445A.438(3)(a-g).

A quality assurance and quality control program must be developed and carried out for the construction of all liner systems. NAC 445A.439 A summary of the quality control data must be submitted to the Department with the as-built drawings. Id.

NAC 445A.447 requires submittal of a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of any portion of a mining operation that may release pollutants. See also, NAC 445A.359 and 445A.378. The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure components used in such mitigating actions be designed to withstand the 24-hour, 500-year storm event.

Other authorities and resources that are considered include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local

county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

(vi) CONCURRENT OR SEQUENTIAL RECLAMATION OF HEAP AND DUMP LEACH PADS PRIOR TO FINAL CESSATION OF OPERATIONS AND CLOSURE

Requirements for concurrent or sequential reclamation of mined areas as they become available prior to final cessation of operations and closure.

NAC 445A.446(1)(c) states that the permanent closure of a facility must be initiated when the end of the design life of that process component is reached.

The closure and stabilization requirements pertain to process and non-process components (solid and liquid process mine wastes) such as heap leach pads, tailings impoundments, pits, waste rock dumps, ore stockpiles, and any other associated mine components that, if not properly managed during operation and closure, could potentially lead to the degradation of waters of the State. NAC 445A.446. A mining facility operator/permittee is required to submit a Tentative Permanent Closure Plan at the time of application for a WPCP. NAC 445A.398(5). Sources which have not been classified as process components such as waste rock disposal facilities, must be evaluated at the end of their operating life to determine the potential for pollutants from these sources to migrate and degrade the waters of the State under the final proposed site conditions and must be closed in accordance with the State Handbook of Best Management Practices (Sections 9-1 through 9-6) prepared pursuant to NAC 445A.336. NAC 445A.447(3).

A Final Permanent Closure Plan must be submitted to the Department two years prior to the anticipated closure of a mine site. NAC 445A.447(2). The Division has prepared a guidance document "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports" which delineates a permittees responsibilities and Division requirements with respect to permanent closure. This plan must provide closure goals and a detailed methodology of activities necessary to achieve a level of stabilization of all known and potential contaminants at the site. The Final Permanent Closure Plan must include a detailed description of all proposed monitoring that will be conducted to demonstrate how the closure goals are being met.

Following the completion of all closure related activities; a Final Closure Report must be submitted to the Bureau summarizing all completed closure related activities. This document should contain all information necessary for the operator to demonstrate to the Department that the completed closure activities, per process and non-process component, will ensure that waters of the State will not be degraded. This report must include a proposal for post-closure monitoring for an initial period of time not less than five (5) years in order to provide additional supporting data that stabilization has truly been achieved.

The Request for Final Closure is made following the completion of the post-closure monitoring period. The request should contain all post-closure monitoring information and clearly demonstrate stabilization. Upon the successful demonstration of stabilization, the Department would consider the mine site to be in final closure, retire the WPCP, and eliminate all NAC 445A fee requirements.

Other authorities and resources that are considered include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

NAC 519A.285 describes the time when reclamation must be initiated and completed and the process for requesting an extension of time. If affected land cannot practicably be reclaimed concurrently with an exploration projector mining operation, reclamation must be initiated within 2 years after completion or abandonment of the exploration project or mining operation; within 3 years after a temporary closure of an exploration project or mining operation; or as required by the BLM, the USFS or another federal land management agency. NAC 519A.285(1)(a-c). The Division may grant one or more extensions of the time when reclamation must begin if the operator of an exploration project or mining operation demonstrates that a reasonable likelihood exists that the project or operation will resume, based on a consideration of factors including, but not limited to: The presence of additional mineralization of the commodity being mined or other commodities in commerce; Historical fluctuations in the value of the commodity being mined or other commodities present if they can be mined using the same disturbances; The design life of any beneficiationprocess components existing at a mining operation; and If the closure was caused because oflitigation. NAC 519A.285(2)(a-d). Each extension is for a 3-year period. NAC 519.285(2). Once initiated, final reclamation activities must be completed as set forth in an approved plan for reclamation, unless the exploration project or mining operation is reactivated. NAC 519A.285(3). The contents of a plan for reclamation for mining operation requires a proposed schedule of the time for initiation and completion of activities for reclamation. NAC 519A.270(6).

NAC 519A.345 states that the Division may, if appropriate, require an operator of a mining operation to reclaim heaps from leaching by regrading to enhance structural stability, promote runoff, reduce infiltration and control erosion; covering with waste rock, topsoil or growth medium; revegetation; process fluid stabilization; and diverting run-on.

RESPONSE CATEGORY 5—TAILINGS [Proposed 40 CFR 320.63(a)(v)]

GENERAL COMMENTS

On a site-specific basis the State of Nevada meetsor exceeds all of the requirements listed for the tailings category.

Nevada WPC regulations do not have specific FOS requirements for tailings; however, the Department does utilize design criteria for dams and other water impounding devices established by the Nevada Division of Water Resources. The design of a tailings impoundment differs greatly and depends on the type of impoundment, local geology, size of the structure, seismic zone, downstream hazard, upstream conditions etc. Ultimately, the design engineer and permittee are responsible for constructing and operating a safe structure and the review process in no way creates a warranty by the State Engineer for the adequacy of the design. Analyses considered in dam design pursuant to NAC 535.210(3) include a stability analysis with an FOS for static conditions not less than 1.3 and an FOS for pseudostatic conditions not less than 1.1, utilizing a peak ground acceleration with a defined seismic event with a maximum 10% probability of exceedance in 50 years. However, if site-specific conditions warrant higher minimum stability requirements, these requirements are incorporated into the WPCP for the facility. In addition, a determination of foundation suitability (e.g., liquefaction potential, ability to support the load/settlement, fault traces or bedrock fractures, horizontally contiguous zones of high permeability, and embankment settlement); seep analysis; tailings deposition; embankment material physical properties; stormwater diversion, etc. are also considered when designing the tailings impoundment.

Currently, process components at Nevada mine facilities must be constructed, at a minimum, to contain a 25-year, 24-hour storm event and to withstand a 100-year, 24-hour storm event. the Division may require additional storm event capacity based on site-specific factors such as proximity to surface water bodies, depth to groundwater, and proximity to population. In Nevada's mine closure guidance, the Division recommends that facilities are constructed to withstand a 500-year, 24-hour event. The Division is considering a change to Nevada's closure regulations to require that closed facilities are designed, at a minimum, to contain a 500-year, 24-hour storm event if containment is necessary and withstand the erosional effects of a 500-year, 24-hour storm event.

(i) SAFETY AND PREVENTION OF PUBLIC ACCESS TO TAILINGS IMPOUNDMENTS

A plan to address public safety by prevention of public access by means of security fencing, or other effective methods.

NAC 519A.390 requires the use of a barricade, fence, permanently anchored seal, or backfill to secure dangerous conditions at a mine. This requirement applies to surface or underground mines as well as any development, benefciation plant, mill, smelter, refinery or other facility used to treat or reduce any mineral commodity, whether or not its is contiguous to an area where exploitation or extraction of mineral commodities occurs. NAC 445A.447 requires submittal of a Final Plan for Permanent Closure for any portion of a mining operation that may release pollutants (NAC 445A.378 and 445A.359), including but not limited to slag piles and other process components. Such a plan may include a barricade, fence, and/or signage, in addition to actions focused on chemical stabilization.

The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure components used in such mitigating actions be designed to withstand the 24-hour, 500-year storm event.

NAC 519A.260(1) requires a plan for reclamation consider the pre and post-mining use of the land. NAC 519A.270(16) requires a description of any necessary monitoring or maintenance of any fencing or signs.519A.345.9(c) requires construction and maintaining berms fences or other means of restricting access.

Other authorities and resources that are considered for preventing public access include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

(ii) TAILINGS IMPOUNDMENT STABILITY DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE

A plan to regrade surface during closure to a stable configuration that prevents ponding and promotes the conveyance of surface water off the unit, and that requires closure of all tailings impoundments and stacks considered to be critical structures to be designed for a long-term static factor of safety of 1.5 or greater and all non-critical structures to be designed for a long-term static factor of safety of 1.3 or greater; and requires that the units being closed be designed for a factor of safety of 1.1 or greater under pseudostatic analysis. The plan must also provide for a stability analysis to be conducted for the unit and include evaluation for static and seismic induced liquefaction.

Nevada WPC regulations do not specifically state a minimum FOS for tailings impoundments; however the Department does utilize design criteria for dams and other water impounding devices established by the Nevada Division of Water Resources. The design of a tailings impoundment differs greatly depending on the type of impoundment, local geology, size of structure, seismic zone, downstream hazard, upstream conditions etc. Ultimately the design engineer and permittee are responsible for constructing and operating a safe structure and the review process in no way creates a warranty by the State Engineer for the adequacy of the design. Analyses considered in dam design pursuant to NAC 535.210(3) include a stability analysis with an FOS for static conditions not less than 1.3 and an FOS for pseudostatic conditions not less than 1.1, utilizing a peak ground acceleration with a defined seismic event with a maximum 10% probability of exceedance in 50 years. However, if site-specific conditions warrant higher minimum stability requirements, these requirements are incorporated into the WPCP for the facility (e.g., WPCP Part I.G). In addition, a determination of foundation suitability (e.g., liquefaction potential, ability to support the load/settlement, fault traces or bedrock

fractures, horizontally contiguous zones of high permeability, and embankment settlement); seep analysis; tailings deposition; embankment material physical properties; stormwater diversion, etc. must also be considered when designing the tailings impoundment.

NAC 445A.397 requires that the engineering design report include an evaluation of structural stability. Nevada WPC regulations do not distinguish between critical and non-critical structures at mine facilities. Nevada does not differentiate between critical and non-critical structures on a site-specific basis and sets stability requirements based on site-specific needs and criteria.

A WPCP issued by the Division also includes a standard provision (Part I.I.) that requires the Permittee to inspect all control devices, systems, and facilities weekly (for closure permits consider relaxing frequency, but not more than necessary, if site is not continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system), and during (when possible) and after major storm events. These inspections are performed to detect evidence of: Deterioration, malfunction, or improper operation of control or monitoring systems; sudden changes in the data from any monitoring device; the presence of liquids in leak detection systems; and severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices.

NAC 445A.398 requires that a permit application include the proposed operating plans for the facility. The plan must include a description and the range of operating conditions for which the components were designed; a plan for the management of process fluids which describes the methods to be used for the monitoring and controlling of all process fluids. NAC 445A.396 requires that a permit application must include the results from testing samples from the facility's mine site which are representative of the overburden, waste rock, and ore at the mine site and that these samples must be evaluated for their potential to release pollutants and degrade waters of the State. When there is potential to degrade, NAC 445A.393 allows the Division the authority to require a higher standard of containment or monitoring or both. This is accomplished with a Division-approved waste rock management plan, which details the placement and management of benign and chemically reactive waste rock. This is described in greater detail in the Division Guidance Document "Waste Rock, Overburden, and Ore Evaluation.

NAC 445A.398(1-2). The operating plan must include the following: a description of the means to evaluate the conditions in the fluid management system so as to be able to quantify the available storage capacity for meteoric waters and to define when and to what extent the designed containment capacity has been exceeded; a plan for monitoring the facility which describes the water quality in the area; the monitoring locations the applicant proposes to sample routinely in order to evaluate surface and groundwater at the site that may be affected by the operation of the facility; an analytical profile of each

surface and groundwater that may be affected by the operation of the facility; and the locations of the leak detection systems, the frequency for sampling these systems and the analytical profile to be used for evaluation of the samples. NAC 445A.398(2-3).

NAC 445A.432 and NAC 445A.433 set-forth the minimum design criteria and universal requirements for process components. These statutes establish minimum contaminant control technologies and require consideration of the site and operating conditions in designing individual process components. See generally, Id. Based on site characterization, best engineering judgment must be used to determine the degree to which designs must provide more or less protection through engineered containment. Id. However, the application of minimum design criteria does not release the holder of a permit from liability for degradation to waters of the State caused by the facility. NAC 445A.433(4).

In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State. NAC 445A.433(1)(a),(b). Process components must be designed to withstand the runoff from a 24-hour storm event with a 100-year recurrence interval; and the primary fluid management system must be designed to be able to remain fully functional and fully contain all process fluids including all accumulations resulting from a 24-hour storm event with a 25-year recurrence interval. NAC 445A.433(1)(c),(d). The Department has the option of requiring additional containment based on the proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(1)(d)(1-3). Contingency plans for managing process contaminated flows in excess of the design quantity must be described in the appropriate operating plans. NAC 445A.433(1).

The fluid management system must be designed to be functional for 5 years after the projected operating life of the process component and permanent closure period. NAC 445A.433(1)(e). The engineering designs must take into consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity. NAC 445A.433(1)(f). Additional containment may be required in areas where groundwater is considered to be near the surface. NAC 445A.433(2).

The program to monitor the site of a facility must be designed to monitor the quality of all ground and surface water which may be affected by the facility. NAC 445A.440(1). The type, number and location of the monitoring points must be described in the application as part of the monitoring plan and must be approved by the Department. Id. Final monitoring requirements must be established by the Department. NAC 445A.440(2). Baseline data must be collected before operation of the facility. NAC 445A.440(3). In areas where there is a substantial separation between the process components and the

groundwater, a system for monitoring highly probable escape pathways in the unsaturated zone may be required by the Department. NAC 445A.440(4). The decision where to locate the monitoring points for the site must be made after considering the site's geology and hydrogeology. NAC 445A.440(5).

NAC 445A.442(1) requires the Department to determine the extent and complexity to which the holder of a permit must monitor individual process components for the release of contaminants after reviewing site and process controlled design conditions. Systems designed to detect and control leaks from process components must be located at the interface of the unit process components and the adjacent environment and be able to provide the first indication that pollutants or contaminants have escaped their primary containment. Id. The program to monitor the process components must include a schedule of activities, a roster of current job titles for persons responsible for and involved in the monitoring program, and the form and frequency of reports to be submitted to the Department. NAC 445A.442(2)(a-c). The Department may randomly collect information or samples for reference. NAC 445A.442(2). The cost of analyzing samples may be placed upon the holder of the permit. Id.

A WPCP issued by the Division also includes a standard provision (Part II.B.2.E.) that provides a regulatory mechanism for the Permittee to submit to the Division for review and approval of revised monitoring plan and sampling protocols annually. Changes in monitoring frequency or the incorporation of additional monitoring points may require modification of the Permit and payment of modification fees.

NAC 445A.437(1) requires that a tailings impoundment utilize a system of containment equivalent to 12 inches of recompacted native, imported, or amended soils which have an in place recompacted coefficient of permeability of no more than $1x10^{-6}$ cm/sec, or competent bedrock or other geologic formations underlying the site which has been demonstrated to provide a degree of containment equivalent to 12 inches. An alternate level of containment may be required by the Department for all of the tailings impoundment or for a portion thereof after considering the anticipated characteristics of the material to be deposited, the characteristics of the soil and geology of the site, the degree to which the hydraulic head on the impoundment liner is minimized, the extent and methods used for recycling or detoxifying fluids, pond area and volume, the depth from the surface to all groundwater, and the methods employed in depositing the impounded material. NAC 445A.437(2)(a-g).

A quality assurance and quality control program must be developed and carried out for the construction of all liner systems. NAC 445A.439 A summary of the quality control data must be submitted to the Department with the as-built drawings. Id.

Mine facilities must be monitored for up to 30 years following the completion of permanent closure actions to prevent degradation of waters of the State. NAC

445A.446(2). The closure and stabilization requirem ents pertain to process and non-process components (solid and liquid process mine w astes) such as heap leach pads, tailings impoundments, pits, waste rock dumps, ore stockpiles, and any other associated mine components that, if not properly managed durin g operation and closure, could potentially lead to the degradation of waters of the State. NAC 445A.446. A mining facility operator/permittee is required to submit a Tentative Permanent Closure Plan at the time of application for a WPCP. NAC 445A.398(5). Sources which have not been classified as process components such as waste rock disposal faci lities, must be evaluated at the end of their operating life to determine the potential for pollutants from these sources to migrate and degrade the waters of the State under the final proposed site conditions and must be closed in accordance with the State Handboo k of Best Management Practices (Sections 9-1 through 9-6) prepared pursuant to NAC 445A.336. NAC 445A.447(3).

A Final Permanent Closure Plan must be submitted to the Department two years prior to the anticipated closure of a mine site. NAC 445A.44 7(2). The Division has prepared a guidance document "Preparation Requirements and Gui delines for Permanent Closure Plans and Final Closure Reports" which delineates a permittees responsibilities and Division requirements with respect to permanent closure. This plan must provide closure goals and a detailed methodology of activities necessary to achieve a level of stabilization of all known and potential contaminants at the site . The Final Permanent Closure Plan must include a detailed description of all proposed monitoring that will be conducted to demonstrate how the closure goals are being met.

Following the completion of all closure related act ivities; a Final Closure Report must be submitted to the Bureau summarizing all completed c losure related activities. This document should contain all information necessary for the operator to demonstrate to the Department that the completed closure activities, p er process and non-process component, will ensure that waters of the State wil l not be degraded. This report must include a proposal for post-closure monitoring for an initial period of time not less than five (5) years in order to provide additional suppo rting data that stabilization has truly been achieved.

The Request for Final Closure is made following the completion of the post-closure monitoring period. The request should contain all p ost-closure monitoring information and clearly demonstrate stabilization. Upon the successful demonstration of stabilization, the Department would consider the mine site to be i n final closure, retire the WPCP, and eliminate all NAC 445A fee requirements.

NAC 445A.447 requires submittal of a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of any portion of a mining operation that may release pollutants. See also, NAC 445A.359 and 445A.378.

The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure components used in such mitigating actions be designed to withstand the 24-hour, 500-year storm event.

Other authorities and resources that are considered for regrading requirements include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

Under NAC 535.200(1), a person is required, pursuant to NRS 535.010, to notify the State Engineer before he or she constructs reconstructs or alters a dam and must submit to the State Engineer a description of all work that is proposed. The State Engineer will review the notice and its accompanying materials and, not later than 30 days after receiving the notice, will respond in writing stating the deficiencies, if any, in the submission that must be cured, that approval of the plans and specifications pursuant to subsection 2 of NRS 535.010 is required before construction may begin, or that no such approval is necessary. NAC 535.200(2)(a-c). A person who files a completed application for approval of plans for a dam pursuant to NAC 535.210 or 535.220 shall be deemed to have complied with these requirements. NAC 535.200(3).

NAC 535.210 sets-forth the requirements of an application seeking approval of plans for a dam. A person must submit the application either in person or by mail. NAC 535.210(1). Each element of the plans and specifications must be prepared by or under the supervision of a professional engineer and must bear the wet stamp and signature of the professional engineer. Id. The design report must include, without limitation, a description of the proposed structure and discussions of: the design approach, a geotechnical report, specifications for construction and an adequate description of the proposed work, calculations regarding strength or stability incorporating a FOS. See generally, NAC 535.210.

A person must also submit an application for approval of plans for decommissioning of a dam. NAC 535.220(1). The application must be submitted in person or by mail. Id. Each element of the plans and specifications must be prepared by or under the supervision of a professional engineer and must bear the wet stamp and signature of the professional engineer. Id.

Under NAC 535.250, the plans for a dam or reservoir must for seismic activity. To obtain the approval of the State Engineer pursuant to NRS 535.010, the plans and specifications must, in addition to all other applicable requirements, demonstrate to the satisfaction of the State Engineer that the dam is able to accommodate an earthquake or other extreme motion event without the failure of the dam or any other unintended release of water. NAC 535.250(1). The applicant must calculate the seismic response to a maximum

credible earthquake of a dam and its foundation, in cluding, without limitation: potential liquefaction, loss of material strength, settlement; ground displacement, and wave action due to landslide or seiche. NAC 535.250(2). Any numeric analysis of the seismic response must be calculated for the normal maximum loading condition with steady-state seepage. Id. If a pseudo static stability analysis is perfor med for an earthen embankment, the calculations must be accompanied by a description o f the assumptions used in deriving the seismic coefficient used in the calculations. I d. However, these additional requirements do not apply to a dam classified as lo w hazard or to a small earth dam classified as significant hazard, if the applicant demonstrates to the satisfaction of the State Engineer that the: static slope stability FOSis 1.5 or greater under normal maximum loading with steady-state seepage, peak site acceleration is not greater than 6.5 feet per second squared, materials used in the foundation an d embankment are not prone to liquefaction, and slope of the embankment is, if earthen, not greater than a horizontal-to-vertical ratio of 3:1, or, if free-draining rock fi ll, not greater than a horizontal-to-vertical ratio of 2:1. NAC 535.250(3)(a-d).

NAC 535.280 establishes dam (e.g., tailings impoundment) abandonment procedures and states that an owner shall not abandon a dam except by decommissioning pursuant to NAC 535.220 or through a transfer pursuant to NAC 535.380.

NAC 535.290(1) states that a person whose applicati on for approval of plans for the decommissioning of a dam has been approved by the S tate Engineer may apply for the closure of the file associated with the dam. The State Engineer will close a file if: the dam has been breached intentionally or through mishap; the dam and impoundment have been decommissioned, the dam was not built, or the appli cant withdraws the application for approval of plans for a dam. NAC 535.290(2)(a-d). If the State Engineer closes the file, the dam may not be returned to service and no water may be impounded behind the dam represented by that file until an owner complies with all applicable sections of chapter 535 of the NRS and NAC. NAC 535.290(3).

To obtain an approval to impound, including a temporary approval to impound, an owner or operator of a dam classified as high hazard or s ignificant hazard must submit to the State Engineer an emergency action plan for the dam . NAC 535.320(1). An owner or operator of a dam classified as high hazard or significant hazard for which an approval to impound has been granted as of October 24, 2014, or that otherwise is impounding water or is capable of impounding water as of October 24, 2014, must submit to the State Engineer an emergency action plan for the dam. NAC 535.320(2). An emergency action plan submitted pursuant to this section must follow the format presented by the Federal Emergency Management Agency in the Federal Guidelin es for Dam Safety: Emergency Action Planning for Dams (FEMA Publication No. P-64) or an equivalent format approved by the State Engineer. NAC 535.320(3)(a).

The State Engineer will inspect or require an owner to inspect a dam classified as high hazard not less than once a year, a dam classified as significant hazard not less than once every 3 years, any dam that is the subject of a complaint submitted to the State Engineer which alleges that the reservoir created by the dam is in an unsafe condition or is being used in an unsafe manner. NAC 535.360(1)(a-c). An inspection by an owner required by the State Engineer pursuant to this paragraph must be completed not later than the date specified by the State Engineer, and any other dam not less than once every 5 years. NAC 535.360(1)(c-d). The State Engineer may at any time inspect, or require an owner to inspect, a dam under construction to determine the condition of any element relevant to the safety of the dam. NAC 535.360(2). If a permittee fails to complete all required repairs in a reasonable time or the State Engineer concludes that a hazardous condition exists that may threaten life or property, the State Engineer may order the operator to lower, drain or cease diverting water into the reservoir until the operator satisfies the State Engineer that the repair has been completed or the condition has been rectified. NAC 535.360(4). If the State Engineer determines, pursuant to subsection 3 of NRS 535.030, that immediate remedial action is necessary to safeguard life or property, the State Engineer will take such action. NAC 535.360(5).

NAC 535.370(1) requires that each owner and each permittee operate and maintain his or her dam and works appurtenant to the dam in a safe manner and in accordance with all applicable permits, laws and regulations; take all necessary action allowed by law to prevent the failure of the dam; notify the State Engineer and local responsible authorities of any problem or unusual event at the dam; modify his or her dam to meet changing downstream hazard conditions or upstream watershed modifications; and maintain an operation manual and log for each dam that he or she owns or operates.

Other authorities and resources that are considered for tailings impoundment management include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

NAC 519A.345(5)(a) requires an operator of a mine to regrade a tailings surface to promote storm runoff and reduce infiltration using the State policy requirement for a minimum 2.0 foot ET earth cover depth for the closure of a process facility. An engineered designed spillway is required to convey water off the Tailings facility. NAC 519A.345(5)(e). Nevada's very arid climate combined with the ET cover depth has effectively been demonstrated in reducing meteoric infiltration rates to less than 5%. The ET cover material is salvaged growth medium material (or suitable overburden) which was stockpiled nearby during the construction phase as required in the reclamation plan for approval of the reclamation permit.

The SRCE program has a specific Tailings module to calculate the ET cover volume, placement and revegetation costs (including the impoundment slope). A designated

environmental scientist, in cooperation with the Bureau Reclamation Branch Professional Engineer, review the 6-month IFM cost estimate for the facility, and the use of the Division's newly developed TIDE program to evaluate the Tailings solution drain down rate period and the associated PFCE program. The PFCE uses the TIDE timeframe to determine inputs for labor while pumping and evaporating solution and the electrical costs for the pumps and evaporators to provide for process fluid management reduction to achieve passive closure of the facility. The cost for rental pumps and the purchase of evaporator(s) are included along with the cost to develop a closure plan in the case that an operator does not have an approved plan submitted.

The IFM is a required 6-month period using site-specific requirements to calculate a 6-month cost for 24/7 labor, rental pumps and electrical power costs for the re-circulation of process solution to prevent a reclaim pond overflow. IFM provides a conservative timeframe until such time that a government agency can secure the posted surety bond amount in the case an operator fails to perform.

(iii) TAILINGS IMPOUNDMENT STORMWATER AND SEDIMENT MANAGEMENT DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE

A plan for the management of all stormwater and sediment generated during operations and during and following closure. For existing units, the plan must provide for permanent stormwater conveyances, ditches, channels and diversions designed to convey the peak flow and ponds and other collection devices designed to store the volume generated during a 24-hour period by a 100-year return interval storm event. For unit that become authorized to operate after [insert the effective date of the Final Rule], the plan must provide for controls designed to store the volume generated during a 24-hour period by a 200-year return interval storm event.

NAC 445A.398 requires the submittal to the Department of the proposed operating plans for the facility for review and approval. The plans must include a description and the range of operating conditions for which the components were designed and a plan for the management of process fluids which describes the methods to be used for the monitoring and controlling of all process fluids.

NAC 445A.396 requires that a permit application must include the results from testing samples from the facility's mine site which are representative of the overburden, waste rock, and ore at the mine site and that these samples must be evaluated for their potential to release pollutants and degrade waters of the State. When there is potential to degrade, NAC 445A.393 allows the Division the authority to require a higher standard of containment or monitoring or both. This is accomplished with a Division-approved waste rock management plan, which details the placement and management of benign and chemically reactive waste rock. This is described in greater detail in the Division Guidance Document "Waste Rock, Overburden, and Ore Evaluation".

NAC 445A.398(1-2). The operating plan must include the following: a description of the means to evaluate the conditions in the fluid management system so as to be able to quantify the available storage capacity for meteoric waters and to define when and to what extent the designed containment capacity has been exceeded; a plan for monitoring the facility which describes the water quality in the area; the monitoring locations the applicant proposes to sample routinely in order to evaluate surface and groundwater at the site that may be affected by the operation of the facility; an analytical profile of each surface and groundwater that may be affected by the operation of the facility; and the locations of the leak detection systems, the frequency for sampling these systems and the analytical profile to be used for evaluation of the samples. NAC 445A.398(2-3).

NAC 445A.424(1)(b) prohibits a mine facility from degrading groundwater to the extent that a state or federal drinking water standard is exceeded or the WAD cyanide concentration exceeds 0.2 mg/L, or from degrading surface water to the extent that the quality of surface water of higher quality is lowered below that allowed by NRS 445A.565. Pursuant to NAC 445A.441, if the Division determines if seepage and/or a discharge does not, or is not expected to, meet applicable water quality standards, the Division has the authority to require the Permittee to implement an approved plan to eliminate the degradation and meet the standards per NAC 445A.424. Such a plan may include a capture and treatment system (however, the capture efficiency is not dictated by regulation; only the resultant water quality is), or another method, such as elimination of influent water or chemical stabilization of the source material. NAC 445A.379 defines stabilization as the condition that results from contaminants in a material are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may be reasonably expected to exist at a site

NAC 445A.432 and NAC 445A.433 set-forth the minimum design criteria and universal requirements for process components. These statutes establish minimum contaminant control technologies and require consideration of the site and operating conditions in designing individual process components. See generally, Id. Based on site characterization, best engineering judgment must be used to determine the degree to which designs must provide more or less protection through engineered containment. Id. However, the application of minimum design criteria does not release the holder of a permit from liability for degradation to waters of the State caused by the facility. NAC 445A.433(4).

In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State. NAC 445A.433(1)(a),(b). Process components must be designed to withstand the runoff from a 24-hour storm event with a 100-year recurrence interval; and the primary fluid management system must be designed to be able to remain fully functional and fully contain all process fluids including all

accumulations resulting from a 24-hour storm event with a 25-year recurrence interval. NAC 445A.433(1)(c),(d). The Department has the opti on of requiring additional containment based on the proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(1)(d)(1-3). C ontingency plans for managing process contaminated flows in excess of the design quantity must be described in the appropriate operating plans. NAC 445A.433(1).

The fluid management system must be designed to be functional for 5 years after the projected operating life of the process component a nd permanent closure period. NAC 445A.433(1)(e). The engineering designs must takeinto consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or s hifting of the subbase, liner or contained material which endangers primary or secon dary containment integrity. NAC 445A.433(1)(f). Additional containment may be requ ired in areas where groundwater is considered to be near the surface. NAC 445A.433(2).

General Mining Stormwater Permit (NVR300000) issued by the Department authorizes stormwater discharges associated with Standard Indu strial Classification (SIC) 10 as derived from Category iii (shown above), defined un der 40 CFR §122.26(b)(14) and all construction-related activities as defined by 40 CFR § 122.26 (b)(14)(x) and (b)(15) at mine sites (including exploration, development and recla mation activities). Facilities that are authorized under NPDES Permit NVR300000 must submit a new or SWPPP to the Department within 60 days of the effective date of the permit or for new dischargers within 30 days of the submitted Notice of Intent to discharge. SWPPPs are available for inspection at the project site or operation covered by this permit. The purpose of the SWPPP is to guide the identification of stormwater pollution sources and the reduction of their impacts, and otherwise lead to compliance wit h the conditions of this permit. Each of the SWPPP elements must be revised as necessary to maintain accuracy if there are changes in design or construction of the project orif the SWPPP is found to be insufficient.

The Permittee shall make SWPPPs available upon requ est to the State or local agency approving sediment and erosion plans, grading plans , and stormwater management plans; local government officials; and the operator of a municipal separate storm sewer receiving discharges from the site. A copy of the SWPPP that is kept on the mining site or made locally available must be provided to the Depa rtment for review at the time of an on-site inspection.

The conditions set in the General Mining Stormwater Permit language are the minimum requirements to maintain and implement an effective stormwater program consistent with U. S. EPA rules (Title 40 of the Code of Feder al Regulations Part 122). BMPs are approved by the U.S. EPA for use in stormwater permits.

NAC 445A.447 requires submittal of a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of any portion of a mining operation that may release pollutants, including but not limited to open pits and pit lakes. See also, NAC 445A.359 and 445A.378, The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure components used in such mitigating actions be designed to withstand the 24-hour, 500-year storm event.

Mine facilities must be monitored for up to 30 years following the completion of permanent closure actions to prevent degradation of waters of the State. NAC 445A.446(2). NAC 445A.433 establishes the minimum design criteria for process components at mine facilities. This regulation requires these components to remain fully functional and fully contain all process fluids including all accumulations from a 24-hour storm event with a 25-year recurrence interval. NAC445A.433(1)(d). The minimum design criteria for process components also require the ability to withstand a 24-hour storm event with a 100-year recurrence interval. NAC 445.433(1)(c). The Division has the discretion to require addition storm capacity based on site-specific factors such as proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(d)(1-3) In exercising this discretion, the Division must use its best engineering judgment to determine whether more or less engineered containment must be provided than the established minimum design criteria. NAC 445A.432. The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that all closure components be designed to withstand run-off from a 24-hour storm event with a 500-year recurrence interval.

Other authorities and resources that are considered for regrading requirements include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

To obtain the approval of the State Engineer pursuant to NRS 535.010, the plans and specifications for a dam must, in addition to all other applicable requirements, demonstrate to the satisfaction of the State Engineer that: the dam and reservoir are able to accommodate the inflow design flood for the tributary watershed without the failure of the dam or any other unintended release of water. NAC 535.240(1)(a). The inflow design flood selected is appropriate given the intended purpose, hazard classification and size of the dam. NAC 535.240(1)(b). For the purposes of this section, the inflow design flood used for design purposes must not be less than: a probable maximum flood, if the dam: is classified as high hazard or is a large dam and classified as significant hazard, or lacks one or more spillways; a flood whose annual chance of exceedance is 0.1 percent, if the dam is a small or medium dam and is classified as significant hazard; a flood whose annual chance of exceedance is 1 percent, for all other dams. NAC 535.240(2)(a-c). However, the State Engineer will approve plans that use an inflow design flood which is

less than those set-forth above if the applicant provides an incremental damage analysis that demonstrates, to the satisfaction of the State Engineer, that a lesser event is appropriate. NAC 535.240(3). An applicant may use one or more watershed diversion structures in lieu of spillways for the protection of a dam embankment so long as: the impoundment created by the embankment so protected is temporary and the diversion structures are designed to accommodate the greater of the inflow design flood or five times the expected life of the impoundment. NAC 535.240(4)(a-b). A dam must have freeboard adequate to prevent overtopping by wave run-up and reservoir fetch above the storm surcharge elevation. NAC 535.240(5). The adequacy of the freeboard must be demonstrated by evidence satisfactory to the State Engineer in the form of: a wave run-up and reservoir fetch calculation or proof that the freeboard is not less than 3 feet above the storm surcharge elevation. NAC 535.240(5)(a-b). "Storm surcharge elevation" means the elevation that the water surface would reach if the inflow design flood of a dam were added to a reservoir that is at its maximum conservation elevation. NAC 535.240(6).

The SRCE program includes a Diversion Ditch and Sediment pond calculation module for site-specific construction inputs that can account for a 24-hour period, 200-year storm event. The module incorporates the reclamation costs based upon the required design dimensions using an excavator for diversions and a dozer to build sediment control ponds and the re-seeding costs for long-term stability. The module has the ability to accept design criteria changes based upon an engineer's professional judgment or any regulatory change.

(iv) TAILINGS IMPOUNDMENT SEEPAGE AND MANAGEMENT AND TREATMENT DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE

A plan for the minimization, prevention, or collection and treatment of discharges and/or seepage, based on site hydrology and water quality characterization information, that provides for a cover system of, at a minimum, a store and release earthen cover system with a thickness of at least twelve inches and, if necessary, additional source controls or capture and treatment at closure, all of which meet a minimum 200-year life design criteria. If seepage water quality is not expected to meet applicable water quality standards, the plan must provide for:

(A) Implementation of an engineered cover system designed to achieve at least a 95 percent reduction in annual net-percolation based on the long-term average and reduce seepage discharges to meet applicable water quality standards;

In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State. NAC 445A.433(1)(a),(b).

NAC 445A.424(1)(b) prohibits a mine facility from degrading groundwater to the extent that a state or federal drinking water standard is exceeded or the WAD cyanide concentration exceeds 0.2 mg/L, or from degrading surface water to the extent that the quality of surface water of higher quality is lowered below that allowed by NRS 445A.565. Pursuant to NAC 445A.441, if the Division determines if seepage and/or a discharge does not, or is not expected to, meet applicable water quality standards, the Division has the authority to require the Permittee to implement an approved plan to eliminate the degradation and meet the water quality standards per NAC 445A.424. Such a plan may include a capture and treatment system (however, the capture efficiency is not dictated by regulation; only the resultant water quality is), or another method, such as elimination of influent water or chemical stabilization of the source material. NAC 445A.379 defines stabilization as the condition that results from contaminants in a material are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may be reasonably expected to exist at a site.

NAC 445A.431 requires that upon termination of the active use of a tailings impoundment, representative samples of the material deposited in the impoundment must be collected and characterized. The tailings must be stabilized during the final closure of a facility so as to inhibit the migration of any contaminant that has the potential to degrade the waters of the State.

NAC 519A.345(5)(a) requires an operator of a mine to regrade a tailings surface to promote storm runoff and reduce infiltration using the State policy requirement for a minimum 2.0 foot ET earth cover depth for the closure of a process facility. An engineered designed spillway is required to convey water off the Tailings facility. NAC 519A.345(5)(e). Nevada's very arid climate combined with the ET cover depth has effectively been demonstrated in reducing meteoric infiltration rates to less than 5%. The ET cover material is salvaged growth medium material (or suitable overburden) which was stockpiled nearby during the construction phase as required in the reclamation plan for approval of the reclamation permit.

(B) A capture and treatment system designed to achieve at least a 95 percent capture efficiency and meet applicable water quality standards; or combination of an engineered cover system and a capture and treatment system to achieve at least a 95 percent reduction in discharged load and meet applicable water quality standards, or

(C) A solution containment system to assure seepage flows are collected, contained, conveyed, and treated to achieve at least a percent reduction to meet applicable water quality standards.

In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility willnot degrade waters of the State. NAC 445A.433(1)(a),(b). Process components must be designed to withstand the runoff from a 24-hour storm event with a 100-year recurrence interval; and the primary fluid management system must be designed to be able to remain fully functional and fully contain all process fluids including all accumulations resulting from a 24-hour storm event with a 25-year recurrence interval. NAC 445A.433(1)(c),(d). The Department has the option of requiring additional containment based on the proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(1)(d)(1-3). Contingency plans for managing process contaminated flows in excess of the design quantity must be described in the appropriate operating plans. NAC 445A.433(1).

NAC 445A.424(1)(b) prohibits a mine facility from degrading groundwater to the extent that a state or federal drinking water standard is exceeded or the WAD cyanide concentration exceeds 0.2 mg/L, or from degrading surface water to the extent that the quality of surface water of higher quality is lowered below that allowed by NRS 445A.565. Pursuant to NAC 445A.441, if the Division determines if seepage and/or a discharge does not, or is not expected to, meet applicable water quality standards, the Division has the authority to require the Permittee to implement an approved plan to eliminate the degradation and meet the water quality standards per NAC 445A.424. Such a plan may include a capture and treatment system (however, the capture efficiency is not dictated by regulation; only the resultant water quality is), or another method, such as elimination of influent water or chemical stabilization of the source material. NAC 445A.379 defines stabilization as the condition that results from contaminants in a material are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may be reasonably expected to exist at a site.

NAC 445A.437(1) requires that a tailings impoundment utilize a system of containment equivalent to 12 inches of recompacted native, imported, or amended soils which have an in place recompacted coefficient of permeability of no more than $1x10^{-6}$ cm/sec, or competent bedrock or other geologic formations underlying the site which has been demonstrated to provide a degree of containment equivalent to 12 inches. An alternate level of containment may be required by the Department for all of the tailings impoundment or for a portion thereof after considering the anticipated characteristics of the material to be deposited, the characteristics of the soil and geology of the site, the degree to which the hydraulic head on the impoundment liner is minimized, the extent and methods used for recycling or detoxifying fluids, pond area and volume, the depth

from the surface to all groundwater, and the methods employed in depositing the impounded material. NAC 445A.437(2)(a-g).

The Division may, if appropriate, require an operator of a mine to reclaim dams for tailings ponds by: covering with waste rock, topsoil, or growth medium; revegetation; and rendering the dam incapable of storing any mobile fluid in a quantity which could pose a threat to the stability of the dam or to public safety. NAC 519A.345(4)(a-c). The Division may also reclaim impoundments for tailings by: regrading to promote runoff and reduce infiltration; covering with waste rock, topsoil, or growth medium; revegetation; process fluid stabilization; and diverting run-on. NAC 519A.345(5)(a-e).

NAC 519A.345(5)(d) requires an operator of a mine to provide for the process fluid stabilization of a tailings facility. Most tailings facilities have an existing reclaim process pond at the toe of the tailings facility for operational drain down. The SRCE program has a module to calculate the closure costs of a double lined reclaim process ponds to include liner cutting and folding with the associated backfill with the appropriate equipment and labor costs for process ponds that may not be needed for process fluid stabilization closure.

To insure containment of the tails passive drain down solution rate, the use of existing double lined process ponds are converted to ET Cells or E Cells. The Bureau has developed a SRCE user page Closure pond module to calculate the cost of converting an existing process pond to an ET or E Cells to contain the passive seepage drain down of a Tails facility (approximately $100,000/per pond acre). The User page Closure pond module has the ability to calculate the reclamation costs for an entirely new constructed closure pond (approximately $200,000/per pond acre) if determined that a larger pond size is required to match the passive closure drain down volume. The User page Closure pond module calculated costs have an input cell linked to the SRCE summary page to include it in the total reclamation amount and make it part of the calculated percentage government in-direct administration costs.

The SRCE program has a specific Tailings module to calculate the ET cover volume, placement, and revegetation costs (including the impoundment slope). A designated environmental scientist, in cooperation with the Bureau's Reclamation Branch Professional Engineer, review the 6-month IFM cost estimate for the facility, and the use of the Division's newly developed TIDE program to evaluate the Tailings solution drain down rate period and the associated PFCE program. The PFCE uses the TIDE timeframe to determine inputs for labor while pumping and evaporating solution and the electrical costs for the pumps and evaporators to provide for process fluid management reduction to achieve passive closure of the facility. The cost for rental pumps and the purchase of evaporator(s) are included

along with the cost to develop a closure plan in the case that an operator does not have an approved plan submitted.

(v) TAILINGS IMPOUNDMENT LINER DESIGN

A liner designed to minimize/eliminate releases from the unit based on site specific conditions.

NAC 445A.424(1)(b) prohibits a mine facility from degrading groundwater to the extent that a state or federal drinking water standard is exceeded or the WAD cyanide concentration exceeds 0.2 mg/L, or from degrading surface water to the extent that the quality of surface water of higher quality is lowered below that allowed by NRS 445A.565. Pursuant to NAC 445A.441, if the Division determines if seepage and/or a discharge does not, or is not expected to, meet applicable water quality standards, the Division has the authority to require the Permittee to implement an approved plan to eliminate the degradation and meet the water quality standards per NAC 445A.424. Such a plan may include a capture and treatment system (however, the capture efficiency is not dictated by regulation; only the resultant water quality is), or another method, such as elimination of influent water or chemical stabilization of the source material. NAC 445A.379 defines stabilization as the condition that results from contaminants in a material are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may be reasonably expected to exist at a site.

NAC 445A.431 states that upon termination of the active use of a tailings impoundment, representative samples of the material deposited in the impoundment must be collected and characterized. The tailings must be stabilized during the final closure of a facility so as to inhibit the migration of any contaminant that has the potential to degrade the waters of the State.

NAC 445A.432 and NAC 445A.433 set-forth the minimum design criteria and universal requirements for process components. These statutes establish minimum contaminant control technologies and require consideration of the site and operating conditions in designing individual process components. See generally, Id. Based on site characterization, best engineering judgment must be used to determine the degree to which designs must provide more or less protection through engineered containment. Id.

In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State. NAC 445A.433(1)(a),(b). Process components must be designed to withstand the runoff from a 24-hour storm event with a 100-year recurrence interval; and the primary fluid management system must be designed to be able to remain fully functional and fully contain all process fluids including all accumulations resulting from a 24-hour storm event with a 25-year recurrence interval.

NAC 445A.433(1)(c),(d). The Department has the option of requiring additional containment based on the proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(1)(d)(1-3). Contingency plans for managing process contaminated flows in excess of the design quantity must be described in the appropriate operating plans. NAC 445A.433(1).

The fluid management system must be designed to be functional for 5 years after the projected operating life of the process component and permanent closure period. NAC 445A.433(1)(e). The engineering designs must takeinto consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity. NAC 445A.433(1)(f). Additional containment may be required in areas where groundwater is considered to be near the surface. NAC 445A.433(2).

Groundwater is considered to be near the surface if: the depth from the surface to groundwater is less than 100 feet and the top 100 feet of the existing formation has a coefficient of permeability greater than that exhibited by 100 feet of $1x10^{-5}$ cm/sec material, open fractured or faulted geologic conditions exist in the bedrock from the surface to the groundwater, or there is an inability to document that all exploratory and condemnation borings beneath the site have been adequately sealed. NAC 445A.433(2)(a-c). No new process component containing process fluids may be located within 1,000 feet of any dwelling which is occupied at least part of the year and which is not a part of the facility. NAC 445A.433(3). This restriction does not apply to modifications at a facility which predate such a dwelling. Id. The application of minimum design criteria does not release the holder of a permit from liability for degradation to waters of the State caused by the facility. NAC 445A.433(4).

NAC 445A.437(1) requires that a tailings impoundment utilize a system of containment equivalent to 12 inches of recompacted native, imported, or amended soils which have an in place recompacted coefficient of permeability of no more than $1x10^{-6}$ cm/sec, or competent bedrock or other geologic formations underlying the site which has been demonstrated to provide a degree of containment equivalent to 12 inches. An alternate level of containment may be required by the Department for all of the tailings impoundment or for a portion thereof after considering the anticipated characteristics of the material to be deposited, the characteristics of the soil and geology of the site, the degree to which the hydraulic head on the impoundment liner is minimized, the extent and methods used for recycling or detoxifying fluids, pond area and volume, the depth from the surface to all groundwater, and the methods employed in depositing the impounded material. NAC 445A.437(2)(a-g).

When a liner is included as part of the waste rock facility design, soil liners must have a minimum thickness of 12 inches and be compacted inlifts which are no more than 6 inches

thick. NAC 445A.438(1). A soil liner must have a permeability of not more than that exhibited by 12 inches of $1x10^{-7}$ centimeters per second (cm/sec) material. Id. Synthetic liners must be rated as having a resistance to the passage of process fluids equal to a coefficient of permeability of $1x10^{-11}$ cm/sec. NAC 445A.438(2). The Division is required to review for completeness the applicant's evaluation of the following design parameters, where applicable, for a liner including the type of foundation, slope and stability; the over liner protection and provisions for hydraulic relief; the load and means of applying load; the compatibility of a liner with waste rock drainage; the complexity of the leak detection and recovery systems (if present); the depth from the surface to all groundwater; and the liner's ability to remain functionally competent until permanent closure has been completed. NAC 445A.438(3)(a-g).

The Division has established permit limitations for leak detection rates for double lined systems, which are allowable leakage rates for process fluids that pass through the primary liner and are collected in an internal sump or drain between the double liner systems. The process fluid evacuates the system between the primary and secondary liners and is placed back into full containment. This allows the head pressure on the secondary liner to remain at a minimal level, therefore significantly reducing the potential for a release to occur from the secondary liner. If allowable leakage rates are exceeded, the permittee must develop a corrective action plan and complete repairs to the containment in order to comply with permitted levels.

The Division guidance document "Permit Limitations for Leak Detection Systems" establishes the following limitations for leak detection systems:

	Quarterly	Annually
DOUBLE-LINED PONDS	150 gallons per day	50 gallons per day
LEACH PADS and OTHER NON-IMPOUNDING SURFACES		
Sub-base permeability		
$1.0 X 10^{-7}$ cm/sec	150 gallons per day	50 gallons per day
$1.0 X 10^{-6}$ cm/sec	75 gallons per day	25 gallons per day
$1.0 X 10^{-5}$ cm/sec	20 gallons per day	10 gallons per day
CONVEYANCE CHANNELS		
Sub-base permeability		
$1.0 X 10^{-7}$ cm/sec	150 gallons per day	50 gallons per day
$1.0 X 10^{-6}$ cm/sec	45 gallons per day	15 gallons per day

For synthetically lined ponds, the EPA and most state regulatory agencies utilize an allowable leakage flow rate (ALR) based on gpad. For a lined process pond at a mine site, the ALR ranges from 200 to 500 gpad, depending on the state or regulatory authority. For a 1-acre process pond (208 feet by 208 feet by 30 feet deep) and a 200 gpad ALR rate, this would equate to an ALR of 200 gpd every day. For a 5-acre process pond (1,040 feet by

208 feet by 30 feet deep) and a 200 gpad ALR, this would equate to an ALR of 1,000 gpd every day.

In Nevada's mining program, a more restrictive leakage rate is utilized and is not dependent on the size of the pond. For either situation, the allowable leakage rate is 150 gpd, averaged quarterly and 50 gpd, averaged annually. It should be noted that in spite of the more restrictive Nevada ALRs, the Nevada-permitted facilities continue to meet the regulatory limits.

In the event that permit limitations are exceeded, a site-specific evaluation must be conducted by the permittee to assess the need for additional process component or site monitoring (NAC 445A.441, WPCP Part II.B.4). Depending upon site-specific conditions, the permittee may be required to institute a mitigation procedure(s) to bring the process component into compliance with the permit limitation. If it can be demonstrated that the permit violation will not result in degradation of waters of the State and the permittee complies with new monitoring levels and mitigation procedures, the Bureau may allow the continued use of the non-compliant process component. If a permit limitation for a leak detection system is exceeded, the Bureau does not intend to use the permit limitation as a means of halting beneficiation or assessing penalties, except in cases where the design criteria is no longer reasonably met, the permittee has been negligent, or the permittee is not responsive in taking proper corrective action.

A quality assurance and quality control program must be developed and carried out for the construction of all liner systems. NAC 445A.439 A summary of the quality control data must be submitted to the Department with the as-built drawings. Id.

Other authorities and resources that are considered for regrading requirements include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

(vi) MANAGEMENT AND AVOIDANCE OF GEOCHEMICALLY ACTIVE MATERIALS; SAMPLING AND MONITORING

If prevention/avoidance is relied on, a management plan that demonstrates geochemically active materials will effectively be avoided, and that includes provisions for sampling and monitoring documentation.

NAC 445A.398 requires the submittal to the Department of the proposed operating plans for the facility for review and approval. The plans must include a description and the range of operating conditions for which the components were designed and a plan for the management of process fluids which describes the methods to be used for the monitoring and controlling of all process fluids. The operating plan must provide a description of the

means to evaluate the conditions in the fluid manag ement system so as to be able to quantify the available storage capacity for meteori c waters and to define when and to what extent the designed containment capacity has been exceeded; a plan for monitoring the facility which describes the water quality in t he area; the monitoring locations the applicant proposes to sample routinely in order to evaluate surface and groundwater at the site that may be affected by the operation of the facility; an analytical profile of each surface and groundwater that may be affected by the operation of the facility; and the locations of the leak detection systems, the frequency for sampling these systems and the analytical profile to be used for evaluation of the samples.

NAC 445A.396 requires that a permit application mus t include the results from testing samples from the facility's mine site which are rep resentative of the overburden, waste rock, and ore at the mine site and that these samples must be evaluated for their potential to release pollutants and degrade waters of the State. When there is potential to degrade, NAC 445A.393 allows the Division the authority to r equire a higher standard of containment or monitoring or both. This is accomplished with a Division-approved waste rock management plan, which details the placement a nd management of benign and chemically reactive waste rock. This is described in greater detail in the Division Guidance Document "Waste Rock, Overburden, and Ore Evaluation.

NAC 445A.424(1)(b) prohibits a mine facility from d egrading groundwater to the extent that a state or federal drinking water standard is exceeded or the WAD cyanide concentration exceeds 0.2 mg/L, or from degrading s urface water to the extent that the quality of surface water of higher quality is lowered below that allowed by NRS 445A.565. Pursuant to NAC 445A.441, if the Division determines if seepage and/or a discharge does not, or is not expected to, meet applicable water q uality standards, the Division has the authority to require the Permittee to implement an approved plan to eliminate the degradation and meet the standards per NAC 445A.424 . Such a plan may include a capture and treatment system (however, the capture efficiency is not dictated by regulation; only the resultant water quality is), or another method, such as elimination of influent water or chemical stabilization of the sou rce material. NAC 445A.379 defines stabilization as the condition that results from co ntaminants in a material are bound or contained so as to prevent them from degrading wate rs of the State under the environmental conditions that may be reasonably expected to exist at a site.

The program to monitor the site of a facility must be designed to monitor the quality of all ground and surface water which may be affected by t he facility. NAC 445A.440(1). The type, number and location of the monitoring points must be described in the application as part of the monitoring plan and must be approved by the Department. Id. Final monitoring requirements must be established by the Department. NAC 445A.440(2). Baseline data must be collected before operation of the facility. NAC 445A.440(3). In areas where there is a substantial separation between the process components and the groundwater, a system for monitoring highly probabl e escape pathways in the

unsaturated zone may be required by the Department. NAC 445A.440(4). The decision where to locate the monitoring points for the site must be made after considering the site's geology and hydrogeology. NAC 445A.440(5).

NAC 445A.442(1) requires the Department to determine the extent and complexity to which the holder of a permit must monitor individual process components for the release of contaminants after reviewing site and process controlled design conditions. Systems designed to detect and control leaks from process components must be located at the interface of the unit process components and the adjacent environment and be able to provide the first indication that pollutants or contaminants have escaped their primary containment. Id. The program to monitor the process components must include a schedule of activities, a roster of current job titles for persons responsible for and involved in the monitoring program, and the form and frequency of reports to be submitted to the Department. NAC 445A.442(2)(a-c). The Department may randomly collect information or samples for reference. NAC 445A.442(2). The cost of analyzing samples may be placed upon the holder of the permit. Id.

A WPCP issued by the Division also includes a standard provision (Part II.B.2.E.) that provides a regulatory mechanism for the Permittee to submit to the Division for review and approval of revised monitoring plan and sampling protocols annually. Changes in monitoring frequency or the incorporation of additional monitoring points may require modification of the Permit and payment of modification fees.

Other authorities and resources that are considered for regrading requirements include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

(vii) WET TAILINGS IMPOUNDMENTS

If a wet tailings impoundment is present:

(A) A requirement to develop and implement a Tailings Operations, Maintenance and Surveillance (TOMS) manual, or similar plan, that defines and describes roles and responsibilities of personnel assigned to the facility; procedures and processes for managing change; the key components of the facility; procedures required to operate, monitor the performance of, and maintain a facility to ensure that it functions in accordance with its design, meets regulatory and corporate policy obligations, and links to emergency planning and response; downstream notification; and, requirements for analysis and documentation of the performance of the facility.

NAC 445A.398 requires the submittal to the Department of the proposed operating plans for the facility for review and approval. The plans must include a description

and the range of operating conditions for which the components were designed and a plan for the management of process fluids which describes the methods to be used for the monitoring and controlling of all process fluids. The operating plan must provide a description of the means to evaluate the conditions in the fluid management system so as to be able to quantify the available storage capacity for meteoric waters and to define when and to what extent the designed containment capacity has been exceeded; a plan for monitoring the facility which describes the water quality in the area; the monitoring locations the applicant proposes to sample routinely in order to evaluate surface and groundwater at the site that may be affected by the operation of the facility; an analytical profile of each surface and groundwater that may be affected by the operation of the facility; and the locations of the leak detection systems, the frequency for sampling these systems and the analytical profile to be used for evaluation of the samples.

NAC 445A.396 requires that a permit application must include the results from testing samples from the facility's mine site which are representative of the overburden, waste rock, and ore at the mine site and that these samples must be evaluated for their potential to release pollutants and degrade waters of the State. When there is potential to degrade, NAC 445A.393 allows the Division the authority to require a higher standard of containment or monitoring or both. This is accomplished with a Division-approved waste rock management plan, which details the placement and management of benign and chemically reactive waste rock. This is described in greater detail in the Division Guidance Document "Waste Rock, Overburden, and Ore Evaluation".

NAC 445A.424(1)(b) prohibits a mine facility from degrading groundwater to the extent that a state or federal drinking water standard is exceeded or the WAD cyanide concentration exceeds 0.2 mg/L, or from degrading surface water to the extent that the quality of surface water of higher quality is lowered below that allowed by NRS 445A.565.

Pursuant to NAC 445A.441, if the Division determines if seepage and/or a discharge does not, or is not expected to, meet applicable water quality standards, the Division has the authority to require the Permittee to implement an approved plan to eliminate the degradation and meet the water quality standards per NAC 445A.424. Such a plan may include a capture and treatment system (however, the capture efficiency is not dictated by regulation; only the resultant water quality is), or another method, such as elimination of influent water or chemical stabilization of the source material. NAC 445A.379 defines stabilization as the condition that results from contaminants in a material are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may be reasonably expected to exist at a site.

NAC 445A.432 and NAC 445A.433 set-forth the minimum design criteria and universal requirements for process components. These statutes establish minimum contaminant control technologies and require consideration of the site and operating conditions in designing individual process components. See generally, Id. Based on site characterization, best engineering judgment must be used to determine the degree to which designs must provide more or less protection through engineered containment. Id.

In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State. NAC 445A.433(1)(a),(b). Process components must be designed to withstand the runoff from a 24-hour storm event with a 100-year recurrence interval; and the primary fluid management system must be designed to be able to remain fully functional and fully contain all process fluids including all accumulations resulting from a 24-hour storm event with a 25-year recurrence interval. NAC 445A.433(1)(c),(d). The Department has the option of requiring additional containment based on the proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(1)(d)(1-3).

In exercising this discretion, the Division must use its best engineering judgment to determine whether more or less engineered containment must be provided than the established minimum design criteria. NAC 445A.432. Contingency plans for managing process contaminated flows in excess of the design quantity must be described in the appropriate operating plans. NAC 445A.433(1). The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that all closure components be designed to withstand run-off from a 24-hour storm event with a 500-year recurrence interval. The fluid management system must be designed to be functional for 5 years after the projected operating life of the process component and permanent closure period. NAC 445A.433(1)(e). The engineering designs must take into consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity. NAC 445A.433(1)(f). Additional containment may be required in areas where groundwater is considered to be near the surface. NAC 445A.433(2).

The program to monitor the site of a facility must be designed to monitor the quality of all ground and surface water which may be affected by the facility. NAC 445A.440(1). The type, number and location of the monitoring points must be described in the application as part of the monitoring plan and must be approved

by the Department. Id. Final monitoring requirements must be established by the Department. NAC 445A.440(2). Baseline data must be collected before operation of the facility. NAC 445A.440(3). In areas where there is a substantial separation between the process components and the groundwater, a system for monitoring highly probable escape pathways in the unsaturated zone may be required by the Department. NAC 445A.440(4). The decision where to locate the monitoring points for the site must be made after considering the site's geology and hydrogeology. NAC 445A.440(5).

NAC 445A.442(1) requires the Department to determine the extent and complexity to which the holder of a permit must monitor individual process components for the release of contaminants after reviewing site and process controlled design conditions. Systems designed to detect and control leaks from process components must be located at the interface of the unit process components and the adjacent environment and be able to provide the first indication that pollutants or contaminants have escaped their primary containment. Id. The program to monitor the process components must include a schedule of activities, a roster of current job titles for persons responsible for and involved in the monitoring program, and the form and frequency of reports to be submitted to the Department. NAC 445A.442(2)(a-c). The Department may randomly collect information or samples for reference. NAC 445A.442(2). The cost of analyzing samples may be placed upon the holder of the permit. Id.

A WPCP issued by the Division also includes a standard provision (Part I.I.) that requires the Permittee to inspect all control devices, systems, and facilities weekly (for closure permits consider relaxing frequency, but not more than necessary, if site is not continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system), and during (when possible) and after major storm events. These inspections are performed to detect evidence of: Deterioration, malfunction, or improper operation of control or monitoring systems; sudden changes in the data from any monitoring device; the presence of liquids in leak detection systems; and severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices.

A WPCP issued by the Division also includes a standard provision (Part II.B.2.E.) that provides a regulatory mechanism for the Permittee to submit to the Division for review and approval of revised monitoring plan and sampling protocols annually. Changes in monitoring frequency or the incorporation of additional monitoring points may require modification of the Permit and payment of modification fees.

NAC 445A.447 requires submittal of a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of any portion of a mining operation

that may release pollutants, including but not limi ted to open pits and pit lakes. See also, NAC 445A.359 and 445A.378, The Nevada g uidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure component s used in such mitigating actions be designed to withstand the 24-hour, 500-year storm event.

Mine facilities must be monitored for up to 30 year s following the completion of permanent closure actions to prevent degradation of waters of the State. NAC 445A.446(2).

Under NAC 535.200(1), a person is required, pursuan t to NRS 535.010, to notify the State Engineer before he or she constructs reco nstructs or alters a dam and must submit to the State Engineer a description of all work that is proposed. The State Engineer will review the notice and its accompanying materials and, not later than 30 days after receiving the notice, will respo nd in writing stating the deficiencies, if any, in the submission that must be cured, that approval of the plans and specifications pursuant to subsection 2 of NRS 535.010 is required before construction may begin, or that no such approval is necessary. NAC 535.200(2)(a-c). A person who files a completed application for approval of plans for a dam pursuant to NAC 535.210 or 535.220 shall be deemed to have complied with these requirements. NAC 535.200(3).

NAC 535.210 sets-forth the requirements of an appli cation seeking approval of plans for a dam. A person must submit the application either in person or by mail. NAC 535.210(1). Each element of the plans and spec ifications must be prepared by or under the supervision of a professional engin eer and must bear the wet stamp and signature of the professional engineer. I d. The design report must include, without limitation, a description of the proposed structure and discussions of: the design approach, a geotechnical report, specifications for construction and an adequate description of the proposed work, calculations regarding strength or stability incorporating a FOS. See generally., NAC 535.210.

A person must also submit an application for approv al of plans for decommissioning of a dam. NAC 535.220(1). The appl ication must be submitted in person or by mail. Id. Each element of the pla ns and specifications must be prepared by or under the supervision of a professional engineer and must bear the wet stamp and signature of the professional engineer. Id.

To obtain an approval to impound, including a temporary approval to impound, an owner or operator of a dam classified as high hazar d or significant hazard must submit to the State Engineer an emergency action pl an for the dam. NAC 535.320(1). An owner or operator of a dam classified as high hazard or significant hazard for which an approval to impound has been granted as of October 24, 2014,

or that otherwise is impounding water or is capable of impounding water as of October 24, 2014, must submit to the State Engineer an emergency action plan for the dam. NAC 535.320(2). An emergency action plan submitted pursuant to this section must follow the format presented by the Federal Emergency Management Agency in the Federal Guidelines for Dam Safety: Emergency Action Planning for Dams (FEMA Publication No. P-64) or an equivalent format approved by the State Engineer. NAC 535.320(3)(a).

The State Engineer will inspect or require an owner to inspect a dam classified as high hazard not less than once a year, a dam classified as significant hazard not less than once every 3 years, any dam that is the subject of a complaint submitted to the State Engineer which alleges that the reservoir created by the dam is in an unsafe condition or is being used in an unsafe manner. NAC 535.360(1)(a-c). An inspection by an owner required by the State Engineer pursuant to this paragraph must be completed not later than the date specified by the State Engineer, and any other dam not less than once every 5 years. NAC 535.360(1)(c-d). The State Engineer may at any time inspect, or require an owner to inspect, a dam under construction to determine the condition of any element relevant to the safety of the dam. NAC 535.360(2). If a permittee fails to complete all required repairs in a reasonable time or the State Engineer concludes that a hazardous condition exists that may threaten life or property, the State Engineer may order the operator to lower, drain or cease diverting water into the reservoir until the operator satisfies the State Engineer that the repair has been completed or the condition has been rectified. NAC 535.360(4). If the State Engineer determines, pursuant to subsection 3 of NRS 535.030, that immediate remedial action is necessary to safeguard life or property, the State Engineer will take such action. NAC 535.360(5).

NAC 535.370(1) requires that each owner and each permittee operate and maintain his or her dam and works appurtenant to the dam in a safe manner and in accordance with all applicable permits, laws and regulations; take all necessary action allowed by law to prevent the failure of the dam; notify the State Engineer and local responsible authorities of any problem or unusual event at the dam; modify his or her dam to meet changing downstream hazard conditions or upstream watershed modifications; and maintain an operation manual and log for each dam that he or she owns or operates.

Other authorities and resources that are considered for regrading requirements include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

NAC 519A.345(5)(a) requires an operator of a mine to regrade a tailings surface to promote storm runoff and reduce infiltration using the State policy requirement

for a minimum 2.0 foot ET earth cover depth for the closure of a process facility. An engineered designed spillway is required to convey water off the Tailings facility. NAC 519A.345(5)(e). Nevada's very arid climate combined with the ET cover depth has effectively been demonstrated in reducing meteoric infiltration rates to less than 5%. The ET cover material is salvaged growth medium material (or suitable overburden) which was stockpiled nearby during the construction phase as required in the reclamation plan for approval of the reclamation permit.

The SRCE program has a specific Tailings module to calculate the ET cover volume, placement and revegetation costs (including the impoundment slope). A designated environmental scientist, in cooperation with the Bureau's Reclamation Branch Professional Engineer, review the 6-month IFM cost estimate for the facility, and the use of the Division's newly developed TIDE program to evaluate the Tailings solution drain down rate time frame and the associated PFCE program.

The IFM is a required 6 month period using site-specific requirements to calculate a 6-month cost for 24/7 labor, rental pumps and electrical power costs for the re-circulation of process solution to prevent a reclaim pond overflow. IFM provides a conservative timeframe until such time that a government agency can secure the posted surety bond amount in the case an operator fails to perform.

The TIDE program is a site-specific model used to determine the solution management period for a wet tailings facility based upon the supernatant area solution volume and the "beach area" where tailings are not being deposited. The TIDE model provides site-specific inputs for the height of the facility, the applied solution rate and the pore space of deposited tailings to calculate the total solution inventory to be evaporated. The TIDE inputs determines the number of months required for 24/7 labor, the pump rental for solution re-circulation and evaporation of the tails solution to prevent overflow of the reclaim pond.

The PFCE uses the TIDE timeframe to determine the labor inputs for pumping and evaporating the solution volume to achieve fluid reduction to achieve the passive closure of the facility. PFCE includes the cost for pump rentals and new evaporator(s) and the associated electrical costs based upon the designated timeframe.

(B) Annual tailings inspection reports by a qualified engineer and an inspection report by an independent qualified engineer at least every five years.

The State Engineer will inspect or require an owner to inspect a dam classified as high hazard not less than once a year, a dam classified as significant hazard not less than once every 3 years, any dam that is the subject of a complaint submitted to the State Engineer which alleges that the reservoir created by the dam is in an

unsafe condition or is being used in an unsafe manner. NAC 535.360(1)(a-c). An inspection by an owner required by the State Engineer pursuant to this paragraph must be completed not later than the date specified by the State Engineer, and any other dam not less than once every 5 years. NAC 535.360(1)(c-d). The State Engineer may at any time inspect, or require an owner to inspect, a dam under construction to determine the condition of any element relevant to the safety of the dam. NAC 535.360(2). If a permittee fails to complete all required repairs in a reasonable time or the State Engineer concludes that a hazardous condition exists that may threaten life or property, the State Engineer may order the operator to lower, drain or cease diverting water into the reservoir until the operator satisfies the State Engineer that the repair has been completed or the condition has been rectified. NAC 535.360(4). If the State Engineer determines, pursuant to subsection 3 of NRS 535.030, that immediate remedial action is necessary to safeguard life or property, the State Engineer will take such action; post, at the head works of the dam, a notice that states: the telephone number and address of the State Engineer's office, the specific action the State Engineer is taking, and the authority under which the State Engineer is acting; and serve a copy of the notice on the operator at the most recent address provided by the operator or owner. NAC 535.360(5)(a-c). The State Engineer may enter onto private land for the purposes of administering this section. NAC 535.360(6). The State Engineer may, pursuant to NRS 535.030, require an owner or his or her designee to: submit to the State Engineer a proposed schedule of inspections of the dam and any works appurtenant to the dam; if the State Engineer approves the inspection schedule, cause the inspections to be conducted; maintain records of all inspections and any actions taken to correct any deficiencies identified; and file with the State Engineer, not later than 30 days after each inspection, a copy of the report of the inspector. NAC 535.360(7)(a-d).

A WPCP issued by the Division also includes a standard provision (Part I.I.) that requires the permittee to inspect all control devices, systems, and facilities weekly (for closure permits consider relaxing frequency, but not more than necessary, if site is not continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system), and during (when possible) and after major storm events. These inspections are performed to detect evidence of: deterioration, malfunction, or improper operation of control or monitoring systems; sudden changes in the data from any monitoring device; the presence of liquids in leak detection systems; and severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices.

(viii) CONCURRENT OR SEQUENTIAL RECLAMATION OF TAILINGS IMPOUNDMENTS PRIOR TO FINAL CESSATION OF OPERATION AND CLOSURE

Requirements for concurrent or sequential reclamation of mined areas as they become available prior to final cessation of operations and closure.

Mine facilities must be monitored for up to 30 years following the completion of permanent closure actions to prevent degradation of waters of the State. NAC 445A.446(2). The closure and stabilization requirements pertain to process and non-process components (solid and liquid process mine wastes) such as heap leach pads, tailings impoundments, pits, waste rock dumps, ore stockpiles, and any other associated mine components that, if not properly managed during operation and closure, could potentially lead to the degradation of waters of the State. NAC 445A.446. A mining facility operator/permittee is required to submit a Tentative Permanent Closure Plan at the time of application for a WPCP. NAC 445A.398(5). Sources which have not been classified as process components such as waste rock disposal facilities, must be evaluated at the end of their operating life to determine the potential for pollutants from these sources to migrate and degrade the waters of the State under the final proposed site conditions and must be closed in accordance with the State Handbook of Best Management Practices (Sections 9-1 through 9-6) prepared pursuant to NAC 445A.336. NAC 445A.447(3).

A Final Permanent Closure Plan must be submitted to the Department two years prior to the anticipated closure of a mine site. NAC 445A.447(2). The Division has prepared a guidance document "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports" which delineates a permittees responsibilities and Division requirements with respect to permanent closure. This plan must provide closure goals and a detailed methodology of activities necessary to achieve a level of stabilization of all known and potential contaminants at the site. The Final Permanent Closure Plan must include a detailed description of all proposed monitoring that will be conducted to demonstrate how the closure goals are being met.

Following the completion of all closure related activities; a Final Closure Report must be submitted to the Bureau summarizing all completed closure related activities. This document should contain all information necessary for the operator to demonstrate to the Department that the completed closure activities, per process and non-process component, will ensure that waters of the State will not be degraded. This report must include a proposal for post-closure monitoring for an initial period of time not less than five (5) years in order to provide additional supporting data that stabilization has truly been achieved.

The Request for Final Closure is made following the completion of the post-closure monitoring period. The request should contain all post-closure monitoring information and clearly demonstrate stabilization. Upon the successful demonstration of stabilization, the Department would consider the mine site to be in final closure, retire the WPCP, and eliminate all NAC 445A fee requirements.

Local county and municipal ordinances and site-specific conditions may require a facility to implementation additional closure practices or methodologies.

NAC 519A.285 describes the time when reclamation must be initiated and completed and the process for requesting an extension of time. If affected land cannot practicably be reclaimed concurrently with an exploration projector mining operation, reclamation must be initiated within 2 years after completion or abandonment of the exploration project or mining operation; within 3 years after a temporary closure of an exploration project or mining operation; or as required by the BLM, the USFS or another federal land management agency. NAC 519A.285(1)(a-c). The Division may grant one or more extensions of the time when reclamation must begin if the operator of an exploration project or mining operation demonstrates that a reasonable likelihood exists that the project or operation will resume, based on a consideration of factors including, but not limited to: The presence of additional mineralization of the commodity being mined or other commodities in commerce; Historical fluctuations in the value of the commodity being mined or other commodities present if they can be mined using the same disturbances; The design life of any beneficiationprocess components existing at a mining operation; and If the closure was caused because oflitigation. NAC 519A.285(2)(a-d). Each extension is for a 3-year period. NAC 519.285(2). Once initiated, final reclamation activities must be completed as set forth in an approved plan for reclamation, unless the exploration project or mining operation is reactivated. NAC 519A.285(3).

The Division may, if appropriate, require an operator of a mine to reclaim dams for tailings ponds by: covering with waste rock, topsoil, or growth medium; revegetation; and rendering the dam incapable of storing any mobile fluid in a quantity which could pose a threat to the stability of the dam or to public safety. NAC 519A.345(4)(a-c). The Division may also reclaim impoundments for tailings by: regrading to promote runoff and reduce infiltration; covering with waste rock, topsoil, or growth medium; revegetation; process fluid stabilization; and diverting run-on. NAC 519A.345(5)(a-e).

NAC 445A.446(1)(c) states that the Permanent closure of a facility must be initiated when the end of the design life of that process component is reached.

NAC 519A.270(6) requires a proposed schedule of the time for initiation and completion of activities for reclamation.

RESPONSE CATEGORY 6—PROCESS PONDS and RESERVOIRS [Proposed 40 CFR 320.63(a)(vi)]

GENERAL COMMENTS

The State of Nevada meets or exceeds all of the requirements listed for the process pond and reservoir category except for the requirement for existing projects to contain a 100-year 24-hour storm event during operations and for new projects to contain a 200-year 24-hour storm event.

Currently mine facilities must be constructed to contain a 25-year 24-hour storm event and withstand a 100-year 24-hour storm event. In Nevada mine closure guidance the Division is recommending that facilities are constructed to withstand a 500-year event. The Division is considering a change to its regulations to require that closed facilities are designed to contain a 100-year 24-hour storm event and to withstand a 500-year 24-hour storm event.

All ponds that are intended to contain process fluids must have a primary synthetic liner and a secondary liner. Between the liners there must be a material which has the ability to rapidly transport any fluids entering it to a collection point, is accessible, and has a system for recovering those fluids. When the material between the liners is unable to collect, transport and remove all liquids at a rate that will prevent hydraulic head transference from the primary liner to the secondary liner, the pond must be shut down. Ponds that are primarily designed to contain excess quantities of process fluids from storm events for limited periods of time may be constructed with a single liner if approved by the Department. Ponds containing non-process fluids may be required to be lined depending on their potential to degrade waters of the State.

Under NAC 519A.345(7)(a), the Division may, if appropriate, require an operator of a mine to reclaim solution ponds, settling ponds and other non tailings impoundments by backfilling and regrading to approximate the natural land form and restoring the regime of the surface water to the regime that existed before the disturbance.

The SRCE program has a module to calculate the closure costs of process ponds to include liner cutting and folding with backfill with the appropriate equipment and labor costs. To insure containment of the passive drain down solution rate, the use of double lined process ponds are converted to ET Cells or E Cells. The Bureaus has developed a User page Closure pond module to calculate the cost of converting an existing process pond to an ET or E Cells to contain seepage drain down of a leach pad at approximately $100,000 per acre pond. The User page Closure pond module has an input space linked to the SRCE summary page to include it in the total reclamation surety amount and make it part of the calculated percentage government in-direct administration costs.

(i) SAFETY AND PREVENTION OF PUBLIC ACCESS TO PONDS AND RESERVOIRS

A plan to address public safety by prevention of public access by means of security fencing, or other effective methods.

NAC 519A.260(1) requires a plan for reclamation consider the pre and post-mining use of the land. NAC 519A.270(16) requires a description of any necessary monitoring or maintenance of any fencing or signs. 519A.345.9(c) requires construction and maintaining berms fences or other means of restricting access.

NAC 519A.390 requires the use of a barricade, fence, permanently anchored seal, or backfill to secure dangerous conditions at a mine. This requirement applies to surface or

underground mines as well as any development, beneficiation plant, mill, smelter, refinery or other facility used to treat or reduce any mineral commodity, whether or not it is contiguous to an area where exploitation or extraction of mineral commodities occurs.

In addition, 30 CFR, Part 56 "Safety and Health Standards—Surface Metal and Non-Metal Mines", Section 56.20011 and Part 57 "Safety and Health Standards –Underground Metal and Non Metal Mines" Section 57.20011 both require mine operators to install barricades (e.g., fencing, concrete barriers, barrels, etc.) and erect warning signs at active mine sites for employee and public safety.

Other authorities and resources that are considered for preventing public access include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

(ii) POND AND RESERVOIR DESIGN CRITERIA

A plan for the design and operation of such ponds and reservoirs to ensure they have adequate freeboard and are designed to prevent discharges of hazardous substances.

NAC 445A.424(1)(b) prohibits a mine facility from degrading groundwater to the extent that a state or federal drinking water standard is exceeded or the WAD cyanide concentration exceeds 0.2 mg/L, or from degrading surface water to the extent that the quality of surface water of higher quality is lowered below that allowed by NRS 445A.565. Pursuant to NAC 445A.441, if the Division determines if seepage and/or a discharge does not, or is not expected to, meet applicable water quality standards, the Division has the authority to require the Permittee to implement an approved plan to eliminate the degradation and meet the standards per NAC 445A.424. Such a plan may include a capture and treatment system (however, the capture efficiency is not dictated by regulation; only the resultant water quality is), or another method, such as elimination of influent water or chemical stabilization of the source material. NAC 445A.379 defines stabilization as the condition that results from contaminants in a material are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may be reasonably expected to exist at a site.

NAC 445A.397 requires that the engineering design report include an evaluation of structural stability. Nevada does not differentiate between critical and non-critical structures on a site-specific basis and sets stability requirements based on site-specific needs and criteria.

NAC 445A.398 requires that a permit application include the proposed operating plans for the facility. The plan must include a description and the range of operating conditions for which the components were designed; a plan for the management of process fluids which

describes the methods to be used for the monitoring and controlling of all process fluids. NAC 445A.398(1-2). The operating plan must include the following: a description of the means to evaluate the conditions in the fluid management system so as to be able to quantify the available storage capacity for meteoric waters and to define when and to what extent the designed containment capacity has been exceeded; a plan for monitoring the facility which describes the water quality in the area; the monitoring locations the applicant proposes to sample routinely in order to evaluate surface and groundwater at the site that may be affected by the operation of the facility; an analytical profile of each surface and groundwater that may be affected by the operation of the facility; and the locations of the leak detection systems, the frequency for sampling these systems and the analytical profile to be used for evaluation of the samples. NAC 445A.398(2-3).

NAC 445A.396 requires that a permit application must include the results from testing samples from the facility's mine site which are representative of the overburden, waste rock, and ore at the mine site and that these samples must be evaluated for their potential to release pollutants and degrade waters of the State. When there is potential to degrade, NAC 445A.393 allows the Division the authority to require a higher standard of containment or monitoring or both. This is accomplished with a Division-approved waste rock management plan, which details the placement and management of benign and chemically reactive waste rock. This is described in greater detail in the Division Guidance Document "Waste Rock, Overburden, and Ore Evaluation.

NAC 445A.432 and NAC 445A.433 set-forth the minimum design criteria and universal requirements for process components. These statutes establish minimum contaminant control technologies and require consideration of the site and operating conditions in designing individual process components. See generally, Id. Based on site characterization, best engineering judgment must be used to determine the degree to which designs must provide more or less protection through engineered containment. Id.

The fluid management system must be designed to be functional for 5 years after the projected operating life of the process component and permanent closure period. NAC 445A.433(1)(e). The engineering designs must take into consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity. NAC 445A.433(1)(f). Additional containment may be required in areas where groundwater is considered to be near the surface. NAC 445A.433(2).

NAC 445A.435 sets forth the minimum design criteria for ponds. Under that section, all ponds which are intended to contain process fluids must have a primary synthetic liner and a secondary liner. NAC 445A.435(1). Between the liners there must be a material which has the ability to rapidly transport any fluids entering it to a collection point which is accessible and has a system for recovering those fluids. Id. When the material between

the liners is unable to collect, transport and remo ve all liquids at a rate that will prevent hydraulic head transference from the primary liner to the secondary liner, the pond must be shut down. NAC 445A.435(2). Ponds which are pri marily designed to contain excess quantities of process fluids that result from storm events for limited periods may be constructed with a single liner if approved by the Department. NAC 445A.435(3). Ponds containing non-process fluids may be required to be lined depending on their potential to degrade waters of the State. NAC 445A.435(4).

The Division has established permit limitations for leak detection rates for double lined systems. These are allowable leakage rates for process fluid that pass through the primary liner and are collected in an internal sump or drain between the double liner systems. The process fluid is evacuated from between the primary and secondary liners and placed back into full containment. This allows the head pressure on the secondary liner to remain at a minimal level, therefore significantly reducing the potential for a release to occur form the secondary liner. If allowable leakage rates are exceeded then the permittee must develop a corrective action plan and complete repairs to th e containment in order to meet or exceed permitted levels.

The Division guidance document titled "Permit Limit ations for Leak Detection Systems" establishes the following limitations for leak detection systems:

	Quarterly	Annually
DOUBLE-LINED PONDS	150 gallons per day	50 gallons per day
LEACH PADS and OTHER NON-IMPOUNDING SURFACES		
Sub-base permeability		
1.0×10^{-7} cm/sec	150 gallons per day	50 gallons per day
1.0×10^{-6} cm/sec	75 gallons per day	25 gallons per day
1.0×10^{-5} cm/sec	20 gallons per day	10 gallons per day
CONVEYANCE CHANNELS		
Sub-base permeability		
1.0×10^{-7} cm/sec	150 gallons per day	50 gallons per day
1.0×10^{-6} cm/sec	45 gallons per day	15 gallons per day

For synthetically lined ponds, the EPA and most sta te regulatory agencies utilize an allowable leakage flow rate (ALR) based on gpad. For a lined process pond at a mine site, the ALR ranges from 200 to 500 gpad, depending on the state or regulatory authority. For a 1-acre process pond (208 feet by 208 feet by 30 feet deep) and a 200-gpad ALR rate, this would equate to an ALR of 200 gpd every day. For a 5-acre process pond (1,040 feet by 208 feet by 30 feet deep) and a 200 gpad ALR, this would equate to an ALR of 1,000 gpd every day.

In the Nevada's mining program, a more restrictive leakage rate is utilized and is not dependent on the size of the pond. For either situation, the allowable leakage rate is 150

gpd, averaged quarterly and 50 gpd, averaged annually. It should be noted that in spite of the more restrictive Nevada ALRs, the Nevada-permitted facilities continue to meet the regulatory limits.

In the event that permit limitations are exceeded, a site-specific evaluation must be conducted by the permittee to assess the need for additional process component or site monitoring. WPCP Part II.B.4. Depending upon site-specific conditions, the permittee may be required to institute a mitigation procedure(s) to bring the process component into compliance with the permit limitation. If it can be demonstrated that the permit violation will not result in degradation of waters of the State and the permittee complies with new monitoring levels and mitigation procedures, the Bureau may allow the continued use of the non-compliant process component. If a permit limitation for a leak detection system is exceeded, the Bureau does not intend to use the permit limitation as a means of halting beneficiation or assessing penalties, except in cases where the design criteria is no longer reasonably met, the permittee has been negligent, or the permittee is not responsive in taking proper corrective action.

NAC 445A.436 states that all vats, tanks and other containers which confine process fluids and can be visually inspected for leaks do not require double liners if an area for secondary containment equal to 110 percent of the largest container is provided. Vats, tanks or other containers that are partially buried and cannot be visually inspected must have a system to detect leaks. Id.

When a liner is included as part of the waste rock facility design, soil liners must have a minimum thickness of 12 inches and be compacted in lifts which are no more than 6 inches thick. NAC 445A.438(1). A soil liner must have a permeability of not more than that exhibited by 12 inches of $1x10^{-7}$ centimeters per second (cm/sec) material. Id. Synthetic liners must be rated as having a resistance to the passage of process fluids equal to a coefficient of permeability of $1x10^{-11}$ cm/sec. NAC 445A.438(2). The Division is required to review for completeness the applicant's evaluation of the following design parameters, where applicable, for a liner including the type of foundation, slope and stability; the over liner protection and provisions for hydraulic relief; the load and means of applying load; the compatibility of a liner with waste rock drainage; the complexity of the leak detection and recovery systems (if present); the depth from the surface to all groundwater; and the liner's ability to remain functionally competent until permanent closure has been completed. NAC 445A.438(3)(a-g).

A quality assurance and quality control program must be developed and carried out for the construction of all liner systems. NAC 445A.439 A summary of the quality control data must be submitted to the Department with the as-built drawings. Id.

The program to monitor the site of a facility must be designed to monitor the quality of all ground and surface water which may be affected by the facility. NAC 445A.440(1). The type, number and location of the monitoring points must be described in the application

as part of the monitoring plan and must be approved by the Department. Id. Final monitoring requirements must be established by the Department. NAC 445A.440(2). Baseline data must be collected before operation ofthe facility. NAC 445A.440(3). In areas where there is a substantial separation between the process components and the groundwater, a system for monitoring highly probable escape pathways in the unsaturated zone may be required by the Department. NAC 445A.440(4). The decision where to locate the monitoring points for the site must be made after considering the site's geology and hydrogeology. NAC 445A.440(5).

NAC 445A.442(1) requires the Department to determine the extent and complexity to which the holder of a permit must monitor individual process components for the release of contaminants after reviewing site and process controlled design conditions. Systems designed to detect and control leaks from process components must be located at the interface of the unit process components and the adjacent environment and be able to provide the first indication that pollutants or contaminants have escaped their primary containment. Id. The program to monitor the process components must include a schedule of activities, a roster of current job titles for persons responsible for and involved in the monitoring program, and the form and frequency of reports to be submitted to the Department. NAC 445A.442(2)(a-c). The Department may randomly collect information or samples for reference. NAC 445A.442(2). The cost of analyzing samples may be placed upon the holder of the permit. Id.

A WPCP issued by the Division includes a standard provision (WPCP Part II.B.2.E.) that provides a regulatory mechanism for the permittee to submit to the Division for review and approval of revised monitoring plan and sampling protocols annually. Changes in monitoring frequency or the incorporation of additional monitoring points may require modification of the Permit and payment of modification fees.

A WPCP issued by the Division also includes a standard provision (WPCP Part I.I.) that requires the permittee to inspect all control devices, systems, and facilities weekly (for closure permits consider relaxing frequency, but not more than necessary, if site is not continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system), and during (when possible) and after major storm events. These inspections are performed to detect evidence of: Deterioration, malfunction, or improper operation of control or monitoring systems; sudden changes in the data from any monitoring device; the presence of liquids in leak detection systems; and severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices.

NAC 445A.447 requires submittal of a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of any portion of a mining operation that may release pollutants. See also, NAC 445A.359 and NAC 445A.378.

The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure components used in such mitigating actions be designed to withstand a 24-hour, 500-year storm event.

Other authorities and resources that are considered for regrading requirements include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

(iii) POND LEAK DETECTION AND COLLECTION SYSTEM DESIGN AND OPERATION

A liner and collection system designed to minimize/eliminate releases from the unit based on site-specific conditions.

NAC 445A.397 requires that the engineering design report must include an evaluation of structural stability. Nevada WPC regulations do not distinguish between critical and non-critical structures at mine facilities. Nevada does not differentiate between critical and non-critical structures on a site-specific basis and sets stability requirements based on site-specific needs and criteria.

NAC 445A.398 requires the submittal to the Department of the proposed operating plans for the facility for review and approval. The plans must include a description and the range of operating conditions for which the components were designed and a plan for the management of process fluids which describes the methods to be used for the monitoring and controlling of all process fluids.

NAC 445A.398(1-2). The operating plan must include the following: a description of the means to evaluate the conditions in the fluid management system so as to be able to quantify the available storage capacity for meteoric waters and to define when and to what extent the designed containment capacity has been exceeded; a plan for monitoring the facility which describes the water quality in the area; the monitoring locations the applicant proposes to sample routinely in order to evaluate surface and groundwater at the site that may be affected by the operation of the facility; an analytical profile of each surface and groundwater that may be affected by the operation of the facility; and the locations of the leak detection systems, the frequency for sampling these systems and the analytical profile to be used for evaluation of the samples. NAC 445A.398(2-3).

NAC 445A.396 requires that a permit application must include the results from testing samples from the facility's mine site which are representative of the overburden, waste rock, and ore at the mine site and that these samples must be evaluated for their potential to release pollutants and degrade waters of the State. When there is potential to degrade, NAC 445A.393 allows the Division the authority to require a higher standard of containment or monitoring or both. This is accomplished with a Division-approved waste

rock management plan, which details the placement and management of benign and chemically reactive waste rock. This is described in greater detail in the Division Guidance Document "Waste Rock, Overburden, and Ore Evaluation.

NAC 445A.424(1)(b) prohibits a mine facility from degrading groundwater to the extent that a state or federal drinking water standard is exceeded or the WAD cyanide concentration exceeds 0.2 mg/L, or from degrading surface water to the extent that the quality of surface water of higher quality is lowered below that allowed by NRS 445A.565. Pursuant to NAC 445A.441, if the Division determines if seepage and/or a discharge does not, or is not expected to, meet applicable water quality standards, the Division has the authority to require the Permittee to implement an approved plan to eliminate the degradation and meet the standards per NAC 445A.424. Such a plan may include a capture and treatment system (however, the capture efficiency is not dictated by regulation; only the resultant water quality is), or another method, such as elimination of influent water or chemical stabilization of the source material. NAC 445A.379 defines stabilization as the condition that results from contaminants in a material are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may be reasonably expected to exist at a site

NAC 445A.432 and NAC 445A.433 set-forth the minimum design criteria and universal requirements for process components. These statutes establish minimum contaminant control technologies and require consideration of the site and operating conditions in designing individual process components. See generally, Id. These statutes establish minimum contaminant control technologies and require consideration of the site and operating conditions in designing individual process components. See generally, Id. Based on site characterization, best engineering judgment must be used to determine the degree to which designs must provide more or less protection through engineered containment. Id.

The following minimum design requirements apply to all process components. In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge. NAC 445A.433(1)(a). All sources must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State. NAC 445A.433(1)(b). All process components must be designed to withstand the runoff from a 24-hour storm event with a 100-year recurrence interval. NAC 445.433(1) (c). The primary fluid management system must be designed to be able to remain fully functional and fully contain all process fluids including all accumulations resulting from a 24-hour storm event with a 25-year recurrence interval. NAC 445A.433(1)(d). The Department may require additional containment based on the following factors: proximity to surface water bodies; depth to groundwater; and proximity to population. NAC 445A. 433(1)(d)(1-3). Contingency plans for managing process contaminated flows in excess of the design quantity must be described in the appropriate operating plans. NAC 445A.433(1).

The fluid management system must be designed to be functional for 5 years after the projected operating life of the process component and permanent closure period. NAC 445A.433(1)(e). The engineering designs must takeinto consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity. NAC 445A.433(1)(f). Additional containment may be required in areas where groundwater is considered to be near the surface. NAC 445A.433(2).

Groundwater is considered to be near the surface if: the depth from the surface to groundwater is less than 100 feet and the top 100 feet of the existing formation has a coefficient of permeability greater than that exhibited by 100 feet of $1x10^{-5}$ cm/sec material, open fractured or faulted geologic conditions exist in the bedrock from the surface to the groundwater, or there is an inability to document that all exploratory and condemnation borings beneath the site have been adequately sealed. NAC 445A.433(2)(a-c). No new process component containing process fluids may be located within 1,000 feet of any dwelling which is occupied at least part of the year and which is not a part of the facility. NAC 445A.433(3). This restriction does not apply to modifications at a facility which predate such a dwelling. Id. The application of minimum design criteria does not release the holder of a permit from liability for degradation to waters of the State caused by the facility. NAC 445A.433(4).

NAC 445A.435 sets forth the minimum design criteria for ponds. Under that section, all ponds which are intended to contain process fluids must have a primary synthetic liner and a secondary liner. NAC 445A.435(1). Between the liners there must be a material which has the ability to rapidly transport any fluids entering it to a collection point which is accessible and has a system for recovering those fluids. Id. When the material between the liners is unable to collect, transport and remove all liquids at a rate that will prevent hydraulic head transference from the primary liner to the secondary liner, the pond must be shut down. NAC 445A.435(2). Ponds which are primarily designed to contain excess quantities of process fluids that result from storm events for limited periods may be constructed with a single liner if approved by the Department. NAC 445A.435(3). Ponds containing non-process fluids may be required to be lined depending on their potential to degrade waters of the State. NAC 445A.435(4).

NAC 445A.436 states that all vats, tanks and othercontainers which confine process fluids and can be visually inspected for leaks do not require double liners if an area for secondary containment equal to 110 percent of the largest container is provided. Vats, tanks or other containers that are partially buried and cannot be visually inspected must have a system to detect leaks. Id.

When a liner is included as part of the waste rock facility design, soil liners must have a minimum thickness of 12 inches and be compacted inlifts which are no more than 6 inches thick. NAC 445A.438(1). A soil liner must have a pe rmeability of not more than that exhibited by 12 inches of $1x10^{-7}$ centimeters per second (cm/sec) material. Id. Syn thetic liners must be rated as having a resistance to the passage of process fluids equal to a coefficient of permeability of $1x10^{-11}$ cm/sec. NAC 445A.438(2). The Division is requiredto review for completeness the applicant's evaluation of the following design parameters, where applicable, for a liner including the type of foundation, slope and stability; the over liner protection and provisions for hydraulic relie f; the load and means of applying load; the compatibility of a liner with waste rock drainage; the complexity of the leak detection and recovery systems (if present); the depth from the surface to all groundwater; and the liner's ability to remain functionally competent un til permanent closure has been completed. NAC 445A.438(3)(a-g).

A quality assurance and quality control program mus t be developed and carried out for the construction of all liner systems. NAC 445A.439 A summary of the quality control data must be submitted to the Department with the as-built drawings. Id.

The program to monitor the site of a facility mustbe designed to monitor the quality of all ground and surface water which may be affected by t he facility. NAC 445A.440(1). The type, number and location of the monitoring points must be described in the application as part of the monitoring plan and must be approved by the Department. Id. Final monitoring requirements must be established by the Department. NAC 445A.440(2). Baseline data must be collected before operation ofthe facility. NAC 445A.440(3). In areas where there is a substantial separation between the process components and the groundwater, a system for monitoring highly probabl e escape pathways in the unsaturated zone may be required by the Department. NAC 445A.440(4). The decision where to locate the monitoring points for the site must be made after considering the site's geology and hydrogeology. NAC 445A.440(5).

NAC 445A.442(1) requires the Department to determi ne the extent and complexity to which the holder of a permit must monitor individual process components for the release of contaminants after reviewing site and process co ntrolled design conditions. Systems designed to detect and control leaks from process c omponents must be located at the interface of the unit process components and the ad jacent environment and be able to provide the first indication that pollutants or con taminants have escaped their primary containment. Id. The program to monitor the proces s components must include a schedule of activities, a roster of current job titles for persons responsible for and involved in the monitoring program, and the form and frequency of reports to be submitted to the Department. NAC 445A.442(2)(a-c). The Department may randomly collect information or samples for reference. NAC 445A.442(2). The cost of analyzing samples may be placed upon the holder of the permit. Id.

A WPCP issued by the Division also includes a standard provision (WPCP Part II.B.2.E.) that provides a regulatory mechanism for the permittee to submit to the Division for review and approval of revised monitoring plan and sampling protocols annually. Changes in monitoring frequency or the incorporation of additional monitoring points may require modification of the Permit and payment of modification fees.

A WPCP issued by the Division also includes a standard provision (WPCP Part I.I.) that requires the permittee to inspect all control devices, systems, and facilities weekly (for closure permits consider relaxing frequency, but not more than necessary, if site is not continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system), and during (when possible) and after major storm events. These inspections are performed to detect evidence of deterioration, malfunction, or improper operation of control or monitoring systems; sudden changes in the data from any monitoring device; the presence of liquids in leak detection systems; and severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices.

NAC 445A.447 requires submittal of a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of any portion of a mining operation that may release pollutants. See also, NAC 445A.359 and NAC 445A.378.

The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure components used in such mitigating actions be designed to withstand the 24-hour, 500-year storm event.

Other authorities and resources that are considered for regrading requirements include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

(iv) CONCURRENT OR SEQUENTIAL RECLAMATION OF PROCESS PONDS AND RESERVOIRS PRIOR TO FINAL CESSATION OF OPERATIONS AND CLOSURE

Requirements for concurrent or sequential reclamation of mined areas as they become available prior to final cessation of operations and closure.

The closure and stabilization requirements pertain to process and non-process components (solid and liquid process mine wastes) such as heap leach pads, tailings impoundments, pits, waste rock dumps, ore stockpiles, and any other associated mine components that, if not properly managed during operation and closure, could potentially lead to the degradation of waters of the State. NAC 445A.446. A mining facility operator/permittee is required to submit a Tentative Permanent Closure Plan at the time of application for a WPCP. NAC 445A.398(5). Sources which have not been classified as

process components such as waste rock disposal facilities, must be evaluated at the end of their operating life to determine the potential for pollutants from these sources to migrate and degrade the waters of the State under the final proposed site conditions and must be closed in accordance with the State Handbook of Best Management Practices (Sections 9-1 through 9-6) prepared pursuant to NAC 445A.336. NAC 445A.447(3).

A Final Permanent Closure Plan must be submitted to the Bureau two years prior to the anticipated closure of a mine site. NAC 445A.447(2). This plan must provide closure goals and a detailed methodology of activities necessary to achieve a level of stabilization of all known and potential contaminants at the site. The Final Permanent Closure Plan must include a detailed description of all proposed monitoring that will be conducted to demonstrate how the closure goals are being met.

In accordance with the Division guidance titled "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," following the completion of all closure related activities; a Final Closure Report must be submitted to the Bureau summarizing all completed closure related activities. This document should contain all information necessary for the operator to demonstrate to this Bureau that the completed closure activities, per process and non-process component, will ensure that waters of the State will not be degraded. This report must include a proposal for post-closure monitoring for an initial period of time not less than five (5) years in order to provide additional supporting data that stabilization has truly been achieved.

NAC 445A.447 requires submittal of a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of any portion of a mining operation that may release pollutants. See also, NAC 445A.359 and NAC 445A.378. The Request for Final Closure is made following the completion of the post-closure monitoring period. The request should contain all post-closure monitoring information and clearly demonstrate stabilization. Upon the successful demonstration of stabilization, the Bureau would consider the mine site to be in final closure, retire the WPCP, and eliminate all NAC 445A fee requirements.

The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure components used in such mitigating actions be designed to withstand the 24-hour, 500-year storm event.

Other authorities and resources that are considered for regrading requirements include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

The Nevada program for bonding uses the SRCE program, which bases costs on Davis Bacon wage rates, rental equipment, the Caterpillar Equipment Performance handbook

and contractor/government markups. It is an incentive for operators to begin concurrent reclamation scheduled with operations and existing equipment and labor. The potential for completing the work at a cost much lower than the SRCE model is great enough to make it an attractive option and allows for concurrent release of bond funds as the work is completed or transfer of those released funds to future disturbance activities.

NAC 519A.285 describes the time when reclamation must be initiated and completed and the process for requesting an extension of time. If affected land cannot practicably be reclaimed concurrently with an exploration projector mining operation, reclamation must be initiated within 2 years after completion or abandonment of the exploration project or mining operation; within 3 years after a temporary closure of an exploration project or mining operation; or as required by the BLM, the USFS or another federal land management agency. NAC 519A.285(1)(a-c). The Division may grant one or more extensions of the time when reclamation must begin if the operator of an exploration project or mining operation demonstrates that a reasonable likelihood exists that the project or operation will resume, based on a consideration of factors including, but not limited to: The presence of additional mineralization of the commodity being mined or other commodities in commerce; Historical fluctuations in the value of the commodity being mined or other commodities present if they can be mined using the same disturbances; The design life of any beneficiationprocess components existing at a mining operation; and If the closure was caused becauseoflitigation. NAC 519A.285(2)(a-d). Each extension is for a 3-year period. NAC 519.285(2). Once initiated, final reclamation activities must be completed as set forth in an approved plan for reclamation, unless the exploration project or mining operation is reactivated. NAC 519A.285(3).

