CHANGE SHEET FOR PERMIT REVISIONS, TECHNICAL REVISION, AND MINOR REVISIONS

Mine Company Name: **New Horizon Mine**
Date: **March 26, 2020**

Permit Number: **C-1981-008**
Revision Description: **TR-97 SW-N102 Removal**

Volume Number	Page, Map or other Permit Entry to be REMOVED		Page, Map or other Permit Entry to be ADDED		Description of Change
1					No changes
2	Pages 2.04.7-28 through 2.04.7-32 (5 pages)		Pages 2.04.7-28 through 2.04.7-32 (5 pages)		Section 2.04.7 has been updated in response to comments. A slight pagination shift occurred through Page 32.
3					No changes
4					No changes
5					No changes
6					No changes
7					No changes
8					No changes
9					No changes
10					No changes

Environment. New Horizon will measure the quantity and quality of discharges from the permit area in compliance with the CDPS permit requirements. A copy of New Horizon's CDPS permit is available onsite for review as necessary.

Surface Water - Five surface water sites will be monitored for the New Horizon mine. These sites include locations along Calamity Draw, Tuttle Draw, and the West Lateral Ditch.

Monitoring Type	**Monitoring Location**	**Monitoring Frequency**	**Quarterly Field Parameters**	**Quarterly Laboratory Parameters**
Surface Water	SW-N103[2]	Quarterly	See List Below.	See List Below.
Surface Water	SW-N104[3]	Quarterly	See List Below.	See List Below.
Surface Water	SW-N108[4]	Quarterly	See List Below	See List Below.
Surface Water	SW-N1[5]	Quarterly	See List Below	See List Below.
Surface Water	SW-N3[6]	Quarterly	See List Below	See List Below.

1. SW-N103 is located on Calamity Draw and represents the downstream condition.
2. SW-N104 is located at the inlet of the 26" HDPE pipe on the West Lateral Ditch.
3. SW-N108 is located on Calamity Draw and represents the upstream condition.
4. SW-N1 is located on Tuttle Draw and represents the upstream condition above mining.
5. SW-N3 is located on Tuttle Draw and represents the downstream condition below mining.

Quarterly Surface Water Field Parameters

Temperature	Flow	pH	Conductivity

Quarterly Surface Water Laboratory Parameters

pH	Conductivity @ 25°C	Total Dissolved Solids	Total Suspended Solids
Calcium (Ca^{+2})^D	Magnesium (Mg^{+2})^D	Ammonia (NH_3)^D	Nitrate-Nitrite^D
Sodium (Na^+)^D	Sulfate (SO_4^-)^D	Arsenic (As)^{TD}	Iron (Fe)^{TD}
Mercury (Hg)^{TD}	Manganese (Mn)^{TD}	Selenium (Se)^{TD}	Zinc (Zn)^{TD}
Phosphorus (PO_4 as P)^T	Lead (Pb)^{TD}	Bicarbonate (HCO_3)^D	Sodium Absorption Ratio (SAR)
Chloride (Cl^-)	Aluminum (Al)^{TR}	Cadmium (Cd)	Copper (Cu)
D = Dissolved TD = Total Dissolved T = Total TR = Total Recoverable			

Groundwater – Fifteen groundwater sites will be monitored, as a result of mining activity in the New Horizon Mine as described below. These sites include locations to monitor the coal, underburden, overburden, and alluvial aquifers at or adjacent to the mine.

Monitoring Type	**Monitoring Location**	**Monitoring Frequency**	**Quarterly Field Parameters**	**Quarterly Laboratory Parameters**
Groundwater	GW-N3	Quarterly	Water level, Temperature, pH, Conductivity	See Below

Groundwater	GW-N8	Quarterly	Water level, Temperature, pH, Conductivity	See Below
Groundwater	GW-N16P1	Quarterly	Water level, Temperature, pH, Conductivity	See Below
Groundwater	GW-N17P1	Quarterly	Water level, Temperature, pH, Conductivity	See Below
Groundwater	GW-N18P1	Quarterly	Water level, Temperature, pH, Conductivity	See Below
Groundwater	GW-N36	Quarterly	Water level, Temperature, pH, Conductivity	See Below
Groundwater	GW-N37	Quarterly	Water level, Temperature, pH, Conductivity	See Below
Groundwater	GW-N38	Quarterly	Water level, Temperature, pH, Conductivity	See Below
Groundwater	GW-N39	Quarterly	Water level, Temperature, pH, Conductivity	See Below
Groundwater	GW-N40	Quarterly	Water level, Temperature, pH, Conductivity	See Below
Groundwater	GW-N41	Quarterly	Water level, Temperature, pH, Conductivity	See Below
Groundwater	GW-N42	Quarterly	Water level, Temperature, pH, Conductivity	See Below
Groundwater	GW-N43	Quarterly	Water level, Temperature, pH, Conductivity	See Below
Groundwater	GW-N44	Quarterly	Water level, Temperature, pH, Conductivity	See Below
Groundwater	GW-N45	Quarterly	Water level, Temperature, pH, Conductivity	See Below
Groundwater	GW-N46	Quarterly	Water level, Temperature, pH, Conductivity	See Below

