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MINERALS & MINING PROGRAM



APPENDIX P

MINE OPERATIONS



**WHARF RESOURCES (U.S.A.), INC.
WHARF AND GOLDEN REWARD MINES
LEAD, SOUTH DAKOTA**

SPILL CONTINGENCY PLAN

(SPILL PREVENTION CONTROL AND COUNTER MEASURE PLAN)

FEBRUARY 16, 1996

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(Updated January 27, 2020)

(Updated January 14, 2021)

1.0 SITE DESCRIPTION

The Wharf Mine is an open pit, heap leach, gold and silver mine with a carbon in column recovery system processing facility. The mine is located approximately 3.5 miles west of Lead, South Dakota. The mine is accessed by the Nevada Gulch Road and then the Wharf Road, an access road constructed on privately held property. The legal description of the land is: Sections 25, 26, 33, 34, 35 and 36 of T.5N., R.2E., and Sections 1, 2, 3 and 4 of T.4N., R.2E., Black Hills Meridian, Lawrence County, South Dakota.

The mine is permitted by the South Dakota Department of Environment and Natural Resources, Board of Minerals and Environment, with 5 permits: numbers 356, 434, 435, 464 and 476.

The Golden Reward Mine is located in the SE $\frac{1}{4}$ of Section 1 and NE $\frac{1}{4}$ of Section 12, Township 4 North, Range 3 East, in Lawrence County, South Dakota. Gold and silver mining and milling had taken place in this area since 1877. However, no mining, leaching, or gold recovery has occurred at the mine site since 1997. The Golden Reward Mine site underwent final reclamation in 2002 and was granted Reclamation Bond Release in 2009.

In 2012, Wharf Resources was granted a new large scale mining permit (Permit No. 476) which would allow Wharf to mine new areas including Green Mountain, Bald Mountain, and part of Golden Reward.

2.0 SPILL CONTINGENCY PLAN

Wharf Resources (U.S.A.), Inc., has developed a contingency plan to deal with any emergency situation arising from an accidental spill of substances with significant contaminant potential. This Spill Contingency Plan (SCP) has been prepared in accordance with 40 CFR 116, pursuant to chapter 311 of the Clean Water Act and South Dakota Administrative Rules Chapter 74:34:01. The plan is designed to guide responders through the processes for first aid, containment and clean-up, and notification requirements for accidental spills at the site. The SCP describes procedures for handling on-site spills of:

30% Liquid Cyanide Solution, Process Leach Solution, Fuel, Chemicals and Reagents

As part of the SCP, Wharf shall routinely conduct in-house inspections of the mine facility for situations and/or conditions that may represent potential spill hazards. Appropriate actions will be taken to minimize the potential for the occurrence of a spill or release of toxic materials.

2.1 Cyanide

Hazards

- Because of the toxicity of sodium cyanide, all persons working with it should be completely familiar with and observe the established safety practices.
 - ⇒ Sodium Cyanide is a rapidly fatal poison when taken internally.
 - ⇒ Prolonged contact with the skin may cause irritation and possibly poisoning, particularly if there are open wounds or skin abrasions.
 - ⇒ Sodium Cyanide is alkaline and causes eye burns. Severe damage can occur.
- **Sodium Cyanide in contact with acids or weak alkalis liberates highly toxic and flammable Hydrocyanic Acid (HCN) Gas.**
- **Toxic amounts of HCN can be liberated from water solutions of sodium cyanide.**
- **Never work alone when working on or with Cyanide.**
- **Consult MSDS prior to working with cyanide.**
- **Contain spills or clean up solutions to the extent safely possible.**
- **If contact made with skin or eyes flush with copious quantity of water.**

2.1.1 Emergency Response

EMERGENCY ACTION (PERSON DISCOVERING THE SPILL)

Contained Spill

Contained Spills are unplanned releases of cyanide solution onto some type of secondary containment. Examples include the cyanide storage tank overflowing into secondary containment or pipes leaking over liner. In the event of a contained spill;

- **Safety –**
 - Protect Yourself from Spills - Don't Become a Casualty.
 - ◆ Never enter an area where there is a cyanide spill unless the area has been determined to be safe to enter with the HCN (Hydrogen Cyanide) detectors
 - ◆ Never assist victims unless you, the rescuer, is wearing the proper personal protective equipment (PPE) for potential cyanide touching.

In the event a spill of highly concentrated cyanide solution (30% Cyanide Solution) to secondary containment has occurred,

- Personal Protective Equipment (PPE) Required During Cleanup

- ◆ Full rubber suits
- ◆ Rubber boots and gloves
- ◆ Face shield
- ◆ Safety goggles
- ◆ Portable HCN monitor
- Steel toe boots
- Hard hat
- SCBA (if HCN > 4.7 mg/L detected)

- If HCN monitor readings are 4.7 ppm or greater follow evacuation procedures for all personnel
- Use the buddy system - No one is to perform cyanide neutralization and cleanup procedures without adequate personnel standing by in a safe place in the event of an emergency. The stand-by person is to be suited up with the same safety gear required for the person doing the neutralization and cleanup.
- Follow the decontamination procedures for the secondary containment affected by the release.

In the event a spill of low concentrated cyanide solution (Process Leach Solution, < 50 mg/L) to secondary containment has occurred,

- PPE required
 - ◆ Rubber or nitrile gloves
 - ◆ Hard hat
 - ◆ Safety glasses
 - Steel toe boots
- Follow the decontamination procedures for the secondary containment affected by the release.

Uncontained Spill

Uncontained spills are unplanned releases of cyanide solution off containment and onto soil. Uncontained spills include:

- Spills from ponds including: pond leakage, overtopping, and dam failure.
- Spills at leach pads including: ruptured pipes, drip lines too close to the edge, inadvertent openings of valves, and seepage or flow from the leach pad base.
- Spills from the plant, including: sump overflows, broken pipes, etc.

Depending upon the concentration of cyanide in the solution released, the following actions will be taken.