Under NAC 519A.345(7)(a), the Division may, if appropriate, require an operator of a mine to reclaim solution ponds, settling ponds and other nontailings impoundments by backfilling and regrading to approximate the natural land form and restoring the regime of the surface water to the regime that existed before the disturbance.

Per NAC 519A.270(6) requires a proposed schedule of the time for initiation and completion of activities for reclamation.

(v) PROCESS POND AND RESERVOIR STORMWATER AND SEDIMENT MANAGEMENT DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE

A plan for the management of all stormwater and sediment generated during operations and during and following closure. For existing units, the plan must provide for permanent stormwater conveyances, ditches, channels and diversions designed to convey the peak flow and ponds and other collection devices designed to store the volume generated during a 24-hour period by a 100-year return interval storm event. For unit that become authorized to operate after [insert the effective date of the Final

Rule], the plan must provide for controls designed to store the volume generated during a 24-hour period by a 200-year return interval storm event.

In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State. NAC 445A.433(1)(a),(b). Process components must be designed to withstand the runoff from a 24-hour storm event with a 100-year recurrence interval; and the primary fluid management system must be designed to be able to remain fully functional and fully contain all process fluids including all accumulations resulting from a 24-hour storm event with a 25-year recurrence interval. NAC 445A.433(1)(c),(d). The Department has the option of requiring additional containment based on the proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(1)(d)(1-3). In exercising this discretion, the Division must use its best engineering judgment to determine whether more or less engineered containment must be provided than the established minimum design criteria. NAC 445A.432. Contingency plans for managing process contaminated flows in excess of the design quantity must be described in the appropriate operating plans. NAC 445A.433(1).

NAC 445A.398 requires that a permit application include the proposed operating plans for the facility. The plan must include a description and the range of operating conditions for which the components were designed; a plan for the management of process fluids which describes the methods to be used for the monitoring and controlling of all process fluids.

NAC 445A.398(1-2). The operating plan must include the following: a description of the means to evaluate the conditions in the fluid management system so as to be able to quantify the available storage capacity for meteoric waters and to define when and to what extent the designed containment capacity has been exceeded; a plan for monitoring the facility which describes the water quality in the area; the monitoring locations the applicant proposes to sample routinely in order to evaluate surface and groundwater at the site that may be affected by the operation of the facility; an analytical profile of each surface and groundwater that may be affected by the operation of the facility; and the locations of the leak detection systems, the frequency for sampling these systems and the analytical profile to be used for evaluation of the samples. NAC 445A.398(2-3).

NAC 445A.396 requires that a permit application must include the results from testing samples from the facility's mine site which are representative of the overburden, waste rock, and ore at the mine site and that these samples must be evaluated for their potential to release pollutants and degrade waters of the State. When there is potential to degrade, NAC 445A.393 allows the Division the authority to require a higher standard of containment or monitoring or both. This is accomplished with a Division-approved waste rock management plan, which details the placement and management of benign and

chemically reactive waste rock. This is described in greater detail in the Division Guidance Document "Waste Rock, Overburden, and Ore Evaluation.

NAC 445A.424(1)(b) prohibits a mine facility from degrading groundwater to the extent that a state or federal drinking water standard is exceeded or the WAD cyanide concentration exceeds 0.2 mg/L, or from degrading surface water to the extent that the quality of surface water of higher quality is lowered below that allowed by NRS 445A.565. Pursuant to NAC 445A.441, if the Division determines if seepage and/or a discharge does not, or is not expected to, meet applicable water quality standards, the Division has the authority to require the Permittee to implement an approved plan to eliminate the degradation and meet the standards per NAC 445A.424. Such a plan may include a capture and treatment system (however, the capture efficiency is not dictated by regulation; only the resultant water quality is), or another method, such as elimination of influent water or chemical stabilization of the source material. NAC 445A.379 defines stabilization as the condition that results from contaminants in a material are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may be reasonably expected to exist at a site.

NAC 445A.432 and NAC 445A.433 set-forth the minimum design criteria and universal requirements for process components. These statutes establish minimum contaminant control technologies and require consideration of the site and operating conditions in designing individual process components. See generally, Id. Based on site characterization, best engineering judgment must be used to determine the degree to which designs must provide more or less protection through engineered containment. Id. However, the application of minimum design criteria does not release the holder of a permit from liability for degradation to waters of the State caused by the facility. NAC 445A.433(4).

The fluid management system must be designed to be functional for 5 years after the projected operating life of the process component and permanent closure period. NAC 445A.433(1)(e). The engineering designs must take into consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity. NAC 445A.433(1)(f). Additional containment may be required in areas where groundwater is considered to be near the surface. NAC 445A.433(2).

General Mining Stormwater Permit (NVR300000) issued by the Department authorizes stormwater discharges associated with Standard Industrial Classification (SIC) 10 as derived from Category iii (shown above), defined under 40 CFR §122.26(b)(14) and all construction-related activities as defined by 40 CFR § 122.26 (b)(14)(x) and (b)(15) at mine sites (including exploration, development and reclamation activities). Facilities that are authorized under NPDES Permit NVR300000 must submit a new or updated SWPPP to the Department within 60 days of the effective date of the permit or for new dischargers

within 30 days of the submitted Notice of Intent to discharge. SWPPPs are to be made available for inspection at the project site or operation covered by this permit. The purpose of the SWPPP is to guide the identification of stormwater pollution sources and the reduction of their impacts, and otherwise lead to compliance with the conditions of this permit. Each of the SWPPP elements must be revised as necessary to maintain accuracy if there are changes in design or construction of the project or if the SWPPP is found to be insufficient.

The permittee shall make SWPPPs available upon request to the State or local agency approving sediment and erosion plans, grading plans, and stormwater management plans; local government officials; and the operator of a municipal separate storm sewer receiving discharges from the site. The copy of the SWPPP that is required to be kept on the mining site or locally available must be made available to the Department for review at the time of an on-site inspection.

The conditions set in the General Mining Stormwater Permit are the minimum requirements to maintain and implement an effective stormwater program consistent with U. S. EPA rules (Title 40 of the Code of Federal Regulations Part 122). BMPs are approved by the U.S. EPA for use in stormwater permits.

NAC 445A.447, in conjunction with NAC 445A.359 and NAC 445A.378, requires submittal of a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of any portion of a mining operation that may release pollutants, including but not limited to open pits and pit lakes. The Nevada guidance document, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure components used in such mitigating actions be designed to withstand the 24-hour, 500-year storm event.

Mine facilities must be monitored for up to 30 years following the completion of permanent closure actions to prevent degradation of waters of the State. NAC 445A.446(2). NAC 445A.433 establishes the minimum design criteria for process components at mine facilities. This regulation requires these components to remain fully functional and fully contain all process fluids including all accumulations from a 24-hour storm event with a 25-year recurrence interval. NAC445A.433(1)(d). The minimum design criteria for process components also require the ability to withstand a 24-hour storm event with a 100-year recurrence interval. NAC 445.433(1)(c). The Division has the discretion to require addition storm capacity based on site-specific factors such as proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(d)(1-3) In exercising this discretion, the Division must use its best engineering judgment to determine whether more or less engineered containment must be provided than the established minimum design criteria. NAC 445A.432. The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final

Closure Reports," recommends that all closure components be designed to withstand run-off from a 24-hour storm event with a 500-year recurrence interval.

A WPCP issued by the Division also includes a standard provision (WPCP Part I.I.) that requires the permittee to inspect all control devices, systems, and facilities weekly (for closure permits consider relaxing frequency, but not more than necessary, if site is not continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system), and during (when possible) and after major storm events. These inspections are performed to detect evidence of: Deterioration, malfunction, or improper operation of control or monitoring systems; sudden changes in the data from any monitoring device; the presence of liquids in leak detection systems; and severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices.

Other authorities and resources that are considered for regrading requirements include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations

Under NAC 519A.275(4) land that is subject to excessive erosion will not be deemed to be reclaimed to a productive post-mining use unless excessive erosion existed before mining or exists on the adjacent land. The operator must provide evidence of the excessive erosion to the Division. Id.

The Division maintains a Trust Fund for Short-Term Fluid Management in accordance with NAC 519A.392 Under that statute, the Division must establish the Trust Fund for Short-Term Fluid Management; deposit money collected pursuant to this section in the Trust Fund; credit all interest earned on the money in the Trust Fund to the Trust Fund; use the money in the Trust Fund only for the management of fluids at a site while the process for forfeiture of a surety pursuant to NAC 519A.390 is pending; and after the conclusion of the process for forfeiture of a surety pursuant to NAC 519A.390, if the surety was forfeited, reimburse the Trust Fund with the surety that was forfeited. NAC 519A.392(4)(a-e). Such reimbursement must be in an amount equal to the total amount of money used from the Trust Fund at the site for which the surety was forfeited. NAC 519A.392(e). An operator that operates more than one mining operation in this State may combine the amount of surety required pursuant to NAC 519A.360 for each site to determine the total amount of surety the operator is required to provide pursuant to NAC 519A.360 for purposes of determining the amount of money to submit pursuant to this section. NAC 519A.392(5).

RESPONSE CATEGORY 7—SLAG PILES [Proposed 40 CFR 320.63(a)(vii)]

GENERAL COMMENTS

The State of Nevada meets or exceeds all of the requirements listed for the slag pile category except for the slightly higher factors of safety requirements, 200-year 24-hour storm storage event requirements and the 200-year design life noted below. Currently, there are no slag piles outside of Division-approved engineered containment within any modern Nevada mining facilities; therefore, the Division suggests that this section of the formula is unnecessary for operating mine facilities today. However, the following discusses slag and describes how a slag pile would be regulated if one were to exist at today's mine facilities. Current facilities that use milling, flotation, roasting, or autoclaving as a processing method produce tailings, which are placed via slurry within Division-approved engineered tailings impoundments. Slag is a different material than tailings and is produced at some Nevada mining operations as part of the final refining portion of the beneficiation process for gold and silver ores. Slag is a process material subject to Nevada WPC regulations and must not be discharged outside of Division-approved engineered containment if it has the potential to degrade waters of the State. For this reason, the State of Nevada has no specific regulations that apply only to slag. From a regulatory standpoint, slag has the same requirements for containment and non-degradation of waters of the State as any other process material that is managed entirely within engineered containment. At Nevada mine sites, slag is typically either recycled into an earlier stage of the beneficiation circuit on Division-approved engineered containment, or is shipped from the mine site to an off-site secondary processing facility for further metal recovery. The Nevada program uses site-specific information to develop reclamation and closure plans customized to address the long-term environmental requirements for each individual slag pile while preventing degradation of waters of the State and ensuring reclamation suitable for the designated post-mining land use.

Nevada WPC regulations require structural stability evaluations for waste rock disposal sites and the fluid management system, but do not contain specific FOS requirements. FOS requirements are specified in a Division guidance document for heap leach pads; however, the same requirements could be applied to a waste rock disposal facility or slag pile if it has the potential to degrade waters of the State. Once designs are approved by the Division, they become part of the WPCP by reference, and are then enforceable requirements. In general, if site-specific conditions warrant initiating stability requirements to protect waters of the State, then those requirements would be included in the WPCP for the facility. Nevada WPC regulations also do not formally designate structures as being critical or non-critical, but instead the regulations focus on portions of a mining operation that have a potential to degrade waters of the State; those portions of the operation are subject to more regulations to eliminate that potential.

The Division does not require stability evaluations for non-critical structures. If the Division determines that the stability of a component is important to protecting the waters of the State or achieving other regulatory requirements, then that component would be regulated accordingly. During mine operations the federal Mine Safety and Health Administration also regulate the mines for stability requirements for worker safety concerns. An example of when Nevada may require stability requirements in post-closure for a waste rock facility would be to protect any critical stormwater and erosion controls that are required to protect waters of the State.

Currently, process components at Nevada mine facili ties at a minimum must be constructed to contain a 25-year, 24-hour storm event and to withs tand a 100-year, 24-hour storm event. The Division may require additional storm event capacit y, based on site-specific factors such as proximity to surface water bodies, depth to groundwater, and proximity to population. In Nevada mine closure guidance, the Division recommends thatfacilities be constructed to withstand a 500-year, 24-hour event. The Division has been conside ring a change to Nevada closure regulations to require that closed facilities at a minimum aredesigned to contain the 500-year, 24-hour storm event if containment is necessary and withstand the erosional effects of a 500-year, 24-hour storm event.

(i) SAFETY AND PREVENTION OF PUBLIC ACCESS TO SLAG PILES

A plan to address public safety by prevention of p ublic access by means of security fencing, or other effective methods.

NAC 519A.390 requires the use of a barricade, fence , permanently anchored seal, or backfill to secure dangerous conditions at a mine. This requirement applies to surface or underground mines as well as any development, benefciation plant, mill, smelter, refinery or other facility used to treat or reduce any miner al commodity, whether or not its is contiguous to an area where exploitation or extract ion of mineral commodities occurs. NAC 445A.447 requires submittal of a Final Plan for Permanent Closure for any portion of a mining operation that may release pollutants (NAC 445A.378 and 445A.359), including but not limited to slag piles and other process com ponents. Such a plan may include a barricade, fence, and/or signage, in addition to actions focused on chemical stabilization.

(ii) MANAGEMENT AND AVOIDANCE OF GEOCHEMICALLY ACT IVE MATERIALS IN SLAG PILES; SAMPLING AND MONITORING OF SLAG PILES

If prevention/avoidance is relied on, a management plan that demonstrates geochemically active materials will effectively be avoided, and that includes provisions for sampling and monitoring documentation.

The Department considers Slag to be a spent process material. Pursuant to NAC 445A.398(6), an application for a WPCP for a miningoperation must include, among other information, a tentative plan for the permanent closure of the facility, which describes the procedures, methods and schedule for stabilizing sp ent process materials. The plan must include: procedures for characterizing spent process materials as they are generated and the procedures to stabilize all process components with an emphasis on stabilizing spent process materials and the estimated cost for the procedures. NAC 445A.398(6)(a-b)

A WPCP application must also include, a plan for mo nitoring the facility which describes the water quality in the area and the monitoring lo cations the applicant proposes to sample routinely in order to evaluate surface and g round water at the site that may be affected by the operation of the facility. NAC 445A.398(3)(a-b).

An application for a WPCP must also include results from testing samples from the facility's mine site which are representative of the overburden, waste rock, and ore at the proposed mine site and characterized by a multi-element spectrographic assay or an equivalent analytical procedure and evaluated for their potential to release pollutants. NAC 445A.396(4)(a-b).

The application for a WPCP must also include an engineering design report, stamped by a Nevada licensed Professional Engineer, containing, among other things, detailed information to allow the Division to determine that the design of the process components is sufficient to protect waters of the State from degradation. NAC 445A.397(1) Further detail on minimum design criteria for process components is provided in NAC 445A.433(1)(a), which provides that in areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge. Annual evaporation exceeds annual precipitation at virtually all mine sites in Nevada.

A Final Permanent Closure Plan must be submitted to the Bureau two years prior to the anticipated closure of a mine site. NAC 445A.447(2) Permanent closure refers to the time when activities for the final stabilization, removal or mitigation of sources of pollutants are initiated. NAC 445A.367. Stabilization is the condition in which contaminants are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may reasonably be expected to exist at a site. NAC 445A.379.

(iii) CONCURRENT OR SEQUENTIAL RECLAMATION OF SLAG PILES PRIOR TO FINAL CESSATION OF OPERATIONS AND CLOSURE

Requirements for concurrent or sequential reclamation of mined areas as they become available prior to final cessation of operations and closure.

NAC 519A.285 describes the time when reclamation must be initiated and completed and the process for requesting an extension of time. If affected land cannot practicably be reclaimed concurrently with an exploration projector mining operation, reclamation must be initiated within 2 years after completion or abandonment of the exploration project or mining operation; within 3 years after a temporary closure of an exploration project or mining operation; or as required by the BLM, the USFS or another federal land management agency. NAC 519A.285(1)(a-c). The Division may grant one or more extensions of the time when reclamation must begin if the operator of an exploration project or mining operation demonstrates that a reasonable likelihood exists that the project or operation will resume, based on a consideration of factors including, but not limited to: The presence of additional mineralization of the commodity being mined or other commodities in commerce; Historical fluctuations in the value of the commodity being mined or other commodities present if they can be mined using the same

disturbances; The design life of any beneficiation process components existing at a mining operation; and If the closure was caused because of litigation. NAC 519A.285(2)(a-d). Each extension is for a 3-year period. NAC 519.285(2). Once initiated, final reclamation activities must be completed as set forth in an approved plan for reclamation, unless the exploration project or mining operation is reactivated. NAC 519A.285(3).

NAC 519A.270(6) requires a proposed schedule of the time for initiation and completion of activities for reclamation.

NAC 445A.446(1)(c) requires that permanent closure of a process component must be initiated when the end of the design life of that process component has been reached, without regard to whether the overall mining operation is still active or not. Permanent closure of a mine facility must also be initiated after five to 10 years (depending on the WPCP renewal schedule) of unplanned temporary closure. NAC 445A.446(2).

A Final Permanent Closure Plan must be submitted to the Bureau two years prior to the anticipated closure of a mine site. NAC 445A.447(2). Permanent closure refers to the time when activities for the final stabilization, removal or mitigation of sources of pollutants are initiated. NAC 445A.367. Stabilization is the condition in which contaminants are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may reasonably be expected to exist at a site. NAC 445A.379.

(iv) SLAG PILE STABILITY DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE

Requirements to regrade surface during closure to a stable configuration that prevents ponding and promotes the conveyance of surface water off the unit, and that requires closure of all waste rock piles considered to be critical structures to be designed for a long-term static factor of safety of 1.5 or greater and all non-critical structures to be designed for a long-term static factor of safety of 1.3 or greater; and requires that the units being closed be designed for a factor of safety of 1.1 or greater under pseudostatic analysis.

Slag is considered a spent process material and must remain on engineered design containment (i.e., components must achieve zero discharge as required under NAC 445A.433), unless it is demonstrated to not have the potential to degrade waters of the State. NAC 445A.398(6). Pursuant to NAC 445A.397(1)(d), the engineering design report for a mine facility must include an evaluation of structural stability. The Division guidance document titled, "Stability Requirements Heap Leach Pads," which can be applied to waste rock disposal facilities or slag piles if they have the potential to degrade waters of the State, recommends minimum factors of safety of 1.3 (static) and 1.05 (pseudostatic), although lower factors of safety may be acceptable if the licensed professional design engineer can demonstrate that the displacement from the design seismic event will not

compromise the integrity of the fluid management system or cause a release of contaminants to waters of the State. The latter seismic stability provision is considered more reasonable than the proposed CERCLA 108(b) fixed limit of 1.1 for pseudostatic FOS while being no less protective.

NAC 445A.433 sets forth minimum design criteria and universal requirements for process components. According NAC 445A.433(1)(f), the design of the process components must take into consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity.

As noted above, Nevada WPC regulations do not formally designate structures as being critical or non-critical, but instead the regulations focus on portions of a mining operation that have a potential to degrade waters of the State. Those portions of the operation are subject to more regulations to eliminate that potential. See, NAC 445A.424, NAC 445A.432, NAC 445A.433, NAC 445A.435, NAC 445A.436, NAC 445A.437. The Division objects to requiring stability evaluations for non-critical structures. If the Division determines that the stability of a component is important for protecting waters of the State or achieving other regulatory requirements, then that component would be regulated accordingly.

The Division guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports", requires that Final Plans for Permanent Closure include a thorough discussion of various alternatives in preventing, or at least minimizing, meteoric water infiltration such as an engineered cap, a topsoil cover, diversion ditches, regrading and reshaping, compacting, etc. Once closure plans including such provisions are approved by the Division, they become part of the WPCP by reference, and represent enforceable requirements.

Waste rock piles are different from slag piles, and the Division is not aware of any examples of slag being placed on waste rock piles at modern Nevada mine facilities. Waste rock piles are covered under section 3 of the CERCLA 108(b) formula and should not be addressed in the slag pile section.

(v) PREDICTIVE STABILITY ANALYSIS OF SLAG PILES

Requirements to provide for a stability analysis to be conducted for the unit as part of the original design, and as part of mine modifications during the active life of the mine.

NAC 445A.397 requires the engineering design report for a mine facility include an evaluation of structural stability for the site of the fluid management system and waste rock disposal sites. NAC 445A.433(1)(f) also requires that the design of process components take into consideration the history of seismic events at the site to preclude

any differential movement or shifting. Both of these requirements pertain to both the original design in the initial WPCP application and to any subsequent applications to modify the facility. NAC 445A.392.

(vi) SLAG PILE STORMWATER AND SEDIMENT MANAGEMENT DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE

A plan for the management of all stormwater and sediment generated during operations and during and following closure. For existing units, the plan must provide for permanent stormwater conveyances, ditches, channels and diversions designed to convey the peak flow and ponds and other collection devices designed to store the volume generated during a 24-hour period by a 100-year return interval storm event. For unit that become authorized to operate after the effective date of the Final Rule, the plan must provide for controls designed to store the volume generated during a 24-hour period by a 200-year return interval storm event.

Under NAC 519A.275(4) land that is subject to excessive erosion will not be deemed to be reclaimed to a productive post-mining use unless excessive erosion existed before mining or exists on the adjacent land. The operator must provide evidence of the excessive erosion to the Division. Id.

The SRCE program includes a Diversion Ditch and Sediment pond calculation module for site-specific construction inputs that can account for a 24 hour period, 200 year storm event. The module incorporates the reclamation costs based upon the required design dimensions using an excavator for diversions and a dozer to build sediment control ponds and the re-seeding costs for long-term stability. The module has the ability to meet design criteria changes based upon an engineer's professional judgment or a regulatory change.

NAC 445A.433 establishes the minimum design criteria for process components at mine facilities. This regulation requires these components to remain fully functional and fully contain all process fluids including all accumulations from a 24-hour storm event with a 25-year recurrence interval. NAC 445A.433(1)(d). The minimum design criteria for process components also require the ability to withstand a 24-hour storm event with a 100-year recurrence interval. NAC 445.433(1)(c). The Division has the discretion to require addition storm capacity based on site-specific factors such as proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(d)(1-3) In exercising this discretion, the Division must use its best engineering judgment to determine whether more or less engineered containment must be provided than the established minimum design criteria. NAC 445A.432. The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that all closure components be designedto withstand run-off from a 24-hour storm event with a 500-year recurrence interval. However, the permittee is not released from liability for degrading the waters of the State by constructing process components in compliance with minimum design criteria. NAC 445A.433(4). Therefore, the permittee is

responsible for corrective actions after a release of pollutants from containment in accordance with their Division-approved emergency response plan (see NAC 445A.398 for reference) and the corrective action regulations at NAC 445A.227 and NAC 445A.22725, regardless of the size of the causative storm event. Division-approved emergency response plans for mining facilities typically require clean-up of all releases; however, even if they didn't, NAC 445A.379 requires stabilization to the extent necessary to prevent degradation of waters of the State.

(vii) SLAG PILE SEEPAGE MANAGEMENT AND TREATMENT DURING ACTIVE OPERATIONS AND DURING AND FOLLOWING CLOSURE

A plan for the minimization, prevention, or collection and treatment of discharges and/or seepage, based on site hydrology and water quality characterization information, that provides for a cover system of, at a minimum, a store and release earthen cover system with a thickness of at least twelve inches and, if necessary, additional source controls or capture and treatment at closure, all of which meet a minimum 200-year life design criteria. If seepage water quality is not expected to meet applicable Federal and state groundwater and surface water quality standards at the point of compliance, the plan must provide for:

(A) Implementation of a containment system that immobilizes hazardous substances to meet applicable water quality standards (e.g., an engineered cover system designed to achieve, at a minimum, a 95 percent reduction in annual net-percolation based on the long-term average to reduce seepage discharges to meet applicable water quality standards;

(B) A capture and treatment system designed to achieve at least a 95 percent capture efficiency and meet applicable water quality standards; or combination of an engineered cover system and a capture and treatment system to achieve at least a 95 percent reduction in discharged load and meet applicable water quality standards at the point of compliance, or

(C) A solution containment system to assure seepage flows are collected, contained, conveyed, and treated to achieve at least a 95 percent reduction to meet applicable water quality standards.

In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State. NAC 445A.433(1)(a),(b). Process components must be designed to withstand the runoff from a 24-hour storm event with a 100-year recurrence interval; and the primary fluid management system must be designed to be able to remain fully functional and fully contain all process fluids including all accumulations resulting

from a 24-hour storm event with a 25-year recurrence interval. NAC 445A.433(1)(c),(d). The Department has the option of requiring additional containment based on the proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(1)(d)(1-3). In exercising this discretion, the Division must use its best engineering judgment to determine whether more or less engineered containment must be provided than the established minimum design criteria. NAC 445A.432. Contingency plans for managing process contaminated flows in excess of the design quantity must be described in the appropriate operating plans. NAC 445A.433(1).

Because of the broad spectrum of environmental conditions, potential impacts, and proposed designs at individual mining operations, the Division does not concur that closure and reclamation requirements should be as prescriptive as stated in this section of the proposed CERCLA rules. Depending on site conditions, a 95 percent reduction in percolation, 95 percent capture, or 95 percent reduction in load may be insufficient, just right, or more than necessary, to meet applicable water quality standards. For example, a 95 percent reduction in percolation through an engineered cover on a leaking leach pad will likely be insufficient and not meet groundwater standards, whereas a 95 percent capture of a groundwater contaminant plume may be more than is necessary to meet applicable water standards. Similarly, a minimum 200-year design life may be appropriate for an engineered liner cap system over a leaking leach pad, but be more than is necessary for a seepage collection pond that will fill with evaporative salts and require replacement every 30 years. Therefore, such overly prescriptive requirements will likely interfere with the effectiveness and efficiency of the regulatory program, while more site-specific design parameters could achieve better results at meeting water quality standards.

Slag is considered a spent process material and must remain on engineered design containment (i.e., components must achieve zero discharge as required under NAC 445A.433), unless it is demonstrated to not have the potential to degrade waters of the State. NAC 445A.398(6). Therefore, for a slag pile, the plan for the minimization, prevention, or collection and treatment of discharges and/or seepage would be the engineering design report, which would prevent discharge and/or seepage from occurring. NAC 445A.397(1)(d).

A Final Permanent Closure Plan must be submitted to the Bureau two years prior to the anticipated closure of a mine site. NAC 445A.447(2). In accordance with the Division-approved final plan for permanent closure, spent process materials are commonly fully encapsulated with liner and buried under an earthen cover system, placed on lined containment and covered with a store and release earthen cover system with approved thickness and other properties, or disposed at an off-site facility authorized to receive such waste material with documentation provided to confirm proper disposal. Regardless of the closure method, the final plan for

permanent closure must demonstrate that there is no potential to degrade waters of the State. Once approved by the Division, the closure plan becomes part of the WPCP by reference, and represents an enforceable document under Nevada WPC law. NRS 445A.675(1).

Although store and release earthen cover systems used on process components at Nevada mining facilities are typically at least 12 inches thick, Nevada WPC regulations do not specify a minimum thickness for earthen cover systems. Instead, Nevada regulations require less prescriptively, and arguably more effectively, that process components and associated process materials be chemically stabilized during permanent closure to prevent them from degrading waters of the State under the environmental conditions that may reasonably be expected to exist at the site. NAC 445A.379 defines "stabilized". Therefore, the final plan for permanent closure must demonstrate that the proposed cover system, or other closure methodology, will achieve chemical stabilization and prevent degradation of waters of the State. See, NAC 445A.367, 445A.379, 445A.447).

NAC 445A.424(1)(b) prohibits seeps or discharges having water quality that is not expected to meet applicable Federal and State groundwater and surface water quality standards at the point of compliance. If such a seep or discharge occurred, it would represent a violation of NAC 445A.424 and require cleaned up pursuant to the approved facility emergency response plan. NAC 445A.398(4). Pursuant to NAC 445A.3456, such a seep or discharge would be considered a release to the environment, and in accordance with Part II.B.3. of the standard WPCP, must be reported to the Division no later than 5:00 PM of the first working day after knowledge of the release, and to the National Response Center pursuant to 40 CFR Part 302 if a federal reportable quantity was exceeded. In the event of a reportable release, or any other permit violation as applicable, Part II.B.4.b. of the standard WPCP requires an assessment of the extent and magnitude of the contamination pursuant to NAC 445A.2269, and Part II.B.4.c. of the standard WPCP requires the permittee to take all available and reasonable actions, and more frequent and enhanced monitoring, to minimize any impact to waters of the State, domestic animals, wildlife, and public health and safety. These permit requirements are authorized by the corrective action regulations at NAC 445A.227 and NAC 445A.22725.

If a slag pile issue needed to be addressed in Nevada the SRCE waste rock program could be utilized. The SRCE program has a specific calculation module to list each waste rock facility for reclamation using an "as-built" input and the mid-slope perimeter length input and a final slope input (2.5:1 or 3:0:1) to determine the volume of material required to be re-graded to meet the final slope stability topography. The waste rock module calculates the volume of growth medium

required based upon the re-sloped acres for both scarification and re-seeding costs. The reclamation costs are determined by the dozer(s) and/or scraper productivity timeframes and the associated labor hours to perform the reclamation task to include the seed and re-seeding labor costs. The equipment timeframe includes rental rate hours, fuel consumption and the wear maintenance costs as determined by the Caterpillar Handbook. The re-grading and revegetation requirements minimize erosion to achieve long-term stability of the facility and meet the required productive post-mining land use and therefore the restricting of public access for safety is not required.

The SRCE program has a specific Generic Hauling module that calculates the total volume of material required based on the cover depth and acreage of a facility, the equipment used, and the transport cost of material based upon the distance from a defined borrow source. SRCE has the ability to calculate the placement of a 10 foot oxide evapotranspiration cover over a defined acid generating waste rock facility or a slag pile to isolate meteoric water from entering the waste facility and thus eliminate the potential for mine-impacted waters. For a mine site with limited borrow source to meet a required cover depth, SRCE has an established synthetic liner material and placement costs based on the square footage of liner required and the SRCE User Page can be used by a mine engineer to calculate the total cost of this reclamation activity. The total cost will be listed as a line item cost in the SRCE summary page which will have agency in-direct costs added.

RESPONSE CATEGORY 8—SOLID and HAZARDOUS WASTE [Proposed 40 CFR 320.63(a)(viii)]

(i) DISPOSAL OF ALL SOLID AND HAZARDOUS WASTES

Requirements for disposal of all solid and hazardous wastes in a manner that is protective of human health and the environment and that is compliance with all applicable Federal, state, and local requirements.

NAC 519A.345(8)(a) authorizes the on-site disposal of all solid waste from the demolition of buildings, foundations, facilities, structures, and other equipment, which is inert or unlikely to create an environmental hazard or threaten the health of the general public, provided that a mine operator follows the operating plan submitted with the Class III Landfill Waiver Application and applicable solid waste regulations, pursuant to NAC 444.731. The Division's Bureau of Waste Management issues approval for Class III Landfill Waivers.

NAC 519A.345(8)(c) requires the proper off-site disposal of solid waste from the demolition of buildings, foundations, facilities, structures, and other equipment by a mine operator in a manner that is protective of human health and the environment as stipulated in Title 40 of the CFR. Further conformance with applicable requirements for the disposal of solid wastes in a manner that is protective of human health and the environment are

stipulated in NAC 444.570 to NAC 444.7499. One of those regulations, NAC 444.636, adopts by reference certain provisions of 40 CFR Parts 257 and 258, and selected documents from the U.S. Geological Survey and the EPA.

Hazardous waste generated at a mining facility must be properly disposed of in accordance with Title 40 of the CFR. Pursuant to 40 CFR 261.4(b), certain solid wastes generated by a mining facility are excluded from classification as hazardous waste, including mining overburden and solid waste from the extraction, beneficiation, and processing of ores and minerals. Such solid wastes must be disposed of either in accordance with the solid waste regulations at NAC 444.570 to 444.7499, or the WPC regulations for mining operations at NAC 445A.350 to NAC 445A.447, as applicable.

The SRCE program includes a Waste Disposal – Solid Waste and Hazardous Material module for both on-site and/or offsite disposal of both solid and hazardous waste materials. The module calculates the hauling cost of the non-hazardous solid waste material volume to an on-site designated Class II permitted landfill. The module calculates the volume of material required for the placement of a growth medium earth cover and the reseeding costs based on the landfill acreage. The SRCE module calculates the off-site transport cost for hazardous waste materials to an approved disposal site based upon the distance from the mine to the disposal site. The SRCE User page has the ability to account for a third party contractor quote to accommodate for a specific type of hazardous waste disposal cost.

According to NAC 445A.367, permanent closure means the time in the operating life of a facility when activities for the final stabilization, removal or mitigation of sources are initiated. A "source" is any building, structure, facility or installation from which there is or may be the discharge of pollutants. NAC 445A.378. Stabilization is the condition in which contaminants are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may reasonably be expected to exist at a site. NAC 445A.379.

NAC 445.430 requires that spent ore which has been left on pads or which will be removed from a pad must first demonstrate stability of the discharge effluent from the pads or from the spent ore such that WAD cyanide levels in the effluent are less than 0.2 mg/l; the pH level of the effluent is between 6.0 and 9.0; and contaminants in any effluent from the processed ore which would result from meteoric waters would not degrade waters of the State. If these requirements cannot be achieved, the Department may grant a variance to those conditions if the holder of the permit can demonstrate that the remaining solid material, when representatively sampled, does not contain levels of contaminants that are likely to become mobile and degrade the waters of the State under the conditions that will exist at the site; or the spent ore is stabilized in such a fashion as to inhibit meteoric waters from migrating through the material and transporting contaminants that have the potential to degrade the waters of the State. NAC 445A.430(2)(a-b). Also, the Department

may approve an alternate method for stabilizing ore that has been leached if the holder of the permit can clearly demonstrate that the condtion in which the materials will be left will not create a potential for the waters of the State to be degraded. NAC 445A.430(3).

NAC 445A.431 states that upon termination of the active use of a tailings impoundment, representative samples of the material deposited in the impoundment must be collected and characterized. The tailings must be stabilized during the final closure of a facility so as to inhibit the migration of any contaminant that has the potential to degrade the waters of the State.

NAC 445A.446 state that the permanent closure of a facility must be initiated following the request of the holder of the permit; for a facility which is under a temporary closure, no later than at the end of one renewal of a 5-year permit which has been issued pursuant to subsection 2 of NAC 445A.420; or when the end of the design life of that process component is reached. NAC 445A.446(1)(a-c). Permanent closure is complete when the requirements contained in NAC 445A.429, NAC 445A.430, and NAC 445A.431 have been achieved. NAC 445A.446(2). The time required for monitoring the facility following permanent closure depends upon the particular site and process characteristics, but in no event may the time required exceed 30 years. NAC 445A.446(3).

NAC 445A.447(1) requires plans for permanent closure for all sources at a facility. A final plan for permanent closure of any source, which has been identified as a process component must be submitted to the Department at least 2 years before the anticipated permanent closure of that process component. NAC 445A.447(2). Sources, which have not been classified as process components must be evaluated at the end of their operating life to determine the potential for pollutants from these sources to migrate and degrade the waters of the State under the final proposed site conditions. NAC 445A.447(3). The sources must be closed in accordance with the State Handbook of Best Management Practices prepared pursuant to NAC 445A.336. Id.

(ii) CONTAMINATED SOIL DISPOSAL

Requirements for contaminated soil disposal in a manner that is protective of human health and the environment and that is in compliance with all applicable Federal, state, and local requirements.

Title 40 of the CFR sets forth the requirements for contaminated soil disposal that is protective of human health and the environment. Contaminated soil generated at a mining facility that is hazardous waste must be properly disposed in accordance with Title 40 of the CFR. Further requirements for disposal of contaminated soil generated at a mining facility that is not hazardous waste are provided for in the solid waste regulations at NAC 444.570 to NAC 444.7499, and in the corrective action regulations at NAC 445A.226 to NAC 445A.22755.

Releases to soil at Nevada mining facilities must be remediated in accordance with the Division-approved site-specific emergency response plan, required under NAC 445A.398(4), which typically requires full excavation of released contaminants. NAC 445A.441(1) also requires an evaluation following a release. Any soil contaminated by a release that may be impossible or inadvisable to excavate is subject to Nevada corrective action regulations at NAC 445A.2269 to NAC 445A.2272 for assessment of conditions, determination of action levels, and determination of appropriate corrective action, if any, for protection of human health and the environment.

Typically, soil contaminated with mine process fluid that is excavated during remediation of process fluid releases and is not hazardous waste is disposed of on lined containment at the mining facility (e.g., on a synthetically-lined leach pad or tailings impoundment). Non-hazardous petroleum-contaminated soil that is excavated during remediation of petroleum releases is typically disposed of at an off-site treatment or disposal facility authorized to receive such material pursuant to NAC 444.570 to 444.7499) or is disposed of at the mine site in accordance with a Division-approved Petroleum-Contaminated Soil (PCS) Management Plan following the Division guidance document titled, "Guidance for Mine-Site Petroleum-Contaminated Soil (PCS) Management Plans." Approved PCS Management Plans are based on establishment of site-specific maximum soil screening levels for on-site disposal using standard risk assessment methods (e.g., ASTM Method E1739-95, "Risk-Based Corrective Action Applied at Petroleum Release Sites," as cited at NAC 445A.22705).

Final stabilization of any contaminated soil that is disposed of at a Nevada mine facility must be performed in accordance with the WPC closure regulations listed below. Also listed are monitoring requirements that apply to release detection and evaluation.

According to NAC 445A.367, permanent closure means the time in the operating life of a facility when activities for the final stabilization, removal or mitigation of sources are initiated. A "source" is any building, structure, facility or installation from which there is or may be the discharge of pollutants. NAC 445A.378. Stabilization is the condition in which contaminants are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may reasonably be expected to exist at a site. NAC 445A.379.

If the Division determines that there has been a variation in a parameter or element monitored by the site-monitoring system as required in NAC 445A.440 which is caused by the facility and has the potential to degrade the waters of the State, there are two response actions. NAC 445A.441. First, the holder of the permit must conduct and submit an evaluation to the Department which: identifies the source and escape pathways of the elements of concern; determines the type, extent and ability of a system needed to contain or confine any migrating contaminant; and identifies methods which can be carried out to remediate the contamination during the continued operation of the facility or at

permanent closure. NAC 445A.441(1)(a-c). Second, the Department must, based on the information provided by the permittee: require the immediate shut down of the process component and the immediate initiation of cleanup activities; allow continued operation of the process component which is the source of the elements of concern with concurrent cleanup activities; allow continued operation of the process component which is the source of the elements of concern while requiring the facility to continue to control the migration of the contaminant while cleanup activities are postponed; or determine that no remedial action is warranted at the present time. NAC 445A.441(2)(a-d).

NAC 445A.442(1) requires the Department to determine the extent and complexity to which the holder of a permit must monitor individual process components for the release of contaminants after reviewing site and process controlled design conditions. Systems designed to detect and control leaks from process components must be located at the interface of the unit process components and the adjacent environment and be able to provide the first indication that pollutants or contaminants have escaped their primary containment. Id. The program to monitor the process components must include a schedule of activities, a roster of current job titles for persons responsible for and involved in the monitoring program, and the form and frequency of reports to be submitted to the Department. NAC 445A.442(2)(a-c). The Department may randomly collect information or samples for reference. NAC 445A.442(2). The cost of analyzing samples may be placed upon the holder of the permit. Id.

Under NAC 445A.443, monitoring of the beneficiation process must include routine characterization of those process materials which will be disposed. The data obtained must be used by the holder of the permit to evaluate periodically and, when necessary, to refine the plan for the permanent closure of the facility. Id.

NAC 445A.446 state that the permanent closure of a facility must be initiated following the request of the holder of the permit; for a facility which is under a temporary closure, no later than at the end of one renewal of a 5-year permit which has been issued pursuant to subsection 2 of NAC 445A.420; or when the end of the design life of that process component is reached. NAC 445A.446(1)(a-c). Permanent closure is complete when the requirements contained in NAC 445A.429, NAC 445A.430, and NAC 445A.431 have been achieved. NAC 445A.446(2). The time required for monitoring the facility following permanent closure depends upon the particular site and process characteristics, but in no event may the time required exceed 30 years. NAC 445A.446(3).

NAC 445A.447(1) requires plans for permanent closure for all sources at a facility. A final plan for permanent closure of any source, which has been identified as a process component must be submitted to the Department at least 2 years before the anticipated permanent closure of that process component. NAC 445A.447(2). Sources, which have not been classified as process components must be evaluated at the end of their operating life to determine the potential for pollutants from these sources to migrate and degrade the

waters of the State under the final proposed site conditions. NAC 445A.447(3). The sources must be closed in accordance with the State Handbook of Best Management Practices prepared pursuant to NAC 445A.336. Id.

NAC 519A.345(8)(c) requires the proper off-site disposal of solid waste from the demolition of buildings, foundations, facilities, structures, and other equipment by a mine operator in conformance with applicable requirements for the disposal of solid waste to an approved landfill per NAC Chapter 444 regulations for the proper management of hazardous waste generated at mine projects.

The SRCE program includes a Waste Disposal – Solid Waste and Hazardous Material module for both on-site and/or off-site disposal of both solid and hazardous waste materials. The module calculates the hauling cost of the non-hazardous solid waste material volume to an on-site designated Class II permitted landfill. The module calculates the volume of material required for the placement of a growth medium earth cover and the reseeding costs based on the landfill acreage. The SRCE module calculates the off-site transport cost for hazardous waste materials to an approved disposal site based upon the distance from the mine to the disposal site. The SRCE User page has the ability to account for a third party contractor quote to accommodate for a specific type of hazardous waste disposal cost.

(iii) DECONTAMINATION OF BUILDINGS AND STRUCTURES

Requirements to decontaminate buildings and structures to remove and safely dispose of hazardous substances.

NAC 519A.345(8) requires the operator of mine to perform certain types of reclamation including demolition of buildings, foundations, facilities, structures and other equipment to the level of the foundation and burying the demolished items on the site in conformance with applicable requirements for the disposal of solid waste both on and off site.

NAC 519A.270(14) requires the contents of plan for reclamation for mining operation to include the proposed disposition of buildings, equipment, piping, scrap, reagents, and any other equipment and materials.

The following WPC regulations apply to Nevada mine facilities and establish the requirements to decontaminate buildings and structures to remove and safely dispose of hazardous substances and other materials that have the potential to degrade waters of the State. The central requirement is that all such sources are chemically stabilized in accordance with a Division-approved final plan for permanent closure to prevent degradation of waters of the State. Solid wastes associated with such facilities are also subject to the solid waste regulations and to the extent that they are not excluded by 40 CFR 261.4(b), Title 40 of the CFR.

According to NAC 445A.367, permanent closure means the time in the operating life of a facility when activities for the final stabilization, removal or mitigation of sources are initiated. A "source" is any building, structure, facility or installation from which there is or may be the discharge of pollutants. NAC 445A.378. Stabilization is the condition in which contaminants are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may reasonably be expected to exist at a site. NAC 445A.379.

If the Division determines that there has been a variation in a parameter or element monitored by the site-monitoring system as required in NAC 445A.440 which is caused by the facility and has the potential to degrade the waters of the State, there are two response actions. NAC 445A.441. First, the holder of the permit must conduct and submit an evaluation to the Department which: identifies the source and escape pathways of the elements of concern; determines the type, extent and ability of a system needed to contain or confine any migrating contaminant; and identifies methods which can be carried out to remediate the contamination during the continued operation of the facility or at permanent closure. NAC 445A.441(1)(a-c). Second, the Department must, based on the information provided by the permittee: require the immediate shut down of the process component and the immediate initiation of cleanup activities; allow continued operation of the process component which is the source of the elements of concern with concurrent cleanup activities; allow continued operation of the process component which is the source of the elements of concern while requiring the facility to continue to control the migration of the contaminant while cleanup activities are postponed; or determine that no remedial action is warranted at the present time. NAC 445A.441(2)(a-d).

NAC 445A.442(1) requires the Department to determine the extent and complexity to which the holder of a permit must monitor individual process components for the release of contaminants after reviewing site and process controlled design conditions. Systems designed to detect and control leaks from process components must be located at the interface of the unit process components and the adjacent environment and be able to provide the first indication that pollutants or contaminants have escaped their primary containment. Id. The program to monitor the process components must include a schedule of activities, a roster of current job titles for persons responsible for and involved in the monitoring program, and the form and frequency of reports to be submitted to the Department. NAC 445A.442(2)(a-c). The Department may randomly collect information or samples for reference. NAC 445A.442(2). The cost of analyzing samples may be placed upon the holder of the permit. Id..

Under NAC 445A.443, monitoring of the beneficiation process must include routine characterization of those process materials which will be disposed. The data obtained must be used by the holder of the permit to evaluate periodically and, when necessary, to refine the plan for the permanent closure of the facility. Id.

NAC 445A.446 state that the permanent closure of a facility must be initiated following the request of the holder of the permit; for a facility which is under a temporary closure, no later than at the end of one renewal of a 5-year permit which has been issued pursuant to subsection 2 of NAC 445A.420; or when the end of the design life of that process component is reached. NAC 445A.446(1)(a-c). Permanent closure is complete when the requirements contained in NAC 445A.429, NAC 445A.430, and NAC 445A.431 have been achieved. NAC 445A.446(2). The time required for monitoring the facility following permanent closure depends upon the particular site and process characteristics, but in no event may the time required exceed 30 years. NAC 445A.446(3).

NAC 445A.447(1) requires plans for permanent closure for all sources at a facility. A final plan for permanent closure of any source, which has been identified as a process component must be submitted to the Department at least 2 years before the anticipated permanent closure of that process component. NAC 445A.447(2). Sources, which have not been classified as process components must be evaluated at the end of their operating life to determine the potential for pollutants from these sources to migrate and degrade the waters of the State under the final proposed site conditions. NAC 445A.447(3). The sources must be closed in accordance with the State Handbook of Best Management Practices prepared pursuant to NAC 445A.336. Id.

NAC 519A.345(8)(c) requires the proper off-site disposal of solid waste from the demolition of buildings, foundations, facilities, structures, and other equipment by a mine operator in conformance with applicable requirements for the disposal of solid waste to an approved landfill per NAC Chapter 444 regulations for the proper management of hazardous waste generated at mine projects.

NAC 519A.345(8)(a) authorizes the on-site disposal of solid waste from the demolition of buildings, foundations, facilities, structures, and other equipment, which is inert or unlikely to create an environmental hazard or threaten the health of the general public, provided that a mine operator follows the operating plan submitted with the Class III Landfill Waiver Application and applicable solid waste regulations, pursuant to NAC 444.731. The Department's Bureau of Waste Management issues approval for Class III Landfill Waivers.

The SRCE program includes a Waste Disposal – Solid Waste and Hazardous Material module for both on-site and/or offsite disposal of both solid and hazardous waste materials. The module calculates the hauling cost of the non-hazardous solid waste material volume to an on-site designated Class II permitted landfill. The module calculates the volume of material required for the placement of a growth medium earth cover and the reseeding costs based on the landfill acreage. The SRCE module calculates the off-site transport cost for hazardous waste materials to an approved disposal site based upon the distance from the mine to the disposal site. The SRCE User page has the ability to account

for a third party contractor quote to accommodate for a specific type of hazardous waste disposal cost.

RESPONSE CATEGORY 9—DRAINAGE [Proposed 40 CFR 320.63(a)(ix)]

GENERAL COMMENTS

Currently, Nevada mine facilities must be constructed to withstand a 24-hour storm event with a 100-year recurrence interval. In Nevada's mine closure guidance, the Division recommends that all closure components be designed to withstand a 24-hour storm event with a 500-year recurrence interval. The Division is considering a change to Nevada regulations that requires closed mine facilities to be designed to withstand a 24-hour storm event with a 500-year recurrence interval. However, current Nevada regulations allow the Division to require a greater level of protection against storm events when appropriate, and the Division has exercised this additional authority on several occasions. Examples of Nevada mine facilities with components that were designed and constructed to contain and withstand a 24-hour storm event with a 500-year or greater recurrence interval include, but are not restricted to, the Mill 5/6-Gold Quarry-James Creek Project, the Goldfield Project, the AA Block Project, and the Liberty Project. Furthermore, in cases where Nevada mine components failed as a result of a larger storm event than they were designed to withstand, the Division used its regulatory authority to require an upgrade of the failed components to withstand a larger storm event (e.g., AA Block Project, Liberty Project). Therefore, although the State of Nevada currently does not have regulations that expressly require mine facilities to contain and withstand a 24-hour storm event with a 200-year recurrence interval, regulatory changes are being considered, and Nevada's track record of requiring upgrades where appropriate demonstrates that additional CERCLA financial assurance is unnecessary for Nevada mine facilities.

(i) MANAGEMENT OF ALL STORMWATER AND SEDIMENT DURING OPERATIONS AND DURING AND FOLLOWING CLOSURE

To satisfy the drainage category component in paragraph (b)(1)(ix) of this section, a plan for the management of all stormwater and sediment generated during operations and during and following closure. For existing units, the plan must provide for permanent stormwater conveyances, ditches, channels and diversions designed to convey the peak flow and ponds and other collection devices designed to store the volume generated during a 24-hour period by a 100-year return interval storm event. For unit that become authorized to operate after the effective date of the Final Rule, the plan must provide for controls designed to store the volume generated during a 24-hour period by a 200-year return interval storm event.

NAC 445A.432 and NAC 445A.433 set-forth the minimum design criteria and universal requirements for process components. These statutes establish minimum contaminant

control technologies and require consideration of the site and operating conditions in designing individual process components. See generally, Id. Based on site characterization, best engineering judgment must be used to determine the degree to which designs must provide more or less protection through engineered containment. Id. However, the application of minimum design criteria does not release the holder of a permit from liability for degradation to waters of the State caused by the facility. NAC 445A.433(4).

In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State. NAC 445A.433(1)(a),(b). Process components must be designed to withstand the runoff from a 24-hour storm event with a 100-year recurrence interval; and the primary fluid management system must be designed to be able to remain fully functional and fully contain all process fluids including all accumulations resulting from a 24-hour storm event with a 25-year recurrence interval. NAC 445A.433(1)(c),(d). The Department has the option of requiring additional containment based on the proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(1)(d)(1-3). In exercising this discretion, the Division must use its best engineering judgment to determine whether more or less engineered containment must be provided than the established minimum design criteria. NAC 445A.432. Contingency plans for managing process contaminated flows in excess of the design quantity must be described in the appropriate operating plans. NAC 445A.433(1).

The fluid management system must be designed to be functional for 5 years after the projected operating life of the process component and permanent closure period. NAC 445A.433(1)(e). The engineering designs must take into consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity. NAC 445A.433(1)(f). Additional containment may be required in areas where groundwater is considered to be near the surface. NAC 445A.433(2).

General Mining Stormwater NPDES Permit NVR300000 issued by the Department authorizes stormwater discharges associated with Standard Industrial Classification (SIC) 10 as derived from Category iii (shown above), defined under 40 CFR 122.26(b)(14) and all construction-related activities as defined by 40 CFR 122.26 (b)(14)(x) and (b)(15) at mine sites (including exploration, development and reclamation activities). Facilities that are authorized under NPDES Permit NVR300000 must submit a new or updated SWPPP to the Department within 60 days of the effective date of the permit or for new dischargers within 30 days of the submitted Notice of Intent to discharge. SWPPPs are to be made available for inspection at the project site or operation covered by this permit. The purpose of the SWPPP is to guide the identification of stormwater pollution sources and the

reduction of their impacts, and otherwise lead to compliance with the conditions of this permit. Each of the SWPPP elements must be revised as necessary to maintain accuracy if there are changes in design or construction of the project or if the SWPPP is found to be insufficient.

The permittee is required to make SWPPPs available upon request to the State or local agency approving sediment and erosion plans, grading plans, and stormwater management plans; local government officials; and the operator of a municipal separate storm sewer receiving discharges from the site. The copy of the SWPPP that is required to be kept on the mining site or locally available must be made available to the Department for review at the time of an on-site inspection.

The conditions set in the General Mining Stormwater NPDES Permit are the minimum requirements to maintain and implement an effective stormwater program consistent with U. S. EPA rules (Title 40 of the Code of Federal Regulations Part 122). BMPs are approved by the U.S. EPA for use in stormwater permits.

NAC 445A.447 requires submittal of a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of any portion of a mining operation that may release pollutants, including but not limited to open pits and pit lakes. See also, NAC 445A.359 and NAC 445A.378. The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure components used in such mitigating actions be designed to withstand the 24-hour, 500-year storm event.

Mine facilities must be monitored for up to 30 years following the completion of permanent closure actions to prevent degradation of waters of the State. NAC 445A.446(2). NAC 445A.433 establishes the minimum design criteria for process components at mine facilities. This regulation requires these components to remain fully functional and fully contain all process fluids including all accumulations from a 24-hour storm event with a 25-year recurrence interval. NAC445A.433(1)(d). The minimum design criteria for process components also require the ability to withstand a 24-hour storm event with a 100-year recurrence interval. NAC 445.433(1)(c). The Division has the discretion to require addition storm capacity based on site-specific factors such as proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(d)(1-3) In exercising this discretion, the Division must use its best engineering judgment to determine whether more or less engineered containment must be provided than the established minimum design criteria. NAC 445A.432. The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that all closure components be designed to withstand run-off from a 24-hour storm event with a 500-year recurrence interval.

WPCP issued by the Division includes a standard provision (WPCP Part II.B.2.E.) that provides a regulatory mechanism for the permittee to submit to the Division for review and approval revised monitoring plan and sampling protocols annually. Changes in monitoring frequency or the incorporation of additional monitoring points may require modification of the Permit and payment of modification fees.

WPCP issued by the Division includes a standard provision (WPCP Part I.I.) that requires the permittee to inspect all control devices, systems, and facilities weekly (for closure permits consider relaxing frequency, but not more than necessary, if site is not continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system), and during (when possible) and after major storm events. These inspections are performed to detect evidence of deterioration, malfunction, or improper operation of control or monitoring systems; sudden changes in the data from any monitoring device; the presence of liquids in leak detection systems; and severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices.

The Division may, if appropriate, require an operator of a mining operation to reclaim solution ponds, settling ponds, and other non-tailings impoundments by backfilling and regrading to approximate the natural land form and restoring the regime of the surface water to the regime that existed before the disturbance. NAC 519A.345(7).

When preparing his or her plan for reclamation an applicant must consider the pre-mining and post-mining use of the land, the technical and economic practicability of the proposed techniques for reclamation, the effectiveness of the proposed activities for reclamation in ensuring public safety, the annual precipitation of the area and its effect on revegetation and the potential for erosion, the existing and proposed post-mining topography in relation to the potential for erosion, the potential for degradation of surface-water or groundwater quality resulting from the proposed activities for reclamation, the visual impact of the reclamation, any other criteria which may affect the applicability of a particular activity for reclamation, including types of soil and the physical and chemical characteristic of the soil, and whether the disturbance was created before or after September 19, 1990. NAC 519A.260(1-9).

Other authorities and resources that are considered for regrading requirements include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

The SRCE program includes a Diversion Ditch and Sediment Pond calculation module for site-specific construction inputs that can account for a 24-hour, 200-year storm event or greater if determined by the Bureau's Closure Branch. . The module incorporates the reclamation costs based upon the required design dimensions using an excavator for

diversions and a dozer to build sediment control ponds and provides the re-seeding costs for long-term stability. The module has the ability to make design criteria changes based upon an engineer's professional judgment or a regulatory change.

RESPONSE CATEGORY 10—SHORT-TERM OPERATIONS and MAINTENANCE [Proposed 40 CFR 320.63(a)(x)]

(i) MANAGEMENT OF ALL STORMWATER AND SEDIMENT DURING OPERATIONS AND DURING AND FOLLOWING CLOSURE

A plan for groundwater and surface water monitoring to assure that monitoring wells are located to detect an exceedance(s) or trends towards exceedance(s) of the applicable standards, and are detected at the earliest possible occurrence, so that investigation of the extent of contamination and actions to address the source of contamination may be implemented as soon as possible. The plan must be currently in effect and must cover a period of at least five years.

The WPC regulations listed below describe the monitoring requirements for Nevada mining facilities. Once approved by the Division, the fluid management and monitoring plans required in NAC 445A.398 (see below), as well as the other operating plans, facility design plans, and closure plans, are incorporated into the WPCP by reference, and thereby become enforceable pursuant to NRS 445A.690. WPCPs (and the plans incorporated into them) have a maximum term of five years, but must be renewed every five years until permanent closure is complete. NAC 445A.409. Pursuant to NAC 445A.446, the time required for monitoring the facility following permanent closure depends upon the particular site and process characteristics, but in no event may the time required exceed 30 years. However, if the Division determines during the 30-year post-closure monitoring period that the facility is not chemically stabilized, then permanent closure is not complete and additional permanent closure actions must be proposed (NAC 445A.447), approved by the Division, and implemented to complete permanent closure, after which another post-closure monitoring period up to 30 years long is initiated.

NAC 445A.398 requires that a permit application include the proposed operating plans for the facility. The plan must include a description and the range of operating conditions for which the components were designed; a plan for the management of process fluids which describes the methods to be used for the monitoring and controlling of all process fluids. NAC 445A.398(1-2). The operating plan must include the following: a description of the means to evaluate the conditions in the fluid management system so as to be able to quantify the available storage capacity for meteoric waters and to define when and to what extent the designed containment capacity has been exceeded; a plan for monitoring the facility which describes the water quality in the area; the monitoring locations the applicant proposes to sample routinely in order to evaluate surface and groundwater at the site that may be affected by the operation of the facility; an analytical profile of each

surface and groundwater that may be affected by the operation of the facility; and the locations of the leak detection systems, the frequency for sampling these systems and the analytical profile to be used for evaluation of the samples. NAC 445A.398(2-3).

The program to monitor the site of a facility mustbe designed to monitor the quality of all ground and surface water which may be affected by t he facility. NAC 445A.440(1). The type, number and location of the monitoring points must be described in the application as part of the monitoring plan and must be approved by the Department. Id. Final monitoring requirements must be established by the Department. NAC 445A.440(2). Baseline data must be collected before operation ofthe facility. NAC 445A.440(3). In areas where there is a substantial separation between the process components and the groundwater, a system for monitoring highly probabl e escape pathways in the unsaturated zone may be required by the Department. NAC 445A.440(4). The decision where to locate the monitoring points for the site must be made after considering the site's geology and hydrogeology. NAC 445A.440(5).

If the Division determines that there has been a va riation in a parameter or element monitored by the site-monitoring system as required in NAC 445A.440 which is caused by the facility and has the potential to degrade the w aters of the State, there are two response actions. NAC 445A.441. First, the holder of the permit must conduct and submit an evaluation to the Department which: identifies the source and escape pathways of the elements of concern; determines the type, extent and ability of a system needed to contain or confine any migrating contaminant; and identifies methods which can be carried out to remediate the contamination during the continued op eration of the facility or at permanent closure. NAC 445A.441(1)(a-c). Second, t he Department must, based on the information provided by the permittee: require the immediate shut down of the process component and the immediate initiation of cleanup a ctivities; allow continued operation of the process component which is the source of the elements of concern with concurrent cleanup activities; allow continued operation of th e process component which is the source of the elements of concern while requiring t he facility to continue to control the migration of the contaminant while cleanup activiti es are postponed; or determine that no remedial action is warranted at the present time. NAC 445A.441(2)(a-d).

NAC 445A.442(1) requires the Department to determi ne the extent and complexity to which the holder of a permit must monitor individual process components for the release of contaminants after reviewing site and process co ntrolled design conditions. Systems designed to detect and control leaks from process c omponents must be located at the interface of the unit process components and the ad jacent environment and be able to provide the first indication that pollutants or con taminants have escaped their primary containment. Id. The program to monitor the proces s components must include a schedule of activities, a roster of current job titles for persons responsible for and involved in the monitoring program, and the form and frequency of reports to be submitted to the Department. NAC 445A.442(2)(a-c). The Department may randomly collect information or

samples for reference. NAC 445A.442(2). The cost of analyzing samples may be placed upon the holder of the permit. Id.

Under NAC 445A.443, monitoring of the beneficiation process must include routine characterization of those process materials which will be disposed. The data obtained must be used by the holder of the permit to evaluate periodically and, when necessary, to refine the plan for the permanent closure of the facility. Id.

NAC 445A.446 state that the permanent closure of a facility must be initiated following the request of the holder of the permit; for a facility which is under a temporary closure, no later than at the end of one renewal of a 5-year permit which has been issued pursuant to subsection 2 of NAC 445A.420; or when the end of the design life of that process component is reached. NAC 445A.446(1)(a-c). Permanent closure is complete when the requirements contained in NAC 445A.429, NAC 445A.430, and NAC 445A.431 have been achieved. NAC 445A.446(2). The time required for monitoring the facility following permanent closure depends upon the particular site and process characteristics, but in no event may the time required exceed 30 years. NAC 445A.446(3).

NAC 445A.447(1) requires plans for permanent closure for all sources at a facility. A final plan for permanent closure of any source, which has been identified as a process component must be submitted to the Department at least 2 years before the anticipated permanent closure of that process component. NAC 445A.447(2). Sources, which have not been classified as process components must be evaluated at the end of their operating life to determine the potential for pollutants from these sources to migrate and degrade the waters of the State under the final proposed site conditions. NAC 445A.447(3). The sources must be closed in accordance with the State Handbook of Best Management Practices prepared pursuant to NAC 445A.336. Id.

WPCP issued by the Division includes a standard provision (WPCP Part I.A.) that states the following: Specific facility conditions and limitations are outlined that require the facility is constructed, operated, and closed in accordance with the approved designs; all process fluids must be contained within the fluid management system including all meteoric waters which enter the system as a result of the 25-year, 24 hour storm event; and not release or discharge any process or non-process contaminants from the fluid management system.

WPCP issued by the Division contain site-specific monitoring requirements (WPCP Part I.D.) which outline sample locations, analytes, testing, other parameters, and sample frequency. Site-specific permit limits are included as appropriate. Site-specific requirements for ongoing investigations such as pit lake study, risk assessment and waste rock management plan updates are included. Facility limitations, reporting and sampling and analysis requirements are boilerplate entries.

Part II.B.3. of the WPCP for a Nevada mining facility requires reporting to the Division no later than 5:00 PM of the first working day after knowledge of a release of a hazardous substance, petroleum, or coolant, to the environment (including to soil, surface water, or groundwater). If the release exceeds a federal reportable quantity, the release must also be reported to the National Response Center. In the event of a reportable release, or any other permit violation as applicable, Part II.B.4.b. of the WPCP requires an assessment of the extent and magnitude of the contamination pursuant to NAC 445A.2269, and Part II.B.4.c. of the WPCP requires the Permittee to take all available and reasonable actions, and more frequent and enhanced monitoring, to minimize any impact to waters of the State, domestic animals, wildlife, and public health and safety. These permit requirements are authorized by the corrective action regulations at NAC 445A.227 and NAC 445A.22725.

The Division guidance document titled, "Guidance Document for the Design and Construction of Groundwater Monitoring Wells," provides additional requirements for the location and construction of monitoring wells to ensure that exceedances of applicable groundwater standards are detected at the earliest possible occurrence, so that investigation of the extent of contamination and actions to address the source of contamination may be implemented as soon as possible.

The SRCE program has a specific water monitoring module to calculate the labor for the collection of a pre-determined number of samples and their collection frequency based on the WPCP requirements. The module accounts for analytical sampling costs and reporting. Groundwater sample monitoring is typically required quarterly and the module calculates any sample frequency cost for a minimum period of 5 years to 30 years post-closure mining as determined by the WPCP. Surface water sampling requirements can be accounted for as required by the WPCP.

The SRCE program has a specific module for listing all dewatering wells, production wells and groundwater monitoring wells to calculate the closure abandonment costs based upon the depth to groundwater.

(ii) INSPECTION AND MONITORING OF EROSION, REVEGETATION, AND RECLAMATION

A plan for inspection and monitoring of erosion and revegetation to ensure reclamation success.

WPCP issued by the Division includes a standard provision (WPCP Part I.I.) that states as follows: "The Permittee shall inspect all control devices, systems, and facilities weekly, and during (when possible) and after major storm events. These inspections are performed to detect evidence of: Deterioration, malfunction, or improper operation of control or monitoring systems; sudden changes in the data from any monitoring device; the presence of liquids in leak detection systems; and severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices." These requirements

remain in effect as long as the WPCP is in effect, which is up to 30 years after permanent closure is completed. NAC 445A.446(3). Any severe erosion detected must be repaired pursuant to Part II.A.2. of the WPCP, which requires the Permittee to maintain in good working order and operate as efficiently as possible, all devices, facilities, and systems to achieve compliance with the terms and conditions of the permit and applicable regulations.

As part of its plan for reclamation, a permittee must provide for a productive post-mining use of the land. NAC 519A.275(1). NAC 519A.275 sets forth the requirements for productive post-mining use of land. The productive post-mining use of the land must be submitted with a plan for reclamation and may not identify a use of the land or degree of productivity which is identical to the pre-mining use or degree of productivity. NAC 519A.275(2). Land which is returned to its pre-mining use or reclaimed after mining or exploration to a level of productivity which is generally consistent with the pre-mining level of productivity or the level of productivity of the surrounding land shall be deemed to be a productive post-mining use. Land which is reclaimed to a degree of productivity which is less productive than its pre-mining use shall be deemed to be productive if the operator takes reasonable measures to: ensure adequate fertilization of the soil; ensure the quantity and quality of the topsoil or growth medium; and establish a productive post-mining use of the land within site-specific economic and technical constraints of the area. NAC 519A.275(3). Land subject to excessive erosion will not be deemed to be reclaimed to a productive post-mining use unless excessive erosion existed before mining or exists on the adjacent land. NAC 519A.275(4). Evidence of the excessive erosion must be provided by the operator to the Division. Id. If the operator is not the owner of the surface of the affected lands, the Division shall consider any comments received from the landowner in making the final determination that the proposed plan for reclamation adequately provides for a productive post-mining use of the land. NAC 519A.275(5).

NAC 519A.315 sets forth the requirements for abandonment of a site and selection of appropriate activities for reclamation of site. The abandonment of a site must be conducted in a manner that ensures public safety, encourages techniques to minimize adverse visual effects, and establishes a safe and stable condition suitable for the productive post-mining use of the land. In selecting appropriate activities for reclamation for a particular site, techniques which minimize adverse visual impact must be considered. Ensuring public safety requires minimizing hazards in areas which the public may have legal access by, if applicable: removing or burying structures, equipment, reagents or scrap; sealing or securing shafts, tunnels and adits pursuant to NAC 513.390; plugging drill holes; leaving slopes in a structurally stable condition; and restricting access to areas which cannot practicably be made safe. Achieving a "stable condition" requires conditions at the site to be resistant to excessive erosion and structurally competent to withstand normal geologic and climatic conditions without significant failure that would be a threat to public safety and the environment.

NAC 519A.330(1)(a) states that the operator shall select and establish species of plants that will result in vegetation productivity comparable to that growing on the affected (disturbed) land before commencement of an exploration project or mine operation. A designated environmental scientist assigned to the project is the same individual who performs the field inspections to verify the mine components have been built according to the approved Reclamation Plan and to ensure that modification to the plan are consistent with the approved Reclamation Permit. The mine operator's staff are notified of observed erosion issues and reported in a formal inspection letter to the operator. An approved Reclamation Permit includes an Attachment B document; Nevada Guidelines for Successful Revegetation for the NDEP, the BLM, and the USFS. This interagency document requires the operator to stabilize the site and establish productive desired plant communities to meet a post-mining land use. This also requires the treatment of noxious weeds. The timeframe to determine revegetation success of the vegetative growth on a reclaimed site may be evaluated for release no sooner than during the third growing season after earthwork and re-seeding have been documented. The operator is required to file a revegetation report based upon the coverage and density of plant species to initiate the final field inspection prior to the revegetation surety release.

The Bureau's Reclamation Branch has a team of environmental scientists who are assigned to perform on-site annual inspections of permitted active mines to evaluate the mine facility for disturbances and determine if affected areas have erosion issues, revegetation success or non-vegetation success on concurrent reclamation, or any control measures to address noxious weeds. Excessive erosion is recorded in the site's inspection report and considered to be unnecessary and undue degradation. The mine operator must perform proper routine maintenance of roads, stormwater diversions, earth cover systems, revegetation and weed control measures in order to obtain any financial surety release of an affected facility.

The SRCE program has a specific reclamation cost module for the yearly calculation of the labor and reporting cost for a minimum 3-year post-closure period for vegetation monitoring. The monitoring module has a percentage acreage input to provide for additional vegetation costs based upon any acreage which has been determined to have failed in the revegetation effort. The post-closure vegetation monitoring years can be adjusted higher to suit site-specific criteria.

(iii) MAINTENANCE AND REPAIRS

A plan for routine maintenance and repairs to roads, stormwater conveyances and collection devices and revegetation maintenance (e.g. weed controls) and repairs (e.g. areas of revegetation failure).

WPCP issued by the Division includes a standard provision (WPCP Part I.I.) that states as follows: "The Permittee shall inspect all control devices, systems, and facilities weekly, and

during (when possible) and after major storm events. These inspections are performed to detect evidence of: Deterioration, malfunction, or improper operation of control or monitoring systems; sudden changes in the data from any monitoring device; the presence of liquids in leak detection systems; and severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices." These requirements remain in effect as long as the WPCP is in effect, which is up to 30 years after permanent closure is completed. NAC 445A.446(3). Any deterioration, malfunction, improper operation, leakage, or severe erosion detected during the routine inspections must be maintained or repaired pursuant to Part II.A.2. of the WPCP, which requires the Permittee to maintain in good working order and operate as efficiently as possible, all devices, facilities, and systems to achieve compliance with the terms and conditions of the permit and applicable regulations.

The SRCE program has a specific Construction Management reclamation cost module to calculate support staff and the maintenance costs necessary to complete the closure of the mine project. This includes road maintenance, stormwater diversion repairs, temporary office spaces, portable bathrooms and dust control water trucks during reclamation.

The Bureau's Reclamation Branch has a team of environmental scientists who are assigned to perform on-site annual inspections of permitted active mines to evaluate the mine facility for disturbances and determine if affected areas have erosion issues, revegetation success or non-vegetation success on concurrent reclamation, or any control measures to address noxious weeds. Excessive erosion is recorded in the site's inspection report and considered to be unnecessary and undue degradation. The mine operator must perform proper routine maintenance of roads, stormwater diversions, earth cover systems, revegetation and weed control measures in order to obtain any financial surety release of an affected facility.

As part of its plan for reclamation, a permittee must provide for a productive post-mining use of the land. NAC 519A.275(1). NAC 519A.275 sets forth the requirements for productive post-mining use of land. The productive post-mining use of the land must be submitted with a plan for reclamation and may not identify a use of the land or degree of productivity which is identical to the pre-mining use or degree of productivity. NAC 519A.275(2). Land which is returned to its pre-mining use or reclaimed after mining or exploration to a level of productivity which is generally consistent with the pre-mining level of productivity or the level of productivity of the surrounding land shall be deemed to be a productive post-mining use. Land which is reclaimed to a degree of productivity which is less productive than its pre-mining use shall be deemed to be productive if the operator takes reasonable measures to: ensure adequate fertilization of the soil; ensure the quantity and quality of the topsoil or growth medium; and establish a productive post-mining use of the land within site-specific economic and technical constraints of the area. NAC 519A.275(3). Land subject to excessive erosion will not be deemed to be reclaimed

to a productive post-mining use unless excessive erosion existed before mining or exists on the adjacent land. NAC 519A.275(4). Evidence of the excessive erosion must be provided by the operator to the Division. Id. If the operator is not the owner of the surface of the affected lands, the Division shall consider any comments received from the landowner in making the final determination that the proposed plan for reclamation adequately provides for a productive post-mining use of the land. NAC 519A.275(5).

NAC 519A.315 sets forth the requirements for abandonment of a site and selection of appropriate activities for reclamation of site. The abandonment of a site must be conducted in a manner that ensures public safety, encourages techniques to minimize adverse visual effects, and establishes a safe and stable condition suitable for the productive post-mining use of the land. In selecting appropriate activities for reclamation for a particular site, techniques which minimize adverse visual impact must be considered. Ensuring public safety requires minimizing hazards in areas which the public may have legal access by, if applicable: removing or burying structures, equipment, reagents or scrap; sealing or securing shafts, tunnels and adits pursuant to NAC 513.390; plugging drill holes; leaving slopes in a structurally stable condition; and restricting access to areas which cannot practicably be made safe. Achieving a "stable condition" requires conditions at the site to be resistant to excessive erosion and structurally competent to withstand normal geologic and climatic conditions without significant failure that would be a threat to public safety and the environment.

The SRCE program has a specific reclamation cost module for the yearly calculation of labor and reporting cost for a minimum 3-year post-closure period for vegetation monitoring. The monitoring module has a percentage acreage input to provide for additional vegetation costs based upon any acreage which has been determined to have failed in the revegetation effort. The post-closure vegetation monitoring years can be adjusted higher to suit site-specific criteria.

RESPONSE CATEGORY 11—INTERIM OPERATIONS and MAINTENANCE [Proposed 40 CFR 320.63(a)(xi)]

(i) INTERIM EMERGENCY WATER MANAGEMENT AND TREATMENT

A plan for the purpose of interim emergency water management to provide information on how process water systems, interceptor wells, seepage collection systems and storm water management systems are operated and maintained to prevent discharges in the event the regulator assumes management of the mine facility. The plan must include process water flow charts showing electrical system requirements, pump operations, seepage collection and interceptor well operations and applicable operation and maintenance requirements. The plan must be updated as major process water system changes occur that would affect the interim emergency water management plan.

NAC 445A.398(5) requires an applicant to submit a temporary closure plan, which describes the activities that must be maintained during the time of temporary closure. NAC 445A.382 defines temporary closure as the cessation of operation of a process component for more than 30 days as a result of a planned or unplanned activity. NAC 445A.444(1-2) also states that such temporary closures may include, but is not restricted to, planned seasonal closure, interruptions to provide planned periods of quiescence for metallurgical or operating reasons, other planned conditions that interrupt the beneficiation process, interruptions due to unforeseen weather events, interruptions due to a failure in a major system component or process failure which causes a fluid management shut down, or a discontinuation of operations due to litigation. The temporary closure plan (and other operating plans) must be updated with each as-built report to reflect any modifications made during construction. NAC 445A.427(1).

Initially, such temporary closure plans are general in nature and typically lack sufficient detail for the Division to assume management of themine facility; however, an unplanned temporary closure must be reported to the Division within 30 days after it begins per NAC 445A.445, and upon notification the Division requires (among other things) submittal of a more detailed temporary closure plan, if warranted, in case the Division or its emergency response contractor has to assume management of the mine facility. In such an event, the Division will already have a flow chart of the processing circuit, a fluid management plan including any seepage collection systems, and a monitoring plan as part of previous WPCP applications, and if the site has had groundwater degradation and has installed interceptor wells, their operation will be described in the associated corrective action plan and in the WPCP monitoring requirements. NAC 445A.398(1-4). The updated more detailed version of the temporary closure plan must provide electrical system requirements, instructions for pump operations, and any other necessary operation and maintenance requirements.

The Division maintains a contract with a consulting firm to provide emergency environmental assessment, mitigation, and remediation (EMAR) on short notice in the event of a potential impact to human health and the environment if such an event at a Nevada mine facility (or other regulated facility) is not being adequately addressed by the permittee or other responsible party. Under thesecircumstances, the Division would work with the EMAR contractor to identify, assess, and remediate a contaminated abandoned mine site, and, if needed, implement the temporaryclosure plan to manage process fluids, prevent releases, and protect waters of the state.

Payments for deposit into a Trust Fund for Short Term Fluid Management, as required by NAC 519A.392, are currently held with the State of Nevada Office of the State Controller in the current 2017 amount of $1,290,160.80. The Trust Fund accrues interest and has never been utilized since its inception in 2000. The purpose of the Trust Fund is to provide a third party mine contractor the necessary monies to address an emergency water management situation at a mine site in the case that a mine operator fails to perform

these legal duties. If the Trust Fund account were to be used for an emergency situation, the monies would be replaced with the IFM surety amount currently posted by the mine operator with the government agency holding the bond.

Attachment A of a Reclamation Permit titled, "Interim Fluid Management (IFM) and Process Fluid Stabilization (PFS) Bond Release," states as follows: When the closure process of a heap leach pad (HLP) and/or tailings storage facility (TSF) is undertaken in a controlled manner by the operator, release of the project bond IFM and PFS amounts may occur at the following phases/intervals of the closure process: IFM – when E or ET Cells have been constructed and the steady state drain-down of process fluids can be managed entirely within the E/ET Cells; PFS Phase I – recirculation of excess process fluids is no longer required and demonstration can be made that only active evaporation of process fluids is required; PFS Phase II – the process fluid drain-down rate is less than evaporation rate and demonstration can be made that process fluids can be managed without active evaporation, conversion of process pond(s) to E/ET Cells has been completed, and the cover system on the HLP and/or the TSF has been constructed; PFS Phase III – drain-down managed entirely within the E/ET Cells, demonstration is made that E/ET Cells have functioned without overtopping for a minimum of 5 years; PFS Evaporation Costs – at completion of PFS (costs include evaporation equipment and power costs).

(ii) ENGINEERING DESIGNS RELATED TO INTERIM WATER MANAGEMENT AND TREATMENT

A conceptual engineering document that describes the processes and methods that are expected to be used to reduce the quantities of process water in storage and circulation inventory at the end of mine production until all process solutions are eliminated and steady-state discharge is reached, in preparation for long-term water management or treatment. The document must include:

(A) A description and list of the current or proposed process water management units and inventories of process water;

(B) A description of the modifications to the process water management system required to create an efficient process water reduction system;

(C) The operation and maintenance requirements for the system with material take-offs of sufficient detail to prepare an engineering-level cost estimate; and

(D) An estimate of the required water reduction period based on the water reduction calculations provided in the plan to be used for planning and operation and maintenance cost calculations.

In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of

contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State. 445A.433(1)(a).

NAC 445A.398(6) requires submittal of a Tentative Plan for Permanent Closure (TPPC) with all applications for WPCPs for Nevada mining facilities. The TPPC describes the procedures, methods and schedule for stabilizing spent process materials, and the estimated cost for the procedures. The process material that must be stabilized includes the process water in storage and circulation. NAC 445A.398(6)(b). Per NAC 445A.447(2), an Final Plan for Permanent Closure (FPPC) must be submitted at least two years before the anticipated permanent closure of a process component. The FPPC replaces the more conceptual TPPC with a detailed engineering document that is ready for implementation, and is therefore of sufficient detail to provide the basis for preparation of an engineering-level cost estimate. The FPPC must describe procedures for chemical stabilization such that contaminants are bound or contained so as to prevent them from degrading waters of the state under the environmental conditions that may reasonably be expected to exist at the site. See, NAC 445A.379. Within 90 days after notifying the Division of an unplanned temporary closure, the permittee must begin to evaluate procedures for permanent closure of the affected process components, and unless otherwise approved by the Division, within 270 days after notification of an unplanned temporary closure, the permittee shall initiate the approved procedures for permanent closure. NAC 445A.445(1)(b),(3).

Nevada WPC regulations do not specify that the inventory of process solution in storage and circulation must be reduced during temporary or permanent closure. Rather, Nevada regulations stipulate that all sources must be removed, mitigated, or stabilized such that the contaminants are bound or contained so as to prevent them from degrading waters of the state under the environmental conditions that may reasonably be expected to exist at the site See, NAC 445A.367 and NAC 445A.379. However, in practice, the reduction of process solution inventory is an important component of most final plans for permanent closure in Nevada. As stated in the Division's guidance document titled, "Guidelines and Procedures for the Permanent Closure of Bioreactors, E and ET Cells," Bioreactors, E and ET Cells have been proven to be effective tools for the management of ...continuous, low flow solutions. E and ET Cells remove or minimize the volume of source solution through passive evaporation or evapotranspiration.

NAC 445A.447(1) states that plans for permanent closure are required for all sources at a facility. A final plan for permanent closure of any source which has been identified as a process component must be submitted to the Department at least 2 years before the anticipated permanent closure of that process component. NAC 445A.447(2). Sources which have not been classified as process components must be evaluated at the end of their operating life to determine the potential for pollutants from these sources to migrate and degrade the waters of the State under the final proposed site conditions and must be

closed in accordance with the State Handbook of Best Management Practices prepared pursuant to NAC 445A.336. NAC 445A.447(3).

The HLDE program was developed by JBR Environmental Consultants, Inc. and Newmont Mining Corporation as a tool for estimating of heap leach pad draindown curves. The draindown curves are designed to be used for reclamation bonding purposes. The quality of collected data determines the accuracy of the results produced by the HLDE estimates become more accurate. Site-specific parameter values are always recommended. The information should be available in the WPCP application prepared during permitting of the leach pad or from various operations/process staff at the mine site. When these data are not available the following methods can be used to obtain the values.

The Nevada PFCE is an estimation tool for the calculation of bond amounts required for IFM and PFS. The IFM calculation includes the electric and power deposit required by NV Energy. The reclamation bond amount for PFS requires that the timeframes and volumes of process solutions are managed during closure of process components and obtained from a model that estimates solution draindown curves. The HLDE model estimates heap leach draindown curves and may be downloaded from the BLM Nevada Locatable Minerals Hard Rock Mining webpage: http://www.blm.gov/nv/st/en/prog/minerals/mining.html. The PFCE calculator can be downloaded at: http://ndep.nv.gov/bmrr/cost_heap-leach-closure.htm.

PFCE Version 1.1 is now available for closure of heap leach pads and tailings storage facilities. NDEP, BLM, and Industry representatives jointly developed PFCE, which is an estimation tool for the calculation of bond amountsrequired for IFM and PFS. Bonding for IFM and PFS ensures that funds are available for managing the heap leach and tailings storage facility process fluids during closure. Detailed definitions of IFM and Phases I-IV of PFS are available below - see IFM and PFS Definitions. PFCE utilizes standardized labor crews, equipment, materials, and unit costs that will be updated yearly to calculate bond amounts based on the specific heap leach pad or tailings storage facility physical parameters, volume of fluids, and timeframes required for IFM and PFS. Timeframes and volumes of fluids may be obtained from a model that estimates heap leach draindown curves. One such model is the HLDE program that may be downloaded from the BLM Nevada Locatable Minerals Hard Rock Mining webpage.

Although the use of PFCE is not required, operators using it in conjunction with the HLDE model may realize a quicker preparation time for the calculation of the IFM and PFS components of the reclamation cost estimate; as well as a faster agency approval time due to standardization of costs and methodologies.

RESPONSE CATEGORY 12—LONG-TERM OPERATIONS and MAINTENANCE [Proposed 40 CFR 320.63(a)(xii)]

(i) GROUNDWATER AND SURFACE WATER MONITORING

A plan for groundwater and surface water monitoring to assure that additional monitoring wells are located to detect an exceedance(s) or trends towards exceedance(s) of the applicable standards and that they are detected at the earliest possible occurrence, so that investigation of the extent of contamination and actions to address the source of contamination may be implemented as soon as possible. The plan must be currently in effect, and must cover a period of at least 200 years.

The program to monitor the site of a facility must be designed to monitor the quality of all ground and surface water which may be affected by the facility. NAC 445A.440(1). The type, number and location of the monitoring points must be described in the application as part of the monitoring plan and must be approved by the Department. Id. Final monitoring requirements must be established by the Department. NAC 445A.440(2). Baseline data must be collected before operation of the facility. NAC 445A.440(3). In areas where there is a substantial separation between the process components and the groundwater, a system for monitoring highly probable escape pathways in the unsaturated zone may be required by the Department. NAC 445A.440(4). The decision where to locate the monitoring points for the site must be made after considering the site's geology and hydrogeology. NAC 445A.440(5).

If the Division determines that there has been a variation in a parameter or element monitored by the site-monitoring system as required in NAC 445A.440 which is caused by the facility and has the potential to degrade the waters of the State, there are two response actions. NAC 445A.441. First, the holder of the permit must conduct and submit an evaluation to the Department which: identifies the source and escape pathways of the elements of concern; determines the type, extent and ability of a system needed to contain or confine any migrating contaminant; and identifies methods which can be carried out to remediate the contamination during the continued operation of the facility or at permanent closure. NAC 445A.441(1)(a-c). Second, the Department must, based on the information provided by the permittee: require the immediate shut down of the process component and the immediate initiation of cleanup activities; allow continued operation of the process component which is the source of the elements of concern with concurrent cleanup activities; allow continued operation of the process component which is the source of the elements of concern while requiring the facility to continue to control the migration of the contaminant while cleanup activities are postponed; or determine that no remedial action is warranted at the present time. NAC 445A.441(2)(a-d).

NAC 445A.442(1) requires the Department to determine the extent and complexity to which the holder of a permit must monitor individual process components for the release of contaminants after reviewing site and process controlled design conditions. Systems designed to detect and control leaks from process components must be located at the interface of the unit process components and the adjacent environment and be able to

provide the first indication that pollutants or contaminants have escaped their primary containment. Id. The program to monitor the process components must include a schedule of activities, a roster of current job titles for persons responsible for and involved in the monitoring program, and the form and frequency of reports to be submitted to the Department. NAC 445A.442(2)(a-c). The Department may randomly collect information or samples for reference. NAC 445A.442(2). The cost of analyzing samples may be placed upon the holder of the permit. Id.

Under NAC 445A.443, monitoring of the beneficiation process must include routine characterization of those process materials which will be disposed. The data obtained must be used by the holder of the permit to evaluate periodically and, when necessary, to refine the plan for the permanent closure of the facility. Id.

NAC 445A.447(1) states that plans for permanent closure are required for all sources at a facility. A final plan for permanent closure of any source which has been identified as a process component must be submitted to the Department at least 2 years before the anticipated permanent closure of that process component. NAC 445A.447(2). Sources which have not been classified as process components must be evaluated at the end of their operating life to determine the potential forpollutants from these sources to migrate and degrade the waters of the State under the final proposed site conditions and must be closed in accordance with the State Handbook of Best Management Practices prepared pursuant to NAC 445A.336. NAC 445A.447(3).

Other authorities and resources that are considered for regrading requirements include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

WPCP issued by the Division includes a standard provision (WPCP Part II.B.2.E.) that provides a regulatory mechanism for the permittee to submit to the Division annually for review and approval a revised monitoring plan and sampling protocols. Changes in monitoring frequency or the incorporation of additional monitoring points may require modification of the Permit and payment of modification fees.

WPCP issued by the Division includes a standard provision (WPCP Part I.I.) that requires the permittee to inspect all control devices, systems, and facilities weekly, and during (when possible) and after major storm events. For closure WPCPs the frequency may be reduced, but not more than necessary, if the site is not continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system. These inspections are performed to detect evidence of: (1) Deterioration, malfunction, or improper operation of control or monitoring systems; (2) Sudden changes in the data from any monitoring device; (3) The presence of liquids in leak

detection systems; and (4) Severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices.

WPCP issued by the Division includes a standard provision (WPCP Part I.A.) that provides for Specific facility conditions and limitations that require the facility to be constructed, operated, and closed in accordance with the approved designs; all process fluids contained within the fluid management system including all meteoric waters which enter the system as a result of the 25-year, 24 hour storm event; and any process or non-process contaminants from the fluid management system not to be released or discharged.

WPCP issued by the Division contains site-specific monitoring requirements (WPCP Part I.D.) which outline sample locations, analytes, testing, other parameters, and sample frequency. Site-specific permit limits are included as appropriate. Site-specific requirements for ongoing investigations such as pitlake study, ecological risk assessment, and waste rock management plan updates are also included. Facility limitations, reporting, and sampling and analysis requirements are boilerplate entries in each permit (WPCP Parts I.G., II.B.1., II.B.2., and II.E., respectively). The groundwater and surface water analyses required in each permit must be reported to the Division, typically quarterly and annually, on Division forms that specify the applicable water quality standards; this facilitates detection of any exceedance(s) of standards at the earliest possible occurrence.

Nevada regulations do not specifically limit the effective time period for the fluid management and monitoring plans to a period of at least 200 years. Instead, NAC 445A.409 requires that a valid WPCP, which includes these and other operating plans, must be maintained until permanent closure is complete. Permanent closure refers to the time in the operating life of a facility when activities for the final stabilization, removal, or mitigation of pollutant sources are initiated. See, NAC 445A.367 and NAC 445A.378. Therefore, if any pollutant sources are not fully stabilized, removed, or mitigated, permanent closure is not complete, and a valid permit, including its associated monitoring plan, must be maintained.

NDEP, BLM and USFS have entered into an MOU agreement to jointly establish Long-Term Trust Funds. The long-term trust fund amount is established using the SRCE reclamation input modules to calculate site-specific long-term monitoring and maintenance requirement costs. Currently the BLM holds long-term trusts on eight (8) Nevada hard rock mines.

The SRCE program has a specific water monitoring module to calculate the labor for the collection of a pre-determined number of samples and their collection frequency based on the WPCP requirements. The module accounts for analytical sampling costs and reporting. Groundwater sample monitoring is typically required quarterly and the module calculates any sample frequency cost for a minimum period of 5 years to 30 years post-

closure mining as determined by the WPCP. Surface water sampling requirements can be accounted for as required by the WPCP.

The SRCE program has a specific module for listing all dewatering wells, production wells and groundwater monitoring wells to calculate the closure abandonment costs based upon the depth to groundwater.

(ii) INSPECTION AND MONITORING OF MASS STABILITY, EROSION, AND RECLAMATION

A plan for inspection and monitoring of mass stability, erosion and revegetation certified by a professional engineer to ensure reclamation success.

NAC 445A.433 specifies minimum design requirements applicable to all process components. The engineering designs must take into consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity. NAC 445A.433(1)(f). Additional containment may be required in areas where groundwater is considered to be near the surface. NAC 445A.433(2). The engineering design report must be prepared and submitted by a professional engineer registered in Nevada. NAC 445A.397(1)

WPCP issued by the Division includes a standard provision (WPCP Part I.I.) that requires the permittee to inspect all control devices, systems, and facilities weekly, and during (when possible) and after major storm events. For closure permits the frequency may be reduced, but not more than necessary, if the site is not continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system. These inspections are performed to detect evidence of: (1) Deterioration, malfunction, or improper operation of control or monitoring systems; (2) Sudden changes in the data from any monitoring device; (3) The presence of liquids in leak detection systems; and (4) Severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices.

WPCP issued by the Division includes a standard provision (WPCP Part II.A.2.) that states that the permittee shall at all times maintain in good working order and operate as efficiently as possible, all devices, facilities, and systems installed or used by the Permittee to achieve compliance with the terms and conditions of the permit.

The Bureau's Regulation and Closure Branch personnel inspect all permitted mine facilities annually, semi-annually, or quarterly, depending on the level of site activity and the potential for degradation of waters of the State or other noncompliance. The results of each inspection are summarized in correspondence to the permittee, including required actions to address any items of concern and appropriate timeframes for the actions to be

performed. The Bureau follows up with the permittee to ensure that the items have been adequately addressed. In the case of significant and/or repeated compliance issues, the Bureau follows a progressive enforcement policy to ensure protection of waters of the State and compliance with applicable statutes and regulations, which may include the assessment of penalties up to $25,000 for each day of each violation (NRS 445A.700 and BMRR Civil Penalty Policy).

The SRCE program has a specific Construction Management reclamation cost module to calculate support staff and the maintenance costs necessary to complete the closure of the mine project. This includes road maintenance, stormwater diversion repairs, temporary office spaces, portable bathrooms and dust control water trucks during reclamation.

The Bureau's Reclamation Branch has a team of environmental scientists who are assigned to perform on-site annual inspections of permitted active mines to evaluate the mine facility for disturbances and determine if affected areas have erosion issues, revegetation success or non-vegetation success on concurrent reclamation, or any control measures to address noxious weeds. Excessive erosion is recorded in the site's inspection report and considered to be unnecessary and undue degradation. The mine operator must perform proper routine maintenance of roads, stormwater diversions, earth cover systems, revegetation and weed control measures in order to obtain any financial surety release of an affected facility.

As part of its plan for reclamation, a permittee must provide for a productive post-mining use of the land. NAC 519A.275(1). NAC 519A.275 sets forth the requirements for productive post-mining use of land. The productive post-mining use of the land must be submitted with a plan for reclamation and may not identify a use of the land or degree of productivity which is identical to the pre-mining use or degree of productivity. NAC 519A.275(2). Land which is returned to its pre-mining use or reclaimed after mining or exploration to a level of productivity which is generally consistent with the pre-mining level of productivity or the level of productivity of the surrounding land shall be deemed to be a productive post-mining use. Land which is reclaimed to a degree of productivity which is less productive than its pre-mining use shall be deemed to be productive if the operator takes reasonable measures to: ensure adequate fertilization of the soil; ensure the quantity and quality of the topsoil or growth medium; and establish a productive post-mining use of the land within site-specific economic and technical constraints of the area. NAC 519A.275(3). Land subject to excessive erosion will not be deemed to be reclaimed to a productive post-mining use unless excessive erosion existed before mining or exists on the adjacent land. NAC 519A.275(4). Evidence of the excessive erosion must be provided by the operator to the Division. Id. If the operator is not the owner of the surface of the affected lands, the Division shall consider any comments received from the landowner in making the final determination that the proposed plan for reclamation adequately provides for a productive post-mining use of the land. NAC 519A.275(5).

NAC 519A.315 sets forth the requirements for abandonment of a site and selection of appropriate activities for reclamation of site. The abandonment of a site must be conducted in a manner that ensures public safety, encourages techniques to minimize adverse visual effects, and establishes a safe and stable condition suitable for the productive post-mining use of the land. In selecting appropriate activities for reclamation for a particular site, techniques which minimize adverse visual impact must be considered. Ensuring public safety requires minimizing hazards in areas which the public may have legal access by, if applicable: removing or burying structures, equipment, reagents or scrap; sealing or securing shafts, tunnels and adits pursuant to NAC 513.390; plugging drill holes; leaving slopes in a structurally stable condition; and restricting access to areas which cannot practicably be made safe. Achieving a "stable condition" requires conditions at the site to be resistant to excessive erosion and structurally competent to withstand normal geologic and climatic conditions without significant failure that would be a threat to public safety and the environment.

The SRCE program has a specific reclamation cost module for the yearly calculation of labor and reporting cost for a minimum 3-year post-closure period for vegetation monitoring. The monitoring module has a percentage acreage input to provide for additional vegetation costs based upon any acreage which has been determined to have failed in the revegetation effort. The post-closure vegetation monitoring years may be adjusted higher to suit site-specific criteria.

NAC 519A.330(1)(a) states that the operator shall select and establish species of plants that will result in vegetation productivity comparable to that growing on the affected (disturbed) land before commencement of an exploration project or mine operation. A designated environmental scientist assigned to the project is the same individual who performs the field inspections to verify the mine components have been built according to the approved Reclamation Plan and to ensure that modification to the plan are consistent with the approved Reclamation Permit. The mine operator's staff are notified of observed erosion issues and reported in a formal inspection letter to the operator. An approved Reclamation Permit includes an Attachment B document; Nevada Guidelines for Successful Revegetation for the NDEP, the BLM, and the USFS. This interagency document requires the operator to stabilize the site and establish productive desired plant communities to meet a post-mining land use. This also requires the treatment of noxious weeds. The timeframe to determine revegetation success of the vegetative growth on a reclaimed site may be evaluated for release no sooner than during the third growing season after earthwork and re-seeding have been documented. The operator is required to file a revegetation report based upon the coverage and density of plant species to initiate the final field inspection prior to the revegetation surety release.

The SRCE program has a specific reclamation cost module to calculate the yearly labor and report cost for a minimum 3-year post-closure period for vegetation monitoring. The

monitoring module has a percentage acreage input to provide for additional vegetation costs based on the acreage which may have failed in the revegetation effort. The post-closure vegetation monitoring years can be adjusted higher to suit site-specific criteria.

(iii) MAINTENANCE OF ROADS, STORMWATER CONVEYANCES/COLLECTION DEVICES, COVER SYSTEMS, REVEGETATION, AND MONITORING WELLS

A plan for routine maintenance and repairs to roads, stormwater conveyances and collection devices, cover systems, and revegetation maintenance (e.g. weed controls) and repairs (e.g. areas of revegetation failure) and monitoring wells.

WPCP issued by the Division includes a standard provision (WPCP Part I.I.) that requires the permittee to inspect all control devices, systems, and facilities weekly, and during (when possible) and after major storm events. For closure permits the frequency may be reduced, but not more than necessary, if the site is not continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system. These inspections are performed to detect evidence of: (1) Deterioration, malfunction, or improper operation of control or monitoring systems; (2) Sudden changes in the data from any monitoring device; (3) The presence of liquids in leak detection systems; and (4) Severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices.

WPCP issued by the Division includes a standard provision (WPCP Part II.A.2.) that states that the permittee shall at all times maintain in good working order and operate as efficiently as possible, all devices, facilities, and systems installed or used by the permittee to achieve compliance with the terms and conditions of the permit.

The SRCE program has a specific Construction Management reclamation cost module to calculate support staff and the maintenance costs necessary to complete the closure of the mine project. This includes road maintenance, stormwater diversion repairs, temporary office spaces, portable bathrooms and dust control water trucks during reclamation.

The Bureau's Reclamation Branch has a team of environmental scientists who are assigned to perform on-site annual inspections of permitted active mines to evaluate the mine facility for disturbances and determine if affected areas have erosion issues, revegetation success or non-vegetation success on concurrent reclamation, or any control measures to address noxious weeds. Excessive erosion is recorded in the site's inspection report and considered to be unnecessary and undue degradation. The mine operator must perform proper routine maintenance of roads, stormwater diversions, earth cover systems, revegetation and weed control measures in order to obtain any financial surety release of an affected facility.

As part of its plan for reclamation, a permittee must provide for a productive post-mining use of the land. NAC 519A.275(1). NAC 519A.275 sets forth the requirements for productive post-mining use of land. The productive post-mining use of the land must be submitted with a plan for reclamation and may not identify a use of the land or degree of productivity which is identical to the pre-mining use or degree of productivity. NAC 519A.275(2). Land which is returned to its pre-mining use or reclaimed after mining or exploration to a level of productivity which is generally consistent with the pre-mining level of productivity or the level of productivity of the surrounding land shall be deemed to be a productive post-mining use. Land which is reclaimed to a degree of productivity which is less productive than its pre-mining use shall be deemed to be productive if the operator takes reasonable measures to: ensure adequate fertilization of the soil; ensure the quantity and quality of the topsoil or growth medium; and establish a productive post-mining use of the land within site-specific economic and technical constraints of the area. NAC 519A.275(3). Land subject to excessive erosion will not be deemed to be reclaimed to a productive post-mining use unless excessive erosion existed before mining or exists on the adjacent land. NAC 519A.275(4). Evidence of the excessive erosion must be provided by the operator to the Division. Id. If the operator is not the owner of the surface of the affected lands, the Division shall consider any comments received from the landowner in making the final determination that the proposed plan for reclamation adequately provides for a productive post-mining use of the land. NAC 519A.275(5).

