Montana Department of
ENVIRONMENTAL QUALITY
Brian Schweitzer, Governor
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CHECKLIST ENVIRONMENTAL ASSESSMENT

COMPANY NAME: RX Exploration, Inc.
PERMIT OR LICENSE: 00674
LOCATION: 12N 6W sec. 36 and 12N 5W sec. 31
PROPERTY OWNERSHIP: [ ] Federal [ ] State [X] Private

Project: Drumlummon Mine

County: Lewis & Clark

TYPE AND PURPOSE OF ACTION: RX Exploration, Inc., (RX) operating under DEQ Exploration License No. 00674, has been core drilling on the 400 level of the Drumlummon mine since February 2008. The mine is flooded to the 400 level. There is a need to access lower levels of the mine, down to the 800 level, to continue exploration drilling from the lower levels. RX proposes to dispose of groundwater pumped from the Drumlummon No.1 shaft by infiltration to groundwater through a 2,000 foot long perforated pipe bedded in gravel and buried to depth of approximately 24 inches, located along an abandoned Northern Pacific Railroad roadbed.

The initial pumping rate would be 40 gpm. Following a trial period, pumping would be increased to 100 gpm, and then by 100 gpm increments from 100 to a maximum 400 gpm. Percolation tests have indicated a maximum rate of 500 gpm would be possible, but the lower rate provides a margin of safety. RX has estimated that pumping at a rate of 400 gpm for six months would dewater the mine workings to the 800 level. Pumping could then be reduced to a rate of 100 to 150 gpm to maintain this water level for the duration of the exploration project.

Water pumped from the No. 1 shaft would be treated as needed to remove arsenic in a treatment plant located underground.

RX has established surface water monitoring points along Silver Creek, both above the mine and below the proposed infiltration line. These are being sampled quarterly for many constituents, including arsenic, and would be monitored monthly during infiltration. Water leaving the treatment plant would be monitored weekly for arsenic during infiltration.

Reclamation Plan: The ground disturbed by construction of the infiltration line would be seeded upon completion to an aggressive grass seed mix designed to compete with the spotted knapweed that infests the area. Spotted knapweed would be aggressively controlled during the life of the operation. Upon closure of the operation, the pipe would be removed and the disturbed ground seeded again.

N = Not present or No Impact will occur.
Y = Impacts may occur (explain under Potential Impacts).

IMPACTS ON THE PHYSICAL ENVIRONMENT	
RESOURCE	[Y/N] POTENTIAL IMPACTS AND MITIGATION MEASURES
1. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE: Are soils present which are fragile, erosive, susceptible to compaction, or unstable? Are there unusual or unstable geologic features? Are there special reclamation considerations?	[N] The Drumlummon mine is located in the immediate vicinity of the Marysville batholith. All of the known precious metal concentrations in the vicinity of Marysville are described as being epithermal type deposits. They occur as veins filling fissures marginal to the Marysville batholith. The Marysville batholith is exposed over a two square mile area and is thought to be an offshoot of the much larger Boulder batholith which extends from Helena to Butte. The large intrusive is thought to be the source of the copper mineralization in the Butte area, while the small offshoot produced the precious metal concentrations in the Marysville camp. The batholiths are of Cretaceous age and intruded Pre-Cambrian sediments of the