HIGH CONCENTRATION 30% LIQUID CYANIDE SOLUTION SPILL

In the event of a highly concentrated uncontained cyanide solution spill ;

- **CALL A MAYDAY!**

- **Safety –**

- Protect Yourself from Spills - Don't Become a Casualty.
 - ♦ Never enter an area where there is a cyanide spill unless the area has been determined to be safe to enter with the HCN (Hydrogen Cyanide) detectors
 - ♦ Never assist victims unless you, the rescuer, is wearing the proper personal protective equipment (PPE) for potential cyanide contact.
- Personal Protective Equipment (PPE) Required
 - ♦ Full rubber suits Steel toe boots
 - ♦ Rubber boots and gloves Hard hat
 - ♦ Face shield SCBA (if HCN > 4.7 mg/L detected)
 - ♦ Safety goggles
 - ♦ Portable HCN monitor
- If HCN monitor readings are 4.7 ppm or greater follow evacuation procedures for all personnel
- Use the buddy system - No one is to perform cyanide neutralization and cleanup procedures without adequate personnel standing by in a safe place in the event of an emergency. The stand-by person is to be suited up with the same safety gear required for the person doing the neutralization and cleanup.

- **Spill Response –**

- If necessary, render Emergency First Aid.
 - ♦ Never exceed your trained capacity to render First Aid
 - ♦ Administer cyanide antidote using amyl nitrite and oxygen.
- Response and Cleanup
 - ♦ Stop the spill at the source
 - ♦ Contain run-off by damming solution with available materials or re-directing flow back onto containment.
 - ♦ Sample spill solution for WAD cyanide
 - ♦ First dilute the cyanide spill with caustic solution or water, then neutralized with a 1:2 solution of bleach and water
 - ♦ Remove contaminated soil and place on containment
 - ♦ Reneutralize the area with the 1:2 bleach solution
 - ♦ Sample soil in spill area and analyze for WAD cyanide. If results are below 0.5 mg/L, the area is considered neutralized. If results are above 0.5 mg/L, the area must be reneutralized and resampled.
- Notify Supervisor and Environmental Personnel and Give Information On:
 - ♦ Spill location

- ◆ What, when, where, and how much was spilled
 - ◆ Injuries and problems caused by the spill
 - ◆ Emergency actions you have taken
- Maintain Watch on the Spill Until Otherwise Advised by Supervisor.
 - Fill Out Spill Report (Appendix A) and Incident Report Forms. Submit forms to supervisor.

LOW CONCENTRATION LIQUID CYANIDE SPILL (Process Leach Solution)

- **CALL MAYDAY! MAYDAY! MAYDAY!**
- Protect Yourself from Spills - Don't Become a Casualty.
 - ◆ Never enter an area where there is a cyanide spill unless the area has been determined to be safe to enter with the HCN (Hydrogen Cyanide) detectors
 - ◆ Never assist victims unless you, the rescuer, is wearing the proper personal protective equipment (PPE) for potential cyanide contact.
- **Spill Response –**
- PPE required
 - ◆ Steel toe boots
 - ◆ Hard hat
 - ◆ Safety glasses
 - ◆ rubber or nitrile gloves
- Response and Cleanup
 - ◆ Stop the spill at the source
 - ◆ Contain run-off by damming solution with available materials or re-directing flow back onto containment Sample spill solution for WAD cyanide
 - ◆ First dilute the cyanide spill with water, then neutralized with a 1:2 solution of bleach and water
 - ◆ Remove contaminated soil and place on containment
 - ◆ Reneutralize the area with the 1:2 bleach solution
 - ◆ Sample soil in spill area and analyze for WAD cyanide. If results are below 0.5 mg/L, the area is considered neutralized. If results are above 0.5 mg/L, the area must be reneutralized and resampled.
- Notify Supervisor and Environmental Personnel and Give Information On:
 - ◆ Spill location
 - ◆ What, when, where, and how much was spilled
 - ◆ Injuries and problems caused by the spill
 - ◆ Emergency actions you have taken
- Maintain Watch on the Spill Until Otherwise Advised by Supervisor.

- Fill Out Spill Report (Appendix A) and Incident Report Forms. Submit forms to supervisor.

EMERGENCY ACTION (SUPERVISOR)

High and Low Cyanide Concentration Spills

The immediate supervisor responding to the scene of a cyanide spill will take the following actions:

- Wear the proper PPE as required above, depending upon the cyanide concentration of the spill
- Ensure the above listed safety and response procedures are being followed by all personnel involved in the spill response including the supervisor
- Eliminate or reduce health or life hazards and perform first aid. Arrange for removal and transport of injured and notify hospitals, doctors, etc. Emergency Medical Services will not transport contaminated patients. The patients must be removed from a decontaminated area (cold zone).
- Assess the Problem and Damage. Determine:
 - ◆ Spill source, quantity, estimated concentration of cyanide, and extent of contamination.
 - ◆ Health and environmental hazards - toxic vapor, groundwater and surface water contamination.
- **EVACUATE ALL UNNEEDED PERSONNEL AND RESTRICT ENTRY TO THE AREA.**
- NOTIFY: While emergency actions are being taken, contact one of the following mine personnel:

<u>Name</u>	<u>Work Phone</u>	<u>Home / Cell Phone</u>	<u>Radio</u>
Lynne Blackman	584-4190	(605) 641-7377	207
John Key	584-4113	(605) 580-7919	60
Amy Gilpin	584-4112	(402) 630-1159	
Ken Nelson	584-4177	(605) 580-0441	106
Tony Auld	584-4146	(605) 591-9837	25
Matt Zietlow	584-4155	(775) 304-1682	108
Jay Hasquet	584-4166	(307) 689-6222	30
Plant Foreman	584-4148		211

On weekends call Management on Duty.

- Information to be given will include:
 - ◆ Injury Information.
 - ◆ Immediate health or environmental hazards such as cyanide (CN) vapors in the air, water pollution, etc.
 - ◆ What, where, when, and how the spill happened.
 - ◆ Volume and concentration of spilled material.
 - ◆ Containment and neutralization actions taken.
- Ensure Spill Report and Incident Report Forms have been filled out completely and correctly.