NAC 519A.315 sets forth the requirements for abandonment of a site and selection of appropriate activities for reclamation of site. The abandonment of a site must be conducted in a manner that ensures public safety, encourages techniques to minimize adverse visual effects, and establishes a safe and stable condition suitable for the productive post-mining use of the land. In selecting appropriate activities for reclamation for a particular site, techniques which minimize adverse visual impact must be considered. Ensuring public safety requires minimizing hazards in areas which the public may have legal access by, if applicable: removing or burying structures, equipment, reagents or scrap; sealing or securing shafts, tunnels and adits pursuant to NAC 513.390; plugging drill holes; leaving slopes in a structurally stable condition; and restricting access to areas which cannot practicably be made safe. Achieving a "stable condition" requires conditions at the site to be resistant to excessive erosion and structurally competent to withstand normal geologic and climatic conditions without significant failure that would be a threat to public safety and the environment.

The SRCE program has a specific reclamation cost module for the yearly calculation of the yearly labor and reporting cost for a minimum 3-year post-closure period for vegetation monitoring. The monitoring module has a percentage acreage input to provide for additional vegetation costs based upon any acreage which has been determined to have failed in the revegetation effort. The post-closure vegetation monitoring years can be adjusted higher to suit site-specific criteria.

RESPONSE CATEGORY 13—WATER TREATMENT [Proposed 40 CFR 320.63(a)(xiii)]

(i) WATER MANAGEMENT AND TREATMENT DURING CLOSURE

A plan for closure water management and water treat ment consisting of a conceptual engineering document that describes the processes a nd methods that are expected to be used for long-term management or treatment of seepage and includes an analysis of the expected operational life of each long-term water management or water treatment system, including collection/interceptor systems, until each system is no longer needed to protect water quality and applicable standards a re met. The plan must describe whether active or passive treatment is proposed and include all operations and maintenance activities required to support all coll ection and treatment systems. The plan must describe the long-term water management a nd water treatment systems with sufficient detail, including locations of key components, expected operational life, material take-offs, and capital, operational and ma intenance costs to prepare an engineering-level cost estimate. The plan must be c urrently in effect and must cover a period of at least 200 years.

In areas where annual evaporation exceeds annual pr ecipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migrati on pathways so that any release from the facility will not degrade waters of the State. NAC 445A.433(1)(a).

NAC 445A.424(1)(b)prohibits a mine facility from de grading groundwater to the extent that a state or federal drinking water standard is exceeded or the WAD cyanide concentration exceeds 0.2 mg/L, or from degrading s urface water to the extent that the quality of surface water of higher quality is lowered below that allowed by NRS 445A.565. Pursuant to NAC 445A.441, if the Division determines if seepage and/or a discharge does not, or is not expected to, meet applicable water q uality standards, the Division has the authority to require the Permittee to implement an approved plan to eliminate the degradation and meet the standards per NAC 445A.424 . Such a plan may include a capture and treatment system (however, the capture efficiency is not dictated by regulation; only the resultant water quality is), or another method, such as elimination of influent water or chemical stabilization of the sou rce material. NAC 445A.379 defines stabilization as the condition that results from co ntaminants in a material are bound or contained so as to prevent them from degrading wate rs of the State under the environmental conditions that may be reasonably expected to exist at a site.

NAC 445A.397 requires that the engineering design r eport include an evaluation of structural stability. Nevada WPC regulations do not distinguish between critical and non-critical structures at mine facilities. Nevada doe s not differentiate between critical and non-critical structures on a site-specific basis and sets stability requirements based on site-specific needs and criteria.

NAC 445A.398 requires that a permit application include the proposed operating plans for the facility. The plan must include a description and the range of operating conditions for which the components were designed; a plan for the management of process fluids which describes the methods to be used for the monitoring and controlling of all process fluids. NAC 445A.398(1-2). The operating plan must include the following: a description of the means to evaluate the conditions in the fluid management system so as to be able to quantify the available storage capacity for meteoric waters and to define when and to what extent the designed containment capacity has been exceeded; a plan for monitoring the facility which describes the water quality in the area; the monitoring locations the applicant proposes to sample routinely in order to evaluate surface and groundwater at the site that may be affected by the operation of the facility; an analytical profile of each surface and groundwater that may be affected by the operation of the facility; and the locations of the leak detection systems, the frequency for sampling these systems and the analytical profile to be used for evaluation of the samples. NAC 445A.398(2-3).

NAC 445A.432 and NAC 445A.433 set-forth the minimum design criteria and universal requirements for process components. These statutes establish minimum contaminant control technologies and require consideration of the site and operating conditions in designing individual process components. See generally, Id. Based on site characterization, best engineering judgment must be used to determine the degree to which designs must provide more or less protection through engineered containment. Id. However, the application of minimum design criteria does not release the holder of a permit from liability for degradation to waters of the State caused by the facility. NAC 445A.433(4).

Process components must be designed to withstand the runoff from a 24-hour storm event with a 100-year recurrence interval; and the primary fluid management system must be designed to be able to remain fully functional and fully contain all process fluids including all accumulations resulting from a 24-hour storm event with a 25-year recurrence interval. NAC 445A.433(1)(c),(d). The Department has the option of requiring additional containment based on the proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(1)(d)(1-3). In exercising this discretion, the Division must use its best engineering judgment to determine whether more or less engineered containment must be provided than the established minimum design criteria. NAC 445A.432. Contingency plans for managing process contaminated flows in excess of the design quantity must be described in the appropriate operating plans. NAC 445A.433(1). In Nevada's mine closure guidance, the Division recommends that facilities be constructed to withstand a 500-year, 24-hour event. The Division is considering a change to Nevada closure regulations to require that closed facilities at a minimum are designed to contain the 500-year, 24-hour storm event if containment is necessary and withstand the erosional effects of a 500-year, 24-hour storm event.

The fluid management system must be designed to be functional for 5 years after the projected operating life of the process component and permanent closure period. NAC 445A.433(1)(e). The engineering designs must take into consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity. NAC 445A.433(1)(f). Additional containment may be required in areas where groundwater is considered to be near the surface. NAC 445A.433(2).

NAC 445A.435 sets forth the minimum design criteria for ponds. Under that section, all ponds which are intended to contain process fluids must have a primary synthetic liner and a secondary liner. NAC 445A.435(1). Between the liners there must be a material which has the ability to rapidly transport any fluids entering it to a collection point which is accessible and has a system for recovering those fluids. Id. When the material between the liners is unable to collect, transport and remove all liquids at a rate that will prevent hydraulic head transference from the primary liner to the secondary liner, the pond must be shut down. NAC 445A.435(2). Ponds which are primarily designed to contain excess quantities of process fluids that result from storm events for limited periods may be constructed with a single liner if approved by the Department. NAC 445A.435(3). Ponds containing non-process fluids may be required to be lined depending on their potential to degrade waters of the State. NAC 445A.435(4).

NAC 445A.436 states that all vats, tanks and other containers which confine process fluids and can be visually inspected for leaks do not require double liners if an area for secondary containment equal to 110 percent of the largest container is provided. Vats, tanks or other containers that are partially buried and cannot be visually inspected must have a system to detect leaks. Id.

NAC 445A.438 establishes the minimum design criteria for liners. When a liner is is placed on native materials, soil liners must have a minimum thickness of 12 inches and be compacted in lifts which are no more than 6 inches thick. NAC 445A.438(1). A soil liner must have a permeability of not more than that exhibited by 12 inches of $1x10^{-7}$ centimeters per second (cm/sec) material. Id. Synthetic liners must be rated as having a resistance to the passage of process fluids equal to a coefficient of permeability of $1x10^{-11}$ cm/sec. NAC 445A.438(2). The Division is required to review for completeness the applicant's evaluation of the following design parameters, where applicable, for a liner including the type of foundation, slope and stability; the over liner protection and provisions for hydraulic relief; the load and means of applying load; the compatibility of a liner with waste rock drainage; the complexity of the leak detection and recovery systems (if present); the depth from the surface to all groundwater; and the liner's ability to remain functionally competent until permanent closure has been completed. NAC 445A.438(3)(a-g).

A quality assurance and quality control program must be developed and carried out for the construction of all liner systems. NAC 445A.439 A summary of the quality control data must be submitted to the Department with the as-built drawings. Id.

The program to monitor the site of a facility mustbe designed to monitor the quality of all ground and surface water which may be affected by the facility. NAC 445A.440(1). The type, number and location of the monitoring points must be described in the application as part of the monitoring plan and must be approved by the Department. Id. Final monitoring requirements must be established by the Department. NAC 445A.440(2). Baseline data must be collected before operation ofthe facility. NAC 445A.440(3). In areas where there is a substantial separation between the process components and the groundwater, a system for monitoring highly probable escape pathways in the unsaturated zone may be required by the Department. NAC 445A.440(4). The decision where to locate the monitoring points for the site must be made after considering the site's geology and hydrogeology. NAC 445A.440(5).

NAC 445A.442(1) requires the Department to determine the extent and complexity to which the holder of a permit must monitor individual process components for the release of contaminants after reviewing site and process controlled design conditions. Systems designed to detect and control leaks from process components must be located at the interface of the unit process components and the adjacent environment and be able to provide the first indication that pollutants or contaminants have escaped their primary containment. Id. The program to monitor the process components must include a schedule of activities, a roster of current job titles for persons responsible for and involved in the monitoring program, and the form and frequency of reports to be submitted to the Department. NAC 445A.442(2)(a-c). The Department may randomly collect information or samples for reference. NAC 445A.442(2). The cost of analyzing samples may be placed upon the holder of the permit. Id.

A WPCP issued by the Division includes a standard provision (WPCP Part II.B.2.E.) that provides a regulatory mechanism for the permittee to submit to the Division annually for review and approval, a revised monitoring plan and sampling protocols. Changes in monitoring frequency or the incorporation of additional monitoring points may require modification of the Permit and payment of modification fees.

A WPCP issued by the Division includes a standard provision (WPCP Part I.I.) that requires the permittee to inspect all control devices, systems, and facilities weekly (for closure permits consider relaxing frequency, but not more than necessary, if site is not continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system), and during (when possible) and after major storm events. These inspections are performed to detect evidence of: Deterioration, malfunction, or improper operation of control or monitoring systems; sudden changes in the data from any monitoring device; the presence of liquids in leak detection systems;

and severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices.

The SRCE program has a supplemental User Tab module with the ability to implement calculations and reclamation costs related to any water treatment if determined to be required by the WPCP. The User page reclamation cost subtotal is linked to the SRCE summary page to include it in the total reclamationsurety amount and make it part of the calculated percentage government in-direct administration costs.

Based upon WPCP determinations of long-term monitoring requirements, NDEP, BLM and USFS have entered into an MOU to jointly establishLong-Term Trust Funds. The long-term trust fund amount is established using the SRCE reclamation input modules to calculate site-specific long-term monitoring and maintenancerequirement costs. Currently the BLM holds long-term trusts on eight (8) Nevada hard rock mines.

(ii) DISPOSAL OF WATER TREATMENT SLUDGES AND RESIDUES

A plan for disposal of wastes produced from water treatment that is protective of human health and the environment and meets applicable Federal, state, and local requirements.

NAC 445A.424(1)(b)prohibits a mine facility from degrading groundwater to the extent that a state or federal drinking water standard is exceeded or the WAD cyanide concentration exceeds 0.2 mg/L, or from degrading surface water to the extent that the quality of surface water of higher quality is lowered below that allowed by NRS 445A.565. Pursuant to NAC 445A.441, if the Division determines if seepage and/or a discharge does not, or is not expected to, meet applicable water quality standards, the Division has the authority to require the Permittee to implement an approved plan to eliminate the degradation and meet the standards per NAC 445A.424. Such a plan may include a capture and treatment system (however, the capture efficiency is not dictated by regulation; only the resultant water quality is), or another method, such as elimination of influent water or chemical stabilization of the source material. NAC 445A.379 defines stabilization as the condition that results from contaminants in a material are bound or contained so as to prevent them from degrading waters of the State under the environmental conditions that may be reasonably expected to exist at a site.

NAC 445A.397 requires that the engineering design report include an evaluation of structural stability. Nevada WPC regulations do not distinguish between critical and non-critical structures at mine facilities. Nevada does not differentiate between critical and non-critical structures on a site-specific basis and sets stability requirements based on site-specific needs and criteria.

NAC 445A.398 requires that a permit application include the proposed operating plans for the facility. The plan must include a description and the range of operating conditions for which the components were designed; a plan for the management of process fluids which describes the methods to be used for the monitoring and controlling of all process fluids. NAC 445A.398(1-2). The operating plan must include the following: a description of the means to evaluate the conditions in the fluid management system so as to be able to quantify the available storage capacity for meteoric waters and to define when and to what extent the designed containment capacity has been exceeded; a plan for monitoring the facility which describes the water quality in the area; the monitoring locations the applicant proposes to sample routinely in order to evaluate surface and groundwater at the site that may be affected by the operation of the facility; an analytical profile of each surface and groundwater that may be affected by the operation of the facility; and the locations of the leak detection systems, the frequency for sampling these systems and the analytical profile to be used for evaluation of the samples. NAC 445A.398(2-3).

NAC 445A.432 and NAC 445A.433 set-forth the minimum design criteria and universal requirements for process components. These statutes establish minimum contaminant control technologies and require consideration of the site and operating conditions in designing individual process components. See generally, Id. Based on site characterization, best engineering judgment must be used to determine the degree to which designs must provide more or less protection through engineered containment. Id. However, the application of minimum design criteria does not release the holder of a permit from liability for degradation to waters of the State caused by the facility. NAC 445A.433(4).

In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge and all sources must be designed to minimize releases of contaminants into groundwater or subsurface migration pathways so that any release from the facility will not degrade waters of the State. NAC 445A.433(1)(a),(b). Process components must be designed to withstand the runoff from a 24-hour storm event with a 100-year recurrence interval; and the primary fluid management system must be designed to be able to remain fully functional and fully contain all process fluids including all accumulations resulting from a 24-hour storm event with a 25-year recurrence interval. NAC 445A.433(1)(c),(d). The Department has the option of requiring additional containment based on the proximity to surface water bodies, depth to groundwater, and proximity to population. NAC 445A.433(1)(d)(1-3). In exercising this discretion, the Division must use its best engineering judgment to determine whether more or less engineered containment must be provided than the established minimum design criteria. NAC 445A.432. Contingency plans for managing process contaminated flows in excess of the design quantity must be described in the appropriate operating plans. NAC 445A.433(1).

The fluid management system must be designed to be functional for 5 years after the projected operating life of the process component and permanent closure period. NAC 445A.433(1)(e). The engineering designs must takeinto consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity. NAC 445A.433(1)(f). Additional containment may be required in areas where groundwater is considered to be near the surface. NAC 445A.433(2).

The program to monitor the site of a facility mustbe designed to monitor the quality of all ground and surface water which may be affected by the facility. NAC 445A.440(1). The type, number and location of the monitoring points must be described in the application as part of the monitoring plan and must be approved by the Department. Id. Final monitoring requirements must be established by the Department. NAC 445A.440(2). Baseline data must be collected before operation ofthe facility. NAC 445A.440(3). In areas where there is a substantial separation between the process components and the groundwater, a system for monitoring highly probable escape pathways in the unsaturated zone may be required by the Department. NAC 445A.440(4). The decision where to locate the monitoring points for the site must be made after considering the site's geology and hydrogeology. NAC 445A.440(5).

NAC 445A.442(1) requires the Department to determine the extent and complexity to which the holder of a permit must monitor individual process components for the release of contaminants after reviewing site and process controlled design conditions. Systems designed to detect and control leaks from process components must be located at the interface of the unit process components and the adjacent environment and be able to provide the first indication that pollutants or contaminants have escaped their primary containment. Id. The program to monitor the process components must include a schedule of activities, a roster of current job titles for persons responsible for and involved in the monitoring program, and the form and frequency of reports to be submitted to the Department. NAC 445A.442(2)(a-c). The Department may randomly collect information or samples for reference. NAC 445A.442(2). The cost of analyzing samples may be placed upon the holder of the permit. Id.

NAC 445A.447 requires submittal of a plan for permanent closure (i.e., actions to prevent degradation of waters of the State) of any portion of a mining operation that may release pollutants. See also, NAC 445A.359 and NAC 445A.378,

The Nevada guidance document titled, "Preparation Requirements and Guidelines for Permanent Closure Plans and Final Closure Reports," recommends that closure components used in such mitigating actions be designed to withstand the 24-hour, 500-year storm event.

A WPCP issued by the Division includes a standard provision (WPCP Part II.B.2.E.) that provides a regulatory mechanism for the permittee to submit to the Division for review and approval of revised monitoring plan and sampling protocols annually. Changes in monitoring frequency or the incorporation of additional monitoring points may require modification of the Permit and payment of modification fees.

A WPCP issued by the Division includes a standard provision (WPCP Part I.I.) that requires the permittee to inspect all control devices, systems, and facilities weekly (for closure permits consider relaxing frequency, but not more than necessary, if site is not continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system), and during (when possible) and after major storm events. These inspections are performed to detect evidence of: Deterioration, malfunction, or improper operation of control or monitoring systems; sudden changes in the data from any monitoring device; the presence of liquids in leak detection systems; and severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices.

Other authorities and resources that are considered for regrading requirements include the State of Nevada Handbook of Best Management Practices, Sections 9-1 through 9-6; local county/municipal ordinances; site-specific conditions; and WPCP requirements and limitations.

NAC 519A.270(18) requires that a mine reclamation plan include a description of any necessary stabilization, management, control or treatment of mine-impacted waters from waste rock dumps, open pits, and underground mines (NAC 519A.345).

NAC 519A.360.4(b),(c) require a mine operator to bond for the costs of process fluid stabilization, and the costs of stabilization, management, control, and treatment of mine-impacted waters to prevent or mitigate the degradation of waters of the State or the adverse effects to human health, terrestrial, and avian life.

NAC 519A.068 defines process fluid stabilization as binding, containing or treating contaminants in a fluid, including meteoric water that comes into contact with a heap leach pad or tailings impoundment, to prevent contaminants from degrading waters of the State through naturally occurring environmental conditions which may be reasonably expected at a site.

NAC 519A.360.4(g)(1),(2) requires that a mine operator bond for the costs of any ongoing or long-term activities which are required to maintain the effectiveness of reclamation or are necessary in lieu of reclamation; or ensure the continuation of post-reclamation stabilization, management, control and treatment ofmine-impacted waters to protect the waters of this State, including, periodic clean-out of sediment basins and ponds used to

collect mine-impacted waters or maintenance of berms and fences, which are used to prevent access to areas which pose a threat to the public safety.

The SRCE program has a supplemental User Tab module with the ability to implement calculations and reclamation costs related to any water treatment if determined to be required by the WPCP. The User page reclamation cost subtotal is linked to the SRCE summary page to include it in the total reclamationsurety amount and make it part of the calculated percentage government in-direct administration costs.

The SRCE program includes a Waste Disposal – Solid Waste and Hazardous Material module for both on-site and/or off-site disposal of both solid and hazardous waste materials. The module calculates the hauling cost of the non-hazardous solid waste material volume to an on-site designated Class II permitted landfill. The module calculates the volume of material required for the placement of a growth medium earth cover and the reseeding costs based on the landfill acreage. The SRCE module calculates the off- site transport cost for hazardous waste materials to an approved disposal site based upon the distance from the mine to the disposal site. The SRCE User page has the ability to account for a third party contractor quote to accommodate for a specific type of hazardous waste disposal cost.

INFORMATION SUBMISSION and RECORDKEEPING REQUIREMENTS

§ 320.64 Information submission and recordkeeping requirements

(a) Owners or operators must submit to EPA information that supports the cost calculation including the maximum financial responsibility amount, final financial responsibility amount, information to support all inputs to the formula, and information to support reductions to the maximum financial responsibility amount in accordance with paragraph (c), including necessary components of applicable enforceable documents. Such information must provide sufficient detail about facility conditions to allow the Administrator to review the formula calculation and determine if the inputs to the formula were accurate, and should include site characterization information and evaluations that support the enforceable documents provided to support reductions.

Nevada mine operators are required to submit a plan of operations, a corresponding reclamation plan, and the associated reclamation costs for approval under an MOU between the Division, the BLM and/or the USFS for an issuance of a reclamation permit. In the case of a mine proposed on all private land, the Bureau, under authority delegated by the Division, serves as the agency adjudicating the reclamation surety amount from the operator for the reclamation liability at the mine site. The financial responsibility amount must be reviewed, approved and the surety amount must be posted prior to any construction disturbance.

Per NAC 519A.360(1) the operator must provide a surety in an amount sufficient to ensure reclamation of the entire area to be affected by his or her project or operation, or a portion of the area to be affected if, as a condition of the issuance of the permit, filing additional surety is required before the operator disturbs land not covered by the initial surety. The amount of surety required must be based on an estimate of the cost of executing the plan for reclamation which would be incurred by the state or federal agency having jurisdiction over the land. NAC 519A.360(2). The operator's estimate of the cost for reclamation must be based on either the costs of equipment rental, operation and labor which are appropriate for the geographic area undergoing reclamation and which would otherwise be incurred by a third-party contractor who performed the reclamation; estimated costs provided by an outside contractor; or any other method which is acceptable to the Administrator of the Division, the BLM, the USFS, or another federal land management agency, if applicable. NAC 519A.360(3)(a-c). In determining the cost of executing the plan for reclamation, the operator shall consider all activities in the plan for reclamation that are required by NAC 519A.010 to NAC 519A.415, inclusive, or chapter 519A of NRS, including, if appropriate: earth moving, regrading, stabilization of heaps and dumps, recontouring of roads and erosion control; process fluid stabilization; stabilization, management, control and treatment of mine-impacted waters; revegetation, preparation of seedbed and planting; demolition of buildings and other structures; removal and disposal or salvage of buildings, structures, equipment, piping, scrap and reagents; and any ongoing or long-term activities which are required to maintain the effectiveness of reclamation or are necessary in lieu of reclamation or ensure the continuation of post-reclamation stabilization, management, control and treatment of mine-impacted waters to protect the waters of this State. NAC 519A.360(4)(a-g). In addition, the operator must consider other activities which include but are not limited to periodic clean-out of sediment basins and ponds used to collect mine-impacted waters or maintenance of berms and fences which are used to prevent access to areas which pose a threat to the public safety; equipment mobilization and demobilization; and administration and management by the Division, the BLM, the USFS, and another federal land management agency, if applicable. NAC 5194.360(4).

In determining the cost of executing the plan for reclamation, the operator shall not consider the cost of any activity not included in the plan for reclamation or not required by NAC 519A.010 to 519A.415, inclusive, or chapter 519A of NRS. NAC 519A.360(5). This subsection does not limit in any way the authorities of the BLM, the USFS, or another federal land management agency to require surety for purposes other than those of NAC 519A.010 to 519A.415, inclusive, and chapter 519A of NRS. Id.

The operator must submit, on a form provided by the Division or in a similar manner documentation for his or her calculation of the cost of executing the plan for reclamation, the source of his or her estimates of costs; a list of specific activities which will be performed to reclaim the affected acres such as those in NAC 519A.360 for each type of

disturbance, and the total acreage of each disturba nce requiring the same activity to be performed for reclamation. NAC 519A.365(1-4).

NAC 519A.370(1) requires the Division to review the operator's estimate of the cost for reclamation and determine if the estimate is reasonably sufficient to conduct all required reclamation. If the Division determines that the e stimated cost of executing the plan for reclamation is insufficient to conduct all requiredreclamation, the application for a permit shall be considered to be incomplete. NAC 519A.370(2).

(b) Owners or operators must retain the calculation of the financial responsibility amount and the information supporting it for a period of t hree years following submission to EPA.

NAC 519A.380 the standardization of reclamation costs are updated yearly to account for inflation or deflation (SRCE Program). NAC 519A.380(1) requires that within 3 years after the effective date of the permit and at least every 3 years thereafter, an operator shall review the amount of surety filed to cover the cost of reclamation to determine whether it is still adequate to execute the approved plan f or reclamation taking inflation into consideration. The operator is required to notify the Division, the BLM, the USFS, and another federal land management agency, if appropri ate, of the results of the review of the surety and within 120 days after the review req uest a decrease in the surety; or increase the surety, to execute the plan for reclamation. NAC 519A.380(2)(a-b).

Per the State of Nevada Record Retention Policy, Mi ning Reclamation Permit files are retained for a period of 35 years after the final r edemption of the reclamation bond has occurred and 20 years for bonding files after all r eclamation activities have been completed. NRS 239.080 states that an official Sta te record may be disposed of only in accordance with a schedule for retention and dispos ition which is approved by the State records committee.

NAC 519A.385(1) states the Division may release a surety either in whole or in part at the request of the operator. The entire surety must no t be released until all of the requirements of the permit have been fulfilled, except that a portion of the surety covering the reclamation of a discrete part of a disturbance must be released when the requirements of the permit regarding the discrete p art of the disturbance have been fulfilled. NAC 519A.385(2)(a). That portion of the surety covering a discrete activity must be released when the requirements of the permit reg arding that discrete activity have been fulfilled. NAC 519A.385(2)(b). Except as othe rwise provided in subsection 3, if revegetation is part of the plan for reclamation, 6 0 percent of the posted surety must be released upon completion of the earthwork. NAC 519. 385(2)(c). After revegetation has been performed by the operator on the regraded land s, according to the approved plan for reclamation, the Division may release an additi onal 25 percent of the surety. Id. The remaining surety must not be released until all req uirements of the permit have been

satisfied. Id. Upon transfer of a permit to a new operator and upon acceptance of the required surety from the new operator, the Division shall release the surety posted by the original operator. NAC 519A.385(2)(d). Percentages greater than those specified in paragraph (c) of subsection 2 may be released if the operator demonstrates that the remaining surety is sufficient to ensure completion of the required reclamation. NAC 519A.385(3). Within 30 days after receiving a request for release of a surety, the agency holding the surety, or its designated agent pursuant to NRS 519A.140, shall inspect the permitted exploration project or mining operation to determine whether the operator has fulfilled the requirements of his or her permit and either release the surety or portion thereof as requested, or notify the operator that the requested surety will not be released, the reasons why and the measures necessary to satisfy the requirements of the permit. NAC 519A.385(4)(a),(b). If a request to release is denied, the operator may appeal the decision pursuant to NAC 519A.415. NAC 519A.385(5). The 30 days within which an agency must respond to a request to release a surety pursuant to subsection 3 may be extended if weather conditions prevent an inspection of the reclaimed area. NAC 519A.385(6).

THIRD-PARTY CERTIFICATION

§ 320.65 Third-Party Certification The financial responsibility amount submitted by owners or operators in compliance with § 320.63 must be certified by an independent qualified professional engineer as defined in § 320.62.

Nevada has a wide range of third party environmental engineering consultants who use the SRCE program, which includes reclamation costs that have been vetted by BMRR, the BLM, the USFS, and Nevada mine operators. The labor costs are updated using Davis Bacon Prevailing Wages on an annual basis. The agencies have the ability to request third party contractor quotes at any time for estimating a site-specific and/or unique reclamation activity cost. BMRR has a team of environmental scientists with earth science degrees and analysis support from an in-house professional reclamation engineer to validate reclamation costs submitted to the agency. The BMRR also retains a BLM engineer liaison in our offices three days per week and one of the liaisons functions is to assist with the audit of financial responsibility cost estimates.

APPENDIX 1--REGULATION and CLOSURE BRANCHES

Nevada NAC 445A Mining Regulations

Nevada Bureau of Mining Regulation and Reclamation

Water Pollution Control Permit Regulation

Nevada Administrative Code 445A.350 – 445A.447

MINING FACILITIES

General Provisions

445A.350 Definitions.
445A.351 "Area of review" defined.
445A.352 "As-built drawings" defined.
445A.353 "Beneficiation" defined.
445A.354 "Best engineering judgment" defined.
445A.355 "Commission" defined.
445A.356 "Contaminant" defined.
445A.357 "Degrade" defined.
445A.358 "Department" defined.
445A.359 "Facility" defined.
445A.360 "Fluid management system" defined.
445A.361 "Groundwater" defined.
445A.362 "Liner" defined.
445A.363 "Meteoric waters" defined.
445A.364 "Mining" defined.
445A.365 "Modify materially" defined.
445A.366 "Ore" defined.
445A.367 "Permanent closure" defined.
445A.368 "Permit" defined.
445A.369 "Person" defined.
445A.370 "Pilot facility" and "testing facility" defined.
445A.371 "Placer mining" defined.
445A.372 "Point source" defined.
445A.373 "Pollutant" defined.
445A.374 "Pond" defined.
445A.375 "Process component" defined.
445A.376 "Process fluid" defined.
445A.377 "Small-scale facility" defined.
445A.378 "Source" defined.
445A.379 "Stabilized" defined.
445A.380 "Storm event" defined.

445A.381 "Tailings impoundment" defined.
445A.382 "Temporary closure" defined.
445A.383 "WAD cyanide" defined.
445A.384 "Waters of the State" defined.
445A.385 "Zero discharge" defined.
445A.386 Adoption of publication by reference.
445A.387 Scope; effect of noncompliance.
445A.388 Appeal of action taken by Department.

Permits for Facilities

445A.390 Permit required; operation under existing permit.
445A.391 Application for permit: Preliminary meeting with representative of Department.
445A.392 Application for permit: Construction or modification of process component; abbreviated application.
445A.393 Application for permit: Definition of site conditions, process materials, characteristics of waste and impacts.
445A.394 Application for permit: Submission; contents.
445A.395 Contents of application: Assessment of area of review.
445A.396 Contents of application: Meteorological report; analysis of samples.
445A.397 Contents of application: Engineering design report; specifications for fluid management system.
445A.398 Contents of application: Proposed operating plans.
445A.399 Preparation of plan for seasonal closure of process components.
445A.400 Initial review of application and notification of applicant; failure to provide information; submission of incorrect information.
445A.401 Action by Department upon application.
445A.402 Notice of intent to issue permit or deny application.
445A.403 Request for hearing on application; submission of comments on draft permit.
445A.404 Scheduling of public hearing on application.
445A.405 Notice of hearing: Publication; contents.
445A.406 Submission of testimony at hearing.
445A.407 Issuance of statement responding to comments on draft permit.
445A.408 Action by Director of Department after period for public comment.
445A.409 Issuance and maintenance of permit; maximum term and renewal of permit.
445A.410 Permit for small-scale facility: Contents of application; limitation on holding; applicability of minimum design criteria.
445A.411 Pilot facility or testing facility: Conditions for issuance of permit.
445A.412 Pilot facility or testing facility: Contents of application for permit.
445A.413 Pilot facility or testing facility: Construction of application indicating need to conduct testing beyond 2 years.
445A.414 Permit for facility using physical separation methods.
445A.415 Granting of permit which allows lower level of engineered containment than required by minimum design criteria.

445A.4155 Conditions pursuant to which modification to design of facility with existing permit does not require new public notice; extension of term of existing permit disallowed.
445A.416 Minor modification of existing permit; modification of operating plans.
445A.417 Major modification of existing permit.
445A.418 Fee for modification of permit.
445A.419 Transfer of permit to new owner or operator.
445A.420 Renewal of permit; operation of facility pending issuance of new permit.

Operation and Design of Facilities

445A.424 Limitations on degradation of water; exemptions.
445A.425 Process components in existence on September 1, 1989: Standards; additional monitoring.
445A.426 Notice of intent to commence active operation of process component.
445A.427 Duties of holder of permit upon construction or modification of process component.
445A.428 Level of containment required for placer mining or flotation facilities.
445A.429 Procedures required to prevent release of contaminants; requirements concerning impoundments.
445A.430 Stabilization of spent ore.
445A.431 Stabilization of tailings.
445A.432 Minimum design criteria: Generally.
445A.433 Minimum design criteria: Universal requirements; areas where groundwater is near surface; proximity of new process components to dwellings; liability for degradation of water.
445A.434 Minimum design criteria: Leach pads and other nonimpounding surfaces designed to contain and promote horizontal flow of process fluids.
445A.435 Minimum design criteria: Ponds.
445A.436 Minimum design criteria: Vats, tanks and other containers which confine process fluids.
445A.437 Minimum design criteria: Tailings impoundments.
445A.438 Minimum design criteria: Liners.
445A.439 Program required to control quality of construction of liner systems.
445A.440 Monitoring: Site of facility.
445A.441 Monitoring: Procedure upon variation in parameter or element being monitored.
445A.442 Monitoring: Process components.
445A.443 Monitoring: Beneficiation process.
445A.444 Examples of planned and unplanned temporary closures.
445A.445 Procedure upon unplanned temporary closure of process component.
445A.446 Permanent closure of facility.

445A.447 Plans for permanent closure; sources not classified as process components.

NAC 445A.350 Definitions. (NRS 445A.425, 445A.465) As used in NAC 445A.350 to 445A.447, inclusive, unless the context otherwise requires, the words and terms defined in NAC 445A.351 to 445A.385, inclusive, have the meanings ascribed to them in those sections.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.242)

NAC 445A.351 "Area of review" defined. (NRS 445A.425, 445A.465) "Area of review" means the area surrounding a facility which is to be evaluated.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24202)

NAC 445A.352 "As-built drawings" defined. (NRS 445A.425, 445A.465) "As-built drawings" means engineering drawings which reflect all changes made from original engineering drawings during the construction of a facility so that a representation of the facility as constructed is portrayed.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24204)

NAC 445A.353 "Beneficiation" defined. (NRS 445A.425, 445A.465) "Beneficiation" means the dressing or processing of ores for:

1. Regulating the size of a desired product;
2. Removing unwanted constituents; and
3. Improving the quality, purity or assay grade of a desired product.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24206)

NAC 445A.354 "Best engineering judgment" defined. (NRS 445A.425, 445A.465) "Best engineering judgment" means that decision by the Department which, after evaluating the available alternatives and levels of technology presented by the applicant, results in an acceptable design for containing contaminants from a facility in order to protect the waters of the State.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24208)

NAC 445A.355 "Commission" defined. (NRS 445A.425, 445A.465) "Commission" means the State Environmental Commission.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.2421)

NAC 445A.356 "Contaminant" defined. (NRS 445A.425, 445A.465) "Contaminant" has the meaning ascribed to it in NRS 445A.325.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24212)

NAC 445A.357 "Degrade" defined. (NRS 445A.425, 445A.465) "Degrade" means to alter the physical or chemical properties of or to cause a change in the concentration of any substance in the waters of the State in violation of the standards established pursuant to NAC 445A.424.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.24214)

NAC 445A.358 "Department" defined. (NRS 445A.425, 445A.465) "Department" means the State Department of Conservation and Natural Resources.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.24216)

NAC 445A.359 "Facility" defined. (NRS 445A.425, 445A.465) "Facility" means all portions of a mining operation, including, but not limited to, the mine, waste rock piles, or piles, beneficiation process components, processed ore disposal sites, and all associated buildings and structures. The term does not include any process component or nonprocess compone nt which is not used for mining or mineral production, and has not been used in the past for m ining or mineral production as part of an operation which is active as of September 1, 1989.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.24218)

NAC 445A.360 "Fluid management system" defined. (NRS 445A.425, 445A.465) "Fluid management system" means that portion of a facility which has been constructed to contain or transport process fluids.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.2422)

NAC 445A.361 "Groundwater" defined. (NRS 445A.425 , 445A.465) "Groundwater" means all subsurface water comprising the zone of saturation, including perched zones of saturation, which could produce usable water.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.24222)

NAC 445A.362 "Liner" defined. (NRS 445A.425, 445A.465) "Liner" means a continuous layer of man-made or reconstructed natural materials, or a combi nation thereof which restricts the downward or lateral movement of liquids.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.24224)

NAC 445A.363 "Meteoric waters" defined. (NRS 445A.425, 445A.465) "Meteoric waters" means any form of precipitation falling from the earth's atmosphere.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.24226)

NAC 445A.364 "Mining" defined. (NRS 445A.425, 445A.465) "Mining" means the process of extracting ores from the earth.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.24228)

NAC 445A.365 "Modify materially" defined. (NRS 445A.425, 445A.465) "Modify materially" means to make:

1. A change in the design or location of a process component, or the characteristics of the waste stream which significantly alters the potential to degrade the waters of the State; or

2. A significant change in the environmental monitoring systems which results in a reduction in the effectiveness of that monitoring system.

The term does not include changes necessitated during construction to suit field conditions, or changes which do not affect point sources.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.2423)

NAC 445A.366 "Ore" defined. (NRS 445A.425, 445A.465) "Ore" means the naturally occurring material from which a metallic mineral of economic value can be extracted.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24232)

NAC 445A.367 "Permanent closure" defined. (NRS 445A.425, 445A.465) "Permanent closure" means that time in the operating life of a facility when activities for the final stabilization, removal or mitigation of sources are initiated.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24234)

NAC 445A.368 "Permit" defined. (NRS 445A.425, 445A.465) "Permit" means a written document issued pursuant to NRS 445A.300 to 445A.730, inclusive, which describes the responsibilities and obligations of the holder of the permit during the construction, operation, and temporary or permanent closure of a facility.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24236)

NAC 445A.369 "Person" defined. (NRS 445A.425, 445A.465) "Person" has the meaning ascribed to it in NRS 445A.390.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24238)

NAC 445A.370 "Pilot facility" and "testing facility" defined. (NRS 445A.425, 445A.465) "Pilot facility" or "testing facility" means a facility which is constructed principally to obtain data on the effectiveness of the beneficiation process to determine:

1. The feasibility of developing a body of ore; or

2. The optimum operating conditions of the process.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.2424)

NAC 445A.371 "Placer mining" defined. (NRS 445A.425, 445A.465) "Placer mining" means the extraction and processing of ores solely by gravity separation methods.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24242)

NAC 445A.372 "Point source" defined. (NRS 445A.425, 445A.465)

1. "Point source" has the meaning ascribed to it in NRS 445A.395.

2. The term includes wheeled, track, stationary or floating equipment used for earth-moving activity from which pollutants are or may be discharged.

(Added to NAC by Environmental Comm'n, eff. 9-1-89; A by R096-01, 1-18-2002)

NAC 445A.373 "Pollutant" defined. (NRS 445A.425, 445A.465) "Pollutant" has the meaning ascribed to it in NRS 445A.400.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.24246)

NAC 445A.374 "Pond" defined. (NRS 445A.425, 445A.465) "Pond" means a process component which stores, confines or otherwise significantly impedes the horizontal movement of process fluids. The term does not include tailings impoundments, vats, tanks or other nonearthen containers.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.24248)

NAC 445A.375 "Process component" defined. (NRS 445A.425, 445A.465) "Process component" means a distinct portion of a constructed facility which is a point source.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.2425)

NAC 445A.376 "Process fluid" defined. (NRS 445A.425, 445A.465) "Process fluid" means any liquids, including meteoric waters, which are intentionally or unintentionally introduced into any portion of the beneficiation process components.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.24252)

NAC 445A.377 "Small-scale facility" defined. (NRS 445A.425, 445A.465) "Small-scale facility" means a facility which chemically processes less than 36,500 tons of ore per year and no more than 120,000 tons of ore for the life of the project at any one permitted site.

(Added to NAC by Environmental Comm'n, eff. 9-1-89; A 9-6-91) — (Substituted in revision for NAC 445.24254)

NAC 445A.378 "Source" defined. (NRS 445A.425, 445A.465) "Source" means any building, structure, facility or installation from which there is or may be the discharge of pollutants.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.24256)

NAC 445A.379 "Stabilized" defined. (NRS 445A.425, 445A.465) "Stabilized" means the condition which results when contaminants in a material are bound or contained so as to prevent them from degrading the waters of the State under the environmental conditions that may reasonably be expected to exist at a site.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.24258)

NAC 445A.380 "Storm event" defined. (NRS 445A.425, 445A.465) "Storm event" means a precipitation event with a specified frequency of return and specified period of duration as defined in Precipitation-Frequency Atlas of the Western United States, vol. VII-Nevada.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.2426)

NAC 445A.381 "Tailings impoundment" defined. (NRS 445A.425, 445A.465) "Tailings impoundment" means a process component which is the final depository for processed ore discharged from a mill.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24262)

NAC 445A.382 "Temporary closure" defined. (NRS 445A.425, 445A.465) "Temporary closure" means the cessation of the operation of a process component for more than 30 days as a result of a planned or unplanned activity.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24264)

NAC 445A.383 "WAD cyanide" defined. (NRS 445A.425, 445A.465) "WAD cyanide" means the cyanide concentration as determined by Method C, Weak Acid Dissociable Cyanide, D2036-082, Part 31 of American Society of Testing Materials Book of Standards.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24266)

NAC 445A.384 "Waters of the State" defined. (NRS 445A.425, 445A.465) "Waters of the State" has the meaning ascribed to it in NRS 445A.415.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24268)

NAC 445A.385 "Zero discharge" defined. (NRS 445A.425, 445A.465) "Zero discharge" means the standard of performance for the protection of surface waters which requires the containment of all process fluids.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.2427)

NAC 445A.386 Adoption of publication by reference. (NRS 445A.425, 445A.465) The Department hereby adopts by reference Precipitation-Frequency Atlas of the Western United States, vol. VII-Nevada, stock number 0317-00161, prepared by the National Weather Service and National Oceanic and Atmospheric Administration, United States Department of Commerce. The publication may be obtained by mail from the Superintendent of Documents, U.S. Government Printing Office, P.O. Box 979050, St. Louis, Missouri 63197-9000, or by toll-free telephone at (866) 512-1800, at a cost of $8.45.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24272)

NAC 445A.387 Scope; effect of noncompliance. (NRS 445A.425, 445A.465)

1. NAC 445A.350 to 445A.447, inclusive, apply to facilities that have the potential to degrade the waters of the State. Surface disturbance activities such as stripping and the stockpiling of ore, when conducted in a manner which presents an insignificant potential to degrade waters of the State are not subject to

those sections. NAC 445A.350 to 445A.447, inclusive, do not apply to facilities involved solely in the mining and processing of sand and gravel, cinders, diatomaceous earth, slate, shale, gypsum, clay or crushed stone.

2. NAC 445A.350 to 445A.447, inclusive, do not replace or in any way affect the responsibility of a person to comply with any other regulations and rules of practice and procedure administered by the Department or any other governmental agency.

3. A permit issued pursuant to NAC 445A.350 to 445A.447, inclusive, may be revoked for noncompliance with the provisions of NAC 445A.350 to 445A.447, inclusive, in accordance with the procedures established in NRS 445A.600.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24274)

NAC 445A.388 Appeal of action taken by Department. (NRS 445A.425, 445A.465, 445A.605) Any person aggrieved by an action taken by the Department pursuant to NAC 445A.350 to 445A.447, inclusive, may appeal to the Commission in accordance with NRS 445A.605.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24276)

Permits for Facilities

NAC 445A.390 Permit required; operation under existing permit. (NRS 445A.425, 445A.465)

1. All facilities in existence on September 1, 1989, must obtain a valid permit within 3 years after September 1, 1989.

2. After July 1, 1990, no person may begin construction of a new process component, or materially modify an existing process component, without first obtaining a permit or permit modification, or the concurrence of the Department that the construction or modification is in conformance with the existing permit.

3. The operator of a process component for which a permit has been obtained may continue to operate that process component under the conditions of the existing permit. This applies to all process components which have been reviewed and approved by the Department but have not yet been issued a permit and are either in the process of being constructed or are operating in accordance with an approval granted as of September 1, 1989. Where detailed plans have not yet been submitted to the Department for a process component that has been conceptually approved under either an existing permit or approved without an existing permit, the process component must meet the regulations in effect when construction of the new process component is initiated.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.2428)

NAC 445A.391 Application for permit: Preliminary meeting with representative of Department. (NRS 445A.425, 445A.465) Before submitting an application for a permit, a prospective applicant must meet with a representative of the Department to discuss:

1. The proposed location of the facility;

2. The operating plans for the process components; and

3. The physical characteristics of the facility's proposed site as required on the application for the permit.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24282)

NAC 445A.392 Application for permit: Construction or modification of process component; abbreviated application. (NRS 445A.425, 445A.465)

1. Except as otherwise provided in subsection 2, a person wishing to construct or modify materially a process component at a facility must file an application for a permit pursuant to NAC 445A.394.

2. Persons wishing to construct a small-scale, pilot, testing, placer or other facility which relies solely on physical separation methods to process ore may file an abbreviated application for a permit pursuant to NAC 445A.410, 445A.412 and 445A.414. The application must be accompanied by the appropriate fee as required by NAC 445A.232.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24284)

NAC 445A.393 Application for permit: Definition of site conditions, process materials, characteristics of waste and impacts. (NRS 445A.425, 445A.465) The failure or the inability to define adequately site conditions, process materials and the probable characteristics of the waste in the application for a permit may result in the Department requiring a higher standard of engineered containment or monitoring, or both. Persons wishing to materially modify a facility must submit all information necessary to define and describe the probable impacts of the modification or new process components on the area of review.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24286)

NAC 445A.394 Application for permit: Submission; contents. (NRS 445A.425, 445A.465)

1. To obtain a permit to construct, operate and close permanently a facility, the owner or operator of the proposed facility or the designated agent of the owner or operator must submit to the Department a written application signed by the owner or, if the owner does not operate the facility, the operator of the facility or his or her designated agent. The application must be accompanied by the appropriate fee established pursuant to NAC 445A.232.

2. An application for a permit must contain:

(a) The name, location and mailing address of the:

(1) Facility.

(2) Owner.

(3) Operator.

(4) Authorized agent.

(b) The legal structure of the applicant, including, but not limited to, whether the applicant is a sole proprietorship, partnership or corporation.

(c) The name of the owner of the land or mining claim or claims on which the facility will be located.

(d) Documentation that notice of the proposed development has been provided to the local board of county commissioners.

(e) The rate at which the facility is anticipated to be chemically processing ore in tons of ore per year.

(f) An assessment of the area of review as required by NAC 445A.395.

(g) A meteorological report as required by NAC 445A.396.

(h) An engineering design report as required by NAC 445A.397.

(i) A copy of the draft operating plans for the facility as required by NAC 445A.398.

(j) A report of the sample analysis as required by NAC 445A.396.

3. New applications or requests for major modifications to existing permits must be submitted to the Department at least 165 days before the date on which the applicant wishes to initiate construction.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24288)

NAC 445A.395 Contents of application: Assessment of area of review. (NRS 445A.425, 445A.465)

1. An assessment of the area of review must include:

(a) Hydrogeological and lithological informati on which defines the subsurface conditions of the s ite beneath and adjacent to all point sources to a minimum depth of 100 feet.

(b) A geological map covering the area within a 1-mile radius of the process components.

(c) A topographic map which identifies:

(1) All known surface waterways, streams, springs and seeps within a 1-mile radius of the facility;

(2) All existing habitable buildings within a 1-mile radius of the facility;

(3) The boundaries and area of the upgradient watershed and the degree to which the 100-year, 24-hour storm event will affect the process components; and

(4) All wells constructed for supplies of drinking water within 5 miles downgradient of the site identified in the records of the Division of Water Resources of the Department or known to the applicant.

2. The Department may require that a greater or lesser area of review be prescribed in an application for a permit based upon:

(a) The ability of the geologic formation at the site of the facility to inhibit contaminant migration;

(b) The size of the human population in the area;

(c) The depth from the surface to all groundwater;

(d) The distance to all surrounding bodies of surface water; and

(e) The quality, uses and potential uses of the ground and surface water within the area of review.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.2429)

NAC 445A.396 Contents of application: Meteorological report; ana lysis of samples. (NRS 445A.425, 445A.465) An application for a permit must include:

1. A summary of the historical monthly averages of rainfall obtained from the nearest recording station to the site adjusted for conditions at the site;

2. The 24-hour storm events with an interval of recurrence of 10 years, 25 years, and 100 years;

3. The diurnal temperature variation from the nearest recording station to the site adjusted for conditions at the site; and

4. Results from testing samples from the faci lity's mine site which are representative of the overburden, waste rock and ore at the proposed mine site that have:

(a) Characterized the samples by a multi-eleme nt spectrographic assay or an equivalent analytical procedure; and

(b) Evaluated the samples for their potential to release pollutants.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.24292)

NAC 445A.397 Contents of application: Engineering design report; specifications for fluid management system. (NRS 445A.425, 445A.465)

1. An engineering design report must be prepared and submitted to the Department by a professional engineer registered in Nevada. The report must include the following information, if applicable:

(a) Engineering plans for the process components used for beneficiation;

(b) The general specifications and calculations for the process components;

(c) Topographic maps showing the location of a ll potential sources at the facility including, but not limited to:

(1) The extraction sites;

(2) The process components used for beneficiation;

(3) The disposal sites for waste rock; and

(4) The disposal sites for spent ore;

(d) Drawings which indicate the layout of the structures and devices for controlling process fluids;

(e) Methods for the control of storm flow runoff;

(f) The existing geological and hydrogeological conditions beneath and adjacent to the site of the fluid management system and waste rock disposal sites and the degree to which these conditions provide natural containment, preferential flow pathways and structural stability;

(g) A description of the liner material and installation procedures for all leach pads, ponds and ditches, including a description of the subbase preparation;

(h) Details of leak detection and site-monitoring systems; and

(i) Process schematics of the facility.

2. Specifications for constructing the fluid management system and for the material to be used must be submitted to the Department with the application for a permit, and must include, but not be limited to, the methods to be utilized for inspecting, testing, and quality assurance and control.

3. The information required by subsections 1 and 2 must be of sufficient detail to allow the Department to make the following factual determinations:

(a) Which of the potential sources at the facility are to be considered process components for the purposes of NAC 445A.350 to 445A.447, inclusive;

(b) That the design of the process components is sufficient to protect the waters of the State from degradation; and

(c) That the monitoring system is adequate to determine if the process components are operating so as to protect the waters of the State from degradation.

Any material modification to a process component requires the approval of the Department before construction begins.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24294)

NAC 445A.398 Contents of application: Proposed operating plans. (NRS 445A.425, 445A.465) The proposed operating plans for a facility must include:

1. A description of the mineral processing circuit which includes a flow chart of the facility and the range of operating conditions for which the process components were designed.

2. A plan for the management of process fluids which describes the methods to be used for the monitoring and controlling of all process fluids. The plan must provide a description of the means to evaluate the conditions in the fluid management system so as to be able to quantify the available storage capacity for meteoric waters and to define when and to what extent the designed containment capacity has been exceeded.

3. A plan for monitoring the facility which describes:

(a) The water quality in the area;

(b) The monitoring locations the applicant proposes to sample routinely in order to evaluate surface and groundwater at the site that may be affected by the operation of the facility;

(c) An analytical profile of each surface and groundwater that may be affected by the operation of the facility; and

(d) The locations of the leak detection systems, the frequency for sampling these systems and the analytical profile to be used for evaluation of the samples.

4. A plan for responding to emergencies which:

(a) Describes what actions must be initiated and by whom as a result of various possible failures in the fluid management system which would result in releases of pollutants; and

(b) Is designed to minimize the environmental impact resulting from the release of process fluids.

5. A temporary closure plan resulting from conditions described in subsection 1 of NAC 445A.444 which describes the activities which must be maintained during the time of closure.

6. A tentative plan for the permanent closure of the facility which describes the procedures, methods and schedule for stabilizing spent process materials. The plan must include:

(a) Procedures for characterizing spent process materials as they are generated; and

(b) The procedures to stabilize all process components with an emphasis on stabilizing spent process materials and the estimated cost for the procedures.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24296)

NAC 445A.399 Preparation of plan for seasonal closure of process components. (NRS 445A.425, 445A.465) If the facility is located in an area where the mean diurnal temperature does not exceed 0 degrees Centigrade for 30 days or more a plan for the seasonal closure of the process components must be prepared. The plan must describe:

1. The impact this change in the weather will have on the process components, including, but not limited to, a discussion of the possible closure of individual process components;

2. Those activities which must be undertaken to prepare those process components which may be potentially affected by the low temperatures;

3. The activities which will be maintained during this time of closure; and

4. The conditions that would allow operations to resume.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24298)

NAC 445A.400 Initial review of application and notification of applicant; failure to provide information; submission of incorrect information. (NRS 445A.425, 445A.465)

1. The Department shall, within 30 days after receiving an application for a permit, notify the applicant in writing:

(a) That the application is procedurally complete or specify any deficiencies; and

(b) Which nonfluid management system sources will not initially be considered as process components for the purposes of NAC 445A.350 to 445A.447, inclusive.

This review is solely to determine if all the information required by NAC 445A.394 to 445A.398, inclusive, has been submitted and is not a determination as to the adequacy of the information.

2. Failure to provide all information required for a determination of completeness within 1 year after the application date renders an application void and requires the submittal of a new application and fee. A new application and fee will not be required if the Department fails to act in a timely manner or if the applicant can demonstrate that circumstances beyond the applicant's control prevented him or her from developing the additional information.

3. If an applicant becomes aware that he or she failed to submit any relevant information or submitted incorrect information in an application, the applicant must promptly submit such information to the Department.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.243)

NAC 445A.401 Action by Department upon application. (NRS 445A.425, 445A.465)

1. After determining that an application is procedurally complete, the Department shall, within 90 days, determine whether the application is technically complete, and prepare and issue:

(a) A draft permit or a notice of intent to deny the application;
(b) A fact sheet which:
(1) Identifies the location of the facility;
(2) Describes the proposed sources;
(3) Provides a description of the facility and monitoring systems;
(4) Identifies the probable receiving water; and
(5) Describes the procedures for public comment; and
(c) A public notice for each draft permit or intent to deny an application for a permit to construct, operate and close a mining and beneficiation facility.
2. The 90-day time for action by the Department may be extended by the amount of time necessary for the applicant to submit additional information necessary to make the application technically complete.
(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24302)

NAC 445A.402 Notice of intent to issue permit or deny application. (NRS 445A.425, 445A.465, 445A.590)
1. The Department shall, at least 30 days before the issuance of a permit or denial of an application:
(a) Circulate a public notice in a manner intended to inform interested and potentially interested persons.
(b) Cause to be published in a newspaper of general circulation within the geographic area of a proposed facility, a notice of the intent to issue the permit or deny the application.
(c) Mail to the applicant and the landowner, if other than the applicant, members of the board of county commissioners of the county in which the facility is to be located, the Division of Minerals, the Division of Water Resources of the Department, and any other person or group who so requests, written notice of the intent to issue a permit or deny the application.
2. Notice given pursuant to subsection 1 must include:
(a) The name, address and telephone number of the Department;
(b) The name and address of the applicant;
(c) The location of the proposed facility;
(d) The tentative decision of the Department to issue a permit or deny the application;
(e) A description of the procedure for:
(1) Making a final decision, which must include 30 days for interested persons to submit to the Department written comments on the tentative decision to issue a permit or deny the application; and
(2) Requesting a public hearing, if one has not been scheduled; and
(f) The specific location where interested persons may obtain further information or inspect and copy the draft permit, statement and fact sheet, and other relevant forms or documents.
(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24304)

NAC 445A.403 Request for hearing on application; submission of comments on draft permit. (NRS 445A.425, 445A.465, 445A.595) The applicant or any interested person may:
1. Request a public hearing on any application for a permit during the 30 days allowed for public comment if a hearing has not been scheduled. The request must be in writing and state the nature of the issues to be raised at the hearing.
2. Submit written comments on the draft permit to the Department within 30 days after notice is given pursuant to NAC 445A.402.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24306)

NAC 445A.404 Scheduling of public hearing on application. (NRS 445A.425, 445A.465, 445A.595) The Department:

1. Shall schedule a public hearing on an application for a permit if it determines that there is a significant degree of public interest in the matter; or

2. May schedule a public hearing on its own initiative.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24308)

NAC 445A.405 Notice of hearing: Publication; contents. (NRS 445A.425, 445A.465, 445A.595) The Department shall cause to be published a notice for a hearing at least 30 days before the hearing in the manner prescribed by NAC 445A.402. In addition to the information required by NAC 445A.402, the notice must include:

1. The date on which the previous public notice was given concerning the permit pursuant to NAC 445A.402;

2. The date, time and place of the hearing; and

3. A brief description of the nature and purpose of the hearing and the applicable rules and procedures.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.2431)

NAC 445A.406 Submission of testimony at hearing. (NRS 445A.425, 445A.465, 445A.595)

1. Any person may submit to the Department at a public hearing held by the Department on the application for a permit, an oral or written statement or other information which relates to the draft of the permit.

2. The Department may:

(a) Set reasonable limits upon the time allowed for oral statements; and

(b) Require persons submitting oral statements to submit statements in writing.

3. The 30-day period for comment is automatically extended to the close of the hearing on that matter.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24312)

NAC 445A.407 Issuance of statement responding to comments on draft permit. (NRS 445A.425, 445A.465) If a final permit is issued, the Department shall issue a statement responding to the comments received on the matter. A copy of the statement must be sent to the applicant and persons submitting comments, and will be made available for inspection by the public. This statement must:

1. Specify which provisions, if any, in the draft of the permit that have been changed in the final permit, and the reasons for the change;

2. Briefly describe and respond to all significant comments submitted during the time established for public comment on the draft of the permit; and

3. Provide that any person aggrieved by the Department's decision may appeal the decision pursuant to NRS 445A.605.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24314)

NAC 445A.408 Action by Director of Department after period for public comment. (NRS 445A.425, 445A.465) Within 15 days after the end of the time for public comment regarding the issuance or renewal of a permit, the Director of the Department shall issue the final permit or provide written notice to the applicant why the final permit will not be issued at that time. This notice must set forth the time allowed for an aggrieved party to appeal the Department's decision.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24316)

NAC 445A.409 Issuance and maintenance of permit; maximum term and renewal of permit. (NRS 445A.425, 445A.465, 445A.495)

1. If an application is approved, a single permit must be issued for the construction, operation and closure of the facility. A valid permit must be maintained until permanent closure is complete.

2. A permit may be issued for a maximum term of 5 years, at which time the holder of the permit may apply for renewal.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24318)

NAC 445A.410 Permit for small-scale facility: Contents of application; limitation on holding; applicability of minimum design criteria. (NRS 445A.425, 445A.465)

1. An application for a permit to construct, operate and close permanently a small-scale facility must contain:

(a) The information required by paragraphs (a) to (e), inclusive, of subsection 2 of NAC 445A.394;

(b) Site information consisting of:

(1) The distance from the surface to groundwater;

(2) A topographic map which identifies all surface waters, waterways and springs within 1/2 mile of the site; and

(3) A description of the general character of the soil and geologic formations which lie beneath and adjacent to the proposed processing site;

(c) A description of and the criteria for the design of the containment system for the individual process components, including plans, schematics and cross-section diagrams of the process components which identify those components which provide for the containment of process fluids; and

(d) A copy of the draft operating plan for the facility which describes:

(1) The chemicals to be used in the beneficiation process;

(2) The methods which are proposed for controlling process fluids so that no discharges occur;

(3) The systems which are proposed for detecting leaks and monitoring the facility;

(4) The actions that will be taken if process fluids escape the fluid management system;

(5) The methods which are proposed to stabilize processed materials before they are disposed of or during the permanent closure of the facility; and

(6) The procedures which are to be instituted to ensure that the facility poses no threat to the environment when there is no activity at the facility or when there is a temporary closure.

2. A person may not concurrently hold more than one permit for a small-scale facility if the facilities are within 1 mile of each other.

3. The minimum design criteria in NAC 445A.433 to 445A.438, inclusive, apply to small-scale facilities.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.2432)

NAC 445A.411 Pilot facility or testing facility: Conditions for issuance of permit. (NRS 445A.425, 445A.465) The Department may issue a permit to construct, operate and close permanently a pilot facility or testing facility if:

1. The facility is to evaluate less than 10,000 tons of ore, except that a greater amount may be permitted if the applicant demonstrates that the greater amount is necessary for a specific purpose in the testing program; and

2. The applicant has clearly shown that the facility will not degrade the waters of the State.

A permit to operate a pilot facility or testing facility may not exceed 1 year for a single test or 2 years for a facility that has several tests to conduct.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24322)

NAC 445A.412 Pilot facility or testing facility: Contents of application for permit. (NRS 445A.425, 445A.465) An application for a permit to construct, operate and close permanently a pilot facility or testing facility must include:

1. The information required in paragraphs (a) to (d), inclusive, of subsection 2 of NAC 445A.394;
2. The quantity of the material to be evaluated;
3. The time required to complete all testing;
4. The type and quantity of chemicals to be utilized in the testing process;
5. A copy of the plans for the system and individual process components;
6. A description of the monitoring systems which are to be used to satisfy the requirements of NAC 445A.424;
7. A description of the procedures to be used to stabilize and dispose of the spent ore;
8. A topographic map of the area for the test site;
9. A description of hydrogeologic conditions at the site; and
10. A draft plan for the permanent closure of the facility, including a plan to stabilize areas disturbed by the operations of the facility.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24324)

NAC 445A.413 Pilot facility or testing facility: Construction of application indicating need to conduct testing beyond 2 years. (NRS 445A.425, 445A.465) An application for a permit to operate a pilot facility or testing facility which indicates a need to conduct testing beyond 2 years will be construed to be a request to operate a facility subject to the filing requirements of NAC 445A.394 to 445A.398, inclusive.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24326)

NAC 445A.414 Permit for facility using physical separation methods. (NRS 445A.425, 445A.465)

1. An applicant for a permit to construct, operate and close permanently a facility which utilizes physical separation methods of concentrating ore such as placer mining and flotation methods and which uses only coagulants, flocculants and reagents submitted to and approved by the Department, must submit to the Department:

(a) The information required by paragraphs (a) to (e), inclusive, of subsection 2 of NAC 445A.394;

(b) An abbreviated area of review which covers only the site and the adjacent area, including an identification of all surface water within 1/2 mile of the site and the depth and quality of all groundwater beneath the site;

(c) A draft operating plan which describes the circuit for concentrating the ores and identifies all process components;

(d) A multi-element spectrographic assay or other approved method of analysis which characterizes the ore body;

(e) The results of an analysis of the process make up water and process water for the inorganic constituents listed in NAC 445A.453 and 445A.455 to determine which and to what extent the process water burden of these elements is increased; and

(f) A certification that the applicant will not utilize any chemicals in the process except those submitted to and approved by the Department.

2. The use of a chemical not approved by the Department removes the facility from this category of operation and requires the holder of the permit to meet the requirements established in NAC 445A.394 to 445A.398, inclusive.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24328)

NAC 445A.415 Granting of permit which allows lower level of engineered containment than required by minimum design criteria. (NRS 445A.425, 445A.465) After receiving a petition from an applicant, the Department may grant a permit which allows a lower level of engineered containment than is required in NAC 445A.434 to 445A.438, inclusive, if the applicant clearly demonstrates:

1. That the groundwater at the facility is exempted from the standards established in paragraphs (b) and (c) of subsection 1 of NAC 445A.424;

2. The following:

(a) The depth from the surface to groundwater is greater than 200 feet and the upper portion of the existing geologic formation has a coefficient of permeability which is not more than that exhibited by 50 feet of material with a coefficient of permeability of $1x10^{-6}$ cm/sec;

(b) No open fractured or faulted geologic conditions exist from the surface to the groundwater; and

(c) All exploratory and condemnation borings beneath the site have been adequately sealed; or

3. That the conditions which exist at the site may allow a lower level of designed containment and still ensure that the waters of the State will not be degraded by providing, in addition to the information required by NAC 445A.394 to 445A.398, inclusive:

(a) An assessment of the combined effect of all relevant characteristics, including:

(1) The depth to all groundwater and the distance to all surface water;

(2) The hydrogeology and stratigraphy of the site; and

(3) The quality, characteristics, and existing and potential beneficial uses of any ground and surface water which may be potentially affected by the proposed facility.

(b) An engineering assessment of the combined effect of such relevant factors as:

(1) The proposed design of each process component, including the type and thickness of the liner or base;

(2) Other construction specifications;

(3) The type of materials to be used and the methods for placement of those materials;

(4) All structures, devices and techniques for controlling drainage and minimizing solution loss;

(5) The method to be used for controlling the internal hydraulic head;

(6) The system to detect and monitor leaks; and

(7) The types of quality assurance and quality control procedures to be used.

(c) An assessment of the potential for the facility to degrade the waters of the State, including an analysis of the potential for process fluids from each component to reach waters of the State, and the potential impact of such fluids on these waters.

The Department may require the applicant to bear the cost of a third-party review of the application to determine whether it meets the requirements of this subsection. The Department shall develop and maintain a list of qualified reviewers from which the applicant can select. The Department must concur with the selection and all direction to the third party must be given by the Department. The time allotted to the Department to determine the completeness of an application pursuant to NAC 445A.401 may be extended by the amount of time necessary to complete the third-party review.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.2433)

NAC 445A.4155 Conditions pursuant to which modification to design of facility with existing permit does not require new public notice; extension of term of existing permit disallowed. (NRS 445A.425, 445A.465)

1. A modification to the design of a facility for which a permit has been granted by the Department does not require a new public notice if:

(a) The modification requires review by the Department pursuant to NAC 445A.350 to 445A.447, inclusive; and

(b) The Commission determines that the modification is not a modification of such significance as to constitute a "minor modification" or a "major modification," as those terms are described in NAC 445A.416 and 445A.417, respectively.

2. Such a modification may not extend the term of the permit.

(Added to NAC by Environmental Comm'n, eff. 10-29-97)

NAC 445A.416 Minor modification of existing permit; modification of operating plans. (NRS 445A.425, 445A.465, 445A.600)

1. A minor modification to an existing permit does not require a new public notice.

2. A minor modification to an existing permit may not extend the term of the permit.

3. A modification to the operating plans does not require a modification to the permit if the change will not result in an increased potential for the facility to degrade waters of the State.

4. For the purposes of this section, "minor modifications" include, but are not limited to:

(a) The phased expansion of the milling and tailings impoundment or the leach pads using the same or equivalent technologies that presently exist at a site which was adequately characterized in the original application but for which detailed design plans were not submitted in the original application.

(b) A significant modification to a monitoring system which does not result in a lessening of the effectiveness of that system.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24332)

NAC 445A.417 Major modification of existing permit. (NRS 445A.425, 445A.465, 445A.600)

1. A major modification to an existing permit requires a public notice.

2. A major modification to an existing permit may extend the term of the permit for not more than 5 years.

3. For the purposes of this section, "major modifications" include:

(a) The addition of a new beneficiation process which includes, but is not limited to, heap leaching and process components for milling, which was not identified in the original application.

(b) A significant change in the location of a proposed process component or site condition which was not adequately described in the original application.

(c) A change in the proposed beneficiation process that significantly alters the characteristics of the waste stream which significantly increases the potential to degrade the waters of the State.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24334)

NAC 445A.418 Fee for modification of permit. (NRS 445A.425, 445A.430, 445A.465)

1. The fee for a minor modification to a permit is one-half the amount of the renewal fee for a permit, up to a maximum fee of $5,000.

2. The fee for a major modification to a permit is equal to the amount of the renewal fee for a permit.

3. The fee for the type of a modification described in NAC 445A.4155 is $500.

(Added to NAC by Environmental Comm'n, eff. 9-1-89; A 10-29-97)

NAC 445A.419 Transfer of permit to new owner or operator. (NRS 445A.425, 445A.465)

1. A permit may be transferred to a new owner or operator.

2. Before the ownership or operation of a facility may be transferred during the term of a permit, the holder of the permit must inform the new owner or operator in writing of the requirements of the current permit and the requirements of NAC 445A.350 to 445A.447, inclusive.

3. A copy of that written notice must be sent to the Department.

4. The new owner or operator must state in writing to the Department that he or she will comply with the existing operating plans or provide revised plans to the Department for review and approval.

5. Until notice is given by the Department that the permit has been transferred, the current operator or owner named on the permit is responsible for complying with NAC 445A.350 to 445A.447, inclusive.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24338)

NAC 445A.420 Renewal of permit; operation of facility pending issuance of new permit. (NRS 445A.425, 445A.465, 445A.495)

1. A permit may be renewed by the Department if the holder of the permit submits an application to renew the permit. The application must:

(a) Be filed at least 120 days before the expiration of the existing permit;

(b) Include the renewal fee required by NAC 445A.232; and

(c) Include any new information to update information previously submitted to the Department.

2. A permit for a facility which is inactive because of an unplanned closure may be renewed once if the holder of the permit demonstrates that the conditions under which the permit was issued will continue and the design life of the process components will not be exceeded.

3. If the Department has not issued a new permit as of the expiration of the existing permit, the holder of the permit may continue to operate the facility pursuant to the terms and conditions of the existing permit until a new permit is issued by the Department.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.2434)

Operation and Design of Facilities

NAC 445A.424 Limitations on degradation of water; exemptions. (NRS 445A.425, 445A.465)

1. A facility, regardless of size or type, may not degrade the waters of the State to the extent that:

(a) The quality of surface water is lowered below that allowed by NRS 445A.565.

(b) For groundwater:

(1) The quality is lowered below a state or federal regulation prescribing standards for drinking water; or

(2) The concentration of WAD cyanide exceeds 0.2 mg/l.

The Department may establish a numerical limit for any constituent not regulated by subparagraphs (1) and (2) which may reasonably be expected to be discharged by the facility in sufficient volume and concentration to cause an adverse impact on human health.

(c) The quality of those waters of the State which already exceed the criteria established by subsection 2 is lowered to a level that the Department finds would render those waters unsuitable for the existing or potential municipal, industrial, domestic or agricultural use.

2. The Department may exempt a body of groundwater or portion thereof from the standards established in subsection 1 if the request for an exemption to the groundwater standards and the supporting information is submitted as part of the application for the permit. The following criteria will be considered by the Department in determining whether to exempt a potentially impacted body of groundwater from the standards in subsection 1:

(a) The impacted groundwater does not currently serve as a source of drinking water and because of the following reasons the groundwater will not serve as a source of drinking water:

(1) The groundwater produces a mineral, hydrocarbon or geothermal fluid which the applicant can demonstrate to the satisfaction of the Department exists at a concentration that is expected to be capable of commercial production and that releases by the facility will not affect this production;

(2) The groundwater is situated at a depth or location which makes recovery of water for drinking economically or technologically impractical; or

(3) It would be economically or technologically impractical to render the water fit for human consumption; or

(b) The total dissolved solids in the groundwater is more than 10,000 milligrams per liter and the groundwater is not reasonably expected to become a supply of drinking water.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24342)

NAC 445A.425 Process components in existence on September 1, 1989: Standards; additional monitoring. (NRS 445A.425, 445A.465)

1. A process component in existence on September 1, 1989, is not required to meet more stringent engineering containment standards during the design life of that component if the applicant can demonstrate that:

(a) The process component meets and will continue to meet its design criteria; and

(b) There have been no significant changes in the characteristics of the material to be contained by the process component which would increase the potential to degrade the waters of the State.

2. Upon issuing a permit for a process component in existence on September 1, 1989, the Department may require additional monitoring of the site to verify that the conditions of this section are being met. A process component found to have had releases of process fluid as a result of this monitoring must comply with the requirements of NAC 445A.441.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24344)

NAC 445A.426 Notice of intent to commence active operation of process component. (NRS 445A.425, 445A.465) At least 30 days before the introduction of process solutions into a new process component or an existing process component which has been materially modified, the holder of the permit must notify the Department of the intent to commence active operation of that process component.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24346)

NAC 445A.427 Duties of holder of permit upon construction or modification of process component. (NRS 445A.425, 445A.465) Within 30 days after completing construction on a new process component or materially modifying an existing process component, the holder of the permit shall submit to the Department:

1. As-built drawings of the process component;
2. A summary of the quality control procedures which were carried out during construction; and
3. The final operating plans required by NAC 445A.398 which have been revised to reflect modifications made during construction.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24348)

NAC 445A.428 Level of containment required for placer mining or flotation facilities. (NRS 445A.425, 445A.465) For placer mining or flotation facilities, the level of containment required by the Department for process fluids will depend upon the characteristics of the ore and process water.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.2435)

NAC 445A.429 Procedures required to prevent release of contaminants; requirements concerning impoundments. (NRS 445A.425, 445A.465)

1. The holder of the permit must institute appropriate procedures to ensure that all mined areas do not release contaminants that have the potential to degrade the waters of the State.
2. Open pit mines must, to the extent practicable, be free-draining or left in a manner which minimizes the impoundment of surface drainage and the potential for contaminants to be transported and degrade the waters of the State.
3. Bodies of water which are a result of mine pits penetrating the water table must not create an impoundment which:
   (a) Has the potential to degrade the groundwaters of the State; or
   (b) Has the potential to affect adversely the health of human, terrestrial or avian life.
4. The holder of a permit may apply to the Commission to establish a beneficial use with a level of protection less than that required by paragraph (b) of subsection 3 for water impounded in a specific mine pit.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24352)

NAC 445A.430 Stabilization of spent ore. (NRS 445A.425, 445A.465)

1. Spent ore which has been left on pads or which will be removed from a pad must first demonstrate stability of the discharge effluent from the pads or from the spent ore such that:
   (a) WAD cyanide levels in the effluent are less than 0.2 mg/l;
   (b) The pH level of the effluent is between 6.0 and 9.0; and
   (c) Contaminants in any effluent from the processed ore which would result from meteoric waters would not degrade waters of the State.
2. If the requirements established in subsection 1 cannot be achieved, the Department will grant a variance to those conditions if the holder of the permit can demonstrate that:

(a) The remaining solid material, when representatively sampled, does not contain levels of contaminants that are likely to become mobile and degrade the waters of the State under the conditions that will exist at the site; or

(b) The spent ore is stabilized in such a fashion as to inhibit meteoric waters from migrating through the material and transporting contaminants that have the potential to degrade the waters of the State.

3. The Department may approve an alternate method for stabilizing ore that has been leached if the holder of the permit can clearly demonstrate that the condition in which the materials will be left will not create a potential for the waters of the State to be degraded.

(Added to NAC by Environmental Comm'n, eff. 9-1-89; A by R141-06, 10-31-2007)

NAC 445A.431 Stabilization of tailings. (NRS 445A.425, 445A.465) Upon termination of the active use of a tailings impoundment, representative samples of the material deposited in the impoundment must be collected and characterized. The tailings must be stabilized during the final closure of a facility so as to inhibit the migration of any contaminant that has the potential to degrade the waters of the State.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24356)

NAC 445A.432 Minimum design criteria: Generally. (NRS 445A.425, 445A.465) NAC 445A.433 to 445A.438, inclusive, define the minimum design criteria required of each process component and the site and operating conditions which are considered to exist when these criteria are applied. These provisions establish minimum contaminant control technologies and define the site and operating conditions which must be evaluated. Based on site characterization, best engineering judgment will be applied to determine the degree to which designs must provide more or less protection through engineered containment.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24358)

NAC 445A.433 Minimum design criteria: Universal requirements; areas where groundwater is near surface; proximity of new process components to dwellings; liability for degradation of water. (NRS 445A.425, 445A.465)

1. The following minimum design requirements apply to all process components:

(a) In areas where annual evaporation exceeds annual precipitation, a process component must achieve zero discharge.

(b) All sources must be designed to minimize releases of contaminants into groundwaters or subsurface migration pathways so that any release from the facility will not degrade waters of the State.

(c) All process components must be designed to withstand the runoff from a 24-hour storm event with a 100-year recurrence interval.

(d) The primary fluid management system must be designed to be able to remain fully functional and fully contain all process fluids including all accumulations resulting from a 24-hour storm event with a 25-year recurrence interval. The Department may require additional containment based on the following factors:

(1) Proximity to surface water bodies;

(2) Depth to groundwater; and

(3) Proximity to population.

Contingency plans for managing process contaminated flows in excess of the design quantity must be described in the appropriate operating plans.

(e) The fluid management system must be designed to be functional for 5 years after the projected operating life of the process component and permanent closure period.

(f) The design of the process components must take into consideration the proposed range of operating conditions for each component and the history of seismic events at the site in order to preclude any differential movement or shifting of the subbase, liner or contained material which endangers primary or secondary containment integrity.

2. Additional containment of process fluids may be required in areas where groundwater is considered to be near the surface. Groundwater is considered to be near the surface if:

(a) The depth from the surface to groundwater is less than 100 feet and the top 100 feet of the existing formation has a coefficient of permeability greater than that exhibited by 100 feet of $1x10^{-5}$ cm/sec material;

(b) Open fractured or faulted geologic conditions exist in the bedrock from the surface to the groundwater; or

(c) There is an inability to document that all exploratory and condemnation borings beneath the site have been adequately sealed.

3. No new process component containing process fluids may be located within 1,000 feet of any dwelling which is occupied at least part of the year and which is not a part of the facility. This restriction does not apply to modifications at a facility which predate such a dwelling.

4. The application of minimum design criteria does not release the holder of a permit from liability for degradation to waters of the State caused by the facility.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.2436)

NAC 445A.434 Minimum design criteria: Leach pads and other nonimpounding surfaces designed to contain and promote horizontal flow of process fluids. (NRS 445A.425, 445A.465) Leach pads and other nonimpounding surfaces which are designed to contain, not impound, process fluids and to promote the horizontal flow of process fluids must meet the following requirements:

1. Process fluids must exert only minimal hydraulic head on the liner.

2. Containment of process fluids must consist of an engineered liner system which provides containment equal to or greater than that provided by a synthetic liner placed on top of a prepared subbase of 12 inches of native, imported or amended soil, which has a maximum recompacted in place coefficient of permeability:

(a) Of $1x10^{-6}$ cm/sec; or

(b) Of $1x10^{-5}$ cm/sec when combined with a system for the detection of leaks which must be located at least beneath those portions of the liner which have the greater potential for leakage. The potential for leakage must be determined by:

(1) The extent of the hydraulic head exerted on a portion of the liner; and

(2) The period of time a portion of the liner is exposed to process fluids.

3. If leach pads or other nonimpounding surfaces are located above areas where groundwater is considered near the surface, the Department may require a liner system with a higher level of engineered containment.

4. When a material or system which provides hydraulic relief is installed beneath a single liner, including, but not limited to, sand, french drains and geotextiles, regardless of the intent of its design, it must function as a leak detection system and include a means for recovering process fluids.

5. Depending on the methods and materials used for their construction, the Department may require all open channels which routinely transport process fluids to be traced by a leak detection system.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24362)

NAC 445A.435 Minimum design criteria: Ponds. (NRS 445A.425, 445A.465)

1. All ponds which are intended to contain process fluids must have a primary synthetic liner and a secondary liner. Between the liners there must be a material which has the ability to rapidly transport any fluids entering it to a collection point which:

(a) Is accessible; and

(b) Has a system for recovering those fluids.

2. When the material between the liners is unable to collect, transport and remove all liquids at a rate that will prevent hydraulic head transference from the primary liner to the secondary liner, the pond must be shut down.

3. Ponds which are primarily designed to contain excess quantities of process fluids that result from storm events for limited periods may be constructed with a single liner if approved by the Department.

4. Ponds containing nonprocess fluids may be required to be lined depending on their potential to degrade waters of the State.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24364)

NAC 445A.436 Minimum design criteria: Vats, tanks and other containers which confine process fluids. (NRS 445A.425, 445A.465) Vats, tanks and other containers which confine process fluids and can be inspected for leaks visually do not require double liners if an area for secondary containment equal to 110 percent of the largest container is provided. Vats, tanks or other containers that are partially buried and cannot be visually inspected must have a system to detect leaks.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24366)

NAC 445A.437 Minimum design criteria: Tailings impoundments. (NRS 445A.425, 445A.465)

1. A tailings impoundment must utilize a system of containment equivalent to:

(a) Twelve inches of recompacted native, imported, or amended soils which have an in place recompacted coefficient of permeability of no more than $1x10^{-6}$ cm/sec; or

(b) Competent bedrock or other geologic formations underlying the site which has been demonstrated to provide a degree of containment equivalent to paragraph (a).

2. An alternate level of containment may be required by the Department for all of the tailings impoundment or for a portion thereof after considering the following factors:

(a) The anticipated characteristics of the material to be deposited;

(b) The characteristics of the soil and geology of the site;

(c) The degree to which the hydraulic head on the impoundment liner is minimized;

(d) The extent and methods used for recycling or detoxifying fluids;

(e) Pond area and volume;

(f) The depth from the surface to all groundwater; and

(g) The methods employed in depositing the impounded material.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24368)

NAC 445A.438 Minimum design criteria: Liners. (NRS 445A.425, 445A.465)

1. When placed on native materials, soil liners must have a minimum thickness of 12 inches and be compacted in lifts which are no more than 6 inches thick. Except when used in tailing impoundments, a soil liner must have a permeability of not more than that exhibited by 12 inches of $1x10^{-7}$ cm/sec material.

2. Synthetic liners must be rated as having a resistance to the passage of process fluids equal to a coefficient of permeability of $1x10^{-11}$ cm/sec.

3. The Department shall review for completeness the applicant's evaluation of the following design parameters, where applicable, for a liner:

(a) The type of foundation, slope and stability;

(b) The over liner protection and provisions for hydraulic relief;

(c) The load and means of applying load;

(d) The compatibility of a liner with process solutions;

(e) The complexity of the leak detection and recovery systems;

(f) The depth from the surface to all groundwater; and

(g) The liner's ability to remain functionally competent until permanent closure has been completed.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.2437)

NAC 445A.439 Program required to control quality of construction of liner systems. (NRS 445A.425, 445A.465) A quality assurance and quality control program must be developed and carried out for the construction of all liner systems. A summary of the quality control data must be submitted to the Department with the as-built drawings.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24372)

NAC 445A.440 Monitoring: Site of facility. (NRS 445A.425, 445A.465)

1. The program to monitor the site of a facility must be designed to monitor the quality of all ground and surface water which may be affected by the facility. The type, number and location of the monitoring points must be described in the application as part of the monitoring plan and must be approved by the Department.

2. Final monitoring requirements must be established by the Department.

3. Baseline data must be collected before operation of the facility.

4. In areas where there is a substantial separation between the process components and the groundwater, a system for monitoring highly probable escape pathways in the unsaturated zone may be required by the Department.

5. The decision where to locate the monitoring points for the site must be made after considering the site's geology and hydrogeology.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24374)

NAC 445A.441 Monitoring: Procedure upon variation in parameter or element being monitored. (NRS 445A.425, 445A.465) If the Department determines that there has been a variation in a parameter or element being monitored by the site-monitoring system as required in NAC 445A.440 which is caused by the facility and has the potential to degrade the waters of the State:

1. The holder of the permit shall conduct and submit an evaluation to the Department which:

(a) Identifies the source and escape pathways of the elements of concern;

(b) Determines the type, extent and ability of a system needed to contain or confine any migrating contaminant; and

(c) Identifies methods which can be carried out to remediate the contamination during the continued operation of the facility or at permanent closure.

2. The Department shall, based on the information provided pursuant to subsection 1:

(a) Require the immediate shut down of the process component and the immediate initiation of cleanup activities;

(b) Allow continued operation of the process component which is the source of the elements of concern with concurrent cleanup activities;

(c) Allow continued operation of the process component which is the source of the elements of concern while requiring the facility to continue to control the migration of the contaminant while cleanup activities are postponed; or

(d) Determine that no remedial action is warranted at the present time.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24376)

NAC 445A.442 Monitoring: Process components. (NRS 445A.425, 445A.465)

1. The Department shall determine the extent and complexity to which the holder of a permit must monitor individual process components for the release of contaminants after reviewing site and process controlled design conditions. Systems designed to detect and control leaks from process components must be located at the interface of the unit process components and the adjacent environment and be able to provide the first indication that pollutants or contaminants have escaped their primary containment.

2. The program to monitor the process components must include:

(a) A schedule of activities;

(b) A roster of current job titles for persons responsible for and involved in the monitoring program; and

(c) The form and frequency of reports to be submitted to the Department.

The Department may randomly collect information or samples for reference. The cost of analyzing samples may be placed upon the holder of the permit.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24378)

NAC 445A.443 Monitoring: Beneficiation process. (NRS 445A.425, 445A.465) Monitoring of the beneficiation process must include the routine characterization of those process materials which will be disposed. The data obtained must be used by the holder of the permit to evaluate periodically and, when necessary, to refine the plan for the permanent closure of the facility.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.2438)

NAC 445A.444 Examples of planned and unplanned temporary closures. (NRS 445A.425, 445A.465)

1. The following are examples of planned temporary closures which have specific conditions defining their beginning and end:

(a) Seasonal closures because of normal weather cycles.

(b) Interruptions in the active beneficiation processes to provide planned periods of quiescence for metallurgical or operating reasons.

(c) Any other planned process condition which will interrupt the active beneficiation process.

2. The following are examples of unplanned temporary closures:

(a) A closure because of unforeseen weather events.

(b) A failure in a major system component or a process failure which causes the fluid management system or a portion thereof to shut down.

(c) The discontinuation of a facility's operations because of litigation.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.24382)

NAC 445A.445 Procedure upon unplanned temporary closure of process component. (NRS 445A.425, 445A.465)

1. In the event of an unplanned temporary closure of one or more process components, the holder of the permit shall:

(a) Within 30 days after an unplanned temporary closure begins, inform the Department of the closure and describe the procedures and controls which have been carried out to maintain the process components during this period.

(b) Within 90 days after the Department has been notified of the unplanned temporary closure:

(1) Begin to evaluate the procedures which will be required to carry out a permanent closure of the process components affected and petition the Department to approve one or more procedures needed for the permanent closure of the process components affected; or

(2) For just cause, request that the Department grant an extension and delay permanent closure. Except as otherwise provided in subsection 2 of NAC 445A.420, the extension may not be longer than the remaining term of the existing permit or for 3 years, whichever is greater.

2. The Department shall approve or disapprove the proposed procedures for permanent closure within 30 days after they are submitted to the Department.

3. Unless the Department has granted an extension pursuant to subparagraph (2) of paragraph (b) of subsection 1 within 270 days after the Department has been notified of the unplanned temporary closure, the holder of the permit shall initiate the approved procedures for permanent closure.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.24384)

NAC 445A.446 Permanent closure of facility. (NRS 445A.425, 445A.465)

1. The permanent closure of a facility must be initiated:

(a) Following the request of the holder of the permit;

(b) For a facility which is under a temporary closure, no later than at the end of one renewal of a 5-year permit which has been issued pursuant to subsection 2 of NAC 445A.420; or

(c) When the end of the design life of that process component is reached.

2. Permanent closure is complete when the requirements contained in NAC 445A.429, 445A.430 and 445A.431 have been achieved.

3. The time required for monitoring the facility following permanent closure depends upon the particular site and process characteristics, but in no event may the time required exceed 30 years.

(Added to NAC by Environmental Comm'n, eff. 9- 1-89) — (Substituted in revision for NAC 445.24386)

NAC 445A.447 Plans for permanent closure; sources not classified as process components. (NRS 445A.425, 445A.465)

1. Plans for permanent closure are required for all sources at a facility.

2. A final plan for permanent closure of any source which has been identified as a process component must be submitted to the Department at least 2 years before the anticipated permanent closure of that process component.

3. Sources which have not been classified as process components must be evaluated at the end of their operating life to determine the potential for pollutants from these sources to migrate and degrade the

waters of the State under the final proposed site c onditions and must be closed in accordance with the State Handbook of Best Management Practices prepared pursuant to NAC 445A.336.

(Added to NAC by Environmental Comm'n, eff. 9-1-89) — (Substituted in revision for NAC 445.24388)

STATE OF NEVADA
Department of Conservation and Natural Resources
Division of Environmental Protection
Bureau of Mining Regulation and Reclamation

Water Pollution Control Permit

Permittee: **Boiler Plate Company** ***(Secretary of State Listed?)***
Secret Mining Project
P.O. Box 0000
Mining Town, NV 89000

Permit Number: **NEV#########**
Review Type/Year/Revision: **New Permit/Renewal YYYY, Revision xx**

Pursuant to Nevada Revised Statutes (NRS) 445A.300 through 445A.730, inclusive, and regulations promulgated thereunder by the State Environmental Commission and implemented by the Division of Environmental Protection (the Divis ion), this Permit authorizes the Permittee to construct, operate, and (for closure permits deleteconstruct, operate, and) close the**Secret Mining Project**, in accordance with the limitations, requirements, and other conditions set forth in this Permit. The Permittee is authorized to process up to **##,###,###** **tons** of ore per year (for closure permits replace the previous sentence with The Permittee is not authorized to mine or process ore).

The facility is located in Paradise County, within Sections 1, 2, and 3, Township 1 North (T1N), Range 2 East (R2E); and Sections 1-36, T2N, R2E, Mo unt Diablo Baseline and Meridian, approximately zz miles north/south/east/west of the town of Smalltown, Nevada.

The Permittee must comply with all terms and conditions of this Permit and all applicable statutes and regulations.

This Permit is based on the assumption that the inf ormation submitted in the application of Day Month Year, as modified by subsequent approved amen dments, is accurate and that the facility has been constructed and is being operated (for clo sure permits replace operated with closed) as specified in the application. The Permittee must i nform the Division of any deviation from, or changes in, the information in the application, whi ch may affect the ability of the Permittee to comply with applicable regulations or Permit conditions.

This Permit is effective as of **Day Month Year**, and shall remain in effect until **Day-1 Month Year**+5, unless modified, suspended, or revoked.

Signed this _____ day of **Month Year**.

_____
Joseph Sawyer, P.E.
Chief, Bureau of Mining Regulation and Reclamation

I. Specific Facility Conditions and Limitations

A. In accordance with operating plans (for closure per mits add:, closure plans,) and facility design plans reviewed and approved by the Division the Permittee shall:

1. Construct, operate, and close the facility in accordance with those plans;
2. Contain within the fluid management system all proc ess fluids including all meteoric waters which enter the system as a result of the 25 -year, 24-hour storm event (for closure permits, unless we determine a different st orm event is appropriate, consider replacing the 25-year, 24-hour storm event with the 500-year, 24-hour storm event); and
3. Not release or discharge any process or non-process contaminants from the fluid management system (for closure or non-closure permi ts that include a discharge add:, except as approved by the Division in accordance wi th this Permit and any associated plans, reports, studies, and designs).

B. Schedule of Compliance: None Required (Delete "Non e Required" if you choose to include any SOC items below) (Between renewals, whe n the Permit is modified, update any completed SOC items with " Completed dd Month yyyy ", but no other status information is allowed. During renewals, all completed SOC items are deleted and the SOC item numbering is revised accordingly.)

1. Put your SOC item(s) here.

The schedule of compliance items above are not cons idered completed until approved in writing by the Division.

C. The fluid management system covered by this Permit consists of the following process components:

1. Lined heap leach pad and solution collection area;
2. Solution collection pipe and lined solution collection ditch;
3. Leak detection system for the pad, solution collection area, and collection ditch;
4. Pregnant and barren solution ponds and corresponding leak detection systems;
5. Transfer pipes, valves, and pumps used in conveyance, control, or detection of process fluids between process components; and
6. Process recovery building, including, but not limit ed to, all tanks, basins, sumps, pumps, and piping necessary to interconnect the components within the building.

D. Monitoring Requirements:

Identification	**Parameter**	**Frequency**
1. Water Supply Well XX	Profile I[2]	Initially then annually

Identification	**Parameter**	**Frequency**
2. Leach Pad, Channel and Pipeline Leak Detection Heap Leach Pad (HLP) Solution Channel (SC)	Average daily accumulation (gpd)	Weekly[1] (once commissioned)
3. Pond Leak Detection (sump capacity, if known) Pregnant Solution Pond (PSP) (x,xxx gal) Barren Solution Pond (BSP) (x,xxx gal)	Average daily accumulation (gpd)	Weekly[1] (once commissioned)
4. Piezometer Measurements Drainage Blanket (DB) Tailings Solids (TS)	Hydraulic head (feet)	Weekly
5. Process Solution Pregnant Pond (PP) Barren Pond (BP) Underdrain Pond (UP) Tailings Slurry (TSL)	Profile I[2]	Quarterly (once commissioned)
6. Mined Materials Waste Rock (WR) Ore Stockpile (OS) Alluvial Overburden (AO); Leach Pad Ore (LO) (Note: for physical separation facilities, no ore or waste rock analyses may be warranted if we can require Profile I analyses of the process wash water instead)	MWMP[4] -Profile I[2] and ANP/AGP[3][5]; ANP/AGP[3][5]	Quarterly; Quarterly
7. Site Monitoring Wells Alluvial Wells Bedrock Wells Upgradient Wells Downgradient Wells	Profile I[2], water and collar elevation (feet AMSL)	Quarterly (once Commissioned)

Identification	**Parameter**	**Frequency**
8. Petroleum Contaminated Soil (PCS) Screening Analysis Each temporary holding pad and treatment cell, by PCS source type; Each approved on-site disposal location, by PCS source type	VOCs[7], SVOCs[8], TPH[9]; VOCs[7], SVOCs[8], TPH[9]	Quarterly, prior to removal[10]; Quarterly after provisional placement[10]
9. PCS Hazardous Waste Determinations Each PCS source	Hazardous waste determination[11]	When required[11]
10. PCS Management Each temporary Holding pad, treatment cell, and disposal location by PCS source type	PCS volume added, volume removed and destination, total volume present (cubic yards)	Quarterly
11. Pit Lake Monitoring Each Pit Lake that forms (for closure permits add a separate item as follows with associated footnote – list every pit that could have a pit lake) A Pit, B Pit, C Pit	Profile III[12], photograph, lake surface elevation (feet AMSL), area (acres), maximum lake depth (feet); Water temperature (°F), field pH (SU), and specific conductance (µS/cm) at lake surface, and for any lake ≥ 25 feet in depth, the same measurements at intermediate and bottom depths, plus the measurement depth (feet); Presence of Water[14]	Quarterly, when present; Monthly, when present; Semi-Annually (Q2 and Q4)

Identification	Parameter	Frequency
12. Waste Rock Storage Facilities A, B, C, etc (list all that could have seeps); Each seep that is flowing	Physical stability, presence of water[15]; Photograph, field pH (SU), field specific conductance (µS/cm), Profile I[2]	Semi-Annually (Q2 and Q4); Semi-Annually (Q2 and Q4 when flowing)

The Permittee may request a reduction of the monitoring frequency after four quarters of complete monitoring based on justification other than cost. Such reductions may be considered modifications to the Permit and require payment of modification fees.

Abbreviations:

gal = gallons; gpm = gallons per minute; gpd = gallons per day; AMSL = above mean sea level; $CaCO_3$ = calcium carbonate; N = nitrogen; SU = standard units; pCi/L = picocuries per liter; DO = dissolved oxygen; mg/L = milligrams per liter; MGD = million gallons per day; MWMP = Meteoric Water Mobility Procedure; ANP/AGP = Acid Neutralizing Potential:Acid Generation Potential ratio; PCS = Petroleum-Contaminated Soil; VOCs = volatile organic compounds; SVOCs = semi-volatile organic compounds; TPH = total petroleum hydrocarbons; ºF = degrees Fahrenheit; µS/cm = microSiemens per centimeter; ASTM = American Society for Testing and Materials; EPA = U.S. Environmental Protection Agency; WAD = weak acid dissociable; Q = calendar quarter of the year

Footnotes:

(1) The sump must be inspected and evacuated on a more frequent basis than weekly (for closure permits consider relaxing frequency, but not more than necessary, if site is not continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system) if the fluid level is above the top of the sump or the invert of any pipe which discharges into the sump, whichever level is lower, or if the potential exists to exceed the sump capacity. (for closure permits, if inspection frequency is relaxed from weekly, also add the following: The sumps must also be inspected during, if possible, and after major storm events in accordance with Part I.I, and at any other time when an increase in leakage flow may occur (e.g., during spring melt, etc.)). Records are required documenting volume, date, and time of extraction to show that sumps are maintained in this condition.

(2) Profile I:

Alkalinity (as $CaCO_3$)	Cadmium	Magnesium	Silver
Bicarbonate	Calcium	Manganese	Sodium
Total	Chloride	Mercury	Sulfate
Aluminum	Chromium	Nitrate + Nitrite (as N)	Thallium

Antimony	Copper	Nitrogen, Total (as N)	Total Dissolved Solids
Arsenic	Fluoride	pH (± 0.1 SU)[13]	WAD Cyanide
Barium	Iron	Potassium	Zinc
Beryllium	Lead	Selenium	-

(Note 1: if this is a physical separation permit, consider eliminating WAD Cyanide from the Profile I list. Typically, when we've done that we've still called it Profile I.)

(Note 2: if the ore, waste rock, or process fluid may contain elevated concentrations of radionuclides, consider using a Profile I-R instead of, or in addition to, Profile I for some or all monitoring points, as applicable. If you add Profile I-R, also consider adding a separate footnote identifying the following Division reference values for radionuclides (because they aren't listed on NDEP Form 0190): 15 pCi/L for Gross Alpha, 5 pCi/L for Combined Radium, and 0.03 mg/L for Uranium) Profile I-R includes Profile I plus the following:

Gross Alpha (pCi/L)	226Radium + 228Radium (pCi/L)	Uranium	-

(Note 3: if the ore, waste rock, or process fluid may contain elevated concentrations of other constituents that are not included in the typical Profile I, consider whether it may be appropriate to add those constituents to the Profile I for that site on a case-by-case basis, especially if there are applicable drinking water standards that apply to those additional constituents.)

(3) When static testing[5] characterization of Mined Materials shows the potential for acid generation as set forth in the current version of the Division guidance document "Waste Rock, Overburden, and Ore Evaluation," the Permittee shall, as applicable, notify the Division in writing and initiate kinetic testing[6] within 10 days.

If the kinetic test results indicate acid generation conditions exist, the Permittee shall submit in writing, within 30 days, the methods proposed for providing containment of these materials and the anticipated impact this acid generation potential may have on final stabilization of all components affected as defined in Nevada Administrative Code (NAC) 445A.359.

(4) The Meteoric Water Mobility Procedure (MWMP) shall be performed by a Nevada-approved laboratory, in accordance with ASTM Method E 2242 (or the most current method).

(5) Acid Neutralizing Potential/Acid Generating Potential (ANP/AGP, also known as static testing or acid-base accounting) shall be performed by a Nevada-approved laboratory, using a LECO-type analysis, with full sulfur speciation, in accordance with the 2015 Update Nevada Modified Sobek Procedure.

(6) Kinetic testing (humidity cell testing) shall be performed by a Nevada-approved laboratory, in accordance with ASTM Method D 5744-07 Option 'A' (or the most current approved method); tests shall be run for a minimum of 20 weeks and for a longer duration if warranted or recommended by the analytical laboratory or required by the Division; samples shall be collected weekly (all weeks) and measurements shall be recorded for redox potential, pH, specific conductance (µS/cm), acidity and/or alkalinity (as deemed appropriate by the laboratory), sulfate, iron (total, plus ferric and ferrous speciation if total iron > 0.6 mg/L and pH < 5 SU), and dissolved calcium and magnesium; weekly filtered extracts per the method will be digested and analyzed for

total recoverable concentrations during week 0, 1, 2, 4, 8, 12, 16, and 20; 4-week extracts thereafter (i.e., week 24, 28, 32, etc.) shall be analyzed by a Nevada-certified analytical laboratory for Profile I[2] parameters, and specific conductance (µS/cm) and acidity and/or alkalinity shall be recorded as recommended by the analytical laboratory; final results reported shall include initial and final static test results[5], a Profile I[2] analysis of the final leachate, all kinetic test results above, and any additional analyses required by the Division.

(7) Volatile Organic Compounds (VOCs) analyzed by a Nevada-certified laboratory using EPA Method 8260B.

(8) Semi-Volatile Organic Compounds (SVOCs) analyzed by a Nevada-certified laboratory using EPA Method 8270D.