IMPACTS ON THE PHYSICAL ENVIRONMENT	
	Belt Supergroup. In the Marysville area, the batholith is a quartz diorite which intruded the Empire Shale and the Helena Limestone, altering them into a hard, dense hornstone around its rim. All of the known deposits are contained in the zone of contact metamorphism or within the outer limits of the granite intrusive. It is believed that the structural openings within which the veins were subsequently deposited were due to contraction effects on the margins of the granitic mass during the period of cooling. The veins are strong features, sometimes traceable for miles. The best deposits were in the hornstone, but some good ore extended into the intrusive. The ore occurred in definite shoots within the vein and sometimes ended abruptly in both lateral and vertical directions. They displayed many of the characteristics of typical epithermal deposits including vertical zoning, clay alteration and quartz-calcite gangue. The ore minerals are very fine native gold which was only visible in particularly high grade areas and silver bearing tetrahedrite in the form of very fine veinlets. The mined out deposits averaged approximately 0.5 oz. gold and 5 oz. silver per ton. The principal sulfides were reported to be pyrite, chalcopyrite, sphalerite, and galena. They amounted to approximately 1% of the material in the high grade ore and increased in volume with depth. Soils are extremely stony sandy loams and very channery loams on slopes of 25 to 60 percent, developed on a north facing slope. A 4 inch thick organic horizon of duff and litter is underlain by a 6 inch thick, poorly developed, grey B horizon grading into decomposed rock and colluvium. There is no evidence of erosion or slope instability. RX will monitor the slope for springs, seeps, or any evidence of instability on a monthly basis during infiltration.
2. WATER QUALITY, QUANTITY AND DISTRIBUTION: Are important surface or groundwater resources present? Is there potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality?	[N] RX proposes to manage mine water via discharge to groundwater through an infiltration trench constructed along an abandoned railroad grade. Recent sampling of water within the Drumlummon mine indicates that the water complies with all ground water standards with the exception of arsenic. Treatment of water for arsenic removal is proposed. There are no groundwater monitoring wells downgradient of the proposed infiltration site. RX has instead proposed to monitor the quality of the discharged water and also the water quality in Silver Creek. Arsenic values are slightly elevated in the mine water, averaging 20 parts per billion (ppb), which exceeds the human health standard of 10 ppb and the average arsenic concentration in Silver Creek of 3 ppb. Discharge from the treatment plant at the underground pumping station would be the compliance point for water quality monitoring. Water that enters the infiltration line would meet State water quality standards. RX has proposed an incremental increase in rate of discharge, beginning at 40 gpm, increasing to 100 gpm, then increasing by 100 gpm increments to 400 gpm. The hill slope below the railroad grade would be monitored for developing springs at each increment and monthly during discharge. The development of new springs would not of themselves create a stability or water quality problem provided they did not result in surficial erosion, wasting, or contamination of surface water with pollutants. RX has established monitoring points on Silver Creek above and below the proposed infiltration trench that would detect any changes to water quality in the creek that may be caused by the discharge. **Groundwater:** Groundwater elevation and flow in Drumlummon Hill is variable and fracture controlled. There are no springs or seeps on the north-facing slope up-gradient of Silver Creek in the area of the proposed 2000-feet-long infiltration system. The ground surface between the railroad grade and Silver Creek appears to be well-drained and evenly-timbered. Depth to bedrock beneath the infiltration system, based on projections from old mine workings in the area, ranges approximately from 30 to 50 feet, suggesting an

adequate depth of colluvium to accept the proposed discharge. The subsurface weathered bedrock is expected to be irregular due to jointing and bedding planes in the sedimentary rock. Where exposed, this rock indicates a steep to medium incline eastward.

Culvert and gate closures of old mine adits were inspected and indicate an absence of groundwater in the colluvium and bedrock either on the level or below the elevation of the infiltration system. Depth to groundwater in the area of the infiltration system is estimated to be approximately between 150 and 200 feet.

The percolation test data show reasonably consistent results for colluvium, which by observation is a loose heterogeneous mix of rock fragments and soil mass. The infiltration system is located on the north-facing slope where chemical and physical weathering has penetrated deeply into the hill slope beneath the colluvium.

The proposed infiltration line is approximately 200 feet above the valley floor. The infiltration system comprises a gravel-filled trench 2 feet wide at bottom and 2000 feet in length that will diffuse clear water at an even rate. The receiving groundwater is expected to be fracture controlled, at variable elevation, gently sloping northeastward. Percolating groundwater is not expected to mound beneath the infiltration system.