EMERGENCY ACTION
(MANAGER)
LIQUID CYANIDE AND MET PROCESS SOLUTION

High and Low Cyanide Concentration Spills

- Managers will take the following actions:
- Ensure supervisor emergency actions (above) have been taken.
- Issue necessary warning of potential hazards.
- Determine on-site damage and extent of spill.
- Determine containment and/or neutralization measures to be continued or initiated.
- Contact Environmental Personnel and they will notify the following immediately upon becoming aware of the spill or as soon as is practical - no later than 24 hours:

A. State Agencies

1. South Dakota Department of Environment and Natural Resources
Minerals and Mining Program (605) 773-4201
or Point Source Control Program (605) 773-3351
or Groundwater Quality Program (605) 773-3296
or State Radio (605) 773-3536
After business hours or on weekends contact:
Emergency Management (605) 773-3231
2. * South Dakota Department of Game, Fish, and Parks
(605) 394-2391

* Depends on the location and affected area of the spill.

B. **County Agencies** Ψ

Lawrence County Emergency Management Officer:

Paul L. Thomson	(Office)	(605) 578-2122
	(Home)	(605) 642-4019

If unable to contact Emergency Management Officer:

Hazardous Materials Officer:

Ken Hawki	(Office)	(605) 578-2122
	(Home)	(605) 578-3425

If unable to contact either of the above:

Lawrence County Central Dispatch Office	
	(605) 578-2230

Ψ Please see Appendix C.

C. **Federal Agencies**

1. # Environmental Protection Agency (EPA)
1-800-424-8802
Dependant on substance spilled and size of the spill.
2. * U.S. Forest Service (Spearfish Ranger District)
(605) 642-4662

* Depends on the location and affected area of the spill.

D. **Emergency Response Consultants**

Emergency response consultants will be contacted by Environmental or Metallurgical Personnel if deemed necessary.

See Section 4.0 for additional persons and agencies to contact in case of an emergency.

2.1.2 **Containment, Neutralization, Clean-Up, and Monitoring**

After initial emergency actions have been taken, additional actions may be necessary to contain, neutralize, clean-up, and monitor the spill.

- CONTAINMENT

Spills can occur resulting in uncontained contaminated soil or water that requires additional corrective measures. Spills that escape mine containment facilities may result in some form of surface and/or groundwater cyanide contamination.

- ♦ Contaminated surface flow down a drainage:

Flow should be dammed near the site of the contamination using earth or impermeable materials (plastic liners, etc.). Collected water should be pumped back to a leach pad or a liquid containment facility.

- ♦ Groundwater Contamination

Cyanide detected in one or more monitoring wells:

Pump well(s) if possible to remove contaminated groundwater and control spread of cyanide contamination. Well discharge should be pumped back to a suitable disposal area. Additional wells may need to be drilled in contaminated areas for monitoring movement and removal of contaminated groundwater. Personnel in the Groundwater Quality Program (DENR) must be notified before injecting any neutralization solutions in groundwater [(605) 773-3296].

Cyanide detection in water supplies:

Immediately prohibit usage of water supply and provide bottled water. Locate source of contamination and contain and treat accordingly to reduce or eliminate contamination.

- ♦ Surface Water Contamination

Sodium hypochlorite (bleach), hydrogen peroxide, ferrous sulfate or any other treatment chemical is not to be used to treat a cyanide release to surface water. This also applies to dry drainages such as McKinley Gulch.

Notify the appropriate agencies for proper spill response measures in the event of a cyanide release to surface water.

- NEUTRALIZATION

Neutralization procedures for cyanide spills are dependent on:

1. Cyanide concentration
2. pH

3. Location and extent of contamination.

Highly concentrated cyanide solution should never be treated with concentrated sodium hypochlorite to avoid release of toxic cyanogen chloride gas.

To reduce formation and release of dangerous amounts of hydrogen cyanide or cyanogen chloride gas, a concentrated cyanide solution spill should be diluted with lime or caustic solution. The alkali solution raises the pH and lowers the hydrogen cyanide concentration. When cyanide has been diluted to concentrations of 100 - 200 milligrams per liter and pH has been raised to 10 or above, sodium hypochlorite can be added to neutralize the spill as described for mine process waters.

Note: Current cyanide solutions at Wharf Resources contain 50 milligrams per liter or less and do not require dilution prior to treatment. More concentrated cyanide solutions can be safely treated with NaOCl (bleach solution) in the open air with the pH above 10. If necessary, treatment of up to 5000 mg/liter is possible.

Neutralizing chemicals will be stored at the warehouse and plant or be readily available in quantities sufficient to neutralize the maximum amount of cyanide that may occur in the normal working solution inventory in the processing ponds at any one time.

- CLEAN-UPS

After containment and neutralization of the solution, the contaminated materials should be eliminated and/or neutralization should be continued until contamination concentrations comply with state or federal law or to SD DENR approval, as applicable.

Clean-up will involve removal and disposal of contaminated material, soil, etc. in a lined containment area (heap leach pad). Clean-up may involve flushing of soils or pumping shallow aquifers to remove contaminated material. All clean-up activities should be carefully planned and recorded to establish a clear record of what actions were taken and where and when the actions occurred.

- MONITORING

- ♦ The South Dakota Department of Environment and Natural Resources will be consulted as to the frequency and duration of surface and groundwater monitoring in the event of a spill.

- ◆ Sampling and analysis of water and/or soil will follow proper EPA protocols (as outlined in Wharf's Sample Collection Procedure and SD DENR Groundwater Quality QAPP).