(9) Total Petroleum Hydrocarbons (TPH) analyzed by a Nevada-certified laboratory using EPA Method 8015 Modified. If any gasoline-range petroleum is suspected, or if the source-type is unknown, both TPH-P (purgeable) and TPH-E (extractable) are required. Otherwise, only TPH-E is required.

(10) Each segregated source type of PCS must be sampled separately pursuant to the approved sample collection protocol. For temporary holding pads and treatment cells, analyses are required only in quarters when PCS removal from the pad is anticipated. Removal to an on-site disposal location is authorized if PCS meets screening levels. For approved on-site disposal locations, analyses are required only in quarters when PCS has been provisionally placed subject to screening results.

(11) A hazardous waste determination is required: a) Initially, for each PCS source prior to management under the PCS Management Plan; b) When a PCS waste stream is suspected to have changed character since the last determination; and c) When a hazardous constituent is detected during screening analyses at a concentration suggestive of hazardous waste. Determinations must be performed pursuant to 40 Code of Federal Regulations (CFR) 262.11 using operator knowledge and/or applicable analytical testing methods described in EPA publication SW-846. Operator knowledge must be adequately described and sufficient to justify the determination.

(12) Profile III:

Alkalinity (as $CaCO_3$)	Calcium	Mercury	Strontium
Bicarbonate	Chloride	Molybdenum	Sulfate
Total	Chromium	Nickel	Thallium
Aluminum	Copper	Nitrate + Nitrite (as N)	Tin
Antimony	Fluoride	Nitrogen, Total (as N)	Total Dissolved Solids
Arsenic	Iron	pH (± 0.1 SU)[13]	Total Suspended Solids
Barium	Lead	Phosphorus	Uranium
Beryllium	Lithium	Potassium	Vanadium
Boron	Magnesium	Selenium	Zinc
Cadmium	Manganese	Sodium	-

(13) All sample analyses resulting in a pH value less than or equal to 5.0 SU shall also be analyzed for acidity (mg/L, as $CaCO_3$ equivalent).

(14) (for closure permits with presence of water monitoring in pits)For presence of water, state whether the pit surface is dry, damp, or wet(ponded or flowing water). If ponded or flowing water is observed, the Permittee shall perform the required monitoring for pit lakes. Field specific conductance shall be reported as total dissolved solids.

(15) (for closure permits with monitoring of waste rock storage facilities)Provide a visual evaluation of each waste rock storage facility for physical stability (e.g., stable, unstable, or slope failure), presence of water, and seepage. If visibly unstable, or slope failure, describe. For presence of water, identify whether the surface and toes of the waste rock storage facility are dry, damp, or wet (ponded or flowing water). If seepage is emanating from any portion of a waste rock storage facility, the Permittee shall perform the required monitoring for seeps. Field specific conductance shall be reported as total dissolved solids.

E. Quarterly and annual monitoring reports and release reporting shall be in accordance with Part II.B.

F. All sampling and analytical accuracy shall be in accordance with Part II.E.

G. Permit Limitations

1. The daily accumulation or flow exceeding 20 gallons per day averaged over the quarter in the leak detection sump/port/pipe identified in Part I.D.2.
2. The daily accumulation or flow exceeding 10 gallons per day averaged over the year in the leak detection sump/port/pipe identified in Part I.D.2.
3. The daily accumulation or flow exceeding 150 gallons per day averaged over the quarter in the leak detection sump/port/pipe identified in Part I.D.3.
4. The daily accumulation or flow exceeding 50 gallons per day averaged over the year in the leak detection sump/port/pipe identified in Part I.D.3.
5. Failure to meet a Schedule of Compliance date or requirement.
6. The storage of process solution in a single-lined pond for more than 20 consecutive days for any single event.
7. Except as otherwise allowed by this Permit, a minimum 2-foot freeboard shall be maintained in all ponds.
8. The hydraulic head on the tailings impoundment piezometers located in the drainage blanket should not exceed XYZ feet. This limitation will not apply to the first seven months of operation of any new tailings impoundment or cell.
9. The tailings impoundment embankment crest elevation shall not exceed X,XXX feet AMSL.
10. The tailings impoundment supernatant pool shall be managed as necessary to maintain a minimum 2-foot freeboard. In beach areas, a damcrest elevation shall be maintained X feet higher than the adjacent maximum tailings elevation.

11. Tailings material may not be removed from the tailings impoundment, except with prior written authorization from the Division.

12. Heap leach pads, as measured vertically from the top of the synthetic liner for any point on the pad, constructed in excess of a maximum permitted elevation of XYZ feet over minimum XX-mil thickness HDPE synthetic liner.

13. The cumulative solution application rate to the heap leach pad should not exceed the permitted X,XXX gallons per minute (gpm). Additionally, the solution application rate *per unit area* should not exceed 0.005 gpm/ft^2.

14. The _____ leach pad injection system shall be operated in accordance with the Division-approved design to minimize the potential to create a phreatic surface within the heap material:

    a. Injection boreholes shall be drilled to a depth not less than 50 feet above the liner surface;
    b. Boreholes shall be placed no less than 100 feet apart;
    c. Two adjacent injection wells shall not receive solution simultaneously;
    d. Solution shall not be applied to the surface of an area under active injection;
    e. A seal ring shall be used to control the zones receiving injected solution within each casing both during the pressure stimulation phase and the leaching phase;
    f. Injection shall not occur until the static solution level in the well is established, and is at or below the lowest perforations in the casing;
    g. Solution levels shall be monitored in all wells within 200 feet from an active injection well. If the solution level rises in any of these nearby wells, the injection rate shall be reduced until the solution level drops again. If the solution level does not drop in a well that initially rose, injection shall be terminated and may be moved to another well that did not exhibit a rise in solution level;
    h. Injection rates shall not exceed the permitted application rates for the heap;
    i. Daily visual observation of the side slopes will be conducted (*consider including this monitoring in Part I.D*). If solution seepage appears on the heap side slopes, solution injection shall be terminated and may be moved to another zone or well that did not exhibit a rise in solution level; and
    j. The _____ injection system shall be operated in a non-sequential progression to avoid creating and sustaining a phreatic surface in the heap. The operation shall not proceed in sequence from north to south, left to right, circular, or any other pattern that causes adjacent wells to be operated in succession to one another.

15. PCS that exceeds screening levels shall not be placed at an on-site disposal location.

Exceedances of these limitations may be Permit violations and shall be reported as specified in Part II.B.4.

H. The facility shall maintain an automated or manual calibrated rain gauge, which shall be monitored at least daily to record precipitation (inches of water) (Only for physical separation facilities that aren't manned every day, add the following phrase) every day that the site is manned. A written and/or electronic record of daily accumulations of precipitation shall be maintained on site (for closure permits change to: at the office of record of the Permittee). Depending on site topography and size, multiple meteorological stations may be required.

I. The Permittee shall inspect all control devices, systems, and facilities weekly (for closure permits consider relaxing frequency, but not more than necessary, if site is not continuously manned and the reduction is justified based on monitoring results and long-term performance of the monitored system), and during (when possible) and after major storm events. These inspections are performed to detect evidence of:

   1. Deterioration, malfunction, or improper operation of control or monitoring systems;
   2. Sudden changes in the data from any monitoring device;
   3. The presence of liquids in leak detection systems; and
   4. Severe erosion or other signs of deterioration in dikes, diversions, closure covers, or other containment devices.

J. Prior to initiating permanent closure activities at the facility, or at any process component or other source within the facility, the Permittee must have an approved final plan for permanent closure.

K. The Permittee shall remit an annual review and services fee in accordance with NAC 445A.232 starting July 1 after the effective date of this Permit and every year thereafter until the Permit is terminated or the facility hasreceived final closure certification from the Division.

L. The Permittee shall not dispose of or treat Petroleum-Contaminated Soil (PCS) on the mine site without first obtaining from the Division approval of a PCS Management Plan. The approved PCS Management Plan and the Division Guidance for Mine-Site PCS Management Plans are hereby incorporated into this Permit by reference.

M. When performing dust suppression activities, the Permittee shall use best management practices and appropriate selection of water source and additives to prevent degradation of waters of the State. If a dust suppressant exceeds a water quality standard and the corresponding natural background water concentration in the area where dust suppression will occur, the Permittee shall demonstrate no potential to degrade waters of the State.

N. Continuing Investigations: None Required (Delete "None Required" if you choose to include any continuing investigation items below. Customize the continuing investigation items to the individual Project; do not require pitlake study or WRMP updates for Projects that don't need them)

   1. The Permittee shall submit to the Division for review and approval an updated pit lake study and ecological risk assessment with each Permit renewal and with any application to modify the Permit that could affect the pit lake predictive model. The study and assessment shall address, at a minimum, the requirements of NAC 445A.429, and shall include all available data, alternative pit lake or backfill scenarios, and mitigations to reduce ecological risk, as applicable. Approval may require modification of the Permit and payment of modification fees.
   2. The Permittee shall submit to the Division for review and approval an updated waste rock management plan (WRMP) with each Permit renewal and with any application to modify the Permit that could affect the WRMP. A revised WRMP must also be approved prior to initiating mining or in-pit backfill activities not previously approved.

The WRMP must include representative characterization data for all anticipated waste rock and overburden in accordance with the current version of the Division guidance document "Waste Rock, Overburden, and Ore Evaluation," in addition to a detailed description of how, when, and where the materials will be managed and monitored, and appropriate controls to eliminate any potential to degrade waters of the State, if applicable. Approval may require modification of the Permit and payment of modification fees.

II. General Facility Conditions and Limitations

A. General Requirements

1. The Permittee shall achieve compliance with the conditions, limitations, and requirements of the Permit upon commencement of each relevant activity. The Administrator may, upon the request of the Permittee and after public notice (if required), revise or modify a Schedule of Compliance in an issued Permit if he determines good and valid cause (such as an act of God, a labor strike, materials shortage, or other event over which Permittee has little or no control) exists for such revision.

2. The Permittee shall at all times maintain in good working order and operate as efficiently as possible, all devices, facilities, and systems installed or used by the Permittee to achieve compliance with the terms and conditions of this Permit.

3. Whenever the Permittee becomes aware that he failed to submit any relevant facts in the Permit application, or submitted incorrect information in a Permit application or in any report to the Administrator, the Permittee shall promptly submit such facts or correct information. Any inaccuracies found in this information may be grounds for revocation or modification of this Permit and appropriate enforcement action.

B. Reporting Requirements

1. The Permittee shall submit quarterly reports (for closure permits consider: semi-annual?), in both hard copy and a Division-approved electronic format (For physical separation facilities, consider requiring only hard copy format), which are due to the Division on or before the 28th day of the month following the quarter (for closure permits consider: by January 28th and July 28th of each year?) and must contain the following:

a. Monitoring results from the leak detection sumps or piezometers identified in Part I.D, reported on Nevada Division of Environmental Protection (NDEP) Form 0590 or equivalent;

b. Analytical results of the solution collected from monitoring locations identified in Part I.D, reported on NDEP Form 0090/0190 (as appropriate) or equivalent;

c. Water and collar elevations for site monitoring wells identified in Part I.D;

d. Analytical results of the MWMP-Profile I and ANP/AGP testing for the materials identified in Part I.D, reported on NDEP Form 0090/0190 (as appropriate) or equivalent;

e. Analytical results for the pit lakes identified in Part I.D, reported on NDEP Form 0290 or equivalent;

f. Other monitoring results for the pit lakes identified in Part I.D;

g. A record of releases, and the remedial actions taken in accordance with the approved Emergency Response Plan on NDEP Form 0490 or equivalent;

h. For any kinetic test initiated, continued, or terminated with Division approval during the quarter, provide a brief report of the test status and an evaluation of the results to date, which shall include all analytical data generated from the date testing was initiated through the reporting quarter;

i. Analytical results, copies of hazardous waste determinations, and monitoring results, identified in Parts I.D.9 through I.D.11, pertaining to the approved PCS Management Plan; and

j. An updated list of all PCS sources managed under the approved PCS Management Plan, with any new or changed sources highlighted, reported on NDEP Form PCS-01 or equivalent; current screening levels for each on-site disposal location; and a detailed explanation of any revisions to screening levels.

Facilities which have not initiated mining or construction, must submit a quarterly report identifying the status of mining or construction. Subsequent to any noncompliance or any facility expansion which provides increased capacity, the Division may require an accelerated monitoring frequency.

2. The Permittee shall submit an annual report, in both hard copy and a Division-approved electronic format (For physical separation facilities, consider requiring only hard copy format), by February 28th of each year, for the preceding calendar year, which contains the following:

a. Analytical results of water quality samples collected from water supply wells reported on NDEP Form 0190 or equivalent;

b. A synopsis of releases on NDEP Form 0390 or equivalent;

c. A brief summary of site operations, including the number of tons of ore milled or placed on heaps (as applicable) during the year, construction and expansion activities, and major problems with the fluid management system;

d. A table of total monthly precipitation amounts recorded in accordance with Part I.H, reported for either a five-year history previous to the date of submittal or the history since initial Permit issuance, whichever is shorter (for closure permits consider extending beyond a five-year history if warranted for specific monitoring locations);

e. An updated version of the facility monitoring and sampling procedures and protocols;

f. An updated evaluation of the closure plans using specific characterization data for each process component with respect to achieving stabilization; and

g. Graphs of leak detection flow rates, pH, total dissolved solids (TDS), sulfate, chloride, nitrate + nitrite (as N), WAD cyanide, fluoride, zinc, and arsenic concentration (as applicable), versus time for all fluid sampling points. These graphs shall display either a five-year history previous to the date of submittal or

the history since initial Permit issuance, whichever is shorter (for closure permits consider extending beyond a five-year history if warranted for specific monitoring locations). Additional parameters may be required by the Division if deemed necessary.

3. Release Reporting Requirements: The following applies to facilities with an approved Emergency Response Plan. If a site does not have an approved Emergency Response Plan, then all releases must be reported as per NAC 445A.347 or NAC 445A.3473, as appropriate.

a. A release of any quantity of hazardous substance, as defined at NAC 445A.3454, to surface water, or that threatens a vulnerable resource, as defined at NAC 445A.3459, must be reported to the Division as soon as practicable after knowledge of the release, and after the Permittee notifies any emergency response agencies, if required, and initiates any action required to prevent or abate any imminent danger to the environment or the health or safety of persons. An oral report shall be made by telephone to (888) 331-6337 for in-State callers or (775) 687-9485 for out-of-State callers, and a written report shall be provided within 10 days in accordance with Part II.B.4.b.

b. A release of a hazardous substance in a quantity equal to or greater than that which is required to be reported to the National Response Center pursuant to 40 Code of Federal Regulations (CFR) Part 302 must be reported as required by NAC 445A.3473 and Part II.B.3.a.

c. A release of a non-petroleum hazardous substance not subject to Parts II.B.3.a. or II.B.3.b., released to soil or other surfaces of land, and the total quantity is equal to or exceeds 500 gallons or 4,000 pounds, or that is discovered in or on groundwater in any quantity, shall be reported to the Division no later than 5:00 P.M. of the first working day after knowledge of the release. An oral report shall be made by telephone to (888) 331-6337 for in-State callers or (775) 687-9485 for out-of-State callers, and a written report shall be provided within 10 days in accordance with Part II.B.4.b. Smaller releases, with total quantity greater than 25 gallons or 200 pounds and less than 500 gallons or 4,000 pounds, released to soil or other surfaces of land, or discovered in at least 3 cubic yards of soil, shall be reported quarterly on NDEP Form 0390 or equivalent.

d. Petroleum Products and Coolants: If a release is subject to Parts II.B.3.a. or II.B.3.b., report as specified in Part II.B.3.a. Otherwise, if a release of any quantity is discovered on or in groundwater, or if the total quantity is equal to or greater than 100 gallons released to soil or other surfaces of land, report as specified in Part II.B.3.c. Smaller releases, with total quantity greater than 25 gallons but less than 100 gallons, released to soil or other surfaces of land, or if discovered in at least 3 cubic yards of soil, shall be reported quarterly on NDEP Form 0390 or equivalent.

4. The Permittee shall report to the Administrator any noncompliance with the Permit.

a. Each such event shall be reported orally by telephone to (775) 687-9400, not later than 5:00 P.M. of the next regular work day from the time the Permittee has knowledge of the circumstances. This report shall include the following:

i. Name, address, and telephone number of the owner or operator;

ii. Name, address, and telephone number of the faci lity;

iii. Date, time, and type of incident, condition, o r circumstance;

iv. If reportable hazardous substances were release d, identify material and report total gallons and quantity of contaminant;

v. Human and animal mortality or injury;

vi. An assessment of actual or potential hazard to human health and the environment outside the facility; and

vii. If applicable, the estimated quantity of material t hat will be disposed and the disposal location.

b. A written summary shall be provided within 10 days of the time the Permittee makes the oral report. The written summary shall contain:

i. A description of the incident and its cause;

ii. The periods of the incident (including exact da tes and times);

iii. If reportable hazardous substances were releas ed, the steps taken and planned to complete, as soon as reasonably practicable, an assessment of the extent and magnitude of the contamination pursuant to NAC 445A.2269;

iv. Whether the cause and its consequences have bee n corrected, and if not, the anticipated time each is expected to continue; and

v. The steps taken or planned to reduce, eliminate, and prevent recurrence of the event.

c. The Permittee shall take all available and reasonab le actions, including more frequent and enhanced monitoring to:

i. Determine the effect and extent of each incident ;

ii. Minimize any potential impact to the waters of the State arising from each incident;

iii. Minimize the effect of each incident upon dome stic animals and all wildlife; and

iv. Minimize the endangerment of the public health and safety which arises from each incident.

d. If required by the Division, the Permittee shall submit, as soon as reasonably practicable, a final written report summarizing any related actions, assessments, or evaluations not included in the report required in Part II.B.4.b., and including any other information necessary to determine and minimize the potential for degradatio n of waters of the State and the impact to human health and the environment. Submittal of the final report does not relieve the Permittee from any additional actions, assessments, or evaluations that may be required by the Division.

C. Administrative Requirements

1. A valid Permit must be maintained until permanent c losure is complete. Therefore, unless permanent closure has been completed and ter mination of the Permit has been approved in writing by the Division, the Permittee shall apply for Permit renewal not later than 120 days before the Permit expires.

2. Except as required by NAC 445A.419 for a Permit transfer, the Permittee shall submit current Permit contact information described in par agraphs (a) through (c) of subsection 2 of NAC 445A.394 within 30 days after a ny change in previously submitted information.
3. All reports and other information requested by the Administrator shall be signed and certified as required by NAC 445A.231.
4. All reports required by this Permit, including, but not limited to, monitoring reports, corrective action reports, and as-built reports, as applicable, and all applications for Permit modifications, shall be submitted in both ha rd copy and a Division-approved electronic format. (For physical separation facilit ies, consider deleting this item entirely, to eliminate the electronic submittal requirement. Either way, ensure that this Part is consistent with Parts II.B.1 and II.B.2)
5. When ordered consistent with Nevada Statutes, the Permittee shall furnish any relevant information in order to determine whether cause exi sts for modifying, revoking and reissuing, or permanently revoking this Permit, or to determine compliance with this Permit.
6. The Permittee shall maintain a copy of, and all mod ifications to, the current Permit at the permitted facilities (for closure permits chang e to: at the office of record of the Permittee) at all times.
7. The Permittee is required to retain during operatio n, closure, and post-closure monitoring (for closure permits delete; operation,), all records of monitoring activities and analytical results, including all original stri p chart or data logger recordings for continuous monitoring instrumentation, and all cali bration and maintenance records. This period of retention must be extended during th e course of any unresolved litigation.
8. The provisions of this Permit are severable. If an y provision of this Permit, or the application of any provision of this Permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this Permit, shall not thereby be affected.
9. The Permittee is authorized to manage fluids and so lid wastes in accordance with the conditions of this Permit. Issuance of this Permit does not convey property rights of any sort or any exclusive privilege; nor does it au thorize any injury to persons or property, any invasion of other private rights, or any infringement of Federal, State, or local law or regulations. Compliance with the terms of this Permit does not constitute a defense to any order issued or any action brought under the Water Pollution Control Statutes for releases or discharges from facilities or units not regulated by this Permit. NRS 445A.675 provides that any person who violates a Permit condition is subject to administrative or judicial action provided in NRS 445A.690 through 445A.705.

D. Division Authority

The Permittee shall allow authorized representatives of the Division, at reasonable times, and upon the presentation of credentials to:

1. Enter the premises of the Permittee where a regulated activity is conducted or where records are kept per the conditions of this Permit;

2. Have access to and copy any record that must be kept per the conditions of this Permit;

3. Inspect and photograph any facilities, equipment (including monitoring and control equipment), practices, or operations regulated by this Permit; and

4. Sample or monitor for any substance or parameter at any location for the purposes of assuring Permit and regulatory compliance.

E. Sampling and Analysis Requirements

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

2. For each measurement or sample taken pursuant to the conditions of this Permit, the Permittee shall record the following information:

a. The exact place, date, and time of the inspection, observation, measurement, or sampling; and

b. The person(s) who inspected, observed, measured, or sampled.

3. Samples must be taken, preserved, and labeled according to Division approved methods.

4. Standard environmental monitoring chain of custody procedures must be followed.

5. Samples shall be analyzed by a laboratory certified or approved by the State of Nevada, as applicable for the method(s) being performed. The Permittee must identify in all required reports the certified and approved laboratories used to perform the analyses, analytical methods performed (electronic version of report only), laboratory reference numbers, sample dates, and laboratory test dates.

6. The accuracy of analytical results, unless otherwise specified, shall be expressed in mg/L and be reliable to at least two significant digits. The analytical methods used must have a practical quantitation limit (PQL) equal to or less than one-half the reference value for Profile I, Surface Water Profile, and Profile III parameters. Laboratories shall report the lowest reasonable PQL based on in-house method detection limit studies. Samples for Profile I parameters shall be filtered and analyzed for the dissolved fraction, unless otherwise required by the Division; samples for Profile III parameters shall be unfiltered and analyzed for the total recoverable fraction. (Remove references to Profiles that aren't used in this Permit. Note: if a surface water body is monitored in Part I.D, especially one with established beneficial uses, consider including a separate Surface Water Profile in Part I.D. Footnotes, and add the following sentence here) Samples for Surface Water Profile parameters shall be analyzed in accordance with NAC 445A.1236 and any other applicable surface water regulations. Unless otherwise approved by the Division, analytical results that are less than the PQL shall be reported quantitatively by listing the PQL value preceded by the "<" symbol.

F. Permit Modification Requirements

1. Any material modification, as defined at NAC 445A.365, plan to construct a new process component, or proposed change to Permit requirements must be reported to the Division by submittal of an application for a Permit modification, or if such changes are in conformance with

the existing Permit, by submittal of a written notice of the changes. The Permit modification application must comply with NAC 445A.391 through 445A.399, 445A.410, 445A.412, 445A.414, 445A.4155, 445A.416, 445A.417, 445A.440, and 445A.442, as applicable. The construction or modification shall not commence, nor shall a change to the Permit be effective, until written Division approval is obtained.

2. Prior to the commencement of mining activities at any site within the State which is owned or operated by the Permittee but not identified and characterized in a previously submitted application or report, the Permittee shall submit to the Division a report which identifies the locations of the proposed mine areas and waste disposal sites, and characterizes the potential of mined materials and areas to release pollutants. Prior to development of these areas the Division shall determine if any of these new sources will be classified as process components and require engineered containment as well as Permit modification.

3. The Permittee shall notify the Division in writing at least 30 days before the introduction of process solution into a new process component or into an existing process component that has been materially modified, or of the intent to commence active operation of that process component. Before introducing process solution or commencing active operation, the Permittee shall obtain written authorization from the Division.

4. The Permittee must obtain a written determination from the Administrator of any planned process component construction or material modification, or any proposed change to Permit requirements, as to whether it is considered a Permit modification, and if so, what type.

5. The Permittee must give advance notice to the Administrator of any planned changes or activities which are not material modifications in the permitted facility that may result in noncompliance with Permit requirements.

Prepared by: Fanny Farkle
Date: Day Month Year

Revision 00: 16 February 2005; employee access statement deleted.

Revision 01: 24 May 2005; Bureau Chief Title changed to Chief, Bureau of Mining Regulation and Reclamation.

Revision 02: 25 May 2006; modified Part I.L to include new PCS Management Plan wording.

Revision 03: 14 February 2007; add NAC 445A.4155 to Part II.F.1.

Revision 04: 01 July 2008; add leak detection sump capacity exceedance to Part I.D footnote 1; revise Part I.L hydrocarbon-contaminated soil management wording.

Revision 05: 29 September 2008; in Part I.L change "...remediate hydrocarbon-contaminated soil..." to "treat Petroleum-Contaminated Soil (PCS)".

Revision 06: 31 March 2009; in Part I.D, hyphenate 'MWMP-Profile I' and 'MWMP-Profile II'

Revision 07: 04 June 2009; in Part II.E.6 substitute 'reference value' for terms "MCL" and "standards".

Revision 08: 11 August 2009; update for new PCS Management Plan in Part I.D, Part I.D Footnotes, Part I.G, Part I.L, and Part II.B.1.

Revision 09: 02 February 2010; update Profile I and Profile II parameter tables per versions 09/20/09 and 12/30/09 respectively.

Revision 10: 21 April 2010; add form number to PCS reporting in Part II.B.1.g and update nitrate reference to nitrate + nitrite in Part II.B.2.g.

Revision 11: 18 May 2010; add new Part II.C.2 requirement to update Permittee contact information.

Revision 12: 11 May 2011; revise Part II.B.3 and Part II.B.4 reporting text and update Chief signature block to Bruce Holmgren.

Revision 13: 07 June 2011; add new Part II.B.1.f to require quarterly reporting of any kinetic test status and add ethylene glycol to Part II.B.3.d.

Revision 14: 20 July 2011; delete Part I.D.6 "Spent Leach Ore" and add "Leach Pad Ore" with quarterly acid-base accounting only to 'new' Part I.D.6 Mined Materials and replace term " waste rock" with "Mined Materials" in Part I.D Foot note (4).

Revision 15: 01 May 2012; capitalize all 'Permit' references; add common abbreviations for Part I.D; update Part I.D footnote (4) Division guidance document reference from a specific date version to "current version"; add new Part I.D footnotes (5), (6), and (7) to specify test methods for MWMP, ANP/AGP, and kinetic testing analyses and reformat subsequent footnote numbers; minor updates/clarifications in Pert I.G.

Revision 16: 17 May 2012; moved 'Abbreviations' from the head to the tail of Part I.D.

Revision 17: 10 September 2012; changed 'Nevada Modified Sobek Method' to 'Nevada Modified Sobek Procedure' in Part I.D. footnote (6); changed 'quantity' to 'total quantity' in Parts II.B.3.c & d; changed 'Ethylene Glycol' to 'Coolants' in Part II.B.3.d.

Revision 18: 30 November 2012 changed phone numbers to all be the same format in Parts II.B.3.a and c.

Revision 19: 13 March 2013; Part I.D.3: added leak detection sump capacity; Part I.D.7: added collar elevation for monitoring wells; Part I.D: bold format for 'Abbreviations:', added abbreviation for gallons, and changed pH standard unit abbreviation to SU (no periods); modified Part I.D. footnote (7) (kinetic testing); new Part I.G.6 (construction without approval); new Part I.G.8 (minimum freeboard); new Parts I.G.10, 11, 12 (tailings impoundments); new Part I.G.15 (leach pad injection systems); Parts II.B.3.c and II.B.4.a: changed 5 PM to 5:00 PM; Parts II.B.3 a & c: added parentheses around telephone area code (888).

Revision 20: 29 May 2013; Page 1: added 'Secretary of State Listed' next to company name; Part I.H: added 'and/or electronic'; Part I.J: changed 'final permanent closure plan' to 'final plan for permanent closure'; Part II.B.2.d & g: modified to allow shorter time period if less than five years since Permit issuance; Part II.B.2.f: made 'closure plans' plural; Part II.C.6: added 'or data logger'.

Revision 21: 12 July 2013; replaced "constituents" with "parameters" in Parts I.D. footnote (7), II.B. 2.g, and II.E.6.

Revision 22: 22 August 2013; Page 1: changed font to bold for project name and number of tons ore to be processed per year.

Revision 23: 13 December 2013; Part I.D: added column after Monitoring Requirements; Part I.D.8: Deleted PCS definition; Part I.D. Abbreviations: added $CaCO_3$, N, PCS, VOCs, SVOCs, TPH; Part I.D. Footnotes (5), (6), and (7): added reference to approved laboratory; Part I.D. Footnotes (5) and (7): added capitalized Method to referenced analytical methods; Part I.D. Footnote (7): deleted pH analyses because they are included in Profile I analyses, and other minor changes; Part I.D. Footnotes (12): defined CFR; Part I.G.6: deleted required approval of permit modification (duplication with Part II.F.1) and added shall not degrade waters; Part I.G.15: added column; Part I.M: new Part to address dust suppressants; Part II.B.1.f: added semicolon; Part II.E.5: references to approved laboratory; Part II.F.1: reworded to include new process components, other NACs, and to prohibit construction until approved; Part II.F.2: minor rewording; and Part II.F.4: added process component construction and specification of type of Permit modification.

Revision 24: 02 June 2014; Added Part I.D.11 for pit lake monitoring; Added ºF and µS/cm to Part I.D. Abbreviations and Part I.D. Footnote (7); Revised Part I.D. Footnote (2) and Part II.B.2.g with Nitrate + Nitrite (as N), and Nitrogen, Total (as N); Hyphenated Nevada-approved and Nevada-certified laboratories throughout; Added Part I.D. Footnote (13) for new Profile III; Deleted Part I.G.6 "The facility shall not degrade…" because discharges already prohibited in zero-discharge permits; Revised Part II.B.1.c to replace water levels with water and collar elevations; Added Parts II.B.1.e and II.B.1.f for pit lake monitoring; Revised Part II.E.6 with Profile III, practical quantitation limits, and filtering requirements.

Revision 25: 21 August 2014; Revised Permit Number to include "(New/Renewal YYYY, Revision xx)" on page 1 and in header on other pages; Revised Part I.B with comments regarding SOC items; Added Parts I.B.1 and I.B.2 regarding revisions to pit lake study and WRMP; Revised Part I.D paragraph on requests for reductions of monitoring requirements to use "parameters" and to not limit the reductions to "analyses;" Revised Part I.D. Footnote (3) to modify the Profile II list with removal of "(Total)" after phosphorus; Revised Parts I.D. Footnotes (8) through (10) to require a Nevada-certified lab; Revised Part I.D. Footnote (13) to modify the Profile III list with "Nitrate + Nitrite (as N)," instead of "Nitrate (as N);" Revised Part II.B.2.g to remove "as SO4" after sulfate.

Revision 26: 14 November 2014; Revised Part I.D. Footnotes (2) and (3) to remove nickel from Profile I and add it to Profile II; Corrected a formatting error in Parts I.I.1, I.I.2, and I.I.3; Revised Part II.D to remove the possessive form in the heading.

Revision 27: March 2015; Added blue font color for items that need to be overwritten with Project-specific information; Reduced line spacing at top of page 1 to keep it on one page; Added text and formatting in paragraph 2 on page 1 for county, township & range, and nearest town; Revised paragraph 4 on page 1, and Part II.D. 1, to remove possessive form of "Permittee's"; Moved boiler SOC items for pit lake studies and waste rock management plans from Parts I.B.1 and I.B.2 to new Parts I.N.1 and I.N.2; Revised Part I.D to put units of measurement in parentheses (e.g., "(feet)" instead of "in feet"); Deleted "formal" from Part I.D paragraph about monitoring reductions; Revised Parts I.D. Footnote (4) and I.L to remove possessive form of "Division's"; Also revised Part I.D. Footnote (4) to add the definition for NAC since this is now the first occurrence of NAC in the boilerplate; Revised Part I.D. Footnote (6) to reference the 2015 Update NV Mod Sobek Procedure; Revised Part I.E to replace "spill" with "release"; Revised Parts II.B. 1.g and II.B.2.b to eliminate "spills and"; Revised Part II.C.4 to add Permit suspension and to delete the distinction between revoking and reissuing or permanently revoking; Revised Part II.D.3 to add photographs; Revised Part II.E.5 to add analytical methods performed; Revised Part II.E.6 regarding customization and Surface Water Profiles; Revised the page header to include "New/Renewal", as on page 1.

Revision 28: July 2015; New revision format on page 1; minor reformat of Profile III table in I.D. Footnote (13); comma added in Part II.B.2.c.

Revision 29: September 2015; revised paragraph at end of Part I.D to mention modification fees; added ASTM, EPA, and WAD in Part I.D. Abbreviations; revised I.D. Footnotes (2) and (13), and added I.D. Footnote (14) regarding acidity analyses; revised Parts I.H and II.B.2.d for meteorological stations; added explanatory comments to Part I.N; added definition of NDEP (the Division) to Part II.B.1.a; added –Profile I to Part II.B.1.d; and added one word to II.E.6 for clarity.

Revision 30: October 2015; revised Part I.D.1 with underlining and to list well number individually; a lso eliminated the use of written-out numbers with numerals in parentheses throughout.

Revision 31: November 2015; revised page 1 to remov e leading zeros from single-digit township and rang e identifiers; revised Part I.D. Footnote (2) to add Note 1 for physical separation facilities (Profile I without WAD cyanide) and Note 2 for radionuclides (Profile I-R) for consideration by permit writers.

Revision 32: February 2016; Changed Bureau Chief to Joe Sawyer; Added sentence at end of Part I.B requ iring written approval of SOC item completion; Part I.G.6 number convention revision; Modified Parts II.B.1 and II.B.2 to require electronic monitoring report submittals; Revised Part II.B.1.a with a different definition for "NDEP "; Added Part II.C.4, requiring electronic submitta ls; Revised Part II.E.5 so analytical methods need only be submitted with electronic version of r eports; Modified Parts II.F.1 and II.F.4 to include proposed changes of Permit requirements; Modified Part II.F.3 to require Division authorizat ion to commence active operation.

Revision 33: September 2016; deleted Profile II and modified Part I.D. Footnote numbering accordingly; added a requirement to Part II.E.6 to report non-detect analytical results quantitatively as < PQL; added notes to several Parts for how to modify boiler for closure permits; also made closure-related modifications and other minor revisions; deleted Part I.D. Footnote (3); added or revised page 1 and Parts I.A, I.A.1, I.A.2, I.A.3, I.D.5, I.D.6, I.D.11, I.D.12, I.D. Abbreviat ions, I.D. Footnote (1), I.D. Footnote (14), I.D. F ootnote (15), I.H, I.I, I.I.1, I.I.2, I.I.4, I.J, I I.A.2, II.B.1, II.B.2.d, II.B.2.g, II.B.3.c, II.B.3.d, II. C.1, II.C.6, II.C.7, and II.E.6.

Bureau of Mining Regulation and Reclamation

POLICY AND PROCEDURES FOR REGULATION BRANCH INSPECTIONS

The Regulation Branch of the Bureau of Mining Regul ation and Reclamation (BMRR) performs inspections of mining facilities. Regulation Branc h inspections are in addition to inspections performed by the Reclamation and Closure Branches o f the BMRR. There are several types of Regulation Branch inspections performed:

1. Compliance Inspections - These inspections are p erformed by the Compliance Inspectors. The inspections are scheduled on a periodic basis with varying frequency depending on the size of the facility and the potential to degrade waters of the State. The goal is to inspect large sites at least four times a year, medium sites twice a year, and s mall or inactive sites once a year. An annual inspection schedule is prepared at the beginning of each calendar year. The inspections are performed in accordance with the Compliance Inspection Guidelines.

2. Permit/Construction Inspections - These inspections are performed by the Permit Writers. They are performed on an as-needed basis, usually before a permit is issued, or corresponding with significant construction activity. The purpose of t hese inspections is to familiarize the Permit Writer with the layout of a new facility or to ensure that construction of process components is in accordance with the approved engineering design.

3. Investigative Inspections – These inspections ar e performed in response to a release of contaminants or a complaint requiring follow-up by the BMRR. These inspections are performed by the Compliance Inspector. The purpose of these inspections is to investigate and document the severity and extent of a release in preparation for potential enforcement action, or to evaluate the validity of a complaint and recommend corrective actions.

The Bureau of Land Management, U.S. Forest Service, and or other State, federal and local government agencies may attend a BMRR Regulation Branch inspection. The permittee is notified in advance for most inspections, except for certain investigative inspections where forewarning is not desirable. Photos or video recordings are takenas necessary to document conditions at the site.

An Inspection Report is prepared to document each i nspection. Noted in the report are any problems or concerns identified during the inspecti on, and deadlines for corrective action if required. The Report is sent in letter form to the permittee, with copies to the federal land management agency, if applicable. The Reports and a ssociated documentation are kept in the BMRR project files.

Bureau of Mining Regulation and Reclamation

POLICY AND PROCEDURES FOR ENFORCEMENT ACTIONS

The Bureau of Mining Regulation and Reclamation (BMRR) takes enforcement actions in accordance with Nevada Revised Statutes (NRS) 445A.675 and 445A.690. The Bureau Chief decides whether a violation requires enforcement action.

The enforcement document issued by BMRR is a Finding of Alleged Violation and Order (FOAV/Order). The FOAV describes the situation and which statutes, regulations, or permit conditions have allegedly been violated. The Order sets forth corrective actions to be undertaken to correct the violation(s) and a schedule for completion of the corrective actions.

An FOAV/Order is normally prepared by the Regulation Branch Compliance Inspector assigned to the mine facility. The draft FOAV/Order is reviewed by the Regulation Branch Supervisor and the Bureau Chief. The final FOAV/Order is effective upon issuance, but an appeal may be filed within 30 days, to the State Environmental Commission.

A Show Cause meeting is required in an Order but can be waived at the defendant's request. This meeting provides an opportunity for the defendant to present all of the information regarding the incident in question, including a description of environmental impacts and corrective actions taken.

Upon completion of the Show Cause meeting, a meeting of the Penalty Panel is scheduled to hear the case. The Penalty Panel meeting is held in accordance with the Division Civil Penalty Policy. The Panel determines a proposed settlement amount. The Bureau Chief or designate, contacts the defendant to discuss the proposed settlement amount and the option of a supplemental environmental project (SEP) in lieu of the settlement amount. The Compliance Inspector sends a letter to the defendant describing the decision of the Penalty Panel and the amount of the proposed settlement, if any. If the defendant accepts the settlement amount, the acknowledgement portion of the letter is signed and returned to the BMRR.

If the defendant does not accept the settlement amount, a counterproposal may be offered. This counterproposal usually consists of a payment plan that is presented to the Bureau Chief for acceptance, or further negotiation. If a settlement cannot be agreed upon, the case is referred to the Office of the Attorney General for processing and collection.

When confirmation is received of the payment of the full settlement amount or completion of an approved SEP, the case is closed and retained in the BMRR enforcement file. If the defendant does not pay the settlement amount or complete an approved SEP, the case will either be turned over to the State Treasure for collection or referred to the Attorney General.

Per Division policy, no permits are to be issued, modified or renewed for facilities which have unresolved Division enforcement actions without Bureau Chief approval. This applies also to facilities which are owned, operated, or managed by persons having unresolved enforcement actions at other facilities under their control.

Nevada NAC 519A Reclamation Regulations

Nevada Bureau of Mining Regulation and Reclamation

Mining and Exploration Regulation

Nevada Administrative Code

CHAPTER 519A - RECLAMATION OF LAND SUBJECT TO MINING OPERATIONS OR EXPLORATION PROJECTS

REGULATION OF MINING OPERATIONS AND EXPLORATION PROJECTS

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REGULATION OF MINING OPERATIONS AND EXPLORATION PROJECTS

General Provisions

NAC 519A.010 Definitions. (NRS 519A.160) As used in NAC 519A.010 to 519A.415, inclusive, unless the context otherwise requires, the words and terms defined in NAC 519A.015 to 519A.095, inclusive, have the meanings ascribed to them in those sections.

(Added to NAC by Environmental Comm'n, eff. 9-19-90; A by R090-00, 7-27-2000; R020-02, 4-5-2002; R097-05, 10-31-2005)

NAC 519A.015 "Abandonment" defined. (NRS 519A.160) "Abandonment" means the permanent cessation of operation or maintenance of an exploration project or mining operation without the intent to resume operation.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.020 "Active" defined. (NRS 519A.160) "Active" means that operations or actions are being conducted at an exploration project or mining operation which results in land being affected.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.025 "Affected" defined. (NRS 519A.160) "Affected" means that the surface of the land is or will be disturbed by an exploration project or mining operation, or that the land is used:

1. As an evaporation or settling pond, leach dump, placer area or tailings pond or dump; or
2. In conjunction with any structure, facility, equipment, machine, tool, material or property incident to an exploration project or mining operation.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.030 "Division" defined. (NRS 519A.160) "Division" means the Division of Environmental Protection of the State Department of Conservation and Natural Resources.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.035 "Exploration project" defined. (NRS 519A.160)

1. "Exploration project" means all activities conducted in this State by a person on or beneath the surface of the land for the purpose of, or in connection with, determining the presence, location, extent, depth or grade of any mineral.
2. The term does not include an exploration project which is limited to a surface disturbance of not more than 5 acres in any calendar year. To determine the area of the surface disturbed:

(a) All land disturbed and left unreclaimed by an operator within a 1-mile radius of the center of the project must be considered; and

(b) Land shall be considered reclaimed if action has been taken to stabilize the land to a condition designed to result in the establishment of a productive postmining use of the land.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.040 "Growth medium" defined. (NRS 519A.160) "Growth medium" means a material which is capable of supporting vegetation.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.043 "Major modification" defined. (NRS 519A.160) "Major modification" means:

1. A change in the postmining land use which requires reclamation techniques which are significantly different from the techniques included in the approved plan for reclamation;

2. The addition of a type of disturbance which was not previously included in the approved plan and which cannot be reclaimed in a manner that is substantially similar to the reclamation techniques included in the approved plan;

3. The proposed disturbance is equal to 25 percent or more of the acreage in the approved plan; or

4. A change in the visual appearance of the reclaimed areas that is substantially different from the visual appearance which was discussed or commented upon during the public comment period.

(Added to NAC by Environmental Comm'n by R097-05, eff. 10-31-2005)

NAC 519A.044 "Mine-impacted waters" defined. (NRS 519A.160) "Mine-impacted waters" means any contaminated water:

1. Resulting from a mining operation, including, without limitation:

(a) An underground mine;

(b) A mine pit penetrating the water table; or

(c) Waste or development rock piles or other nonprocess components; and

2. Requiring stabilization, management, control or treatment to prevent or mitigate:

(a) The degradation of the waters of this State; or

(b) Adverse effects to the health of human, terrestrial or avian life.

(Added to NAC by Environmental Comm'n by R052-15, eff. 12-21-2015)

NAC 519A.045 "Mining operation" defined. (NRS 519A.160) "Mining operation" means all activities conducted in this State by a person on or beneath the surface of land for the purpose of, or in connection with, the development or extraction of any mineral. The term does not include a small mining operation or a sand or aggregate pit.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.050 "Minor modification" defined. (NRS 519A.160) "Minor modification" means:

1. A change involving more than 10 acres but less than 25 percent of the acreage included in the approved plan for reclamation if:

(a) The types of disturbances are included in the approved plan; or

(b) The change, including, but not limited to, the postmining land use, does not require reclamation techniques significantly different from those included in the approved plan;

2. Changes in the equipment used for reclamation; or

3. Changes to the final contours.

(Added to NAC by Environmental Comm'n, eff. 9-19-90; A by R097-05, 10-31-2005)

NAC 519A.055 "New exploration project" defined. (NRS 519A.160) "New exploration project" means an exploration project which was not active before October 1, 1990.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.060 "New mining operation" defined.(NRS 519A.160) "New mining operation" means a mining operation which was not active before October 1, 1990.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.065 "Operator" defined. (NRS 519A.160) "Operator" means any person who owns, controls or manages an exploration project or a mining operation.
(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.068 "Process fluid stabilization" defined. (NRS 519A.160) "Process fluid stabilization" means binding, containing or otherwise treating contaminants in a fluid, including, without limitation, meteoric waters, that have intentionally or unintentionally been introduced into a heap leaching facility or tailings facility to prevent the contaminants from degrading the waters in this State through naturally occurring environmental conditions which may be reasonably expected at the mine site.
(Added to NAC by Environmental Comm'n by R090-00, eff. 7-27-2000)

NAC 519A.070 "Productive postmining use of the land" defined. (NRS 519A.160) "Productive postmining use of the land" means a use which supports activities including:
1. Wildlife habitat;
2. Livestock grazing;
3. Agriculture and ranching;
4. Industry;
5. Recreation; or
6. Any other activities which benefit the State of Nevada, its residents or the owner of the land.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.075 "Reclamation" defined. (NRS 519A.160) "Reclamation" means actions performed during or after an exploration project or mining operation to shape, stabilize, revegetate or otherwise treat the land in order to return it to a safe, stable condition consistent with the establishment of a productive postmining use of the land and the safe abandonment of a facility in a manner which ensures the public safety, as well as the encouragement of techniques which minimize the adverse visual effects.
(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.080 "Revegetation" defined. (NRS 519A.160) "Revegetation" means the establishment of the pre-exploration or pre-mining vegetation or a comparable vegetative cover.
(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.085 "Small mining operation" defined. (NRS 519A.160) "Small mining operation" means a person who does not remove from the earth in any calendar year material in excess of 36,500 tons and who disturbs less than 5 acres of land in any calendar year. To determine the area of the surface disturbed, all land disturbed and left unreclaimed by an operator within a 1-mile radius of the center of the project must be considered.
(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.090 "Temporary closure" defined. (NRS 519A.160) "Temporary closure" means the cessation of an exploration project or mining operation for a period of not more than 3 years.
(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.095 "Topsoil" defined. (NRS 519A.160) "Topsoil" means the material at or near the surface of the earth which has been modified and acted upon by natural, physical, chemical or biological agents in a manner which will allow it to support revegetation.
(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.100 Applicability: Land within exploration project or mining operation. (NRS 519A.160) NAC 519A.010 to 519A.415, inclusive, applies to affected land which is loca ted in exploration projects or mining operations which are active on or after October 1, 1990.
(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.105 Applicability: Road used for access to exploration project or mining operation. (NRS 519A.160) NAC 519A.010 to 519A.415, inclusive, does not apply to a road which an operator can prove to the satisfaction of the Division existed before January 1, 1981, if the road:
1. Is used for access to an exploration project or mining operation; and
2. Has not been altered other than maintenanc e activities and minor repairs since January 1, 1981.
(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.110 Effect of provisions on existing sureties and appro ved plans of reclamation; applicability to revisions to plans for reclamation. (NRS 519A.160)
1. NAC 519A.010 to 519A.415, inclusive, does not affect, alter or modify the t erms and conditions of any approved plan for reclamation or surety obtained from a federal land management agency before October 1, 1990, which is consistent with NAC 519A.010 to 519A.415, inclusive.
2. NAC 519A.010 to 519A.415, inclusive, applies to any revisions to a plan for reclamation submitted on or after October 1, 1990.
(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.115 Preliminary compliance with provisions. (NRS 519A.160) An operator who submits a complete application for a permit by April 1, 1993, and pays the applicable fees as required by NAC 519A.225 shall be deemed to be in compliance with NAC 519A.010 to 519A.415, inclusive, until the Division either issues a permit or denies the application.
(Added to NAC by Environmental Comm'n, eff. 9-19-90)

Permits and Fees

NAC 519A.120 Time when obtaining of permit and payment of fees r equired. (NRS 519A.160)
1. The operator of each exploration project o r mining operation which is active on October 1, 1990, shall obtain the permit required by NRS 519A.180 or 519A.200, as applicable, and pay the fees required by NAC 519A.225:
(a) On or before October 1, 1993; or
(b) Before abandonment of the exploration project or mining operation,
whichever occurs first.

2. The operator of each exploration project and mining operation which becomes active after October 1, 1990, shall obtain the permit required by NRS 519A.180 or 519A.200, as applicable, and pay the fees required by NAC 519A.225 before engaging in exploration or mining.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.125 Permits for exploration projects: Application. (NRS 519A.160, 519A.190)

1. The operator of an exploration project shall apply to the Division for a permit.

2. The application must include:

(a) The applicant's name, address and telephone number;

(b) If the applicant is a corporation or other business entity which is required to have a registered agent, the name, address and telephone number of its registered agent and its principal officers or partners;

(c) A complete plan for reclamation;

(d) The estimate of the cost of executing the plan for reclamation required by NAC 519A.360;

(e) A statement that the applicant agrees to assume responsibility for the reclamation of any surface area affected by his or her exploration project;

(f) A map which depicts the area to be covered by the surety; and

(g) For the purpose of calculating the amount of the surety, the average number of drill holes to be left open at any one time during the life of the project.

3. The application must be accompanied by the fee charged by the Division for an application for the issuance of a permit required by NAC 519A.225.

(Added to NAC by Environmental Comm'n, eff. 9-19-90; A 9-5-91)

NAC 519A.130 Permits for exploration projects: Duration; limitation on issuance. (NRS 519A.160)

1. A permit for an exploration project is valid for the life of the project unless it is suspended or revoked by the Division.

2. If a permit for an exploration project is included in a permit for a mining operation, it is valid for the life of the operation.

3. A permit must not be issued to an operator who has an outstanding notice of noncompliance issued pursuant to NAC 519A.400.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.135 Interim permits for exploration projects: Prerequisites; effect; duration. (NRS 519A.160)

1. The Division may grant an interim permit for an exploration project conducted on private land if:

(a) The operator requests the interim permit in writing;

(b) The project contains a disturbance on affected land which is greater than 5 acres but less than 20 acres within a 1-mile radius of the center of the project, including all lands, both public and private, associated with the project;

(c) The project employs best management practices during operation and reclamation to control erosion and minimize the transport and delivery of sediment to surface water, which must be the best management practices described in the *State of Nevada Handbook of Best Management Practices* or practices equivalent thereto;

(d) The operator files an application for a permit with the Division, including the information required in subsection 2 of NAC 519A.125 before disturbing and not reclaiming 5 acres of land;

(e) The operator provides surety which is acceptable to the Division;

(f) The operator files the fee required by NAC 519A.225 and submits the statement required by paragraph (e) of subsection 2 of NAC 519A.125;

(g) The operator does not have an outstanding notice of noncompliance issued pursuant to NAC 519A.400; and

(h) The operator is not in violation of the provisions of:

(1) Chapter 519A of NRS;

(2) NAC 519A.010 to 519A.415, inclusive; or

(3) An approved plan for reclamation.

2. The Division may grant an interim permit for an exploration project conducted on public land administered by the Bureau of Land Management, the United States Forest Service or another federal land management agency if:

(a) The operator requests the interim permit in writing;

(b) The project contains a disturbance on affected land which is greater than 5 acres but less than 20 acres within a 1-mile radius of the center of the project, including all lands, both public and private, associated with the project;

(c) The operator submits to the Division a plan for reclamation approved by the applicable federal land management agency before disturbing and not reclaiming 5 acres of land;

(d) The operator demonstrates that a surety acceptable to the applicable federal agency has been filed;

(e) The operator files the fee required by NAC 519A.225 and submits the statement required by paragraph (e) of subsection 2 of NAC 519A.125;

(f) The operator does not have an outstanding notice of noncompliance issued pursuant to NAC 519A.400; and

(g) The operator is not in violation of the provisions of:

(1) Chapter 519A of NRS;

(2) NAC 519A.010 to 519A.415, inclusive; or

(3) An approved plan for reclamation.

3. An operator meeting the requirements of subsection 1 or 2 may proceed with the exploration project while the Division processes the application for a permit.

4. An interim permit granted pursuant to this section remains in effect until:

(a) A final permit is issued or denied; or

(b) The interim permit is revoked or suspended,

by the Division.

(Added to NAC by Environmental Comm'n, eff. 9-19-90; A by R044-12, 9-14-2012)

NAC 519A.140 Permits for mining operations: Application. (NRS 519A.160, 519A.210)

1. The operator of a mining operation shall apply to the Division for a permit.

2. An application must include:

(a) The applicant's name, address and telephone number;

(b) If the applicant is a corporation or other business entity which is required to have a registered agent, the name, address and telephone number of its registered agent and its principal officers or partners;

(c) A complete plan for reclamation;

(d) The estimate of the cost of executing the plan for reclamation required by NAC 519A.360;

(e) A statement that the applicant agrees to assume responsibility for the reclamation of any surface area affected by his or her mining operation;

(f) A map which depicts the area to be covered by the surety;

(g) For the purpose of calculating the amount of the surety, the average number of drill holes to be left open at any one time during the life of the project; and

(h) The fee charged by the Division for an application for and the issuance of a permit required by NAC 519A.225.

(Added to NAC by Environmental Comm'n, eff. 9-19-90; A 9-5-91)

NAC 519A.145 Permits for mining operations: Duration; inclusion of exploration activities; limitation on issuance. (NRS 519A.160)

1. A permit issued for a mining operation is valid for the life of the operation unless it is suspended or revoked by the Division.

2. Upon request by the applicant, a permit for mining must include all exploration activities conducted within the project area.

3. A permit for mining must not be issued to an operator who has an outstanding notice of noncompliance issued pursuant to NAC 519A.400.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.150 Exploration projects and mining operations on public land. (NRS 519A.160, 519A.240) If an exploration project and mining operation take place on public lands administered by the Bureau of Land Management, the United States Forest Service or another federal land management agency:

1. A plan of operations which has been approved by the federal agency may be substituted for the application for a permit required by NAC 519A.125 or 519A.140 and if it is accompanied with a surety which is acceptable to the Division and includes a plan for reclamation of all affected land, it is deemed to be a complete application for a permit; and

2. Evidence of a surety filed with the federal agency may be substituted for the surety required by NAC 519A.350.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.155 Exploration projects and mining operations on both private and public land. (NRS 519A.160, 519A.240) If an exploration project and mining operation takes place on a site which includes privately owned land and public land administered by the Bureau of Land Management, the United States Forest Service or another federal land management agency:

1. A plan of operations which has been approved by the federal agency may be substituted for the application for a permit required by NAC 519A.125 or 519A.140 if the plan sets forth reclamation practices for both the public and privately owned lands;

2. The memorandum of understanding entered into by the Division and the federal agency must provide for the review by the Division of those portions of the plan of operations regarding privately owned land so that the Division can determine if they are consistent with the requirements of NAC 519A.010 to 519A.415, inclusive; and

3. Evidence of a surety approved by the federal agency may be substituted for the surety required by NAC 519A.350 if the surety is in an amount for the public and privately owned land which is acceptable to the Division.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.160 Submission to Division of new or amended plan of operation. (NRS 519A.160, 519A.240) When an operator of an exploration project or mining operation submits a new or amended plan of operation to the federal agency, he or she shall file a copy with the Division to allow the Division to conduct its review concurrently with the federal agency.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.165 Review of application for permit; provision of additional information. (NRS 519A.160, 519A.190, 519A.210)

1. The Division shall review an application for a permit and notify the applicant if additional information is required within 15 days after the receipt of the application. The notice must state the additional information which is required.

2. If the applicant provides additional information to complete an application, the Division shall notify the applicant if more additional information is required within 15 days after receipt of the additional information. The notice must state the additional information which is required.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.170 Treatment of information as confidential. (NRS 519A.150, 519A.160)

1. An operator may request when the information is submitted that the information submitted to the Division with the request for a permit be treated as confidential. The Division shall consider a request only if the operator, when the information is submitted, stamps or writes "confidential business information" on each page.

2. The operator must show to the satisfaction of the Division that the information contained in the application for a permit is entitled to protection as a trade secret.

3. Except as otherwise provided in subsection 4, if the Division determines that the information is not entitled to protection as a trade secret it must not make the information public until the Division has:

(a) Notified the operator; and

(b) Allowed at least 10 working days after the notice has been sent for the informant to appeal the decision.

4. If the request is not made at the time the information is submitted, the Division may make the information available to the public without notice to the operator.

5. "Trade secret":

(a) Includes the location of exploration drillholes and a formula, pattern, compilation, program, device, method, technique or process that:

(1) Derives independent economic value, present or potential, from not being generally known to, and not being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use; and

(2) Is the subject of efforts that are reasonable under the circumstances to maintain its secrecy.

(b) Does not include the name and address of the operator.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.175 Time for final denial or issuance of final permit; effective date of permit; notice of denial. (NRS 519A.160)

1. The Division shall issue a final permit to the applicant or a final decision to deny a permit within 15 days after:

(a) If a public hearing is required, the close of the period for submitting comments and information prescribed in NAC 519A.185 to 519A.210, inclusive; or

(b) If a public hearing is not required and the application is complete, the receipt of an application for a permit and the required fees.

2. A permit issued by the Division becomes effective upon the receipt by the Division of the surety required by NAC 519A.350.

3. If the application for a permit is denied, the Division must notify the applicant of:

(a) The reasons for denial; and

(b) The time within which an appeal must be brought and procedures for appealing the decision pursuant to NAC 519A.415.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.180 Time for issuance of draft of permit or notice of intent to deny application; extension of time for review of application. (NRS 519A.160)

1. The Division shall prepare and issue a draft of a permit or notice of intent to deny the application for a permit, the grounds for the denial, if applicable, and the public notice pursuant to NAC 519A.185, if applicable, within:

(a) Fifteen days after it completes its review of a complete application for an exploration project or mining operation on federal land;

(b) Thirty days after it completes its review of a complete application for an exploration project on private land; and

(c) Sixty days after it completes its review of a complete application for a mining operation on private land.

2. If the Division determines that an application for a permit does not comply with the requirements of NAC 519A.010 to 519A.415, inclusive, the application will be denied unless the operator requests that the time for the Division to review a complete application set forth in paragraphs (a), (b) and (c) of subsection 1 be extended for the amount of time necessary for the applicant to submit additional documentation and information.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.185 Provision of notice of intent to issue draft of pemit or to deny application. (NRS 519A.160)

1. Except as otherwise provided in subsection 3, the Division shall, at least 30 days before the issuance of a draft permit or a notice of intent to deny the application for a permit for an exploration project or mining operation to be conducted on privately owned land:

(a) Circulate a public notice of the intent to issue a draft permit or deny the application in a manner intended to inform interested persons;

(b) Cause to be published in a newspaper of general circulation within the geographic area of a proposed exploration project or mining operation, a notice of the intent to issue the permit or deny the application; and

(c) Mail to the operator, landowner of record who is identified by the applicant in the application, members of the board of county commissioners of the county in which the project or operation is to be located, Division of Minerals of the Commission on Mineral Resources and any other person or group who so requests, written notice of the intent to issue a draft permit or deny the application.

2. Notice given pursuant to subsection 1 must include:

(a) The name, address and telephone number of the Division;

(b) The name and address of the operator;

(c) The location of the proposed project or operation;

(d) The tentative decision of the Division to issue a draft permit or deny the application for a permit;

(e) A description of the procedure which the Division will use to make a final decision to issue or deny the permit;

(f) The location where interested persons may obtain further information or inspect and copy the draft of the permit and other relevant forms and documents; and

(g) A statement that interested persons must submit to the Division written comments and information on the tentative decision of the Division within 30 days after the date on which the notice is published.

3. An application for a permit which has been submitted pursuant to NAC 519A.150 or 519A.155 is not subject to the notice requirements of NAC 519A.185 to 519A.210, inclusive.

(Added to NAC by Environmental Comm'n, eff. 9-19-90; A by R080-08, 12-17-2008)

NAC 519A.190 Submission of comments and information concerning draft of permit; request for public hearing. (NRS 519A.150, 519A.160)

1. Within 30 days after notice is published pursuant to NAC 519A.185:

(a) Any person may submit written comments andinformation regarding the draft of the permit to the Division.

(b) The operator or any person who is directly affected by the application for a permit may request in writing a public hearing on any application for a permit. The request must state the reason for the request and the issues to be raised at the hearing.

2. Upon the receipt of written comments or information, the Division shall send a copy of the comments or information to the applicant.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.195 Prerequisites for scheduling public hearing on application for permit. (NRS 519A.150, 519A.160) The Division shall schedule a public hearing on an application for a permit if:

1. A person who is directly affected by the application for a permit requests the hearing and the Division determines that the request is reasonable and there is a significant degree of public interest in the matter; or

2. The Division deems it necessary.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.200 Notice of public hearing. (NRS 519A.150, 519A.160)

1. The Division shall cause to be published a notice for a hearing at least 30 days before the hearing in the manner prescribed by NAC 519A.185.

2. In addition to the information required by NAC 519A.185, the notice must include:

(a) The date on which the public notice required by NAC 519A.185 was given concerning the permit;

(b) The date, time and place of the hearing; and

(c) A brief description of the nature and purpose of the hearing and the applicable rules and procedures for the hearing.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.205 Submission of comments and information at public hearing; provision of records to operator. (NRS 519A.150, 519A.160)

1. Any person may submit to the Division at a public hearing on the application for a permit held by the Division an oral or written statement or other information which relates to the draft of the permit.

2. The Division shall, if appropriate:

(a) Set reasonable limits upon the time allowed for oral statements;

(b) Require persons submitting oral statements to submit the statements in writing; and

(c) Extend the period allowed for the submission of comments and information by interested persons to the close of the hearing.

3. Upon the request of the operator, the Division shall provide the operator with copies of all comments made and information submitted before and during the hearing.

4. If the operator desires a verbatim record of the hearing, he or she must bear the cost of making such a record.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.210 Statement by Division responding to public comments. (NRS 519A.160)

1. If the Division issues a final permit, it shall, if applicable, issue at the same time a statement responding to the comments received on the matter.

2. A copy of the statement must be sent to the operator and all persons submitting comments or information and will be made available for inspection by the public.

3. The statement must:

(a) Set forth the provisions, if any, in the draft permit that have been changed in the final permit, and the reasons for the change;

(b) Briefly describe and respond to all significant comments and information submitted; and

(c) State that any person aggrieved by the Division's decision may appeal the decision pursuant to NAC 519A.415.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.215 Transfer of permit to new operator. (NRS 519A.160, 519A.240)

1. The Division shall transfer a permit to a new operator if the new operator submits to the Division:

(a) A written request to transfer the permit, which must include, with respect to the parent corporation, subsidiary corporation or other company receiving the permit as a result of the transfer:

(1) A statement that the corporation or company agrees to assume responsibility for the reclamation of any affected land which is the subject of the existing permit;

(2) A statement explaining the corporate structure of the corporation or company;

(3) A copy of the state business license of the corporation or company; and

(4) A copy of the certificate of registration of the corporation or company which is filed with the Secretary of State;

(b) If the exploration project or mining operation is on privately owned land, a surety to ensure that reclamation will be completed;

(c) If the exploration project or mining operation is on public land administered by the Bureau of Land Management, the United States Forest Service or another federal land management agency, evidence that a surety acceptable to that agency has been filed; and

(d) If the exploration project or mining operation is on privately owned and public land administered by the Bureau of Land Management, the United States Forest Service or another federal land management agency either:

(1) Evidence that a surety acceptable to the federal agency has been filed with the agency which covers reclamation of all disturbed land, including privately owned and public land; or

(2) A surety to cover:

(I) The cost of reclamation on privately owned land, in a form and amount acceptable to the Division; and

(II) Evidence that a surety acceptable to the Bureau of Land Management, the United States Forest Service or another federal land management agency has been filed with the agency for reclamation of land.

2. The Division shall transfer a permit to a new operator within 30 days after it receives the information and documentation required by subsection 1 unless the current operator requests that the transfer be made on a later date.

3. The Division shall not transfer a permit to an operator who is in violation of any provision of:

(a) NAC 519A.010 to 519A.415, inclusive;

(b) Chapter 519A of NRS; or

(c) An approved plan for reclamation,

and to whom a notice of noncompliance has been served and remains outstanding pursuant to NAC 519A.400.

(Added to NAC by Environmental Comm'n, eff. 9-19-90; A by R044-12, 9-14-2012)

NAC 519A.220 Suspension or revocation of permit. (NRS 519A.150, 519A.160) If the Division suspends or revokes a permit for noncompliance with the provisions of:

1. NAC 519A.010 to 519A.415, inclusive;
2. Chapter 519A of NRS; or
3. An approved plan for reclamation,

the revocation or suspension is effective not later than 30 days after the operator is sent written notice by the Division setting forth the facts or conduct warranting the revocation or suspension.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.225 Fees for application for permit. (NRS 519A.160)

1. An applicant for a permit for an exploration project shall submit to the Division an application fee of:

(a) One dollar and fifty cents for each acre of affected and unreclaimed public land included in the plan for reclamation; and

(b) Two dollars and fifty cents for each acre of affected and unreclaimed privately owned land included in the plan for reclamation.

2. An applicant for a permit for a mining operation shall submit to the Division an application fee of:

(a) One dollar and fifty cents for each acre of affected and unreclaimed public land administered by a federal land management agency and included in the plan for reclamation; and

(b) Two dollars and fifty cents for each acre of affected and unreclaimed privately owned land included in the plan for reclamation.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.227 Fee for modification to permit. (NRS 519A.160)

1. The fee for a minor modification to a permit for an exploration project or a permit for a mining operation is $500 plus $20 per acre or part of an acre, not to exceed one-half the annual fee assessed pursuant to NAC 519A.230 and 519A.235.

2. The fee for a major modification to a permit for an exploration project or a permit for a mining operation is equal to the amount of the applicable annual fee assessed pursuant to NAC 519A.230 and 519A.235.

3. For a modification that does not constitute a major modification or a minor modification and involves a disturbance of 10 acres or less, a transfer of the permit or a change to the schedule for completion of reclamation, the fee is the lesser of $250 or one-half the annual fee assessed pursuant to NAC 519A.230 and 519A.235.

4. Fees paid pursuant to this section are nonrefundable.

(Added to NAC by Environmental Comm'n by R020-02, eff. 4-5-2002; A by R097-05, 10-31-2005)

NAC 519A.230 Submission of fee if permit not issued. (NRS 519A.160) If a permit is not issued by April 15, 1991, the operator of an exploration project or mining operation that is active on October 1, 1990, shall submit to the Division the fee set forth in NAC 519A.235.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.235 Annual submission of fees for services by Division. (NRS 519A.160)

1. On or before April 15, 1991, and on or before April 15 of each year thereafter, an operator of an exploration project or a mining operation shall submit to the Division for services rendered by the Division the applicable fees required by this section.

2. For each exploration project which is active on October 1, 1990, and for which a permit has been issued by the Division or an application for a permit has been submitted to the Division, the operator shall submit to the Division:

(a) If the total affected area is 20 acres or less, a fee of $100.

(b) If the total affected area is more than 20 acres but not more than 100 acres, a fee of $500.

(c) If the total affected area is more than 100 acres but not more than 500 acres, a fee of $1,000.

(d) If the total affected area is more than 500 acres, a fee of $2,000.

3. For each mining operation which is active on October 1, 1990, and for which a permit has been issued by the Division or an application for a permit has been submitted to the Division, the operator shall submit to the Division:

(a) If the total affected area is 50 acres or less, a fee of $500.

(b) If the total affected area is more than 50 acres but not more than 200 acres, a fee of $1,500.

(c) If the total affected area is more than 200 acres but not more than 500 acres, a fee of $3,000.

(d) If the total affected area is more than 500 acres but not more than 1,000 acres, a fee of $4,500.

(e) If the total affected area is more than 1,000 acres but not more than 2,500 acres, a fee of $9,000.

(f) If the total affected area is more than 2,500 acres but not more than 5,000 acres, a fee of $12,000.

(g) If the total affected area is more than 5,000 acres, a fee of $16,000.

(Added to NAC by Environmental Comm'n, eff. 9-19-90; A by R020-02, 4-5-2002)

NAC 519A.240 Time for submission of fees for new exploration projects and mining operations. (NRS 519A.160) For new exploration projects or new mining operations, the fees set forth in NAC 519A.235, as applicable, must be submitted to the Division by the operator on April 15 of each year following issuance of the permit for the exploration project or mining operation.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

Reclamation of Land

NAC 519A.245 Circumstances under which reclamation is required. (NRS 519A.160) Reclamation of affected land which was disturbed:

1. On or after January 1, 1981, and before October 1, 1990, must be required as part of a permit if the land was disturbed by the current operator. The standards for reclamation required by the Bureau of Land Management, the United States Forest Service or another federal land management agency at the time the disturbance was created apply to federal and privately owned land.
2. Before January 1, 1981, is not required.
3. By someone other than the current operator must not be required, unless the current operator is using the affected land in an active project or operation.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.250 Exemption of open pits and rock faces from requirements. (NRS 519A.160, 519A.230)

1. An operator may request in writing that the Division grant an exception to the requirements for reclamation for open pits and rock faces which may not be feasible to reclaim.
2. If the operator proves to the satisfaction of the Division that reclamation is not feasible, the Division shall exempt an open pit or rock face from the requirements for reclamation of NAC 519A.010 to 519A.415, inclusive.
3. The Division shall base its determination of the feasibility of reclaiming open pits and rock faces on the technological and economic practicability of achieving a safe and stable condition suitable for a productive postmining land use. The Division shall consider, without limitation, the:
   (a) Topography of the site;
   (b) Geology and stability of the site;
   (c) Time required to complete reclamation;
   (d) Consumption of resources required to complete reclamation;
   (e) Potential adverse environmental impacts to the quality of the air and water associated with the activities for reclamation; and
   (f) Future access to mineral resources.
4. Upon request by the applicant, the return of material to the open pit from which it was extracted shall be considered to be not feasible for the purposes of reclamation.
5. If an open pit or rock face is exempted from reclamation, public safety must be provided for by means other than reclamation, including, but not limited to, restrictions on access to the site or restrictions on the deed to the property.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.255 Reclamation not required beyond that approved by federal agency. (NRS 519A.160, 519A.240) If an operator can establish to the satisfaction of the Division that reclamation was approved by the Bureau of Land Management, the United States Forest Service or another federal land management agency, further reclamation is not required on affected land.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.260 Considerations in preparing plan for reclamation. (NRS 519A.160, 519A.230) When preparing his or her plan for reclamation an applicant must consider:

1. The pre-mining and postmining use of the land;
2. The technical and economic practicability of the proposed techniques for reclamation;
3. The effectiveness of the proposed activities for reclamation in ensuring public safety;
4. The annual precipitation of the area and its effect on revegetation and the potential for erosion;
5. The existing and proposed postmining topography in relation to the potential for erosion;
6. The potential for degradation of surface-water or groundwater quality resulting from the proposed activities for reclamation;
7. The visual impact of the reclamation;
8. Any other criteria which may affect the applicability of a particular activity for reclamation, including types of soil and the physical and chemical characteristic of the soil; and
9. Whether the disturbance was created before or after September 19, 1990.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.265 Contents of plan for reclamation for exploration project. (NRS 519A.160, 519A.230) A plan for reclamation for an exploration project must include:

1. A topographic map or sketch in sufficient detail to allow the Division to locate the area to be explored and determine the potential for adverseeffects on surface water which may result from the exploration activities.
2. A description of any land within the project area which was affected by:

(a) A project conducted by a previous operator and which is inactive on the date on which the application for a permit for an exploration project is filed;

(b) The current operator before January 1, 1981, and is inactive on the date on which the application for a permit for an exploration project is filed;

(c) The current operator before January 1, 1981, and is active on the date on which the application for a permit for an exploration project is filed;

(d) The current operator on or after January 1, 1981, but before October 1, 1990, and which is inactive on the date on which the application for a permit for an exploration project is filed; and

(e) The current operator on or after January 1, 1981, but before October 1, 1990, and which is active on the date on which the application for a permit for an exploration project is filed.

3. A description of any land within the project area:

(a) On which the operation is active on or after October 1, 1990; and

(b) Comprising access roads which were created before January 1, 1981.

4. A description of the techniques for prospecting and excavation to be used which will affect the surface.
5. The proposed location and approximate length and width of access roads.
6. A description of the best management practices employed during operation and reclamation to control erosion and minimize the transport and delivery of sediment to surface water, which must be the best management practices described in the *State of Nevada Handbook of Best Management Practices* or practices equivalent thereto.
7. The estimated amount of acreage that will be disturbed by the project.
8. The anticipated schedule for the project and for reclamation.

9. The proposed use of the areas to be affected if different from the pre-exploration use.

10. The activities for reclamation to be undertaken during and upon completion of the project.

11. The proposed methods to monitor and control noxious weeds as described in NAC 555.010 during reclamation.

(Added to NAC by Environmental Comm'n, eff. 9-19-90; A by R044-12, 9-14-2012)

NAC 519A.270 Contents of plan for reclamation for mining operati on. (NRS 519A.160, 519A.230) The plan for reclamation for a mining operation must include:

1. A topographic map of the area of the operation depicting:

(a) The boundaries of the area of the operation;

(b) Surface ownership of the land within the area of the operation;

(c) The areas to be affected in sufficient detail so that they can be located from the ground;

(d) The kind of disturbances, including:

(1) Tailings impoundments;

(2) Leach pads;

(3) Waste rock dumps;

(4) Buildings;

(5) Roads; and

(6) All other surface facilities; and

(e) A description of the land within the area of operation which was affected by:

(1) An operation conducted by a previous operator and which is inactive on the date on which the application for a permit for an operation is filed;

(2) The current operator before January 1, 1981, and which is inactive on the date on which the application for a permit for an operation is filed;

(3) The current operator before January 1 , 1981, and which is active on the date on which the application for a permit for an operation is filed;

(4) The current operator on or after January 1, 1981, but before October 1, 1990, and which is inactive on the date on which the application for a permit for an operation is filed; and

(5) The current operator on or after January 1, 1981, but before October 1, 1990, and which is active on the date on which the application for a permit for an operation is filed.

2. A description of any land within the area of operation:

(a) On which the operation is active on or after October 1, 1990; and

(b) Comprising access roads which were created before January 1, 1981.

3. The location of any surface water body within one-half-mile down gradient of the operation which may be impacted by excess sedimentation resulting from the mining operations.

4. An estimate of the number of acres affected by each type of disturbance.

5. A proposed productive postmining use of the land.

6. A proposed schedule of the time for initiation and completion of activities for reclamation.

7. The proposed postmining topography.

8. The technical criteria used to determine t he final gradient and stability of slopes created o r affected by the mining operation.

9. The proposed methods to be used in reclaiming impoundments used during the operation.

10. A statement of any constraints on the est imated time to complete reclamation caused by the residual moisture content or physical or chemical qualities of impoundments.

11. The kinds of access roads and their estimated width and length which will be built and the manner in which they will be reclaimed.

12. A description of the best management practices employed during operation and reclamation to control erosion and minimize the transport and delivery of sediment to surface water, which must be the best management practices described in the *State of Nevada Handbook of Best Management Practices* or practices equivalent thereto.

13. The proposed revegetation of the land for its postmining land use, including:

(a) A plan for the management of topsoil and growth medium;

(b) A list of each species of vegetation;

(c) The rate of seeding of vegetation;

(d) The type of fertilizer and mulch to be used;

(e) When the planting will occur; and

(f) The proposed methods to monitor and control noxious weeds as described in NAC 555.010 during reclamation.

14. The proposed disposition of:

(a) Buildings;

(b) Equipment;

(c) Piping;

(d) Scrap;

(e) Reagents; and

(f) Any other equipment and materials.

15. A description of any surface facilities such as buildings or roads which will not be reclaimed.

16. A description of any necessary monitoring and maintenance of fences, signs and other structures which will be performed by the operator on the reclaimed land.

17. A description of any reclamation which is necessary because of instream mining.

18. A description of any necessary stabilization, management, control or treatment of mine-impacted waters.

19. A statement of the effect that the proposed reclamation will have on future mining in the area.

20. A statement setting forth the effect that the proposed reclamation will have on public safety.

(Added to NAC by Environmental Comm'n, eff. 9-19-90; A by R044-12, 9-14-2012; R052-15, 12-21-2015)

NAC 519A.275 Requirements for productive postmining use of land. (NRS 519A.160)

1. A productive postmining use of the land required to be submitted with a plan for reclamation need not provide a use of the land and degree of productivity which is identical with the use of the land before the mining began or the use of the adjacent land or the degree of use.

2. Land which is returned to its pre-mining use or reclaimed after mining or exploration to a level of productivity which is generally consistent with the pre-mining level of productivity or the level of productivity of the surrounding land shall be deemed to be a productive postmining use.

3. Land which is reclaimed to a degree of productivity which is less productive than its pre-mining use shall be deemed to be productive if the operator takes reasonable measures, including, but not limited to:

(a) Ensuring adequate fertilization of the soil;

(b) Ensuring the quantity and quality of the topsoil or growth medium; and

(c) Establishing a productive postmining use of the land within site-specific economic and technical constraints of the area.

4. Land subject to excessive erosion will not be deemed to be reclaimed to a productive postmining use unless excessive erosion existed before mining or exists on the adjacent land. Evidence of the excessive erosion must be provided by the operator to the Division.

5. If the operator is not the owner of the surface of the affected lands, the Division shall consider any comments received from the landowner pursuant to NAC 519A.190 and 519A.205 in making the final determination that the proposed plan forreclamation adequately provides for a productive postmining use of the land.

(Added to NAC by Environmental Comm'n, eff. 9-19-90; A by R080-08, 12-17-2008)

NAC 519A.280 Approval required of proposed postmining use of land. (NRS 519A.160) Notwithstanding any other provisions of NAC 519A.010 to 519A.415, inclusive, a proposed postmining use of land must be approved by:

1. If the land is subject to the jurisdiction of the Bureau of Land Management, the United States Forest Service or another federal land management agency, the federal land manager; or

2. If the land is privately owned and if required by law, a local governmental entity with the authority to approve the postmining use of private land within its jurisdiction.

(Added to NAC by Environmental Comm'n, eff. 9-19-90; A by R080-08, 12-17-2008; R044-12, 9-14-2012)

NAC 519A.285 Time for initiation of reclamation; extension of time; completion of reclamation. (NRS 519A.160)

1. If affected land cannot practicably be reclaimed concurrently with an exploration project or mining operation, reclamation must be initiated:

(a) Within 2 years after completion or abandonment of the exploration project or mining operation;

(b) Within 3 years after a temporary closure of an exploration project or mining operation; or

(c) As required by the Bureau of Land Management, the United States Forest Service or another federal land management agency.

2. The Division may grant one or more extensions of the time when reclamation must begin if the operator of an exploration project or mining operation demonstrates that a reasonable likelihood exists that the project or operation will resume, based on a consideration of factors including, but not limited to:

(a) The presence of additional mineralization of the commodity being mined or other commodities in commerce;

(b) Historical fluctuations in the value of the commodity being mined or other commodities present if they can be mined using the same disturbances;

(c) The design life of any beneficiation process components existing at a mining operation; and

(d) If the closure was caused because of litigation.

Each extension is for a 3-year period.

3. Once initiated, final reclamation activities must be completed as set forth in an approved plan for reclamation, unless the exploration project or mining operation is reactivated.

4. As used in this section, "process component" has the meaning ascribed to it in NAC 445A.375.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.290 Departure from approved plan for reclamation. (NRS 519A.160, 519A.230)

1. An operator may not depart from an approve d plan for reclamation without a modification of the plan which is approved by the Division or ot her written approval from the Division except in the case of an emergency.

2. As used in this section, emergency means a situation in which compliance with a provision of an approved plan for reclamation may result in b odily injury or in environmental damage not anticipated in the plan.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.295 Procedure for operator to modify plan for reclamati on. (NRS 519A.160, 519A.230)

1. An operator may request a modification to a plan for reclamation:

(a) By submitting to the Division a written re quest and those portions of the application for a permit which are applicable to the requested modifi cation, including, a revision to the calculated cost of executing the plan for reclamation and the amount of surety, if applicable; and

(b) For any reason, including:

(1) A proposed change in the postmining land use;

(2) The addition of a new disturbance to the affected land; and

(3) Proposed changes to the methods and techniques which will be used for reclamation.

2. The Division shall review a request for a major modification to a plan for reclamation or a minor modification to a plan for reclamation of a m ining operation and notify the applicant if additional information is required within 15 days a fter the receipt of the request. The notice must state the information which is required.

3. If the applicant provides additional infor mation to complete a request, the Division shall notify the applicant if more additional information is required within 15 days after receipt of the additional information. The notice must state the additional information which is required.

4. The Division shall issue a notice of inten t to allow or deny the request within 15 days after the later of:

(a) The close of the period for public comment provided in NAC 519A.190; or

(b) The receipt of the request for modification and the corresponding fees.

5. If the request for a modification is denied, the Division shall notify the applicant of:

(a) The reasons for denial; and

(b) The time allowed and procedures for appealing the decision pursuant to NAC 519A.415.

6. A request for a minor modification to a pl an for reclamation of an exploration project shall be approved or denied, and the reason for denial gi ven, within 10 days after the request for modification is submitted.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.300 Modification by Division of plan for reclamation. (NRS 519A.150, 519A.160)

1. The Division, on its own motion, may modify an approved plan for reclamation if:

(a) A provision of the plan is in conflict with the provisions of a specific statute;

(b) It becomes impossible or impracticable to comply with any provision of the plan; or

(c) A significant problem is discovered to exi st which results or may result from compliance with any provision of the plan.

2. If the Division, on its own motion, modifies a plan it:

(a) Shall notify the operator in a manner which allows the operator sufficient time to appeal the modification; and

(b) State the time allowed for an appeal of the decision in the modified plan.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.305 Requirements for notice and public comment before modifying plan for reclamation. (NRS 519A.150, 519A.160)

1. The Division shall, at least 30 days before making a major modification to a plan for reclamation of a mining operation:

(a) Circulate a public notice of the intent to modify the plan in a manner intended to inform interested persons;

(b) Cause to be published in a newspaper of general circulation within the geographic area of an exploration project or mining operation, a notice of the intent to modify the plan; and

(c) Mail to the operator, the landowner, members of the board of county commissioners of the county in which the project or operation is located, the Division of Minerals of the Commission on Mineral Resources and any other person who so requests, written notice of the intent to modify the plan.

2. Notice given pursuant to subsection 1 must include:

(a) The name, address and telephone number of the Division;

(b) The name and address of the operator;

(c) The location of the project or operation;

(d) A description of the procedure which the Division will use to make a final decision to modify a plan;

(e) The specific location where interested persons may obtain further information or inspect and copy relevant forms and documents; and

(f) A statement that interested persons must submit to the Division written comments on the tentative decision of the Division within 30 days after the date on which the notice is published.

3. The Division:

(a) Shall allow written comments and information and a public hearing as provided in NAC 519A.185 to 519A.210, inclusive, before making a major modification to a plan for reclamation.

(b) Is not required to allow written comments and a public hearing as provided in NAC 519A.185 to 519A.210, inclusive, before making a minor modification to a plan for reclamation.

(Added to NAC by Environmental Comm'n, eff. 9-19-90; A by R097-05, 10-31-2005)

NAC 519A.310 Approval of modification to approved plan for reclamation of public land. (NRS 519A.160) A modification to an approved plan for reclamation of public land which is managed by a federal land management agency must be:

1. Approved by the federal agency; and

2. Approved by the Division.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.315 Manner for abandonment of site; selection of appropriate activities for reclamation of site. (NRS 519A.160, 519A.230)

1. The abandonment of a site must be conducted in a manner which ensures public safety, encourages techniques to minimize adverse visual effects and establishes a safe and stable condition suitable for the productive postmining use of the land.

2. In selecting appropriate activities for reclamation for a particular site, techniques which minimize adverse visual impact must be considered.

3. As used in this section, "ensures public safety" includes minimizing hazards in areas to which the public may have legal access by, if applicable:

(a) Removing or burying structures, equipment, reagents or scrap;

(b) Sealing or securing shafts, tunnels and adits pursuant to NAC 513.390;

(c) Plugging drill holes;

(d) Leaving slopes in a structurally stable condition; and

(e) Restricting access to areas which cannot practicably be made safe.

4. As used in this section, "stable condition" means a condition that is resistant to excessive erosion and is structurally competent to withstand normal geologic and climatic conditions without significant failure that would be a threat to public safety and the environment.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.320 Notification by operator of completion, abandonment or suspension of work on exploration project or mining operation. (NRS 519A.160)

1. An operator shall notify the Division in writing within 90 days after an exploration project or mining operation is completed or abandoned. The notice must state the date on which the activities for reclamation included in the approved plan for reclamation will begin.

2. Except as otherwise provided in subsection 3, the operator shall notify the Division in writing within 90 days after work is suspended on an exploration project or mining operation for more than 120 days. The notice must state:

(a) The nature and reason for the suspension;

(b) The anticipated duration of the suspension; and

(c) Any event which would reasonably be expected to result in either the resumption of activities or the abandonment of the project or operation.

3. A temporary closure caused by weather conditions does not require notice pursuant to subsection 2.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.325 Removal and stockpiling of topsoil; avoidance of depression in land. (NRS 519A.160, 519A.230)

1. If practicable and necessary for the establishment of the postmining use of the land, sufficient topsoil, if available, must be removed during the creation of a disturbance and stockpiled for use in future reclamation. The stockpile must be posted to identify the material, and stabilized as necessary to prevent excessive losses from erosion. If topsoil is unavailable, any growth medium to be used that requires removal and stockpiling must be managed in the same manner as topsoil.

2. The creation of a depression during reclamation which may form a pond must be avoided unless the pond is part of the postmining use of the land.

3. As used in this section, "stabilized" means the condition which results when an area which has been reclaimed no longer exhibits a potential to impact adversely public safety or the environment.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.330 Revegetation of land. (NRS 519A.160, 519A.230)

1. An operator shall:

(a) Select and establish species of plants that will result in vegetation productivity comparable to that growing on the affected lands before commen cement of the exploration project or mining operation, which is required by the manager of the land or which is consistent with the postmining use of the land.

(b) Consult a person with experience in revege tation or test the land before the selection of plants.

2. The operator may rely upon available techn ical data and the results of field tests when selecting seeding practices and soil amendments whi ch will result in viable vegetation. These practices of selection may be included in the plan for reclamation.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.335 Authority of Division to approve appropriate method s of reclamation. (NRS 519A.140, 519A.160) The Division may approve any appropriate method of reclamation for exploration projects and mining operations if t he method is consistent with the provisions of NAC 519A.010 to 519A.415, inclusive.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.340 Authority of Division to request operator of explor ation project to perform certain types of reclamation. (NRS 519A.140, 519A.160) The Division may, if appropriate, request an operator of an exploration project to reclaim:

1. Roads and drill pads by:

(a) Recontouring or regrading to round off, cut and fill slopes;

(b) Removing culverts;

(c) Ripping or scarifying the surface;

(d) Constructing water bars;

(e) Revegetation; and

(f) Restoring or stabilizing drainage areas and streambeds.

2. Drill holes from exploration by plugging the holes with the minimum surface plug required pursuant to chapter 534 of NRS.

3. Trenches and pits by:

(a) Backfilling and regrading to approximate the form of the land before it was disturbed;

(b) Regrading to make the land stable; and

(c) Revegetation.

(Added to NAC by Environmental Comm'n, eff. 9-19-90; A 9-5-91)

NAC 519A.345 Authority of Division to require operator of mining operation to perform certain types of reclamation. (NRS 519A.140, 519A.160) The Division may, if appropriate, require an operator of a mining operation to reclaim:

1. Roads and drill pads by:

(a) Recontouring or regrading to round off, cu t and fill slopes to the original contour or to approximate the form of the land before its disturbance;

(b) Removing culverts;

(c) Ripping or scarifying the surface;

(d) Constructing water bars;

(e) Revegetation; and

(f) Restoring or stabilizing drainage areas or streambeds.

2. Drill holes from exploration by plugging the holes with the minimum surface plug required pursuant to chapter 534 of NRS.

3. Waste and development rock piles by:

(a) Regrading to round off sharp edges, enhance the stability, reduce susceptibility to erosion and facilitate efforts for revegetation;

(b) Revegetation;

(c) Diverting runon; and

(d) Implementing measures to stabilize, manage, control or treat mine-impacted waters.

4. Dams for tailings ponds by:

(a) Covering with waste rock, topsoil or growth medium;

(b) Revegetation; and

(c) Rendering the dam incapable of storing any mobile fluid in a quantity which could pose a threat to the stability of the dam or to public safety.

5. Impoundments for tailings by:

(a) Regrading to promote runoff and reduce infiltration;

(b) Covering with waste rock, topsoil or growth medium;

(c) Revegetation;

(d) Process fluid stabilization; and

(e) Diverting runon.

6. Heaps from leaching by:

(a) Regrading to enhance structural stability, promote runoff, reduce infiltration and control erosion;

(b) Covering with waste rock, topsoil or growth medium;

(c) Revegetation;

(d) Process fluid stabilization; and

(e) Diverting runon.

7. Solution ponds, settling ponds and other nontailings impoundments by:

(a) Backfilling and regrading to approximate the natural land form; and

(b) Restoring the regime of the surface water to the regime that existed before the disturbance.

8. Buildings, foundations, facilities, structures and other equipment by:

(a) Demolishing to the level of the foundation and burying the demolished items on the site in conformance with applicable requirements for the disposal of solid waste;

(b) Salvaging and sale;

(c) Disposal off of the site in conformance with applicable requirements for the disposal of solid waste; and

(d) Continuing use in a manner consistent with the postmining land use.

9. Open pit mines by:

(a) Performing activities that will provide for public safety;

(b) Stabilizing pit walls or rock faces where required for public safety;

(c) Constructing and maintaining berms, fences or other means of restricting access;

(d) Implementing measures to stabilize, manage, control or treat mine-impacted waters;

(e) Creating a lake for recreational use, wildlife or other uses; and

(f) Revegetation.

Reclamation of open pits or rock faces does not require backfilling although backfilling in whole or in part with waste rock from an adjacent mining operation may be encouraged if backfilling is feasible and does not create additional negative environmental impacts.

10. Underground mines by:

(a) Sealing shafts, adits, portals and tunnels to prevent access;

(b) Constructing and maintaining berms, fences or other means of restricting access; and

(c) Implementing measures to stabilize, manage, control or treat mine-impacted waters.

(Added to NAC by Environmental Comm'n, eff. 9- 19-90; A 9-5-91; R090-00, 7-27-2000; R052-15, 12-21-2015)

Provision of Surety

NAC 519A.350 General requirements. (NRS 519A.160, 519A.190, 519A.210)

1. An operator shall file a surety with the D ivision or a federal land management agency, as applicable, to ensure that reclamation will be completed on privately owned and federal land. The surety may be:

(a) A trust fund;

(b) A bond;

(c) An irrevocable letter of credit;

(d) Insurance;

(e) A corporate guarantee;

(f) A cash deposit; or

(g) Any combination thereof.

2. If the surety is a trust fund:

(a) The operator shall make periodic payments to the trust fund at least annually for the term of the exploration project or mining operation.

(b) The initial payment to the trust must be:

(1) For a new exploration project or mining operation, made before the land is affected.

(2) For an exploration project or miningoperation which is active on October 1, 1990, made within 60 days after the operator receives a permit from the Division.

(c) The balance of the trust fund must be suff icient at all times to satisfy the requirements of NAC 519A.360.

3. If the surety is the bond of a corporation:

(a) It must state that the operator shall fait hfully perform all requirements of the permit issue d by the Division.

(b) The corporation must be licensed to do business in the State of Nevada.

4. The operator may provide evidence of a sur ety provided by the program for the pooling of reclamation performance bonds developed by the Divi sion of Minerals of the Commission on Mineral Resources pursuant to NRS 519A.290.

5. If the surety is an irrevocable letter of credit, the letter of credit must:

(a) Be executed and issued by a bank authorize d and doing business in the State of Nevada or a correspondent bank which is authorized to do business in the State of Nevada.

(b) Be made at the request of the operator.

(c) State that the issuing bank will honor drafts for payment upon compliance with the terms of the credit.

(d) Be irrevocable and issued for at least 1 year.

The operator shall notify the Division at least 60days before the expiration of the letter of credit The notice must state whether it will be renewed or replaced with another form of surety.

6. If the surety is insurance:

(a) The policy must guarantee the performance of each reclamation obligation and permitting requirement of the operator if the operator defaults on any such obligation or requirement.

(b) The insurance company issuing the policy must be authorized to conduct the business of insurance in the State of Nevada.

(c) The insurance company issuing the policy must have a superior financial strength rating and a superior credit rating as determined by A.M. Best Company of Oldwick, New Jersey, or equivalent ratings from a nationally recognized insurance rating service.

(d) The policy must provide for a financial guarantee which satisfies the requirements of NAC 519A.360 and which is available at all times if the operator defaults on any reclamation obligation or permitting requirement.

7. If the surety is a corporate guarantee:

(a) Not more than 75 percent of the required surety may be satisfied by the corporate guarantee, which is subject to periodic review and approval by the Administrator of the Division. The remaining portion of the surety must be satisfied by a surety identified in this section.

(b) The audited financial statements of the corporation must indicate that the corporation has two of the following three ratios:

(1) A ratio of total liabilities to stockholder's equity less than 2 to 1.

(2) A ratio of the sum of net income plus depreciation, depletion and amortization to total liabilities greater than 0.1 to 1.

(3) A ratio of current assets to current liabilities greater than 1.5 to 1.

(c) The net working capital and tangible net worth each must equal or exceed the amount established for reclamation pursuant to NAC 519A.360.

(d) The tangible net worth must be at least $10,000,000.

(e) Ninety percent of the assets of the corporation must be:

(1) Located in the United States; or

(2) At least six times the amount established pursuant to NAC 519A.360.

8. If the surety is a cash deposit:

(a) The deposit must be deposited with and held in trust by the State Treasurer. Any interest earned on the deposit must be credited to the trust. The State Treasurer may release the deposit either in whole or in part to the operator or the Division only upon receipt of a written request from the Administrator or his or her designee.

(b) The deposit must be sufficient to satisfy the requirements of NAC 519A.360 and the Division shall determine the portion of the deposit to be allocated as the surety for each individual exploration project or mining operation.

9. Any financial information submitted to the Division pursuant to this section must be prepared in accordance with accounting principles that are generally accepted in the United States.

(Added to NAC by Environmental Comm'n, eff. 9-19-90; A by R089-01, 10-25-2001; R080-08, 12-17-2008; R044-12, 9-14-2012; R052-15, 12-21-2015)

NAC 519A.355 Provision of statewide surety for exploration projects. (NRS 519A.160, 519A.190) The applicant for a permit for an exploration project may provide a statewide surety for all projects conducted within the State of Nevada.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.360 Amount of surety required. (NRS 519A.160, 519A.190, 519A.210)

1. The operator shall provide surety in an amount sufficient to ensure reclamation of:

(a) The entire area to be affected by his or her project or operation; or

(b) A portion of the area to be affected if, as a condition of the issuance of the permit, filing additional surety is required before the operator disturbs land not covered by the initial surety.

2. The amount of surety required must be based on an estimate of the cost of executing the plan for reclamation which would be incurred by the state or federal agency having jurisdiction over the land.

3. The operator's estimate of the cost for reclamation must be based on either:

(a) The costs of equipment rental, operation and labor which are appropriate for the geographic area undergoing reclamation and which would otherwise be incurred by a third-party contractor who performed the reclamation;

(b) Estimated costs provided by an outside contractor; or

(c) Any other method which is acceptable to the Administrator, the Bureau of Land Management, the United States Forest Service or another federal land management agency, if applicable.

4. In determining the cost of executing the plan for reclamation, the operator shall consider all activities in the plan for reclamation that are required by NAC 519A.010 to 519A.415, inclusive, or chapter 519A of NRS, including, if appropriate:

(a) Earth moving, regrading, stabilization of heaps and dumps, recontouring of roads and erosion control;

(b) Process fluid stabilization;

(c) Stabilization, management, control and treatment of mine-impacted waters;

(d) Revegetation, preparation of seedbed and planting;

(e) Demolition of buildings and other structures;

(f) Removal and disposal or salvage of buildings, structures, equipment, piping, scrap and reagents;

(g) Any ongoing or long-term activities which are required to:

(1) Maintain the effectiveness of reclamation or are necessary in lieu of reclamation; or

(2) Ensure the continuation of post-reclamation stabilization, management, control and treatment of mine-impacted waters to protect the waters of this State,

including, without limitation, periodic clean-out of sediment basins and ponds used to collect mine-impacted waters or maintenance of berms and fences which are used to prevent access to areas which pose a threat to the public safety;

(h) Equipment mobilization and demobilization; and

(i) Administration and management by the Division, the Bureau of Land Management, the United States Forest Service and another federal land management agency, if applicable.

5. In determining the cost of executing the plan for reclamation, the operator shall not consider the cost of any activity not included in the plan for reclamation or not required by NAC 519A.010 to 519A.415, inclusive, or chapter 519A of NRS. This subsection does not limit in any way the authorities of the Bureau of Land Management, the United States Forest Service or another federal land management agency to require surety for purposes other than those of NAC 519A.010 to 519A.415, inclusive, and chapter 519A of NRS.

(Added to NAC by Environmental Comm'n, eff. 9-19-90; A by R090-00, 7-27-2000; R044-12, 9-14-2012; R052-15, 12-21-2015)

NAC 519A.365 Submission to Division of information regarding estimation of costs for reclamation. (NRS 519A.160, 519A.190, 519A.210) The operator shall submit, on a form provided by the Division or in a similar manner:

1. Documentation for his or her calculation of the cost of executing the plan for reclamation;
2. The source of his or her estimates of costs;
3. A list of specific activities which will be performed to reclaim the affected acres such as those in NAC 519A.360 for each type of disturbance; and
4. The total acreage of each disturbance requiring the same activity to be performed for reclamation.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.370 Determination of whether estimate of cost for reclamation is sufficient. (NRS 519A.160, 519A.190, 519A.210)

1. The Division shall review the operator's estimate of the cost for reclamation and determine if the estimate is reasonably sufficient to conduct all required reclamation.
2. If the Division determines that the estimated cost of executing the plan for reclamation is insufficient to conduct all required reclamation, the application for a permit shall be considered to be incomplete.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.375 Disturbances of land for which surety not required. (NRS 519A.160, 519A.190, 519A.210) Surety will not be required for reclamation of land disturbances which were created before October 1, 1990, and which are no longer active as part of an active exploration project or mining operation on October 1, 1990.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.380 Periodic review of amount of surety; notification required; adjustment of amount. (NRS 519A.160)

1. Within 3 years after the effective date of the permit and at least every 3 years thereafter, an operator shall review the amount of surety filed to cover the cost of reclamation to determine whether it is still adequate to execute the approved plan for reclamation taking inflation into consideration.
2. The operator shall:

(a) Notify the Division, the Bureau of Land Management, the United States Forest Service and another federal land management agency, if appropriate, of the results of the review of the surety; and

(b) Within 120 days after the review:

(1) Request a decrease in the surety; or

(2) Increase the surety,

to execute the plan for reclamation.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.385 Release of surety: Request for release; conditions; denial of request. (NRS 519A.160)

1. The Division may release a surety either in whole or in part at the request of the operator.
2. The entire surety must not be released until all of the requirements of the permit have been fulfilled, except that:

(a) A portion of the surety covering the reclamation of a discrete part of a disturbance must be released when the requirements of the permit regarding the discrete part of the disturbance have been fulfilled.

(b) That portion of the surety covering a discrete activity must be released when the requirements of the permit regarding that discrete activity have been fulfilled.

(c) Except as otherwise provided in subsection 3, if revegetation is part of the plan for reclamation, 60 percent of the posted surety must be released upon completion of the earthwork. After revegetation has been performed by the operator on the regraded lands, according to the approved plan for reclamation, the Division may release an additional 25 percent of the surety. The remaining surety must not be released until all requirements of the permit have been satisfied.