The old mine workings are currently flooded to the level of the main (400 level) portal, and water drains via gravity from the portal to a nearby percolation pond, as it has done since 1951. Measured flows from the adit during 2008 have ranged from 15 to 35 gpm. This project would result in temporary cessation of this discharge while the mine water is being drawn down and routed to the infiltration trench.

Available data indicate that water pumped from the Drumlummon mine will comply with groundwater quality standards as a result of the proposed arsenic treatment system and the otherwise good quality of the mine water. Discharge of the mine water to surface water is not proposed; however, available data indicate that dissolved metals concentrations in the mine water are sufficiently low that the discharged water would comply with aquatic life standards.

Surface Water: Based upon flow measurements conducted by RX during the fall of 2008, Silver Creek is a losing stream in the vicinity of the Drumlummon mine. Surface water tends to seep into surrounding ground rather than receiving inflows from the groundwater system. Water that infiltrates into the groundwater system from the infiltration trench would not be expected to enter surface flows of Silver Creek within the losing reach of the creek. Monitoring of Silver Creek upstream and downstream of the discharge area will be conducted to verify that the discharge of mine water does not impact the creek.

Silver Creek originates at the confluence of Ottawa and Rawhide Gulches, about 2,000 feet west of the mine and flows approximately 6 miles east before exiting the mountains. The creek has been impacted by historic mining activities. Most of the creek below Marysville, past the Drumlummon Mine and on down the valley, has been placered, leaving a severely altered channel. A series of small and large tailing impoundments have been placed in the valley bottom, displacing the natural stream course. Beavers have established on parts of the creek, including on the reach below the proposed infiltration line. The ponds trap sediment moving down valley, providing deposition of sediments and attenuation of metals. Water quality in Silver Creek is impacted from historic mining within the watershed, and sometimes exceeds aquatic life standards for copper, iron, lead, and mercury. Human health standards for lead and mercury are also occasionally exceeded in Silver Creek. Exceedances most commonly occur during spring runoff, and are likely associated with suspended sediment in the stream. Most available water quality analyses provide only total metals data, so it cannot be confirmed that all the exceedances are due to erosion of sediment rather than the presence of dissolved metals. There is a fish consumption advisory on the creek due to mercury levels found in stream sediment which may be ingested by fish.

In the event of an unanticipated release of mine water to Silver Creek, available water quality data indicate that such a discharge would not result in exceedances of human health or aquatic life criteria in surface water.

IMPACTS ON THE PHYSICAL ENVIRONMENT	
3. AIR QUALITY: Will pollutants or particulate be produced? Is the project influenced by air quality regulations or zones (Class I airshed)?	[N]
4. VEGETATION COVER, QUANTITY AND QUALITY: Will vegetative communities be significantly impacted? Are any rare plants or cover types present?	[N] The old railroad grade has been invaded by spotted knapweed and now supports a thriving weed community. RX will seed the construction area after placement of the infiltration pipe and will begin a weed control effort in 2009, in conjunction with herbicide application that has been instituted on other areas of the mine. The slope downgradient of the infiltration trench is a Douglas-fir community, apparently a Douglas-fir/pinegrass habitat type, with some lodgepole. The understory is well developed providing an estimated 80% ground cover of vegetation and litter. A few colonies of quaking aspen are also found. An NRIS search of Montana's Natural Heritage Program for both townships 12N 6W and 12N 5W showed there are no known rare or endangered plants. There is no expectation that infiltration of the mine water to the ground water would have any impact on existing vegetation.
5. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS: Is there substantial use of the area by important wildlife, birds or fish?	[N] The area is used by mule deer and moose with some regularity and probably other wildlife as well. No threatened or endangered species are known to inhabit the area.
6. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES: Are any federally listed threatened or endangered species or identified habitat present? Any wetlands? Species of special concern?	[N]
7. HISTORICAL AND ARCHAEOLOGICAL SITES: Are any historical, archaeological or paleontological resources present?	[N] There are some boards from a collapsed cabin on private land along the railroad grade. These may be disturbed to some degree during construction. Only approximately ½ of one percent of the existing railroad bed will be disturbed and that portion of the railroad bed that is disturbed will be seeded and restored to original contour.
8. AESTHETICS: Is the project on a prominent topographic feature? Will it be visible from populated or scenic areas? Will there be excessive noise or light?	[N] The project site is in heavy timber. Construction equipment may be visible from the Marysville road during placement of the infiltration pipe but there will be no visible activity after construction is complete.
9. DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR OR ENERGY: Will the project use resources that are limited in the area? Are there other activities nearby that will affect the project?	[N] Groundwater would be removed from the Drumlummon mine and returned to the groundwater system.
10. IMPACTS ON OTHER ENVIRONMENTAL RESOURCES: Are there other activities nearby that will affect the project?	[N] This project is a necessary part of the continuing exploration/evaluation of the Drumlummon mine.