2.1.3 Documentation and Reporting

A written report is to be made immediately after termination of spill response operations. The report should include:

- SUMMARY OF EVENTS
 - ◆ Injury Information
 - ◆ Immediate health or environmental hazards (CN vapor, water pollution, etc.)
 - ◆ What, where, when, and how the spill happened
 - ◆ Volume and concentration of the spill material
 - ◆ Containment and neutralization actions taken
 - ◆ Organization of the response
 - ◆ Resources used
- EFFECTIVENESS OF RESPONSE AND CLEAN-UP ACTIVITIES

Note any changes of water quality as clean-up and neutralization progress.
- COPIES OF WATER QUALITY ANALYSES
- RECOMMENDATIONS OR PREVENTATIVE MEASURES
 - ◆ Precautions to prevent recurrence of the spill or incident
 - ◆ Suggestions for improved response
- FIGURE SHOWING LOCATION OF SPILL
 - ◆ Containment facilities used
 - ◆ Locations of neutralization sites
 - ◆ Monitoring sites
- SPILL DOCUMENTATION AND REPORTING

The Environmental Department shall be notified within 24 hours of a spill event. A completed spill report form will be submitted to the Department within 72 hours. *

The form shall include, but is not limited to:

 - ◆ The title of the person reporting the incident
 - ◆ Containment measures taken
 - ◆ Treatment measures taken
 - ◆ Recovery measures taken

- ◆ Proposed further mitigation if required
- ◆ Monitoring and sampling results
- ◆ Location of disposal of removed contaminants
- ◆ Photographic documentation when practical

* If requested by the Department, written progress reports shall be submitted after the initial report, until corrective action is complete.

2.1.4 Cyanide Antidote Location and Administration Procedures

First Aid Supplies

First aid supplies should be immediately accessible at all times and should be inspected monthly by the individuals who would be using them in an emergency. The following items are required:

- Two boxes (two dozen) amyl nitrite pearls.
 - ◆ **CAUTION:** UNSTABLE - REPLACE EVERY YEAR. Store in cool, dark location.
- Oxygen inhalators.
- Cyanco kit
- A set of instructions on First Aid Treatment.

First Aid Rescue Procedures

- Call for nearby help.
- Protect yourself from cyanide exposure.

In areas of high cyanide concentration, the following PPE is required:

- ◆ Full rubber suits
- ◆ Rubber boots and gloves
- ◆ Face shield
- ◆ Safety goggles
- ◆ Portable HCN monitor

In areas of low cyanide concentrations, PPE required

- ◆ Rubber or nitrile gloves

- Move victim to fresh air.
- Flush contaminated skin areas with large quantities of water.
- Quickly determine the victim's condition.
- Give first aid immediately as outlined below, even while clothing is being removed or flushing is taking place.
- **Send for trained medical help** (to administer amyl nitrite and Cyanco kit, if necessary).

INHALATION

- Fully Conscious
 - ♦ Give Oxygen
- Unconscious / Not Fully Conscious
 - ♦ Give Oxygen and amyl nitrite immediately (see procedure).
- Not Breathing
 - ♦ Give Oxygen and amyl nitrite immediately (see procedure)
 - ♦ Force breathing with oxygen resuscitator or protected artificial respiration.

ABSORBED THROUGH EYE/SKIN

- Give oxygen and amyl nitrite as for inhalation (see procedure).
- Immediately rinse with plenty of plain water for at least 15 minutes and remove contaminated clothing.
- Lay victim down and keep warm.
- Watch victim for at least 1-2 hours.
- Cyanide can also cause caustic burns.

SWALLOWING

- Conscious
 - ♦ Give oxygen and amyl nitrite as for inhalation (see procedure).
 - ♦ Immediately rinse mouth with plain water and expectorate.
 - ♦ DO NOT induce vomiting.
- Unconscious / Not Breathing
 - ♦ DO NOT give unconscious person anything by mouth.
 - ♦ Give oxygen and amyl nitrite immediately as for inhalation (see procedure).
 - ♦ DO NOT induce vomiting.

AMYL NITRITE PROCEDURE

Amyl nitrite is flammable. Remove all sources of ignition; do not smoke! To avoid dizziness, do not inhale amyl nitrite.

Caution: The uninterrupted administration of amyl nitrite can cause low blood pressure or dizziness.

IF BREATHING

- Crush ampule in gauze or cloth.
- Hold ampule in gauze or cloth under nose 15 seconds then away for 15 seconds.
- Repeat step two (above) 5-6 times per ampule, using a new ampule every 3 minutes if needed (1-4 ampules).
- Continue treatment until victim is conscious or medical help arrives.

IF NOT BREATHING _____

- Crush ampule in gauze or cloth.
- Hold ampule and gauze under oxygen resuscitator face mask to avoid choking from ampule in throat.
- Force deep breathing with resuscitator, 1 breath every 4-5 seconds. Hold ampule for 3 breaths, take out for 3 breaths.
- Repeat 5-6 times per ampule, using new ampule every 3 minutes (1-4 ampules).
- Continue treatment until victim is conscious or until relieved by medical personnel. Avoid overusing amyl nitrite.

2.2 Fuel

A separate SPCC plan for petroleum products has been prepared in compliance with the provisions of 40 CFR, Part 112 and signed by a registered professional engineer. This plan is available for use in the environmental office.

Fuels, including diesel, gasoline, lubricating oils (considered as fuel in this discussion), propane, and methanol must be handled carefully to avoid spills. Adherence to the transportation plan (see Section 3.0.4 and Attachment 1) will significantly reduce the potential for fuel spills. On-site fuels will be stored in facilities designed to contain spills, and fueling sites will be located and constructed to minimize fuel losses.

Three types of spills must be considered. These are:

1. Spills during transport to the site.
2. Fuel losses in storage and fueling area.
3. Fuel spills in areas not designed for containment, such as fuel trucks servicing construction equipment.

2.2.1 HEALTH AND SAFETY

All fuels should be considered highly flammable and sparks or open flames must be avoided around spills. In case of fire, immediately call a MAYDAY. Attempt to put out the fire without exposing yourself to risk or injury. If there is any question as to safety, evacuate the area of all personnel immediately. Immediately call your supervisor. The supervisor will then immediately contact the safety coordinator and department head or management on duty.

Propane is a colorless, odorless gas that may be stench. Exposure will cause eye and skin freeze burns, dizziness, headache, fatigue, coughing, unconsciousness, and death. First aid should include flushing of eyes and skin with running water and using cool wet bandages. Transport immediately to a medical facility.