(d) Upon transfer of a permit to a new operator and upon acceptance of the required surety from the new operator, the Division shall release the surety posted by the original operator.

3. Percentages greater than those specified in paragraph (c) of subsection 2 may be released if the operator demonstrates that the remaining surety is sufficient to ensure completion of the required reclamation.

4. Within 30 days after receiving a request for release of a surety, the agency holding the surety, or its designated agent pursuant to NRS 519A.140, shall inspect the permitted exploration project or mining operation to determine whether the operator has fulfilled the requirements of his or her permit and either:

(a) Release the surety or portion thereof as requested; or

(b) Notify the operator that the requested surety will not be released, the reasons why and the measures necessary to satisfy the requirements of the permit.

5. If a request to release is denied, the operator may appeal the decision pursuant to NAC 519A.415.

6. The 30 days within which an agency must respond to a request to release a surety pursuant to subsection 3 may be extended if weather conditions prevent an inspection of the reclaimed area.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.390 Forfeiture of surety: Grounds; notice and hearing. (NRS 519A.160)

1. A surety filed with the Division, the Bureau of Land Management, the United States Forest Service or another federal land management agency is subject to forfeiture if:

(a) An exploration project or mining operation has been completed, abandoned, or temporarily closed for a period greater than allowed pursuant to NAC 519A.285 without initiating activities for reclamation;

(b) The permit is suspended or revoked pursuant to NAC 519A.220; or

(c) The operator ceases to conduct business in the State of Nevada and does not transfer the permit to a new operator.

2. The Division shall notify an operator personally or by registered mail that his or her surety is subject to forfeiture, and inform the operator of his or her right to a hearing before the Commission. A hearing must be scheduled pursuant to NAC 519A.400, or pursuant to NAC 519A.220 if the permit is suspended or revoked.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

Trust Fund for Short-Term Fluid Management

NAC 519A.392 Payments for deposit into Fund; use and reimbursement of money in Fund. (NRS 519A.160)

1. In addition to the surety required pursuant to NAC 519A.350, on or before October 1, 2000, an operator of a mining operation that is required to hold a permit from the Department of Wildlife pursuant to NRS 502.390 shall submit to the Division:

(a) Thirty-six thousand dollars if the total amount of surety the operator is required to provide pursuant to NAC 519A.360 is more than $35,000,000 as of the date the operator submits the money;

(b) Twenty-four thousand dollars if the total amount of surety the operator is required to provide pursuant to NAC 519A.360 is more than $7,000,000 but less than or equal to $35,000,000 as of the date the operator submits the money;

(c) Six thousand dollars if the total amount of surety the operator is required to provide pursuant to NAC 519A.360 is more than $1,000,000 but less than or equal to $7,000,000 as of the date the operator submits the money; or

(d) One thousand dollars if the total amount of surety the operator is required to provide pursuant to NAC 519A.360 is less than or equal to $1,000,000 as of the date the operator submits the money.

2. In addition to the surety required pursuant to NAC 519A.350 and the payment required pursuant to subsection 1, on or before April 15, 2001, an operator of a mining operation that is required to hold a permit from the Department of Wildlife pursuant to NRS 502.390 shall submit to the Division:

(a) Thirty-six thousand dollars if the total amount of surety the operator is required to provide pursuant to NAC 519A.360 is more than $35,000,000 as of the date the operator submits the money;

(b) Twenty-four thousand dollars if the total amount of surety the operator is required to provide pursuant to NAC 519A.360 is more than $7,000,000 but less than or equal to $35,000,000 as of the date the operator submits the money;

(c) Six thousand dollars if the total amount of surety the operator is required to provide pursuant to NAC 519A.360 is more than $1,000,000 but less than or equal to $7,000,000 as of the date the operator submits the money; or

(d) One thousand dollars if the total amount of surety the operator is required to provide pursuant to NAC 519A.360 is less than or equal to $1,000,000 as of the date the operator submits the money.

3. In addition to the surety required pursuant to NAC 519A.350 and the payments required pursuant to subsections 1 and 2, on or before April 15, 2002, an operator of a mining operation that is required to hold a permit from the Department of Wildlife pursuant to NRS 502.390 shall submit to the Division:

(a) Thirty-six thousand dollars if the total amount of surety the operator is required to provide pursuant to NAC 519A.360 is more than $35,000,000 as of the date the operator submits the money;

(b) Twenty-four thousand dollars if the total amount of surety the operator is required to provide pursuant to NAC 519A.360 is more than $7,000,000 but less than or equal to $35,000,000 as of the date the operator submits the money;

(c) Six thousand dollars if the total amount of surety the operator is required to provide pursuant to NAC 519A.360 is more than $1,000,000 but less than or equal to $7,000,000 as of the date the operator submits the money; or

(d) One thousand dollars if the total amount of surety the operator is required to provide pursuant to NAC 519A.360 is less than or equal to $1,000,000 as of the date the operator submits the money.

4. The Division shall:

(a) Establish the Trust Fund for Short-Term Fluid Management;

(b) Deposit money collected pursuant to this section in the Trust Fund;

(c) Credit all interest earned on the money in the Trust Fund to the Trust Fund;

(d) Use the money in the Trust Fund only for the management of fluids at a site while the process for forfeiture of a surety pursuant to NAC 519A.390 is pending; and

(e) After the conclusion of the process for forfeiture of a surety pursuant to NAC 519A.390, if the surety was forfeited, reimburse the Trust Fund with the surety that was forfeited. Such reimbursement must be in an amount equal to the total amount of money used from the Trust Fund at the site for which the surety was forfeited.

5. An operator that operates more than one mining operation in this State may combine the amount of surety required pursuant to NAC 519A.360 for each site to determine the total amount of surety the operator is required to provide pursuant to NAC 519A.360 for purposes of determining the amount of money to submit pursuant to this section.

(Added to NAC by Environmental Comm'n by R120-00, eff. 9-25-2000)

Enforcement

NAC 519A.395 Inspections by Division and federal agencies; submission of results to operator. (NRS 519A.160)

1. The Division may inspect an exploration project or mining operation to determine if it is in compliance with the terms and conditions of a permit and the status of activities for reclamation. Such an inspection must be conducted during normal business hours and the operator may be given adequate notice so that personnel familiar with the permit and its requirements may be present.

2. Pursuant to NRS 519A.140, the Division, the Bureau of Land Management, the United States Forest Service or another federal land management agency may inspect a permitted exploration project or mining operation which is located on federal land or on both federal and private land to determine compliance with the terms and conditions of a permit and the status of activities for reclamation. Inspection of activities for reclamation on private property must be conducted during normal business hours and the operator may be given adequate notice so that personnel familiar with the permit and its requirements may be present.

3. The results of the inspection must be forwarded to the operator within 30 days of completion after the report of the inspection.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.400 Notice of noncompliance: Service; contents; withdrawal. (NRS 519A.160, 519A.270)

1. If the Division has reason to believe that an operator has violated any provision of chapter 519A of NRS, NAC 519A.010 to 519A.415, inclusive, or an approved plan for reclamation, it shall serve a notice of noncompliance on the operator. The notice must:

(a) Be served personally or by registered mail addressed to the operator at the address shown in the records of the Division;

(b) Specify each violation; and

(c) Set a date and time for a hearing and inform the operator that his or her permit may be suspended or revoked and his or her surety forfeited upon completion of the hearing or if the operator fails to attend the hearing.

2. The Division may withdraw a notice of noncompliance and cancel a hearing required by subsection 1 if the operator demonstrates that the alleged violation has been remedied or has agreed to a corrective plan of action approved by the Division.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.405 Maximum amount of civil penalty. (NRS 519A.160, 519A.280) The civil penalty imposed by the Division pursuant to NRS 519A.280 must not exceed $5,000 per violation.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

Miscellaneous Provisions

NAC 519A.410 Submission to Division of information and documentation concerning small mining operations. (NRS 519A.160)

1. The operator of a small mining operation shall submit to the Division:

(a) A sketch or topographic map of the operation depicting:

(1) The boundaries of the project area;

(2) Surface ownership within the project area;

(3) Areas to be affected and the nature of the disturbances including tailings impoundments, leach pads, waste rock dumps, buildings, roads and all other surface facilities;

(4) Areas within the project area which were previously affected by activities other than those of the operator or which will not be subject to additional or continuing disturbance because of his or her activities;

(5) The location of any body of surface water within one-half-mile down gradient from the operation which may be impacted by excess sedimentation resulting from the mining operations; and

(6) The location of access roads that were created before January 1, 1981.

(b) An estimate of the acreage affected by each type of disturbance set forth pursuant to subparagraph (3) of paragraph (a) of subsection 1.

(c) A proposed postmining use of the land and general description of the manner in which the postmining use of the land will be attained by reclamation.

2. The information and documentation required by subsection 1 must be submitted:

(a) By October 1, 1991, for a small mining operation which is active on October 1, 1990; or

(b) Before disturbance of the surface for a new small mining operation.

(Added to NAC by Environmental Comm'n, eff. 9-19-90)

NAC 519A.415 Appeals to Commission. (NRS 519A.160)

1. Any person aggrieved by:

(a) The issuance, denial, renewal, suspension, modification, condition or revocation of a permit; or

(b) The issuance, modification or rescission of any other order,

by the State Department of Conservation and Natural Resources may appeal to the Commission.

2. Any person who requests a hearing before the Commission concerning a final decision of the Department pursuant to chapter 519A of NRS may do so by filing a request, within 10 days after notice of the action of the Department, on form 3* with the State Environmental Commission,

Richard H. Bryan State Office Building, 901 South S tewart Street, Suite 4001, Carson City, Nevada 89701-5249.

3. The provisions of NAC 445B.875 to 445B.899, inclusive, apply to a hearing of the State Environmental Commission requested pursuant to subsection 1.

4. The Commission will affirm, modify or reve rse any action of the Department which is appealed to it.

*(See adopting agency for form.)

(Added to NAC by Environmental Comm'n, eff. 9-19-90; A 10-29-93)

DUTIES OF DIVISION OF MINERALS

General Provisions

NAC 519A.510 Definitions. (NRS 513.063, 519A.250, 519A.290) As used inNAC 519A.510 to 519A.635, inclusive, unless the context otherwise requires,the words and terms defined inNAC 519A.512 to 519A.555, inclusive, have the meanings ascribed to them in those sections.

(Added to NAC by Dep't of Minerals, eff. 10-9- 90; A 3-4-92; A by Comm'n on Mineral Resources by R069-99, 8-19-99; R066-02, 8-23-2002)

NAC 519A.512 "Administrator" defined. (NRS 519A.250, 519A.290) "Administrator" means the Administrator of the Division.

(Added to NAC by Dep't of Minerals, eff. 10-9- 90) — (Substituted in revision for NAC 519A.530)

NAC 519A.515 "Bond pool" defined. (NRS 519A.290) "Bond pool" means the program for the pooling of reclamation performance bonds that c ollects, holds and distributes money paid to the pool by its participants to assist those participants to comply with:

1. The bonding and surety requirements of chapter 519A of NRS;
2. The requirements for financial guarantees set forth in the regulations adopted pursuant to 43 U.S.C. § 1740; or
3. The bonding requirements imposed pursuant to an ordinance adopted by a county in this State.

(Added to NAC by Dep't of Minerals, eff. 10-9-90; A by Div. of Minerals, 11-14-97)

NAC 519A.520 "Commission" defined. (NRS 519A.290) "Commission" means the Commission on Mineral Resources.

(Added to NAC by Dep't of Minerals, eff. 10-9-90)

NAC 519A.525 "Division" defined. (NRS 519A.250, 519A.290) "Division" means the Division of Minerals of the Commission on Mineral Resources.

(Added to NAC by Dep't of Minerals, eff. 10-9-90)

NAC 519A.535 "Exploration project" defined. (NRS 519A.250, 519A.290) "Exploration project" means all activities conducted in this Sta te by a person on or beneath the surface of land for the purpose of, or in connection with, determining the presence, location, extent, depth or grade of any mineral, which affects the surface.

(Added to NAC by Dep't of Minerals, eff. 10-9-90; A 3-4-92)

NAC 519A.540 "Mining operation" defined. (NRS 519A.250, 519A.290) "Mining operation" means all activities conducted in this State by a person on or beneath the surface of land for the purpose of, or in connection with, the development or extraction of any mineral. The term does not include an aggregate or sand pit.

(Added to NAC by Dep't of Minerals, eff. 10-9-90; A 3-4-92)

NAC 519A.545 "Operator" defined. (NRS 519A.250, 519A.290) "Operator" means any person who owns, controls or manages an exploration project or a mining operation.

(Added to NAC by Dep't of Minerals, eff. 10-9-90)

NAC 519A.550 "Participant" defined. (NRS 519A.290) "Participant" means an operator who has paid money to the bond pool to cover his or her bonded liability and who is in good standing in the bond pool.

(Added to NAC by Dep't of Minerals, eff. 10-9-90)

NAC 519A.552 "Plan" defined. (NRS 513.063, 519A.250, 519A.290) "Plan" means a plan of operation filed with and approved by the United States Bureau of Land Management or the United States Forest Service.

(Added to NAC by Comm'n on Mineral Resources by R066-02, eff. 8-23-2002)

NAC 519A.555 "Responsible regulatory authority" defined. (NRS 519A.290) "Responsible regulatory authority" means the governmental agency that has authority to require, modify, release or require forfeiture of a reclamation performance bond for a mining operation or an exploration project.

(Added to NAC by Dep't of Minerals, eff. 10-9-90)

Program for the Pooling of Reclamation Performance Bonds

NAC 519A.570 Administration by Division; application for participation. (NRS 519A.290)

1. The Division will administer the bond pool.
2. A person who wishes to participate in the bond pool must complete an application on a form provided by the Division.
3. The application to participate in the bond pool must include a statement by the applicant and documentation that:

(a) Indicates whether the applicant has ever forfeited a bond or surety held for the reclamation of mined land and, if so, the location of the operation for which the bond or surety was forfeited and the circumstances of the forfeiture.

(b) Lists the location, scale and any other pertinent details of the previous mining or exploration activities of the applicant that required reclamation performance bonding during the preceding 10 years.

(c) Shows the structure of the business organization and the financial status of the applicant at the time of application. Except as otherwise provided in subsection 4, the documentation must include:

(1) An organizational chart naming any parent company;

(2) Current and long-term assets;

(3) Current and long-term liabilities;

(4) The net worth of the business organization; and

(5) Evidence that the financial statements have been reviewed by a certified public accountant and are a fair representation of the financial status of the applicant.

4. The Administrator may waive the requirements of subparagraph (5) of paragraph (c) of subsection 3 for an applicant who:

(a) Applies for bond coverage of $10,000 or less; and

(b) Submits to the Administrator a signed and notarized affidavit stating under penalty of perjury that the information provided by the applicant pursuant to subparagraphs (2), (3) and (4) of paragraph (c) of subsection 3 is true.

(Added to NAC by Dep't of Minerals, eff. 10-9-90; A 9-16-92; A by Div. of Minerals, 11-14-97)

NAC 519A.575 Submission of information by applicant; prequalification of applicant. (NRS 519A.290)

1. An applicant may submit any part of the information required by NAC 519A.570 before submitting the remaining required information.

2. The Administrator or his or her designee may prequalify an applicant for participation in the bond pool, subject to receipt and final review of any materials required to complete the application.

(Added to NAC by Dep't of Minerals, eff. 10-9-90)

NAC 519A.580 Notification of applicant; right to appeal denial of application. (NRS 519A.290) The Division will notify the applicant within 20 business days after receipt of an application that:

1. The applicant has been accepted to participate in the bond pool subject to payment of the entry deposit and the first installment of the premium due the first year;

2. The application is incomplete and identify what additional information is required; or

3. The application has been denied and the reasons for the denial. An applicant may appeal this decision pursuant to NAC 519A.630.

(Added to NAC by Dep't of Minerals, eff. 10-9-90)

NAC 519A.585 Establishment of amount of bond; amount of coverage by bond pool. (NRS 513.063, 519A.290)

1. The responsible regulatory authority shall establish the amount of the reclamation performance bond.

2. A participant is subject to a maximum bond amount for which the bond pool may be liable. The maximum amount may be reached by bonding more than a single mining operation or exploration project or a combination thereof.

3. A participant may participate in the bond pool with greater bond coverage than is required by the responsible regulatory authority with the approval of the Administrator or a person designated by him or her. Any coverage in excess of the coverage required by the responsible regulatory authority must be identified and may not be used to cover reclamation costs in the event of the forfeiture by the participant. The Administrator or a person designated by the Administrator will include any such coverage in determining the amount of the deposit and premiums the participant is required to pay pursuant to NAC 519A.595.

4. The maximum bond coverage for a participant who is the operator of one or more mining operations or exploration projects, or any combination thereof, is $3,000,000.

5. A participant may request a change in his or her bond pool coverage. The Administrator or a person designated by the Administrator may require additional information before increasing the bond coverage of a participant.

(Added to NAC by Dep't of Minerals, eff. 10-9-90; A 3-4-92; A by Div. of Minerals, 11-14-97; A by Comm'n on Mineral Resources by R066-02, 8-23-2002)

NAC 519A.590 Indemnification of bond pool. (NRS 519A.290) Before acceptance into the bond pool, the applicant must execute a general agreement of indemnity on a form provided by the Division. After acceptance into the bond pool, the applicant must indemnify and keep indemnified and save and hold harmless the bond pool against all loss, costs, expenses and attorney's fees incurred by the bond pool as a result of his or her participation in the bond pool or forfeiture of any part of his or her bond.

(Added to NAC by Dep't of Minerals, eff. 10-9-90)

NAC 519A.595 Payment of entry deposit and premiums. (NRS 513.063, 519A.290)

1. Each participant must pay the entry deposit and premiums required by this section to maintain participation in the bond pool.

2. If an operator becomes a participant before August 23, 2002, the participant must pay a deposit equal to 15 percent of his or her bond coverage at the time of entry into the bond pool. The amount of the deposit will be adjusted if the bond coverage provided by the pool increases or decreases solely because of a recalculation of the amount of the bond so the deposit is equal to 15 percent of the bond coverage. If the bond coverage provided by the pool increases because the plan is amended, the deposit for the bond will be calculated in the manner provided in subsection 3. The deposit and any addition to the original deposit must remain in the bond pool until the participant has been released by the responsible regulatory authority from further reclamation liability. The deposit will not be released in the event of a forfeiture.

3. If an operator becomes a participant after August 23, 2002, the amount of the deposit for:

(a) A bond that is less than $10,000, is 100 percent of the amount of the bond; and

(b) A bond that is $10,000 or more, is a percentage of the amount of the bond calculated using the following formula:

$$\frac{3}{299{,}000}\ (\text{amount of bond} - 10{,}000) + 50$$

4. Annual premiums, established as an equal percentage of each participant's bond coverage, must be paid by the participant:

(a) In quarterly installments on or before March 31, June 30, September 30 and December 31; or

(b) Annually in accordance with a schedule approved by the Administrator or a person designated by him or her.

5. Upon entry to the bond pool, the participant must, based on the date of entry, pay a prorated amount of the first:

(a) Quarterly premium; or

(b) Annual premium, if the participant pays the premium in accordance with a schedule approved by the Administrator or a person designated by him or her pursuant to subsection 4.

After entry to the bond pool, the participant mustpay the regular quarterly or annual amount on or before the date the premium is due.

6. The annual premium will be calculated as follows:

(a) Except as otherwise provided in paragraph (b), for bonds that were issued before August 23, 2002, the annual premium is 5 percent of the bond coverage of a participant.

(b) For bonds that are issued on or after August 23, 2002, or for bonds that have increased because the plan is amended, the annual premium:

(1) Except as otherwise provided in subparagraph (3), for bonds whose total amount is less than $10,000, is 3 percent of the amount of the bonds.

(2) Except as otherwise provided in subparagraph (3), for bonds whose total amount is at least $10,000, is a percentage of the amount of the bond calculated using the following formula:

$$\frac{-0.5}{299{,}000}\ (\text{amount of bond} - 10{,}000) + 10$$

(3) If the amount of the deposit and the premiums paid by a participant equal or exceed the amount of the bond, is 3 percent of the amount of the bond. For the purposes of this subparagraph, any late penalty paid by a participant will not be considered in determining the amount of the annual premium.

7. Except as otherwise provided in NAC 519A.610 and 519A.615, the annual premium is nonrefundable.

8. If a change occurs in the required premium as a percentage of the bond coverage of a participant, the Administrator or a person designated by him or her will notify the participant not less than 30 days before the due date of the next:

(a) Quarterly premium; or

(b) Annual premium, if the participant pays his or her premium in accordance with a schedule approved by the Administrator or a person designated by the Administrator pursuant to subsection 4.

The Administrator or a person designated by him or her will base any change in the percentage of the premium on the recommendation of an actuary who is approved by the Commissioner of Insurance to review the status of the bond pool. The findings of the actuary must show that a change in percentage allows the bond pool to remain self-sustaining under statistically expected forfeiture rates and forecasted administrative costs.

9. The Administrator or a person designated by him or her will:

(a) Consult with the Risk Management Division of the Department of Administration to determine the availability and cost of obtaining insurance to insure against exposure to a risk that would cause the liability of the bond pool to exceed the amount of money in the bond pool.

(b) Consult with the Commission to determine whether to obtain such insurance. If the insurance is obtained, the Administrator or a person designated by him or her will establish a schedule for payment of the premiums for each participant based on the participant's portion of the total liability of the bond pool.

(c) Notify each participant of the amount of the premium the participant owes not less than 30 days before the premium is due.

(Added to NAC by Dep't of Minerals, eff. 10-9-90; A by Div. of Minerals, 11-14-97; A by Comm'n on Mineral Resources by R066-02, 8-23-2002)

NAC 519A.600 Use of money held in bond pool; interest earned on money; transfer of administrative expenses. (NRS 519A.290)

1. All money held in the bond pool must be used only for the purposes of the bond pool, including administrative expenses.

2. All interest earned on money held in the bond pool must be added to the bond pool and be used solely for the purposes of the bond pool. Participants are not entitled to receive any interest on deposits or premiums paid into the pool.

3. Except as otherwise provided in this subsection, administrative expenses, calculated at a rate of 3 percent of the average total active bond amount held in the bond pool at the end of each of the 4 immediately preceding fiscal quarters, may be transferred annually from the bond pool to the Account for the Division of Minerals created pursuant to NRS 513.103. The amount transferred must be based on the actual administrative expenses incurred by the Division and may not exceed the amount resulting from the calculations made pursuant to this subsection.

4. As used in this section, "total active bond amount" means the total amount of money held in the bond pool that has not been requested to be returned to a participant.

(Added to NAC by Dep't of Minerals, eff. 10-9-90; A by Div. of Minerals by R108-13, 10-24-2014)

NAC 519A.605 Failure to pay premiums: Penalty; termination of participation; liability of bond pool. (NRS 519A.290)

1. If a participant fails to pay the premiums in the amount and by the time required by NAC 519A.595, the participant shall pay a penalty of 5 percent of the amount of:

(a) His or her quarterly premium; or

(b) His or her annual premium, if the participant pays the premium annually in accordance with a schedule approved by the Administrator or a person designated by the Administrator pursuant to that section.

2. If a participant fails to pay the quarterly or annual premium and the 5 percent penalty specified in subsection 1 within 30 calendar days after the date on which the premium is due, the Division will notify the participant that his or her participation in the bond pool will be terminated if full payment of the quarterly or annual premium and penalty is not received within 70 calendar days after the date on which the premium was due. The notice will be sent to the participant and the responsible regulatory authority by certified mail, return receipt requested, at least 30 calendar days before any action concerning termination is taken by the Administrator or a person designated by the Administrator.

3. If full payment of the quarterly or annual premium, including any penalty, is not received within 70 calendar days after the date on which it is due, the Division will send a notice to the responsible regulatory authority and the participant by certified mail, return receipt requested, that his or her participation in the bond pool is terminated. If a participant's participation in the bond pool is terminated pursuant to this section, the Division will not return the deposit paid by participant pursuant to NAC 519A.595.

4. The bond pool:

(a) Is liable for the coverage of the participant for reclamation of land that is disturbed until the date of termination.

(b) Is not liable for the reclamation of any land that is disturbed after the date of termination.

(Added to NAC by Dep't of Minerals, eff. 10-9-90; A by Div. of Minerals, 11-14-97)

NAC 519A.610 Release of deposit and unused premium. (NRS 519A.290) The Administrator or a person designated by the Administrator will request the State Treasurer to release the deposit of a participant and any unused premium paid by him or her, less any outstanding penalties or premiums, within 5 business days after receipt of written notification from the responsible regulatory authority that the participant:

1. Has satisfied the requirement to reclaim land disturbed by a mining operation or exploration project and the bond may be released; or
2. Has obtained a surety which replaces the bond coverage of the participant by the bond pool.

(Added to NAC by Dep't of Minerals, eff. 10-9-90; A by Div. of Minerals, 11-14-97)

NAC 519A.615 Partial release of deposit and unused premium. (NRS 519A.290) The deposit of a participant and any unused premium paid by him or her may be partially released in the same manner described in NAC 519A.610 if the responsible regulatory authority notifies the Division that:

1. The required amount of the bond has been reduced; or
2. The participant has partially substituted another form of surety for a portion of the coverage provided by the bond pool.

The reduction in the amount of the deposit required is the same percentage as the percentage decrease in the coverage provided by the bond pool.

(Added to NAC by Dep't of Minerals, eff. 10-9-90; A by Div. of Minerals, 11-14-97)

NAC 519A.620 Forfeiture of bond: Action by Administrator; liability and exoneration of bond pool. (NRS 519A.290)

1. Upon notification from the responsible regulatory authority that a participant has failed to complete the required reclamation and that the responsible regulatory authority, in accordance with all applicable laws and regulations, requires forfeiture of the bond, the Administrator will:

(a) Immediately notify the participant that his or her participation in the bond pool is terminated and his or her deposit will not be returned; and

(b) Request that the State Treasurer transfer to the responsible regulatory authority an amount of money from the bond pool determined by the Administrator or his or her designee to be equal to the estimated cost of reclamation less any other bonds or surety held in favor of the State of Nevada or the United States relating to the mining operation or exploration project of the participant to which the forfeiture applies.

2. The maximum liability of the bond pool is the coverage provided to the participant relating to the mining operation or exploration project of the participant at the time of the forfeiture.
3. If the responsible regulatory authority exonerates the participant from any portion of bonded liability, the bond pool is exonerated of an equal amount of bonded liability.

(Added to NAC by Dep't of Minerals, eff. 10-9-90)

NAC 519A.625 Forfeiture of bond: Action against participant or former participant. (NRS 519A.290) In the event of a forfeiture by a participant or a former participant whose participation in the bond pool is terminated pursuant to NAC 519A.605, the Administrator or a person designated by the Administrator will immediately notify the Attorney General and request that action be taken against the participant or former participant in the name of the State of Nevada in any court of competent jurisdiction to recover the full costs incurred by the bond pool as a result of the forfeiture. Any money recovered must be deposited in the bond pool and used for the general purposes of the bond pool.

(Added to NAC by Dep't of Minerals, eff. 10-9-90; A by Div. of Minerals, 11-14-97)

NAC 519A.630 Appeal of denial or termination of participation in bond pool. (NRS 519A.290)

1. Any person who is denied participation in the bond pool pursuant to NAC 519A.580 or whose participation in the bond pool is terminated pursuant to NAC 519A.620 may appeal the denial or termination.

2. Written notice of the appeal must be recei ved by hand delivery or certified mail, return receipt requested, by the Division within 20 calend ar days after receipt of the notice of denial or termination.

3. The appeal must state the grounds for the appeal of the denial or termination.

4. Within 30 calendar days after receipt of a notice of appeal, the Division will send a notice of the hearing to the person appealing the denial o r termination. The notice will include the time, place and nature of the hearing, the legal authorit y and jurisdiction under which the hearing is to be held, and a statement of the matters asserted.

5. The hearing will be held before a panel composed of:

(a) The Administrator who is the chair of the panel and hearing officer;

(b) A member of the Commission who is designated by the Chair of the Commission; and

(c) A representative of the current participants in the bond pool who is selected by the Chair of the Commission and the Administrator.

6. The person appealing the denial or termination may present evidence and has the burden of proving that the denial or termination should be modified or reversed.

7. The panel shall render a written decision which must be served personally or by certified mail upon the person appealing the denial or termin ation. The decision of the panel is a final decision for the purposes of judicial review.

(Added to NAC by Dep't of Minerals, eff. 10-9-90)

Fee for Filing Plan of Operation

NAC 519A.634 Amount of fee. (NRS 519A.250) The amount of the fee that an operator must pay pursuant to subsection 1 of NRS 519A.250 is $20 per acre or part of an acre.

(Added to NAC by Comm'n on Mineral Resources by R069-99, eff. 8-19-99)

NAC 519A.635 Refund of portion of fees. (NRS 513.063, 519A.250)

1. The Division will refund to an operator a portion of the fees required by NRS 519A.250 according to the following schedule:

(a) For an amended plan:

(1) That reduces the number of acres or p art of an acre to be disturbed from the original number of acres or part of an acre to be disturbed; and

(2) For which a fee has been paid to the Division pursuant to NRS 519A.250,

the refund is $1 for each acre or part of an acre removed from planned disturbance by the amendment.

(b) For a plan, there is no refund.

(c) For a notice, there is no refund.

2. An operator who wishes to receive a refundmust send to the Administrator a written request and a copy of the approved amended plan showing the reduction in acreage. Within 20 business days after receiving a valid written request for a refund and a copy of the amended plan, the

Administrator or his or her designee will request that the State Controller issue a check to the operator in an amount calculated pursuant to paragraph (a) of subsection 1.

3. As used in this section:

(a) "Notice" means a notice of intent to conduct activities that disturb the surface which is filed with the United States Bureau of Land Management or the United States Forest Service.

(b) "Operator" includes a person who is required by federal law to file a plan, an amended plan or a notice with the United States Bureau of Land Management or the United States Forest Service.

(Added to NAC by Dep't of Minerals, eff. 10-9-90; A by Comm'n on Mineral Resources by R080-01, 1-16-2002; R066-02, 8-23-2002)

STATE OF NEVADA
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL PROTECTION
BUREAU OF MINING REGULATION AND RECLAMATION

RECLAMATION PERMIT TEMPLATE

PERMITTEE:	Company Address City State Zip Code		
PROJECT NAME:	Project Name		
PROJECT LOCATION:	Sections, Township, Range; Mount Diablo Baseline an d Meridian, County, Nevada		
PERMIT NUMBER:	0000	**BLM CASE NUMBER:**	
PROJECT TYPE:	Mine	**AMENDMENTS:**	

Pursuant to Nevada Revised Statutes (NRS) 519A.010 to 519A.280, inclusive, and regulations promulgated thereunder by the State Environmental Commission as Nevada Administrative Code (NAC) 519A.010 to 519A.415, inclusive, and implemen ted by the Division of Environmental Protection (hereinafter the Division), this permit authorizes **Company** to reclaim the **Project Name** consistent with the conditions of this permit and the reclamation plan dated, date of Plan, *Title of Plan* and the amendments noted above. (if applicable)

This permit is effective as of the ## day of Month 20XX, and upon receipt by the Division of an acceptable surety, or verification from the fede ral land management agency that satisfactory surety has been posted. A surety is required by NAC 519A.350 prior to engaging in the activities authorized by this permit. Unless it is modified, suspended or revoked by the Division, this permit is valid for the life of the project. The permit will not now or in the future serve as a determination of ownership or the validity of any mining claim to which it might relate.

The Permittee must comply with all terms and conditions of this permit and all applicable statutes and regulations.

Issued this ## day of Month 20XX.

_____

Joseph Sawyer, P.E., Chief
Bureau of Mining Regulation and Reclamation

1. Permitted Disturbances

A. Disturbance Acreage Table: All disturbances are lo cated on private lands and/or public lands administered by the Bureau of Land Man agement or United States Forest Service (whichever applies).

Disturbance Category	Existing Disturbance Acres		Proposed Disturbance Acres		Total Disturbance Acres		Grand Total
	Public	Private	Public	Private	Public	Private	Public & Private
Open Pit	-	-	200.0	300.0	200.0	300.0	**500.0**
Waste Rock Dump #1	-	-	-	250.0	-	250.0	**250.0**
Waste Rock Dump #2	-	-	250.0	-	250.0	-	**250.0**
Waste Rock Dump #3	-	-	-	250.0	-	250.0	**250.0**
Waste Rock Dump #4	-	-	150.0	150.0	150.0	150.0	**300.0**
Access Road	4.0	4.0	10.0	10.0	14.0	14.0	**28.0**
Haul Roac	-	-	100.0	100.0	100.0	100.0	**200.0**
Tailings Impoundment	-	-	150.0	150.0	150.0	150.0	**300.0**
Cooling Pond	-	-	60.0	60.0	60.0	60.0	**120.0**
Heap Leach Facility	-	-	120.0	120.0	120.0	120.0	**240.0**
Process Ponds	-	-	20.0	20.0	20.0	20.0	**40.0**
Structures & Building Are	-	-	-	35.0	-	35.0	**35.0**
Drainage Diversic	-	-	15.0	15.0	15.0	15.0	**30.0**
Exploration Roads & Pads	75.0	75.0	50.0	50.0	125.0	125.0	**250.0**
Infiltration Basins	-	-	20.0	20.0	20.0	20.0	**40.0**
Storage & Equipment Area	2.5	2.5	500.0	500.0	502.5	502.5	**1005.0**
Total	**81.5**	**81.5**	**1645.0**	**2030.0**	**1726.5**	**2111.5**	**3838.0**

Example Disturbance Table

B. Drill holes will be plugged in accordance with t he provisions specified in Chapter 534 of the Nevada Administrative Code. All drill hole cuttings, grout, and fluids shall be contained in sumps constructed at the drill sites. No more than number in written form **(bold #)** drill holes will remain unplugged at any one time.

2. Departure from Approved Plan for Reclamation

A. Except in the case of an emergency, the operator may not depart from the approved plan for reclamation without a modification approved by the Division.

B. When an operator submits an amended plan of oper ation to the federal agency, a copy shall also be filed with the Division.

3. Fees

A. On or before April 15 of each year submit the fe es as required by NAC 519A.235.

B. On or before April 15 of each year submit the fe es as required by NRS 519A.260.

4. Reports

A. On or before April 15 of each year, the operator shall submit a report (NRS 519A.260), in a format specified by the Division, relating to the status and production of the operation and identifying each acre of land affected and land reclaimed by the operation.

5. Project Completion, Abandonment or Suspension of Work

A. The Division shall be notified in writing within ninety (90) days after an operation is complete or abandoned. The notice must state the date on which the activities for reclamation will begin as specified in NAC 519A.320.

B. The Division shall be notified in writing within ninety (90) days after work is suspended at the operation for more than one-hundred-twenty (120) days. The notice must state the nature and reason for the suspension; the anticipated duration of the suspension; and any event which would reasonably be expected to result in either the resumption of activities or the abandonment of the operation. The operator is not required to notify the Division of a temporary closure caused by weather conditions.

6. Surety

A. The Division and appropriate federal land management agency(s) shall review the estimate of the cost for reclamation submitted by the operator and determine if the estimate is adequate or reasonably sufficient to complete all required reclamation.

B. The operator shall file and maintain an acceptable surety as specified in NAC 519A.350 to ensure that reclamation will be completed. The surety amount will be based on the approved cost for reclamation.

C. Within three (3) years after the effective date of this permit and at least every three (3) years thereafter, the operator shall submit to the Division and the appropriate federal land management agency(s) an updated estimate of the cost for reclamation to determine whether the surety amount is still adequate to execute the approved reclamation plan. Inflation must be considered.

D. The Division and the appropriate federal land management agency(s) may approve release of surety either in whole or in part at the request of the operator. The operator must provide documentation on reclamation work completed and/or stages of process fluid stabilization completed before any portion of the surety may be released. (See Attachment A)

E. Release of the surety amount for reclamation of a specific component or discrete part of a disturbance does not release the operator from liability for reclamation of that component of disturbance should the reclamation fail to meet the requirements of this permit.

7. Inspection of Exploration Project and/or Mining Operation

A. The operator shall allow authorized representatives of the Division, and the appropriate federal land management agency(s) to inspect the operation, during normal business hours, to determine compliance with the terms and conditions of this permit and the status of reclamation activities.

8. Notice of Noncompliance/Suspension or Revocation of Permit

A. A notice of noncompliance may be issued by the Division if an operator fails to comply with the provisions of NAC 519A.010 to 519A. 415, inclusive; Chapter 519A of NRS; or an approved plan for reclamation.

B. The Division may suspend or revoke this permit if the operator does not resolve the noncompliance or agree to a corrective plan of action approved by the Division.

C. The surety posted by the operator may be forfeited if the permit is suspended or revoked, or the operator ceases to conduct business in the State of Nevada and does not transfer the permit to a new operator.

9. General Requirements

A. The operator shall maintain a copy of this permit and all modifications at the permitted project or operation at all times.

B. The provisions of this permit are severable. If any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this permit, shall not be affected.

C. Any noncompliance with this permit shall be reported orally to the Division within forty-eight (48) hours of the time the operator has knowledge of the circumstances. A written summary shall be provided within ten (10) days after the oral report is made.

D. Any changes in the operator's name or address shall be reported within ten (10) days to the Division in writing, and must indicate the permit number and appropriate changes.

E. Any changes in Corporation/Partnership/Proprietorship name, officers, or address shall be reported within ten (10) days to the Division in writing, and must indicate the permit number and appropriate changes.

F. The operator shall meet the revegetation standards as set forth in Attachment B.

G. An operator who initiates reclamation activities prior to meeting chemical stabilization (closure) requirements will be responsible to provide a surety for and to repair any reclaimed areas which may be re-affected by closure activities.

10. Schedule of Compliance

A. The permittee shall achieve compliance in accordance with the following schedule:

1. On or before July 1, 20XX collect data and establish the site-specific revegetation release criteria for this project in accordance with the Attachment B guideline included with this permit.

Permit Modification History:
Date (signed by Chief): For a first permit, include NOFD and permit effective date
For each modification, include the date the permit is signed by Chief and brief explanation of nature of modification.
List most current modification first (in descending order)

ATTACHMENT A

FOR MINING OPERATIONS

DOCUMENTATION OF RECLAMATION ACTIVITIES FOR SURETY RELEASE

An operator may request surety release in accordance with applicable State and Federal regulations. The following documentation must be submitted simultaneously to the Nevada Division of Environmental Protection and the federal land management agency prior to the agencies conducting a site inspection:

1. Map(s) clearly identifying the area, noting specific treatments and sampling locations (as applicable).

2. Description of the following activities:

Earthwork :

- The number of acres regraded and/or ripped.
- Final slope angles left after regrading.
- Methodology used to check final slope angles (e.g., clinometer, transit, etc.).
- The number of acres that received topsoil/growth medium.
- Depth and source of topsoil/growth medium and application method.
- Dates of initiation and completion of activities.

Revegetation Activities :

- The number of acres that were seeded and/or planted.
- Seed bed preparation methods utilized.
- Seeding/planting methods used (e.g., broadcast seeding, etc.).
- Provide information on how seed was covered.
- Seed mix and seeding rate; document by maintaining seed tags and any testing results (PLS, germination, noxious weeds, etc.).
- If applicable, the number of acres that received fertilization, mulch or amendments.
  - Fertilizer (N-P-K, type, application rate, application method).
  - Mulches and soil amendments (type, application rate, and application method).
  - Date of initiation and completion of activities.

Final Revegetation Sampling :

- Adjacent representative vegetation type or range site description (baseline data).
- Sampling method (e.g., line intercept).
- Number of samples taken (disturbed and adjacent representative sites).
- Statement of methodology demonstrating sample size, adequacy and how the locations of sampling sites were determined.
- Results of sampling (copy of sampling worksheet) for disturbed and representative areas. Indicate all perennial species located.
- Dates of sampling.

Other Reclamation Activities such as; structure and debris removal, safety feature installation, erosion control treatment, e quipment removal or other permit requirements.

3. **Interim Fluid Management (IFM) and Process Fluid Stabilization (PFS) Bond Release:**

When the closure process of a heap leach pad (HLP) and/or tailings storage facility (TSF) is undertaken in a controlled manner by the operator, release of the project bond IFM and PFS amounts may occur at the following phases/intervals of the closure process:

- IFM – when evaporation (E) or evapotranspiration (ET) Cells have been constructed and the steady state drain-down of pro cess fluids can be managed entirely within the E/ET Cells;
- PFS Phase I – recirculation of excess process fluids is no longer required and demonstration can be made that only active evaporation of process fluids is required;
- PFS Phase II – the process fluid drain-down rate is less than evaporation rate and demonstration can be made that process fluids can be managed without active evaporation, conversion of process pond(s) to E/ET Cells has been completed, and the cover system on the HLP and/or the TSF has been constructed;
- PFS Phase III – drain-down managed entirely within the E/ET Cells, demonstration is made that E/ET Cells have functioned without overtopping for a minimum of 5 years;
- PFS Evaporation Costs – at completion of PFS (costs include evaporation equipment and power costs).

4. For bond reduction, an operator must provide det ailed calculation of the surety amount proposed for release. This calculation should also show the surety amount required for the remaining reclamation work to be completed, and/or remaining PFS activities.

5. Prior to release, a field inspection is required to verify that reclamation has been performed in accordance with the approved reclamation plan and permit.

ATTACHMENT B

NEVADA GUIDELINES FOR SUCCESSFUL REVEGETATION FOR THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION, THE BUREAU OF LAND MANAGEMENT AND THE UNITED STATES FOREST SERVICE

MINING OPERATIONS

1. Reclaimed Desired Plant Communities (RPDC) for Mining Operation Disturbances

Reclamation goals for mining disturbances are: 1) stabilize the site, and 2) establish a productive community based on the applicable landuse plan and designated post-mining land uses. To meet these goals, a *Reclaimed Desired Plant Community* (RDPC) should be selected for use on the disturbed mine sites.

The RDPC is defined as:

A perennial plant community established on a disturbed site which contributes to stability through management and land treatment, and which produces that type and amount of vegetation necessary to meet or exceed both the land use and activity plan objective established for the site.

Several RDPCs may be selected based on site-specific revegetation goals and variable site characteristics for the mining disturbances. When selecting RDPCs, major alterations in reconstructed soils and the subsequent effect of this on the site's capability to establish and sustain the desired vegetation must be considered. A RDPC must have a reasonable chance for success when making the selection.

The plant community for the RDPC should be diverse, and when appropriate for the site should include grasses, forbs, shrubs and/or trees. The RDPC shall be comprised of species native to the area, or introduced species where the need is documented for inclusion to achieve the approved post-mining land use. The RDPC must meet the requirements of applicable State and Federal seed, poisonous and noxious plants, and introduced species laws or regulations. All RDPCs must be approved by the agencies. Plants for RDPCs may be selected using one or more of the following methods:

- Select existing vegetation types around the mine site to represent the varied RDPCs.
- Use test plots, demonstration areas, or areas concurrently reclaimed within the minesite or within similar representative areas from adjacent mines to serve as the RDPCs as long as they meet the reclamation goal.
- For areas where existing vegetative types adjacent to the mine area are

severely disturbed or where test plots or demonstration areas are not reasonable alternatives, RDPCs may be selected using appropriate ecological or range site descriptions or other technical sources.

2. Guidelines for Successful Revegetation

The revegetation release criteria for reclaimed mine sites will be to achieve as close to 100 percent of the perennial plant cover of selected comparison areas as possible. The comparison or reference areas will be selected from representative plant communities adjacent to the mine site, test plots or demonstration areas or, as appropriate, representative ecological or range site descriptions. As approved by the agencies, the selected plant communities or reference areas must have a reasonable chance for success on the mine site. Each plan-of-operations shall identify the site-specific release criteria in the reclamation plan or permit. The agencies may also require specific release standards for individual plant species or vegetative types (grasses, forbs, shrubs, trees). Cover would be estimated using a method as described in Sampling Vegetation Attributes, Interagency Technical Reference, 1996, BLM/RS/ST-96/002+1730 or other acceptable technical methods.

The determination of successful revegetation of mining disturbances will require an evaluation of the data by the agencies on a site-specific basis. These data must include all of the information requested in Attachment A of the Reclamation Permit, "Documentation of Reclamation Activities for Surety Release and Annual Fee Responding". When making this evaluation, the following information shall also be considered:

- Have the desirable species been successfully established, and do they provide sufficient aerial cover to adequately protect the site from soil erosion?

- Is there evidence that a self-sustaining community has been established? Are vegetative reproduction (e.g. rhizomes) and seedling establishment of the desirable seeded species occurring?

- Is there evidence of site stability, including the lack of surface soil erosion, gully formation and slumping?

- Has the revegetation goal in the reclamation plan been met?

- Has the operator taken reasonable measures to establish the RDPC?

3. Time Frames

The success of the vegetative growth on a reclaimed site may be evaluated for release no sooner than during the third growing season after earthwork, planting and irrigation (if used) has been completed. Final bond release may be considered at that time. Interim progress of reclamation will be monitored as appropriate by the agency and operator. Where it has been determined that revegetation success has not been met, the agencies and the operator will meet to decide on the best course of actions necessary to meet the reclamation goal.

EXPLORATION PROJECTS

The same guidelines as described above should be used to evaluate the success of the RDPCs for plan-level exploration disturbances. The agencies may also decide, depending on the size and scope of the project, to evaluate revegetation and reclamation success based on general ground reconnaissance and professional judgment. Extenuating circumstances may be considered when evaluating the success of the revegetation effort. If regulatory agencies determine that remediation is required on the site, the operator and agencies will meet to determine the procedures.

BLM NOTICES

Regarding notice-level activities on public lands, the BLM will evaluate revegetation and reclamation success based on general ground reconnaissance and professional judgment. Notice-level disturbance may be considered reclaimed if in the professional judgment of the regulatory agency effective action has been taken to stabilize and revegetate the site to a condition designed to result in the establishment of a productive post-mining land use. Extenuating circumstances may be considered when evaluating the success of the revegetation effort. If the BLM determines that further stabilization or revegetation efforts are needed, the operator and BLM will meet to determine what further steps are necessary.

Federal Register Wednesday January 11, 2017

BMRR Regulation Branch Response to Comments

Introduction

Except for the first two responses below which are to provide additional EPA requested information only, BMRR is providing follow-up information to four other Nevada Mine facilities that were referenced in the Federal Register CERCLA 108(b) announcement on 11 January 2017. It is important to note that Nevada has a robust monitoring, inspection and compliance program. Due to the level of containment, and permitting that requires zero discharge of all process fluids, when releases to the environment occur they are quickly discovered and reported to the Division by the Permittee, or they are discovered directly by BMRR during routine site inspections. All permitted mine facilities in Nevada that use chemicals (with rare exceptions for pilot testing facilities) are required to have an approved Emergency Response Plan (ERP) in accordance with NAC 445A.398, that describes actions that must be taken to minimize environmental impact in response to releases. The ERPs for Nevada mine facilities typically require full remediation of releases of process solution, chemicals, and petroleum products regardless of environmental risk; thus, the Nevada mining industry is held to a higher remediation standard for releases than any other Nevada industry. Remediation is performed by the Permittee with BMRR oversight until all soils and/or degraded waters of the State are remediated to current standards. All of the facilities mentioned below have had all of their process fluid releases completely remediated or remediation is in progress. None of the sites in question required any public funding and all are fully bonded. Where necessary long-term trusts are either in place or are under consideration.

No mining facilities that commenced operation after the Nevada mining reclamation program inception in September 1990 have required public funding for remediation of soil or groundwater degradation. It is important to note that the releases listed in the Federal Register are on average 20-years old. In the last 20 years, as BMRR's regulatory program has matured, the response to releases at Nevada mine facilities has improved further, becoming more uniform and with better documentation. Releases to the environment do occur at most active mine sites; however, as mentioned numerous times throughout this document, most releases tend to be easily managed because they are discovered quickly and most often consist solely of soil contamination that is excavated and placed into containment to eliminate exposure pathways and eliminate the potential for degradation of waters of the State. The program maintains a formal policy for reporting and mitigating releases per regulation. Additional federal oversight is unnecessary.

Furthermore, releases of process fluids rarely occu r at Nevada mine facilities when they are in closure, due to the static nature of closed facilit ies, the presence of lined containment with soil caps or covers, and the significant reduction in pr ocess fluid inventory through natural or mechanical evaporation methods.

Standard and Trenton Canyon Mines

Page 3463 Comment: Standard and Trenton Canyon Mines

"..EPA's data set did not contain depth to groundwater data. EPA solicits comments on depth to groundwater data for six hardrock mining facilities for which data were not collected. These are..Standard (Nevada), and Trenton Canyon (Nevada)."

BMRR Response:

At the Standard Mine Project (SMP), groundwater flows in a west north-westerly direction with varying groundwater depths originally ranging frombetween 142 feet below ground surface (bgs) to 515 feet bgs. According to the original WPCP application, there are four water-bearing zones within the SMP site that monitoring wells were positioned in. The formations include the Prida, the Natchez Pass, the Grass Valley, and alluvium. Throughout various expansions or for other various reasons during SMP operations, a portion ofthe groundwater monitoring wells have been abandoned or replaced.

Currently, a series of groundwater monitoring wellsprovide quarterly monitoring of groundwater elevations and water quality. A monitoring well located upgradient of the SMP heap leach facility has maintained a static water level of approximately 310 feet bgs. Monitoring wells positioned downgradient of the heap leach facility, have maintained static water levels of approximately 225 feet bgs. The site water supply well has been obstructed from groundwater depth measurements since July of 2014, but up until that time, maintained a static water level ranging from approximately 250 to 300 feet bgs.

The SMP WPCP application was submitted to the Division in March of 2003. WPCP NEV2003103 was issued on 2 December 2003 and the WPCP is currently active. The WPCP allows for the Permittee to process up to 7.5 million tons of ore per year, using a heap leach pad and a pair of carbon adsorption trains. Currently there is no active mining at the SMP and a majority of the equipment has been removed from the site except for the carbon columns and associated ponds, pumps and piping that collect and transfer process solutions throughout the mine site.

At the Trenton Canyon Project (TCP), depth to groundwater is in excess of 425 feet bgs for the entire TCP area. On the north side of the property depth to groundwater under the Valmy area is an excess of 550 feet bgs. To the west side of the project below the heap leach facility the depth to groundwater is in excess of 450 feet bgs. To the south of the project in the TCP area the depth to groundwater is in excess of 425 feet bgs.

The TCP was first permitted by the Division in June 1996 to the Santa Fe Pacific Gold Company. Newmont acquired the TCP through a merger with Santa Fe Gold. Since the merger,

Newmont USA Limited has been the Permittee of the TCP. A sale of the northern Valmy area to Marigold Mining Company occurred in August 2015 and is now part of the Marigold WPCP. The TCP is currently in temporary closure conducting care and maintenance on site.

Federal Register Wednesday January 11, 2017

BMRR Regulation Branch Response to Comments

Florida Canyon and Jerritt Canyon Mines

Page 3471 Comment: Florida Canyon Mine

"…The Florida Canyon gold and silver open pit mine with cyanide heap leach operation, located in Nevada, has been in operation since 1986. A groundwater plume consisting of weak acid dissociable (WAD) cyanide, mercury and nitrate was identified on the west side of the mine's leach pad and appeared to be related to process solution leakage. As a result of continued contamination of groundwater the Nevada Division of Environmental Protection (NDEP) issued a Finding of Alleged Violation and Order in August 2012. BLM also placed the mine in non-compliance in August 2012. The facility has identified and mitigated groundwater contaminant sources, as well as operated and optimized the groundwater plume pump-back system and evaluates on a quarterly basis to verify that the plume migration has been halted, and that groundwater cleanup is occurring."

BMRR Regulation and Closure Branches Response:

The Florida Canyon Mine (FCM) was constructed in 1986 and began operation in 1987, prior to the promulgation of the Nevada WPC mining regulations in 1989. Therefore, its construction was not in accordance with current minimum design requirements for process facilities found at NAC 445A.432 through NAC 445A.438. The FCM's first mining permit application was submitted to the Division on 30 December 1993. At that time, the Project consisted of open pit mining, a lined heap leach pad, and gold processing facilities.

A groundwater contaminant plume was first discovered during the review of a quarterly monitoring report in 2000. Following the discovery of contamination within a downgradient monitoring well, the Division issued multiple FOAV/ Orders requiring the Permittee to identify potential process solution sources, install monitoring wells for plume delineation, and install a pump-back system to control migration of groundwater contaminants. Extensive source investigations were conducted to rule out various process components, such as the heap leach solution collection trench, barren solution pond, and subgrade sumps located within the process buildings. Angle-boring tests were conducted under the process plant to determine whether the plant's facilities were leaking contaminants. Repairs to the solution channels, relining of the barren pond and sumps in the process area had some effect on the plume. None of these tests and remedial actions identified or eliminated all of the source(s) of the plume, thus confirming the Divisions position that the heap leach pad is also a source of the plume. During investigations, the Permittee indicated that a portion of the heap leach pad constructed prior to Nevada WPC regulations may have suffered catastrophic damage. A crushed leak detection pipe was discovered via video camera inspection. Near the central portion of the leach pad the pipe passes

through and is booted to the liner of the heap leach pad. Current best-engineering practice does not allow for this type of installation and due to the location of the damage under the fully-loaded leach pad, repairs to the existing pipe could not be performed. On January 30, 2015, the Permittee was ordered, pursuant to NAC 445A.430 and NAC 445A. 441, to permanently close the center portion of the heap leach pad where the plume appeared to be originating. The southern portion of the pad has been closed since 2006. Currently, two-thirds of the heap leach pad has been closed; the non-leaking northern portion remains open for recirculating solution while solution inventory is reduced through evaporation. The northern portion of the pad is scheduled to be closed following the construction of the South Area leach pad expansion, which is currently underway. Makeup water and cyanide addition ceased in early 2015 to the central and northern portions of the leach pad. The Division only required the central portion of the leach pad to be closed as a part of the enforcement action. The permittee was not required to discontinue leaching on the northern portion of the leach pad, but did so to assist with water management requirements. The Permittee resumed leaching on the northern portion in September 2016. The Division concluded on June 17, 2016 that the Permittee had complied with release investigation/follow up actions and the enforcement case was closed while additional corrective actions described above continue.

The remaining groundwater contamination plume consists of elevated concentrations of arsenic, chloride, mercury, nitrate, and total dissolved solids. A pump-back system continues to operate and is modified as necessary to maintain hydraulic control of the plume, which is sampled quarterly via a network of monitoring wells. Reports with sampling results are submitted by the Permittee to the Division each quarter for review. Over time, monitoring requirements have been reduced due to evidence of plume capture and decreased contaminant levels.

The Division has approved the Florida Canyon Final Plan for Permanent Closure (FPPC) for the entire extant leach pad. The closure work done to date with regard to the 2015 FOAV/Order is in accordance with the approved FPPC. This includes re-sloping, covering the pad with 2-3 feet of growth media, re-seeding, and promoting meteoric run-off from the covered pad. The system of pump-back wells is currently capturing the plume and preventing it from migrating further downgradient. Continued operation of the pump-back system is required until groundwater is no longer degraded above drinking water standards (NAC 445A.424) or the Division approves a demonstration pursuant to NAC 445A.22745 that remediation may be terminated.

No public money is currently being, or has ever been, utilized for the remediation activities (seepage or otherwise) at the Florida Canyon Mine site. All remedial activities have been paid for by the Permittee, with oversight by BMRR, which is fully funded via permit fees. Although this has been a complex and long-lasting remedial project, the BMRR oversight and enforcement action have been effective and are leading toward final mitigation with permanent source elimination. There is no demonstrated need for additional federal financial assurance at this site.

BMRR Reclamation Branch Response:

As stated in the Federal Register, dated January 11, 2017, under the CERCLA 108(b) proposed rules for hard rock mining, the noted Florida Canyon gold and silver mine has been in operation since 1986. BMRR has regulated mining activities under regulations adopted in 1989. NAC 519A.010 - NAC 519A.415 were developed to implement the requirements of the NRS 519A.010 - NRS 519A.290 to ensure reclamation of lands subject to mining operations. Regulations require each mine operator to submit a Plan of Operations, a Reclamation Plan and an approved reclamation cost to be posted with a government agency prior to any construction at the mine site. Regulations require an updated reclamation cost every three years to account for inflation. All modifications within the three-year time span must be submitted and approved with a revised reclamation permit and the associated surety bond must be posted prior to construction. Implementation of these statutes and regulations ensures public safety and protection of waters of the State of Nevada, and provides for a productive post-mining land use.

The BMRR Reclamation Branch implements the noted regulatory framework (NRS and NAC) with a designated environmental scientist-permit writer-site inspector who reviews the mine's Plan of Operations, Reclamation Plan, and associated reclamation costs, and performs routine onsite inspections providing verification of the documentation submitted. The environmental scientist evaluates a mine's reclamation cost using the Nevada SRCE program, and the overall PFS cost using the HLDE program and the associated PFCE program. These Nevada programs are widely recognized and vetted systematic methodologies, used in many other states and countries, which provide the ability to input site-specific criteria to calculate the reclamation cost for each type of mine component and mine design. The SRCE program calculates reclamation earthwork volumes and re-seeding costs. The PFCE program determines process solution management costs to achieve passive closure. These reclamation cost programs are updated yearly using approved Federal Davis Bacon labor rates, hourly rental equipment rates for a third-party contractor to perform the reclamation work, and includes a government administration add-on rate cost of 25-40%, dependent upon a mine's disturbance, to implement the posted surety bond.

Nevada regulations require PFS management costs for mines with process fluid facilities. An IFM is a required 6-month site-specific requirement which calculates a reclamation cost to account for 6 months of 24/7 labor, rental pumps and electrical power costs for the re-circulation of process solution to prevent pond overflows. IFM provides a conservative interim timeframe until a government agency can secure the posted surety bond amount in the case that an operator fails to perform the required reclamation. The environmental scientist works in cooperation with the designated BMRR Reclamation Branch Professional Engineer to perform the IFM evaluation cost, evaluate the HLDE program and the PFCE program. The HLDE program provides site-specific user inputs to account for a leach pad acreage footprint and height, the process solution application rate per acre, the hydraulic conductivity parameterbased upon the ore grain-size distribution and the total volume of process solution that will need to be actively evaporated based upon the

solution application rate per acre, and includes the remaining draindown solution of the older leached acres. These combined HLDE inputs provide a solution drain-down curve which determines the total number of months of evaporation needed to reach a passive closure volume.

The BMRR Reclamation Branch uses the PFCE program to determine the PFS costs based upon the number of months as determined by the HLDE program for evaporation of the solution inventory. The costs include the rental of re-circulation pumps and new turbo evaporators and the total 24/7 labor hours required for the pumping and evaporation of the solution inventory.

The Florida Canyon Mine currently has a total surety bond amount of $39,189,469.00 posted with the BLM State office in Reno, Nevada, and is up to date as of November 23, 2016. The total leach pad earthwork reclamation and PFS cost is $24,810,331.00. The leach pad IFM 6-month cost is $2,838,024.00 with an additional $8,013,026.00 for longer-term PFS management costs. There is $2,132,920.00 to convert the existing lined process ponds to evaporative passive closure ponds (E Cells). The leach pad PFS cost includes 5 years to operate the ground water pump-back system with six existing pump-back wells. Approximately 150 acres of the leach pad has been concurrently reclaimed with a 2-foot thick evapotranspiration soil cover to minimize infiltration of meteoric water and provide a seeding base for re vegetation success. Vegetation has been established but has not yet reached maturity.

BMRR, in cooperation with the BLM and the Permittee, has established a long-term trust fund, which includes the cost of operating the pump-back well system for an additional 25 years to monitor and mitigate the noted groundwater plume. The long-term trust includes E Cell synthetic liner replacement costs for 500 years with fencing replacement. The current trust fund amount as of November 2016 is $7,093,408.00 with the fund slightly over performing the projected value at this time.

Page 3471 Comment: Jerritt Canyon Mine

"...The Jerritt Canyon mine located in Nevada has bee n in operation since 1981. The gold and silver mine is an open pit and underground cyanide vat leach operation that also processes refractory ores using both roasting and chlorinatio n processes. Seepage from the Tailings Storage Facility 1 (TSF–1) was detected in the allu vium in 1987. In an effort to address the seepage issue nine trench drains were constructed a long the embankment toes in 1988 to intercept and collect seepage from the impoundment. As of January 2015, a ring of ninety monitoring wells surrounded TSF–1, of which 76 are operational. The facility is required to operate, maintain and monitor the Seepage Remediati on System at all times to ensure the capture of affected groundwater, to preclude furthe r migration, and to ensure contraction of the overall extent of the TSF–1 seepage groundwatercontaminant plume. Contamination from TSF–1 leakage has degraded groundwater in the immed iate vicinity, including in some cases with antimony, arsenic, cadmium, magnesium, mangane se, mercury, selenium, and WAD cyanide. Authorization by NDEP to impound tailings slurry into another tailings storage facility (TSF–2) was granted in July 2013 and almost immediately, the 150 gpd permitted leak detection rate was exceeded. The facility believed that the s pecific cause of the exceedance was unknown but it was assumed to be puncture(s) in the primary liner system and/or residual meteoric waters that entered the system during line r repairs before operation began. After several unsuccessful attempts at addressing the leakage, the facility opted to manage TSF–2 as a single-lined facility and agreed to install vadose zone wells outside the periphery of TSF–2."

BMRR Regulation and Closure Branches Response:

The Jerritt Canyon Mine's TSF-1 began construction in 1981 and pre-dates promulgation of Nevada WPC mining regulations in 1989. Therefore, i ts construction was not in accordance with the current minimum design requirements for tailing s storage facilities at NAC 445A.437. TSF-1 does not have an engineered liner system; however,the impoundment does have a prepared sub-base consisting of graded and partially compacted soil and tailings mix. For new tailings storage facilities, the Division currently requires full co ntainment with at least one synthetic liner, which goes beyond the minimum design criteria for tailing s storage facilities established at NAC 445A.437 but is consistent with the authority provi ded at NAC 445A.432 for the Division to use best-engineering judgement to determine whether additional containment is necessary.

A groundwater contaminant plume was discovered in 1987 and a system of pump-back wells and monitoring wells was installed and has been operate d semi-continuously ever since to prevent further migration of the contaminant plume. The gro undwater contaminant plume consists of chloride and total dissolved solids concentrations, with sporadic antimony, arsenic, cadmium, magnesium, manganese, mercury, sulfate thallium, an d WAD cyanide concentrations, that exceed groundwater quality standards established a t NAC 445A.424. Downgradient surface water in Foreman Creek is routinely monitored and has not shown any degradation. Likewise, off-site wells at a downgradient third-party ranch have not shown degradation of groundwater caused by the Jerritt Canyon Mine facility.

TSF-1 was constructed in seven phases from 1981 to1998, and is approximately 350 acres in size. In 2010, the Division required submittal of a Final Plan for Permanent Closure for TSF-1, and implementation of the FPPC after Division approval,combined with a required proposal to design, construct, and operate a new double-lined TSF-2 to replace TSF-1. Tailings deposition to TSF-1 ceased during the third quarter of 2013 with the commissioning of TSF-2. By October 2014, the TSF-1 supernatant pool had dried completely. Permanent closure activities are ongoing (i.e., fill and liner being installed prior to cover) and are expected to be complete in 2018.

In the late 1980s, to address the seepage issue and prevent further degradation of the waters of the State, tailings deposition into TSF-1 was modified from subaqueous to subaerial in an attempt to reduce high concentrations of chlorine entering TSF-1, and to increase compaction of the tails. The past elevated chlorine concentrations were a result of a legacy chlorination circuit used within the wet mill. This circuit was closed during the mid-1980s and that facility is in the process of being dismantled during the first quarter of 2017.

In addition to changing the tailings deposition method, nine trenches were constructed along the embankment toes in 1988 to intercept and collect seepage from the impoundment. These trenches have been consolidated into five collection trenches. Pump-back wells were installed to transfer seepage back to the mill as reclaim water or to the evaporation pond. The collective pumping rate from these wells has ranged from 200 gallons per minute (gpm) to 1,400 gpm and the current flowrate is 550 gpm.

The above seepage recovery system is a result of multiple BMRR enforcement actions. An FOAV/Order was initially issued March 5, 1991 to resolve cyanide and chloride contamination originating from TSF-1. A second FOAV/Order was issued November 12, 2008 to optimize the seepage collection system, evaluate additional seeps identified in the TSF-1 embankment and evaluate its stability, and finely to reduce and ultimately eliminate the TSF-1 supernatant pool (plume source). On October 13, 2009, BMRR and the Permittee agreed to a consent decree that was completed in Elko Nevada District Court.

Beginning in 2015, the pumpback well system was upgraded with the addition of flow totalizers and an electronic telemetry system so that all of the pump-back wells can now be monitored remotely for flow rates and depth to water. The improved monitoring has allowed for better pump operation, reduced downtime and maintenance, and a much improved facility water balance. The plume is managed using a network of 92 downgradient wells.

An FPPC for TSF-1 was submitted to the Division in August 2011. The FPPC was revised in 2014 and again in 2017. The FPPC for TSF-1 includes characterization and cleaning of ancillary piping, structures and equipment prior to removal. The outer tailings embankment is currently well vegetated to inhibit erosion damage. Many years will be required for the tailings solids to dewater through evaporation and drain-down. Once dry enough, TSF-1 will be covered with at least 3 feet of waste rock to build a platform for heavy equipment; then a cap consisting of geosynthetic liner and 3 feet of growth media will be installed. The geosynthetic liner will consist of 40-mil linear

low-density polyethylene (LLDPE) and will extend to the inside edge of the TSF-1 embankment crest perimeter. LLDPE was selected because its elasticity will accommodate the settling that will occur as the tailings material continues to dry out. The cap is designed to inhibit further infiltration of meteoric water into the tailings solids. Stormwater run-off will be removed from the TSF-1 surface via flow control structures, consistent with the Reclamation Plan. Ultimately, the drain-down flow from the dried tailings in TSF-1 will diminish to the extent either that groundwater is no longer degraded above drinking water standards or a demonstration can be made pursuant to NAC 445A.22745 that remediation may be terminated. At that point, the pump-back wells will be properly plugged and abandoned pursuant to NAC 534.358 through 534.438, and other pump-back system components will be removed and properly disposed in accordance with the FPPC and applicable regulations.

In December 2016 as a part of the TSF-1 FPPC the Permittee began mounding the tailings beach above the 6,389-foot elevation predominately in the northern half of the low-point area. This mounding will offset the higher amount of consolidation settlement expected in the low-point area and assist with the final surface water run-off plan. The Temporary discharge of tailings slurry will cease on August 1, 2017. This action will assist with the final closure of TSF-1. Permanent closure activities are ongoing with liner and fill being installed prior to final cover.

TSF-2 History: The above referenced consent decree and the 2010 Permit renewal required the Permittee to submit engineering designs for the construction of a new TSF (TSF-2). The Permittee submitted a Major Modification in December 2010 (approved in July 2011) to replace TSF-1 with a new, double-lined (80-mil high-density polyethylene (HDPE) primary liner, a 60-mil HDPE secondary liner), and leak detected tailings facility with a dry storage capacity of 9 million tons. TSF-2 was proposed to be constructed in two phases.

Pursuant to NAC 445A.398, a Tentative Plan for Permanent Closure (TPPC) of TSF-2 was submitted with the TSF-2 design. In accordance with NAC 445A.447, the TPPC must be replaced with a more detailed FPPC at least two years before the anticipated permanent closure of TSF-2. The most recent update (2014) of the TPPC for TSF-2 describes tentative closure actions very similar to those in the FPPC for TSF-1, including cleaning of ancillary infrastructure, removal of components or burial in place, installation of a waste rock platform, and installation of a cap consisting of a geosynthetic liner and 3 feet of growth media.

BMRR authorized deposition of tailings slurry into TSF-2 in July 2013 and almost immediately, the permitted allowable leakage rate for the TSF-2 leak collection and recovery system (LCRS) was exceeded. BMRR provided the following options to the Permittee: 1) locate and repairing the puncture(s) in the primary liner, or 2) manage TSF-2 as a single-lined tailings impoundment. After several unsuccessful attempts to address the primary liner leakage, the Permittee opted to manage TSF-2 as a single-lined facility and agreed to install vadose zone wells outside the periphery of TSF-2.

During the 2nd quarter 2016, the Permittee decided to postpone construction the TSF-2 Phase 2 expansion and elected to dedicate resources to accelerate the TSF-1 closure and to determine the feasibility of converting the west basin of the Water Storage Reservoir (WSR) to a TSF.

BMRR Reclamation Branch Response:

As stated in the Federal Register, dated January 11th, 2017 under the CERCLA 108(b) proposed rules for hard rock mining, the noted Jerritt Canyon gold and silver mine has been in operation since 1981. The BMRR has regulated mining activities under regulations adopted in 1989. NAC 519A.010 - NAC 519A.415 were developed to implement the requirements of NRS 519A.010 - NRS 519A.290 to ensure reclamation of lands subject to mining operations. Regulations requires each mine site to submit a Plan of Operations, a Reclamation Plan and an approved reclamation cost to be posted with a government agency prior to any construction at the mine site. Regulation requires an updated reclamation cost every (3) three years to account for inflation. All modifications within the three-year time span must be submitted and approved with a revised reclamation permit and the associated surety bond posted prior to construction. The required three year reclamation cost update incorporates all mine modifications within the three-year period. Statues and Code implementation insures public safety, protection of Waters for the State of Nevada and provides for a post-mining productive land use.

The BMRR Reclamation Branch implements the noted regulatory framework (NRS-NAC) with a designated environmental scientist-permit writer-site inspector who reviews the Mine's Plan of Operations, the Reclamation Plan, associated reclamation costs and performs routine onsite inspections providing verification of the documentation submitted. The environmental scientist evaluates Jerritt Canyon Mine's reclamation costs using the Nevada SRCE program, and the overall PFS cost using the HLDE and PFCE programs. The BMRR HLDE program is used to verify the operator's process fluid management of the tailings facility to determine the timeframe to passive closure. The SRCE and the PFCE programs are widely recognized and vetted systematic methodologies which provide the unique ability to input site-specific criteria to calculate the reclamation cost for each mine type of mine component and accommodate every mine design. The SRCE program calculates reclamation earthwork volumes and the re-seeding costs. The PFCE program determines process solution management costs to achieve passive closure. These reclamation cost programs are updated yearly using approved Federal Davis Bacon labor rates, hourly rental equipment rates for a third party contractor to perform the reclamation work, and includes a government administration add-on rate of 31 % of additional costs to implement the posted surety amount for this mine site.

Nevada Regulations require PFS management costs for mines with process fluid facilities. An IFM is a required 6-month site-specific requirement which calculates a reclamation cost to account for 6 months of 24/7 labor, rental pumps and electrical power costs for the re-circulation of process

solution to prevent pond overflows. IFM provides a conservative timeframe and cost based upon the maximum mine operational rate until a governmen t agency can secure the posted surety amount in the case an operator fails to perform. The environmental scientist works in cooperation with the designated BMRR Reclamation Branch Profess ional Engineer to perform the IFM cost, evaluate the TIDE program and the PFCE program. The HLDE program provides site-specific user inputs to account for a tailings facility process s olution application and drain down based upon the hydraulic conductivity parameter to determine t he volume of process solution that will need to be actively managed to reach a passive closure v olume into E Cell closure pond. The PFCE program determines the PFS costs based upon the num ber of months as determined by the TIDE program for evaporation of the total solution inven tory. The costs include the rental cost of re-circulation pumps, new turbo evaporators and the to tal number of 24/7 labor hours required for the pumping and evaporation of the solution inventory.

The TSF-1 tailings facility has a total disturbance footprint of 361 acres. As of November 2016, concurrent reclamation includes 185 acres of the ta ilings surface covered with 940,000 cubic yards of overburden material (3.0 ft. depth) and the installation of 3,820,035 square ft. (88 acres) of 40 mil HDPE geomembrane liner over this placed cover material. A reclamation cost is assigned for an additional cover placement of 3.0 ft. of growth medium over the geomembrane to support revegetation success.

The TSF-1 has a Seepage Recovery System which is cu rrently operating with 90 pump back wells surrounding the impoundment perimeter to control an d capture the contaminant plume. The seepage solution is collected and piped to a lined pond for active evaporation. The pump back system is expected to operate for more than 11 years.

TSF-2 tailings facility has a total disturbance foo tprint of 135 acres and the reclamation plan will utilize the same reclamation protocol as noted abov e for the TSF-1 closure. This facility is active with underdrain solution seepage pumped to a series of double lined ponds. In addition there are peripheral monitoring wells installed.

BMRR works in cooperation with the USFS and the ope rator of Jerritt Canyon Mine to determine the reclamation costs which are updated yearly in A pril. The current total Jerritt Canyon Mine surety bond amount is $74,392,879.00 includes a sur ety determination amount of $10,830.932 which is posted separately with the USFS. Individu ally, the TSF-1 and TSF-2 have earthwork reclamation costs for the tailings earth cover, growth medium placement and re-grading costs is $5,113,620.00. The geomembrane liner placement cost s are $4,841,180.00. The 6-month IFM cost is $1,229,848.00. The PFS management costs for re-circulation, replacement the TSF-1 wells and active evaporation of the solutions volume inve ntories is $23,497,857.00. The revegetation cost for these facilities is $122,762.00.

Goldstrike Mine Release 2003

Page 3474 Comment Goldstrike Mine Release:

"..Releases also have occurred from other leach pad operations, including the Barrick Goldstrike mine in Nevada, where there was a release of 159,000 gallons of cyanide in 2003..."

BMRR Regulation Branch Response:

Listed below is a chronology of the 2003 release at the Goldstrike Mine. It should be noted that no public funds have been spent on any clean up or remediation activities at the Goldstrike Mine facility. All releases of process fluids have been managed and remediated appropriately under the direction of the facility assigned BMRR compliance inspector.

The spill occurred on November 12, 2003 for 53 min from 7:18 - 8:11 PM. Original release volume estimate was 159,000 gallons, assuming 100% release of 3,000 gpm for 53 minutes at the North Block Area. In the 10-day report the volume estimate was increased to 185,500 gallons. Supernatant solution was sampled at release: 16.45 mg/l WAD cyanide. The solid fraction was also sampled at 25.28 mg/l WAD cyanide. Total sodium cyanide (NaCN) was calculated at 30 pounds. The estimated volume of 185,500 is an overestimate due to a large volume of the material flowing within containment in lined clay pipe ditch to a concrete lined tailings event pond, which filled approximately 50%. A small amount of the release also flowed on a road and into an adjacent storm pond.

The spill was initially discovered due to a drop in flow detected at the Roaster control panel. An operator was dispatched to investigate who found a ruptured flange fitting on HDPE pipe spraying tails 50-60' in air being blown by 40+ mph winds onto approximately 100 yard by 30 yard area of adjacent south bank of Brush Creek, which was dry at the time. The operator radioed for immediate shutdown of pipe flow. This is the only flange fitting on the tails lines in this area - all other joints are welded HDPE. Release flowed down Brush Creek all the way to Rodeo Creek diversion and then along it to a few 100 yards downstream of Rodeo Backfill Shaft 10,650 ft total flow path. A temporary earthen dam was created to stop release at this point. The entire release above Rodeo Creek was excavated and WAD cyanide confirmatory samples were taken. Contaminated material was taken to North Block tails impoundment. The Rodeo Creek channel is riprapped and underlain with a Claymax sheeting. The release percolated through riprap and red tails visible between boulders. This section was washed with dewatering water and the effluent collected in a sump dug and lined for this purpose at the temporary dam. Effluent in the sump was pumped via guzzler trucks to the North Block Roaster Containment Pond. The drainage was cleaned completely to avoid degradation of surface water in the future. Three inspection trenches dug across Rodeo Creek, in June after spring flow stopped, to inspect for red tails and none were found. Although, a thin layer was found nearby in several spots shallowly buried under recent gray sediment. Thirty shallow samples in three transects across Rodeo Creek were all non-detect

for WAD cyanide except for one, which was resampled and yielded non-detect. Confirmatory sampling plan for Brush creek and adjacent hillside was to be no more than 10 subsamples per composite sample, and each subsample no more than 1 00 ft from the next. The BMRR mine compliance inspector conducted inspections of remedation work on 11/13/03, 2/26/04, 6/10/04. Photos sent of original release.

The 10-day report was received 11/24/03 on time, in cluding map of release extent and updated volume and NaCN totals. Preventative measures prov ided in separate letter received 12/5/03, and also in 7/15/04 final report. As of 1/22/04 ap proximately 250,000 gallons of wash effluent and 40,300 cubic yards of soil were removed. An app roved sediment control structure was constructed in Rodeo Creek to prevent sediments fro m being washed downstream. Remaining Brush Creek and hillside confirmatory sample result s submitted on 3/16/04. At about this time Brush Creek and Rodeo Creek began flowing so final sampling of Rodeo Creek (described above) had to wait until flow stopped in May 2004. Samples of Rodeo Creek water passing the sediment control structure at the downstream end of the rele ase indicated no detectable cyanide. Final report with Rodeo Creek sample results, sample map submitted 7/15/04. The excavated hillside also reseeded. Sediment control structure at toe o f release removed to North Block tails and confirmatory WAD cyanide results from under structure submitted 9/17/04 - all non-detect.

To prevent future releases the failed stub-end flan ge was replaced with welded HDPE joint. Standard operating procedures where updated for res ponding to flow variations in tailings line and an alarm was installed in conjunction with telemetry for flow pressures.

No further action required per NDEP 8/4/04 correspondence.

Goldstrike Mine Release 1995

Page 3474 Comment Goldstrike Mine Release:

"..Releases also have occurred from other leach pad operations, including the Barrick Goldstrike mine in Nevada. 21,625 gallons of sodium cyanide in 1995."

BMRR Regulation Branch Response:

It should be noted that no public funds have been spent on any clean up or remediation activities at the Goldstrike Mine facility. All releases of process fluids have been managed and remediated appropriately under the direction of the facility assigned BMRR compliance inspector.

On October 17, 1995 at 5:30 am based on initial estimates, approximately 21,625-gallon sodium cyanide solution spill occurred at the Barrick Goldstrike Mine AA Leach Facility. The cause of the spill was a ruptured twelve-inch diameter header line. The spilled material flowed along the mine access road and entered a stormwater pond. Due to the compaction of the dirt access road, the majority of the liquid ended up in the stormwater pond.

Following the completion of the cleanup activities, the actual volume of solution released was determined to be 11,200 gallons. The fluid volume was determined by the actual amount of free liquid collected with a vacuum truck combined with the moisture content times the volume of excavated soil. The actual sodium cyanide concentration of the barren solution released, as sampled from an area adjacent to the line break was 120 ppm, equaling 11.2 pounds of sodium cyanide released.

Immediately following the shutdown of the failed barren line, excavation procedures were initiated on all soils that came in contact with the barren solution. A road grader was used to blade the road surface and perimeter berm down to dry soil. Approximately 160 cubic yards of road surfacing material and 425 cubic yards of soil from the stormwater pond were excavated and removed to the AA Heap Leach pad. As an additional measure, the access road and excavated stormwater pond were treated with sodium hypochlorite solution follow excavation activities. All cleanup was completed on October 17, 1995 for all areas from the line break to the inlet to the stormwater pond. Clean out of the stormwater pond was completed on October 22, 1995.

Waters of the State were not threatened and the areas impacted by the released material were remediated quickly with oversight and approval from the BMRR site assigned mine compliance inspectors. No public funds have ever been required to manage spilled material at mine site in Nevada that commenced operation after promulgation of Nevada reclamation regulations in September 1990.

Florida Canyon Mine Release 1996

Page 3474 Comment Florida Canyon Mine Release:

"…[T]he Florida Canyon mine in Nevada released 52,500 gallons of sodium cyanide (30 percent solution) in 1996."

BMRR Regulation Branch Response:

On December 30, 1996, at the Florida Canyon mine, during a routine inspection by a process plant operator a flow of water was discovered next to the process building. The flow was process fluid originating from a solution ditch that transmit sol ution into a pipeline that then empties into a process pond. It was determined that a partially o bstructed pipe allowed approximately 52,500 gallons of process fluid to be released between 10: 30 pm on December 29 and 12:10 am. On December 30. It was easily to identify the flow pa th due to dry ground conditions with the total flow path extending approximately 6,000 feet. Most of the solution was contained within a three-foot wide drainage channel. The estimated volume of sodium cyanide was 20.9 pounds. The flow did not encounter any surface waters and there were no known animal mortalities.

Twenty-eight soil samples were collected later the same day on December 30, 1996 a total of for analysis to determine the extent of the release. T he highest concentration of WAD cyanide was 22.5 ppm. The visible pools of standing water were neutralized with dilute calcium hypochlorite. Approximately 700 cubic yards of impacted soils were excavated and placed into containment on the heap leach pad. On December 31, 1996 an additi onal 10 samples were collected to confirm remediation success.

To prevent further releases, the Permittee installe d a high water level indicator in the solution flow ditch along with an interconnected pump that w ould automatically transfer fluid to the barren pond in an upset condition. The facility access road was recontoured to direct any future flows to emergency event and sediment ponds. Waters of the State were not threatened and the areas impacted by the released material were remedi ated quickly with oversight and approval from the BMRR site assigned mine compliance inspect ors. No public funds have ever been required to manage spilled material at an active mine site in Nevada.

Robinson Mine Release 1996

Page 3474 Comment Robinson Mine Release:

"...The Robinson Nevada Mining Company operates the Robinson Operation surface mine in White Pine County, Nevada. This facility produces gold and copper using flotation processes. The facility released copper flotation tailings five times in 1996, leading to violations of its water pollution control permit."

BMRR Regulation Branch Response:

The releases in question all occurred during the mill start-up period after several months of inactivity. Releases during a start-up period at any operating mine site are not uncommon and are to be expected. In addition, the Ely area typically experiences sub-zero temperatures this time of the year, which may have also contributed to the increased number of releases observed, but tended to allow for easier remediation because of the frozen ground surfaces. All five releases noted at the Robinson Mine were quickly cleaned up with the spilled material returned to containment within the process circuit or tailings impoundment. Waters of the State were not threatened and the areas impacted by the released material were remediated quickly with oversight and approval from the BMRR site assigned mine compliance inspectors. No public funds have ever been required to manage spilled material at mine site in Nevada that commenced operation after promulgation of Nevada reclamation regulations in September 1990.

Release #1 (1/7/1996; 5,000 gallons flotation tailings slurry) was the result of a tailings feed pipe disconnecting at the cyclone bank on the tailings embankment. The release was confined to a small area (approximately 500 square feet) on the downside of the tailings embankment. The cyclone pipe connection was repaired the same day, the collected slurry was removed from the embankment and placed within the tailings impoundment, and the embankment and tailings impoundment were repaired the same day.

Release #2 (2/12/1996; 66,000 gallons flotation tailings slurry) was the result of a cyclone failure on the tailings embankment, resulting in the tailings slurry overtopping the tailings embankment, collecting in a ditch. The slurry was collected via vacuum truck the same day and returned to the tailings impoundment. The impacted soil was removed the next day and placed in the tailings impoundment. The cyclone was repaired and returned to service.

Release #3 (2/26/1996; 2,500 gallons flotation circuit reclaim water) was the result of a valve failure on the booster pump feeding the reclaim water head tank, resulting in the reclaim water overflowing the tank, overtopping the containment berm, and entering a roadside ditch. The remaining reclaim water present was sampled and based on the results, allowed to percolate/evaporate within the ditch. The valve was repaired and returned to service the day of the release.

Release #4 (3/7/1996; 10,000 gallons flotation circuit reclaim water) was the result of a control valve failure in the mill facility. Reclaim water overflowed containment and quickly overwhelmed the tailings pump house sump. Reclaim water was diverted to the tailings thickener emergency containment pond and returned to the process circuit following the replacement of the control valve. New operating procedures were developed and implemented and a new surge water tank was installed to minimize any future recurrence.

Release #5 (3/20/1996; 4,000 gallons flotation circuit tailings slurry) was the result of a sump in the mill facility overflowing its containment due to a faulty level indicator and entering a gravel parking area where it was eventually contained. The sump level indicator was replaced, the standing solution was collected by vacuum truck and returned to the process circuit, and the impacted gravel was returned to the mill circuit. All remedial actions were completed on 3/22/1996.

NEVADA DIVISION OF
ENVIRONMENTAL PROTECTION

STATE OF NEVADA
Department of Conservation & Natural Resources
Brian Sandoval, Governor
Bradley Crowell, Director
Greg Lovato, Administrator

July 11, 2017

Ms. Sonya Sasseville
Director, Program Implementation and Information Division
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William Jefferson Clinton Building
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Mail Code: 5303P
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Submitted to www.regulations.gov

RE: *Financial Responsibility Requirements Under CERCLA § 108(b) for Classes of Facilities in the Hardrock Mining Industry – Proposed Rule*

Docket ID No. EPA-HQ-SFUND-2015-0781

Dear Ms. Sasseville:

The Nevada Division of Environmental Protection (NDEP) provides these comments for consideration by the US Environmental Protection Agency (EPA). Nevada is a national leader in regulating hard rock mining activities in a manner that protects valuable water and other environmental resources while supporting a growing and sustainable mining industry of critical importance to the State's economy. After reviewing the proposed rule, NDEP has concluded that the proposed additional financial assurance regulation is unnecessary, duplicative and potentially harmful because Nevada's existing program provides strong, and more than adequate, protection against the degree and duration of risk posed by hazardous substances at operating Nevada hardrock mines.

1. **Nevada's existing regulatory programs (including financial assurance programs) protect against the degree and duration of risk posed by hazardous substances at operating Nevada hardrock mines, therefore additional federal regulation is unnecessary.**

As detailed in the attached supporting document, the Nevada hardrock mining regulatory programs, including its reclamation surety program administered by NDEP, meet or exceed necessary technical criteria in all thirteen response categories of the proposed rule. Nevada's mining regulatory programs are comprehensive and have evolved since their enactment in 1989 and 1990 to address identified and potential risks posed by hazardous substances and pollutants at operating mines, including authority for NDEP to require financial assurance for long-term management of mine-impacted waters on private land. In addition, Nevada has

adopted more detailed criteria which take into account all elements and features of mine sites including, but not limited to, the three dimensional structure of site features, the hydrologic data in the area of the mine, and the geologic structures of the mine site location. Nevada's program also offers broader protection by requiring financial assurance for monitoring and cleanup of pollutants not listed as CERCLA hazardous substances, including sulfate and total dissolved solids. The program also offers necessary flexibility for regulators to adjust design criteria, as needed, to ensure safety and stability at each mine site, including designs for mine construction, operation, corrective action, reclamation and closure. Because many of Nevada mines operate on public lands, NDEP, the Bureau of Land Management, and the United States Forest Service have entered into Memoranda of Understanding to ensure consistency and coordination during implementation of mine financial assurance requirements between private and public lands. In sum, Nevada has developed a detailed, comprehensive, and protective program that has been successfully implemented and enforced and that should provide EPA with assurance that operating hardrock mines in Nevada do not pose any undue risk of releases, and have adequate financial assurance if any releases do occur. As evidence of this, modern Nevada mines that commenced operation after the promulgation of Nevada mine reclamation financial assurance regulations in 1991 have not required public funding for proper closure and reclamation.

2. **EPA's proposed rulemaking is not consistent with the degree and duration of risk posed by hazardous substances at operating Nevada hardrock mines**

The Comprehensive Environmental Response Compensation and Liability Act (CERCLA) § 108(b)(1) requires EPA to promulgate rules for financial assurance that are consistent with the degree and duration of risk associated with the production, transportation, treatment, storage, or disposal of hazardous substances. The proposed rulemaking does not adequately characterize the degree and duration of risk of hazardous substance at active Nevada hardrock mining operations, and as a result does not justify the level of financial assurance required by the proposed rule.

EPA has interpreted that this section of the statute does not require any "precise association with a risk calculation."[1] However, EPA's underlying review of risks posed by operating mines in the rulemaking docket does not fairly document the level of risk posed by operating Nevada mines. The rulemaking references a limited number of release occurrences at operating mines that had no previous significant legacy mining issues.[2] However, supporting documentation for the proposed rulemaking merely documents that such releases have occurred at operating hardrock mines in Nevada, not that they have occurred with such regular occurrence or magnitude to justify the level of financial assurance required by the proposed rule.

[1] 82 Fed. Reg. at 3460.
[2] 82 Fed. Reg. at 3471.

As our enclosed comments and supporting information substantiate, hazardous substance releases that have occurred at operating Nevada hardrock mines have been or are being addressed in a manner that is protective of human health and the environment. Additionally, Nevada's existing regulations and financial assurance requirements provide NDEP more than adequate authority to address and require financial assurance for hazardous substance releases for the entire scope of the thirteen response categories at active hardrock mines when necessary. Therefore, consistent with the degree and duration of risk posed, no additional financial assurance under CERCLA is warranted for operating Nevada hardrock mines beyond what is already required under Nevada's program.

3. **EPA's proposed rulemaking does not establish level of financial responsibility at an appropriate level based on the payment experience of the Hazardous Substance Superfund ("Fund").**

CERCLA § 108(b) (2) requires EPA to promulgate rules for financial assurance that protect against an appropriate level of risk based on the payment experience of the Fund. Nevada and EPA have identified a number of pre-regulation legacy mines in Nevada with releases that have been or are being addressed through both federal and state response authorities. However, the payment experience of the Fund on modern Nevada mines without legacy components has not been documented, is not accurately reflected in the proposed rulemaking, and does not support the level of financial responsibility in the proposed rule.

4. **EPA's proposed rulemaking would unnecessarily jeopardize Nevada's program, which financially assures effective, efficient, and protective mine reclamation, closure and cleanup in Nevada.**

CERCLA § 114(d) will govern the interrelationship between regulations promulgated by EPA under CERCLA § 108(b) and Nevada's existing financial assurance regulations. That statute provides as follows:

> Except as provided in this subchapter, no owner or operator of a vessel or facility who establishes and maintains evidence of financial responsibility in accordance with this subchapter shall be required under any State or local law, rule, or regulation to establish or maintain any other evidence of financial responsibility in connection with liability for the release of a hazardous substance from such vessel or facility. Evidence of compliance with the financial responsibility requirements of this subchapter shall be accepted by a State in lieu of any other requirement of financial responsibility imposed by such State in connection with liability for the release of a hazardous substance from such vessel or facility.[3]

[3] 42 U.S.C. § 9614(d).

Under the Supremacy Clause of the U.S. Constitution, state laws that "interfere with, or are contrary to" federal law are invalid.[4] Therefore, to the extent that EPA's financial assurance program overlaps or is duplicative of Nevada's existing program, the Nevada program is subject to challenge on the basis that it is pre-empted by federal law under CERCLA § 114(d).

This would not be the first time a pre-emption challenge was raised under CERCLA. When CERCLA was passed in 1980, section 114(c) of the Act stated as follows:

> Except as provided in this chapter, no person may be required to contribute to any fund, the purpose of which is to pay compensation for any claims for any costs of response or damages or claims which may be compensated under this subchapter. Nothing in this section shall preclude any State from using general revenues for such a fund, or from imposing a tax or fee upon any person or upon any substance in order to finance the purchase or prepositioning of hazardous substance response equipment or other preparations for the response to a release of hazardous substances which affects such State.[5]

Private entities subsequently filed lawsuits to invalidate state superfund programs on the basis that the programs were pre-empted under this section of CERLCA. The issue of whether CERCLA § 114(c) pre-empted state superfund programs came before the Supreme Court of the United States in *Exxon Corp. v. Hunt*, which involved a challenge to the validity of the New Jersey Spill Compensation and Control Act (Spill Act).[6] In that case, the Court held that "[t]hose parts of the [Spill Act] that permit Spill Fund expenditures beyond the mandatory state share for remedial costs for sites on the National Priorities List, or for removal costs that are eligible for Superfund compensation under the terms of the NCP [National Contingency Plan], are pre-empted by § 114(c)."[7] The Court's interpretation of CERCLA § 114(c) invalidated the Spill Act, in part, as to expenditures for remedial costs within the scope of CERCLA.[8] However, authorized expenditures under the Spill Act that were outside the scope of CERCLA were not pre-empted by section 114(c) and continued to remain in effect as long as they were severable from the pre-empted sections.[9]

This may have created a piecemeal approach to hazardous substance cleanup if Congress had not repealed CERCLA § 114(c) in 1986 under the Superfund Amendments and Reauthorization

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[4] *Hillsborough Cnty. v. Automated Med. Labs., Inc.*, 471 U.S. 707, 712 (1985).
[5] 42 U.S.C. § 9614(c) (1980).
[6] 475 U.S. 355, 361 (1986).
[7] *Id.* at 376.
[8] *Id.* at 375-76.
[9] *Id.* at 376.

Act.[10] The reasoning for this repeal was documented in the Senate Committee on Environment and Public Works report, which stated as follows:

> Clarification of section 114(c) will allow the State to move forward and develop the tax mechanisms necessary for meeting the growing needs for response to hazardous substances releases and participation in the Superfund program, as well as for maintaining State hazardous waste programs.
>
> The primary effect of the amendment will be to remove a potential barrier to the creation of State superfund programs. The amendment may result in an increase in the number and pace of hazardous substance response actions undertaken or partially funded by States, since States will be able to raise funds to assist such hazardous substance response.[11]

Given this historical context, and to address identified deficiencies in the proposed rule, in the event EPA decides to move forward with a final rulemaking, it must modify the rule to meet the statutory requirements of CERCLA § 108(b) (1) & (2) to provide for complete program exemption for States, like Nevada, with existing comprehensive regulatory and financial programs. To meet these statutory requirements and protect Nevada's established and successful mining financial assurance program from pre-emption challenges and a duplicative regulatory structure, EPA would need to modify the proposed rule to include an option for complete program exemption.

Program exemption in place of a separate federal program will have at least three primary benefits. First, exemption will prevent disruption to Nevada's successful financial assurance program.

Second, program exemption will advance sound public policy. As described above, Congress repealed CERCLA § 114(c) to increase the number and pace of response actions by encouraging states to develop programs that undertake or to fund hazardous substance cleanup. By providing for program exemption, EPA will equally encourage states to develop financial assurance programs which could increase state resources dedicated to mine site cleanup and reclamation and conserve federal resources that would have otherwise been dedicated to federal program oversight in those states. This would also allow states to select and implement environmental requirements appropriate for varying hydrologic settings (e.g. the arid west vs. the wet southeast). In Nevada, the administration and personnel costs to operate its financial assurance program are fully funded by revenue generated from permit fees assessed against mining operators. This model ensures that Nevada's program receives a sustainable source of

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[10] P.L. 99-499 (1986).

[11] S. Rep. No. 11, 99th Cong., 1st Sess. 59, 60 (1985).

funding for oversight costs. For these reasons, providing an exemption for programs such as Nevada's is in the public's best interest.

Third, program exemption will avoid regulatory complexities that result from pre-emption disputes. As the holding *Exxon* instructs, Nevada's financial assurance program is vulnerable to pre-emption challenges to the extent that it conflicts with the proposed federal program. However, the parts of Nevada's program that are not covered by CERCLA will survive any successful pre-emption challenge and result in a piecemeal approach to federal and state regulatory oversight of financial assurance requirements. By preserving state regulatory oversight through program exemption, EPA would maintain a clear, effective, and efficient regulatory approach to financially assuring hardrock mine cleanup and reclamation in Nevada.

EPA expressed several concerns with the concept of program deferral in the preamble to the proposed rule[12] that may also apply to program exemption. Several of the concerns are common to general environmental program implementation and oversight, including if the program is administered entirely within EPA, because it is not clear the EPA Superfund program has or will develop the resources necessary for field inspection and verification of mine financial assurance compliance. As they pertain to Nevada and the hardrock mining financial assurance program, we believe these concerns are adequately addressed.

Nevada's mining financial assurance program has several safeguards that should allay concerns with program exemption, including:

- Public notice of proposed Water Pollution Control and Mine Reclamation Permits and bonding amounts, prior to mine operation or major mine modification, and public review and appeal of these actions to the State Environmental Commission;
- Oversight by the Mining Oversight and Accountability Commission under Nevada Revised Statutes Chapter 514A;
- Program and financial audits from the State Legislative Counsel Bureau;
- Quarterly on-site state inspections to ensure compliance; and
- Public records availability.

Together with NDEP's extensive experience and demonstrated technical expertise, these additional measures assure transparency, accountability, and consistency in Nevada's program.

NDEP encourages EPA to review the attached support document, which provides a detailed review of the protectiveness of Nevada's program. NDEP provided the attached support document to interested Nevada stakeholders for review, including the Nevada Mining Association and Great Basin Resources Watch, both of whom have considerable experience with the Nevada mine regulation programs. Where feasible and determined to be warranted, NDEP revised the document to address input received from these parties.

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[12] 82 Fed. Reg. at 3469

In closing, NDEP believes this rulemaking presents a tangible opportunity for EPA to demonstrate its commitment to cooperative federalism and to acknowledge the expertise and competence of state programs in hardrock mine financial assurance regulation.

NDEP is available to meet with the EPA rulemaking team to discuss our comments in further detail. Please contact me at 775-687-9373 or glovato@ndep.nv.gov at your convenience.

Sincerely,

Greg Lovato
Administrator

Attachment

ec: (w/ Attachment)
Kenneth E. Wagner, Office of the Administrator, US Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, MC 1101A Room 3309A WJCN, Washington, DC
Bradley Crowell, Director, NV Department of Conservation and Natural Resources
Jennifer Carr, Deputy Administrator, NDEP
Joe Sawyer, Chief, Bureau of Mining Regulation and Reclamation, NDEP
Frederick "Rick" Perdomo, Senior Deputy Attorney General, Nevada Office of the Attorney General
Marci Todd, Acting Director, BLM NV State Office, 1340 Financial Blvd., Reno, NV 89502
Bill Dunkelberger, Forest Supervisor, Humboldt Toiyabe National Forest, USFS, 1200 Franklin Way, Sparks, NV 89431
Dana Bennett, President, Nevada Mining Association, 201 W. Liberty Street, Suite 300, Reno, NV 89501
John Hadder, Director, Great Basin Resources Watch, P.O. Box 207, Reno, NV, 89504
Greg Conrad, Executive Director, Interstate Mining Compact Commission, 445A Carlisle Drive, Herndon, VA 20170
Rich Perry, Administrator, NV Division of Minerals, 400 W. King St., Ste. 106, Carson City, NV 89703

To: Cogliano, Gerain[Cogliano.Gerain@epa.gov]
Cc: Pease, Michael[pease.michael@epa.gov]; Huff, Mark J[huff.markj@epa.gov]; Johnson, Barnes[Johnson.Barnes@epa.gov]; Sasseville, Sonya[Sasseville.Sonya@epa.gov]; Foster, Barbara[Foster.Barbara@epa.gov]; Stachowiak, Robert[Stachowiak.Robert@epa.gov]
From: Huggins, Richard
Sent: Wed 1/11/2017 4:32:15 PM
Subject: RE: CERCLA 108(b) Docket

Gerain, see below for the email from the stakeholder about the incorrect link to the docket.

As mentioned on the phone, when you are on the FR page for the HRM rule, the docket link they have sends you to : Recently posted EPA Rules and Notices from FR Feed. Furthermore the entire box on the FR page that says enhanced content (green) is wrong. Here is the correct link:

https://www.regulations.gov/docket?D=EPA-HQ-SFUND-2015-0781

Richard Huggins Jr.