1. GW-N3 monitors the underburden aquifer adjacent to the New Horizon 1 mine area.
2. GW-N16P1 monitors the underburden aquifer directly adjacent to the mining area.
3. GW-N17P1monitors the Dakota coal aquifer directly adjacent to the mining area.
4. GW-N18P1 monitors the overburden aquifer directly adjacent to mining area.
5. GW-N36 monitors the overburden aquifer and represents the up gradient condition.
6. GW-N37 monitors the Dakota coal aquifer and represents the up gradient condition.
7. GW-N38 monitors the underburden aquifer and represents the up gradient condition.
8. GW-N39 monitors the alluvial aquifer which represents the up gradient condition.
9. GW-N40 monitors the alluvial aquifer which represents the adjacent condition.
10. GW-N41 monitors the overburden aquifer up gradient of the mining area.
11. GW-N42 monitors the Dakota coal aquifer up gradient of the mining area.
12. GW-N43 monitors the underburden aquifer up gradient of the mining area.
13. GW-N44 monitors the overburden aquifer and represents the down gradient condition.
14. GW-N45 monitors the Dakota coal aquifer and represents the down gradient condition.
15. GW-N46 monitors the underburden aquifer and represents the down gradient condition.

For the groundwater sites, water levels, field parameters, and laboratory analyses will be collected quarterly with the parameters listed below.

Quarterly Groundwater Laboratory Parameters

pH	Conductivity at 25°C	Total Dissolved Solids	Bicarbonate (HCO_3^-)^D	Calcium (Ca^{+2})^D
Magnesium (Mg^{+2})^D	Ammonia (NH_3)^D	Nitrate^D	Phosphate (PO_4^{-3} as P)^D	Sodium (Na^+)^D
Sulfate (SO_4^{-2})^D	Arsenic (As)^{TD}	Iron (Fe)^D	Lead (Pb)^{TD}	Manganese (Mn)^{TD}
Mercury (Hg)^{TD}	Selenium (Se)^{TD}	Zinc (Zn)^{TD}	Alkalinity	Alumium^D
Carbonate^D	Chloride^D	Nitrogen as Nitrate	Nitrogen as Nitrite	Iron^{TR}
Lead^D	Molybdenum^D	Potassium	Sodium	Cation/Anion Balance
D = Dissolved TD = Total Dissolved T = Total TR = Total Recoverable				

Probable Hydrological Consequences

A discussion of the probable hydrologic consequences and reclamation plan are contained in Section 2.05.6(3) and Section 2.05.6(3)(b)(v) of the permit application document. The following discussion is intended to supplement the description of potential impacts of mining and mitigation of these potential effects. The determination of significance has been made considering the impact on the quality of the human environment, existing water uses, and the intended post mining land use of the area.

Interruption of Groundwater Flow and Drawdown

In order to develop the impact assessment for groundwater quantity, two different analyses techniques were utilized. First, pit inflow volumes were determined on an annual basis using an analytical approach developed by McWhorter, 1982. The second analysis involved the determination of annual pit inflow rates and annual drawdowns in the adjacent overburden and coal aquifers as a result of the pit inflows. This analysis utilized the USGS 3-dimensional finite-difference groundwater flow model MODFLOW.

Transient simulations were performed for a five-year period, using the maximum drawdown estimates for the overburden and coal. These drawdown results are expressed as a maximum at the pit and are expressed as a conical depression which results in decreased drawdown at further distance from the mine. For the overburden, the pit drawdown was 5 feet for years 1 and 2, 8 feet during year 3, 15 feet during year 4, and 30 feet during year 5. The drawdown for the coal simulation was 8 feet during year 1, 5.8 feet during year 2, 6 feet during year 3, 7.3 feet during year 4, and 8 feet during year 5. The zero impact contour for the overburden and coal after five years of mining is approximately 4,000 feet. The overburden and coal drawdown contours do not intersect any of the boundaries, therefore, no impact of the San Miguel River from drawdown in the deeper part of the overburden or coal is predicted. Shallow aquifer flow into Tuttle and Calamity Draws in the vicinity of the pit will be decreased, but will be offset by pumpage from the pit. Simulated average daily pit inflow for the coal and overburden aquifers varied from 1,255 cubic feet per day in year 1 to 5,604 cubic feet per day in year 5. New Horizon's approach to these potential impacts is to monitor the aquifers and discharge from the pit to determine the extent of drawdown. The hydrological monitoring program should provide reasonably accurate measurements of effects of mining. Should the monitoring show that impacts to the groundwater aquifers are precluding its use, New Horizon will provide alternate water sources of comparable quantity and quality. As described in the water augmentation plan, New Horizon has a 114 acre foot consumptive use right on the Highline Canal which would be used to mitigate the potential 26 acre foot impact on surface water right users from pit inflow drawdown.

Impact on Groundwater Rights

No surface or groundwater rights have been identified within the New Horizon 2 mine area. Therefore, there will be no direct impact from the approved mining plan on any local water rights.