Methanol is a clear, colorless liquid that may liberate methane gas and methanol fumes. Methanol may be fatal or cause blindness if swallowed. Breathing the vapor may cause headache, vomiting, dizziness, narcosis, respiratory failure, low blood pressure, and central nervous system depression. Contact with eyes or skin will cause temporary corneal damage and dermatitis. Medical conditions generally aggravated by exposure are eye disorders, skin disorders, and liver and kidney disorders. First aid should include:

1. Drink large amounts of water and induce vomiting if swallowed.
2. Move to fresh air and give oxygen if breathing is difficult.
3. Flush skin and eyes with water for at least 15 minutes.
4. Remove contaminated clothing.
5. Transport to a medical facility.

2.2.2 FUEL SPILL EMERGENCY RESPONSE

1. **CALL MAYDAY! MAYDAY! MAYDAY!**
2. Protect Yourself - Don't Become a Casualty.
3. Render Emergency First Aid.
4. Evacuate Unnecessary Personnel.
5. Protect from Ignition.
6. Identify Source - Stop the Spill - Contain Run-off.
7. Ventilate Area.
8. Initiate Clean-up, if possible.
9. Notify Supervisor and Environmental Personnel.
10. Maintain Watch on Spill Until Otherwise Advised by Supervisor.
11. Fill Out Spill Report and Incident Report Forms

2.2.3 SPILL CONTAINMENT

If possible, all flammable materials in and adjacent to the spill site should be removed immediately. Fuel spills must then be contained as soon as possible after the loss has occurred to prevent its spreading and to simplify clean-up procedures.

A Spill Response Kit is available for use at the Warehouse. Please report any materials used, removed, or missing to the SMRTeam or the Environmental Department. An inventory list of all spill kit supplies is included in Appendix B.

A. Fueling Pad Spills (in lined area)

Fueling pad spills, in a lined area, do not require further containment.
Fueling pad spills, in an unlined area, will be treated as land spills.

B. Land Spills

To prevent the spill from spreading laterally, construct an earthen dike or dam of sufficient size to intercept both the fuel and any impacted water.

C. Water Spills

Contain the floating fuel with a boom, which is any device that will float on water and prevent the spread of the fuel. Commercial booms are available in the spill response kit, or a boom may be constructed of logs or any readily available flotation device. Ideally, the boom will extend a few feet into the water. A filter fence is recommended for small streams and ditches.

Deploy a boom across the channel, downstream from the spill - the higher the current, the more acute the angle needed between the boom and the shore. Spread sorbent material on the upstream side of the boom to prevent fuel from passing through joints or gaps. Fuel coming from

upstream should strike the boom and be diverted to the shore where it can be recovered by sorption.

2.2.4 SPILL NOTIFICATION

The necessary notification of outside agencies will be made by the Environmental Department after notifying the Mine Manager (or Management on Duty during the weekends). Please see page 5, section 2.1.1, Emergency Action Liquid Cyanide - Part 5 for details.

2.2.5 REMOVAL OF FUEL AND CONTAMINATED MATERIAL

A. From fuel tank containment

Fuel may be removed by suction and used or placed in a designated lined containment area in containers. The containers will be moved to an approved disposal site.

B. From land

First remove free product by suction. Contaminated soil beneath the spill must then be removed to a lined containment area. Both the product and soil will be moved to an approved disposal site. If considered a potential groundwater or surface water contamination problem, the SD DENR will be consulted regarding the frequency and duration of surface and groundwater monitoring.

C. From water

A suction pump may be used to remove fuel or a commercial skimmer may remove fuel mechanically. Booms may also be used as recommended above. If any of these methods is unfeasible, incineration may be used with the approval of fire control authorities. Prior to incineration of unrecoverable fuel spills on water, Point Source Control Program, DENR, shall be notified.

If groundwater is contaminated, then fuel must be removed with recovery wells or trenches and the water/fuel mixture taken to a disposal area. The Groundwater Quality Program, DENR, shall be notified immediately upon Wharf's becoming aware of a groundwater contamination problem.

2.3 Chemicals and Reagents

Various chemicals and reagents will be used in the mining and mineral processing operation. Substances of most concern will include hydrogen peroxide (H_2O_2) for neutralization of spent ore, Sodium Hypochlorite ($NaOCl$) for neutralization of cyanide spills, caustic and lime to maintain high pH in process solution, hydrochloric acid (HCl) for pH control, sulfuric acid (H_2SO_4) for pH control as well

as cleaning screens and carbon for the columns, and phosphoric acid (H_3PO_4) that may be used for the metabolic process in the biological de-nitrification facilities.

An important factor in the handling of these substances will be the method of transportation and storage. Transportation to the site will minimize or eliminate chemical and reagent spills (See Section 3.0.4 and Attachment 1). On-site storage of chemicals and reagents will be in facilities designed to handle these substances, which will significantly reduce the possibility of spills.

2.3.1 Hydrogen Peroxide

Hydrogen Peroxide is a clear, colorless liquid that is mixable with water in all proportions. Hydrogen Peroxide is a strong oxidizer, and if it is spilled on combustible materials (including ordinary clothing), it can ignite them. In case of spontaneous combustion, use only water to fight the fire. **Do not** use chemical fire retardants. Since hydrogen peroxide is a corrosive liquid, fire fighters should wear full body protection and self-contained breathing apparatus.

First Aid

In case of contact, immediately flush the skin and/or eyes with large amounts of water for at least 15 minutes while quickly removing contaminated clothing and shoes. Wash contaminated clothing and shoes thoroughly and promptly. Clothing left to dry before washing may ignite. Contact a physician.

Spill Containment and Clean-up

Stop the spill at the source and contain run-off. Hydrogen peroxide is not flammable. However, it will accelerate fires because it is an excellent oxygen source; therefore, do not use any combustible material in containing the spill. Most spills will occur in contained areas where dilution of the spill with water and washing it into the appropriate pond is satisfactory.

Small spills occurring off contained areas should be diluted with large quantities of water. Large spills require containment and pump-back to the neutralization pond. Note: Only qualified personnel wearing the proper PPE should initiate hydrogen peroxide neutralization.

2.3.2 Sodium Hypochlorite

Sodium Hypochlorite is light yellow green in color with a slight chlorine odor. It is completely soluble in water.

First Aid

In case of contact, immediately flush the skin and/or eyes with large amounts of water for at least 15 minutes. Contact a physician.