Senior Special Assistant

Office of Resource Conservation and Recovery

U.S. Environmental Protection Agency

Desk: 703-308-0017 iPhone: Ex. 6 - Personal Phone

From: Huggins, Richard
Sent: Wednesday, January 11, 2017 11:15 AM
To: Sasseville, Sonya <Sasseville.Sonya@epa.gov>
Cc: Pease, Michael <pease.michael@epa.gov>; Huff, Mark J <huff.markj@epa.gov>; Johnson, Barnes <Johnson.Barnes@epa.gov>
Subject: RE: CERCLA 108(b) Docket

The link is wrong on the FR page, here is the correct docket link

https://www.regulations.gov/docket?D=EPA-HQ-SFUND-2015-0781

Richard Huggins Jr.

Senior Special Assistant

Office of Resource Conservation and Recovery

U.S. Environmental Protection Agency

Desk: 703-308-0017 iPhone: Ex. 6 - Personal Phone

From: Sasseville, Sonya
Sent: Wednesday, January 11, 2017 10:36 AM
To: Sweeney, Katie <KSweeney@nma.org>; Foster, Barbara <Foster.Barbara@epa.gov>; Pease, Michael <pease.michael@epa.gov>
Cc: Johnson, Barnes <Johnson.Barnes@epa.gov>; Bridgeford, Tawny <TBridgeford@nma.org>
Subject: RE: CERCLA 108(b) Docket

Katie, we are checking into this and will get back to you.

Sonya

From: Sweeney, Katie [mailto:KSweeney@nma.org]
Sent: Wednesday, January 11, 2017 10:17 AM
To: Foster, Barbara <Foster.Barbara@epa.gov>; Pease, Michael <pease.michael@epa.gov>
Cc: Sasseville, Sonya <Sasseville.Sonya@epa.gov>; Johnson, Barnes <Johnson.Barnes@epa.gov>; Bridgeford, Tawny <TBridgeford@nma.org>
Subject: CERCLA 108(b) Docket

Barbara and Mike,

To follow up on the voicemails I left earlier today, there is definitely something amiss with the docket for the Hardrock Mining CERCLA 108(b) rule as accessed on the Regulations.gov website. If you click on the proposed rule and then click on view all documents in this docket – more than 1400 documents show up. Most do not appear to be related to the proposed rule and in fact, some appear to be separate rulemakings altogether. Also, if you try to search the docket for documents that are supposed to be there (e.g. EPA's Nov. 2016 Memorandum to the Record: Releases from Hardrock Mining Facilities), those documents cannot be found. Please advise as to what is being done to fix this and when the correct documents will be available. Obviously, with only a 60-day comment period, the industry needs to begin review as soon as possible.

Thanks for your attention to this matter.

Katie

Katie Sweeney
Senior Vice President, Legal Affairs & General Counsel
National Mining Association
101 Constitution Ave. NW, Suite 500 East
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KSweeney@nma.org

To: Huff, Mark J[huff.markj@epa.gov]; Sasseville, Sonya[Sasseville.Sonya@epa.gov]; Hofmann, Lee[Hofmann.Lee@epa.gov]; Benware, Richard[Benware.Richard@epa.gov]; Foster, Barbara[Foster.Barbara@epa.gov]
Cc: ORCR Press[ORCR_Press@epa.gov]
From: Ames, Jeremy
Sent: Tue 1/31/2017 1:51:12 PM
Subject: Inside EPA: EPA Highlights Template For Future Superfund Financial Regulations

EPA Highlights Template For Future Superfund Financial Regulations

January 30, 2017

EPA is highlighting three areas of its proposed first-ever Superfund financial responsibility rule for the hardrock mining sector that could serve as a template for any future financial assurance regulations for other industrial sectors, even as the rule is at risk of being scrapped by GOP lawmakers.

The proposed rule, published in the Federal Register Jan. 11, is in the midst of a 60-day comment period until March 13. If finalized, the rule would require owners and operators of certain types of hardrock mines and mineral processing facilities to give financial assurances of their ability to pay for potential releases of hazardous substances from their facilities, including Superfund cleanup costs, health assessment costs and natural resource damages (NRD), according to the proposal.

The Obama EPA framed the rule as a measure to lift any burdens on taxpayers to pay for future hardrock mining cleanups that may be needed.

During a Jan. 10 webinar, EPA staff generally read from prepared slides, saying the rule is the first such regulation under the agency's section 108(b) authority under the Comprehensive Environmental Response, Compensation & Liability Act (CERCLA).

Sonya Sasseville, with EPA's Office of Resource Conservation & Recovery, noted that subparts A, B and C of the proposed rule include components that EPA expects will serve as the foundation for future section 108(b) rulemakings, recommending that commenters interested in other sectors for which EPA is exploring financial assurance rules focus on those subparts.

Subpart A of the rule is titled General Facility Requirements, and in general would require that the amount of financial assurance a company provides be consistent with the degree of risk posed by its management of hazardous substances. That amount of financial responsibility would be available to pay for response, health assessment and NRD costs for which the mine operator or owner is responsible, the slides say.

Subpart B is titled General Financial Responsibility Requirements, and would require owners and operators to update every three years the financial responsibility amount based on class-specific requirements. The subpart also sets notification requirements to EPA, the slides say. For instance, a party would be required to notify EPA within 10 days of filing for bankruptcy under Chapter 11, and would have to notify EPA of any claims made against it under CERCLA, among other requirements.

This subsection would also specify allowances for an owner or operator to petition EPA to release it from its financial responsibility obligations. The party would need to submit "evidence to demonstrate that the degree and duration of risk associated with the management of hazardous substances at the facility is minimal," the slides say.

Financial Instruments

Subpart C is titled Available Financial Responsibility Instruments, and notes that the six types of financial responsibility instruments allowed under the proposal are: letter of credit, surety bond, insurance, financial test, corporate guarantee and trust fund, the slides say. The agency is proposing two possible options regarding a financial test or corporate guarantee. The slides say EPA prefers the option of not allowing use of either of these, but is also considering permitting use of a credit-rating based financial test or corporate guarantee.

EPA notes in the slides that these financial assurance instruments would be available to pay out CERCLA or NRD costs awarded by a final judgment from a federal court, and costs under a CERCLA settlement with federal agencies. The instruments would also be available to pay into a trust fund created under a unilateral administrative order, the slides say.

Further, EPA also makes note that instrument providers can be subject to "direct action" claims brought by other parties, including EPA. This could occur, for instance, in cases where an owner or operator files for bankruptcy, an EPA staff person said on the webinar.

EPA was under a Dec. 1 court-ordered deadline to issue the proposed hardrock mining rule, and to decide whether to move forward on similar rules for three other industrial sectors, per a negotiated legal agreement with environmentalists. CERCLA section 108(b) set out a 1983 requirement for EPA to identify classes of facilities, and then called for issuing financial assurance rules for those classes.

Environmentalists sued EPA to obtain a court order to propose and finalize the mining rule after the agency took no action following a 2009 notice identifying the hardrock mining sector as the first sector for which it would issue such rules. EPA agreed to an enforceable schedule after the U.S. Court of Appeals for the District of Columbia Circuit in May 2015 ordered the agency to update its schedule for issuing the rules and heavily criticized EPA for its lack of progress in writing the rules.

While there is a court-ordered time line for the hardrock mining rule, it nonetheless faces significant opposition from the mining industry and congressional Republicans, some of whom have pledged to eliminate it. For instance, upon release of the proposal, Senate Energy & Natural Resources Committee Chairman Lisa Murkowski (R-AK) vowed to "stop this rule in its tracks."

It is also unclear whether EPA under President Donald Trump will continue to support the rule.

Clarifying Intent

On the webinar, EPA staff clarified the proposed rule, responding to questions sent into the webinar.

Regarding subpart C, the agency was asked about whether it had conducted any outreach to trust institutions. Agency staff replied EPA did meet with the trust industry, and said the discussions

were helpful and will inform the language of a proposed trust agreement. The agency also said notes from these discussions will be placed in the rule's docket on regulations.gov.

Staff also responded to questions on whether, if a surety steps in, there would be a cap on its financial responsibility liability. In response, staff said that section 108 does cap such liability to the limits of the policy or instrument.

The agency was also asked about the reasoning behind requiring a written statement from a state insurance commissioner or attorney general to EPA stating that a bond is legally valid and enforceable. EPA replied that the requirement stems from past experience -- the agency had to deal with it in the underground storage tank program, for instance -- and that the agency had some concern that a bond might implicate statue insurance law.

The agency also answered questions about the hardrock mining-specific section of the proposed rule, subpart H. EPA would exclude certain classes of facilities from the financial assurance requirements, including mines with a disturbance of less than five acres, provided such a mine is not located within a mile of another mine that employed hazardous substances in its processes and where a mine disturbance occurred in the previous 10 years. EPA staff was asked whether the less-than-five-acres requirement applied to a specific mine feature or the aggregate of a mine in total. EPA staff responded it is the aggregate of a mine.

Further, the agency was asked about why EPA is not allowing less-than-five-acre mines to be exempt if they are within one mile of other mines. Staff responded that the agency is concerned about the impact of numerous small mines, noting the history of Superfund sites with small mines in close proximity to each other.

During the webinar, Sasseville also said that EPA plans to host a separate webinar specific to the financial responsibility formula in the proposed rule on Jan. 30. EPA is proposing a formula for facilities to calculate their amount of financial responsibility, allowing for adjustments due to current conditions at their facilities, such as for environmentally-protective practices. The proposal says the agency "expects that many, if not most, facilities[] will be able to adjust the amount required based on the calculation."

Even with such adjustments, the National Mining Association argues that the rule nonetheless

would put an “exorbitant price tag” on the industry and duplicates existing state and federal regulatory programs.

But Earthworks -- a litigant in the suit that forced the rule -- disputes that the proposed rule is duplicative. While mining companies hold bonds for reclamation at hardrock mining sites they operate on, those funds are strictly for when operations go according to plan and do not cover accidents, an Earthworks spokesman has said. CERCLA section 108 financial assurance is for when operations fail to go according to plan, and aims to protect taxpayers, the source says. -- Suzanne Yohannan (syohannan@iwpnews.com)

To: Carr, Loften[Carr.Loften@epa.gov]; Cybulski, Walter[Cybulski.Walter@epa.gov]; DiForte, Nicoletta[DiForte.Nicoletta@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Hanley, Jim[Hanley.James@epa.gov]; Hillenbrand, John[Hillenbrand.John@epa.gov]; Kulpan, Bruce[Kulpan.Bruce@epa.gov]; Kyte, Larry[kyte.larry@epa.gov]; Purcell, Mark[purcell.mark@epa.gov]; Stachowiak, Robert[Stachowiak.Robert@epa.gov]; Tiago, Joseph[Tiago.Joseph@epa.gov]; Lensink, Andy[Lensink.Andy@epa.gov]; Bishlawi, Randa[Bishlawi.Randa@epa.gov]; Kobelski, Bruce[Kobelski.Bruce@epa.gov]; Baptista, Chrisna[Baptista.Chrisna@epa.gov]; Tomten, Dave[Tomten.Dave@epa.gov]; Salo, Earl[Salo.Earl@epa.gov]; Suriano, Elaine[Suriano.Elaine@epa.gov]; Fidis, Alexander[Fidis.Alexander@epa.gov]; Geselbracht, Jeanne[Geselbracht.Jeanne@epa.gov]; Farber, Glenn[Farber.Glenn@epa.gov]; Luzecky, Hollis[Luzecky.Hollis@epa.gov]; Marcy, Ken[Marcy.Ken@epa.gov]; Prins, Christopher[Prins.Christopher@epa.gov]; Jenkins, Robin[Jenkins.Robin@epa.gov]; Mahmud, Shahid[Mahmud.Shahid@epa.gov]; Steiner-Riley, Cara[Steiner-Riley.Cara@epa.gov]; Kline, Bill[Kline.Bill@epa.gov]; Hodes, Colette[Hodes.Colette@epa.gov]; Greenberg, Marc[Greenberg.Marc@epa.gov]; Ames, Jeremy[Ames.Jeremy@epa.gov]; Burgess, Michele[Burgess.Michele@epa.gov]; Pease, Michael[pease.michael@epa.gov]; Vyas, Peggy[Vyas.Peggy@epa.gov]; Horton, Rachel[Horton.Rachel@epa.gov]; Benware, Richard[Benware.Richard@epa.gov]; Anderson, RobinM[Anderson.RobinM@epa.gov]; Palmer, Scott[Palmer.Scott@epa.gov]; Taylor, Timothy[Taylor.Timothy@epa.gov]; Stewart, Tracey[Stewart.Tracey@epa.gov]; Sasseville, Sonya[Sasseville.Sonya@epa.gov]; Barr, Linda[Barr.Linda@epa.gov]; Krueger, Anna[Krueger.Anna@epa.gov]; Kohler, Amanda[Kohler.Amanda@epa.gov]; Krahe, Joseph[Krahe.Joseph@epa.gov]; Shimeles, Taetaye[Shimeles.Taetaye@epa.gov]; Hoffman, Wendy[Hoffman.Wendy@epa.gov]; Hofmann, Lee[Hofmann.Lee@epa.gov]; Cultice, Alyssa[Cultice.Alyssa@epa.gov]; MacDonald, Jennifer[Macdonald.Jennifer@epa.gov]; Hood, Lynne[Hood.Lynne@epa.gov]; Schoenborn, William[Schoenborn.William@epa.gov]; Guignet, Dennis[Guignet.Dennis@epa.gov]; Sheldrake, Beth[sheldrake.beth@epa.gov]; Naftz, Douglas[Naftz.Douglas@epa.gov]; Ingemansen, Dean[Ingemansen.Dean@epa.gov]; McWhirter, Lisa[McWhirter.Lisa@epa.gov]; Huff, Mark J[huff.markj@epa.gov]; Godsey, Cindi[Godsey.Cindi@epa.gov]; Kelly, PatrickM[Kelly.PatrickM@epa.gov]; Huynh-Linenberg, Jacquie[huynh-linenberg.jacquie@epa.gov]; Binford, Marshall[Binford.Marshall@epa.gov]; Mott, Patricia[Mott.Patricia@epa.gov]; Aultz, Erica[aultz.erica@epa.gov]; Rountree, Jillian[Rountree.Jillian@epa.gov]; Kawakami, Cynthia[kawakami.cynthia@epa.gov]; McKim, Krista[mckim.krista@epa.gov]; Housman, Van[Housman.Van@epa.gov]; Zaragoza, Larry[Zaragoza.Larry@epa.gov]
Cc: McKenna, Elizabeth[Mckenna.Elizabeth@epa.gov]; Painter, Paula[Painter.Paula@epa.gov]; Beitin, Clara[Beitin.Clara@epa.gov]; BERMAN, TESSA[Berman.Tessa@epa.gov]
From: Foster, Barbara
Sent: Wed 1/11/2017 4:39:29 PM
Subject: 108(b) workgroup

Workgroup --

The 108(b) proposed Hardrock Mining Rule and the Additional Classes Notice are in today's *Federal Register*. The links are below:

Hardrock Mining Proposal:

https://www.gpo.gov/fdsys/pkg/FR-2017-01-11/pdf/2016-30047.pdf

Additional Classes Notice:

https://www.gpo.gov/fdsys/pkg/FR-2017-01-11/pdf/2016-30040.pdf

Barbara Foster

OSWER/ORCR/PIID

703-308-7057

To: Pease, Michael[pease.michael@epa.gov]
From: Pease, Michael
Sent: Wed 11/30/2016 10:36:39 PM
Subject: INVITATION: Call on CERCLA 108(b) Hardrock Mining Rule

Good evening,

Tomorrow U.S. Environmental Protection Agency expects to sign a proposed rulemaking on financial responsibility requirements for the hardrock mining and mineral processing industry under Section 108(b) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

We would like to offer you and other representatives of the surety, insurance and banking community the opportunity to join a call on Tuesday about the proposal (a calendar invite will be sent soon). The call details are below:

When: Tuesday, December 6, 2016

Time: 3:00 p.m. (Eastern)

Call-in number: Ex. 6 - Personal Privacy conference line

Conference code: Ex. 6 - Personal Privacy conference line

If you have any questions, please let me know.

Michael Pease

Office of Resource Conservation and Recovery
U.S. EPA
1200 Pennsylvania Avenue, NW
Washington, DC 20460

(703) 308-0008

To: agoodin@earthjustice.org[agoodin@earthjustice.org]
Cc: Johnson, Barnes[Johnson.Barnes@epa.gov]; Sasseville, Sonya[Sasseville.Sonya@epa.gov]; Radtke, Meghan[Radtke.Meghan@epa.gov]; Foster, Barbara[Foster.Barbara@epa.gov]; Huff, Mark J[huff.markj@epa.gov]; Hoffman, Wendy[Hoffman.Wendy@epa.gov]; Stachowiak, Robert[Stachowiak.Robert@epa.gov]; john.sullivan3@usdoj.gov[john.sullivan3@usdoj.gov]; Lowery, Brigid[Lowery.Brigid@epa.gov]; Huggins, Richard[Huggins.Richard@epa.gov]
From: Huggins, Richard
Sent: Wed 11/30/2016 10:32:32 PM
Subject: INVITATION: Call on CERCLA 108(b) Hardrock Mining Rule with Environmental Organizations

Good evening,

Tomorrow the U.S. Environmental Protection Agency expects to sign a proposed rulemaking on financial responsibility requirements for the hardrock mining and mineral processing industry under Section 108(b) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

We would like to offer you the opportunity to join a call on Monday about the proposal (a calendar invite will be sent soon). The call details are below:

When: Monday, December 5, 2016

Time: 12:30 p.m. (Eastern)

Call-in number:

Conference code

Ex. 6 - conference line

If you have any questions, please let me know.

Richard

Richard Huggins Jr.

Senior Special Assistant

Office of Resource Conservation and Recovery

U.S. Environmental Protection Agency

Desk: 703-308-0017 iPhone: Ex. 6 - Personal Phone

To: john.cash@ur-energy.com[john.cash@ur-energy.com]; lrussell@hecla-mining.com[lrussell@hecla-mining.com]
Cc: Johnson, Barnes[Johnson.Barnes@epa.gov]; Sasseville, Sonya[Sasseville.Sonya@epa.gov]; Radtke, Meghan[Radtke.Meghan@epa.gov]; Foster, Barbara[Foster.Barbara@epa.gov]; Huff, Mark J[huff.markj@epa.gov]; Hoffman, Wendy[Hoffman.Wendy@epa.gov]; Stachowiak, Robert[Stachowiak.Robert@epa.gov]; Lowery, Brigid[Lowery.Brigid@epa.gov]; Ames, Jeremy[Ames.Jeremy@epa.gov]
From: Huggins, Richard
Sent: Wed 11/30/2016 10:23:35 PM
Subject: INVITATION: Call on CERCLA 108(b) Hardrock Mining Rule with Industry Stakeholders

Good evening,

Tomorrow the U.S. Environmental Protection Agency expects to sign a proposed rulemaking on financial responsibility requirements for the hardrock mining and mineral processing industry under Section 108(b) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

We would like to offer you the opportunity to join a call on Monday about the proposal (a calendar invite will be sent soon). The call details are below:

When: Monday, December 5, 2016

Time: 1:30 p.m. (Eastern)

Call-in number:

Conference code Ex. 6 - conference code

If you have any questions, please let me know.

Richard

Richard Huggins Jr.

Senior Special Assistant

Office of Resource Conservation and Recovery

U.S. Environmental Protection Agency

Desk: 703-308-0017 iPhone: **Ex. 6 - Personal phone**

To: gorell@comstockmining.com[gorell@comstockmining.com]
Cc: Johnson, Barnes[Johnson.Barnes@epa.gov]; Sasseville, Sonya[Sasseville.Sonya@epa.gov]; Radtke, Meghan[Radtke.Meghan@epa.gov]; Foster, Barbara[Foster.Barbara@epa.gov]; Huff, Mark J[huff.markj@epa.gov]; Hoffman, Wendy[Hoffman.Wendy@epa.gov]; Stachowiak, Robert[Stachowiak.Robert@epa.gov]; john.sullivan3@usdoj.gov[john.sullivan3@usdoj.gov]; Lowery, Brigid[Lowery.Brigid@epa.gov]; Ames, Jeremy[Ames.Jeremy@epa.gov]
From: Huggins, Richard
Sent: Wed 11/30/2016 10:14:27 PM
Subject: INVITATION: Call on CERCLA 108(b) Hardrock Mining Rule with Industry Stakeholders

Good evening,

Tomorrow U.S. Environmental Protection Agency expects to sign a proposed rulemaking on financial responsibility requirements for the hardrock mining and mineral processing industry under Section 108(b) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

We would like to offer you the opportunity to join a call on Monday about the proposal (a calendar invite will be sent soon). The call details are below:

When: Monday, December 5, 2016

Time: 1:30 p.m. (Eastern)

Call-in number:

Conference code: Ex. 6 - conference code

If you have any questions, please let me know.

Richard

Richard Huggins Jr.

Senior Special Assistant

Office of Resource Conservation and Recovery

U.S. Environmental Protection Agency

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Subject: INVITATION: Call on CERCLA 108(b) Hardrock Mining Rule with Environmental Organizations

Tomorrow the U.S. Environmental Protection Agency expects to sign a proposed rulemaking on financial responsibility requirements for the hardrock mining and mineral processing industry under Section 108(b) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

We would like to offer you the opportunity to join a call on Monday about the proposal (a calendar invite will be sent soon). The call details are below:

When: Monday, December 5, 2016

Time: 12:30 p.m. (Eastern)

Call-in number:

Conference code: Ex. 6 - conference code

If you have any questions, please let me know.

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Subject: INVITATION: Call on CERCLA 108(b) Hardrock Mining Rule with Industry Stakeholders

Tomorrow U.S. Environmental Protection Agency expects to issue a proposed rulemaking on financial responsibility requirements for the hardrock mining and mineral processing industry under Section 108(b) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

We would like to offer you the opportunity to join a call on Monday about the proposal (a calendar invite will be sent soon). The call details are below:

When: Monday, December 5, 2016

Time: 1:30 p.m. (Eastern)

Call-in number: Ex. 6 - conference line

Conference code: Ex. 6 - Conference code

If you have any questions, please let me know.

Richard

Richard Huggins Jr.

Senior Special Assistant

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November 30, 2016

Comprehensive Report: An Overview of Practices at Hardrock Mining and Mineral Processing Facilities and Related Releases of CERCLA Hazardous Substances

Final Report

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List of Acronyms

Acronym	Definition
ACGP	Alaska Construction General Permit
ADEC	Alaska Department of Environmental Conservation
ADEQ	Arizona Department of Environmental Quality
ADNR	Alaska Department of Natural Resources
ADWR	Arizona Department of Water Resources
AMD	Acid Mine Drainage
AMLRA	Arizona Mined Land Reclamation Act
APDES	Alaska Pollutant Discharge Elimination System
APMA	Application for Permits to Mine in Alaska
APP	Aquifer Protection Permit
ARAP	Aquatic Resource Alteration Permit
ATCM	Airborne Toxics Control Measure
ATSDR	Agency for Toxic Substances and Disease Registry
AWQS	Arizona Water Quality Standards
AZPDES	Arizona Pollutant Discharge Elimination System
BLM	Bureau of Land Management
BR	Biennial Report
BRS	Biennial Reporting System
CAA	Clean Air Act
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CWA	Clean Water Act
DCHD	Douglas County Health Department
DEQ	Department of Environmental Quality
DMRs	Discharge monitoring reports

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DOE	Department of Energy
DOI	U.S. Department of the Interior
DPNR	Department of Planning and Natural Resources
DRI	Developments of Regional Impact
EAW	Environmental Assessment Worksheet
ECHO	Enforcement and Compliance History Online
EIS	Environmental Impact Statement
ELGs	Effluent Limitation Guidelines
EPA	U.S. Environmental Protection Agency
ERNS	Emergency Response Notification System
ERP	Environmental Resource Permit
FDEP	Florida Department of Environmental Protection
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FRS	Facility Registry System
HDPE	High Density Polyethylene
HRM/P	Hard Rock Mining and Processing
ICIS	Integrated Compliance Information System
IDEM	Indiana Department of Environmental Management
IDEQ	Idaho Department of Environmental Quality
IDL	Idaho Department of Lands
IDNR	Indiana Department of Natural Resources
ILO	International Labour Organization
ISL	In situ Leaching
IW	Industrial Wastewater
LDR	Land Disposal Restriction(s)
MACT	Maximum Achievable Control Technology
MANPHO	Mandatory Phosphate Program
MCLs	Maximum Contaminant Levels
MDEQ	Montana Department of Environmental Quality
MEPA	Minnesota Environmental Policy Act

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MEPA	Montana Environmental Policy Act
MGWPCS	Montana Groundwater Pollution Control System
MIW	Mine-Influenced Water
MOU	Memorandum (or Memoranda) of Understanding
MPDES	Montana Pollutant Discharge Elimination System
MSHA	Mine Safety and Health Administration
MSSW	Management and Storage of Surface Waters Program
NAICS	North American Industry Classification System
NEI	National Emissions Inventory
NEPA	National Environmental Policy Act
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
NSPS	New Source Performance Standards
NV DEP	Nevada Department of Environmental Protection
NV DNR	Nevada Department of Natural Resources
ODEQ	Oklahoma Department of Environmental Quality
OFW	Outstanding Florida Waters
OSDH	Oklahoma State Department of Health
OU	Operable Unit
PCB	Polychlorinated biphenyl
pH	Measure of acidity
PVC	Polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RDA	Residue Disposal Area
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RRC	Texas Railroad Commission
SCA	St. Croix Alumina

SDS	State Disposal System
SDWA	Safe Drinking Water Act
SMARA	Surface Mining and Reclamation Act
SMGB	Surface Mining and Geology Board
SO2	Sulfur Dioxide
SWPPP	Storm Water Pollution Prevention Plan
SX/EW	Solvent extraction and electrowinning
TAP	Toxic Air Pollutants
TCEQ	Texas Commission on Environmental Quality
TDEC	Tennessee Department of Environment & Conservation
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TPDES	Texas Pollutant Discharge Elimination System
TRI	Toxics Release Inventory
U.S.	United States
UIC	Underground Injection Control
UMTRCA	Uranium Mill Tailings Radiation Control Act
UPDES	Utah Pollution Discharge Elimination System
USACE	U.S. Army Corps of Engineer
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
UTS	Universal Treatment Standards
VMRP	Voluntary Mercury Reduction Program
WAD	Weak Acid Dissociable
WDRs	Water Discharge Requirements
WQS	Water Quality Standards
WRP	Wetland Resource Permit

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Glossary

Acid mine drainage (AMD): a type of mine-influenced water and a major contaminant vector to surface and groundwater. When water is exposed to air and sulfide-bearing materials, forming solutions of net acidity and increasing the leaching and mobility of metals and trace elements. "Acid mine drainage" is sometimes referred to as "acid rock drainage" to clarify that acid in an environment may be generated by processes other than human mineral extraction and processing activities. Because this document deals with mining and milling practices, it will use acid mine drainage, henceforth AMD.

Adit: A horizontal passage leading into an underground mine for the purposes of access or drainage.

Beneficiation: preliminary processing such as grinding, gravity and magnetic concentration, flotation, and leaching that separate and concentrate minerals, such as in preparation for further refining, and does not generally result in a chemical change. Beneficiation involves the removal of uneconomic material from ore through physical and/or chemical methods to generate a product with a higher concentration of the valuable material and waste, called tailings. Exempt from regulation as a hazardous waste under RCRA Subtitle C.

CERCLA hazardous substances: elements, compounds, and hazardous wastes with statutory designation as hazardous substances under Section 102 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. For more information, see https://www.epa.gov/epcra/epcracerclacaa-ss112r-consolidated-list-lists-march-2015-version.

Contemporary mining: practices currently used and marked by technological sophistication and increased regulatory oversight. Technological advances allowed for more accurate characterization of unexploited ore bodies and more efficient processing, making lower grade economical to mine; an attendant increase in the number and size of mining operations that take advantage of economies of scale to increase their size while lowering their fixed costs (see below); an increasingly connected global economy which has led to a larger market for natural resources, multinational mining companies, and commodity cycles driven by the demands of developing countries' economies; and consideration for the potential deleterious social, economic, and environmental effects of mining operations, enforced by national and local regulatory regimes.

Dump leaching: involves the application of leach solution to uncrushed and otherwise unprocessed ore, directly from the mine. The dump leaching process can take up to two years to process a given ore pile and in some cases results in relatively low extraction rates. Because of its low cost, dump leaching is the most common leach method used for production of copper and is also used for nickel mining.

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Economies of scale: the cost advantage from increased output. At larger mining operations, the per-unit fixed cost (e.g., of purchasing large machinery or investing in heap leaching pads) decreases because the costs are spread over a greater amount of product. Exploiting economies of scale makes lower grades of ore economical to mine.

Erosion: the moving of rock or other surface material by wind, rain, and other processes from one location to another. Mining can disturb large amounts of surface material and contribute to mine-influenced water, sedimentation, and other water quality problems.

Extraction: the process by which an operator removes valuable minerals from the ground, often requiring the removal of waste products (overburden and waste rock) at the same time. The extraction methods considered in this report are open pit mining, underground mining, and non-entry (in situ) mining.

Federal surface management regulations: the Bureau of Land Management (under 43 CFR Subpart 3809) and the United States Forest Service (under 36 CFR Part 228) permit and oversee mining activities on public federal lands. These agencies are charged with preventing "unnecessary and undue degradation" to public lands, and generally require the submission and approval of plans of operation for proposed activities, including an environmental assessment and reclamation plans. Other requirements include proper disposal, concurrent reclamation, and providing for post-mining monitoring, maintenance, and treatment.

Fugitive dust: particulate matter suspended in the air by wind action and human activities, such as extraction and milling. Because the dust may contain metals or chemical residues, human health and environmental problems may arise through direct inhalation, soil and plant deposition, or accumulation within a water body.

Heap leaching: the beneficiation process in which ore is placed on a leach pad on an impermeable barrier, leach solution is applied using sprinklers or misters, and the pregnant solution containing the liberated mineral of interest is collected. Due to cost efficiencies, heap leaching is typically used for treatment of low-grade oxidized ores.

Lixiviant: the solution used to extract minerals from ore in heap, dump leaching, and in situ leaching. The lixiviant captures the desired mineral when it comes in contact with the ore, then is transported to a separate processing stage where the mineral is pulled out of the lixiviant (for example, through ion exchange). Lixiviants can be reused.

Milling: the facility at which beneficiation, or processing, takes place. It usually includes equipment used for processing itself, and is connected to supplementary features that support processing: process ponds that house process liquid before use or reuse, tailings facilities that store processing waste, and transportation facilities to receive unprocessed ore and ship out processed concentrates.

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Mine-influenced water (MIW): MIW encompasses any water whose chemical composition has been affected by mining or mineral processing. One type of MIW is AMD, but MIW also includes drainage that is neutral or alkaline. In addition to environmental concerns posed by acidity or alkalinity, MIW often contains elevated concentrations of mobilized contaminants, suspended solids, or sulfate or arsenate content.

Placer mining: Placer mining uses water to excavate, transport, and/or concentrate minerals from placer or alluvial deposits, where erosion and deposition have created deposits of minerals within sediments or rock fragments. This type of mining has been used predominantly for gold prospecting over the years, but has also been used for the recovery of platinum, silver, and heavy mineral sands containing tin, titanium, zircon, rare earths, or iron.

Point source: discharge from a discernible, confined and discrete conveyance. These discharges are regulated by NPDES permitting and other requirements under the Clean Water Act. Seepage to groundwater is not considered a point source, and is not regulated under the Clean Water Act. The classification of point and nonpoint discharges from mining operations has evolved over time.

Pregnant solution: a solution containing dissolved extractable mineral that was leached from the ore.

Primary processing: generally occurs after beneficiation and transforms concentrated mineral particles into a more useful chemical form, such as by heat (e.g., smelting) or chemical reactions.

Reagent: a substance added to a process to facilitate a desired chemical reaction, such as to liberate minerals from ore in leaching or flotation.

Overburden: non-mineralized material on top of ore deposits that must be removed in order to reach ore deposits. Typically stored on site and can be used for backfill and revegetation after mining operations are complete. The term may also be used to refer to waste rock, although overburden typically has a lower potential for environmental contamination. It is distinct from tailings, which remain after economically valuable components have been removed.

Reclamation and closure: refers to tasks conducted after mining operations have concluded to return the facility site to public use, and to ensure there are no post-operational releases. Tasks include monitoring the site, conducting water treatment if necessary, and covering and revegetating features that had created a surface disturbance, among others. Reclamation and closure is regulated under both federal surface management regulations (on federal land) and state regulations.

Seepage: the continuous release of fluid (e.g., from a tailings storage facility) into local soil, bedrock, or groundwater.

Tailings: the waste material created when valuable minerals or metals have been physically or chemically separated from ore. All beneficiation procedures generate tailings, in addition to mineral processing activities. Tailings usually take the form of a slurry (e.g., wet tailings), but

may also undergo dewatering and disposal as paste or filtered tailings. Depending on the commodity and the beneficiation process, tailings may contain a variety of hazardous substances.

Tailings storage facility: general term that includes "ponds," "impoundments," and "dams." Many different types of facilities are used to contain and manage the tailings (waste ore) resulting from hardrock mining. Depending on the type of tailing (e.g., slurry, filtered, or paste), facilities may include liners, tailings ponds, and retention dams.

Trace elements: any element present in a substance in low concentrations, such as contaminants in mine-influenced water. Includes metals (e.g., gold, mercury), metalloids (e.g., arsenic), and nonmetals (e.g., sulfur).

Waste rock: material surrounding or within ore deposits that contains minerals in concentrations considered too low to be extracted at a profit. Its geochemistry may contribute to mine-influenced water. Typically stored on-site, sometimes co-disposed with tailings.

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Introduction

Section 108(b) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, establishes certain regulatory authorities concerning financial responsibility requirements. Specifically, the statutory language addresses the promulgation of regulations that require classes of facilities to establish and maintain evidence of financial responsibility consistent with the degree and duration of risk associated with the production, transportation, treatment, storage, or disposal of hazardous substances. On July 28, 2009, the U.S. Environmental Protection Agency (EPA) identified hardrock mining facilities (i.e., extraction, beneficiation, and processing of ores and nonmetallic minerals) as the initial class of facilities that will be subject to financial assurance requirements under CERCLA 108(b) (74 FR 37213). Consequently, EPA is developing a proposed rule to apply financial assurance requirements for facilities within this class.

Public comments received in response to the 2009 proposed notice questioned the need for these requirements in light of existing environmental regulatory programs at both the state and federal levels, and considering the risk of future releases of hazardous substances from current mining operations. As part of EPA's consideration of financial assurance regulations for facilities within identified sectors, EPA is evaluating the validity of these assertions. This document endeavors to address that topic by investigating the extent to which the implementation of federal and state environmental regulatory programs and current hardrock mining and mineral processing practices have affected the non-permitted releases of hazardous substances into the environment. It also discusses how the nature and frequency of releases and other impacts may have changed over time.

This document first summarizes the methodology of this review and resulting conclusions. Each of the sections that follow describes the status of extraction, processing and waste management methods in the United States and provides a technical description of how they are implemented. Next, the potential sources of hazardous releases are described, as well as the regulatory framework in place to manage mining and processing practices. Finally, evidence from specific non-operating sites and currently operating facilities is presented in order to analyze the past and current non-permitted releases and their causes. Appendices include additional information on methodology and applicable regulations.

Methodology

The methodological approach focuses on several major extraction (mining), mineral processing, and waste management practices. Hardrock mining is the extraction of rock and other materials from the earth that contain a target metallic or non-fuel non-metallic mineral. The extraction processes include in situ solution mining, extraction of mineral-bearing groundwater brines, and surface or underground excavation of solid earthen materials. Mineral processing includes practices following the extraction of mineral ore that involve the separation and/or concentration

of metallic or non-fuel, non-metallic minerals from the ore, and to refine ores or mineral concentrates to extract a target material.

Initially, this research effort focused on characterizing practices within each commodity sector.[1] EPA concluded that a better approach was to focus specifically on mining, processing, and waste management practices that are commonly used within the U.S. hardrock mining industry, regardless of the commodity. Many processing practices, such as physical processing, flotation and leaching are applicable to many commodities. Several distinct waste management practices are also applicable to the majority of currently operating facilities. Furthermore, practices are more determinative of the hazards related to releases than the commodity, as specific process chemicals and methods are used in mining and mineral processing of multiple commodities. Although there are strong correlations between certain practices and commodities (e.g., Bayer processing for aluminum or ion exchange for uranium), those correlations are noted in the relevant practice papers.[2]

Each following section includes discussions of major extraction, mineral processing, or waste management practices. These practices include:

- Surface and Underground Mining
- Non-Entry (Solution) Mining
- Physical Processing, Gravity Processing, and Magnetic Processing
- Flotation
- Cyanidation
- Acid Leach, Solvent Extraction, and Electrowinning
- Pyrometallurgical Processes
- Bayer Process for Aluminum
- Mine-Influenced Water
- Waste Rock Piles
- Tailings Management

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[1] EPA developed a list of hardrock commodities under consideration for this rulemaking. The list of 33 hardrock commodities excludes several commodities that are not expected to be mined or processed in the United States in the future based on USGS mineral profiles (e.g., arsenic, asbestos, columbium, gallium, mercury, and thorium). For more information, please see: U.S. Environmental Protection Agency, *Memorandum: Mining Classes Not Included in Identified Hardrock Mining Classes of Facilities* (Washington, DC: U.S. Government Publishing Office, 2009). Accessed at http://www.regulations.gov/contentStreamer?documentId=EPA-HQ-SFUND-2009-0265-0033&disposition=attachment&contentType=pdf.

[2] For example, gold and silver frequently co-occur in ore and can be extracted using cyanide leaching. For information regarding the common techniques for several commodities, see: U.S. Environmental Protection Agency, Office of Compliance, *Sector Notebook Project: Profile of the Metal Mining Industry* (Washington, DC: U.S. Government Publishing Office, 1995). Accessed 14 December 2015 at: https://www.epa.gov/sites/production/files/2015-05/documents/epa_metal_mining_sector_notebook.pdf

Each practice's subsection is structured similarly and discusses the following topics:

- Past and current use;
- Technical description;
- Potential sources and releases of CERCLA hazardous substances and management practices to address those potential sources and releases;
- Applicable state and federal regulations; and
- Documented releases at non-operating sites and currently operating facilities.[3]

For each practice, information was gathered through a literature review spanning technical references, academic sources, and government publications.[4] To the extent possible, historical methods were distinguished from contemporary techniques. The discussion of relevant regulatory frameworks for each practice drew upon prior EPA research of environmental regulations applicable to mining (see Appendix IV), supplemented by additional research to target each practice.

To develop a profile of past and contemporary practices and environmental releases of CERCLA hazardous substances associated with each practice, publicly available information was gathered for a sample of 29 non-operating hardrock mining and primary processing CERCLA sites, as

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[3] "Currently operating facilities" refers to facilities that have not formally entered closure as of July 2015, and includes all active, intermittent, or temporarily idled hardrock mining and mineral processing facilities. These facilities were identified using data from the Mine Safety and Health Administration, U.S. Geological Survey, and other public sources. EPA identified "non-operating" sites for this document by drawing upon mines and mineral processors that have undergone cleanup activities under CERCLA authority. In some cases, currently operating facilities may have portions that no longer have ongoing mining or processing activities, or portions designated as CERCLA cleanup sites. Throughout this document, EPA refers to "non-operating sites" as either those that were not identified as currently operating, or those where a portion of the mine or processing facility is no longer in use and has undergone CERCLA cleanup activities (e.g., legacy pits, ponds, or waste piles).

[4] Several references provided information used throughout this document. These include:

- U.S. Environmental Protection Agency, *Technical Resource Documents: Extraction and Beneficiation of Ores and Minerals* (Washington, DC: U.S. Government Publishing Office, 1994).
- U.S. Environmental Protection Agency, *Sector Notebook Project: Profile of the Nonferrous Metals Industry* (Washington, DC: U.S. Government Publishing Office, 1995). Accessed December 14, 2015, at: https://nepis.epa.gov/Exe/ZyPDF.cgi/50000FOZ.PDF?Dockey=50000FOZ.PDF
- U.S. Environmental Protection Agency, Office of Compliance, *Sector Notebook Project: Profile of the Metal Mining Industry* (Washington, DC: U.S. Government Publishing Office, 1995).
- National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002). Accessed August 2, 2015, at: http://www.nap.edu/catalog/10318/evolutionary-and-revolutionary-technologies-for-mining.
- J.J. Marcus, ed., *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining* (London: Imperial College Press, 1997).
- Peter Darling, ed., *SME Mining Engineering Handbook*, Third Edition (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volumes 1-2.

well as a sample of 70 currently operating facilities in the United States.[5,6,7] The sites and facilities examined represent stratified samples by primary commodity (see Appendices I and II). For some practices, additional non-operating sites and currently operating facilities are discussed to further illustrate the relevant issues. Information about non-operating sites was gathered largely from Record of Decision (ROD) and Remedial Investigation/Feasibility Study (RI/FS) documents. Information about currently operating sites came from various EPA databases, Emergency Response Notification System (ERNS) incident notifications, Mine Safety and Health Administration (MSHA) records, federal and state permit documents, and general research.

ERNS is used to store information on notifications of oil discharges and hazardous substances releases.[8] ERNS contains, in addition to other data, information about the material and the quantity released, where the release occurred, when the release occurred, and information about property damage, injuries, and deaths occurring due to the release. ERNS primarily contains initial accounts of releases reported to the National Response Center (NRC); exact incident details or follow-up actions may not be reported.

From the National Response Center (NRC) website, EPA aggregated reports for the period 1990-2014 and identified unique incidents involving CERCLA hazardous substances at hardrock mining facilities. Due to the nature of the reporting framework, these data do not include much information about continuous releases or information about releases after facility closure.

Review of individual site permits, environmental impact statements, and other documentation was outside of the scope of this report. Appendix III provides further discussion of the protocol used to gather information about non-operating sites and currently operating facilities. Where the protocol did not result in significant information, consultation with mining experts also informed the search for case studies.

This document does *not* endeavor to develop a formal risk assessment of the non-operating and currently operating sites and facilities. This effort also does not endeavor to evaluate past actions at the historical cleanup sites. Systematic and comprehensive information about facility

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[5] The sample of currently operating facilities relied on a list generated on November 18, 2014. Additional research into the facilities in the sample may have uncovered that some of them stopped operating or have temporarily suspended their activity. Where applicable, this document notes such instances. However, no effort was made to continuously review the operational status of the facilities.

[6] All references to "facilities" discuss currently operating facilities, while "sites" refer to non-operating sites. All references to "sites" and "facilities" cover both hardrock mining and mineral processing sectors.

[7] For a complete list of the sample non-operating sites and currently operating facilities, see Appendix III.A. and III.B

[8] The types of release reports that are available in ERNS fall into three major categories: substances designated as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended; oil and petroleum products, as defined by the Clean Water Act of 1972 (CWA), as amended by the Oil Pollution Act of 1990; and all other types of materials. Because CERCLA defines hazardous substances to include CWA hazardous substances and toxic pollutants, the Clean Air Act hazardous air pollutants, the Resource Conservation and Recovery Act (RCRA) hazardous wastes, and the Toxic Substances Control Act imminently hazardous chemical substances, releases of these substances are also subject to CERCLA reporting requirements.

characteristics, waste management, releases, and regulatory oversight was not available for either non-operating sites or currently operating facilities. Thus, this profile is based on information that may be incomplete or anecdotal. For example, ROD, RI/FS, and permit documents provide narrative information; the absence of discussion of certain processes, activities, or occurrences cannot be taken as evidence of the fact that they did not take place.

The analysis conducted represents a general assessment of the occurrence of releases, and is also subject to the following data limitations:

- **Data Availability:** A range of publicly available CERCLA documents contained information about releases from the sample of non-operating sites. Documentation about operations and releases at currently operating facilities was inherently more difficult to find, absent major enforcement actions.
- **Magnitude and Severity of Releases:** This review did not attempt to characterize the environmental or human health risks associated with specific releases. No comparison of magnitude and severity was drawn between releases at non-operating sites and currently operating facilities.
- **Legacy Contamination:** Many sites and facilities within the non-operating and currently operating samples have been active for a century or longer. When a post-1980 release occurred at these facilities, it was difficult to determine if the equipment or practice responsible for the release was newly constructed or part of the site's past operations.

Certain drafts of practices discussed in Sections 1 and 2 of this document have undergone limited peer review by U.S. Geological Survey (USGS) staff and an independent mining expert.

Conclusions

The research effort yielded several insights concerning the extent to which the implementation of federal and state environmental regulatory programs, along with current mineral extraction, beneficiation, and processing practices in the United States, have affected the releases of hazardous substances into the environment. Overall, the review of regulations, practices, and past and current releases showed that despite changes in regulations and practices, the release of CERCLA hazardous substances as a result of mining and mineral processing activities is an ongoing issue across varying industry management practices. Extraction practices generally do not involve the use of hazardous chemicals, with the exception of non-entry mining. Nonetheless, releases resulting from surface and underground disturbances do occur. The potential harm related to each respective processing practice depends upon the nature of the chemicals the process uses. Waste management, i.e., generation, transportation, treatment, storage, and disposal, are practices with overarching concerns.

Past Experience

EPA has determined that 102 non-operating CERCLA sites that have ceased mining and mineral processing activities, including sites on the National Priorities List (NPL) and sites at which removal actions occurred, experienced releases resulting from industrial activity in the hardrock mining and primary processing sectors. From these 102 sites, EPA selected a sample of 29 sites for additional data collection to characterize the practices and releases that led to the CERCLA listing. In most of these cases, tailings management contributed to releases. Other non-tailings releases resulted from exposed pits or adits, waste rock piles, leaching solutions, Bayer refining, flotation, and smelting processes. In many cases, releases were largely due to the direct discharge of wastes into the local environment, minimal containment efforts, or operator bankruptcy and abandonment. Additionally, most releases described in publicly available information occurred after closure of the mine or processing site, suggesting that the potential for releases and adequate monitoring remains a long-term issue after closure.

Contemporary Experience

Federal and state authorities, including EPA, Bureau of Land Management (BLM) and states, promulgated modern environmental regulations applicable to hardrock mining and primary processing operations throughout the 1970s, 1980s and 1990s. During this period, incremental requirements and applicability standards continued to bring hardrock mining and mineral processing operations into the period of contemporary mining.[9] Regulations under the Clean Water Act (CWA), for example, introduced waste management regulations and sought to end direct discharges into waterways, and federal and state reclamation requirements have sought to prevent operator abandonment.[10] In addition, mining and mineral processing facilities produce wastes regulated under both Subtitle C and D of the Resource Conservation and Recovery Act (RCRA).

Technological developments have resulted in a wide range of management strategies to prevent or mitigate environmental releases. The use of these engineering controls depends on the existing regulatory requirements, and factors such as operator sophistication and economics.[11,12] Also during the early to mid-20th century, a combination of economic and technological factors increased the amount of surface disturbance and waste generation relative to the scale of mining

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[9] This document uses the phrase "contemporary mining" to describe contemporary mining practices marked by technological sophistication and increased regulatory oversight.

[10] U.S. Environmental Protection Agency Region 10, *EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska* (Washington, DC: U.S. Government Publishing Office, 2003). Accessed November 7, 2015, at: http://yosemite.epa.gov/R10/WATER.NSF/Sole+Source+Aquifers/hardrockmining.

[11] G. Hilson and B. Murck, "Progress toward pollution prevention and waste minimization in the North American gold mining industry," *Journal of Cleaner Production* 9 (2001), p. 405-415.

[12] G. Hilson, "Pollution prevention and cleaner production in the mining industry: an analysis of current issues," *Journal of Cleaner Production* 8 (2000), p. 119-126.

activities.[13] For example, cyanide heap leaching, which was developed relatively recently, exploits economies of scale to process low-grade ore.[14] The corresponding amount of waste rock and tailings being mined and deposited at a single site as a result of large-scale mining operations is increasing.[15] In turn, the environmental impact of mining and processing operations may be particularly high at larger facilities. For example, EPA found that in 2007, two percent of the estimated 294 mines with NPDES permits generated approximately 90 percent of the industry's discharges, accounting for pollutant toxicity.[16]

At least 52 mines and processors in the sample of currently operating facilities experienced permits exceedances, spills, seepages, fugitive dust, or other releases while using contemporary mining and processing practices. Releases occurred in the 1980s, 1990s, and after 2000. Similar to past releases, tailings management has continued to play a role in roughly half of the publicly documented releases. Releases occurred at both old and newly constructed tailings facilities. The review of mining and processing practices revealed the following concerns related to each practice:

- The environmental impacts of large mining operations, particularly surface mines, may include surface disturbances, fugitive dust, and contaminated mine waters from exposed mine walls and waste piles. Open pits and underground adits were the cause or the site of releases at a minimum of nine mining operations since 1980 in EPA's review.
- Despite no physical extraction of rock, non-entry mining can introduce hazardous contaminants into the environment. The threats are releases to adjacent groundwater and to surface soils and surface water from spills. Non-entry mining and related practices were responsible for 56 releases at two currently operating facilities.
- The primary environmental concerns associated with physical processing are the generation of fugitive dust and tailings, which can result in discharges to the environment. EPA's review revealed that at least four operations experienced continuous releases as a result of tailings from physical processing.
- Flotation processes may release flotation solution as well as tailings into the local environment, whose environmental risk profile is determined by their chemical

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[13] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[14] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

[15] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[16] U.S. Environmental Protection Agency, *Ore Mining and Dressing Preliminary Study Report*, EPA-820-R-10-025 (Washington DC, October 2011).

composition. Flotation contributed to releases at four operations since 1980 in EPA's review.

- In addition to the release of cyanide, discharges from cyanidation processes both during operations and after closure can also contain toxic elements. EPA found that cyanidation processes led to releases at 10 operations since 1980 in its review.
- Acid leach involves the use of sulfuric acid solutions. In addition to the threat sulfuric acid poses as a hazardous substance, the acid can mobilize other contaminants from surrounding material. EPA's review associated acid leaching with environmental releases at six operations since 1980.
- A major environmental concern with pyrometallurgical processes includes the release of sulfur dioxide and particulate matter containing lead, arsenic, and other airborne pollutants. Since 1980, six operations have experienced releases from roasting, smelting, and refining.
- The major environmental concern associated with the Bayer process is red mud, which can contain arsenic, chromium, and radium-226. Pyrometallurgical processing was responsible for releases at three facilities since 1980, according to EPA's review.

Most of these processes generate waste rock and/or tailings, with the exception of non-entry mining and pyrometallurgical processing. The disposal of waste rock and tailings requires long-term management and monitoring because of the potential for continued releases after facility closure. Of particular concern for waste management practices is the generation of mine-influenced water (MIW). MIW can contain process chemicals and additional mobilized contaminants.

No matter the extraction, processing, or waste management practice, facilities must transport, store, and dispose of material in the course of operations, e.g., through pipes and in ponds. Transportation and storage can result in releases due to leaks, seepage and spills. Pipe failure is a common source of release among currently operating facilities, although it did not lead to any Superfund sites in the non-operating sample. Process ponds contributed to releases in both the currently operating and non-operating samples, generally through seepage.

In addition to mining and processing activities, operator bankruptcy and abandonment were also associated with releases.[17] Commodity cycles affect the financial health of mine and processing

[17] These findings reflect anecdotal evidence of the contributing factors to releases. In a literature review, no systematic reviews studied operator financial health in the hardrock mining sector and the creation of CERCLA liabilities. More broadly, however, studies have suggested that, in mining and in other industries, business owners respond to declining prices and profitability by cutting costs, thereby increasing the potential for accidents and environmental risk. The prices of gold, copper, and iron ore have demonstrated volatility in recent years. Price volatility increases the likelihood at any given time that mine operators may have to cut cost to respond to decreased profitability. For the connection between profitability and environmental performance in the gold mining industry, see Bruce Finnie, Jeffrey Stuart, Linda Gibson, and Fern Zabriskie, "Balancing Environmental and Industry Sustainability: A Case Study of the US Gold Mining Industry," *Journal of Environmental Management* 90 (2009): 3690-3699, p. 3692. For recent volatility of commodity prices, see Federal Reserve Economic Data, Federal Reserve Bank of St. Louis. Accessible at: https://fred.stlouisfed.org/.

facility owners/operators, which in turn may affect the environmental performance and likelihood of bankruptcy and abandonment.[18,19] This pattern can be especially relevant for smaller mining companies with relatively limited resources.[20]

The incidents from EPA's review related to all of the extraction, processing, and waste deposition practices described in this document. In these incidents, all of the practices either resulted in releases or contributed to increasing the volume or environmental harm of a release, or both. The effects of these releases ranged from minimal impacts with no known long-term effects to significant impairment to groundwater, surface waters, and air quality. Observed releases affected local wildlife, plants, and human populations. They varied in scale from sudden, catastrophic releases to continuous seepage into the local environment over the course of years and decades. The releases also occurred in the presence of engineering controls and mitigation strategies.

For more information on releases related to each practice, see the relevant chapters, below.

Limitations

A number of factors limited the inferences that can be drawn from data about releases at currently operating facilities:

- **Compliance:** Although environmental regulations establish a set of minimum standards, compliance with those regulations may not be fully achieved by individual facilities, making it difficult to determine actual practices. As described previously, even in the event of full compliance with the existing regulatory framework, the owner/operator of the facilities may not be following all available management practices designed to prevent and mitigate releases. The management practices described in the following sections represent available options rather than standard or required controls.
- **Permitted Releases:** Before the establishment of the current regulatory framework, all releases – even direct discharge of toxic material into the local environment – did not constitute illegal discharges. However, due to data limitations, the review of contemporary facilities considered only unpermitted releases or permit exceedances.
- **Releases after the Operation Period:** Releases occur during the post-closure and post-reclamation phases, which currently operating facilities have not yet reached.
- **Case Study Limitations:** The evaluation of past operations was drawn from CERCLA sites. Similarly, the review of currently operating facilities focused on case studies of

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[18] D. Laurence, "Establishing a sustainable mining operation: an overview," *Journal of Cleaner Production* 19 (2011), p.278-284.

[19] J.A. Brierley and C.L. Brierley, "Present and future commercial applications of biohydrometallurgy," *Hydrometallurgy* 59 (2001), p. 233-239.

[20] G. Hilson and B. Murck, "Progress toward pollution prevention and waste minimization in the North American gold mining industry," *Journal of Cleaner Production* 9 (2001), p. 405-415.

ongoing releases. For all sites and facilities, the review relied upon publicly available documents obtained online. No effort was made to obtain information in hard copy from state or local offices. Thus, the data for any mine or processor may not be complete, and this document does not attempt to characterize the statistical probability of releases in the overall hardrock mining and mineral processing universe.

Section 1: Current Mining and Mineral Practices

A. Surface and Underground Mining

B. Non-Entry (Solution) Mining and Ion Exchange Processing

C. Physical Processing, Gravity Processing, and Magnetic Processing

D. Flotation Processing

E. Cyanidation

F. Acid Leach, Solvent Extraction, and Electrowinning

G. Pyrometallurgical Processes

H. Bayer Process for Aluminum

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A. Surface and Underground Extraction

Introduction

Mining is the process of extracting valuable minerals from their geologic source prior to beneficiation. The extraction of material from the earth during mining can be broadly divided into three categories: surface (open-pit) mining, underground mining, and solution mining (such as in situ leaching [ISL] or brine extraction). This document describes surface and underground mining, which are conventional mining methods that entail drilling, blasting, and/or removing earth or rock.

The environmental impacts of large mining operations, particularly surface mines, may include surface disturbances, fugitive dust, and contaminated mine drainage from exposed mine walls and waste piles.[21] At contemporary mines, economies of scale have favored surface mines, with a trend towards larger operations. As a result, the corresponding amount of overburden, waste rock, and tailings being mined and deposited at a single site is also generally increasing. Several sources, however, describe a renewed interest in underground mining as the availability of amenable near-surface deposits becomes exhausted.

While waste rock and other extraction wastes are generally exempted from the hazardous waste-management requirements of RCRA Subtitle C, federal and state mining programs contain requirements for how surface and underground mines should be reclaimed during and after operations. Moreover, the requirements vary greatly across states and specific operations. The CWA and delegated state programs also lay out requirements for water quality from mine drainage.

A review of non-operating CERCLA sites suggested that releases can occur during operations, as well as post-closure.

Past and Current Use

Historically, most metal ore extraction in the United States used underground mining; however, cost and the development of other technology have made it a less common extraction method. From the 1990s to the year 2000, the types of mines worldwide transitioned from 90 percent underground to 85 percent open-pit operations.[22] In the United States, surface mines produced approximately 97 percent of all non-coal ores by tonnage in 2007, with underground mines

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[21] The main extraction wastes are overburden and waste rock; waste rock disposal is considered in Section 2.B. Tailings are waste from ore processing; disposal is considered in Section 2.C.

[22] M. Randolph, "Chapter 1.2.: Current Trends in Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1.

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producing three percent of non-coal ores.[23] For metal ores specifically, surface mines produced almost 99 percent of ores, by tonnage.[24]

In metal mining, mergers and acquisitions have resulted in fewer operating companies, increased foreign ownership, and fewer and larger facilities.[25] The corresponding amount of waste rock and tailings being mined and deposited at a single site as a result of large-scale mining operations is also increasing. For example, large open-pit copper mines in the United States can generate up to a million tons of waste and ore daily, for decades.[26]

Currently, the industry is beginning to face engineering and economic constraints for size and depth of open-pit operations. Several sources describe a renewed interest in underground mining for this reason.[27] Some ore deposits may only be mined economically by underground mining methods. These deposits typically are deeper, and have geological features that require more targeted extraction methods.[28]

Technical Description

Both surface and underground mining generally entail drilling, blasting, and removing earth or rock. Economic factors, (e.g., commodity prices and production costs) and technical factors (e.g., the size, orientation, and geology of deposits) determine the extraction method used.[29]

In surface mining, commonly referred to as "open-pit mining," operators use heavy equipment to remove overburden materials that lie on top of ore deposits, e.g., non-valuable rock, soil, or surface features. After these overburden materials are removed, the ore deposits are extracted.

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[23] Michael Nelson, "Chapter 6.1.: Evaluation of Mining Methods and Systems," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1.

[24] Michael Nelson, "Chapter 6.1.: Evaluation of Mining Methods and Systems," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1.

[25] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[26] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[27] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002); M. Randolph. "Chapter 1.2.: Current Trends in Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1, Volume 1; Steve Fiscor, "Major Open-Pit Copper Mines Move Underground." *Engineering and Mining Journal* (8 June 2010). Accessed October 9, 2015, at: http://www.e-mj.com/features/409-major-open-pit-copper-mines-move-underground.html#.VPDnDnzF9KI

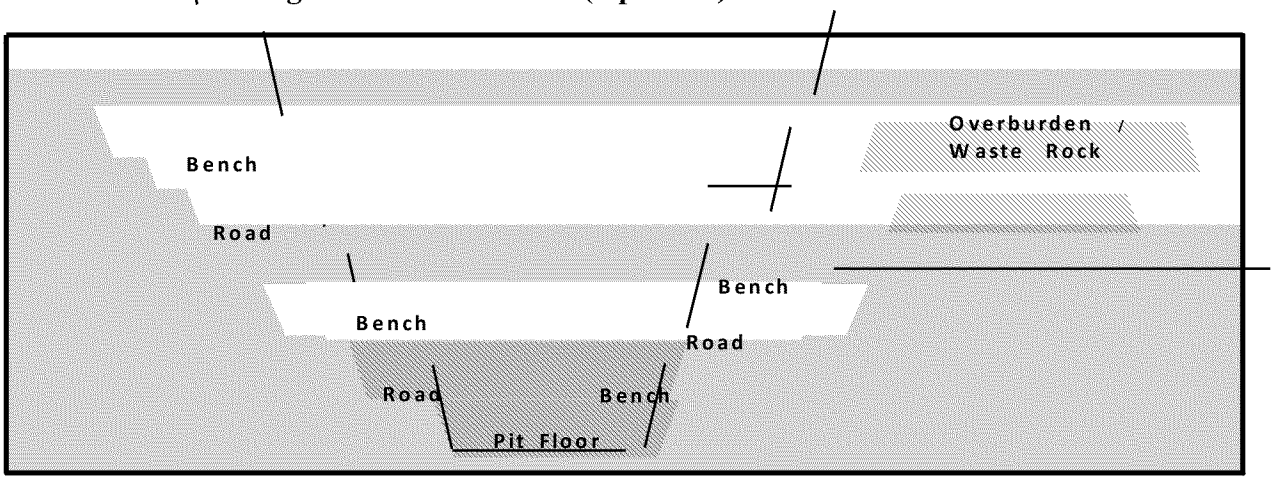
[28] Michael Nelson, "Chapter 6.1: Evaluation of Mining Methods and Systems," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1.

[29] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

Waste rock, which contains minerals at too low a concentration to be extracted profitably, may surround or be within the ore deposit, and is also removed. Generally, the geochemical properties of waste rock present additional environmental considerations for waste management.

Surface mining cuts one or more horizontal benches to extract the ore while dumping overburden and waste rock at dedicated disposal sites outside the final pit boundary.[30] Exhibit 1.A.1. shows a typical open-pit mine configuration. At some surface mines, the disposal of mine and processing wastes may occur in another area of an open pit, or in a dedicated storage facility on-site.[31] Less commonly, waste is used to backfill an already mined pit.[32]

Exhibit 1.A.1. Configuration of a Surface (Open-Pit) Mine



Underground mining methods are used when deposits occur deep beneath the earth's surface. Hardrock mines conducting underground operations commonly use nitrogen-based explosives to dislodge ore and waste. To reach the ore body, remove ore and waste, and provide ventilation, miners must excavate either a vertical shaft, a horizontal passageway (adit), or an inclined passageway.[33] Blasted ore is hauled away by trains, loaders, or trucks that either bring it directly to the surface, or transport it to a shaft where it is hoisted to the surface and sent to a crushing facility.

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[30] Andrew Wetherelt and Klass Peter van der Wielen, "Chapter 10.1: Introduction to Open Pit Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011).

[31] Andrew Wetherelt and Klass Peter van der Wielen, "Chapter 10.1: Introduction to Open Pit Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011).

[32] Andrew Wetherelt and Klass Peter van der Wielen, "Chapter 10.1: Introduction to Open Pit Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011).

[33] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

Because of economies of scale, large-scale surface mining techniques typically offer more efficient, productive, and safe ore recovery than underground methods, but require deposits to be relatively close to the surface and have uniform ore distribution.[34] On the other hand, deeper, less continuous deposits can only be mined economically by underground methods, which can target pockets of minerals more selectively. Underground mining may also be utilized if mining sites are subject to surface use restrictions.[35] Compared to surface mining, underground extraction operations require the pre-production installation of a great deal of infrastructure, in turn necessitating more careful planning and a larger initial capital investment.[36]

Potential Sources of Hazardous Substances

Both types of mining create large amounts of excavated material, with surface mining tending to generate greater amounts of waste rock. Surface mines generate dust, large piles of waste rock, and large, usually permanent holes in the earth's surface. Dust and waste rock – produced during both open-pit and underground mining – can release trace elements and other toxic substances. Waste rock and overburden piles are typically stored on-site, which may result in acid mine drainage (AMD)[37] or other MIW if exposed to stormwater, surface water or groundwater.[38] Exhibit 1.A.2. describes these causes of potential releases and management methods in more detail.

Because of the trend towards fewer and larger facilities, the environmental impact of mining and processing operations may also be concentrated. For example, EPA found that in 2007, two percent of the estimated 294 mines with NPDES permits generated approximately 90 percent of the industry's discharges, accounting for pollutant toxicity.[39]

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[34] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[35] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[36] Nelson, "Chapter 6.1: Evaluation of Mining Methods and Systems," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011).

[37] "Acid mine drainage" is sometimes referred to as "acid rock drainage" to clarify that acid in an environment may be generated by processes other than human mineral extraction and processing activities. Because this document deals with mining and milling practices, it will use acid mine drainage, henceforth AMD.

[38] Tailings and other spent ore may also contribute to water contamination. These waste products of beneficiation and processing are discussed in Section 2.C.

[39] U.S. Environmental Protection Agency, *Ore Mining and Dressing Preliminary Study Report*, EPA-820-R-10-025 (Washington DC, October 2011).

Exhibit 1.A.2. Potential Releases Associated with Surface and Underground Extraction Methods

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Topographical impacts	Surface mines can result in significant alterations of natural landscapes and sometimes generate large piles of waste rock and typically permanent holes in the earth's surface. Subsidence from underground mining can result in the collapse of the overlying surface topography and pronounced changes at the surface.[40]	During design and planning phase, targeted extraction techniques such as selective mining and avoidance could be used to minimize topographic impacts.[41] While active, special handling techniques such as backfilling at underground mines can minimize and/or prevent subsidence.[42] At closure, backfilling open-pit mines, in-pit co-disposal of tailings and waste rock with dry or wet covers,[43] and revegetation of the mining area can lessen or minimize topographical impacts.[44]
Fugitive dust	Extraction can release toxic substances normally bound in rock. Before processing, a large amount of waste material is separated from mineral ore and frequently stored on-site in waste rock piles or tailings storage facilities. This waste may also contain chemicals introduced during separation processes, such as cyanide leaching agents. As a result, fugitive dust emissions containing toxic air pollutants may be released from surface mining pits, from piles of waste rock and tailings, or from the transportation of ore and waste materials.[45] For example, at gold mines, beneficiation processes such as milling (crushing) and autoclaving, as well as refining processes can generate atmospheric mercury emissions.[46]	For worker health and safety reasons during operations surface and underground mines control dust in conformance with MSHA regulations that require a variety of both wet and/or dry methods to reduce fugitive dust. This includes dust control for drilling, equipment and conveyors, haul roads, and any other mine features where fugitive dust resulting in worker health and safety may be an issue.[47] At closure dry or wet covers can be used to lessen or minimize fugitive dust emissions from mines.[48]

[40] F.K. Allgaier, ed., "Chapter 5: Environmental Effects of Mining," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997).

[41] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.1. Accessed December 4, 2015, at http://www.gardguide.com.

[42] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.1.

[43] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.7.

[44] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.6.

[45] Pramod Thakur, "Chapter 15.4: Evaluation of Mining Methods and Systems," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[46] G. Jones and G. Miller, *Final Report to EPA Region 9: Mercury and Modern Gold Mining in Nevada* (Washington, DC: U.S. Government Printing Office, 2005). Accessed January 13, 2015, at http://www.chem.unep.ch/mercury/Trade%20information/NRDCNEVADABYPRODUCTRECOVERYREPORT.pdf.

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TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
	Coarse dust usually settles within a few hundred meters of the source. Smaller particle size fractions (PM10), however, can be carried by wind in dust clouds for great distances and may be deposited on or near populated areas. Because the dust may contain metals, human health and environmental problems may arise through direct inhalation, soil and plant deposition, or accumulation within a water body.	
Mine drainage – underground mines	Water flowing through underground mines can cause releases of mine water through mining openings.[49] Contact with exposed rock in mine shafts can transport contaminants and negatively impact soil and water quality. Mine water can have environmentally significant concentrations of metals and solids, elevated temperatures, and altered pH, depending on the nature of the ore body and local geochemical conditions. In addition, mine water can acidify over time as sulfide minerals are exposed to water and air, resulting in AMD. AMD, and MIW more generally, can cause significant threats to surface water and groundwater resources during active mining and for decades after operations cease.[50] For example, in 1993, the U.S. Forest Service (USFS) estimated that AMD impacted between five and ten thousand miles of domestic streams and rivers.[51] The need for costly water treatment can persist for decades after a mine has closed.[52] Depending on the hydrology of the site, the drainage may be discharged to groundwater or surface water. Acidic drainage also increases the leaching and mobility of some metals and trace elements.[53]	Grouting and other methods have been shown to be highly effective at reducing drainage from underground mines during operations.[54] Flooding can significantly block the flow of oxygen and prevent acid generation; however, soluble products can result in unacceptable water quality.[55] Seals can be used to create flooded conditions, however, if considerable hydraulic head is created rigorous engineering design is required.[56] Where discharges from underground mines result in unacceptable water quality conditions the mine discharge may be allowed to discharge naturally (e.g. out the mine portal) where it is captured and treated, or the discharge may be prevented by pumping the underground mine and maintaining the level. This technique is also used where underground mine discharges to groundwater require mitigation.[57] In the event the mine drainage requires treatment prior to discharge, either during operations or post-closure, a variety of active, passive and in situ mine drainage treatment techniques are potentially applicable.[58]

[47] Fred N. Kissell, *Handbook for Dust Control in Mining*, No.2003-147 (Washington, DC: U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, 2003). Accessed 4 December 2015 at: http://www.cdc.gov/niosh/mining/UserFiles/works/pdfs/2003-147.pdf

[48] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.6.2.

[49] U.S. Environmental Protection Agency, DRAFT: *Mining Environmental Impact Statement Technical Report* (Washington, DC: U.S. Government Printing Office, 2013), p. 31.

[50] F.K. Allgaier, ed., "Chapter 5: Environmental Effects of Mining," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997).

[51] U.S. Environmental Protection Agency, Office of Compliance, *Sector Notebook Project: Profile of the Metal Mining Industry* (Washington, DC: U.S. Government Publishing Office, 1995).

[52] U.S. Environmental Protection Agency, Office of Compliance, *Sector Notebook Project: Profile of the Metal Mining Industry* (Washington, DC: U.S. Government Publishing Office, 1995).

[53] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Resource Document: Extraction and Beneficiation of Ores and Minerals* EPA 530-R-94-013, Volume 2: Gold (Washington, DC: U.S. Government Printing Office, 1994). Accessed December, 2015, at: https://archive.epa.gov/epawaste/nonhaz/industrial/special/web/pdf/iron.pdf.

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Mine drainage – open-pit mines	Open-pit mine highwalls are prone to high rates of erosion and mass wasting. The exposed rock on the pit walls and the overburden may result in AMD or other MIW, often forming "pit lakes". Similar to underground mines, MIW can have environmentally significant concentrations of metals, other contaminants, and sediments, elevated temperatures, and altered pH.	Passive mitigation methods: [59] • Revegetation • Pit backfill to reduce exposure to air and water. For example, burying waste rock or using overburden material as backfill can reduce acid generation substantially, under proper geologic conditions. • Prevention of pit lake formation (e.g., drainage and treatment systems) • Diversion channels and ditches prevent AMD by intercepting and conveying runoff from undisturbed areas around active mining sites. [60] • Natural or constructed hydrological systems, including wetlands, limestone drains, water covers, and naturally occurring geochemical or biological processes • Bioremediation processes treating mine wastewater using natural acidophilic microbes.[61] Active: • Treatment of mining wastewater and separation of solids[62,63] • Pit lake pump/treatment/neutralization

[54] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.5.5.

[55] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.5.4.

[56] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.5.5.

[57] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 7.4, 4.2.2.2.

[58] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 7.5.

[59] R. Verburg, "Chapter 16.5: Mitigating Acid Rock Drainage," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[60] G. Hilson and B. Murck, "Progress toward pollution prevention and waste minimization in the North American gold mining industry," *Journal of Cleaner Production* 9 (2001), p. 405-415.

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Mine drainage - Waste rock piles	The large quantities of overburden or waste rock material produced in surface or underground mining can be susceptible to weathering and leaching of contaminants resulting in discharge of hazardous materials. Waste rock produced from surface mines consists of non- mineralized and low-grade mineralized rock removed from above or within the ore body during extraction activities. Waste rock is typically disposed in large piles or dumps in close proximity and down-slope of the point of extraction. Regardless of the layout of the unit, waste rock dumps are generally constructed on unlined terrain, with underlying soils stripped, graded, or compacted depending on engineering considerations[64]	As part of mine design targeted extraction techniques such as selective mining and avoidance could be used to minimize mining of waste rock that could result in MIW.[65] As part of the waste rock disposal area design engineered barriers such as a liner can be utilized to collect seepage from waste rock resulting reduced seepage management requirements.[66] During operations special handling techniques such the addition of alkaline materials or amendments can be used to reduce potential for AMD.[67] At closure waste rock areas can be reclaimed using dry and wet covers to lessen or minimize discharges of MIW from waste rock piles. [68] In the event the mine drainage requires treatment prior to discharge, either during operations or post-closure, a variety of active, passive and in situ mine drainage treatment techniques are potentially applicable.[69]

[61] D.B. Johnson, "Acidophilic Microbial Communities: Candidate for Bioremediation of Acidic Mine Effluents," *International Biodeterioration & Biodegradation* 35:13 (1995), p. 41-58; and T. Umita, "Biological mine drainage treatment." *Resources, Conservation and Recycling* 16 (1996), p.179-188; and United Nations. *1995 Industrial Commodity Statistics Yearbook - Production Statistics (1986-95)* (New York: United Nations, 1997).

[62] United Nations Environment Programme, United Nations Industrial Development Organization, and the World Bank Group, *Pollution Prevention and Abatement Handbook, Airborne Particulate Matter: Pollution Prevention and Control* (Washington DC: 1998), p. 235-239.

[63] G. Hilson,. "Barriers to Implementing Cleaner Technologies and Cleaner Production (CP) Practices in the Mining Industry: A Case Study of the Americas," *Minerals Engineering* 13:7 (2000), p. 699-717.

[64] A. Kent, "Waste Rock Disposal Design," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining,* ed. J.J. Marcus (London: Imperial College Press, 1997).

[65] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.1.

[66] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.6.1.

[67] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.4.2.

[68] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.2.

[69] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 7.5.

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During ongoing operations, drainage, diversion, and wastewater treatment techniques can help to mitigate mine drainage, which may contain contaminants. During reclamation and closure, replacing the overburden as backfill and revegetation of the area can restore landscape features, prevent erosion, and reduce the potential for further water quality issues. Various factors, including the size and sophistication of mining operations, variation in regulatory requirements, and economic conditions may influence the preventative measures adopted at each site.[70] For example, all types of mining operations use culverts to intercept and convey runoff under access roads, stockpile areas, and structures. Some sources suggest, however, that many mining operations commonly undersize culverts or install them at too flat a grade to effectively carry away runoff.[71] In a survey of North American gold mines, some larger mining companies also reported neutralizing acidic mine drainage with lime, while no smaller mining companies indicated doing so.[72]

State and Federal Regulations

While BLM and USFS oversee mining activities on federal land, state-level mining regulations in many states apply to extraction operations on both private and public lands. BLM has required reclamation of lands since 1987, and USFS has required reclamation since 1974. Many states also maintain Memoranda of Understanding (MOU) with the federal government to share responsibility for management of mining on public lands.

While these federal and state regulations establish frameworks for reclamation and prevention of water contamination, performance standards vary greatly in their specificity and stringency. For example, BLM guidance states that particular mining claims may require appropriate mitigation and reclamation measures in plans of operations given anticipated potential environmental impacts, but that generally BLM land use plans do not prohibit certain mining practices through "zoning."[73] Mines opened after 1978 are required to treat effluent water, although the required treatment period after mine closure may not be specified. As such, a facility can close in full environmental compliance, but acid drainage and other MIW may remain potential concerns for more than 50 years.[74] While some states mirror BLM's management guidance, Montana Code Part 3 (Metal Mine Reclamation) details specific reclamation actions at sites that must be conducted and prohibits certain mining practices. As a result, not all mines may conduct

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[70] G. Hilson and B. Murck, "Progress toward pollution prevention and waste minimization in the North American gold mining industry," *Journal of Cleaner Production* 9 (2001), p. 405-415.

[71] C.D. Lidstone and A. Korte, "Chapter 16.4: Water and Sediment Control Systems," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[72] G. Hilson and B. Murck, "Progress toward pollution prevention and waste minimization in the North American gold mining industry," *Journal of Cleaner Production* 9 (2001), p. 405-415.

[73] U.S. Department of the Interior, Bureau of Land Management, *Surface Management Handbook* H-3809-1 (Washington, DC: U.S. Government Printing Office, 2012), Section 8.7.1, p. 8-14.

[74] U.S. Environmental Protection Agency, Office of Compliance, *Sector Notebook Project: Profile of the Metal Mining Industry* (Washington, DC: U.S. Government Publishing Office, 1995).

backfilling, pit lake treatment, or revegetation, or conduct reclamation activities concurrent with present operations.

While BLM surface mining regulations have not defined more specific standards for mine operation, reclamation, and closure,[75] congressional bills that also strive to define narrower standards for reclamation and water quality were introduced in 2009 and 2014, but were not ratified.[76]

Federal Regulations

Federal agencies have promulgated rules for extraction operations under various statutes and regulations. These include:

- **Land Disposal:** RCRA Subtitle C excludes mining extraction wastes, including waste rock and overburden, from being regulated as hazardous waste at the federal level.[77] Mining wastes may be subject to RCRA Subtitle D solid waste disposal requirements, which are regulated by the states.
- **Surface Management:** The BLM and the USFS permit and oversee mining activities on public federal lands. These agencies are charged with preventing "unnecessary and undue degradation" to public lands, and generally require the submission and approval of plans of operation for proposed activities, including an environmental assessment and reclamation plans. Other requirements include proper disposal, concurrent reclamation, and providing for post-mining monitoring, maintenance, and treatment.

Under 36 CFR Part 228 regulations, mining operations on USFS land must minimize adverse environmental impacts, by following approved plans of operation and complying with applicable Federal and state laws. Reclamation must be conducted at the earliest practicable time or within one year of conclusion of operations.

- **Discharges to Water:** Under the CWA effluent limitation guidelines (ELGs) for ore mining and dressing, mine drainage is subject to water quality standards for total suspended solids, pH, and specific metals.[78] These regulations also specify technology-based standards, and sometimes require National Pollutant Discharge Elimination System (NPDES) permits for these operations to incorporate certain best management practices.

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[75] A.P. Morriss, R.E. Meiners, and A. Dorchak, "Between a Hard Rock and a Hard Place: Politics, Midnight Regulations, and Mining," *Administrative Law Review* 55:3 (2003), p.551-606.

[76] HR 699, S. 796 (2009); HR 5060 (2014).

[77] The Bevill Amendment, passed by Congress in 1980, excluded "solid waste from the extraction, beneficiation, and processing of ores and minerals" from regulation under RCRA Subtitle C.

[78] 40 CFR Volume 50 Subpart J Section 440. In light of recent Supreme Court cases regarding the scope of waters protected under the Clean Water Act, applicability is further clarified in the proposed rulemaking EPA and Army Corps of Engineers at 79 FR 22187, "Definition of 'Waters of the United States' Under the Clean Water Act," accessed at: https://www.federalregister.gov/articles/2014/04/21/2014-07142/definition-of-waters-of-the-united-states-under-the-clean-water-act.

Where ELGs may not apply, technology-based limits are developed during the facility-specific permitting process. The NPDES program applies to both active and inactive mines, as well as abandoned mines where legally responsible owners or operators of point sources can be identified.

Runoff from waste rock piles may be regulated under NPDES stormwater permits when it is not commingled with process water or mine drainage.[79,80] Stormwater permits regulate stormwater contaminated by contact with material from mining activities, primarily requiring site-specific pollution prevention planning and/or implementation of mitigation practices.[81] These include treatment requirements, operating procedures, practices to control runoff, and monitoring. These rules do not cover all potential sources of water pollution. Mining pits protected by cover do not qualify as point sources from a "discrete conveyance," and do not fall under point-source requirements under the CWA.[82]

While EPA issues and oversees point-source discharge permitting under Section 402 of the CWA, the U.S. Army Corps of Engineers (USACE) issues "dredge and fill" permits under Section 404 of the CWA. Under CWA Section 404, mining operations may need to obtain a permit from USACE to address the discharge of dredged or fill materials into surface water, including wetlands. In areas with streams, wetlands, or lakes, excavation and construction activities may trigger this requirement. Some regulatory uncertainty exists regarding how mining overburden, slurry and tailings are regulated under the CWA because of different definitions of fill material used by EPA and USACE. Thus, Section 404 permits have been issued for mining operations outside of Section 402 NPDES permitting requirements.[83]

- **Air Emissions:** No federal air regulations specifically oversee fugitive dust concerns in mining operations, although the federal surface management regulations under BLM and USFS described above tend to require dust control practices. While these requirements are not discussed in the context of air toxics management, these measures are frequently incorporated into mining permits.

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[79] Seepage to groundwater is not considered a point source, and is not regulated under the Clean Water Act. The classification of point and nonpoint discharges from mining operations has evolved over time. For more information regarding current definitions of point sources from mining operations, see: *Greater Yellowstone Coalition v. Lewis*, 628 F.3d 1143 (9th Cir. Dec 23, 2010)

[80] U.S. Environmental Protection Agency Region 10, *EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska* (Washington, DC: U.S. Government Publishing Office, 2003). Accessed November 7, 2015, at: http://yosemite.epa.gov/R10/WATER.NSF/Sole+Source+Aquifers/hardrockmining

[81] Best management practices for stormwater permits are described at 40 CFR 122.2.

[82] The classification of point and nonpoint discharges from mining operations has evolved over time. For more information regarding current definitions of point sources from mining operations, see: *Greater Yellowstone Coalition v. Lewis*, 628 F.3d 1143 (9th Cir. Dec 23, 2010)

[83] C. Copeland, "Controversies over Redefining 'Fill Material' Under the Clean Water Act," *Congressional Research Service*, No. RL31411 (Washington, DC: U.S. Government Printing Office, 2013).

State Regulations

Over time, state mining reclamation laws shifted from focusing on coal mining operations only, to cover metals and ultimately surface and underground mining. The eight states with the most mining activity[84] have enacted surface mining management and reclamation laws, while all but Idaho regulate underground mining. Minnesota was the first to enact a surface mine reclamation requirement for minerals (in 1969), while Arizona was the last (in 1996). Other states with limited or no hardrock mining activity generally have not established regulatory programs for hardrock mining. For example, Texas has promulgated reclamation standards only for uranium operations. In Indiana, local authorities, rather than state agencies, establish requirements for land use and reclamation.

Non-Operating Sites and Currently Operating Facilities

Mine water may pass through open pits or underground adits and enter the local environment through runoff to surface water or seepage to groundwater. AMD is of particular concern because there is often a significant lag time between the start of mine operations and the observation of acidic drainage.[85] It may take at least five years for the oxidization of the acid-generating material and subsequent transportation into the local environment to take place.[86] A review of available documents revealed that releases related to extraction practices occurred at four of 29 non-operating sites and two of 70 currently operating facilities. This review separately considers releases from waste rock piles (an byproduct of surface and underground mining) later in this document, including 18 additional non-operating mines and five additional currently operating mine that experienced releases.[87]

This review of contemporary mines did not capture information characterizing the scope and efficacy of reclamation and closure practices. Improper and failed reclamation have been the basis for past CERCLA actions at hardrock mines, and remains a consideration for the environmental performance of contemporary mines.

Non-Operating Sites

Documents confirmed that 10 of the 29 non-operating mining and processing sites sampled for this review practiced surface and/or underground mining.[88] Two sites conducted exclusively surface mining, three sites conducted exclusively underground mining, and 5 sites conducted

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[84] Those states are Alaska, Arizona, California, Idaho, Minnesota, Montana, Nevada, Utah.

[85] U.S. Environmental Protection Agency, *Technical Report: Acid Mine Drainage Prediction* (Washington, DC: U.S. Government Printing Office, 1994), p. 2.

[86] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 8.3.4.

[87] For more detail, see Sections 2A and 2B on mine-influenced water and waste rock deposition.

[88] Note that it is likely, based on a review of mining and milling practices, that most if not all 29 non-operating sites reviewed practiced surface and/or underground mining. Documentation specifically described those practices at ten sites, however.

both. Activity at many of the sites extended back before the advent of major environmental legislation but continued into the 1980s and 1990s. At all 3 of the sites where surface or underground mining was responsible for the release of contaminant, the releases occurred as the result of acid mine drainage or mine-influenced water. It may take years to observe issues related to those contaminant vectors, so it is impossible to know if they are the result of past or more recent operations.[89]

- The **Captain Jack Mill** (EPA ID COD981551427) is a Superfund site in Ward, Colorado, that includes the workings of the Big Five Mine and White Raven mine, which included both open pits and underground adits, as well as the Captain Jack mill site. Gold and silver mining occurred at the site from 1861 through 1992. The EPA placed the site on the NPL in 2003 following the detection of antimony, arsenic, cadmium, copper, lead, manganese, thallium, and zinc in nearby Left Hand Creek. The primary source of contamination was AMD from the Big Five adit, which was constructed in the 19th century.[90]
- The **Summitville Mine** (EPA ID COD983778432) is a Superfund site in Rio Grande County, Colorado. It was active from 1875 through 1992. The mine had underground adits and open pits, and extracted gold, silver, and copper. The mine released MIW from various adits and pits at the site. This problem was accentuated by snowmelt and drainage that entered the mine's underground workings and flowed out through the adits before the adits were plugged.[91]
- The **Blackbird Mine** (IDD980725832) was a cobalt mine near Salmon, Idaho, that conducted surface and underground mining. It was operated intermittently from 1883 through 1982. AMD, in addition to the direct discharge of tailings into surface water in the mine's early operation, has released arsenic, cobalt, and copper into the local environment. The underground workings have been identified as a source of AMD.[92]
- One CERCLA site not in the sample, **Barite Hill/Nevada Goldfields** (EPA ID SCN000407714) was proposed for the NPL in 2008. The mine operated from 1989 to 1994. The operator, Nevada Goldfields, Inc., filed for bankruptcy in 1999 and abandoned the site.[93] The mining pits and ponds, and waste rock piles released arsenic, cadmium,

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[89] U.S. Environmental Protection Agency, *Technical Report: Acid Mine Drainage Prediction* (Washington, DC: U.S. Government Printing Office, 1994), p. 2.

[90] U.S. EPA Region 8, Captain Jack Superfund Site Record of Decision (Washington, DC: U.S. Government Printing Office, 2008)

[91] U.S. Department of Health and Human Services, U.S. Public Health Service Agency for Toxic Substances and Disease Registry, Division of Health Assessment and Consultation. Public Health Assessment: Summitville Mine, Del Norte, Rio Grande County, Colorado (Washington, DC: U.S. Government Printing Office, 1997)

[92] U.S. Environmental Protection Agency Region 10, Office of Environmental Cleanup, Blackbird Mine Superfund Site Record of Decision (Washington, DC: U.S. Government Printing Office, 2003)

[93] "NPL Site Barite Hill/Nevada Goldfields, McCormick, South Carolina," U.S. Environmental Protection Agency. Accessed October 8, 2015: https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0407714

chromium, copper, lead, mercury, nickel, selenium, silver, zinc, and cyanide into the surrounding surface water and soil. The site has also experienced AMD.

Currently Operating Facilities

Documents confirmed that at least 51 facilities conducted surface mining, underground mining, or both, out of the sample of 70 currently operating facilities. Twenty-seven of the 51 facilities exclusively practiced surface mining, 20 exclusively practiced underground mining, and 4 practiced both mining methods. Of those 51 facilities, available documents and databases identified surface and underground mining as the source of contamination at three facilities

- **Kinross Crown Resources Buckhorn** (MSHA ID 4503615) is an underground gold mine located in north-central Washington state. The facility has been active since 2008. In 2008 and 2009, the mine committed 46 violations for discharging water containing sulfates and total dissolved solids in excess of permitted concentrations. The mine has discharged the contaminants into the groundwater, surface water, and springs and seeps. Causes of the discharges included the failure of the wastewater treatment system, seepage of mine water from the underground mine, and acid drainage from mine operation areas, including the underground workings. In 2012, the Washington Department of Ecology levied a $395,000 civil penalty against Crown, which was resolved through a 2013 Settlement Agreement. Water quality violations from the mine have continued in 2014 and 2015.[94]
- **Smoky Canyon Don** (MSHA ID 1001590) is an open pit phosphate mine located near Soda Springs, Idaho. Simplot has operated the facility since 1983. Selenium poisoning of local cattle created concern about Smoky Canyon and other nearby phosphate mines in the 1990s. In 2006, the USFS ordered a Non-Time Critical Removal Action to address the release of selenium and other constituent materials from Smoky Canyon Don. The selenium originated in overburden disposal areas, where operators deposit soil and other material that overlays ore deposits. The overburden disposal areas released selenium into both nearby Pole Canyon Creek and groundwater. The USFS and Simplot reached a Settlement Agreement/Consent Order to determine the nature and extent of the contamination, and a 2012 Engineering Evaluation/Cost Analysis to address additional potential pathways of contamination.[95]

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[94] Ann Maest, "Analysis of Water Quality Impacts at the Buckhorn Mountain Mine and Recommendations for Improvement: Final Report," prepared by Stratus Consulting, Inc., for the Okanogan Highlands Alliance (November 4, 2010). Accessed 16 September 2016 at: http://s3.amazonaws.com/zanran_storage/okanoganhighlands.org/ContentPages/2478359423.pdf; and Accountability for Buckhown Water Quality Deterioration: Violations Mount," Okanogan Highlands Alliance. Accessed 16 September 2016 at: http://www.okanoganhighlands.org/minemonitoring/mine-seepage.

[95] Formation Environmental for J.R. Simplot Company. *Final: Smoky Canyon Mine Remedial Investigation/Feasibility Study – Remedial Investigation Report.* September 2014.

B. Non-Entry (Solution) Mining and Ion Exchange Processing

Introduction

Non-entry (in situ) mining methods recover materials of interest with little to no physical extraction of rock, obtaining elements dissolved in liquid solutions. In the United States, the most common of these methods are ISL, in which aqueous solutions (lixiviants) are injected into wells to help dissolve minerals of interest, and brine extraction, in which underground sources of water with naturally dissolved elements of economic interest (brine) are pumped to and processed at the surface. These methods of extraction and processing, primarily associated with uranium recovery, generate less waste material and cause fewer surface disturbances than surface or underground mining techniques.[96, 97] However, there are still significant environmental risks associated with mining methods such as ISL, particularly to local groundwater.[98]

Non-entry mining can release hazardous contaminants into the environment. The primary threats are releases to adjacent groundwater and to surface soils and water from spills. At the federal level, the Underground Injection Control (UIC) program under the Safe Drinking Water Act (SDWA) manages activities that may pose a risk to groundwater resources. For uranium mining, the EPA and the Nuclear Regulatory Commission (NRC) have also promulgated a variety of technical standards for uranium facilities that address health, safety, and environmental issues under the Atomic Energy Act of 1954 and the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA).

In part because of the relatively recent expansion in use of this extraction method, limited evidence from non-operating Superfund sites was available to illustrate these practices or associated releases. Other publicly available sources, however, have documented releases related to ISL and its attending processing practices at currently operating uranium facilities. This is of significant concern, given the inherent risks associated with underground injection of lixiviants and the severity of potential risks that may stem from uranium recovery practices.

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[96] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[97] B. Dershowitz, "Discrete fracture network modeling in support of in situ leach mining," *Mining Engineer Magazine* (November 2011). Accessed October 2, 2015, at: http://www.golder.com/eu/en/modules.php?name=Publication&sp_id=241&page_id=212&service_id=50

[98] A recent proposed rulemaking under UMTRCA focused on the potential environmental and health risks posed by ISL uranium mining. See U.S. Environmental Protection Agency, Office of Radiation and Indoor Air, *Draft Report: Economic Analysis: Proposed Revisions to the Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings Rule (0 CFR Part 192)* (November 2014).

Past and Current Use

In the United States, non-entry mining operations recover uranium, copper, potash, magnesium, and lithium.[99] For uranium operations, this technique is also referred to as "in situ recovery." The most common applications are ISL operations to extract uranium in Texas, Wyoming, and Nebraska and copper in Arizona.[100] ISL operations in Texas and Wyoming have extracted water-soluble salts and uranium since the 1960s.[101] In the 1980s, ISL became increasingly prevalent for recovering uranium. Conventional surface and underground uranium mines and the mills that processed the extracted ore were phased out; only one conventional mill processing ore from two mines remains in the United States.[102] Processing practices associated with uranium – such as ion exchange, resin stripping, precipitation, and drying – now take place almost exclusively at or in association with ISL facilities.[103]

Brine extraction has been used to recover lithium in Nevada and zinc in California, while the Frasch process (which uses hot, high-pressure water) recovers sulfur in Texas and Louisiana. Bore-hole mining, which uses water jets to break rocks into slurry that is pumped to the surface, has also recovered phosphate in Florida and uranium in Wyoming.[104]

Non-entry methods for other minerals have been more difficult to implement, as only certain types of deposits are amenable to these methods.[105] ISL requires highly permeable sandstones, such as those containing uranium, while other non-entry methods leverage naturally existing deposits of minerals dissolved in groundwater. Copper ISL operations primarily recover minerals

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[99] J. Kyle, D. Maxwell, and B. Alexander, "Chapter 11.5: In-Situ Techniques of Solution Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[100] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[101] T. Albanese and J. McGagh, "Chapter 1.3: Mining: Future Trends in Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1.

[102] "Uranium Mining Overview," World Nuclear Association, updated June 2015. Accessed January 21, 2016, at: http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/uranium-mining-overview/.

[103] "Uranium Mining Overview," World Nuclear Association, updated June 2015. Accessed January 21, 2016, at: http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/uranium-mining-overview/.

[104] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[105] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

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where prior mining has created sufficient permeability for leaching solutions to contact ore minerals, although these operations experience lower recovery rates.[106]

Technical Description

Non-entry (in situ) mining recovers materials of interest with little to no physical extraction of rock, recovering elements dissolved in solutions. Because it eliminates the need to remove and manage extraction wastes, non-entry mining is typically more economical than conventional excavation techniques, and is particularly feasible for low-grade deposits.[107]

ISL dissolves metals and other minerals from rocks by first injecting chemical lixiviants through a drilled well.[108] Minerals of interest react with the solution and are mobilized from the rock into the solution, referred to as a pregnant solution. The pregnant solution is then extracted from a recovery well. After the minerals of interest have been removed from the solution, the lixiviant may be reused. The parent material containing the ore and the geochemical behavior of the commodity itself determine the type of lixiviant used. Alkaline lixiviants (generally sodium carbonate and sodium bicarbonate) are predominant in North America. Compared to acidic lixiviants (such as sulfuric acid) that are more powerful dissolving agents, alkaline lixiviants create less environmental impact.[109]

Brine extraction is a related technique to ISL that injects water only, or pumps to the surface brines containing naturally dissolved materials.[110] For example, heated water is used to recover magnesium.[111] For aqueous deposits containing naturally dissolved materials, the brine solution is pumped to the surface and evaporated. The Frasch process (used to recover native sulfur) and

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[106] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[107] J. Kyle, D. Maxwell, and B. Alexander, "Chapter 11.5: In-Situ Techniques of Solution Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[108] A lixiviant is a liquid medium used in hydrometallurgy to selectively extract the desired metal from the ore or mineral. It assists in rapid and complete leaching. The metal can be recovered from it in a concentrated form after leaching. See American Institute of Mining Engineers, *Transactions of the American Institute of Mining Engineers* 49 (Princeton: Princeton University, 1917), p. 617.

[109] J. Kyle, D. Maxwell, and B. Alexander, "Chapter 11.5: In-Situ Techniques of Solution Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[110] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[111] "In Situ Recovery Facilities," U.S. Nuclear Regulatory Commission, last updated March 31, 2015 .Accessed from: http://www.nrc.gov/materials/uranium-recovery/extraction-methods/isl-recovery-facilities.html.

bore-hole mining also use water to dissolve, melt, or break apart rock, and then pump the solution or mixture to the surface.[112]

ISL extraction is particularly amenable to previously mined ore bodies, which allow for increased contact with rock, although new technologies in non-entry mining also use fracturing or drilling to enhance contact with ore.[113] For example, the most successful practice for copper ISL generally takes place in previously mined ore bodies, which allows lixiviants to contact rubble of lower grade wall rock.[114] Through injection wells, lixiviant solution floods underground mine caverns and extracts ore left in the walls of mining operations. The saturated brine is pumped out through extraction wells. The solution from ISL or brine extraction is pumped aboveground through separate recovery wells and is processed in surface treatment facilities using ion exchange columns, precipitation reactions, or solvent extraction.[115]

In Situ Leaching and Ion Exchange Processing of Uranium

Ion exchange represents the most common method of follow-on processing after recovery of uranium-bearing solution. For uranium, a lixiviant composed of a native groundwater from the host aquifer, a complexing reagent to leach the uranium, and an oxidant is injected into a well. The leach liquor oxidizes and dissolves the uranium, creating a pregnant solution.[116] Extraction wells pump the solution to the treatment plant, where it passes through ion exchange resins, binding the constituent uranium compounds to the resins in the form of a uranyl carbonate.[117] Additional oxidant and reagent are added to the barren leach solution, which is recycled to the

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[112] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[113] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[114] J. Kyle, D. Maxwell, and B. Alexander, "Chapter 11.5: In-Situ Techniques of Solution Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[115] J. Kyle, D. Maxwell, and B. Alexander, "Chapter 11.5: In-Situ Techniques of Solution Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[116] "In Situ Leach (ISL) Mining of Uranium," World Nuclear Association, updated July 2014. Accessed January 21, 2016, at http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/in-situ-leach-mining-of-uranium/.

[117] It is also possible to capture the uranium compounds through a liquid ion exchange, or solvent extraction system. In the United States, however, "[ion exchange] is used in the vast majority of ISL operations" and "ion exchange operations [are] used by most if not all in situ operations." See "In Situ Leach (ISL) Mining of Uranium," World Nuclear Association, updated July 2014. Accessed January 21, 2016, at http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/in-situ-leach-mining-of-uranium/; and "Identification and Description of Mineral Processing Sectors and Waste Streams: Uranium," U.S. Environmental Protection Agency, last updated November 15, 2012. Accessed January 11, 2016, at https://archive.epa.gov/epawaste/nonhaz/industrial/special/web/pdf/part1.pdf.

leach circuit.[118] A concentrated chloride salt solution then strips the uranium compound from the resins.[119] Hydrochloric acid is applied to remove the carbonate from the uranium, at which point hydrogen peroxide precipitates the uranium out of the salt solution.[120] The uranium crystals are then filtered, dried, and roasted to create uranium oxide concentrate, or "yellowcake," a product containing about 80-85% uranium by mass.[121] The resultant yellowcake is shipped to a separate facility for conversion to nuclear reactor fuel.[122]

Usually, a uranium ISL facility encompasses the uranium source, injection wells, an ion exchange circuit, the precipitation circuit, and the roasting circuit. It is possible, however, for some processing stages to occur at a remote uranium source. The ISL leach liquor can be pumped to a central processing facility where it undergoes ion exchange, sometimes alongside leach liquor from conventional ore that has undergone heap leaching.[123] Alternatively, a remote facility may include an ion exchange circuit and ship the loaded resins to a central precipitation and roasting facility.[124]

Potential Sources of Hazardous Substances

Because non-entry mining does not physically remove rock, this method of extraction generates less solid waste material and causes fewer surface disturbances than surface or underground mining techniques.[125,126] Non-entry mining therefore presents a lower risk of harms associated

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[118] "In Situ Leach (ISL) Mining of Uranium," World Nuclear Association, updated July 2014. Accessed January 21, 2016, at http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/in-situ-leach-mining-of-uranium/.