IMPACTS ON THE HUMAN POPULATION	
11. HUMAN HEALTH AND SAFETY: Will this project add to health and safety risks in the area?	[N]

IMPACTS ON THE HUMAN POPULATION	
12. INDUSTRIAL, COMMERCIAL AND AGRICULTURAL ACTIVITIES AND PRODUCTION: Will the project add to or alter these activities?	[N] This project would allow the continued exploration of the Drumlummon mine.
13. QUANTITY AND DISTRIBUTION OF EMPLOYMENT: Will the project create, move or eliminate jobs? If so, estimated number.	[N] This project would allow the continued employment of about two dozen miners, drillers, and professional staff. If exploration is successful, there may a significant increase in employment.
14. LOCAL AND STATE TAX BASE AND TAX REVENUES: Will the project create or eliminate tax revenue?	[N] There would be a small positive impact on local property and State income taxes from the earnings of mine employees and from taxes paid on equipment.
15. DEMAND FOR GOVERNMENT SERVICES: Will substantial traffic be added to existing roads? Will other services (fire protection, police, schools, etc.) be needed?	[N]
16. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS: Are there State, County, City, USFS, BLM, Tribal, etc. zoning or management plans in effect?	[N]
17. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES: Are wilderness or recreational areas nearby or accessed through this tract? Is there recreational potential within the tract?	[N]
18. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING: Will the project add to the population and require additional housing?	[N] A few professional staff have found temporary housing in Marysville. Most mine employees commute from homes or temporary housing in the Helena area.
19. SOCIAL STRUCTURES AND MORES: Is some disruption of native or traditional lifestyles or communities possible?	[N]
20. CULTURAL UNIQUENESS AND DIVERSITY: Will the action cause a shift in some unique quality of the area?	[N]
21. PRIVATE PROPERTY IMPACTS: Are we regulating the use of private property under a regulatory statute adopted pursuant to the police power of the state? (Property management, grants of financial assistance, and the exercise of the power of eminent domain are not within this category.) If not, no further analysis is required.	[N]
22. PRIVATE PROPERTY IMPACTS: Does the proposed regulatory action restrict	[N]

IMPACTS ON THE HUMAN POPULATION	
the use of the regulated person□s private property? If not, no further analysis is required.	
23. PRIVATE PROPERTY IMPACTS: Does the agency have legal discretion to impose or not impose the proposed restriction or discretion as to how the restriction will be imposed? If not, no further analysis is required. If so, the agency must determine if there are alternatives that would reduce, minimize or eliminate the restriction on the use of private property, and analyze such alternatives.	[N/A]
24. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:	[N]

25. **Alternatives Considered**:

No Action: Under the No Action alternative the DEQ would deny this application to discharge underground mine water to the ground water system under the Exploration License. RX would then have the option of terminating the project or proposing an alternate method of water management and disposal.

Approval: Approval would allow continuation of the exploration phase of this project as proposed by RX Exploration.