Spill Containment and Clean-up

Stop the spill at the source and contain run-off. Most spills will occur in contained areas where dilution of the spill with water and washing it into the appropriate pond is satisfactory.

Spills occurring off contained areas should be diluted with large quantities of water and/or neutralized with sodium bisulfite. Large spills require containment and pump-back to the neutralization pond. Note: Only qualified personnel should initiate sodium hypochlorite neutralization.

2.3.3 Caustic and Lime

Caustic (Sodium Hydroxide - NaOH) is colorless with no odor and is non-combustible.

Lime (Calcium Hydroxide - Ca(OH)₂, Hydrated Lime, Slaked Lime) is a white powder with no odor and is non-flammable and non-combustible.

First Aid

Health hazards include severe burning of the skin and eyes with possible blindness, irritation of the respiratory tract, and severe tissue damage if ingested. First aid should include immediate and continuous irrigation with water, remove the victim to fresh air, do not induce vomiting, and contact a physician.

Spill Containment and Clean-up

Stop the spill at the source and contain run-off. Spills should be flushed with water and taken to containment (neutralization pond preferably).

2.3.4 Sulfuric Acid

Sulfuric Acid is an oily, colorless to slightly yellow, clear to turbid liquid with no odor. It is non-flammable.

First Aid

Sulfuric acid may cause severe irritation, blisters or burns to the skin, digestive tract, nose, throat, and eyes. In case of contact, immediately flush the skin and/or eyes with large amounts of water for at least 15 minutes while quickly removing contaminated clothing and shoes. Move the victim to fresh air. Do not induce vomiting; instead, immediately give victim plenty of milk or water to drink. Contact a physician.

Spill Containment and Clean-up

Stop the spill at the source and contain run-off. Sulfuric acid is stored in a bulk tank on containment. In case of a small spill, dilute with plenty of water. Neutralize residue with alkali such as soda ash or lime. Adequate ventilation is required for soda ash due to release of carbon dioxide gas. For major spills, keep unprotected persons away. Protected persons should contain the acid by diking the spill with soil or clay. Recover the acid if possible and dispose of on the leach pad. Vapor may contain explosive hydrogen. Note: Only qualified personnel wearing the proper PPE should initiate sulfuric acid neutralization.

2.3.5 Nitric Acid

Nitric Acid is a colorless liquid with a pungent odor. It is non-flammable, but will increase the flammability of wood and organics. It can cause explosions with sulfuric acid, metal powders, carbides, and turpentine.

First Aid

In case of contact, immediately flush the skin with large amounts of water. If the eyes are affected, flush with water for at least 15 minutes and get immediate medical attention. In case of inhalation, remove to fresh air and get immediate medical attention. In case of ingestion, do not induce vomiting. Immediately give large quantities of water.

Spill Containment and Clean-up

Stop the spill at the source and contain run-off. Flush the area with plenty of water and neutralize with alkaline material, such as soda ash, lime, etc. Wear suitable protective clothing and eye protection. Adequate ventilation is required.

2.3.6 Hydrochloric Acid

Hydrochloric Acid is a clear, colorless fuming liquid with a pungent odor.

First Aid

Hydrochloric acid may cause severe irritation, blisters or burns to the skin, digestive tract, nose, throat, and eyes. In case of contact, immediately flush the skin and/or eyes with large amounts of water for at least 15 minutes while quickly removing contaminated clothing and shoes. Move the victim to fresh air. Do not induce vomiting; instead immediately give victim plenty of milk and water to drink. Contact a physician.

Spill Containment and Clean-up

Stop the spill at the source and contain run-off. Hydrochloric acid is stored in bulk tanks on containment. In case of a spill to soils, treat with excess caustic to neutralize the acid and dispose of on the heap leach pad. Note: Only qualified personnel wearing the proper PPE should initiate hydrochloric acid neutralization.

Spill Response, Monitoring, and Reporting

Spill response, monitoring, and reporting of chemical or reagent spills will follow the same procedures outlined in Section 2.1.

3.0 MISCELLANEOUS INFORMATION

3.1 Reportable Quantities

ALL SPILLS MUST BE TREATED EQUALLY!

Any quantity of liquid cyanide, met process solution, or chemicals and reagents must be properly reported.

All petroleum spills over 25 gallons (whether overland or discharged to surface waters) shall be properly reported.

Any oil spill to surface water less than 25 gallons that causes sheen on the water shall be reported. Any overland oil spills less than 25 gallons that cannot be corrected within 24 hours must be properly reported.

3.2 Spill Response Equipment

A spill response kit is available for use at the Warehouse. Please report any materials used, removed, or missing to the SMRTeam or the Environmental Department. An inventory list of all spill kit supplies is included in Appendix B.

3.3 Spill Reporting

Spill information is recorded in Coeur Wharf's Intelex Environmental Incident system. An example of the form is included in Appendix A.

3.4 Transportation Routes

Access routes within Lawrence County used to transport any hazardous material, special waste, or oil to the mine site are illustrated in Attachment 1. These routes include Interstate 90, Highway 85, Highway 14A, Nevada Gulch Road, and the Wharf Road. A copy of these transportation routes is on file with the Lawrence County Civil Defense Office.

3.5 Potential Overland Spills

Attachment 2 consists of an inventory map of potential points of containment for potential overland spills. Attachment 3 consists of an inventory of the locations of all previous spills that have occurred since the Wharf Mine has been in operation.