[119] "Identification and Description of Mineral Processing Sectors and Waste Streams: Uranium," U.S. Environmental Protection Agency, last updated November 15, 2012. Accessed January 11, 2016, at https://archive.epa.gov/epawaste/nonhaz/industrial/special/web/pdf/part1.pdf.

[120] "Identification and Description of Mineral Processing Sectors and Waste Streams: Uranium," U.S. Environmental Protection Agency, last updated November 15, 2012. Accessed January 11, 2016, at https://archive.epa.gov/epawaste/nonhaz/industrial/special/web/pdf/part1.pdf.

[121] "Uranium Mining Overview," World Nuclear Association, updated June 2015. Accessed January 21, 2016, at http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/uranium-mining-overview/.

[122] Note that ion exchange is also used to extract uranium in phosphate processing; uranium and phosphate rock often occur together, and ion exchange can remove radioactive elements from phosphate to be sent for fertilizer processing. See International Atomic Energy Agency, *The Recovery of Uranium from Phosphoric Acid* (Conference Held at Vienna, Austria, March 16-19, 1987).

[123] "Uranium Mining Overview," World Nuclear Association, updated June 2015. Accessed January 21, 2016, at http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/uranium-mining-overview/.

[124] "In Situ Leach (ISL) Mining of Uranium," World Nuclear Association, updated July 2014. Accessed January 21, 2016, at http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/in-situ-leach-mining-of-uranium/.

[125] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[126] B. Dershowitz, "Discrete fracture network modeling in support of in situ leach mining," *Mining Engineer Magazine* (November 2011).

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with solid waste or surface disturbances. ISL methods, however, may cause groundwater contamination from chemical lixiviants, or from dissolved metals or co-occurring elements such as thorium, radium, radon, arsenic, vanadium, zinc, selenium, and molybdenum.[127] The type of reagent can increase the potential risk of contamination. For example, ISL using acidic reagents changes the pH of groundwater and dissolves other minerals and metals in addition to the target uranium. In contrast, the alkaline bicarbonate reagents used in the United States selectively dissolve uranium, with much lower risk of contamination.[128] As of 2009, no remediation of an ISL operation in the United States for which data are available had successfully returned the aquifer to baseline conditions. More than half of those ISL operations experienced uranium and selenium levels above the baseline even after groundwater restoration efforts.[129]

Some of the impacts associated with non-entry mining can be avoided with proper engineering and management before the commencement of mining activities.[130] Monitoring and maintenance limit the release of lixiviants and mobilized metals from ISL operations. Practices to limit the environmental impact of ISL include baseline environmental data collection, pilot operations with test liquids, and installation of monitoring wells.[131,132] This includes the proper engineering of well and surface infrastructure, analysis of background groundwater chemistry, and analysis and testing of aquifer hydrology and geology using pump tests. In addition, monitoring wells are installed farther down gradient from the well cluster to monitor groundwater and ensure that lixiviant is not escaping the mining area.

Ensuring a net inflow of clean water into the capture zone can also prevent injection solution from escaping due to pressure gradient differences.[133] After ISL and related processing operations, reclamation entails the removal of all radiological hazards (for uranium extraction operations), capping and covering of drill holes, and restoration of groundwater to pre-ISL

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[127] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[128] J. Kyle, D. Maxwell, and B. Alexander, "Chapter 11.5: In-Situ Techniques of Solution Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[129] Susan Hall, "Groundwater Restoration at Uranium In-Situ Recovery Mines, South Texas Coastal Plain," Open-File Report 2009-1143, *U.S. Geological Survey* (Talk presented in Keystone, CO, on 11 May 2009).

[130] Gavin Mudd, *An Environmental Critique of In Situ Leach Mining: The Case Against Uranium Solution Mining* (Melbourne: Australian Conservation Fund, 1998). Accessed October 2, 2015, at: http://www.sea-us.org.au/pdfs/isl/no2isl.pdf

[131] U.S. Nuclear Regulatory Commission, *Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities* (Washington, DC: U.S. Government Printing Office, 2009). Accessed 2 October 2015 at: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/v1/intro-ch1.pdf.

[132] B. Dershowitz, "Discrete fracture network modeling in support of in situ leach mining," *Mining Engineer Magazine* (November 2011).

[133] B. Dershowitz, "Discrete fracture network modeling in support of in situ leach mining," *Mining Engineer Magazine* (November 2011).

conditions.[134,135] Depending on geologic and hydrologic conditions, however, metals and leach solution may seep into surrounding aquifers post-closure.[136]

Non-entry mining that does not use chemical lixiviants may cause leakage of water, but this can often be safely discharged into nearby surface water. Drilled wells from any of these methods, however, may cause the surface lands to sink or shift (subsidence).[137,138]

Groundwater restoration techniques include direct cleaning or "self-cleaning."[139] Direct cleaning, which is the most common method in the United States, uses reverse osmosis, washing and restoration with natural groundwater, or cleaning by precipitation. Self-cleaning uses natural attenuation, but this process may take place over tens to hundreds of years. It can be accelerated through increasing groundwater flow rates, or by introducing substances to encourage bacterial bio-remediation. Alternatively, a "groundwater sweep" restoration pumps water from the mined aquifer to a deeper aquifer, to surface evaporation ponds, or to the next aquifer subject to ISL.[140]

Even with the application of the above mitigation strategies, the majority of ISL mines experience higher levels of selenium and uranium in the groundwater after restoration than before mining started.[141]

Exhibit 1.B.1. provides more detail about the sources of potential releases from non-entry mining, as well as the management methods that may mitigate these risks.

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[134] B. Dershowitz, "Discrete fracture network modeling in support of in situ leach mining," *Mining Engineer Magazine* (November 2011).

[135] U.S. Nuclear Regulatory Commission, *Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities* (Washington, DC: U.S. Government Printing Office, 2009).

[136] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[137] J.T. Laman, "Chapter 10. Solution Mining and In-Situ Leaching," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997).

[138] Land subsidence is a geological phenomenon that occurs when large amounts of groundwater are withdrawn from rock formations, causing rocks to fall cave or fall in. Source: "Land Subsidence," U.S. Geological Survey, updated August 20, 2015. Accessed October 2, 2015, at: http://water.usgs.gov/ogw/subsidence.html

[139] J. Kyle, D. Maxwell, and B. Alexander, "Chapter 11.5: In-Situ Techniques of Solution Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[140] Susan Hall, "Groundwater Restoration at Uranium In-Situ Recovery Mines, South Texas Coastal Plain," Open-File Report 2009-1143, *U.S. Geological Survey* (Talk presented in Keystone, CO, on 11 May 2009).

[141] Susan Hall, "Groundwater Restoration at Uranium In-Situ Recovery Mines, South Texas Coastal Plain," Open-File Report 2009-1143, *U.S. Geological Survey* (Talk presented in Keystone, CO, on 11 May 2009).

Exhibit 1.B.1. Potential Releases Associated with ISL and Ancillary Processes[142,143,144]

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Lixiviant contamination of surrounding groundwater(horizontal excursion)	The primary concern associated with ISL is contamination of surrounding groundwater (excursions). Excursions can occur due to poor design of the wellfield (pattern of injection, recovery, and monitoring wells). The wellfield needs to be carefully designed to follow the flow of groundwater. Unpredicted aspects of aquifer geology (e.g., fractures in the parent material) can also lead to poor wellfield design and excursions. Depending on the parent material, gypsum, calcite, or other minerals can form precipitates in the lixiviant eventually plugging the aquifer, wells, or pumps. In addition, some lixiviants can lead to increased microbial growth (by introducing previously limiting elements), which can also clog rock pores and impact pressure. Failure of an injection or recovery well as well as pore clogging can alter the pressure gradient in the underground aquifer being mined, leading to excursions. Leaks caused by the lixiviant are most commonly associated with acidic lixiviants, which can corrode well infrastructure. Mechanical failure can occur if exploratory or other wells not in use in the mining operation are present and not properly plugged or if pipe joints have separated or casings have ruptured. These types of excursions are especially difficult to detect and remedy.	Pump tests are usually conducted before mining commences to ensure proper understanding of the groundwater hydrology and aquifer chemistry and geology. If these tests are conducted with realistic pumping pressures and conditions they can allow for the analysis of potential problems. The use of alkaline lixiviants in the United States also decreases the likelihood of gypsum, calcite and other mineral formations. EPA guidelines for Class III wells mandate that more liquid be removed from the recovery well than was input in injection wells (typically 0.5 percent to 5 percent more) in order to minimize the possibility of excursion. Monitoring wells allow for quick detection of any excursions so that they can be cleaned up. The plugging of wells is essential. Well shafts are typically encased (e.g., Polyvinyl chloride [PVC] pipe) to avoid leakage and vertical flow.
Surface spills of lixiviant	Flash floods can lead to failures during such extreme weather events if surface equipment is not properly engineered. Surface spills can also occur during processing or during "wash downs" of processing plant equipment.	Proper engineering of surface equipment is necessary to account for any potential extreme weather events. In addition, to prevent surface exposure at processing facilities, most are designed with curbed concrete floors and drainage systems. The drainage systems are designed to collect any spilled fluids and transfer them to surface retention ponds.
Leaks from storage/disposal of mining fluids in evaporation ponds	As lixiviant becomes degraded with continued cycling through the mine, fresh lixiviant needs to be introduced. Spent mining solutions are temporarily stored in surface retention ponds before final disposal (e.g., processing and re-injection underground for fluids or disposal at an NRC-licensed site for solids, for uranium recovery). During this time there is a	Alkaline lixiviant is the only type currently used in the US and typically produces lower levels of impurities in mined fluids. This enhances recycling of lixiviant and decreases the amount of wastewater that needs to be stored and managed above ground.

[142] "Environmental Impacts of Different Uranium Mining Processes," Alberta Environment, last updated 2008. Accessed October 2, 2015, at: https://extranet.gov.ab.ca/env/infocentre/info/library/8178.pdf

[143] Gavin Mudd, *An Environmental Critique of In Situ Leach Mining: The Case Against Uranium Solution Mining* (Melbourne: Australian Conservation Fund, 1998).

[144] U.S. Nuclear Regulatory Commission, *Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities* (Washington, DC: U.S. Government Printing Office, 2009).

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
	risk of leakage at these surface ponds. Surface ponds can also be breached during flash floods or other storm events.	Proper pond lining can limit the chance of leaks. This design could include two separate layers of chemically unreactive plastic (e.g., high density polyethylene) with sand or another porous material between them. Placing a layer of clay underneath that liner would further protect against leaching should a leak occur. Retention ponds must also have leak detection systems.
Release of radon and other radioactive elements from leaching fluids	Radon is a known carcinogen and can be released during both the construction of ISL wellfields as well as during ion exchange and related processing. In addition, substantial quantities of radon can be released from spent mining fluids being temporarily stored in surface retention ponds.	Because of the short half-life of radon (3.8 days) in the environment no active management typically occurs for this type of pollution. Rather, dilution and degradation in the atmosphere is typically sufficient. Limited air monitoring is normally conducted.
Release of radioactive materials in dust	Particulates can accumulate around ion exchange facilities. These can include uranium dust or salts that can precipitate out of the lixiviant. These are then introduced into the environment through ventilation of the processing facility.	Processing typically contains dust collection systems that capture these particulates and in most cases collects 99% of contaminants.
Reclamation of mining fluids	After an ore body has been fully mined groundwater must be restored to pre-mining quality. As such, groundwater in the mined area is chemically treated to remove excess contaminants above background levels. This is done in a four step process: removal of contaminated water by ceasing injection and continuing removal, pre-treatment via reverse osmosis, chemical treatment to precipitate and immobilize contaminants, and re-introduction of the treated water. Undocumented background levels and insufficient treatment can lead to groundwater contamination. Most ISL mining zones are situated between two low permeability clay deposits. Clay has a high surface area and the unique ability to store large amounts of cations. As such, potentially harmful chemicals from the lixiviant can attach to clay particles and persist there (potentially beyond remediation activities) until the groundwater chemistry favors their eventual release.	A substantial suite of background data should be collected before the commencement of mining activities. These data should include measurements of sulfates, pH, total salinity, uranium, radium, arsenic, molybdenum, and selenium. Proper chemical treatment of mining fluids requires a strong understanding of the unique chemistry and geology of each ISL site.
Transport and disposal of solid radioactive wastes	The processing of lixiviant from ion exchange and subsequent circuits produces solid radioactive wastes, such as spent resin and tank sediments. These wastes are typically stored in surface retention ponds until they, along with residual pond sludge, need to be transferred to NRC-licensed disposal facilities once the mine is decommissioned.	Proper transport and disposal of solid waste according to existing regulations should avoid these impacts.

State and Federal Regulations

Both federal and state regulatory programs manage non-entry mining.

The UIC program under the federal SDWA and delegated state programs regulate the construction, operation, permitting, and closure of injection and extraction wells in order to protect underground sources of drinking water.[145] Additionally, EPA's New Source Performance Standards (NSPS) prohibit mines and mills using ISL methods from discharging process wastewater, unless annual precipitation exceeds annual evaporation.[146] ELGs under the CWA also specify requirements for pH, total suspended solids, chemical oxygen demand, and specific contaminants.[147] For non-entry mining facilities that discharge to surface waters, these requirements are incorporated into permits.

For uranium ISL facilities, the predominant commodity extracted using non-entry mining, the EPA and the U.S. Department of Energy (DOE) have also promulgated a variety of technical standards for uranium facilities that address health, safety, and environmental issues under the Atomic Energy Act of 1954 and UMTRCA of 1978. The standards include the removal of contaminated equipment and material, cleaning up evaporation ponds, plugging wells, backfilling and recontouring disturbed areas, revegetation, and site radiation surveys. Waste products from processing are regulated by the NRC and must be disposed of in a licensed disposal facility.[148]

While UMTRCA has historically regulated only traditional uranium mill processes, EPA promulgated a proposed rule establishing ground water restoration and monitoring requirements at ISL facilities under UMCTRA. These requirements, which would be implemented by the NRC, include preliminary characterization of aquifer geochemistry and groundwater conditions, corrective action in the case of contamination, wellfield restoration, and post-operational monitoring for groundwater quality. These baseline and restoration tests would address 13 of the most important chemicals affecting groundwater pollution: arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, nitrate (as nitrogen), molybdenum, radium, total uranium and gross alpha particle activity.[149]

The Office of Surface Mining, the U.S. Department of the Interior, and individual states regulate conventional surface or underground uranium ore extraction. On the other hand, the NRC regulates

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[145] "Underground Injection Control," U.S. Environmental Protection Agency, Under Ground Injection Control Program, last Updated November 2013. Accessed October 2, 2015, at: http://water.epa.gov/type/groundwater/uic/index.cfm.

[146] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Resource Document: Extraction and Beneficiation of Ores and Minerals* EPA 530-r-94-013, Volume 5: Uranium (Washington, DC: U.S. Government Printing Office, 1994).

[147] 40 CFR 440 (CWA effluent limitation guidelines: ore mining and dressing point source category).

[148] J. Kyle, D. Maxwell, and B. Alexander, "Chapter 11.5: In-Situ Techniques of Solution Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[149] 80 FR 4156. Vol. 80, No. 16, 4156. January 26, 2015. *Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings; Proposed rule.* Accessed 28 June 2016 at: https://www.regulations.gov/document?D=EPAHQ-OAR-2012-0788-0001

uranium processing and concentration. ISL uranium facilities, even standalone ISL facilities that transport recovery fluid to a separate plant for further processing, fall under the purview of the NRC.[150] The NRC requires the restoration of aquifer quality to the use class prior to mining operations. NRC and delegated "agreement states" issue licenses for uranium in situ solution mining and conduct environmental reviews of the construction, operation, and decommissioning of uranium ISL facilities.[151]

State Regulations

In Texas, after ISL operations are completed, all radiological hazards must be removed and groundwater must be restored to pre-operational conditions under Title 30 Section 331.107(b). The Texas Commission for Environmental Quality (TCEQ) regulates underground injection wells through the Underground Injection Well Permit Program, under Chapter 27 of the Texas Water Code. 30 TAC 331.104 requires that a restoration table in the UIC permit that establishes levels for key constituents, meeting the pre-existing conditions for groundwater of the mining zone.

In situ uranium operations in Texas are required to obtain a radioactive material license, which TCEQ issues. The Texas Railroad Commission regulates the exploration phase of ISL uranium mining through a permit program. Wyoming, South Dakota, and New Mexico also regulate uranium ISL operations under state-specific mining programs, which require reclamation and bonding.[152] In Arizona, copper ISL facilities must also obtain an Aquifer Protection Permit (APP), use best demonstrated control technology, and maintain state aquifer water quality standards.

Non-Operating Sites and Currently Operating Facilities

Most non-entry mining sites in the United States are uranium production and processing facilities, and ISL for uranium is a relatively new extraction method. Thus, scant documentation about non-operating ISL sites exists. In more recent years, the use of ISL and related processing methods has expanded such that only one conventional uranium mine and associated mill operation remains in the United States. Releases related to ISL have increased concomitant to that expansion, as reflected in the sample.

Non-Operating Sites

ISL is a relatively new mining method. As such, none of the reviewed documents recorded any releases associated directly with ISL or non-entry mining. However, alkaline leach and ion exchange,

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[150] "Uranium Recovery: What We Regulate," U.S. Nuclear Regulatory Commission, updated February 10, 2015. Accessed January 21, 2016, at http://www.nrc.gov/materials/uranium-recovery.html.

[151] U.S. Nuclear Regulatory Commission, *Generic Environmental Impact Statement for In Situ Leach Uranium Milling Facilities* (Washington, DC: U.S. Government Printing Office, 2013). Accessed October 2, 2015, at: http://www.nrc.gov/materials/uranium-recovery/geis.html.

[152] U.S. Nuclear Regulatory Commission, *Generic Environmental Impact Statement for In Situ Leach Uranium Milling Facilities* (Washington, DC: U.S. Government Printing Office, 2013).

the processing method for ISL solution, have been used to process uranium for much longer. Documents confirmed that three of the 29 non-operating mining and processing CERCLA sites sampled for this review extracted metals or minerals through alkaline leach and ion exchange.[153] Tailings ponds failure and the attendant discharge of tailings liquid and other process wastewaters contributed to releases at two of the sites.

- The **Homestake Mining Co.** site (EPA ID NMD007860935) was a uranium mill near Milan, New Mexico, from 1958 to 1990. From the start of activity, the mill operated an alkaline leach-caustic precipitation process to produce yellowcake. Material for the mill originated at five underground uranium mines and a satellite ion exchange facility in Ambrosia Lake, New Mexico. Operators disposed of waste from milling in two on-site tailings ponds. In 1983, EPA placed the site on the National Priorities List due to elevated selenium and uranium concentrations in the local aquifer and nearby groundwater wells. Homestake, the operator of the mill, installed a groundwater injection system to clean the aquifer, but the contamination plume ultimately traveled off-site. Remediation, monitoring, and maintenance continued for at least twenty years after mill closure.[154]
- The **United Nuclear Corporation** (EPA ID NMD30443303) operated a uranium mine mill near Church Rock, New Mexico. The underground mine was active from 1967 to 1982, the mill was active from 1977 to 1982. The site included a leaching circuit and an ion exchange plant. United Nuclear disposed of processing waste in tailings disposal cells. In 1979, the dam for the South tailings disposal cell breached and released 93 million gallons of liquid into the Rio Puerco, contaminating the local aquifer and releasing uranium and radium into local surface water and soils.[155]

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[153] Cyprus Tohono Mine (EPA ID AZD094524097), Homestake Mining Co. (NMD007860935), and United Nuclear Corp. (NMD030443303).

[154] U.S. Environmental Protection Agency, Region 6, *Record of Decision: Homestake Mining Company Radon Operable Unit, Cibola County, New Mexico* (Washington, DC: U.S. Government Printing Office, 1989); "Homestake Mining Co. Superfund Site Description," U.S. Environmental Protection Agency, from September 8, 1993, Federal Register Notice. Accessed January 13, 2012, https://nepis.epa.gov/Exe/ZyNET.exe/20013X6J. TXT?ZyActionD=ZyDocument&Client=EPA&Index=1986+Thru+1990&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C86thru90%5CTxt%5C00000015%5C20013X6J.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL. and Center For Disease Control, Agency for Toxic Substances and Disease Registry, Health Consultation: Homestake Mining Company Mill Site, Milan, Cibola County, New Mexico (Washington, DC: U.S. Government Printing Office, 2009).

[155] U.S. Environmental Protection Agency, "Action Memorandum: Request for a Non-Time-Critical Removal Action at the Northeast Church Rock Mine Site, McKinley County, New Mexico, Pinedale Chapter of the Navajo Nation," sent September 29, 2011; and U.S. Environmental Protection Agency, Region 6, *Five-Year Review Report: Second Five-Year Review Report for the United Nuclear Corporation Ground Water Operable Unit* (Washington, DC: U.S. Government Printing Office, 2003).

Currently Operating Facilities

Documents confirmed that three of the 70 currently operating facilities reviewed use ISL extraction and/or related processing practices,[156] and three facilities use brine extraction.[157] Of those six, two uranium ISL facilities experienced releases due to ISL practices and related operations.[158]

- **Uranium One Willow Creek** (no MSHA ID) encompasses two distinct sites: the Irigaray processing plant located in Johnson County, Wyoming, and the Christensen Ranch satellite operation, located in Campbell County, Wyoming. Uranium One is the site's owner and operator. Initial activity at the site began at the Irigaray site in 1978; operations from the currently active wells and processing facilities began in 2010. Both sites are in situ uranium recovery mines with ion exchange plants and precipitation circuit. The yellowcake drying/packing circuit is located at Irigaray.

  Since the start of the most recent round of production and processing, the Nuclear Regulatory Commission has filed event reports on at least 34 spills, leaks, or other releases, originating from injection fluid, recovery fluid, production fluid, evaporation ponds, and disposal wells. For example, on August 19, 2011, 7,000 to 10,000 gallons of sodium chloride brine overflowed a tank and spilled. On January 2, 2014, 77,000 gallons of production fluid containing from 11.9 ppm uranium to 13.6 ppm uranium spilled due to a frozen, burst pipe. On August 14, 2015, 492 gallons of in situ recovery fluid containing 11.2 ppm uranium spilled. In addition to those liquid releases, on September 9, 2014, two sampling operators at the Honeywell Uranium Refinery in Illinois opened a barrel of yellow cake shipped from the Willow Creek facility. Willow Creek had not allowed the yellowcake sufficient time to dry, leaving decomposing uranyl peroxide hydrates that pressurized the barrel. Upon opening, the barrel ejected yellowcake in a three foot radius.[159]

- Production at the **Lost Creek** ISL mine (no MSHA ID) in Sweetwater County, Wyoming, operated by Ur-Energy, began in 2013, although limited mineral exploration and activity had taken place at the site dating back to the 1960s. Currently, the facility extracts uranium through six contiguous in situ recovery projects. The recovery fluid is then piped to a processing plant,

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[156] Energy Fuels White Mesa (4201429), Uranium One Willow Creek (no MSHA ID), and Lost Creek (no MSHA ID).

[157] Rockwood Lithium (No MSHA ID), Florida Canyon Mine (MSHA ID 2601947), and Intrepid Potash East/West (No MSHA ID).

[158] A third facility outside of the currently operating sample, the Cogema Mining ISL facility in Bruni, Texas, may have experienced releases during decommissioning activities in 1997-1998, but publicly available documentation is limited regarding these incidents. See, for example, Texas Department of Health. Bureau of Radiation Control, "Radioactive Material Spill – Cogema Mining, Inc. – Bruni, Texas," *Summary of Incidents for Second Quarter 1999* (Dallas: U.S. Government Printing Office, 1999).

[159] "Site Summary: Willow Creek Uranium Recovery Project," Nuclear Regulatory Commission, updated July 15, 2015. Accessed January 21, 2016, at http://www.nrc.gov/info-finder/materials/uranium/licensed-facilities/christensen-ranch.html; and "Issues at Operating Uranium Mines and Milles – Wyoming, USA," World Information Service on Energy, updated September 2, 2015. Accessed September 11, 2015, at http://www.wise-uranium.org/umopuswy.html

where it undergoes ion exchange, resin stripping, precipitation, and filtering/drying/packaging. Since the resumption of operations in 2013, the Nuclear Regulatory Commission has filed event reports on at least 22 spills, leaks, or other releases of waste water, injection fluid, and production fluid. Further, in December 2013, the state of Wyoming ordered a halt of operation at Lost Creek because the facility failed to maintain the bleed in its injection/recovery ratios, making it possible for contaminated groundwater to escape the mine site.[160] The Nuclear Regulatory Commission issued three additional violations for exposing workers to yellow cake dust in November 2014.[161]

[160] A "bleed" refers to the need to extract more water than is injected into the aquifer, thus ensuring an inflow of groundwater to the mine site instead of an outflow from the mine site. See "In Situ Leach (ISL) Mining of Uranium," World Nuclear Association, updated July 2014. Accessed January 21, 2016, at http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/in-situ-leach-mining-of-uranium/.

[161] Douglass H. Graves and Steve E. Cutler, *Preliminary Economic Assessment of the Lost Creek Property, Sweetwater County, Wyoming* (Bozeman, MT: Prepared by TREC, Inc., for Ur-Energy, Inc., 2015); and "Issues at Operating Uranium Mines and Milles – Wyoming, USA," World Information Service on Energy, updated September 2, 2015. Accessed September 11, 2015, at http://www.wise-uranium.org/umopuswy.html

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C. Physical Processing and Gravity and Magnetic Separation

Introduction

Physical processing and gravity and magnetic separation techniques are used widely across the mining industry. Physical processing (or comminution) is a standard first step in many other mineral processing activities. It includes crushing and grinding procedures that reduce the size of ore fragments, either in preparation for market specifications about particle size (such as in the case of iron ore), or to allow further processing (as is the case for base and precious metals).[162] The primary environmental concerns associated with physical processing are the creation of fugitive dust and tailings, which can result in discharges to the environment. Subsequent processing, such as cyanidation, may be associated with process chemicals that can pose additional environmental concerns. Standard industry practice to control dust involves a combination of wetting agents, dust collection and filtration. Containment (typically within a concrete area) is required if process chemicals are employed. After physical processing, magnetic and gravity separation methods exploit differences in the physical properties of crushed particles to isolate minerals of interest. While few regulations specifically regulate physical processing or gravity and magnetic separation, potential environmental discharges from these processes are addressed by many larger regulatory frameworks across federal and state programs.

A review of a sample of non-operating sites and currently operating mining facilities did not indicate evidence of releases specifically related to gravity and magnetic separation. Rather, past waste management practices (e.g., open dumping) and streambed excavation methods contributed to releases. The physical process of grinding and crushing liberates substances previously bound in rock, however, which may be released to the environment in the air and in MIW.

Past and Current Use

Separation and liberation of ore from waste material have been a part of mining operations since the very beginning of the industry. Comminution (encompassing all crushing, milling, and grinding procedures) is used widely across hardrock commodity sectors in the United States, as most ore requires some level of physical processing, either in preparation for further processing or to meet product requirements. Physical processing techniques have experienced few fundamental changes in recent years. Significant improvements in throughput and efficiency have taken place, however. For example, computer models of grinding circuits have reduced waste and use of chemicals by tailoring grinding operations to specific ore characteristics.[163] In addition, currently used equipment has the

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[162] J. Mosher, "Chapter 14.2: Crushing, Milling, and Grinding," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[163] Earle A. Ripley, Robert E. Redmann, and Adèle A. Crowder, *Environmental Effects of Mining* (Delray Beach, Fla: St. Lucie Press, 1996).

ability to mill a broader range of material, while historic grinding mills processed fairly specific particle size ranges.

Gravity separation has historically played a role in recovering gold from placer deposits; currently operating gold operations still use it to recover gold that is not bound to other minerals. The heavy minerals industry (e.g., titanium, zirconium, and hafnium commodities) also uses it extensively for recovery of minerals such as ilmenite, rutile, leucoxene and zircon, as well as to separate coarse-grained metal sulfides.[164,165] Dense medium separation, in which particles sink or float in a liquid medium, also finds applications in iron-ore processing.[166]

Recent improvements in technology have increased the applications of magnetic separation, as the availability of much stronger magnetic fields allows use of this process on additional commodities. For years, magnetic separation was used mainly in the dry separation of minerals from beach sand deposits and to remove tramp iron that can damage equipment, but more recently it has also been used to treat fines at iron-ore operations and remove paramagnetic wolframite and hematite from tin ores.[167,168]

Technical Description

Physical processing prepares ore for further processing and is commonly the first step in beneficiation. Gravity and magnetic separation isolate valuable material from waste either for further processing, or more rarely, as a final product. Unlike many other types of processing that require intensive use of chemicals, gravity and magnetic processing usually involve minimal use of additives. However, process chemicals may be added during physical processing in preparation for other steps (e.g., leaching or flotation).

Physical Processing

Physical processing is the first step in the beneficiation process for most commodities, including those that require further magnetic or gravity separation. It usually involves a multi-step reduction process that entails multiple procedures, from the initial crushing of rock to the ultra-fine grinding required by certain industrial mineral processing applications. The initial steps are generally carried out by crushers, which reduce ore from the originally mined size to the point where grinding can be

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[164] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[165] N. Subasinghe, "Chapter 14.4: Gravity Concentration and Heavy Medium Separation," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[166] Barry A. Wills and Tim Napier-Munn, *Wills' Mineral Processing Technology, Seventh Edition: An Introduction to the Practical Aspects of Ore Treatment and Mineral Recovery*, Seventh Edition (Oxford: Butterworth-Heineman, 2006).

[167] P. Iyer, "Chapter 14.6: Magnetic and Electrostatic Separation," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[168] Barry A. Wills and Tim Napier-Munn, *Wills' Mineral Processing Technology, Seventh Edition: An Introduction to the Practical Aspects of Ore Treatment and Mineral Recovery*, Seventh Edition (Oxford: Butterworth-Heineman, 2006).

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undertaken, and screens or other sizing equipment. The crushing process is usually dry, and involves multiple iterations to get the particles to the desired size.[169]

Grinding is the next step, undertaken once the particles are small enough. It is usually carried out as a wet process, with the addition of water (and other process chemicals, such as those for subsequent flotation and leaching processing) to create a slurry.

Gravity Processing

After physical processing, gravity separation uses differences in density to separate heavy minerals and metals from lighter waste material (gangue). Gravity concentrators such as pulsating screens, shaking devices, or flowing film separators create particle movement, causing heavier particles to sink and lighter particles to rise closer to the surface. Gravity separation devices generally use water to create a slurry, and require feed material that is of uniform size. Other fluid media of varying densities, such as solution containing suspended metal particles, can be used to adjust the process to various ore types. These processes tend to be inexpensive to operate and rarely use harmful chemicals in slurry feeds, resulting in relatively less environmental damage than many other processing techniques.[170]

Magnetic Processing

Magnetic processing (either wet or dry) uses differences in magnetic strength to separate out particles. Magnetic pulleys, typically installed in the conveyor head, are commonly used devices.[171] High-intensity magnetic separators, like induced-roll magnetic separators and lift-type magnetic separators, separate materials of varying magnetism by deflecting them with high-intensity magnets. Some magnetic separators, such as the Jones separator, also work on wet feed streams.[172] While magnetic processing primarily separates iron ores, it can also be used for heavy mineral sands (e.g., zircon, ilmenite and rutile).

The electrostatic separation process relies on differences in electrical conductivity rather than magnetic strength. In this dry process, medium-sized particles fall through a high-voltage static field and are diverted by the natural conductivity of the material. This method has generally been used to recover valuable heavy minerals from beach-sand deposits.[173, 174]

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[169] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[170] N. Subasinghe, "Chapter 14.4: Gravity Concentration and Heavy Medium Separation," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[171] P. Venkatraman, F. Knoll, and J. Lawver, "Chapter 7: Magnetic and Electrostatic Separation," in *Principles of Mineral Processing*, eds. Maurice C. Furstenau and Kenneth N. Han (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2014).

[172] P. Iyer, "Chapter 14.6: Magnetic and Electrostatic Separation," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[173] P. Venkatraman, F. Knoll, and J. Lawver, "Chapter 7: Magnetic and Electrostatic Separation," in *Principles of Mineral Processing*, eds. Maurice C. Furstenau and Kenneth N. Han (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2014).

Potential Sources of Hazardous Substances

Physical processing and gravity and magnetic separation generally require few chemical additives and thus have a relatively small potential for adverse environmental impacts from process chemicals.[175] Dust from crushed and ground rock is a primary source of adverse effects during physical processing, posing concerns for human health as well as air and water quality.[176] Water application and enclosure minimize risks from dust created during physical processing, often in conjunction with exhaust ventilation systems that help capture and remove dust before it is expelled from exhaust fans.[177]

Additionally, tailings produced from physical processing and magnetic and gravity separation can contain trace elements and may present health and environmental concerns. Most stand-alone operations (e.g., those where no additional processing is performed) that use only physical processing and gravity and magnetic separation produce tailings that have few hazardous substances, and thus have a lessened potential for environmental harm.[178]Facilities may dispose of wastes from various processes in the same waste management units, however, with the resulting mixture containing more hazardous constituents than tailings from gravity or magnetic separation alone.[179]

The primary method of managing environmental discharges from tailings is to pump the mineral slurries to tailings ponds, where the solids settle to the bottom and consolidate, allowing the cleaned liquid above to be recycled to the plant or discharged. In cases where chemicals are added to the slurry to facilitate additional processing, or where wastes from other processes are co-mingled, tailings ponds may have to be lined with plastic liners or covered to prevent leaks or overflow.[180] Section 2.C. discusses tailings management in more detail.

Exhibit 1.C.1. describes these potential releases in more detail.

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[174] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[175] D. Van Zyl and J. Johnson, ed., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997).

[176] This is particularly important during the grinding process, since the size range of particles undergoing grinding is often in the respirable category. Any particles smaller than 60 micrometers can be suspended in the air and subsequently be inhaled or deposited in nearby ecosystems.

[177] Department of Health and Human Services, Center for Disease Control and Prevention, *Dust Control Handbook for Industrial Minerals Mining and Processing* (Washington, DC: U.S. Government Printing Office, 2012).

[178] D. Van Zyl and J. Johnson, ed., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997).

[179] U.S. Environmental Protection Agency, *Mineral Processing Facilities Placing Mixtures of Exempt and Non-Exempt Wastes in On-site Waste Management Units: Technical Background Document Supporting the Supplemental Proposed Rule Applying Phase IV Land Disposal Restrictions to Newly Identified Mineral Processing Wastes* (Washington, DC: U.S. Government Printing Office, 1995). Accessed October 30, 2015, at: https://archive.epa.gov/epawaste/nonhaz/industrial/special/web/pdf/mixtures.pdf.

[180] D. Dahlstrom, "Chapter 14.7: Dewatering Methods," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

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Exhibit 1.C.1. Potential Releases Associated with Physical, Gravity, and Magnetic Processing

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Fugitive dust	Comminution can release large quantities of dust and fine particles. Dust may also escape from uncovered tailings facilities. Coarse dust usually settles within a few hundred meters of the source. Smaller particle size fractions (PM10), however, can be carried by wind in dust clouds for great distances and may be deposited on or near populated areas. Because the dust may contain trace elements or other harmful substances (e.g. asbestos or silica), human health and environmental problems may arise through direct inhalation, soil and plant deposition, or accumulation within a water body.	The following practices help to manage fugitive dust from physical, gravity, and magnetic processing activities[181]: • Application of water through wet spray systems • Enclosure of the dust source • Exhaust ventilation • Maintenance of a slight negative pressure for enclosed grinding equipment, which ensures that any air leakage will flow into and not out of the equipment.
Tailings	During gravity separation and magnetic separation, the valuable product is separated from the waste material and the waste material is eliminated as tailings. In most cases, the tailings do not use chemical additives, but problems such as MIW with acidic properties or trace elements may arise. If these tailings are not disposed of correctly, runoff and seepage can contaminate groundwater and surface water. If facilities dispose of tailings in impoundments alongside wastes from other processes, the resulting mixtures may also contain higher concentrations of potentially harmful substances.	Proper construction of tailings ponds allows potential contaminants to settle out of water before it discharges. When chemicals are added to the slurry, leak detectors and linings must be employed to ensure that no harmful substances are discharged to the environment.[182, 183] As part of mine design targeted extraction techniques such as selective mining and avoidance could be used to minimize mining of ore resulting in tailings that could result in MIW.[184] As part of the tailings disposal facility design engineered barriers such as a liner can be utilized to collect seepage from tailings resulting in reduced seepage management requirements.[185]

[181] Department of Health and Human Services, Center for Disease Control and Prevention, *Dust Control Handbook for Industrial Minerals Mining and Processing* (Washington, DC: U.S. Government Printing Office, 2012).

[182] D. Dahlstrom, "Chapter 14.7: Dewatering Methods," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[183] For more details on the construction of tailings ponds in regards to specific site and tailings characteristics, see D. Van Zyl, J. Johnson, "Chapter 8.5: Tailings Disposal Design," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997).

[184] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.1.

[185] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.6.1.

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TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
		Another technique is production of paste or dry dewatered tailings to reduce potential for MIW.[186] During operations special handling techniques such the addition of alkaline materials or amendments can be used to reduce potential for AMD from tailings.[187] At closure tailings areas can be reclaimed using dry and wet covers to lessen or minimize discharges of MIW.[188] In the event the mine drainage requires treatment before discharge, either during operations or post-closure, a variety of active, passive and in situ mine drainage treatment techniques are potentially applicable.[189]

[186] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.8.

[187] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.4.2.

[188] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.2.

[189] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 7.5.

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State and Federal Regulations

While few regulations pertain specifically to physical, gravity and magnetic processing, many broader regulatory frameworks across the industry address these practices at the state and federal level. Section 2.C.4. discusses regulations applicable to tailings management in more detail.

Federal Regulations

Potential releases from physical processing and gravity and magnetic separation for certain ores is regulated under the ELGs outlined by the CWA. For example, the CWA does not allow concentrations of pollutants over a certain level for tungsten mills processing by physical methods, or titanium mills beneficiating by electrostatic, magnetic or physical methods. In addition, it sets limitations on sediment in wastewater discharge and guidelines for treatment for certain types of mining such as placer mining, which often uses gravity separation.[190] As a result, most direct-discharging ore mining and dressing facilities use settling or precipitation treatment.[191] Where ELGs may not apply, technology-based limits are developed during the facility-specific permitting process. The NPDES program applies to both active and inactive mines, as well as abandoned mines where legally responsible owners or operators of point sources can be identified.

While the Clean Air Act (CAA) and RCRA do not directly address fugitive dust or tailings from physical processing and gravity and magnetic separation, state and local governments implement State Implementation Plans (which manage particulate matter emissions) under CAA as well as solid waste management guidelines under RCRA Subtitle D. Under RCRA Subtitle D, the federal government provides information and policy guidance to support state and local governments, such as criteria for the safe re-use of tailings in other industrial applications.[192] In situations where facilities combine tailings with mineral processing wastes that exhibit hazardous characteristics, the waste mixtures may also fall under RCRA Subtitle C regulations. The MSHA also specifies inspections and safety standards for impoundments, retention dams, and tailings ponds, and the Federal Emergency Management Agency (FEMA) is charged with administering a national dam safety program that includes tailings structures.[193]

Mining operations on federal land are subject to additional regulation. According to BLM Section 3809 rules, mining operations must prevent unnecessary or undue degradation, which

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[190] 40 CFR 424 (ferro-alloy manufacturing); 40 CFR 436 (mineral mining and processing); 40 CFR 440 (ore mining and dressing).

[191] U.S. Environmental Protection Agency, *Technical Support Document for the 2004 Effluent Guidelines Program Plan* EPA-821-R-04-014 (Washington, DC: U.S. Government Printing Office, 2004).

[192] U.S. Environmental Protection Agency, *Final Rule: Criteria for the Safe and Environmentally Protective Use of Granular Mine Tailings Known as "Chat"* Docket EPA-HQ-RCRA-2006-0097 (Washington, DC: U.S. Government Printing Office, 2007). Accessed October 30, 2015, at: https://archive.epa.gov/epawaste/nonhaz/industrial/special/web/html/index-4.html

[193] 30 CFR Part 57, Subpart S. For more information, see: "Dam Safety Standards and Technical Guidance," MSHA. U.S. Department of Labor. Accessed October 30, 2015, at: http://www.msha.gov/DamSafety/DamSafetyTechGuidance.asp.

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includes managing all tailings, rock dumps, deleterious material or substances and any other waste produced from mining operations.[194] Tailings from physical processing and gravity and magnetic separation fall under this general regulation as waste produced by mining operations and are thus subject to the permitting and approval requirements for operations on BLM lands. Dust suppression measures are usually employed as standard operating procedures under BLM-approved Plans of Operations.

In some cases, specific types of ores are subject to additional regulations. For example, UMTRCA mandates special closure designs for uranium mill tailings ponds to prevent radon gas releases.[195] While gravity and magnetic separation are not typically used for uranium ore, physical processing is generally a first step in beneficiation for uranium.

State Regulations

As with federal BLM surface management guidance, state mining regulatory programs may incorporate practices such as dust control, backfilling, erosion control and revegetation into state mining permits. Some states specifically regulate dust created by mining. For example:

- **Alaska** has a prohibition on fugitive dust, requiring anyone engaging in an industrial activity or construction project to take reasonable precautions to prevent particulate matter from being emitted into the ambient air, and prohibiting emissions harmful to human health or welfare and to animal or plant life. [196]
- **Rhode Island**'s Air Pollution Control Regulation No. 5 on fugitive dust prohibits any person to use matter capable of releasing dust in any way that could cause airborne particulate matter to travel beyond the property line of the emission source without taking adequate precautions to prevent particulate matter from becoming airborne.[197]
- **Michigan**'s Natural Resources and Environmental Protection Act requires crushers, grinding mills and screening operations to be sprayed with water or a surfactant solution, utilize choke-feeding, or be treated by an equivalent method in accordance with an operating program designed to significantly reduce the fugitive dust emissions to the lowest level that a particular source is capable of achieving.[198]
- **Utah**'s Environmental Quality and Air Quality regulations require any person owning or operating a mine to minimize fugitive dust.[199]
- **California's** Asbestos Airborne Toxics Control Measure (ATCM) requires all

[194] 43 CFR Part 3809

[195] UMTRCA, PL 95-604

[196] 18 AAC 50.045(d), 18 AAC 50.110

[197] R.I. Air Pollution Control Regulation No. 5, authorized pursuant to R.I. Gen. Laws § 42- 17.1-2(s) and 23-23

[198] Natural Resources and Environmental Protection Act 451 of 1994. 324.5524 Fugitive dust sources or emissions.

[199] R307-205-7, R307-205-8

construction, grading, quarrying, and surface mining operations in areas known to naturally contain asbestos to take specified control measures during road construction and maintenance operations.[200]

- **Idaho's** Permit by Rule for Non-Metallic Mineral Processing Plants requires that facilities that crush or grind any nonmetallic mineral or rock register with the Idaho Department of Environmental Quality (IDEQ). The rule sets electrical generator rules, fugitive dust control standards, monitoring, and record keeping.[201]

Several state regulations manage tailings, although in some cases tailings from gravity and magnetic separation that have no chemical additives are excluded from regulation. In addition, some regulations only address tailings from specific types of ore. For example:

- **Alaska**'s Department of Environmental Conservation Solid Waste Disposal Permit makes tailings from hardrock mines and tailings from placer mines that have been amalgamated or chemically treated subject to the State solid waste management general standards and requirements, which usually necessitate pre-operational, operation, and post-closure monitoring.[202]Tailings that have not been chemically treated (which is often the case with gravity and magnetic separation), however, are not subject to regulation.
- **Montana**'s Hard Rock Mining Reclamation Act specifies that milling operations are subject to permitting, requiring a detailed description of the design, construction, and operation of the mill, tailings, and waste rock disposal facilities, and best management practices are expected in the disposal of tailings and other waste.[203]
- **Nevada**'s regulations on hazardous materials require that tailings from active and inactive uranium and thorium mills are disposed of in a safe and environmentally sound manner.[204]

Non-Operating Sites and Currently Operating Facilities

The available documents indicate that four out of 29 non-operating sites used gravity separation and 18 out of 29 used physical processing. It is likely, however, that most of these sites used physical processing in conjunction with or in preparation for other types of beneficiation, even though the available documents do not specify this. Out of 57 current sites, available documents indicate that four use gravity separation and 30 use physical processing. Again, though, it is likely that most of these sites employ some physical processing methods.

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[200] 17 CCR 93105

[201] IDAPA 58.01.01.795–799

[202] Title 18 AAC Chapter 60- Solid Waste Management

[203] ARM 17.24.101-ARM.17.24.189

[204] NRS 459.300-NRS459.370

Non-Operating Sites

A review of CERCLA sites reveals that many non-operating sites used physical processing and magnetic or gravity separation alongside other processes. Evidence indicated that waste management practices, rather than the beneficiation practices, largely contributed to environmental contamination:

- The **Ely Copper Mine** (EPA ID: VTD988366571) in Vershire, Vermont, conducted copper mining and processing from 1821 to 1920.[205] Copper ore was processed using physical techniques, with flotation and roasting activities taking place in the early 20th century. According to state and federal authorities, mine drainage and runoff from exposed tailings piles caused elevated metal concentrations in soil, surface water, and groundwater.
- The **Torch Lake** site (EPA ID MID980901946) processed copper ore for over a century in Houghton County, Michigan, beginning in 1868.[206] The site extracted copper by stamping, crushing, grinding, and driving the rock through meshes. Gravity separation further refined the crushed rock. Ammonia leaching processes began in 1916. The operators dumped both tailings and spent leaching liquor into Torch Lake, which served as a repository for tailings throughout the site's history. Approximately 200 million tons of tailings were dumped into Torch Lake during the site's years of operation. In the 1970s, tests found that Torch Lake had high concentrations of copper and other trace elements, which were attributed to waste disposal practices.
- The **Anaconda Company Smelter** site (EPA ID MTD093291656) processed copper ore from 1884 until 1980.[207] Initial steps crushed ore and used gravity separation to concentrate ore in preparation for roasting and smelting, Tailings from gravity concentration were discharged onto the floodplains of Warm Springs Creek. In the 1980s, the operator agreed to conduct remedial actions because groundwater in the vicinity of

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[205] "Waste Site Cleanup & Reuse in New England: Ely Copper Mine," U.S. Environmental Protection Agency. Accessed October 28, 2015: https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0102065

[206] U.S. Environmental Protection Agency, *Superfund Record of Decision: Torch Lake, MI* (Washington, DC: U.S. Government Printing Office, 1992). Accessed October 28, 2015: http://nepis.epa.gov/Exe/ZyNET.exe/91001NR1.txt?ZyActionD=ZyDocument&Client=EPA&Index=1991%20Thru%201994&Docs=&Query=%28tailings%29%20OR%20FNAME%3D%2291001NR1.txt%22%20AND%20FNAME%3D%2291001NR1.txt%22&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&UseQField=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5CZYFILES%5CINDEX%20DATA%5C91THRU94%5CTXT%5C00000021%5C91001NR1.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=p%7Cf&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=3.

[207] U.S. Environmental Protection Agency, *EPA Superfund Record of Decision: Anaconda Co. Smelter* (Washington, DC: U.S. Government Printing Office, 1994). Accessed October 28, 2015: http://www.mtech.edu/academics/clsps/ptc/sciencesocietysuperfund/pdfs/archival_materials/anaconda_archives/anaconda_rod/b_smelter.pdf.

the site contained cadmium levels that exceeded federal SDWA Maximum Contaminant Levels (MCLs).

Evidence for one site also indicated the use of physical processing and gravity separation without the use of other process chemicals. Site documents for the Pioneer Pit mine CERCLA site (EPA ID CAN000905978) did not indicate any chemical use at this site; the mine instead processed gold placer deposits using sluice boxes (gravity separation). Releases of sediment resulted from hydraulic excavation methods (which use high pressure water jets to break up stream beds), not processing activities.

Publicly available information did not directly tie known releases to these processing methods. All four non-operating sites operated before the promulgation of the CWA, which now prevents the use of the waste management practices (e.g., open dumping) and excavation methods that contributed to contamination at these sites.

Currently Operating Facilities

Little evidence was available to shed light on the incidence and types of releases from the currently operating facilities, and there is no evidence specifically tying releases to physical, magnetic or gravity separation. Because available documentation did not always discuss non-chemical processing methods, this review focused on facilities that were identified to use only physical processing and gravity or magnetic separation.

Four facilities extracted heavy mineral sands at placer operations: Iluka Resources in Virginia (MSHA IDs 4407250, 4407222, and 4407221),[208] DuPont Titanium in Florida (MSHA ID 800225), Southern Ionics North Mine in Georgia (MSHA ID 901230), and Southern Ionics South Mine in Georgia (unknown MSHA ID). These facilities did not appear to utilize chemical processes, and no evidence suggested releases of hazardous substances. At least two of these facilities (Iluka Resources and DuPont Titanium) used gravity separation, electromagnetic and electrostatic separation methods.

[208] "Heavy Mineral Sands," Virginia Department of Mines, Minerals, and Energy. Accessed July 31, 2015, at: https://www.dmme.virginia.gov/dgmr/heavyminsand.shtml

D. Flotation Processing

Introduction

Flotation processing separates valuable minerals from waste material using differences in water-repellency, either natural or chemically induced. It is often used in conjunction with gravity concentration, and the concentrate resulting from metallic ore flotation is commonly treated by smelting. The primary environmental concerns stem from the tailings produced by flotation processes and their geochemical contents, which can result in MIW. While the CWA addresses releases to surface water directly from flotation processes, potential environmental impacts from flotation tailings are not addressed by the CWA because they are generally considered non-point sources. Instead, they are addressed by groundwater frameworks across federal and state programs.

A review of a sample of non-operating sites and currently operating mining facilities revealed several releases related to facilities that engaged in flotation processing. Causes were generally due to geochemical contaminants in flotation tailings, which resulted in discharges to groundwater or surface water.

Past and Current Use

The first documented use of flotation occurred in 1877 for the processing of graphite from ores. Until about 1920, flotation was a relatively inefficient process requiring large quantities of oil or fatty materials to cause the desired separation. During this period, the primary reagents used for flotation included oils, soaps, ketones, esters, aldehydes, lime and soda ash. Over time, chemicals employed in other industries were adapted for use in flotation processing of mineral ore, substantially decreasing the amount of reagent necessary for separation and making the process more effective. Primary reagents used for flotation during the period from 1921 to 1950 included xanthate, chelating agents, fatty acids, petroleum sulfonates and primary amines.

By 1950, reagents developed for targeted application in flotation increased the use of the process to more ores and minerals.[209] Flotation is commonly used now, including during concentration of antimony, cobalt, copper, gold-silver, iron, lead-zinc, nickel, molybdenum, phosphate ores and platinum group metal.[210,211]

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[209] D. Fuerstenau, "A Century of Developments in the Chemistry of Flotation Processing," in *Froth Flotation: A Century of Innovation*, eds. Maurice C. Furstenau, Graeme Jameson, and Roe-Hoan Yoon (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2007).

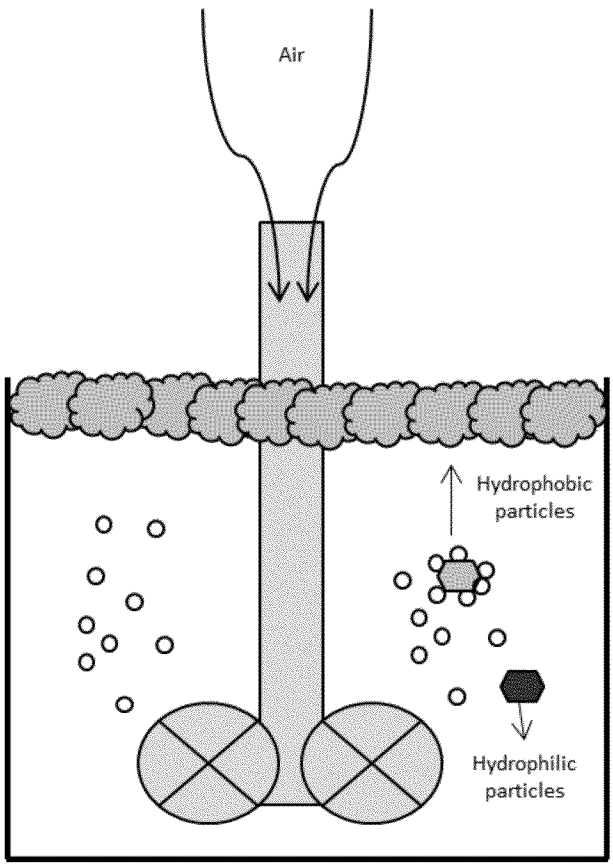
[210] Corby G. Anderson, "The Metallurgy of Antimony," *Chemie Der Erde – Geochemistry* 72 (2012), p. 3-8.

[211] F.K. Crundwell, *Extractive Metallurgy of Nickel, Cobalt and Platinum Group Metals* (Amsterdam: Elsevier, 2011).

Technical Description

Flotation sorts material based on differences in hydrophobicity (water repellency), either inherent or chemically induced. In most cases, the ore must undergo initial processing such as crushing to create distinct grains of valuable mineral and waste material. Ore particles are mixed with water in a slurry, which then goes through flotation cells that agitate the slurry and produce microscopic air bubbles. Chemicals are added that make the desired mineral hydrophobic (water-repelling). As bubbles travel up through the slurry, air attaches to the hydrophobic mineral particles and they float to the top. The concentrated froth layer can then be removed. The hydrophilic (water-loving) waste particles remain in the liquid, where they are transported to the tailings facility.[212] This process is illustrated in Exhibit 1.D.1.

Exhibit 1.D.1. Simplified Flotation Cell[213]



[212] S. Kawatra, "Chapter 14.5: Fundamental Principles of Froth Flotation," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2011), Volume 2.

[213] Adapted from S. Kawatra, "Chapter 14.5: Fundamental Principles of Froth Flotation," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2011), Volume 2.

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Flotation is a versatile process that can separate minerals with a range of particle densities.[214] In addition, a variety of chemical reagents allow flotation to work even with ores that are not naturally hydrophobic.

Flotation processes use six categories of reagents: frothers, collectors, modifiers, flocculants, activators and depressants. Frothers control bubble size and ensure that the froth layer at the top is stable. Collectors control the hydrophobicity of the components, such as an oil that bonds only with the surface of a particular mineral, rendering those particles hydrophobic. The remaining types of reagents help create optimal conditions for selective separation by influencing the way that collectors attach to mineral surfaces – for example, by controlling pH or modifying the way that collectors adhere to specific mineral surfaces.[215] Some commonly used reagents are shown in Exhibit 1.D.2.

Exhibit 1.D.2. Common Reagents Associated with Flotation Processing[216]

FROTHERS	COLLECTORS	DEPRESSANTS	FLOCCULANTS
Aliphatic Alcohol Pine Oil Polyglycol Ether	Xanthates Dithiophosphates Thionocarbamates Cyanide Salt Kerosene	Cyanide Lime	Aluminum Salts Anionic Polyacrylamide

Potential Sources of Hazardous Substances

Flotation processes generate tailings that consist of a mixture of waste material and the remaining liquid, which consists mostly of water and any remaining reagents. These are generally pumped to a tailings impoundment, where solids are settled out of the solution.[217, 218, 219]

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[214] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[215] S. Kawatra, "Chapter 14.5: Fundamental Principles of Froth Flotation," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2011), Volume 2.

[216] S. Kawatra, "Chapter 14.5: Fundamental Principles of Froth Flotation," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2011), Volume 2.

[217] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Resource Document: Extraction and Beneficiation of Ores and Minerals* EPA 530-r-94-013, Volume 4: Copper (Washington, DC: U.S. Government Printing Office, 1994).

[218] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Resource Document: Extraction and Beneficiation of Ores and Minerals* EPA 530-r-94-013, Volume 1: Lead-Zinc (Washington, DC: U.S. Government Printing Office, 1994).

[219] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Resource Document: Extraction and Beneficiation of Ores and Minerals* EPA 530-r-94-013, Volume 3: Iron (Washington, DC: U.S. Government Printing Office, 1994).

In some cases, reagents have the potential for environmental harm. Of the reagents shown in Exhibit 1.D.1., some (e.g., pine oil, anionic polyacrylamide) are relatively benign. In contrast, cyanide, certain aluminum salts, certain aliphatic alcohols, glycol ether and lime are CERCLA hazardous substances.[220] Xanthates (often used as collectors for copper, nickel, lead, zinc, silver, and gold) are not listed as CERCLA hazardous substances, but can be toxic to freshwater fish and invertebrates.[221] Xanthates have also been known to have negative effects on soil biota, including the inhibition of nitrogen transformation and nitrite oxidization.[222]

Most of these reagents are consumed during flotation, with only small residual quantities making it into the tailings.[223] Facilities may dispose of wastes from various processes in the same waste management units, however, with the resulting mixture containing more hazardous constituents than tailings from flotation alone.[224]

Proper construction of tailings ponds allows potential contaminants to settle out of water before it discharges. When chemicals are added to the slurry, leak detectors and linings must be employed to ensure that no harmful substances are discharged to the environment.[225,226, 227] The primary method of managing environmental discharges from tailings is to pump the mineral slurries to tailings ponds, where the solids settle to the bottom and consolidate, allowing the cleaned liquid above to be recycled to the plant or discharged. See Section 2.C. for more details on tailings management.

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[220] "EPCRA/CERCLA/CAA Section 112(r) Consolidated List of Lists," U.S. Environmental Protection Agency, updated March 2015. Accessed November 3, 2015, at: http://www2.epa.gov/epcra/epcracerclacaa-ss112r-consolidated-list-lists-march-2015-version; and "CERCLA Substance Priority List," ATSDR, updated 2013. Accessed November 3, 2015 at: http://www.atsdr.cdc.gov/spl/.

[221] M.C. Fuerstenau, *The Toxicity of Selected Sulfhydryl Collectors to Rainbow Trout* (Rapid City, Bureau of Mines Open File Report 11-75 (Rapid City, SD: South Dakota School of Mines & Technology, 1974).

[222] J. Ashworth, G.A. Rodgers, and G.G. Briggs, "Xanthates as inhibitors of fertilizer nitrogen transformation in soil," *Chemistry and Industry* 3 (1979), p. 90-92.

[223] J.R. Hawley, *The Use, Characteristics and Toxicity of Mine-mill Reagents in the Province of Ontario* (Toronto: Ministry of the Environment, 1972).

[224] U.S. Environmental Protection Agency, *Mineral Processing Facilities Placing Mixtures of Exempt and Non-Exempt Wastes in On-site Waste Management Units: Technical Background Document Supporting the Supplemental Proposed Rule Applying Phase IV Land Disposal Restrictions to Newly Identified Mineral Processing Wastes* (Washington, DC: U.S. Government Printing Office, 2013).

[225] D. Dahlstrom, "Chapter 14.7: Dewatering Methods," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011).

[226] For more details on the construction of tailings ponds in regards to specific site and tailings characteristics, see D. Van Zyl, J. Johnson, "Chapter 8.5: Tailings Disposal Design," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997).

[227] D. Dahlstrom, "Chapter 14.7: Dewatering Methods," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011).

State and Federal Regulations

While few regulations pertain specifically to flotation processing and its waste products, the CWA, state groundwater programs, hardrock mining, and solid waste regulatory frameworks address these practices at the state and federal level. Section 2.C.4. describes the regulatory framework for tailings in more detail.

Federal Regulations

Potential releases from flotation processing are regulated under the ELGs outlined by the CWA for many minerals, including gold, silver, copper, lead and titanium.[228] These requirements set discharge limits and water quality requirements for direct discharges to surface water from flotation operations for sediment, metals and pH. Runoff from tailings impoundments may be regulated under stormwater permits.[229] Stormwater permits regulate stormwater contaminated by contact with material from mining activities.

While RCRA does not directly address tailings from flotation processing (a beneficiation waste under the Bevill exclusion), state and local governments implement solid waste management guidelines under RCRA Subtitle D. Specifically, the federal government provides information and policy guidance to support state and local governments, such as criteria for the safe re-use of tailings in other industrial applications.[230] In situations where facilities combine tailings with mineral processing wastes that exhibit hazardous characteristics, the waste mixtures may also fall under RCRA Subtitle C regulations. MSHA also specifies inspections and safety standards for impoundments, retention dams and tailings ponds, and the FEMA is charged with administering a national dam safety program that includes tailings structures.[231]

Mining operations on federal land are subject to additional regulation. According to BLM Section 3809 rules, mining operations must prevent unnecessary or undue degradation, which includes managing all tailings and any other waste produced from mining operations.[232] Tailings from flotation processing fall under this general regulation as waste produced by mining operations and are thus subject to the permitting and approval requirements for operations on BLM lands.

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[228] 40 CFR 436 (mineral mining and processing); 40 CFR 440 (ore mining and dressing).

[229] The classification of point and nonpoint discharges from mining operations has evolved over time. For more information regarding current definitions of point sources from mining operations, see: *Greater Yellowstone Coalition v. Lewis*, 628 F.3d 1143 (9th Cir. Dec 23, 2010)

[230] U.S. Environmental Protection Agency, *Final Rule: Criteria for the Safe and Environmentally Protective Use of Granular Mine Tailings Known as "Chat"* Docket EPA-HQ-RCRA-2006-0097 (Washington, DC: U.S. Government Printing Office, 2007).

[231] 30 CFR Part 57, Subpart S. For more information, see: "Dam Safety Standards and Technical Guidance," MSHA. U.S. Department of Labor. Accessed October 30, 2015 at: http://www.msha.gov/DamSafety/DamSafetyTechGuidance.asp.

[232] 43 CFR Part 3809

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State Regulations

Several state regulations manage tailings through state environmental programs, state mining regulatory programs, solid waste management programs, or dam safety regulations. For example:

- **Alaska**'s Department of Environmental Conservation Solid Waste Disposal Permit makes tailings from hardrock mines and tailings from placer mines that have been amalgamated or chemically treated subject to the state's solid waste management general standards and requirements, which usually necessitate pre-operation, operation, and post-closure monitoring.[233]
- **Arizona's** Groundwater Permit requires mines in active groundwater management areas to reduce water loss from tailings impoundments.[234] As a result, water removed from tailings is usually recycled back into industrial processes.
- **California** manages mining wastes through the state's Porter-Cologne Water Quality Control Act. All mining units, including tailings structures, must comply with siting and construction standards. Disposal and management regulations for mining waste establish monitoring, closure, and maintenance requirements, which are based on wastes' potential hazard to water.[235]
- **Idaho's** Dam Safety Program regulates tailings structures through dam and impoundment structure requirements. The state oversees the construction, enlargement, alteration, repair, operation, and maintenance of dams and impoundments.[236]
- **Montana**'s Hard Rock Mining Reclamation Act specifies that milling operations are subject to permitting, requiring a detailed description of the design, construction, and operation of the mill, tailings, and waste rock disposal facilities, and best management practices are expected in the disposal of tailings and other waste.[237]

Non-Operating Sites and Currently Operating Facilities

Non-Operating Sites

Eight of the 29 non-operating mining and processing CERCLA sites reviewed used flotation processing techniques.[238] The causes of releases were identified for six of the eight CERCLA

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[233] Title 18 AAC Chapter 60- Solid Waste Management

[234] ARS §45

[235] 27 CCR Div. 7.1

[236] Idaho Code 42-17; IDAPA 37.06.06; IDAPA 37.03.05

[237] ARM 17.24.101-ARM.17.24.189

[238] Cyprus Tohono Mine (EPA ID AZD094524097), Captain Jack Mill (EPA ID COD981551427), Summitville Mine (EPA ID COD983778432), Bunker Hill Mining & Metallurgical Complex (EPA ID IDD048340921), Blackbird Mine (EPA ID IDD980725832), Li Tungsten Corp. (EPA ID NYD986882660), Tar Creek (Ottawa County) (EPA ID OKD980629844), Gilt Edge Mine (EPA ID SDD987673985).

sites that used flotation, although there is no indication that the releases at these sites were directly caused by flotation processing. Some releases were influenced by waste management practices, such as tailings storage facility failures.

The review identified one non-operating, non-CERCLA site that directly released flotation solution, with minimal evidence of long-term environmental impacts. The Jamestown Mine in Tuolomne County, California (MSHA ID 0404695) began gold mining and processing operations in 1986. In 1987, the flotation operations released 500 gallons of flotation solution into the area adjacent to a processing building, with 200 gallons released into a sediment pond. Test samples taken the day of the release indicated that concentrations of the flotation compounds were below detectable levels.[239]

Currently Operating Facilities

At least fifteen of 70 currently operating facilities reviewed use flotation as a method for mineral processing.[240] Copper is mined at five of these sites.[241] At least 13 of the 15 facilities experienced hazardous substance releases, but little evidence was available concerning the causes and types of releases, including whether the release was associated with the flotation process.

The review identified one currently operating facility that directly released flotation solution in violation of the facility's water quality permit. The Robinson Nevada Mining Company operates the Robinson Operation surface mine (MSHA ID 2601916) in White Pine County, Nevada. The facility produces gold and copper using flotation processes. [242] The facility released copper flotation tailings five times in 1996, leading to violations of its water pollution control permit.[243] Releases ranged from 1,500 gallons to 66,000 gallons per release. The largest spill, on February 12, 1996, contaminated 2.3 miles of a downstream drainage bed. This release violated the Nevada Revised Statutes 445A.465 law regarding discharges of injection fluids or pollutants.

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[239] U.S. Environmental Protection Agency, Office of Solid Waste, *Human Health and Environmental Damages from Mining and Mineral Processing Wastes* (Washington, DC: U.S. Government Printing Office, 1995). Accessed December 7, 2015, at: http://www3.epa.gov/epawaste/nonhaz/industrial/special/mining/minedock/damage/damage.pdf

[240] Asarco Ray (MSHA ID 0200150), Ashdown (MSHA ID 2600578), Coeur Kensington (MSHA ID 5001544), Freeport McMoRan Morenci (MSHA ID 0200024), Hecla Greens Creek (MSHA ID 5001267), Intrepid Potash East/West (MSHA IDs 2900175 (West) and 2900170 (East)), Mosaic South Pasture Hardee (MSHA ID 0800903), Nyrstar East Tennessee Complex-Young (MSHA ID 4000170), Nyrstar Middle Tennessee Complex- Elmwood/Gordonsville(MSHA ID 4000864), Rio Tinto Kennecott Bingham Canyon-Copperton-Magna (MSHA IDs 4200149 and 4201996), Robinson Nevada (MSHA ID 2601916), Stillwater East Boulder (MSHA ID 2401879), Stillwater Stillwater/Columbus(MSHA ID 2401490), Thompson Creek (MSHA ID 1000531), US Silver Galena (MSHA ID 1000082)

[241] Asarco Ray (MSHA ID 0200150), Freeport McMoRan Morenci (MSHA ID 0200024), Rio Tinto Kennecott Bingham Canyon-Copperton-Magna(MSHA IDs 4200149 and 4201996), Robinson Nevada (MSHA ID 2601916), US Silver Galena (MSHA ID 1000082)

[242] "Robinson Mine," KGHM Polska Miedz. Accessed October 27, 2015: http://kghm.com/en/our-business/mining-and-enrichment/robinson

[243] U.S. Environmental Protection Agency, *Damage Cases and Environmental Releases from Mines and Mineral Processing Sites* (Washington, DC: U.S. Government Printing Office, 1997).

The smaller spills contaminated small areas of soil. Information about long-term environmental effects and regulatory enforcement actions was not readily available.

E. Cyanidation

Introduction

In cyanidation, cyanide is used to separate gold or silver from its ore. This beneficiation process dissolves gold and silver from ore, separating it from waste material (tailings or spent heap). The cyanide solution containing gold and silver is then processed on site by carbon adsorption or by zinc precipitation (Merrill-Crowe process) to produce doré metal, a semi-pure mixture of gold and silver. Cyanidation is typically performed using either agitated tank or heap leaching processes.[244]

Cyanide leaching generates most of the gold produced in the United States and worldwide. Leaching tanks, leach pads, piping, and storage facilities (e.g., process solution ponds, tailings facilities) can release cyanide and other mobilized contaminants into the environment, however, at both active and abandoned mines. Coincident with increased regulatory requirements, mitigation and best management practices have evolved in an effort to control the risk of these releases and better mitigate their impacts.

Nevertheless, substantial releases of cyanide have been observed both historically and as a result of contemporary mining practices, suggesting that technological advances and regulatory oversight may have not eliminated the potential for serious environmental contamination. Limited evidence from the literature and several Superfund sites also suggests that financial health of mining firms may play a role in site operations and the incidence of releases, with volatile metal commodity prices a key determinant of a mining company's bottom line.

Past and Current Use

Cyanidation is the predominant mineral processing method currently in use in the United States to process gold ores, as well as to recover byproduct silver contained in most gold ores.[245]

Agitated tank leaching processes have been in use in the United States since 1891, with heap leaching and carbon adsorption processes emerging in the 1970s.[246] Heap leaching systems are typically used for treatment of low-grade oxidized ores, with their use increasing during periods of high commodity prices. Because of lower capital costs, heap leaching is used when agitated

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[244] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

[245] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

[246] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

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tank leaching processes are not cost effective.[247,248] While used throughout the United States, this process is predominant in Nevada, where ores are more amenable to heap leaching methods.[249]

In 1991, all forms of cyanidation produced 90 percent of the gold produced in the United States. Of that amount, 33 percent was produced by heap leaching and 56 percent was produced by tank leaching.[250] Updated statistics on the current use of cyanidation by the U.S. mining industry are not available.

Technical Description

Two main types of cyanide leaching systems process ore at currently operating facilities: agitated tank leaching, and heap leaching. Preliminary steps to prepare and make the ore more amenable to cyanidation include physical processing (e.g., crushing, grinding, and sizing, described in Section 1.C.), flotation (discussed in Section I.D. of this document), and oxidation (e.g., roasting, described in Section I.G.). During and after leaching, the two most common recovery processes used to remove gold and other metals from the cyanide solution are: 1) carbon adsorption, desorption, and electrowinning; and 2) the Merrill-Crowe method (zinc precipitation). The resulting intermediate product is further refined by smelting, and in most cases the cyanide solution is recycled. These ancillary processes are addressed within the following sections on agitated tank and heap leaching.

Agitated Tank Leach

Exhibit 1.E.1. presents the agitated tank leaching process. The standard agitated tank cyanide leach process consists of crushing and then grinding the ore to roughly the consistency of fine sand. Alternatively, concentrate from flotation processing, which uses chemical reagents and air bubbles to separate minerals of interest, may also be used as feed to the agitated tank cyanide leach process. The ground ore or concentrate is combined with water, sodium cyanide, and quick lime (to maintain the alkalinity of the solution), and passed through a series of agitated mixing tanks with a residence time of 24 hours.[251] Dissolved gold and silver are collected with activated carbon (carbon-in-pulp adsorption or carbon-in-leach processing), thickener tanks, vacuum

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[247] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

[248] Dump leaching is a rarely used third type of cyanidation in which uncrushed ore or waste rock is stacked in a pile, sometimes without a liner. This process requires even less capital investment, but requires increased processing time and results in a lower recovery rate. However, some technical descriptions use the terms "heap leaching" and "dump leaching" interchangeably. This document describes and refers to the two main types of cyanidation: agitated tank leaching and heap leaching.

[249] Daniel Kappes, "Precious Metal Heap Leach Design and Practice," in *Mineral Processing Plant Design, Practice, and Control Proceedings*, ed. Andrew L. Mular (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2002). Accessed August 27, 2015, at: http://www.kcareno.com/pdfs/mpd_heap_leach_desn_and_practice_07apr02.pdf

[250] Carlos D. Da Rosa, James S. Lyon, and Philip M. Hocker, *Golden Dreams, Poisoned Streams: How Reckless Mining Pollutes America's Waters, and How We Can Stop It* (Washington, DC: Mineral Policy Center, 1997).

[251] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

filters, or zinc precipitation.[252] Electrowinning, which uses electric currents to further separate metals, and smelting then produce doré metal, a semi-pure mixture of gold and silver. Mercury, which is commonly present in gold ores, is removed as a byproduct.[253]

Heap Leaching

Exhibit 1.E.2. shows the cyanide heap leaching process. Unprocessed, crushed, or agglomerated (pelletized) ore is placed on a leach pad on an impermeable barrier.[254] Water-based cyanide leach solution is applied to heap leach piles using sprinklers or misters. After passing through the pile of ore and dissolving precious metals, the gold- and silver-containing (pregnant) cyanide solution is collected in a solution pond or in a valley-fill containment. Metal from cyanide heap leaching processes is recovered using activated carbon or, if the ore is high in silver content, by zinc precipitation. The recycled cyanide solution is then reapplied to the ore stack. Similar to agitated tank leaching, electrowinning and smelting then produce doré metal, with mercury removed as a byproduct.[255]

Heaps can be constructed on flat ground (the most common type of heap-leach design), or can be placed in fairly steep-walled valleys with side slopes up to 20 percent.[256] "Such valley-fill heap leach facilities, which store metal-bearing cyanide solution, dam natural valleys and reduce evaporation. Although the best design practice is to minimize pressure and prevent leakage by minimizing the depth and height of the solution, valley-fill designs store solutions at depths creating significant pressure.

Generally, heap leach systems incorporate impermeable liners to maximize metal recovery and prevent leakage into the environment.[257] Almost all gold heap-leach facility designs operate on a zero-discharge basis and include the following components: a low-permeability compacted soil or geosynthetic clay under-layer; a leak detection layer; a plastic or geomembrane liner; a

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[252] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

[253] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

[254] Ores with small particle size must sometimes be prepared before other processes such as smelting or leaching can be conducted. Agglomeration binds together fine-grained materials that can prevent the efficient flow of solution through the leach pile. Commonly, cement, lime, or other binding and neutralizing agents create larger ore particles. This creates pellets, briquettes or nodules which can be more easily refined using other processes.

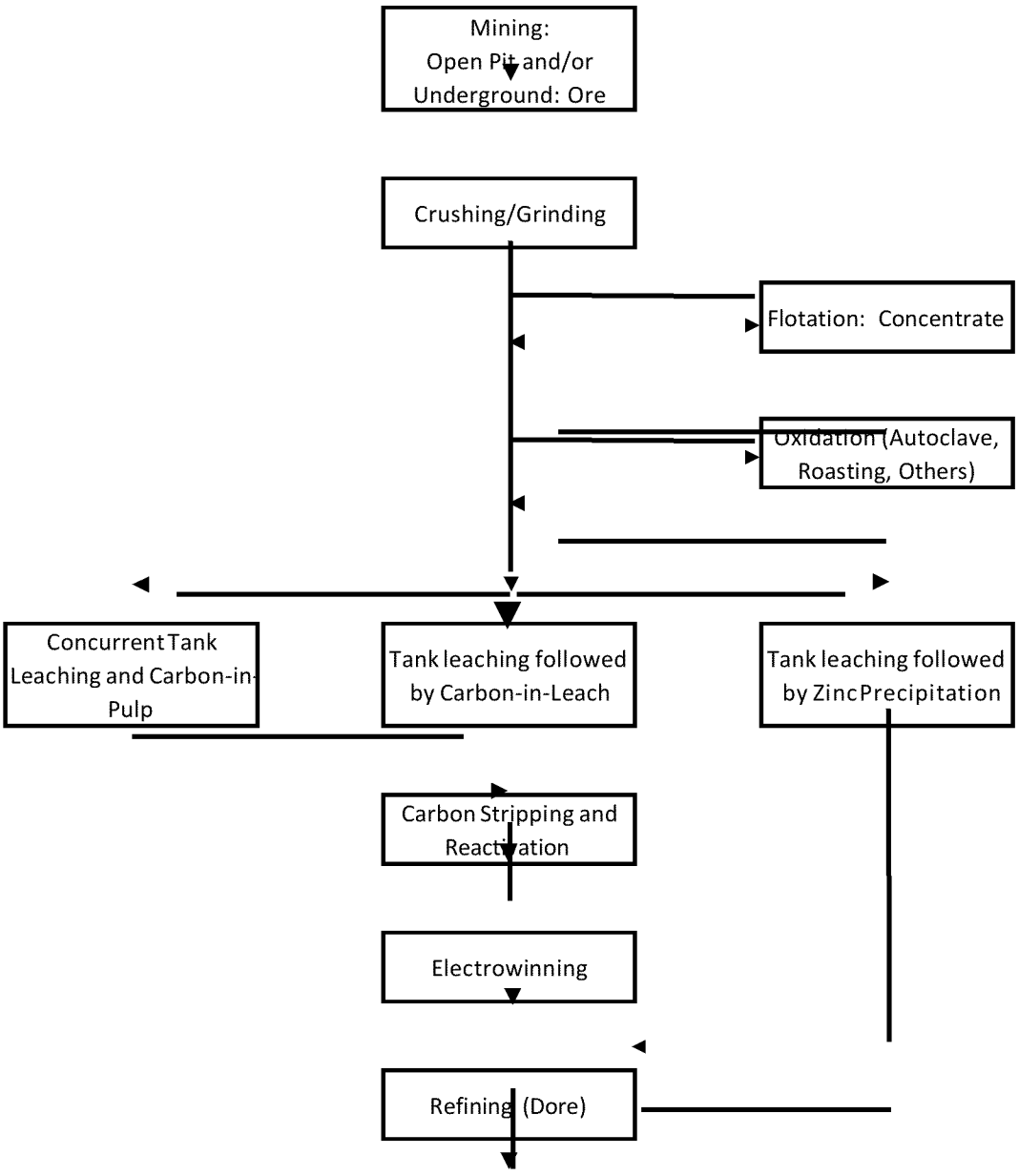
[255] Daniel Kappes, "Precious Metal Heap Leach Design and Practice," in *Mineral Processing Plant Design, Practice, and Control Proceedings*, ed. Andrew L. Mular (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2002).

[256] John Marsden and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

[257] Donald I. Bleiwas, *Estimated Water Requirements for Gold Heap-Leach Operations*, Open-File Report 2012-1085, Version 1.1 (Washington, DC: U.S. Government Printing Office, 2012). Accessed September 4, 2015, at: http://pubs.usgs.gov/of/2012/1085/pdf/ofr20121085_v1-1.pdf

geotextile cover to prevent damage to the plastic liner; drain pipes, and a crushed gravel cover to protect the pipes and liner and provide a permeable base below the heaped ore.[258]

Exhibit 1.E.1. Agitated Tank Cyanide Leaching Processes Flowsheet[259]



[258] Daniel Kappes, "Precious Metal Heap Leach Design and Practice," in *Mineral Processing Plant Design, Practice, and Control Proceedings*, ed. Andrew L. Mular (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2002).

[259] Adapted from John Marsden and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

Potential Sources of Hazardous Substances

The management of environmental and public safety risks from cyanide use in mining remains a subject of debate in the scientific and engineering communities.[260] In addition to the release of cyanide, discharges from cyanidation processes both during operations and after closure can also contain potentially toxic elements including lead, cadmium, copper, arsenic, and mercury.[261,262]

Because cyanides break down in sunlight, the major environmental impacts occur from the immediate toxicity. In air and surface water, free cyanide typically degrades into non-toxic forms because of volatilization (vaporization), complexation (binding with other substances) and biological degradation.[263] The chemical is much more persistent in groundwater, though. Cyanide toxicity inhibits respiration in fish, birds, and mammals that are exposed via water or air. Accidental releases of cyanide-containing effluent from mining operations, both in the United States and internationally, have resulted in fish kills and other severe shocks to aquatic ecosystems.[264] Humans exposed to high levels of cyanide gas over a short time can experience comas, as well as damage to the brain and heart, sometimes resulting in fatality.

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[260] See, for example: T. Mudder and M. Botz, "Cyanide and society: a critical review," *The European Journal of Mineral Processing and Environmental Protection* 4 (2002), p. 62-74; J.J. Latios, "Cyanide, Mining, and the Environment," *Pace Environmental Law Review* 30 (2013), p. 869-949; R. Eisler and S. Wiemeyer, "Cyanide Hazards to Plants and Animals from Gold Mining and Related Water Issues," *Rev Environ Contam Toxicol* 183 (2004), p. 21-54; and Gavin Hilson and A.J. Monhemius, "Alternatives to cyanide in the gold mining industry: what prospects for the future?," *Journal of Cleaner Production* 14:12-13 (2006), p.1158-1167.

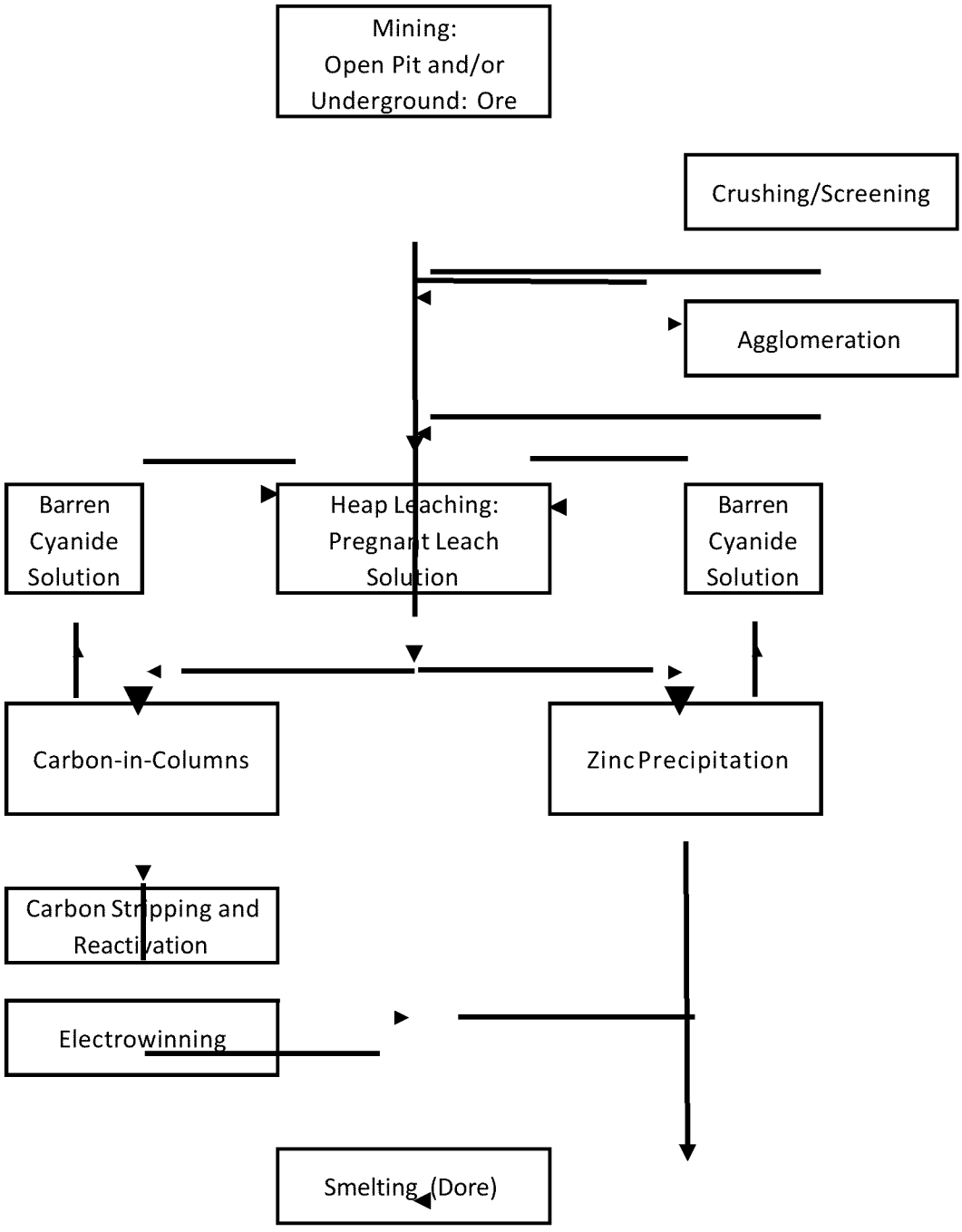
[261] R. Eisler and S. Wiemeyer, "Cyanide Hazards to Plants and Animals from Gold Mining and Related Water Issues," *Rev Environ Contam Toxicol* 183 (2004), p. 21-54.

[262] See The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009); J.L. Jambor, D.W. Blowes, and A.I.M. Ritchie, eds., *Environmental Aspects of Mine Wastes*, Short Couse Handbook, Vol. 31 (Québec: Mineralogical Association of Canada, 2003); K.A., Lapakko, "Regulatory mine waste characterization: A parallel to economic resource evaluation," in *Proceedings of the Western regional Symposium on Mining and Mineral Processing Waters*, ed. F. Doyle (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 1990), p. 31-39; and R.W. Lawrence, "Prediction of the behaviour of mining and processing wastes in the environment," in *Proceedings of the Western regional Symposium on Mining and Mineral Processing Waters*, ed. F. Doyle (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 1990), p. 115-121.

[263] J.J. Latios, "Cyanide, Mining, and the Environment," *Pace Environmental Law Review* 30 (2013), p. 869-949.

[264] J.J. Latios, "Cyanide, Mining, and the Environment," *Pace Environmental Law Review* 30 (2013), p. 869-949.

Exhibit 1.E.2. Cyanide Heap Leaching Processes Flowsheet[265]



[265] Adapted from John Marsden and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

Cyanide leaching processes create wastes that can present risks of releases of hazardous substances such as cyanide, cyanide-metal complexes, and metals via groundwater and surface water routes. [266] MIW (e.g., acid, alkaline, or neutral mine drainage), runoff originating from exposed heap leach piles or tailings is also a distinct risk associated with this practice (for more information regarding tailings management, see Section 2.C.).[267] Exhibit 1.E.3. discusses these types of potential releases in more detail.

State and Federal Regulations

Current operations are subject to substantially more comprehensive regulatory requirements relative to past operations, where discharges and abandonment were common. At both the federal and state level, land management and environmental regulations address potential environmental risks from gold mining and primary processing, including the practices and potential release risks identified above.

Mining and processing operations may be subject to preliminary environmental planning and assessment, operational requirements and performance standards, and reclamation requirements.

Federal Regulations

Federal agencies have promulgated rules regarding cyanide leaching operations under mining regulations. These include:

- **Solid Waste:** RCRA Subtitle C generally excludes extraction and beneficiation wastes, and many mineral processing wastes, from regulation as hazardous waste. Tailings and mine wastewater containing cyanide are exempt from RCRA Subtitle C under the Bevill Amendment as beneficiation wastes. During the 1998 rulemaking for the RCRA Phase IV Land Disposal Restrictions, EPA confirmed that cyanide-bearing wastes generated from beneficiation processes were not regulated under Subtitle C.[268] Many currently operating gold mines maintain RCRA Subtitle C permits for hazardous wastes unrelated to cyanide.

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[266] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Resource Document: Extraction and Beneficiation of Ores and Minerals* EPA 530-r-94-013, Volume 2: Gold (Washington, DC: U.S. Government Printing Office, 1994).

[267] Mine runoff can result from a number of mining and processing features, including exposed rock tunnels and waste rock tunnels. This issue is not unique to cyanidation practices. Although this process occurs naturally, mining exposes increased quantities of waste rock and tailings to rainwater, snowmelt, and surface water. Acidic drainage reduces the pH levels of surrounding aquatic ecosystems, threatening aquatic life and vegetation, and drainage of any pH level can contain mobilized contaminants.

[268] 63 Federal Register 28556. Vol. 63, No. 100, 28556. May 26, 1998.

Exhibit 1.E.3. Potential Releases Associated with Cyanidation and Ancillary Processes

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Solution from tanks or heap leach piles	Cyanide leaching uses one or combination of the following process chemicals: sodium cyanide, potassium cyanide, sodium hydroxide, nitric acid, and lime, as well as other process chemicals. Process chemicals may be discharged accidentally from drums, tanks and other storage containers during operations and post-closure if not properly disposed. Leaks may also occur from the leaching system itself, such as from heap leach pad liner punctures. Valley-fill heap leach designs create a high risk of solution leakage and storage issues, because of the high fluid pressures associated with tailings dams.[269] Cyanide solution without leached minerals, as well as process water recovered from tailings and heap leach facilities, is recycled back to the agitated tank cyanide leaching process. In addition to cyanide, the leach solutions accumulate metal impurities. Discharges of leach solutions may occur as a result of leakage of ponds, tanks, and piping during operations and may also be responsible for long-term post-closure seepage containing cyanide and metals.[270]	There are a multitude of liner systems and designs that can be applied. The combination of the design and the materials will determine the leakage rate of the liner system.[271] Liner systems can be designed and constructed with leak detection alarm systems and fluid recovery systems. Leak collection systems can be constructed between primary and secondary synthetic liners to collect and remove fluids from leaks, minimizing the pressure on the secondary liner. Fluid collection pipes can transmit fluid away from drainage layers.
Leach tailings	Following cyanidation processing, the spent ore or tailings is discharged to a tailings storage facility (impoundment). These wastes are typically treated to reduce the cyanide concentration, but may contain residual cyanide and cyanide complexes. They may also contain metals present in the ore body.[272] The waste	During mine design, targeted extraction techniques such as selective mining and avoidance could be used to minimize mining of ore resulting in leach tailings that could result in MIW.[273] As part of the leach tailings disposal facility design

[269] Daniel Kappes, "Precious Metal Heap Leach Design and Practice," in *Mineral Processing Plant Design, Practice, and Control Proceedings*, ed. Andrew L. Mular (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2002).

[270] Daniel Kappes, "Precious Metal Heap Leach Design and Practice," in *Mineral Processing Plant Design, Practice, and Control Proceedings*, ed. Andrew L. Mular (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2002).

[271] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.6.1.

[272] Bernd Lottermoser, *Mine Wastes: Characterization, Treatment and Environmental Impacts*, 3rd Edition (Medford, MA: Springer Science and Business Media, 2010).

[273] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.1.

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TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
	impoundment may be unlined or lined, and in either case might incorporate a collection or pumpback system for recovery of escaped tailings solution. See Section 2.C. for further discussion of tailings management.	engineered barriers such as a liner can be utilized to collect seepage from tailings resulting in reduced seepage management requirements. [274] Another technique is production of paste or dry dewatered leach tailings to reduce potential for MIW.[275] During operations special handling techniques such the addition of alkaline materials or amendments can be used to reduce potential for AMD from leach tailings.[276] At closure leach tailings areas can be reclaimed using dry and wet covers to lessen or minimize discharges of MIW. [277]
Mine drainage	Water percolating through uncovered or otherwise exposed tailings or heap leach piles may react with sulfide minerals, creating acid drainage and other MIW. Depending on the hydrology of the site, the drainage may be discharged to groundwater or surface water. A variety of factors affect the rate of MIW generation from tailings including the water level within the pile, exposure to oxygen, and the presence of bacteria. Tailings and ore piles are susceptible to acid generation because of the increased surface area exposure of minerals not extracted by the cyanide leaching process. Both surface water discharges and seepage to groundwater from tailings impoundments may contain MIW which also increases the leaching and mobility of metals.[278]	In the event the mine drainage requires treatment prior to discharge, either during operations or post-closure, a variety of active, passive and in situ mine drainage treatment techniques are potentially applicable.[282]

[274] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.6.1.

[275] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.8.

[276] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.4.2.

[277] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.2.

[278] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Resource Document: Extraction and Beneficiation of Ores and Minerals* EPA 530-r-94-013, Volume 2: Gold (Washington, DC: U.S. Government Printing Office, 1994).

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TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
	Nevada contains most of the current U.S. gold operations.[279] A 2003 USGS study of hydrological and geological conditions of northern Nevada found that mines in Nevada are much less likely than those in other states to discharge acid waters to local waterways because of low precipitation, the isolated nature of local waterways, composition of ores, and prevalence of soils containing neutralizing lime.[280] Risks from seasonal precipitation still exist, however, and there are several documented instances of AMD contamination from currently operating Nevada gold mines.[281]	
Mercury releases	Gold ore processing and production facilities are the seventh largest source of mercury air emissions in the United States.[283] Mercury commonly occurs in gold-bearing ore and is a relatively volatile element. As such, it can escape to the atmosphere, particularly from thermal processes. Mercury releases can occur as a result of various cyanidation steps.[284,285] They include preliminary roasting and autoclaving, carbon regeneration, electrowinning, mercury distillation and recovery, and doré furnace smelting. Atmospheric mercury	As part of mine design targeted extraction techniques such as selective mining and avoidance could be used to minimize mining of waste rock that could result in mercury releases.[287] Releases can be reduced using a hypochlorite injection system and by improving process and control equipment efficiency.[288]

[282] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 7.5.

[279] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Document: Acid Mine Drainage Prediction* EPA 530-R-94-036 (Washington, DC: U.S. Government Printing Office, 1994). Accessed August 13, 2015, at: https://www.epa.gov/sites/production/files/2015-09/documents/amd.pdf

[280] J.T. Nash, *Overview of Mine Drainage Geochemistry at Historical Mines, Humboldt River Basin and Adjacent Mining Areas, Nevada*, USGS Bulletin 2210-E (Washington, DC: U.S. Government Printing Office, 2003). Accessed August 13, 2015, at: http://pubs.usgs.gov/bul/b2210-e/B2210E508V6.pdf

[281] Ronald Eisler, *Biogeochemical, Health, and Ecotoxicological Perspectives on Gold and Gold Mining* (Boca Raton: CRC Press, 2010).

[283] "Fact Sheet: Final Rule to Reduce Mercury Emissions from Gold Mine Ore Processing and Production Sources," U.S. Environmental Protection Agency, updated 2010. Accessed February 13, 2015, at http://www.epa.gov/ttn/atw/area/gold_mines_fs_121610.pdf and EPA. 2010. National Emission Standards for Hazardous Air Pollutants: Gold Mine Ore Processing and Production Area Source Category; and Addition to Source Category List for Standards. 40 CFR Part 63 Subpart EEEEEEE. 76 FR 9450.

[284] Glenn Miller, "Byproduct Mercury Production in Modern Precious Metals Mines in Nevada," presented at EPA Region 8: 2007 Stakeholder Panel for Managing Domestic Stocks of Commodity-Grade Mercury, July 24-25, 2007. Accessed August 13, 2015, at: https://archive.epa.gov/mercury/archive/web/pdf/byproductmercuryproductioninmodernpreciousmetalsminesinnevada.pdf

[285] Greg Jones and Glenn Miller "Mercury and Modern Gold Mining in Nevada," Final Report to EPA Region 9, October 24, 2005. Accessed January 13, 2015, at http://www.chem.unep.ch/mercury/Trade%20information/NRDC%NEVADABYPRODUCTRECOVERYREPORT.pdf.

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
	emissions can also volatilize from heaps and tailings facilities resulting in a discharge.[286]	
Land application disposal	Cyanide solution is sometimes applied to soil for disposal, in anticipation that exposure to air will neutralize the solution. Land application of spent cyanide solutions during operations, rinsing, and post-closure seepage treatment activities, however, may introduce cyanide into the environment that does not degrade and persists in the long-term.	In theory, cyanide may be attenuated in soils through treatment methods, including precipitation, biodegradation, and oxidation. Cyanide may persist long-term, though, despite these mechanisms.[289]

[287] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.1.

[288] "Nevada Voluntary Mercury Reduction Program (VMRP), Questions and Answers," Nevada Division of Environmental Protection, updated May 2005, accessed August 13, 2015, at https://ndep.nv.gov/mercury/docs/voluntar_mercury_q&a05.pdf.

[286] Glenn Miller, "Environmental Technologies in the Mining Industry," presented April 12, 2011. Accessed August 13, 2015, at: http://dels.nationalacademies.org/resources/static-assets/besr/miscellaneous/Miller.pdf

[289] Glenn Miller, "Environmental Technologies in the Mining Industry," presented April 12, 2011.

State and local governments implement solid waste management guidelines under RCRA Subtitle D. EPA's authority under Subtitle D is limited; its primary role is to promulgate sanitary landfill criteria to prevent adverse effects on health or the environment. As of 2013, EPA has not finalized any solid waste management requirements specifically applicable to the disposal of Bevill waste.

- **Discharges to Water:** Under the CWA ELGs for ore mining and dressing, mines and mills extracting and beneficiating gold and silver ores (except for placer deposits) must comply with a zero-discharge requirement for point sources of process wastewater." [290] These requirements also specify effluent limitations for other wastewater from gold mines and mills, including limits on cyanide, sediment, and other trace elements. Where ELGs may not apply, technology-based limits are developed during the facility-specific permitting process. The NPDES program applies to both active and inactive mines, as well as abandoned mines where legally responsible owners or operators of point sources can be identified. Runoff from tailings impoundments, spent ore piles and waste rock piles may be regulated under stormwater permits.[291] Stormwater permits regulate stormwater contaminated by contact with material from mining activities.
- **Surface Management:** BLM 3809 regulations on surface management have several requirements that relate to cyanide. Under BLM's 1990 cyanide management policy, cyanide operations on BLM lands must create a cyanide management plan and comply with design and treatment standards. Cyanide operations are also factored in BLM's bonding and reclamation requirements. BLM conducts quarterly inspections of operations using cyanide. Operators must construct and operate cyanide facilities such that they will not overflow during local 100-year or 24-hour storm events, snowmelt events, and draindown from heaps during power outages. Operators must also exclude access by the general public, wildlife, and livestock to structures containing lethal levels of cyanide. BLM regulations on the design, operation, and monitoring of waste management structures also apply to cyanide-bearing wastes.[292] The surface management regulations also specify engineering requirements and require liners, containment systems, and inspections for process areas, including cyanide leach operations and tailings impoundments or ponds.

  The USFS has not developed specific policies for cyanide management. Cyanide leaching operations are considered under the general review and permitting process, in which plans of operation and permitting incorporate operation-specific practices.

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[290] 40 CFR Volume 50 Subpart J Section 440. In light of recent Supreme Court cases regarding the scope of waters protected under the Clean Water Act, applicability is further clarified in the proposed rulemaking EPA and Army Corps of Engineers at 79 FR 22187, "Definition of 'Waters of the United States' Under the Clean Water Act," accessed at: https://www.federalregister.gov/articles/2014/04/21/2014-07142/definition-of-waters-of-the-united-states-under-the-clean-water-act

[291] The classification of point and nonpoint discharges from mining operations has evolved over time. For more information regarding current definitions of point sources from mining operations, see: *Greater Yellowstone Coalition v. Lewis*, 628 F.3d 1143 (9th Cir. Dec 23, 2010)

[292] 43 CFR Subpart 3809.420

- **Air Emissions:** No federal air regulations specifically oversee cyanide in mining operations. The CAA National Emission Standards for Hazardous Air Pollutants (NESHAPs), however, address mercury emissions from gold mine ore processing and production.[293] While mercury amalgamation is rarely used to extract gold from ore at currently operating mines, mercury can naturally occur in gold ore and can be released through thermal processing and refining.

State Regulations

Many states' regulatory requirements do not specifically address cyanide use in mining. In these cases, however, cyanide releases are controlled under other state environmental regulations. Many states have operational, technology, and performance-based standards for general mining waste management and disposal. For example, Nevada water pollution control regulations and California mining waste management regulations each have minimum design criteria and performance standards for the specific management of mining waste. Nevada's regulations apply to both waste rock piles and to disposal sites for processed ores. California's definition of mining waste (to which design and performance standards apply) includes all solid, semisolid, and liquid waste materials from the extraction, beneficiation, and processing of ores and minerals.