Approval with modification: Specific details of water quality monitoring requirements and discharge quality limitations were not provided in the application. Monitoring locations, frequency, and effluent limits to be required by DEQ as conditions of the permit approval are listed in the following table:

RX Exploration Drumlummon Project Ground Water Effluent Limits:

Parameter	Drumlummon mine water quality (mg/L) (average dissolved) (RX & DEQ data)	Silver Creek Water Quality (2007 avg.) (mg/L)	Aquatic life criteria @ hardness of 130 (mg/L)	Ground Water (human health) standard (mg/L)	Ground Water Effluent Limit (dissolved) (mg/L)
hardness	186	131	n/a	n/a	n/a
Nitrate + Nitrite as N	0.22	0.33	n/a	10	7.5
Antimony	<0.003	<0.003	n/a	0.006	0.006
Arsenic	0.022	0.003	0.15	0.01	0.003
Cadmium	0.00015	<0.0002	0.0003	0.005	0.005
Copper	0.002	0.005	0.012	1.3	1.3
Iron	0.03	1.5	1.0	n/a	n/a
Lead	<0.001	0.012	0.0044	0.015	0.015
Mercury	<0.0001	0.0001	0.000091	0.002	0.002
Zinc	0.012	0.028	0.15	2.0	2.0

n/a = not applicable

Monitoring of discharge from the treatment plant to the infiltration trench on a weekly basis will be required for the following parameters: pH, specific conductance, flow rate, sulfate, hardness, nitrate + nitrite as N, and the following dissolved metals: antimony, arsenic, cadmium, copper, iron, lead, mercury, and zinc. Analyses must achieve the required reporting values listed in Circular DEQ-7. Monitoring of Silver Creek will be required monthly at the following stations: SW-1, SW-2, SW-2B, and SW-4, and must include the same parameters as above plus monitoring for metals in the total recoverable fraction. Results of monitoring must be submitted to DEQ on a monthly basis. Exceedance of any effluent limits in the discharge from the treatment plant must be reported by

RX to DEQ immediately upon receipt of analytical results, and may result in requirements for additional monitoring, modification of the treatment system, and/or cessation of discharge. Identification of increased dissolved metals concentrations in Silver Creek would result in a required investigation of possible causes, and may result in reduction in allowable discharge rates, modification of effluent limits, additional monitoring requirements, cessation of discharge, and/or other required actions.

This discharge authorization is valid only for the exploration phase of the Drumlummon project. If ore recovery under a Small Miners Exclusion Statement is to occur, RX must obtain a water discharge permit from DEQ's Water Protection Bureau in order to continue discharge from the mine dewatering system.

DEQ reserves the right to direct RX to modify the above monitoring requirements (such as increased monitoring frequency, addition of surface water or groundwater monitoring locations, and addition of parameters to the list of required analytes) if the results of field inspection reveal that additional monitoring is appropriate to assure protection of the environment.

26. **Public Involvement**: There will be a 2-week public comment period on this EA from 1/19/09 to 2/2/09. A public meeting may be scheduled if warranted by the level of public interest.

27. **Other Governmental Agencies with Jurisdiction**: None

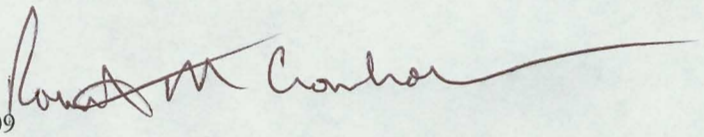
28. **Magnitude and Significance of Potential Impacts**: There would be no significant impacts associated with this proposal.

29. **Cumulative Effects:** None

Recommendation for Further Environmental Analysis:

[ ] EIS [ ] More Detailed EA [X] No Further Analysis – Approval with Modification (see above)

EA Checklist Prepared By: Robert Cronholm
Program Supervisor



Robert Cronholm — January 9, 2009
Signature — Date