4.0 EMERGENCY CONTACT LIST

EMERGENCY MEDICAL

Wharf Emergency Response Team	(605) 584-4163
Monument Health Deadwood Clinic	(605) 717-6431
Monument Health Lead Deadwood Hospital	(605) 722-6100
Lawrence County Sheriff's Department	(605) 578-2230
Lawrence County Emergency Response Office (Search and Rescue, Emergency Response)	(605) 578-2122

STATE AGENCIES

Department of Environment and Natural Resources (DENR)

Minerals and Mining Program	(605) 773-4201
Point Source Control Program	(605) 773-3351
Groundwater Quality Program	(605) 773-3296
State Radio	(605) 773-3536

After business hours or on weekends, contact:

Emergency Management	(605) 773-3231
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FEDERAL AGENCIES

Environmental Protection Agency (EPA)	1-800-424-8802
U.S. Forest Service (Nemo Ranger District)	(605) 642-4662

EMERGENCY RESPONSE CONSULTANTS

<u>NAME</u>	<u>PHONE</u>	<u>ALTERNATE PHONE #</u>
Brenntag West, Inc. (Lime, Hydrogen Peroxide, Acetic Acid) (Phosphoric Acid)	1-800-531-0799	(701) 225-8760
Cyanco (Cyanide)	1-775-623-1214	
Great Western Chemical (Sulfuric Acid, Sodium Hypochlorite) (Sodium Bisulfite)	1-800-544-2436	(406) 442-8900
NALCO Chemical Company (Anti-scalants)	(801) 273-1462	
Mid-Continent (Rapid City, South Dakota)	(605) 348-0111	

WHARF PERSONNEL

(Weekdays and Weeknights)

<u>NAME</u>	<u>HOME / CELL PHONE</u>
Lynne Blackman	(605) 641-7377
Ken Nelson	(605) 580-0441
John Key	(605) 580-7919
Matt Zietlow	(775) 304-1682
Tony Auld	(605) 591-9837
Jay Hasquet	(307) 689-6222
Amy Gilpin	(402) 630-1159

(Weekends)

1)	Management on Duty	See Weekend Roster
2)	Pit Foreman	(605) 584-4163
	(Mobile)	(605) 580-1327
3)	Process Plant	(605) 584-4148
		(605) 584-4149



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181
www.state.sd.us/denr

September 30, 2002

Mr. James F. Lessard
Engineering Manager
Wharf Resources (USA), Inc.
HC 37 Box 811
Lead, South Dakota
57754-9710

RE: Acid Rock Drainage Prevention and Management Plan for Lower Deadwood
Formation and Precambrian rock units in Trojan Pit

Dear Jim,

Department review is complete on the Acid Rock Drainage Prevention and Management Plan (Plan) submitted in November, 2001, the plan appendix submitted in July 2002, and the associated Technical Revision to substitute the NAG pH procedure for the pyritic sulfur cutoff criteria required in the Acid Rock Drainage Management and Prevention Conditions to Mine Permit #464. Based on the review of this plan, supplementary data submitted in the appendix, and associated negotiations and discussions, the department grants approval for the plan and the associated Technical Revision with the following conditions:

1. Wharf shall complete static Net Acid Generation (NAG) tests and paste pH tests of all lower Deadwood formation and Precambrian rock units encountered in the Trojan Pit. At a minimum, these tests shall be completed on representative splits of 20' intervals from development drill hole samples located on a 50'x50' grid throughout the entire pit.
2. Based on a correlation of NAG results to Acid Base Accounting tests from 152 samples from the Lower Deadwood Formation, a NAG pH cutoff criterion of 5.0 is established (Fig. 1). In the event that Wharf encounters rock exhibiting a NAG pH of less than 5.0 in the 50'x50' development drill holes, this rock zone will be deemed a special management zone. Prior to mining the Special Management Zone, Wharf shall define the volume of the zone using additional NAG pH tests of blast holes surrounding the development drill hole(s), visual geologic inspection, mapping, and surface sample analyses as necessary.

- Based on the NAG pH tests completed within the special management zone, a mean NAG pH value will be calculated as follows:

$$\bar{x} = -\log \left[\frac{1}{n} \sum_{i=1}^n 10^{-x_i} \right]$$

Where:

\bar{x} = Average NAG pH of samples within Special Management Zone

n = Number of samples within Special Management Zone

i = Independent sample within Special Management Zone

x_i = NAG pH of independent sample

A Net Neutralization Potential (NNP) will be estimated for the special management zone based on the mean NAG pH value using the attached NAG pH-NNP correlation chart to determine base amendment requirements

- All shot muck containing special management rock zones will be flagged in the field using colored pin flags or other method prior to mining.
- All NAG pH values collected and any special management rock zones identified will be recorded on mine bench maps and assigned a unique tracking code or sample number. These maps will be constructed for each bench containing lower Deadwood Formation or Precambrian rocks, will be permanently stored in the mine office, and will be available for inspection by the department at any time.
- Rock mined from any special management zones will be blended with net neutralizing rock to achieve a minimum 3:1 neutralization potential to acid potential ratio. Lime addition during the gold recovery process will not be included in calculation of the required 3:1 ratio.

The required amendment quantity will be calculated as follows:

$$Q_{BA} = \frac{-3Q_{SMZ} NNP_{SMZ}}{NNP_{BA}}$$

→ 4 for ore (3 for waste rock)

Where:

Q_{BA} = Quantity of required base amendment (tons)

NNP_{BA} = Estimated NNP of base amendment (t/kt CaCO_3 eq.)

Q_{SHZ} = Quantity of Special Handling Zone (tons)

NNP_{SMZ} = Estimated NNP of Special Management Zone (t/kt CaCO_3 eq)

7. The Net Neutralization Potential of the rock used for base amendment will be estimated as follows:

Lower Deadwood Formation: The Net Neutralization Potential of lower Deadwood Formation rock used for base amendment will be estimated based on the mean NAG pH of the rock volume using the NAG pH-NNP correlation chart shown as Figure 1. All lower Deadwood Formation rock used for base amendment shall have a NAG pH of greater than 7.0, correlating to a NP:AP ratio of greater than 3:1 as shown on Figure 1.

Intermediate and upper Deadwood Formation: The Net Neutralization Potential of the intermediate and upper Deadwood Formation will be estimated based on the existing ABA database for the respective rock units using geostatistical methods. Estimating parameters will be developed by Wharf Resources based on best professional judgement, and will be reported to the department along with the quarterly reports described below.

Intrusive porphyry rock units: Intrusive porphyry rock units will not be used as base amendment.

Precambrian rock units: Precambrian rock units will not be used as base amendment.

If the available volume or NNP proves insufficient to create the 3:1 ratio, other suitable base amendments will be required prior to mining.