States also set surface and groundwater quality standards. Some of these, including Nevada, include limits on cyanide concentrations. Some states also have stormwater regulations directed at mining, which may regulate runoff from waste disposal units carrying cyanide-bearing wastes. In Alaska, stormwater discharges are required to have Alaska Pollutant Discharge Elimination System (APDES) permits, which require grab sampling for cyanide and effluent limitations consistent with the federal CWA. In Nevada, Nevada Stormwater General Permit NVR300000 applies specifically to stormwater discharges from waste rock dumps and overburden piles metals mining activities.

Some state regulations, which also often apply to operations on private land, specify requirements such as treatment criteria, engineering standards, as well as specific review processes for cyanide operations.[294] For example:[295]

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[293] 40 CFR 63, Subpart EEEEEEE *(area sources)*

[294] For survey reviews of state-level regulations, please see: California State Mining and Geology Board, *A Comparison of Regulatory Surface Mining Programs in the Western United States* (Sacramento: California Department of Conservation Resources Agency). Accessed August 13, 2015, at: http://www.consrv.ca.gov/smgb/reports/Documents/SMGB%20IR%202007-04%20FINAL%20with%20%20appendices.pdf; and U.S. Environmental Protection Agency, Office of Solid Waste. *Technical Report: Treatment of Cyanide Heap Leaches and Tailings* (Washington, DC: U.S. Government Printing Office, 1994). Accessed August 13, 2015, at: https://nepis.epa.gov/Exe/ZyNET.exe/2000EF6J.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1991+Thru+1994&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C91thru94%5CTxt%5C00000012%5C2000EF6J.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL.

[295] EPA selected states for review based on the level of overall hardrock mining and mineral processing activity. These states include: Alaska, Arizona, California, Idaho, Minnesota, Montana, Nevada, and Utah.

- **Nevada's** mining regulations specifically oversee cyanide. [296] Nevada water control regulations establish minimum design criteria for tailings impoundments and ponds. Process areas must obtain a permit to ensure compliance with these engineering standards. These rules also specify the treatment of spent ore from leaching operations. Nevada regulations prohibit mining facilities from causing the concentration of weak acid dissociable (WAD) cyanide in groundwater to exceed 0.2 mg/l. Spent ore left on pads or removed from pads must also demonstrate that WAD cyanide levels in effluent are under 0.2 mg/l. Cyanide in surface waters must not exceed a 22 µg/l average over one hour, and a 5.2 µg/l average over 96 hours.

Nevada's Voluntary Mercury Air Emission Reduction Program established mercury emission reduction goals.[297] Nevada also requires additional technological controls for mercury emissions on thermal units at existing and new metal mines. All users of thermal units at existing metal mines must apply for a Mercury Operating Permit to construct before constructing thermal units.[298]

- **Idaho** regulations require permits for cyanide facilities and lay out standards for construction, operation, and closure. Permit applications require environmental and risk management reviews.[299] Idaho regulations also require that before disposal or abandonment of leached ore, concentrations of WAD cyanide or free cyanide and other pollutants in process-contaminated water draining from the leached ore must be reduced to a level set by the permit writer based on disposal method, location, and potential for surface water and groundwater contamination, or have a pH of between 6.5 and 9 (stabilized).[300]
- **Indiana** water quality standards prohibit operations that produce cyanides and cyanogen compounds from draining these substances directly or indirectly into any sewer system or watercourse. Indiana regulations also require water treatment control facilities to submit monthly reports that detail flow measurements and wastewater characteristics to the Indiana Department of Environmental Management (IDEM).[301]
- Two states have enacted legal bans on the use of cyanide in mineral operations: a **Montana** referendum banned open pits that use cyanide leaching in 1998, and the **Wisconsin** legislature banned cyanide for mining and ore processing in 2001.

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[296] NAC 445A. Accessed at: http://www.leg.state.nv.us/nac/nac-445a.html.

[297] In 2003, Nevada produced 82 percent of the gold mined in the United States. The Toxic Release Inventory (TRI) for Nevada indicates that four Nevada mining companies emitted roughly 90 percent of the state's reported mercury air emissions in 2001. For more information, see: "Fact Sheet: Final Rule to Reduce Mercury Emissions from Gold Mine Ore Processing and Production Sources," U.S. Environmental Protection Agency, updated 2010. Accessed February 13, 2015, at http://www.epa.gov/ttn/atw/area/gold_mines_fs_121610.pdf

[298] NAC 445B.3611 – 445B.3689. Accessed at: http://www.leg.state.nv.us/nac/nac-445b.html.

[299] IDAPA 58.01.13. Accessed at: https://adminrules.idaho.gov/rules/2005/58/0101.pdf

[300] IDAPA 58.91.13. Accessed at: http://adminrules.idaho.gov/rules/2005/58/0101.pdf

[301] 327 IAC 2. Water Quality Standards. Accessed at: http://www.in.gov/legislative/iac/title327.html.

Non-Operating Sites and Currently Operating Facilities

The available documents showed that cyanide leach processes were used in at least seven of 15 non-operating sites in the sample, and are used in at least five of 16 currently operating facilities in the sample. Additionally, 2013 TRI data indicated that throughout the United States, at least 23 mineral mining facilities handled cyanide compounds.

The combined history of these sites and facilities suggests that releases can occur during operations, as well as post-closure from waste storage facilities. In addition, financial health of companies can influence operational and mitigation practices employed by the operators, which, in turn, may affect the potential for releases.

Non-Operating Sites

Fifteen non-operating CERCLA sites that mined or processed gold or silver were reviewed.[302] These non-operating sites showed contamination from hazardous substances such as trace elements, cyanide, and polychlorinated biphenyls (PCBs); they also discharged MIW. Cyanide was used at seven of the 15 non-operating sites.

Eleven of 15 sites began operations before 1900. It is possible that these sites became contaminated before the promulgation of major environmental laws and regulations that currently govern mining and primary processing. For example, little mineral extraction or processing activity took place at one of the sites in the sample, the Upper Tenmile Creek Mining Area, after the 1930s. Similarly, California Gulch (EPA ID COD980717938) ceased operations before 1980. ROD and RI/FS documents do not, however, discuss regulatory oversight at the time releases occurred.

At the same time, research shows that since the promulgation of major environmental laws since 1980, gold mines and mineral processing sites using cyanide leach methods have continued to experience releases resulting in CERCLA site listing. In particular, heap leach processes have been associated with five of the six cyanidation-related releases since 1980, while one site experienced leaks from a tank leaching operation. For example, the Brewer Gold Mine used heap leach cyanidation methods to process ore. In 1990, large rainstorms caused a dam to break and over 10 million gallons of the solution spilled into the nearby waterways. The leaked solution killed fish in Little Fork Creek and Lynches River for nearly 50 miles downstream.

The review of these 15 non-operating sites also showed that financial and economic factors appear to have played a role in some of the actions leading up to these CERCLA listings. For example:

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[302] The sample includes: Asarco, Inc. (Globe Plant) (EPA ID COD007063530), Barite Hill/Nevada Goldfields (EPA ID SCN000407714), Blackbird Mine (EPA ID IDD980725832), Brewer Gold Mine (EPA ID SCD987577913), Bueno Mill & Mine Site (EPA ID CON000802129), Bunker Hill Mining & Metallurgical Complex (EPA ID IDD048340921), California Gulch (EPA ID COD980717938), Captain Jack Mill (EPA ID COD981551427), Cimarron Mining Corp. (EPA ID NMD980749378), East Helena Site (EPA ID MTD006230346), Gilt Edge Mine (EPA ID SDD987673985), Pioneer Pit and Gardner's Point Placer Mines (EPA ID CAN000905978), Silver Mountain Mine (EPA ID WAD980722789), Summitville Mine (EPA ID COD983778432), and Upper Tenmile Creek Mining Area (EPA ID MTSFN7578012).

- The Gilt Edge Mine's operations began at the site in 1876, although cyanidation was not used throughout the entire duration of operation. Currently, the 360-acre primary mine disturbance area encompasses a former open pit and a cyanide heap-leach gold mine, as well as prior mine exploration areas used by various companies. The Brohm Mining Company, the most recent mine operator, faced financial problems in the 1990s and informed state authorities that it would not continue site controls. The Brohm Mining Company left 150 million gallons of acidic metal-laden water in three open pits, as well as millions of cubic yards of acid-generating waste rock that requires cleanup and long-term treatment. Elevated nitrates and cyanide were present in heap leach residues. Consequently, EPA proposed a CERCLA listing on May 11, 2000.
- At the Summitville site, Summitville Consolidated Mining Corp., Inc. used cyanide heap leaching to extract precious metals. In 1986, a leak was detected in the heap leach pad. Summitville Consolidated abandoned the site and filed for bankruptcy in December 1992. EPA assumed responsibility of the site as an emergency response and placed the site on the NPL two years later.
- Other non-operating, non-Superfund sites also offer examples of cyanide leaching releases. Zortman and Landusky Mines (MSHA ID 240150) and Beal Mountain Mine (MSHA ID 2401642), all in Montana, used cyanidation to extract precious metals. Both underwent bankruptcy and left significant pollution at their respective sites. In addition to a heap leach pad leak, the Zortman and Landusky facility experienced cyanide releases from a leach pad pipe, a solution pond liner leak, and a process pond liner leak.[303]

Currently Operating Facilities

All 16 currently operating facilities selected for closer analysis have been in operation for fewer than 40 years.[304] Of these, 11 began activities under their current operator after 2000. Equipment failure or operator errors were cited as reasons for almost all documented releases at facilities in the currently operating sample. ERNS and enforcement information revealed evidence of releases of cyanide at three facilities. Our review revealed evidence of 13 cyanide releases from four sites, from 1991-2014. Six of these releases occurred in 2000 or later. Three incident reports in ERNS for the sample of currently operating facilities report spills of cyanide of 22,000

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[303] U.S. Bureau of Land Management, *Final Engineering Evaluation/Cost Analysis (EE/CA) For Water Management at the Zortman and Landusky Mines, Phillips County Montana*, prepared by Spectrum Engineering (Washington, DC: U.S. Government Printing Office, 2006). Accessed August 28, 2015: http://www.blm.gov/style/medialib/blm/mt/field_offices/lewistown/zortman.Par.62509.File.dat/finaleeac.pdf; and US Department of Agriculture. *Final (Revision 6) Engineering Evaluation/Cost Analysis. Beal Mountain Mine. Beaverhead-Deerlodge National Forest Silver Bow County, Montana*, prepared by Tetra Tech (Washington, DC: U.S. Government Printing Office, 2010). Accessed August 28, 2015, at: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5183264.pdf

[304] These include: Apache Mining Old Wasp Mine(MSHA ID: 0203246), Barrick Cortez (MSHA IDs 2600827 and 2602573), Barrick Goldstrike Mine/Mill/Roaster (MSHA IDs 2601089, 2602674, and 2602673), Golden Sunlight Mine (MSHA ID 2401417), Coeur Kensington (MSHA ID 5001544), Coeur Rochester (MSHA ID 2601941), Florida Canyon Mine (MSHA ID 2601947), Geo Nevada Spring Valley (MSHA ID 2602470), Hecla Greens Creek (MSHA ID 5001267), Kinross Crown Resources Buckhorn Mine (MSHA ID 4503615), Newmont Chukar (MSHA ID 2602481), Newmont Emigrant/Mill 6 (MSHA IDs 2602697 and 2602678), Sixteen To One Mine (MSHA ID 0401299), US Silver Galena (MSHA ID 1000082), Veris Gold Saval 4- Jerritt Canyon (MSHA IDs 2602742 and 2601621), and Waterton Global Hollister Mine (MSHA ID 2602535).

gallons, 53,000 gallons, and 159,000 gallons in single incidents, respectively. Permit documents for one currently operating facility also reported an estimated leak of 170,000 gallons of tailings seepage solution from a ruptured underground pipe. Currently operating facilities that experienced releases from cyanidation operations include:

- ERNS data showed reports of 31 releases from 1990-2013 at Barrick Goldstrike Mine (EPA ID NVD000626531), a gold surface mine, including releases of arsenic, mercury, cyanide, and sulfuric acid. Several of these releases involved relatively large quantities, such as a spill of 21,625 gallons of sodium cyanide in 1995 due to equipment failure of a process unit and a spill of 159,000 gallons of cyanide in 2003 due to equipment failure from a tailings impoundment, which affected a nearby dry stream bed. In 2015, Barrick paid penalties for RCRA Subtitle C allegations regarding mercury releases dating back to 2007.[305] The mine has also faced administrative enforcement actions under the Clean Air Act and CERCLA for a release of 3,300 pounds of anhydrous ammonia in 2011, which resulted in the evacuation and transport to local hospitals of 13 workers.[306]
- The **Florida Canyon** mine (MSHA ID 2601947) began operations in Nevada In 1986 as a cyanide heap leach facility. The west side of the mine's leach pad seeped cyanide, mercury, nitrate, and process solution into the groundwater. Remediation began in 2000, but the contamination continued. As a result, the Nevada Department of Environmental Protection issued a Finding of Alleged Violation and Order in August 2012, and BLM placed the mine in noncompliance at the same time. The facility submitted a corrective action plan in 2013, involving a groundwater plume pump back system and capture zone evaluation.[307]

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[305] "Enforcement and Compliance History Online (ECHO): Barrick Goldstrike Mines, Inc. (FRS ID 11003802178)," U.S. Environmental Protection Agency. Accessed September 28, 2016, at: https://echo.epa.gov/enforcement-case-report?id=09-2012-5124.

[306] "Enforcement and Compliance History Online (ECHO): Barrick Goldstrike Mines, Inc. (FRS ID 11003802178)," U.S. Environmental Protection Agency. Accessed September 28, 2016, at: https://echo.epa.gov/enforcement-case-report?id=09-2014-3501.

[307] Office of Resource Conservation and Recover. "Discharges from Hardrock Mines and Mineral Processors Operating in the Modern Mining Era (1978-Present)." September 29, 2016.

F. Acid Leach, Solvent Extraction and Electrowinning

Introduction

Acid leaching (including heap leaching and dump leaching techniques) usually entails treating crushed or uncrushed (run-of-mine) ore with sulfuric acid solution to dissolve the metal, which is then recovered and purified by solvent extraction and electrowinning (SX/EW). Hydrometallurgical processes, including acid leaching, are most commonly applied to oxide ores and low-grade oxide and sulfide mine wastes.[308] Although it is occasionally used for other metals such as nickel and mercury, acid leaching is generally identified with the production of copper, which is by far its most common use.[309] As such, this chapter focuses on acid leach in relation to copper production. Heap and vat leaching processes using cyanide solutions to produce precious metals such as gold and silver are described in Section 1.E.

Leaching tanks, leach pads, piping and storage facilities (e.g., process solution ponds and facilities associated with leaching) can release sulfuric acid and mobilized contaminants into the environment. These leaching solutions can pose significant environmental and human health risks if they are not contained successfully. Information on documented releases reveals that acid leach operations have caused contamination of both surface and groundwaters in addition to injuring habitat and wildlife. Releases due to equipment failures, chronic seepage, or weather-related overflows seem to be the most common problems; acid leach operations need to ensure proper reclamation of spent dump or heap leach piles, maintenance of equipment, and preparation of systems for severe weather in order to minimize environmental impacts.

Past and Current use

Dump leaching involves the application of leach solution to uncrushed and otherwise unprocessed ore, directly from the mine. Because of its low cost, dump leaching is the most common leach method used for production of copper. Dump leaching is also used for nickel mining. Because the dump leaching process can take up to two years to process a given ore pile and in some cases results in relatively low extraction rates, heap leaching may be employed instead. In heap leaching, the operator first crushes or agglomerates the ore, exposing more surface area and making the leach solution more effective. Although also typically used for treatment of low-grade ores, heap leaching is slightly more expensive. Because of this cost

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[308] U.S. Congress, Office of Technology Assessment, "Chapter 6: Copper Production Technology," in *Copper: Technology and Competitiveness* (Washington, DC: U.S. Government Printing Office, 1988).

[309] Randolph Scheffel, "Copper Heap Leach Design and Practice," in *Mineral Processing Plant Design, Practice, and Control Proceedings*, ed. Andrew L. Mular (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2002).

differential, the prevalence of heap leaching increases during periods of high commodity prices.[310]

In 1963, General Mills' production of LIX 63 (a copper reagent) led to the widespread use of the SX/EW process for copper production. The SX/EW process has also been extended to the production of nickel, cobalt, and rare-earth elements in some instances, but copper production remains by far the most common use.[311] As of 2013, 38 percent of total U.S. mine production of copper was processed using leaching and SX/EW.[312]

Technical Description

Leaching

Leaching dissolves metals from ore using aqueous or other liquid medium. Two main types of acid leaching systems process ore in contemporary copper mining operations: dump leaching and heap leaching. Raffinate (sulfuric acid solution) is the most common process solution employed during acid leach.

Heap leaching (described in greater detail in Section 1.E.) involves placing ore on a leach pad on an impermeable barrier and applying solution to the ore stack (usually through sprinklers or drip irrigation). Dump leaching is very similar to heap leaching, except ore is not crushed before being placed on the leach pad, and in most cases the leach pad is not lined. Instead, downstream surface and groundwater collections systems are typically employed to capture the leach solution. After leaching, the pregnant solution containing the dissolved metals is piped to the SX/EW plant, and the spent leach solutions are generally recycled for reuse.

SX/EW

In a typical solvent extraction circuit, the pregnant solution from leaching is pumped to a mixer, where the aqueous solution is mixed with an extractant (usually an organic solvent) to form a concentrated metal-laden solution. The extractant is designed to extract only the desired metal (e.g., copper), leaving impurities (such as unwanted metals) in the leachate. The solution is then pumped to a settling tank, where the copper-loaded organic solution is separated from the aqueous leachate solution. The leachate (now devoid of the desired metal) is recycled back to the leaching unit, and the copper-laden solution moves to the electrowinning stage.

In electrowinning, an electric current is passed through the metal-laden solution within an electrolytic cell, which causes the dissolved metals to deposit on cathodes. These purified metal

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[310] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

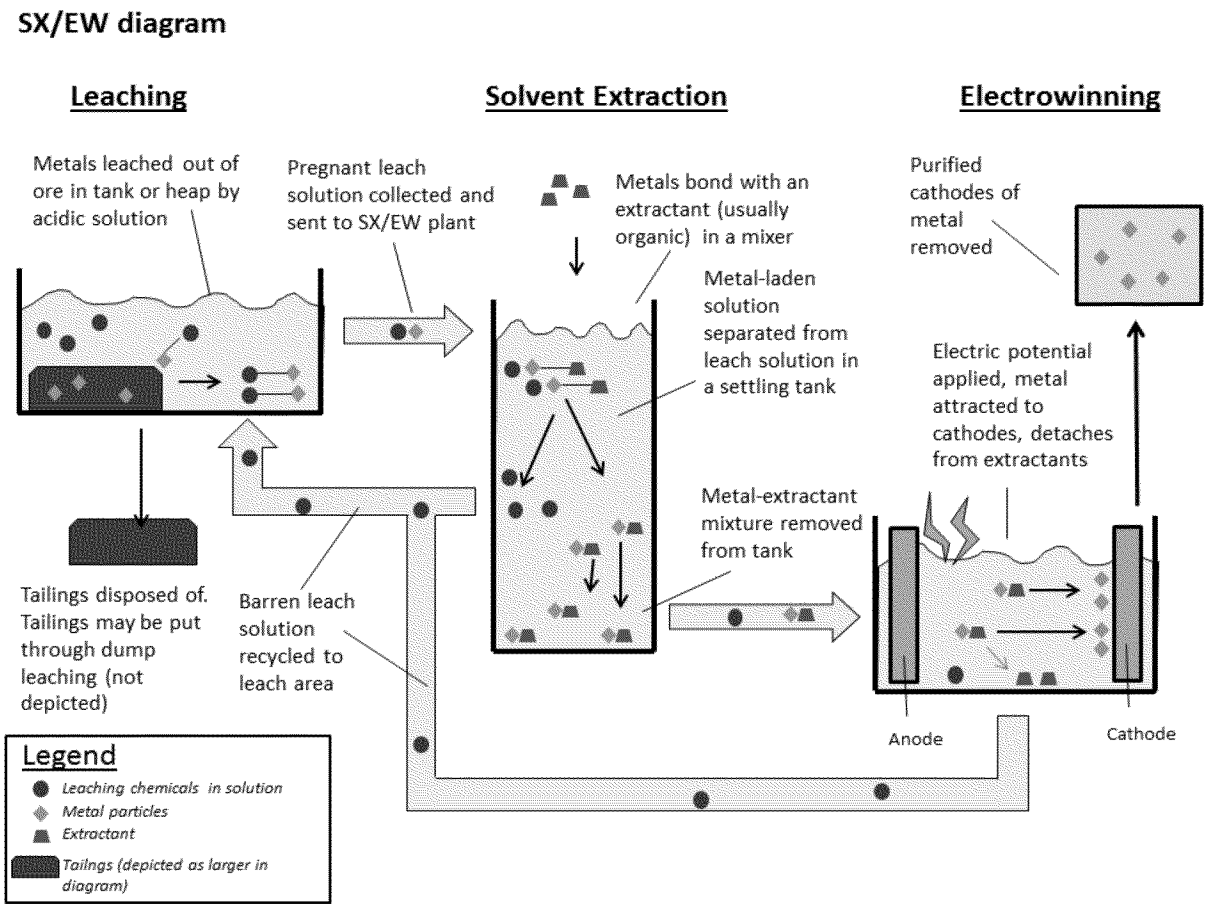
[311] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[312] "USGS Minerals Yearbook: Copper," U.S. Geological Survey, 2013. Accessed Dec. 18, 2015, at http://minerals.usgs.gov/minerals/pubs/commodity/copper/myb1-2013-coppe.pdf

deposits are ready to be removed, and the remaining solution can be recycled back to the extraction stage.[313]

Exhibit 1.F.1. shows a simplified flow chart of the acid leach, solvent extraction, and electrowinning process.

Exhibit 1.F.1. Acid Leach, Solvent Extraction and Electrowinning Flow Chart



Potential Sources of Hazardous Substances

Sulfuric acid is the most common leaching agent used for acid leach and SX/EW. The process also uses large quantities of organic solvents that can require costly disposal. These process reagents can have serious human health consequences as well as ecological effects.[314] In addition, sulfuric acid can leach metals from other mining wastes and containment areas,

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[313] U.S. Congress, Office of Technology Assessment, "Chapter 6: Copper Production Technology," in *Copper: Technology and Competitiveness* (Washington, DC: U.S. Government Printing Office, 1988).

[314] Agency for Toxic Substances and Disease Registry: Division of Toxicology, *Public Health Statement Sulfur Trioxide and Sulfuric Acid* CAS#: 7664-93-9 (Washington, DC: U.S. Government Printing Office, 1998). Accessed December 18, 2015, at http://www.atsdr.cdc.gov/ToxProfiles/tp117-c1-b.pdf.

transporting other contaminants to surface and groundwater systems. While leaching solutions are generally recycled back to the process, failure to contain them properly can result in releases. After leaching has been discontinued, the abandoned leach site can be a source of acidic effluents, hazardous trace elements, and total dissolved solids if it is not properly monitored and managed.[315] MIW and runoff originating from exposed heap leach piles or tailings are also distinct risks associated with this practice.[316] Exhibit 1.F.2 discusses these types of potential releases in more detail.

State and Federal Regulations

Current operations are subject to substantially more comprehensive regulatory requirements relative to past operations, where discharges and abandonment were common. At both the federal and state level, land management and environmental regulations address potential environmental risks from copper mining and primary processing, including the practices and potential release risks identified above.

Mining and processing operations may be subject to preliminary environmental planning and assessment, operational requirements and performance standards, and reclamation requirements.

Federal Regulations

Federal agencies have promulgated rules regarding acid leaching operations under mining regulations. These include:

- **Solid waste.** RCRA Section 3001(b)(1) (the Bevill Amendment) exempts solid waste from extraction and beneficiation, including leaching, solvent extraction, and electrowinning, from regulation as hazardous waste under RCRA Subtitle C. State and local governments implement solid waste management guidelines under RCRA Subtitle D. EPA's authority under Subtitle D is limited; its primary role is to promulgate sanitary landfill criteria to prevent adverse effects on health or the environment. As of 2013, EPA has not finalized any solid waste management requirements specifically applicable to the disposal of Bevill waste.[317]

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[315] U.S. Congress, Office of Technology Assessment, "Chapter 8, Environmental Aspects of Copper Production," in *Copper: Technology and Competitiveness* (Washington, DC: U.S. Government Printing Office, 1988).

[316] Mine runoff can result from a number of mining and processing features, including exposed rock tunnels and waste rock tunnels. This issue is not unique to cyanidation practices. Although this process occurs naturally, mining exposes increased quantities of waste rock and tailings to rainwater, snowmelt, and surface water. Acidic drainage reduces the pH levels of surrounding aquatic ecosystems, threatening aquatic life and vegetation, and drainage of any pH level can contain mobilized contaminants.

[317] L. Luther, "Background on and Implementation of the Bevill Bentsen Exclusions in the Resource Conservation and Recovery Act: EPA Authorities to Regulate 'Special Wastes,'" *Congressional Research Service* R43149 (Washington, DC: U.S. Government Printing Office, 2013).

Exhibit 1.F.2. Potential Releases Associated with Acid Leach and SX/EX

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Solution from tanks or leach piles	Process chemicals such as sulfuric acid that are used in acid leach and SX/EW may be discharged from drums, tanks and other storage containers during operations and post-closure if not properly disposed. Leaks may also occur from the leaching system itself, such as from heap leach pad liner punctures. Valley-fill heap leach designs create a high risk of solution leakage and storage issues because of the high fluid pressures.[318] Discharges of leach solutions may occur as a result of leakage of ponds, tanks, and piping during operations and may also be responsible for long-term post-closure seepage containing acidic effluents and toxic metals.[319,320]	Liner systems can be designed and constructed with leak detection alarm systems and fluid recovery systems. Typically, a minimum of one synthetic membrane is used in combination with a compacted earthen liner. Additional measures, such as using two synthetic liners, can be applied when significant pressure creates cause for concern. Leak collection systems can be constructed between primary and secondary synthetic liners to collect and remove fluids from leaks, minimizing the pressure on the secondary liner. Fluid collection pipes can transmit fluid away from drainage layers. Detailed hydrologic characterization of heap and dump sites before construction and ongoing monitoring are additional proactive management steps that mitigate the possibility of a harmful release.
Leach tailings	Following acid leach operations, the spent ore or tailings is discharged to a tailings storage facility (impoundment). These wastes may be highly acidic and may also contain metals present in the ore body.[321] The waste impoundment may be	During mine design, targeted extraction techniques such as selective mining and avoidance could be used to minimize mining of ore resulting in leach tailings that could result in MIW.[322]

[318] Daniel Kappes, "Precious Metal Heap Leach Design and Practice," in *Mineral Processing Plant Design, Practice, and Control Proceedings*, ed. Andrew L. Mular (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2002).

[319] Daniel Kappes, "Precious Metal Heap Leach Design and Practice," in *Mineral Processing Plant Design, Practice, and Control Proceedings*, ed. Andrew L. Mular (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2002).

[320] U.S. Congress, Office of Technology Assessment, "Chapter 8, Environmental Aspects of Copper Production," in *Copper: Technology and Competitiveness* (Washington, DC: U.S. Government Printing Office, 1988).

[321] Bernd Lottermoser, *Mine Wastes: Characterization, Treatment and Environmental Impacts*, 3rd Edition (Medford, MA: Springer Science and Business Media, 2010).

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
	unlined or lined, and in either case might incorporate a collection or pumpback system for recovery of escaped tailings solution.	As part of the leach tailings disposal facility design, engineered barriers such as a liner can be utilized to collect seepage from tailings resulting in reduced seepage management requirements.[323] Another technique is production of paste or dry dewatered leach tailings to reduce potential for MIW.[324] During operations special handling techniques such as the addition of alkaline materials or amendments can be used to reduce potential for AMD from leach tailings.[325] At closure leach tailings areas can be reclaimed using dry and wet covers to lessen or minimize discharges of MIW.[326]
Mine drainage	Water percolating through uncovered or otherwise exposed tailings or leach piles may react with sulfide compounds, creating acid drainage. Depending on the hydrology of the site, the acid drainage may be discharged to groundwater or surface water. A variety of factors affect the rate of acid drainage generation from tailings, including the water level within the pile, exposure to oxygen, and the presence of bacteria. Tailings and ore piles are susceptible to acid generation because of the	In the event the mine drainage requires treatment prior to discharge, either during operations or post-closure, a variety of active, passive and in situ mine drainage treatment techniques are potentially applicable.[328]

[322] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.1.

[323] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.6.1.

[324] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.8.

[325] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.4.2.

[326] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.2.

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TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
	increased surface area exposure of minerals not extracted by the leaching process. Both surface water discharges and seepage from tailings impoundments may contain acid drainage which also increases the leaching and mobility of metals.[327]	

[328] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 7.5.

[327] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Resource Document: Extraction and Beneficiation of Ores and Minerals* EPA 530-r-94-013, Volume 2: Gold (Washington, DC: U.S. Government Printing Office, 1994).

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Facilities sometimes dispose of Bevill-exempt wastes in the same waste management units as non-exempt hazardous wastes.[329] In situations where facilities combine tailings with other wastes that exhibit hazardous characteristics, the waste mixtures may fall under RCRA Subtitle C regulations.

- **Discharges to Water:** Untreated tailings may not be discharged into surface waters.[330] To comply with water quality standards under the CWA, mine operators must obtain permits under NPDES for any discharge of pollutant from a point source to waters of the United States.[331] For many hardrock commodities, EPA has promulgated ELGs requiring technology-based controls and establishing specific water quality standards. For example, the ore mining and dressing ELG establishes a zero-discharge requirement for point sources of process wastewater for copper mining and milling operations using leaching processes, and the nonferrous metals manufacturing ELG establishes water quality requirements for discharges from electrowinning operations.[332] For discharges or pollutants not covered by the ELGs, EPA or the delegated state authority incorporates limits into permits on a site-specific basis. Under the CWA ELGs for ore mining and dressing, mines and mills extracting and beneficiating copper ores using leaching processes must comply with a zero-discharge requirement for point sources of process wastewater."[333] Where ELGs may not apply, technology-based limits are developed during the facility-specific permitting process. The NPDES program applies to both active and inactive mines, as well as abandoned mines where legally responsible owners or operators of point sources can be identified.

  Runoff from tailings impoundments, spent ore piles, and waste rock piles may be regulated under NPDES stormwater permits if it is not commingled with process water or

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[329] An EPA survey of 106 facilities in 1989 indicated that 20 facilities placed mixtures of Bevill-exempt and non-exempt wastes in the same waste management unit. See: U.S. Environmental Protection Agency, *Mineral Processing Facilities Placing Mixtures of Exempt and Non-Exempt Wastes in On-site Waste Management Units: Technical Background Document Supporting the Supplemental Proposed Rule Applying Phase IV Land Disposal Restrictions to Newly Identified Mineral Processing Wastes* (Washington, DC: U.S. Government Printing Office, 2013).

[330] U.S. Environmental Protection Agency Region 10, *EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska* (Washington, DC: U.S. Government Publishing Office, 2003).

[331] Point sources are defined broadly, includes any discernable, confined, and discrete conveyance, such as a pipe, ditch, channel, tunnel, conduit, or container. "Waters of the United States" includes navigable waters, tributaries, interstate waters, intrastate waters used by interstate travelers, or for industrial purposes by industries engaged in interstate commerce. Generally, mining operations would fall under the Clean Water Act for process wastewater, mine drainage, and stormwater. See: U.S. Environmental Protection Agency Region 10, *EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska* (Washington, DC: U.S. Government Publishing Office, 2003).

[332] 40 CFR 440 (ore mining and dressing); 40 CFR Part 421 (nonferrous metals manufacturing).

[333] 40 CFR Volume 50 Subpart J Section 440. In light of recent Supreme Court cases regarding the scope of waters protected under the Clean Water Act, applicability is further clarified in the proposed rulemaking EPA and Army Corps of Engineers, "Definition of 'Waters of the United States' Under the Clean Water Act," 79 *FR* 22187 (Washington, DC: U.S. Government Printing Office, 2014). Accessed December 18, 2015, at: https://www.federalregister.gov/articles/2014/04/21/2014-07142/definition-of-waters-of-the-united-states-under-the-clean-water-act

mine drainage.[334] Stormwater permits regulate stormwater contaminated by contact with material from mining activities, primarily requiring site-specific pollution prevention planning and/or implementation of mitigation practices.[335] These include treatment requirements, operating procedures, practices to control runoff, and monitoring.

- **Surface Management:** Mining operations on public federal land are subject to additional regulation. According to the BLM Section 3809 rules, mining operations must prevent unnecessary or undue degradation, which includes managing all tailings, rock dumps, deleterious material or substances and any other waste produced from mining operations.[336] Any field-scale testing using sulfuric acid (e.g., test heaps) must be conducted under a formal plan of operations, which includes environmental evaluation. BLM guidance indicates that proper disposal of mining wastes must involve siting of tailings facilities to minimize potential for environmental impact. Further, operators must conduct reclamation to maximize long-term geotechnical and geochemical stability and minimize the formation and release of leachate.[337] Requirements include:
    - Operators must have low-permeability liners or containment systems to minimize the release of solution to the environment using best available technology, and must monitor for potential contaminant releases from leaching operations and tailings impoundments.
    - Operators must construct a secondary containment system around vats, tanks, and recovery circuits that can retain solution from a leak or failure, in order to prevent the release of toxic solutions to the environment.
    - Operators must design, construct, and operate leaching facilities and tailings impoundments to contain precipitation from the local 100-year, 24-hour storm event.
- **Air Emissions:** Leaching and the SX/EW process do not produce the air pollution associated with alternative processes, such as smelting. No regulations under the CAA or other laws directly apply to acid leaching, solvent extraction, and electrowinning.

State Regulations

Many states have operational, technology, and performance-based standards for general mining waste management and disposal in state solid waste regulations, state groundwater pollution laws, dam safety programs, or state mining laws. Generally, state and local governments

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[334] Seepage to groundwater is not considered a point source, and is not regulated under the Clean Water Act. The classification of point and nonpoint discharges from mining operations has evolved over time. For more information regarding current definitions of point sources from mining operations, see: *Greater Yellowstone Coalition v. Lewis*, 628 F.3d 1143 (9th Cir. Dec 23, 2010)

[335] Best management practices for stormwater permits are described at 40 CFR 122.2.

[336] 43 CFR Part 3809

[337] U.S. Department of the Interior, Bureau of Land Management, *Surface Management Handbook* H-3809-1 (Washington, DC: U.S. Government Printing Office, 2012), Section 5.3.2

implement solid waste management guidelines under RCRA Subtitle D, establishing operating and closure requirements that apply to all types of industrial waste disposal units. States with delegated authority also implement CWA regulations, with state programs at least as stringent as federal regulations. Several state regulations specifically manage mine tailings, although in some cases tailings with no chemical additives are excluded from regulation. For example:

- **Alaska's** land reclamation performance standards require heap leach operations to neutralize spent ore (AS 27.19.020; 11 AAC 97.200-240).
- **Arizona's** APP program requires leaching operations and tailings facilities to use best demonstrated control technology and to comply with Aquifer Water Quality Standards.
- **Idaho's** Rules for Ore Processing require pollutant levels in water draining from leached ore to be reduced to a level established in a permit, and to have a pH of between 6.5 and 9 (IDAPA 58.91.13).

Additional examples of specific state programs for tailings management are discussed in Section 2.C.

Non-Operating Sites and Currently Operating Facilities

The available documents identified acid leach and/or SX/EW processes as a practice for at least two of 29 non-operating sites in the sample,[338] and at least 9 of 70 currently operating facilities in the sample.[339] Copper was the most common commodity produced at these sites.

The combined history of these sites and facilities suggests that releases associated with acid leach and SX/EW processes can occur during operations, as well as during the post-closure period from waste storage facilities.

Non-Operating Sites

Out of the two non-operating sites in the sample that identified acid leach and SX/EW as a process, one site presented evidence of related contamination:

- The **Cyprus Tohono** (EPA ID AZD094524097) mine is located near Casa Grande, Arizona. Between 1975 and 1983, this site leached oxide ore using sulfuric acid solution (raffinate) and then used SX/EW to produce copper cathodes. The leach tailings were excavated and hauled to nearby storage areas. Soil in the storage areas was later found to have elevated levels of selenium, sulfate, and other trace elements and nearby

[338] Cyprus Tohono Mine (EPA ID AZD094524097) and ASARCO, Inc. Globe Plant (EPA ID COD007063530).

[339] ASARCO Ray Hayden (MSHA ID 0200150), ASARCO Silver Bell (MSHA ID 0200134), Freeport McMoran Tyrone (MSHA ID 2900159), Rio Tinto Kennecott Magna/KennecottNorth (MSHA ID 4200149), Rio Tinto Kennecott Copperton/KennecottSouth (MSHA ID 4201996), Freeport McMoran Morenci (MSHA ID 200024), Energy Fuels White Mesa Mill (MSHA ID 4201429), Materion Delta (MSHA ID 4200706), Molycorp Mountain Pass (MSHA ID 402542).

groundwater had high concentrations of sulfate and uranium.[340] Although copper operations continue at this mine, CERCLA removal actions have addressed contamination from former tailings impoundments and process ponds.

Research into additional sites revealed further evidence of releases due to leaching activity. For example, the Torch Lake Copper Mines (MID980901946), located in Keweenaw Peninsula in Michigan, discharged stampsands the operator had leached for copper between 1868 and 1968 that reduced Torch Lake's volume by 20 percent and dramatically altered the shoreline. In addition, lesions and tumors were found on fish caught in the lake. In 1972, the operator discharged 27,000 gallons of leaching liquor into the lake.[341]

Currently Operating Facilities

Out of the nine current sites in the reviewed sample that identified acid leach and SX/EW as a process, evidence of related contamination was present at five sites;

- The **ASARCO[342] Ray Hayden** (MSHA ID 0200150) mine is located near Hayden, Arizona. ASARCO Ray Hayden operations include leaching facilities, an open-pit copper mine, milling operations, a solvent extraction plant, and an electrowinning plant. The facility is conducting cleanup under a 2008 CERCLA administrative consent order (EPA ID AZD008397127), for contamination potentially dating back to the beginning of operations in 1911. Several recent releases occurred at the site, most of them due to the failure of the leachate collection systems during heavy rain. During 1990-1993, at least 19 spills of hazardous materials were reported, typically either chronic seepage from leaching facilities or accidental discharges from dams, pipelines and ponds. For example:
    - In 1990, a rainstorm overwhelmed several dams and the screens leading to the solution collection pipelines became clogged with debris. As a result, copper-laden leachate solutions overflowed the dams, releasing approximately 324,000 gallons to Mineral Creek.[343]
    - In 1991, a broken pipeline caused 150,000 gallons of leach solution to discharge to Mineral Creek. Later that year, an electrical failure led to another release of 1,500 gallons of solution.[344]

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[340] U.S. Army Corps of Engineers, *Preliminary Assessment/Site Inspection Report: Cyprus Tohono Mine, Casa Grande AZ* USACE Contract No.: DACA45.98.D0004 Task Order 25 (Washington, DC: U.S. Government Printing Office, 2003).

[341] U.S. Environmental Protection Agency Region V, *Record of Decision: Decision Summary, Torch Lake Superfund Site Operable Unit II, Houghton County, Michigan* (Washington, DC: U.S. Government Printing Office, 1993).

[342] Prior to its 2005 Chapter 11 Bankruptcy, "ASARCO" was the abbreviation for the American Smelting and Refining Company. After reorganization, the emerging company's name was ASARCO, LLC.

[343] U.S. Environmental Protection Agency, *Damage Cases and Environmental Releases from Mines and Mineral Processing Sites* (Washington, DC: U.S. Government Printing Office, 1997).

[344] U.S. Environmental Protection Agency, *Damage Cases and Environmental Releases from Mines and Mineral Processing Sites* (Washington, DC: U.S. Government Printing Office, 1997).

- In 1993, a bulldozer struck a leachate solution pipeline resulting in the release of 7,200 gallons of copper sulfate solution to Mineral Creek.[345]

These releases resulted in water quality degradation at the site and visible impacts on Mineral Creek – the cobble and gravel substrate in the nearby streambed was coated with a blue-green layer of copper oxides.[346]

- The **ASARCO Silver Bell** (MSHA ID 0200134) mine is located near Marana, Arizona. Leaching operations at Silver Bell occurred between 1960 and 1993. During site inspections conducted in 1993, the Arizona Department of Environmental Quality (ADEQ) observed a stream originating at the base of an active leach dump near El Tiro Pit. Samples revealed multiple water quality violations from this leach dump, including contamination from selenium, zinc, cadmium, and copper, which resulted in surface water quality degradation.[347]
- The **Freeport McMoran Tyrone** (MSHA ID 2900159) mine is located near Silver City, New Mexico. The Tyrone mine is a porphyry copper deposit that uses leaching and an SX/EW plant to produce copper. Several documented spills occurred at the site, mostly due to pipeline failures or seepage. For example:
  - In 1997, 65,000 gallons of raffinate leaked from a ruptured weld.[348]
  - In 2003, maintenance activity on a pipeline system led to 2,600 gallons of raffinate spilling.[349]

  At least five other related spills were reported between 1994 and 2012. These releases have resulted in contaminated groundwater and surface water throughout the mine's area, and a 2012 groundwater assessment concluded that groundwater seepage from the Tyrone Mine will require water treatment in perpetuity.[350]
- The **Rio Tinto Kennecott Copperton/ Kennecott South** (MSHA IDs 4200149 and 4201996) mine is located southwest of Salt Lake City, Utah. The Kennecott Copper Mine

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[345] U.S. Environmental Protection Agency, *Damage Cases and Environmental Releases from Mines and Mineral Processing Sites* (Washington, DC: U.S. Government Printing Office, 1997).

[346] U.S. Environmental Protection Agency, *Damage Cases and Environmental Releases from Mines and Mineral Processing Sites* (Washington, DC: U.S. Government Printing Office, 1997).

[347] U.S. Environmental Protection Agency, *Damage Cases and Environmental Releases from Mines and Mineral Processing Sites* (Washington, DC: U.S. Government Printing Office, 1997).

[348] Bonnie Gestring, *U.S. Copper Porphyry Mines Report: The Track Record of Water Quality Impacts Resulting from Pipeline Spills, Tailings Failures, and Water Collection and Treatment Failures* (Washington, DC: Earthworks, July 2012). Accessed December 7, 2015, at https://www.earthworksaction.org/files/publications/Porphyry_Copper_Mines_Track_Record_-_8-2012.pdf.

[349] Bonnie Gestring, *U.S. Copper Porphyry Mines Report: The Track Record of Water Quality Impacts Resulting from Pipeline Spills, Tailings Failures, and Water Collection and Treatment Failures* (Washington, DC: Earthworks, July 2012).

[350] Bonnie Gestring, *U.S. Copper Porphyry Mines Report: The Track Record of Water Quality Impacts Resulting from Pipeline Spills, Tailings Failures, and Water Collection and Treatment Failures* (Washington, DC: Earthworks, July 2012).

is an open-pit copper mine. Acid leachate has been released numerous times over the years: from 1965-1991, reservoirs used for storing excess surface and leach waters overflowed in heavy rainfall events. In addition, on one occasion a leak in the leach water collection system resulted in a plume of contaminated groundwater.[351]

- The **Freeport McMoran Morenci** (MSHA ID 200024) mine is located northeast of Safford, Arizona. The Morenci mine is an open-pit copper mine with leaching, solvent extraction, and electrowinning operations. It has been operating since 1872. Twenty-one releases were reported between 1992 and 2008, with the vast majority of spills related to pipeline spills and equipment failures. Recent examples include:
    - In 2006, 3,000 pounds of sulfuric acid was released from a pipeline break. That same year, 1,127 pounds of material was released from another pipeline break, and a third pipeline break released rich electrolyte with an acid content of 1,057 pounds.[352]
    - In 2007, a power failure resulted in the release of 1,200,000 gallons of pregnant leach solution.[353]
    - In 2008, a pipeline spill released 186,000 gallons of sulfuric acid and trace elements into Chase Creek, lowering the pH and increasing copper and zinc concentrations for more than two miles downstream.[354]

  Many other releases of sulfuric acid and raffinate from pipelines occurred as well. The cumulative impacts related to the Morenci mine were found to have injured surface waters, terrestrial habitat and wildlife, and migratory birds.[355]

Based on the available documentation, primary concerns for acid leach and SX/EW are proper reclamation of spent dump or heap leach piles, maintenance of equipment, and ensuring that systems are prepared for rainfall events. The most common cause of releases was pipe failure, with chronic seepage from disposal areas, other equipment failures, and weather-related discharges also causing contamination.

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[351] U.S. Environmental Protection Agency, *Record of Decision, Kennecott North Zone Site, Kennecott South Zone Site* (Washington, DC: U.S. Government Printing Office, 2002).

[352] Bonnie Gestring, *U.S. Copper Porphyry Mines Report: The Track Record of Water Quality Impacts Resulting from Pipeline Spills, Tailings Failures, and Water Collection and Treatment Failures* (Washington, DC: Earthworks, July 2012).

[353] Bonnie Gestring, *U.S. Copper Porphyry Mines Report: The Track Record of Water Quality Impacts Resulting from Pipeline Spills, Tailings Failures, and Water Collection and Treatment Failures* (Washington, DC: Earthworks, July 2012).

[354] Bonnie Gestring, *U.S. Copper Porphyry Mines Report: The Track Record of Water Quality Impacts Resulting from Pipeline Spills, Tailings Failures, and Water Collection and Treatment Failures* (Washington, DC: Earthworks, July 2012).

[355] Bonnie Gestring, *U.S. Copper Porphyry Mines Report: The Track Record of Water Quality Impacts Resulting from Pipeline Spills, Tailings Failures, and Water Collection and Treatment Failures* (Washington, DC: Earthworks, July 2012).

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G. Pyrometallurgical Processes

Introduction

Pyrometallurgy includes types of mineral processing that use heat to concentrate metals and remove impurities from ore. These processes generally involve oxidizing sulfides into oxides and reducing oxides into metals using a reducing agent such as carbon-based compounds.[356] Many metals, such as aluminum, copper, chromium, gold, iron, lead, nickel, platinum, and silver are commonly concentrated through pyrometallurgical processes, which include drying, calcining, roasting, smelting, and refining.

Historically, pyrometallurgical processes have been associated with significant environmental and human health effects because of their production of criteria air pollutants as well as waste that may include trace elements.[357] As such, they are often regulated by industry-specific requirements under the CAA. Releases of environmental contaminants that appear associated with smelting and related activities, however, continue to occur at currently operating facilities. At the same time, the smelting industry in the U.S. is declining and certain subsets of the industry (such as lead smelting) have closed U.S. operations entirely and/or moved their operations to other countries, at least in part because of more stringent environmental regulations.[358]

Past and Current Use

Simple roasting (exposure to reactive gas) and smelting (melting to remove impurities) processes have existed since prehistoric times, when early humans discovered that smelting could help them concentrate copper and produce bronze. Iron smelting was developed over the 2nd millennium BCE, when new furnace designs enabled the generation of higher temperatures required for iron smelting. Technological advances over the next millennia included the invention of the blast furnace in the 1100s and the invention of the reverberator furnace in the late 1600s, both of which are still in use today. Other advances such as puddling and rolling techniques made these types of furnaces increasingly efficient. By the Industrial Revolution, production capacity had increased greatly.[359]

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[356] Kawatra, S. Komar, "Primary Metal Production," lecture delivered for a class given at Michigan Technological University. Accessed November 5, 2015, at: http://www.chem.mtu.edu/chem_eng/faculty/kawatra/CM2200_Primary_Metals.pdf

[357] U.S. Environmental Protection Agency, *Sector Notebook Project: Profile of the Nonferrous Metals Industry* (Washington, DC: U.S. Government Publishing Office, 1995).

[358] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[359] F. Habashi, "Fire and the Art of Metals: A Short History of Pyrometallurgy," *Mineral Processing and Extractive Metallurgy* 114:3 (2005), p. 165-71.

Today, various forms of smelting operations are used to process concentrates containing copper, chromium, gold, iron, lead, platinum, silver, tin, and zinc, among other metals.[360] Smelting can introduce pollutants like sulfur dioxide and trace elements, discharged as residue from air filtration systems or from furnace slag.[361]

In the recent decades, concerns about environmental consequences associated with smelting have resulted in the decrease and ultimate closure of some smelting operations in the U.S., particularly primary lead and aluminum smelters. On November 2, 2015, Alcoa Inc. announced that it would reduce its aluminum smelting capacity by 503,000 metric tons by the end of March 2016.[362] This reduction, equivalent to 31 percent of total primary aluminum production in the U.S., will have a significant impact on smelting in the country.[363] U.S. aluminum production will likely continue to decrease: falling aluminum prices are leading primary aluminum production to move to countries which produce aluminum cheaper.[364] For example, China is expected to account for 55 percent of aluminum production in 2015, up from 24 percent in 2005.[365]

Pyrometallurgical processing for lead has halted completely in the United States. In 2013, the last primary lead smelter in the United States (Doe Run Company's operation in Herculaneum, MO) closed. Pyrometallurgical processing as a whole is declining in the U.S., and it is estimated that hydrometallurgical processing (e.g., leaching and solvent extraction) will start to replace smelting in the coming decades.[366]

Technical Description

Pyrometallurgical processing generally occurs after beneficiation of the ore (such as crushing, grinding, or flotation) has taken place. Various pyrometallurgical processes are often carried out in succession, as early steps can help prepare the ore for further pyrometallurgical processing or

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[360] U.S. Environmental Protection Agency, Office of Compliance, *Sector Notebook Project: Profile of the Metal Mining Industry* (Washington, DC: U.S. Government Publishing Office, 1995).

[361] Hilman C. Ratsch, *Heavy-Metal Accumulation in Soil and Vegetation from Smelter Emissions* (Washington, DC: U.S. Government Printing Office, 1974).

[362] "Alcoa Cuts Back on Metal Making as Aluminum Extends Price Slump," Bloomberg Business, November 2, 2015. Accessed November 6, 2015: http://www.bloomberg.com/news/articles/2015-11-02/alcoa-scales-back-metal-making-as-aluminum-extends-price-slump

[363] "A 127-Year-Old U.S. Industry Collapses Under China's Weight," Bloomberg Business, November 3, 2015. Accessed November 6, 2015: http://www.bloomberg.com/news/articles/2015-11-03/when-a-127-year-old-u-s-industry-collapses-under-china-s-weight.

[364] Aluminum prices have fallen 27 percent in the last year alone. See: "A 127-Year-Old U.S. Industry Collapses Under China's Weight," Bloomberg Business, November 3, 2015. Accessed November 6, 2015: http://www.bloomberg.com/news/articles/2015-11-03/when-a-127-year-old-u-s-industry-collapses-under-china-s-weight.

[365] "A 127-Year-Old U.S. Industry Collapses Under China's Weight," Bloomberg Business, November 3, 2015. Accessed November 6, 2015: http://www.bloomberg.com/news/articles/2015-11-03/when-a-127-year-old-u-s-industry-collapses-under-china-s-weight.

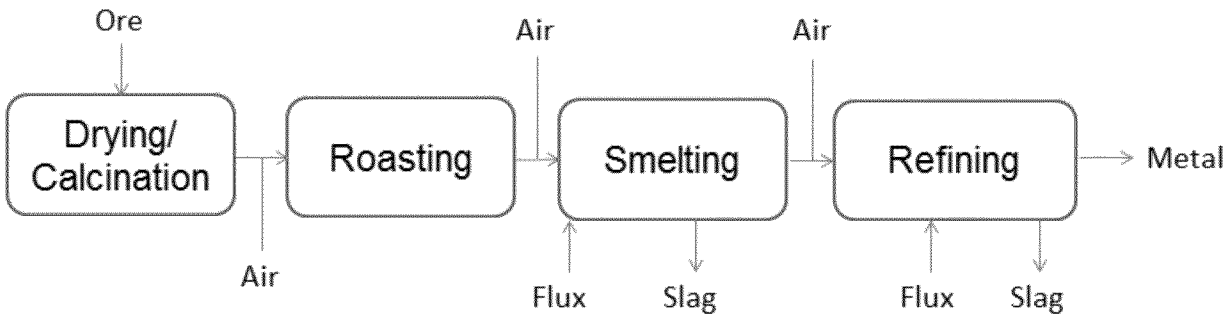
[366] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

other processing techniques such as cyanidation or hydrometallurgical techniques. Early steps generally include some combination of drying, calcination and roasting. Smelting occurs after these initial steps, once the ore has been made more suitable for reduction. After smelting, if the ore is still in need of further purification, the final step consists of refining, which can refer to a wide range of techniques that span both hydrometallurgical and pyrometallurgical methods.[367]

Additives during pyrometallurgical processing are known as fluxes; their purpose is to combine with waste products (apart from gases) and make them easier to separate from the metal product at the working temperature. For example, some ores include waste material that has a high melting point, making it difficult to separate. In these cases, a flux such as lime might be added to combine with the unwanted mineral matter in the ore (gangue), generating a slag with a lower melting point that is easier to handle and separate from the metal product.[368]

The sections that follow summarize the major pyrometallurgical processes. Exhibit 1.F.1. shows these processes in a flow chart.

Exhibit 1.F.1. Simplified Flow Chart of Pyrometallurgical Processing[369]



Drying and Calcination

Drying and calcination describe processes through which mineral ores are heated to release volatile compounds, including water and oxygen, in the absence of additional gas, in order to increase the ratio of target substance to the rock in which it is contained. It is usually the first pyrometallurgical process to take place, and it usually requires no additives. The calcination process derives its name from the decomposition of limestone (*calcium carbonate*) into lime (*calcium oxide)*, although it can be used to describe other processes where volatiles are removed as a gas, including the decomposition of zinc carbonate to zinc oxide, and bauxite (*aluminum hydroxide*) into a form of aluminum (*aluminum oxide*) that is ready to undergo the Hall-Heroult

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[367] Jeanne Mager Stellman, "Chapter 82 - Metal Processing and Metal Working Industry," *Encyclopaedia of Occupational Health and Safety*, (Geneva: International Labour Office/ ILO/ International Labour Organisation, 1998), Volume 4.

[368] S. Ramachandra Rao, *Resource Recovery and Recycling from Metallurgical Wastes* (Amsterdam: Elsevier, 2006).

[369] Adapted from Jain, Ravi, Zengdi Cui, and Jeremy Domen, *Environmental Impact of Mining and Mineral Processing: Management, Monitoring, and Auditing Strategies* (Oxford: Elsevier Butterworth-Hein, 2015).

process described below.[370] Calcination can produce air emissions that contain the volatile compounds released from the ore, including sulfur dioxide, water vapor, and other forms of particulate matter.

Roasting

Unlike drying and calcination, which do not involve adding gases, roasting involves heating the ore and exposing it to a reactive gas in order to remove unwanted compounds present in the ore. Roasting is usually used to convert sulfides to oxides by reaction with air, although the process can also use other gases, such as chlorine. The ore particles react with the gas, and the gaseous waste product is carried away, leaving behind concentrated ore particles. Since the particles do not melt, the reaction starts on the particle surface and gradually works into the particle core.[371] Because the roasting process usually involves removing sulfides from the ore, the most significant pollutant produced is sulfur dioxide, which is regulated under the CAA.

Smelting

Smelting is the process through which ore is melted to remove impurities and further concentrate the final product, generating a molten metal, slag, and waste gas. The impurities are either carried off in the slag or burned off as gas and particulates. In some furnaces, the roasting and smelting processes are combined.

Smelting processes vary greatly based on the ore. The smelting processes for aluminum, copper, and iron all have specific inputs that facilitate the concentration of the metals of interest based on their chemical properties. Generally, however, additives allow the molten metal to be separated and removed from other materials. One example of a smelting process is the Hall-Heroult process, which was invented in the late 1800s and is still the primary method for aluminum smelting. The process dissolves aluminum oxide in a molten salt bath and applies a low voltage current. Molten aluminum is then reduced and isolated, and hydrogen fluoride and other wastes are discarded. During this process, electrical resistance is used to generate temperatures above one thousand degrees Celsius.[372]

Refining

Unlike smelting, refining involves no chemical change to the raw material – it merely purifies the final material instead of altering its makeup. Refining includes a wide range of processes involving both pyrometallurgical and hydrometallurgical techniques, as it refers to any process

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[370] "Process Description Calcination," DGEngineering. Accessed November 5, 2015, at: http://www.dgengineering.de/Rotary Kiln-Processes-Calcination.html.

[371] Kawatra, S. Komar, "Primary Metal Production," lecture delivered for a class given at Michigan Technological University. Accessed November 5, 2015, at: http://www.chem.mtu.edu/chem_eng/faculty/kawatra/CM2200_Primary_Metals.pdf.

[372] Kawatra, S. Komar, "Primary Metal Production," lecture delivered for a class given at Michigan Technological University. Accessed November 5, 2015, at: http://www.chem.mtu.edu/chem_eng/faculty/kawatra/CM2200_Primary_Metals.pdf

that helps to increase the grade of a metal.[373] A couple examples of refining methods, which can vary greatly, include the Pattison and the Parkes processes.

Potential Sources of Hazardous Substances

A major environmental concern with pyrometallurgical processes across the board has been the release of sulfur dioxide and other noxious gases and particulate matter released from flues in the furnaces. Other byproducts include liquid waste, slag, sludge, and spent potliners. See Exhibit 1.F.2. for a summary of typical wastes or byproducts associated with pyrometallurgical processing of the major commodities processed in the U.S.

Air Emissions

The most common gaseous release from pyrometallurgical processes is sulfuric dioxide gas (SO_2), although releases have declined with regulations and continuing advances in engineering over the last several decades. Annual releases of SO_2 from metal processing totaled 4,775 thousand tons in 1970, but by 1980 emissions were down to 1,842 thousand tons. Continuing this trend, emissions decreased to 530 thousand tons by 1995, and 144 thousand tons in 2014.[374] Current practices require that these emissions be captured, and they are now typically converted to sulfuric acid.

More efficient and environmentally-conscious smelting processes have been developed as technologies and environmental regulations have evolved. Electrostatic precipitators, for example, use electric charges to attract small particles out of flue-based discharges, while baghouses use fine fabric meshes to filter out similar sets of particulate matter. Use of these technologies can remove 99 percent of toxic metal particles and 99.99 percent of dust.[375,376] Ideally, the baghouse dust is recycled. If not, it is disposed of in a hopper.[377] The dust is a hazardous waste that is subject to solid waste management guidelines.

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[373] Ahindra Ghosh, *Principles of Extractive Metallurgy*, Second Edition, (New Delhi: New Age International, 1991).

[374] "National Emissions Inventory Air Pollutant Emissions Trends Data: 1970-2014 Average annual emissions, all criteria pollutants," U.S. Environmental Protection Agency, updated March, 2015. Accessed November 5, 2015, at https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data.

[375] United Nations Environment Programme, United Nations Industrial Development Organization, and the World Bank Group, *Pollution Prevention and Abatement Handbook, Airborne Particulate Matter: Pollution Prevention and Control* (Washington DC: World Bank, 1998).

[376] T. Moore, "Hazardous Air Pollutants: Measuring in Micrograms," *EPRI Journal* 19:1 (1994), p. 33-37.

[377] U.S. Environmental Protection Agency, *Air Pollution Cost Control Manual*, Sixth Edition (Washington, DC: U.S. Government Printing Office, 2002), Section 6, Chapter 1.

Exhibit 1.F.2. Potential Releases Associated with Pyrometallurgy[378, 379]

METAL	PROCESS	MATERIAL INPUT	AIR EMISSIONS	LIQUID WASTE	OTHER WASTES
Copper	Copper smelting	Copper concentrate, siliceous flux	Sulfur dioxide, particulate matter containing arsenic, antimony, cadmium, lead, mercury and zinc	None	Acid plant blowdown slurry/sludge, slag containing iron sulfides, silica
Lead	Lead smelting	Lead sinter, coke	Sulfur dioxide, particulate matter containing cadmium and lead	Plant washdown wastewater, slag granulation water	Slag containing impurities such as zinc, iron, silica and lime, surface impoundment solids
Zinc	Zinc calcining	Zinc ore, coke	Sulfur dioxide, particulate matter containing zinc and lead	None	Acid plant blowdown slurry
Aluminum	Alumina calcination	Aluminum hydrate	Particulates and water vapor	None	None
	Primary electrolytic aluminum smelting	Alumina, carbon anodes, electrolytic cells, cryolite	Fluoride—both gaseous and particulates, carbon dioxide, sulfur dioxide, carbon monoxide, C2F6,CF4 and perfluorinated carbons (PFC)	None	Spent potliners
Iron	Iron smelting using a blast furnace	Iron ore or sinter, coke, limestone or dolomite	Sulfur dioxide, carbon monoxide	Coolant containing zinc, tar, and lime residue	Slag containing sulfur, magnesium, and/or silicon-based compounds

[378] Jeanne Mager Stellman, "Chapter 82 - Metal Processing and Metal Working Industry," *Encyclopaedia of Occupational Health and Safety*, (Geneva: International Labour Office/ ILO/ International Labour Organisation, 1998), Volume 4.

[379] U.S. Environmental Protection Agency, "Iron and Steel," in *Identification and Description of Mineral Processing Sectors and Waste Streams* (Washington, DC: U.S. Government Printing Office, 2012). Accessed November 5, 2015, at https://archive.epa.gov/epawaste/nonhaz/industrial/special/web/pdf/id4-hfa.pdf

Several mining companies also have flue gas desulfurization (wet scrubber) systems at their sites. These alkaline slurries chemically neutralize the acid gas before it is released into the atmosphere, often removing upwards of 90 percent of SO_2 from flue gases.[380] Scrubbing processes also pull many of the other pollutants out of the waste gas, including arsenic, lead, and zinc.

Liquid Waste

Wastewater generated by the wet scrubbing and slag cooling processes is a major source of liquid waste in pyrometallurgical processes. Though most wastewater from the wet scrubbing process can be recycled for future use, smelters in the 1970s and early 1980s would often discharge or "blow down" a small amount of wastes in order to minimize corrosion and buildup of solids. Over the next ten years, several plants abandoned this practice, instead using various separation techniques to extract target metals from the solid wastes. Other plants began to neutralize these wastes and discharge them into lined surface impoundments or wastewater treatment facilities.[381] By the mid-1990s, lead smelters had ceased storing wastewater from the slag quenching process in unlined surface impoundments, and instead recycled the solids back into the smelting process.[382] Other smelters adopted similar approaches over this time, either recycling sludges back into the smelting process or neutralizing these wastes with lime or magnesium before selling the resulting product or sending it to special landfills.[383]

Other Wastes

Slag, the collection of compounds removed from the molten metal product, is created during smelting. Some types of slag can be commercial products and are considered relatively benign; for example, iron and steel slag can be sold for use in construction or cement.[384]When slag is produced, however, it is very hot. Slag that is not intended for reuse can be air cooled, but slag that may be sold often requires quenching with water, producing wastewater that can contain harmful substances (discussed above). In addition, many types of slag have been a source of some environmental contamination. Nonferrous slag in particular contains elements that are of

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[380] G. Hilson, "Pollution prevention and cleaner production in the mining industry: an analysis of current issues," *Journal of Cleaner Production* 8 (2000), p. 119-126.

[381] U.S. Environmental Protection Agency, Office of Solid Waste, *Technical Background Document: Remanded Smelting Wastes* (Washington, DC: U.S. Government Printing Office, 1995). Accessed at: http://www.epa.gov/osw/nonhaz/industrial/special/mining/minedock/smelt/remsmelt.pdf

[382] U.S. Environmental Protection Agency, Office of Solid Waste, *Technical Background Document: Remanded Smelting Wastes* (Washington, DC: U.S. Government Printing Office, 1995).

[383] U.S. Environmental Protection Agency, Office of Solid Waste, *Technical Background Document: Remanded Smelting Wastes* (Washington, DC: U.S. Government Printing Office, 1995).

[384] D.M. Proctor, E.C. Shay, K. A Fehling, and B.L. Finley, "Assessment of human health and ecological risks posed by the use of steel-industry slags in the environment," *Human Ecological Risk Assessment* 8 (2002), p. 681–711.

concern – some types of slag contain concentrations of aluminum, chromium, copper, iron, manganese, lead, and zinc that exceed EPA soil screening levels for human contact.[385]

Blowdown slurry and sludge, which result from the sulfur recovery process, qualifies as a hazardous waste and is regulated under RCRA.[386]

State and Federal Regulations

At both the federal and state level, environmental regulations address potential environmental releases from pyrometallurgical processing, particularly smelting. While some smelting wastes are excluded from regulation under RCRA Subtitle C, many are regulated as hazardous wastes and face strict reporting and management requirements. Additionally, the CAA and CWA regulate releases to air and water, including industry-specific guidelines for pyrometallurgical processing of minerals.

Federal Regulations

Nonferrous metal manufacturing facilities, including smelting and refining operations for several primary metals must comply with ELGs under the CWA.[387] Processing facilities each obtain permits under NPDES, which specify water quality requirements and operating standards related to process wastewater and stormwater from industrial activity based on ELGs.

Solid wastes from pyrometallurgical processes include residues from air filtration systems and furnace slags from thermal processing. RCRA exempts many types of mineral processing wastes under the Bevill Amendment, including several types of smelting and refining wastes.[388] State and local governments implement solid waste management guidelines under RCRA Subtitle D. Emissions control dust from baghouses in iron and steel production (waste code K061) and spent potliners from the Hall-Heroult process from aluminum reduction (waste code K088) are specifically regulated as RCRA hazardous wastes.

As outlined in Exhibit 1.F.3., the CAA, passed in 1970 and amended in 1977 and 1990, regulates air emissions from many mineral processing sectors at the federal level. Section 111 of the CAA requires the EPA to establish federal emission standards for industrial source categories which cause or contribute significantly to air pollution. Accordingly, EPA promulgated NSPS at 40

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[385] Nadine M. Piatak, Michael B. Parsons, and Robert R. Seal, "Characteristics and Environmental Aspects of Slag: A Review," *Applied Geochemistry* 57 (2015), p. 236-66.

[386] Jeanne Mager Stellman, "Chapter 82 - Metal Processing and Metal Working Industry," *Encyclopaedia of Occupational Health and Safety*, (Geneva: International Labour Office/ ILO/ International Labour Organisation, 1998), Volume 4.

[387] Regulated facilities include aluminum smelting, copper smelting, electrolytic copper refining, lead smelting, and rare earths ores processing. 40 CFR Part 421. Promulgated in 1974-1976, revised in 1980-1990. See: "Nonferrous Metals Manufacturing Effluent Guidelines," U.S. Environmental Protection Agency. Accessed November 5, 2015, at: http://water.epa.gov/scitech/wastetech/guide/nfmm/.

[388] U.S. Environmental Protection Agency, Office of Solid Waste, *Technical Background Document: Remanded Smelting Wastes* (Washington, DC: U.S. Government Printing Office, 1995).

Exhibit 1.F.3. National Emission Standards for Hazardous Air Pollutants Relevant to Hardrock Mining and Mineral Processing

INDUSTRIAL SECTOR	NESHAP	NSPS	CITATIONS
Ferroalloys production	☐	☐	**NESHAP:** 40 CFR 63, Subpart XXX (*major sources*); 40 CFR 63 Subpart YYYYYY(*area sources*) **NSPS:** 40 CFR 60 Subpart Z, 60.260-266
Iron and steel processing[389]	☐	☐	**NESHAP:** 40 CFR 63, Subpart EEEEE (Iron and steel foundries - major sources); 40 CFR Part 63 Subpart YYYYY (Electric Arc Steelmaking Facilities – area sources); 40 CFR 63, Subpart ZZZZZ (area sources); 40 CFR 63 Subpart RRRRR (Taconite iron ore processing - major sources) **NSPS:** 40 CFR 63, Subpart YYYYY (Electric Arc Furnace Steelmaking Facilities – area sources)**;** 40 CFR 60 Subpart AA, and AAa, 60.270-276 (Electric arc furnaces – major sources); 40 CFR 60 Subpart Na, 60.140a-145a (Secondary emissions from basic oxygen process steelmaking facilities constructed after 1/20/1983)
Gold mine ore processing and production	☐		**NESHAP:** 40 CFR 63, Subpart EEEEEEE *(area sources)*
Primary aluminum reduction plants	☐	☐	**NESHAP:** 40 CFR 63, Subpart LL (*major sources*) **NSPS**: 40 CFR 60 Subpart S, 60.190-60.195
Primary lead production	☐	☐	**NESHAP:** 40 CFR 63, Subpart TTT (*major sources*) **NSPS:** 40 CFR 60 Subpart R, 60.180-186
Primary copper production	☐	☐	**NESHAP:** 40 CFR 63, Subpart QQQ (Primary copper – major sources); 40 CFR 63, Subpart EEEEEE (Primary copper smelting – area sources); 40 CFR 63, Subpart ZZZZZZ (Aluminum, copper, and other nonferrous foundries - area sources); 40 CFR 63, Subpart J (PVC and copolymers production, primary copper smelting, secondary copper smelting, and primary nonferrous metals: zinc, cadmium, and beryllium) **NSPS:** 40 CFR 60 Subpart P, 60.160-166 (*Primary copper smelters*)

[389] While the RCRA exempts many types of mineral processing wastes, emissions control dust from baghouses in iron and steel production is specifically regulated as RCRA hazardous waste (waste code K061).

INDUSTRIAL SECTOR	NESHAP	NSPS	CITATIONS
Primary magnesium refining	☐		**NESHAP:** 40 CFR 63, Subpart TTTTT (Primary magnesium refining - major sources)
Other nonferrous metals processing	☐	☐	**NESHAP:** 40 CFR 63, Subpart ZZZZZZ (Aluminum, copper, and other nonferrous foundries - area sources); 40 CFR 63, Subpart J (PVC and copolymers production, primary copper smelting, secondary copper smelting, and primary nonferrous metals: zinc, cadmium, and beryllium); 40 CFR 63, Subpart GGGGGG (Primary nonferrous metals: zinc, cadmium, and beryllium – area sources) **NSPS:** 40 CFR 60 Subpart Q, 60.170-176 (*Primary zinc smelters*); 40 CFR 60 Subpart LL, 60.380-386 *(Metallic Mineral Processing Plants)*
Nonmetallic Mineral Processing Plants		☐	**NSPS:** 40 CFR 60 Subpart OOO, 60.670-676 *(Nonmetallic mineral processing plants)*
Phosphates	☐	☐	**NESHAP:** 40 CFR 63, Subparts AA and BB (Phosphoric acid manufacturing and phosphate fertilizers) **NSPS:** 40 CFR 60 Parts T-X *(Phosphate fertilizer industry)*; 40 CFR 60 Subpart NN, 60.400-404 *(Phosphate rock plants)*

CFR Part 60. These standards apply to sources that have been constructed or modified since the promulgation of each standard.

Section 112 of the CAA addresses emissions of hazardous air pollutants, which are known or suspected to cause cancer or other serious health effects. The 1990 CAA Amendments directed the EPA to issue technology-based standards for industrial categories emitting hazardous air pollutants. Consequently, over the past 25 years, EPA has promulgated NESHAPs at 40 CFR Part 63 for multiple industrial sources. Major sources, which emit 10 tons per year of a single hazardous air pollutant or 25 tons per year of any combination of hazardous air pollutants, must follow hazardous air pollutant standards that require Maximum Achievable Control Technology (MACT) standards. Non-major sources may be regulated as "area sources." Specific control requirements vary by source. Requirements include:

- Technology-based performance standards
- Operational requirements
- Emission limits

Generally, state and local air pollution control agencies are responsible for implementation and enforcement of these CAA air standards. EPA reviews and approves state programs to maintain a consistent national regulatory framework.

The following exhibit illustrates the specific applicability of NSPS and NESHAP regulations to primary mineral processing facilities.

State Regulations

Many states have delegated authority under the CAA to regulate industrial sources of air pollution. Five states have partial delegated authority for the industry-specific NESHAP,[390] while three have full delegated authority.[391] For NSPS implementation, four states have partial delegated authority[392] and three have full delegated authority.[393] EPA implements the NSPS programs for one state.[394] Five states (Arizona, California, Idaho, Minnesota, and Nevada) also have separate state-level air toxics programs. Of these, we identified several programs with technical standards specifically designed for primary processing operations. We summarize them below:

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[390] Alaska, Arizona, California, Idaho, and Nevada.

[391] Minnesota, Montana, and Utah. From: "Clean Air Act," The Environmental Council of the States (ECOS) State Delegations. http://www.ecos.org/section/states/enviro_actlist/states_enviro_actlist_caa

[392] Alaska, Arizona, California, and Nevada.

[393] Minnesota, Montana, and Utah.

[394] Idaho.

- California Emissions of Toxic Metals from Non-Ferrous Metal Melting Airborne Toxic Control Measures: Non-ferrous metal melting furnaces, including reverberatory, induction, and direct arc furnaces, must have an emissions collection system, undergo testing, and use fugitive emissions control systems. (7 CCR 93107)
- Nevada Mercury Control Program: In 2002, Nevada's Voluntary Mercury Air Emission Reduction Program established emission reduction goals.[395] Nevada also requires additional MACT for mercury emissions on thermal units at existing and new metal mines. All users of thermal units at existing metal mines must apply for a Mercury Operating Permit to construct before constructing thermal units. (NAC 445B.3611 – 445B.3689)

Non-Operating Sites and Currently Operating Facilities

Non-Operating Sites

Smelting was identified as a practice at 12 sites of the sample of 29 non-operating sites reviewed.[396] The most common commodities processed at these sites were lead, zinc, copper, gold, and silver.[397] Releases directly related to smelting were identified at three of the 12 sites in this sample.[398] These releases came in the form of airborne emissions, including lead, cadmium, arsenic, and particulate matter, and occurred both before and after the promulgation of air regulations:

- **National Zinc Corp.** (EPA ID OKD000829440): The National Zinc Corporation operated a zinc smelter in Bartlesville, Oklahoma from 1907 to 1976.[399] The smelter did not have air emission controls, which allowed emissions to be deposited downwind.[400] Blood lead studies in 1991 and 1992 funded by Agency for Toxic Substances and Disease Registry (ATSDR) and performed by Oklahoma State Department of Health (OSDH), now ODEQ) indicated that approximately 14 percent of the children in the contaminated

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[395] In 2003, Nevada produced 82 percent of the gold mined in the United States. The TRI for Nevada indicates that four Nevada mining companies emitted roughly 90 percent of the state's reported mercury air emissions in 2001. For more information, see: EPA. 2010. Fact Sheet: Final Rule to Reduce Mercury Emissions from Gold Mine Ore Processing and Production Sources. Accessed February 13, 2015 at http://www.epa.gov/ttn/atw/area/gold_mines_fs_121610.pdf

[396] Tex-Tin Corp. (EPA ID TXD062113329), Asarco, Inc. (Globe Plant) (EPA ID COD007063530), California Gulch (EPA ID COD980717938), Summitville Mine (EPA ID COD983778432), Bunker Hill Mining & Metallurgical Complex (EPA ID IDD048340921), Eagle Zinc Co. Div. TL Diamond (EPA ID ILD980606941), East Helena Site (EPA ID MTD006230346), Omaha Lead (EPA ID NESFN0703481), Shieldalloy Corp. (EPA ID NJD002365930), Li Tungsten Corp. (EPA ID NYD986882660), National Zinc Corp. (EPA ID OKD000829440), Tar Creek (Ottawa County) (EPA ID OKD980629844).

[397] Seven sites processed zinc, seven sites processed lead, five sites processed copper, five sites processed gold, and five sites processed silver.

[398] East Helena Site (MTD006230346), Omaha Lead (NESFN0703481), National Zinc Corp. (OKD000829440)

[399] "Superfund Program: National Zinc Corp., Bartlesville, OK," U.S. Environmental Protection Agency. Accessed November 11, 2015: https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0601010

[400] "Superfund Program: National Zinc Corp., Bartlesville, OK," U.S. Environmental Protection Agency. Accessed November 11, 2015: https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0601010

area had elevated levels of blood lead greater than 10 micrograms per deciliter. Contaminants of concern at the National Zinc Corporation site are lead and cadmium in air dispersion and slag material contaminated soils.

- **Omaha Lead** (EPA ID NESFN0703481): The Omaha Lead site occupies 20 square miles in downtown Omaha, Nebraska.[401] Two lead smelting facilities operated on the site. ASARCO smelted and refined lead from the early 1870s until 1996.[402]

The ASARCO facility emitted lead and other trace elements from smokestacks. Wind transported the pollutants, which were eventually deposited on nearby land.[403] Ambient air quality tests, conducted by the Douglas County Health Department (DCHD) in 1984, measured lead concentrations exceeding the ambient standard of 1.5 micrograms per cubic meter.[404] The highest measurement by DCHD was 6.57 micrograms per cubic meter.[405] DCHD found elevated blood lead levels in children living near the Omaha Lead site, compared to the national average.[406] Soil sampling indicated significant lead contamination in the surrounding area.[407] The site was added to the NPL list on April 30, 2003.[408]

- **East Helena Site** (EPA ID MTD006230346): The East Helena site occupies 8.4 square miles near East Helena, Montana. The site included a primary lead smelter and a primary zinc smelter, which emitted lead, cadmium, and arsenic compounds during its operational period of 1888 until 2001.[409] Despite mitigation steps, including the installation of an acid plant to control sulfur dioxide emissions, the facility exceeded sulfur dioxide emissions in 1978 and 1980.[410] In 1981, the facility added a tall stack to the blast furnace baghouse to reduce ground-level emissions. The site was added to the NPL in 1983.

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[401] U.S. Environmental Protection Agency, *Omaha Lead Site Interim Record of Decision* (Washington, DC: U.S. Government Printing Office, 2004).

[402] "Superfund Sites – NPL. Omaha Lead," U.S. Environmental Protection Agency. Accessed October 30, 2015: http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0703481.

[403] "Superfund Sites – NPL. Omaha Lead," U.S. Environmental Protection Agency. Accessed October 30, 2015: http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0703481.

[404] U.S. Environmental Protection Agency, *Omaha Lead Site Interim Record of Decision* (Washington, DC: U.S. Government Printing Office, 2004).

[405] U.S. Environmental Protection Agency, *Omaha Lead Site Interim Record of Decision* (Washington, DC: U.S. Government Printing Office, 2004).

[406] U.S. Environmental Protection Agency, *Omaha Lead Site Interim Record of Decision* (Washington, DC: U.S. Government Printing Office, 2004).

[407] U.S. Environmental Protection Agency, *Omaha Lead Site Interim Record of Decision* (Washington, DC: U.S. Government Printing Office, 2004).

[408] U.S. Environmental Protection Agency, *Omaha Lead Site Interim Record of Decision* (Washington, DC: U.S. Government Printing Office, 2004).

[409] "Superfund Program: East Helena Site, East Helena, MT," U.S. Environmental Protection Agency. Accessed November 11, 2015: http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0800377

[410] U.S. Environmental Protection Agency, *EPA Superfund Record of Decision: East Helena Site* (Washington, DC: U.S. Government Printing Office, 1989).

Currently Operating Facilities

Five of the 70 currently operating facilities reviewed use primary smelting as a processing technique.[411] Two of these facilities, ASARCO Ray Hayden Complex (MSHA IDs 0200826 and 0200150) and Rio Tinto Kennecott Bingham Canyon-Copperton-Magna (MSHA IDs 4200149 and 4201996) produce copper. Stillwater mine (MSHA ID 2401490) produces platinum, US Antimony Montana produces antimony, and Nyrstar Clarksville is the only primary zinc facility in the United States. EPA's Toxics Release Inventory (TRI) data indicate that the ASARCO Ray Hayden Complex and Nyrstar Clarksville released air emissions. ASARCO had a permit for air emissions from its smelter, although the emissions led to the presence of contaminants in higher than expected levels in two nearby towns.[412,413] Emissions from the Nyrstar facility contain compounds typical to smelting activities (e.g., zinc, cadmium, lead, and copper), available documentation does not provide direct evidence that smelting or other pyrometallurgical processes caused these releases or if Nyrstar had a permit for the releases.[414]

Releases of contaminants have been observed both before and after the promulgation of major environmental regulations, suggesting that technological advances and regulatory oversight may have not eliminated the potential for environmental contamination.

ASARCO Ray Hayden Complex (MSHA IDs 0200826 and 0200150)[415]

The ASARCO Ray Hayden Complex includes the Ray surface copper mine and concentrator and the Hayden smelter. The Ray mine began operations in 1880 and the Hayden smelter began operations in 1920. The Ray facility extracts and crushes copper ore, before it is processed and smelted at the Hayden facility.

Smelting conducted at the facility both before and after the promulgation of environmental regulations has resulted in elevated levels of lead, arsenic, and copper in nearby land. A 1,000-foot tall smokestack was constructed in 1974 to reduce ground-level emissions. Yet, air quality monitoring in the two neighboring towns, Hayden and Winkelman, Nevada, measured elevated levels of arsenic, lead, copper, cadmium, and chromium from site operations in 2013 and

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[411] Asarco Ray (MSHA IDs 0200826 and 0200150), Nyrstar Clarksville (MSHA ID Unknown), RioTinto Kennecott Bingham Canyon-Copperton-Magna(MSHA IDs 4200149 and 4201996), Stillwater Stillwater/Columbus (MSHA ID 2401490), US Antimony Montana (MSHA ID Unknown).

[412] Arizona Department of Environmental Quality, "Air Quality Permit No. 1000042 for the Asarco Hayden Smelter," October 10, 2001.

[413] U.S. Environmental Protection Agency Region 10, *Administrative Settlement Agreement and Order on Consent for Asarco Hayden Plant Site* Docket No. CERCLA-2008-13, April 15, 2008.

[414] TRI reported air emissions from the Nyrstar Facility: zinc, cadmium, lead, manganese, and copper compounds. Air emissions from the Ray Hayden Facility: arsenic, barium, antimony, zinc, mercury, selenium, nickel, cadmium, manganese, silver, chromium, cobalt, copper, and lead compounds, and sulfuric acid.

[415] "Superfund Site – Asarco Hayden Plant," U.S. Environmental Protection Agency Region 9. Accessed October 30, 2015: http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/ViewByEPAID/AZD008397127#area

2014.[416] The facility is conducting cleanup under a 2008 CERCLA administrative consent order (EPA ID AZD008397127). As of January 2015, the facility had been in significant violation of its CAA permit for at least the past three years.[417]

Additionally, data in ERNS indicate that at least one release at the complex was directly related to smelting activity. In 2002 blowdown equipment failure of the Hayden smelter led to a release of 1.37 pounds of arsenic compounds. While other data directly linking releases at the complex to smelting are limited, there are 88 releases reported to ERNS attributed to the complex, many of them of compounds typically associated with smelting.

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[416] "Asarco Hayden Plant: Site Updates and Upcoming Public Meeting," U.S. Environmental Protection Agency Region 9. Accessed October 30, 2015: http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/6b0358416fdb7e3288257d9000669ee8/$FILE/70348280.pdf/Asarco%2010_14.pdf

[417] "Enforcement and Compliance History Online (ECHO): Ray Mine Unit and Hayden Smelter (FRS ID 110000471338)," U.S. Environmental Protection Agency. Accessed October 30, 2015, at: http://echo.epa.gov/detailed-facility-report?fid=110000471338

H. Bayer Process

Introduction

In nature, metallic aluminum is never found in its pure form; it almost always exists in the form of hydrated oxides or silicates, which are usually contained in an ore called bauxite. The Bayer process is the key industrial method for turning this ore into aluminum oxide (known as alumina), which can then undergo electrolytic smelting for further purification. The process involves dissolving the ore in a sodium hydroxide solution, which allows the alumina to be precipitated out and the waste ore to be carried away as red mud. While red mud is not classified as hazardous under RCRA Subtitle C, large volumes are produced, making proper disposal an important issue.[418] Limits for the amount of wastewater overflow and discharges from impoundments such as red mud lakes are set by the CWA ELGs for the nonferrous metals manufacturing point-source category. Louisiana and Texas, where U.S. bauxite refining facilities currently operate, also regulate red mud under solid waste regulations, requiring operating and closure standards for surface impoundments holding processing waste. Limited evidence from non-operating Superfund sites indicates that hazardous substance releases from red mud disposal areas occurred at two sites engaged in Bayer processing, leading to contamination of surrounding environment, including surface water. No evidence exists of red mud releases from currently operating facilities in the U.S., although one site received complaints regarding dust emitted from the red mud lagoons.

In addition, sodium hydroxide, used to dissolve the ore during the Bayer process, is highly corrosive and can pose human health and environmental risks if released.[419] As a hazardous process chemical, it faces handling, transportation, and management requirements under RCRA Subtitle C. Releases of sodium hydroxide due to equipment failure and operator errors have occurred historically, as well as at currently operating sites within the reviewed sample.

Past and Current Use

The Bayer process was invented in Russia in 1888 by chemist Karl Josef Bayer. It was immediately accepted into industrial practices, largely replacing the earlier Le Chatelier process and becoming the primary method of alumina production worldwide. Although improvements in engineering have decreased the costs, the Bayer process itself has remained relatively unchanged since that time, and is still used to produce nearly all of the world's alumina supply.[420]

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[418] Dietrich G. Altenpohl, *Aluminum: Technology, Applications and Environment: A Profile of a Modern Metal from Within* (Malden, MA: Wiley, 1998).

[419] "Hazardous Substance Fact Sheet: Sodium Hydroxide," New Jersey Department of Health. Accessed November 12, 2015, at http://nj.gov/health/eoh/rtkweb/documents/fs/1706.pdf

[420] Fathi Habashi, "Bayer's Process for Alumina Production: A Historical Perspective," *Bulletin of Historical Chemistry* 17/18 (1995), p. 15-19.

Primary aluminum processing production in the United States (and thus, use of the Bayer process) reached its peak of 4,654,000 metric tons in 1980, and has been generally trending down (with some fluctuations) since then. Recent years' production ranged from 1,727,000 metric tons in 2009 to 1,946,000 metric tons in 2013.[421] Nearly all bauxite ore, the ore processed to produce aluminum, originates from overseas mining operations; thus no U.S. mining facilities produce bauxite ore.[422]

Technical Description

The Bayer process converts bauxite ore (a hydrated oxide of aluminum consisting of 30 to 56 percent alumina as well as iron, silicon, and titanium) to crystalline alumina that is suitable for electrolysis. The crude bauxite ore is crushed and ground before being mixed with a preheated solution of caustic soda (sodium hydroxide). Lime is often added at this stage to control phosphorus content and improve the solubility of alumina. This slurry is then pumped into heated pressure chambers, which dissolves the ore into sodium aluminate. Iron, titanium, and other impurities settle out of this solution, because they are not affected chemically and remain solid. These solids are the primary waste material from the Bayer process, known as red mud. They are separated from the sodium aluminate solution, washed, and then pumped to disposal areas. The washwater, which contains caustic soda, is recycled to the process.

The sodium aluminate solution is then cooled (usually by the washwater from the waste product) and seeded with alumina crystals from a previous cycle, which supersaturates the solution. This forces the alumina to precipitate out. Alumina is then washed and filtered before undergoing calcination in rotating furnaces called rotary kilns, which readies it for further processing to turn it into aluminum metal (generally through the Hall-Heroult process).[423, 424] See Exhibit 1.H.1. for a simplified diagram of the Bayer process.

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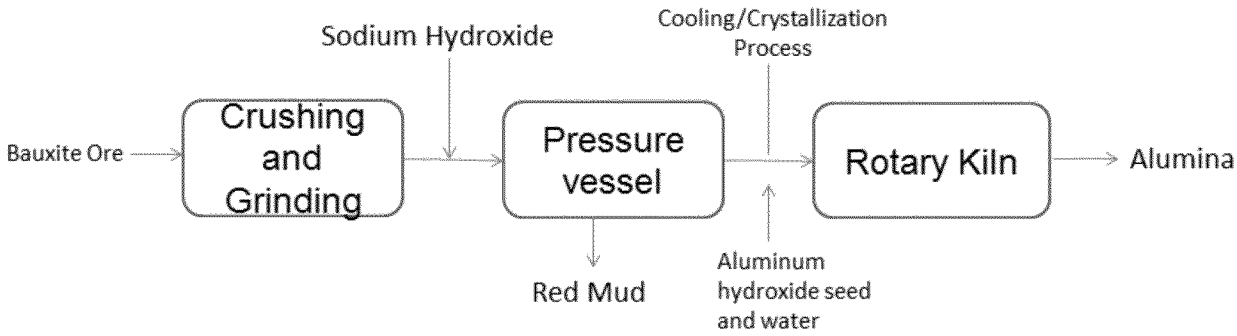
[421] "Historical statistics for mineral and material commodities in the United States: Aluminum," Thomas D. Kelly and Grecia R. Matos, U.S. Geological Survey Data Series 140, updated 2013. Accessed Nov. 10, 2015, at http://minerals.usgs.gov/minerals/pubs/historical-statistics/.

[422] "Minerals Commodity Summary: Bauxite and Alumina," U.S. Geological Survey, updated 2015. Accessed Dec. 10, 2015, at: http://minerals.usgs.gov/minerals/pubs/commodity/bauxite/mcs-2015-bauxi.pdf.

[423] Dietrich G. Altenpohl, *Aluminum: Technology, Applications and Environment: A Profile of a Modern Metal from Within* (Malden, MA: Wiley, 1998).

[424] U.S. Environmental Protection Agency, "Chapter 12: Introduction to Metallurgical Industry," in *AP 42 Emissions Factors*, Fifth Edition (Washington, DC: U.S. Government Printing Office, 1998), Volume I.

Exhibit 1.H.1. Simplified Flow Chart of the Bayer Process



Potential Sources of Hazardous Substances

The major environmental concern associated with the Bayer process is red mud, which is produced in large quantities.[425] Red mud is made up primarily of iron, aluminum, silica, calcium and sodium, but can contain other trace elements depending on the composition of the original bauxite ore. While these trace elements are generally only present in low concentrations and are rarely considered a serious threat to health, arsenic, chromium, and radium-226 could pose concerns in some cases. In addition, red mud is highly alkaline, which has negative effects on plant life in surrounding areas.[426]

Usually, red mud is deposited in large on-site surface impoundments ("red mud lakes"), where the mud settles to the bottom and the water is removed and treated. In these "lakes," the mud builds up in place and dries to a solid. After at least 25 years, these areas can be revegetated, although they generally require some topsoil modification because of the high alkalinity, salinity and sodicity (sodium content) of red mud.[427]

Releases associated with the Bayer process generally occur in three general ways. First, the berms or dikes used to contain red mud lakes can fail and release the mud itself. Second, releases can occur once the lakes have dried up. Finally, precipitation can cause elements such as arsenic and selenium to leach from the red mud, or wind erosion can release fine particles of red mud into the air. EPA investigated risks associated with these types of releases in 1990, however, and found that the potential for danger to health and the environment is generally low.[428]

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[425] Depending on the grade of the bauxite ore, the Bayer process can produce one to two times as much red mud as it does alumina. See Dietrich G. Altenpohl, *Aluminum: Technology, Applications and Environment: A Profile of a Modern Metal from Within* (Malden, MA: Wiley, 1998).

[426] U.S. Environmental Protection Agency, *Report to Congress on Special Wastes from Mineral Processing* (Washington, DC: U.S. Government Printing Office, 1990).

[427] J. Wong, "Use Of Waste Gypsum In The Revegetation On Red Mud Deposits: A Greenhouse Study," *Waste Management & Research* 11:3 (1993), p. 249-56.

[428] U.S. Environmental Protection Agency, *Report to Congress on Special Wastes from Mineral Processing* (Washington, DC: U.S. Government Printing Office, 1990).

Other hazardous releases that can stem from the Bayer process include fugitive dust from early physical processing, and sodium hydroxide. There is little evidence that fugitive dust has been a concern, and typical methods of containment from physical processing can be used to minimize these risks. Sodium hydroxide is highly corrosive and can pose human health and environmental risks if released, but as it is generally recycled back into the process, potential for releases is generally low.[429]

See Exhibit 1.H.2. for a summary of potential releases and best management practices for minimizing these risks.

State and Federal Regulations

While few regulations pertain specifically to the Bayer process, or alumina processing in general, broad regulatory frameworks address these practices at the state and federal level. See Section 2.C.4. for broader discussion of the regulations applicable to tailings (including red mud).

Federal Regulations

RCRA (the Bevill Amendment) exempts red mud from regulation as hazardous waste under RCRA Subtitle C. State and local governments implement solid waste management guidelines under RCRA Subtitle D. EPA's authority under Subtitle D is limited; its primary role is to promulgate sanitary landfill criteria to prevent adverse effects on health or the environment. As of 2013, EPA has not finalized any solid waste management requirements specifically applicable to the disposal of Bevill waste.[430]

In situations where facilities combine tailings with mineral processing wastes that exhibit hazardous characteristics, these waste mixtures may also fall under RCRA Subtitle C. Red and brown muds from bauxite refining, however, are specifically excluded by the Bevill Amendment from regulation under RCRA Subtitle C. Finally, the MSHA specifies inspections and safety standards for impoundments, retention dams, and tailings ponds, and the FEMA is charged with administering a national dam safety program that includes surface impoundment structures.[431]

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[429] "Hazardous Substance Fact Sheet: Sodium Hydroxide," New Jersey Department of Health. Accessed November 12, 2015, at http://nj.gov/health/eoh/rtkweb/documents/fs/1706.pdf

[430] L. Luther, "Background on and Implementation of the Bevill Bentsen Exclusions in the Resource Conservation and Recovery Act: EPA Authorities to Regulate 'Special Wastes,'" *Congressional Research Service* R43149 (Washington, DC: U.S. Government Printing Office, 2013).

[431] 30 CFR Part 57, Subpart S. For more information, see: "Dam Safety Standards and Technical Guidance," MSHA. U.S. Department of Labor. Accessed October 30, 2015, at: http://www.msha.gov/DamSafety/DamSafetyTechGuidance.asp.

Exhibit 1.H.2. Potential Releases Associated with the Bayer Process

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Fugitive Dust	The early stages of the Bayer process (crushing and grinding) may release dust.	The following practices help to manage fugitive dust[432]: • Application of water through wet spray systems • Enclosure of the dust source • Exhaust ventilation • Maintenance of a slight negative pressure for enclosed grinding equipment, which ensures that any air leakage will flow into and not out of the equipment.
Red Mud	Red mud is the waste material that is removed from the target metal during the Bayer process. [433] It contains iron, aluminum, silica, calcium and sodium, depending on the original ore used. Although red mud by itself is not toxic, it is extremely alkaline with a pH value between 13 and 14 and can cause environmental damage if leaching, spilling, or wind erosion occurs.	Red mud is generally stored on site in ponds and is not hazardous, although it can pose environmental and human health concerns if it leaches out of the containment pond or releases dust from dried mud lakes. Potential uses for red mud are limited, though the following options have been explored with some success: recovering raw materials from red mud, using red mud as an input in cement production, or using red mud to naturally purify water. [434]
Sodium Hydroxide	Sodium Hydroxide, or caustic soda, is a main input into the Bayer process that is generally recycled through the process. In some cases, generally due to human error, caustic soda is spilled and released into the environment.	Proper handling and storage of sodium hydroxide in proper containers should allow the fluid to be fully recycled.[435]

[432] Department of Health and Human Services, Center for Disease Control and Prevention, *Dust Control Handbook for Industrial Minerals Mining and Processing* (Washington, DC: U.S. Government Printing Office, 2012).

[433] "Primary Metals – Chapter 4: Aluminum Smelting and Refining," Illinois Sustainable Technology Center, University of Illinois. Accessed November 5, 2015, at http://www.istc.illinois.edu/info/library_docs/manuals/primmetals/chapter4.htm.

[434] Dong-Yan Liu and Chuan-Weng Wu, "Stockpiling and Comprehensive Utilization of Red Mud Research Progress," *Materials* (2012), p. 1232-1246.

[435] F.E. Farghly, M. A. Barakat, and S. M. El-Sheikh, "Removing Al and Regenerating Caustic Soda from the Spent Washing Liquor of Al Etching," *Journal of Materials* 57:8 (2005), p. 34-38.

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Potential releases from aluminum and bauxite refining using the Bayer process are regulated under the ELGs outlined by the CWA for the nonferrous metals manufacturing point-source category.[436] These requirements limit the volume of process wastewater overflow that may be discharged from impoundments. Runoff from surface impoundments may be regulated under stormwater permits.[437] Stormwater permits regulate stormwater contaminated by contact with material from mining activities.

State Regulations

State and local governments implement solid waste management guidelines under RCRA Subtitle D. Currently, facilities using the Bayer process and releasing red and brown muds operate in Texas and Louisiana, and are regulated under those states' solid waste regulations (Texas: Title 30 Texas Administrative Code Chapter 335; Louisiana: Title 33, Part VI). Both states mandate operating and closure standards for surface impoundments holding processing waste.

Non-Operating Sites and Currently Operating Facilities

Non-Operating Sites

None of the non-operating mining and processing CERCLA sites within the sample reviewed used Bayer processing. Additional research identified the St. Croix alumina facility, located on the St. Croix Island of the U.S. Virgin Islands, and the North Alcoa Site, located in East St. Louis, as non-operating Superfund sites that produced alumina using the Bayer process. At these sites, on-site disposal of red and brown muds led to contamination in the surrounding area:

- **St. Croix Alumina** (EPA ID VIN000206465): The St. Croix Alumina (SCA) site produced alumina from bauxite using the Bayer process.[438] The site, which began operations in 1962,[439] generated red mud from the Bayer process.[440] The caustic sludge contaminated land in the area surrounding the facility and seeped into the Alucroix Channel, which feeds into the Caribbean Sea.[441]

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[436] 40 CFR Part 421.

[437] The classification of point and nonpoint discharges from mining operations has evolved over time. For more information regarding current definitions of point sources from mining operations, see: Greater Yellowstone Coalition v. Lewis, 628 F.3d 1143 (9th Cir. Dec 23, 2010)

[438] "Former St. Croix Alumina (SCA) site in St. Croix VI," Integrated Solar and Wind Energy Powers Oil Recovery. Accessed November 13, 2015: https://frtr.gov/pdf/meetings/may10/presentations/gordon-presentation.pdf.

[439] Daniel Shea, "EPA Begins Superfund Evaluation of Red Mud," *Virgin Islands Daily News* (June 9, 2011). Accessed November 13, 2015: http://virginislandsdailynews.com/news/epa-begins-superfund-evaluation-of-red-mud-1.1159506.

[440] Fiona Stokes, "V.I. reaches $135M settlement with companies blamed for environmental damage on St. Croix's south shore," *Virgin Island Daily News* (June 14, 2014). Accessed November 18, 2015: http://virginislandsdailynews.com/news/v-i-reaches-135m-settlement-with-companies-blamed-for-environmental-damage-on-st-croix-s-south-shore-1.1702800.

[441] Kery Murakami, "Lockheed Martin Denies Liability For Toxic Leak Damages," *Law 360* (May 12, 2015). Accessed November 13, 2015: http://www.law360.com/articles/654891/lockheed-martin-denies-liability-for-toxic-leak-damages.