Impact of Spoil Material on Groundwater Flow and Recharge

The mine pit will remain open only until the coal has been removed. Following the short-term water level decline on the groundwater system as a result of pumpage of groundwater inflow to the pit, a potential long-term impact to the local groundwater flow is the period of time necessary for resaturation of the spoil material and reestablishment of a flow gradient. Spoil material at the New Horizon 2 mine will be replaced using techniques which will restore permeabilities of the material. Thus, the mining operation will not diminish vertical or horizontal permeabilities but may increase these permeabilities. As a result, there should be no significant impacts from the mining operation on groundwater flow and recharge rates. The time period required for the spoil material to resaturate should be greatly reduced because of the irrigation recharge as the mined area will be revegetated for an irrigation type of post mining land use.

Containment of Pit Inflow and Impacts on Water Quality

All runoff and pit pumpage from disturbed areas will be routed through sedimentation pond 007. The pond is designed and constructed to impound runoff and pit pumpage from areas disturbed by mining and provide sufficient residence time to insure that the pond discharge water chemistry meets the effluent requirements specified in the NPDES Permit. A review of the chemical and flow data indicates that the potential for any discharge from Pond 007 to exceed receiving stream or federal standards is minimal. Past history of mine operations at the Nucla Mine indicate very few exceedances of the standards over the years of operations. As previously discussed, highest pit inflow is predicted to occur in year 5 at approximately 5,600 cubic feet per day. To assess the impact of this inflow on Calamity Draw and the San Miguel water quality, it was assumed that the entire flow was discharged and that the TDS level for the overburden aquifer was representative of the chemical load. The duration of the water quality impacts is relatively short term (5 years) and the significance of the impact is negligible as TDS increases in the range of 0.08 to 1.5 percent are projected on the San Miguel River and Calamity Draw, respectively. These increases in TDS will be additional magnesium/sodium-sulfate type water which may result in a slight increase in salinity. These projected changes in TDS levels will in no way affect the present and potential uses of the surface water and are so small that they may not be measurable.

Impact of Spoil Water Quality on the Ground and Surface Water Quality

The available data indicate that a small proportion of the overburden may produce acid through the oxidation of pyrite. Based on laboratory tests on overburden cores, calcite is almost ubiquitous. Calcite serves two functions. First, it buffers the pH of the water, which overall tends to slow the oxidation of pyrite, slowing the production of acid. Second, it will neutralize the acid that is produced. The core samples that exhibited low paste pH's are surrounded by non-acid producing, calcite-bearing rocks. The water that contacts the low-paste pH materials will have first reacted with calcite, and therefore developed a pH-buffer capacity of its own. The groundwater monitoring data indicate that mixed overburden and interburden waters have near neutral pH's. Sample pH's less than 6 are associated only with the lower Dakota coal. Where the coal's permeability is high enough to produce about 5 gpm during sampling, the acid-producing reactions do not appear to be fast enough to maintain the pH of the water less than 5. Oxidation rates may increase because of the mining process. However, the supply of oxidation is only one of the constraints on the production of acid. Other constraints are imposed by the quantity of calcite present, and the reactivity of the pyrite. The paste-pH test, conducted under oxidizing conditions, indicates that a very small proportion of the overburden is likely to produce acid. The acid that is produced will be quickly neutralized. During the mining process, New Horizon will test the overburden and if acidic layers are encountered, they will be mixed with non-acidic layers to neutralize any acid forming effects.

Potential Impacts of Replaced Spoil on Groundwater Quality

The analysis of geochemical controls on groundwater quality suggests that the water chemistry and concentrations of most elements of concern are controlled by mineralogic reactions that will resist changes in water chemistry. Production of acid may occur in very local settings and is probably most prevalent in the coal, which will be mined. Calculations indicate that neutralization of the acid will occur rapidly with mixing of water, or with movement of acidic water into calcite-bearing rocks. Also, the analysis conducted indicates that chemical changes are not likely to occur.

Effects of Mining on the Local Geomorphology

Impacts from mining on the local geomorphology will be long term, but appear to be of minimal significance. The reestablished reach of the drainage which will be mined will result in a shorter, slightly steeper stream channel. The potential for increased sediment loads in the drainage (once pond 007 is removed) should be offset by the stable banksides and the relatively small change in overall gradient. The increased runoff and consequent erosion potential on disturbed basins in the mining area due to the temporary loss of topsoil stricture should be of minimal significance. Contour ripping, mulching and revegetation have been demonstrated to minimize soil erosion and will be used to mitigate the increased runoff potential until the topsoil structure is developed.

Effects of Sediment Ponds on Channel Characteristics and Downstream Users

Potential impacts of sediment pond 007 on downstream users will involve possible reductions in flow due to impounded water. The water augmentation plan discusses the available water which will be used should impacts be identified. New Horizon currently has rights to a sufficient quantity of water to supply all users associated with the mining activities, plus an additional quantity of water that can be used to mitigate any impact to downstream users.

Effects of Sediment Pond Discharge on Surface Water Quality

The effects of sediment pond diversions on surface water quality will be negligible because the structure has been designed to minimize impacts to the hydrologic balance. The diversion involves such minor areas of disturbance that chemical and sediment changes in the flows will be unmeasurable.