8. A database will be developed and maintained containing the pre-mining location, volume, NAG pH, and estimated NNP of all special management rock zones. The database shall also contain records of all blending completed including the corresponding special management rock unit; the estimated NNP of the base amendment; the volume of the base amendment; pre-mining location of the base amendment; and the final location of the blended unit. This information will be submitted to the department on a quarterly basis.
9. Wharf shall prepare representative splits of -200 mesh sample pulps for all NAG pH samples. These representative splits shall be stored at the mine site until mine closure and adequately cataloged to allow retrieval of specific samples when requested by the department. At the department's request, Wharf shall provide duplicate sample pulps specified by the department for analysis at an independent third party lab at department expense.

NAG pH verses NNP

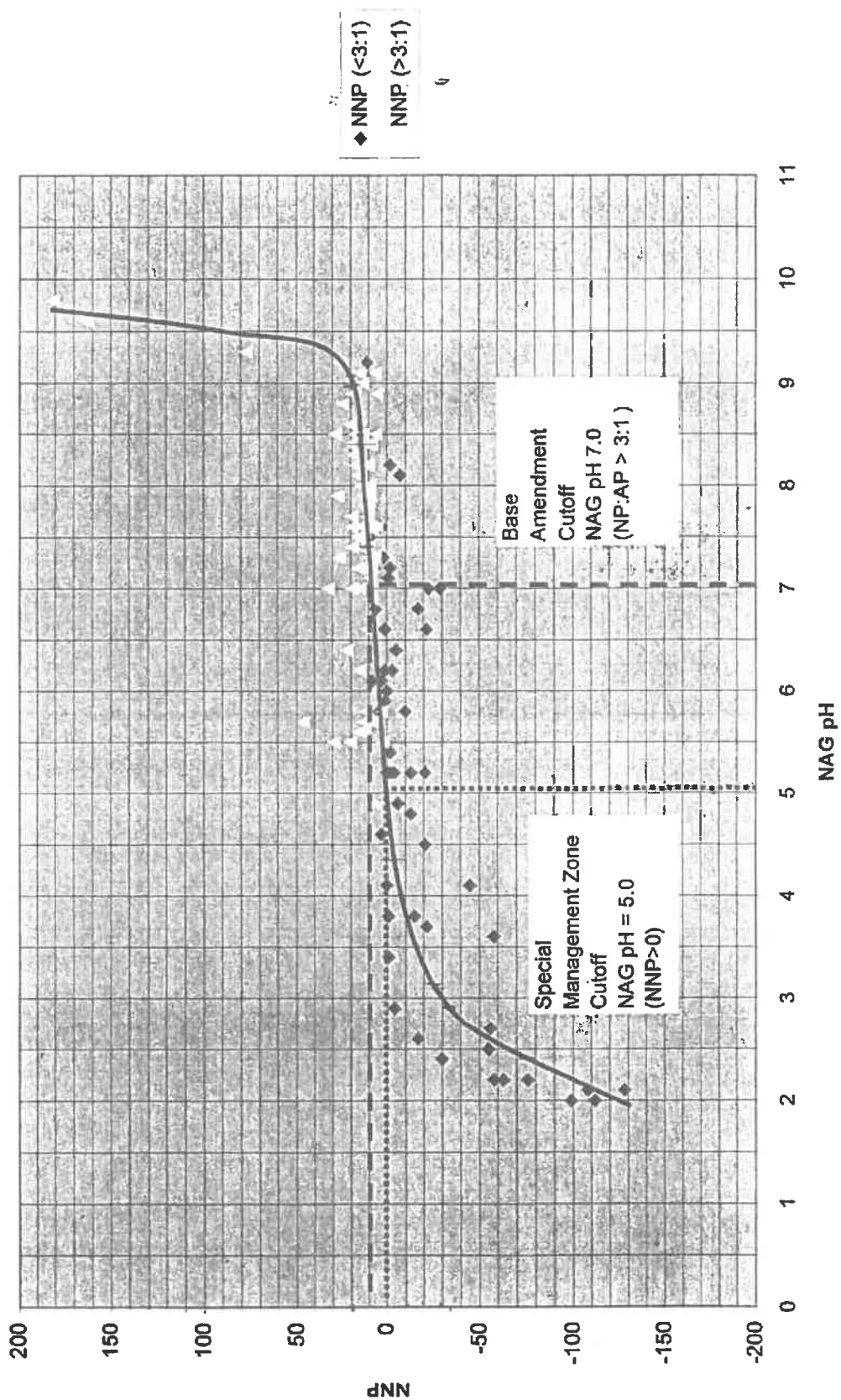


Figure 1. Correlation chart of calculated Net Neutralization Potential versus NAG pH showing correlation curve to be used for estimation of NNP for lower Deadwood Formation.

10. Wharf shall maintain quality assurance records for all internal NAG pH analyses including but not limited to pre-analysis pH of the hydrogen peroxide reagent, laboratory instrument calibration records, time and date of analyses, and the laboratory personnel completing the analyses. These records shall be available for inspection by the department at any time.
11. In conjunction with the fourth quarter report of each year, Wharf shall delineate any Special Management Zones that have been exposed in the ultimate pit walls or floors or are expected to be exposed in the following year. For the purpose of compliance with permit condition 7 of the Acid Rock Drainage Prevention and Management Conditions of Mine Permit #464, Special Management Zones delineated on the basis of NAG pH will be deemed potentially acid generating. Wharf shall provide a mitigation plan for department approval describing actions that will be taken to maintain compliance with permit condition 7.
12. The department reserves the right to alter this plan if it does not prove effective in meeting the permit conditions of Wharf's Mine Permits or if field conditions, additional geochemical data, or environmental monitoring data indicate a change is warranted.
13. Wharf may submit proposed modifications to this plan based on additional geochemical and geological data developed in consultation with the department as mining progresses through the lower unit of the Deadwood Formation.

We appreciate Wharf's cooperation in this matter. Please feel free to contact our office should you have any questions regarding this correspondence.

Sincerely,



Mark R. Nelson, CPG
Senior Hydrologist
Minerals and Mining Program

cc: S. Michals, SD GF&P

