

**Applicant Name:** Cascade County Commission

**Project Title:** Identifying the Fate of Acid Mine Drainage and Potential for Impact to the Madison Aquifer

**Project Abstract**

Some samples from wells developed for new housing areas around Great Falls show unexpectedly poor water quality in the Madison aquifer, similar in chemistry to acid mine drainage (AMD). A hydrogeologic evaluation of the area is required to differentiate between locally generated acid rock drainage and acid mine drainage that has traveled from the historic coal mines south of Great Falls.

The Cascade County Commission and the Montana Bureau of Mines and Geology propose an extensive hydrogeologic evaluation completed over 36 months: "Identifying the fate of acid mine drainage and potential for impact to the Madison Aquifer." Recently published studies by Dr. Chris Gammons of Montana Tech illustrate the effectiveness of using sulfur and oxygen isotopes of sulfate to uniquely fingerprint the acid mine water entering the local flow system. Wells completed in the Madison aquifer near Centerville have been shown to contain a component of water found at the Stockett area mines. A more extensive sampling effort using Gammons isotope tracer techniques is proposed to fully identify the extent and location of AMD affected aquifers.

The goals of this project are to: (1) trace the fate, including the location and geochemical evolution, of acid mine drainage originating in the Stockett area, (2) evaluate the mechanisms creating poor quality water in some parts of the Madison aquifer near Great Falls, and (3) disseminate information. These goals will be accomplished through several activities including extensive sampling and isotope-geochemical analysis of groundwater and aquifer host rocks/cores, establishing the potential flow path of AMD across Johnson Flats through geophysical methods, drilling, and installing wells downgradient from mine discharge.

**Applicant Name:** Central Montana Regional Water Authority

**Project Title:** Water Resources Monitoring for the Musselshell-Judith Rural Water System

### **Project Abstract**

The proposed project, Water Resources Monitoring for the Musselshell-Judith Rural Water System (MJRWS), will be completed by the Central Montana Regional Water Authority (CMRWA) using its recently developed *Water Resources Monitoring Plan*. The project location is within the Judith Basin, a hydrologic unit that occurs in parts of Judith Basin and Fergus counties. Project goals and objectives follow:

#### Goals:

1. Use water resource monitoring to assist water users of Judith Basin.
2. Share useful water resources data with the community.
3. Improve the understanding of Judith Basin water resources.
4. Provide and use information to assess impacts of climatic trends on area aquifers.

#### Objectives

- Determine magnitudes and trends of water resources parameters.
- Develop and maintain an accessible data archive.
- Periodically analyze, report, and hold meetings to share data and inform the public.
- Incorporate regional climate information into local forecasts.
- Establish aquifer parameters and boundaries for the Madison and Kootenai aquifers.
- Identify source aquifers to area springs.
- Characterize the discharge of Big Spring.
- Coordinate monitoring plan activities with the Montana Bureau of Mines and Geology.
- Develop public/private partnerships to facilitate monitoring plan activities.

It will take nearly four years to develop the framework for the water monitoring project, collect baseline data, analyze the baseline data, and generate reports. This is a regional project with statewide implications. The Montana legislature has placed a high priority on regional water project funding as evidenced by the creation of the Treasure State Endowment Program (TSEP) regional water account in 1999 and the appropriation of continuing administrative funding for the four regional water projects in Montana.

The Madison aquifer is a deep aquifer with an abundant supply of high quality water in the proposed project area. The MJRWS will use the Madison aquifer to provide quality drinking water to central Montana communities. There is currently limited data on the Madison aquifer in the Judith Basin and its relationship with other groundwater and surface water resources in the region. Given the extremely high value of this water resource, there is significant potential for future development. Now is the time to start collecting the baseline data that will ensure the proper management, protection, and responsible development of the Madison aquifer to support Montanans into the future.

**Applicant Name:** City-County Board of Health for Lincoln County

**Project Title:** Assessment and Development of Protocols to Ensure Public Health Protection from Impacts of Vermiculite Mining in Lincoln County

**Project Abstract**

The City-County Board of Health for Lincoln County (BOH) is applying for a grant to help mitigate environmental damages to natural resources caused by vermiculite mining in Lincoln County and, ultimately, to safeguard public health. Libby amphibole (LA) asbestos is a by-product of vermiculite mining that has caused a large number of asbestos-related disease and death in the area. The Libby Asbestos Superfund Site (site) was established to remediate LA found within the site boundary. However, studies have shown that LA is present in tree bark, soil, and duff throughout Lincoln County beyond the site.

The BOH is concerned that (1) people in Lincoln County outside the site continue to be exposed to LA asbestos, (2) certain activities performed in Lincoln County are more likely to result in LA exposure, and (3) public uncertainty about LA exposure may limit resource development in the county.

The objective of this project is to design and implement a feasibility study that will address questions about LA contamination present in trees, soil, and wood wastes in Lincoln County forests and landfills. Confirmation that LA is not present in these media throughout Lincoln County should improve timber sales and recreational activities, and where LA is present, provide recommendations for mitigating exposures during timber management, recreational, and wood waste disposal. The overall goals for the project include improving local economic conditions, increasing employment opportunities, and improving tourism. Considering federal superfund money cannot be used outside the site, the BOH seeks this grant to assess LA exposures outside the site.

The project is located in Lincoln County and will include sampling and analysis, and a feasibility study that identifies methods to reduce or eliminate LA exposures during timber management, recreation and landfill disposal activities. The project will take 20 months to accomplish.

**Applicant Name:** Deer Lodge Valley Conservation District

**Project Title:** French Gulch Placer Mining Restoration

**Project Abstract**

French Gulch is located 10 miles southeast of Anaconda, on the Mount Haggin Wildlife Management Area in the Big Hole River drainage. French Gulch was the first gold strike in the Big Hole River drainage in the 1860s and placer mining occurred in the drainage through the early 1900s. More than five miles of stream have been impacted to varying degrees by placer mining practices resulting in a straightened stream channel, the presence of large dredge spoils, increased stream gradient, reduced riparian area width, and isolation of the stream from its floodplain.

The straightened channel has resulted in poor fish habitat. French Gulch likely served as an important spawning and rearing tributary to French Creek prior to mining. Further, the straight channel and lack of a floodplain increase fine sediment erosion and transportation to French Creek downstream. In some stream reaches, large gravel spoils, partly vegetated by upland species, cover the valley bottom and replace former riparian vegetation.

The goal of this project is to restore stream and floodplain function to the lower three miles of French Gulch impacted by placer mining activities. The objectives are to improve aquatic and riparian habitat and water quality to benefit the fish, wildlife and plant species, restore fish passage, and improve wetlands.

A natural channel pattern and floodplain would be established by removing mine tailings and/or relocating the stream channel to enhance fish habitat. Water quality would be improved because a functioning channel and floodplain would reduce stream bank erosion and aid in fine sediment deposition. A stable stream channel would also reduce the potential for mercury, present in some dredge spoils, to enter the stream. The Deer Lodge Valley Conservation District and partners are sponsoring this project. It is anticipated that the project will be completed in 2017.

**Applicant Name:** Deer Lodge Valley Conservation District

**Project Title:** Moose-French Creek Placer Mining Restoration

**Project Abstract**

Moose and French creeks are located on the Mount Haggin Wildlife Management Area in the Big Hole River drainage 10 miles southeast of Anaconda. The first gold strike in the Big Hole drainage occurred here in the 1860s and mining occurred in the area through the early 1900s.

Approximately one-half mile of Moose Creek was mined for gold leaving behind a straightened stream channel that is confined by placer tails. The placer tailings lock the stream into its current straightened configuration resulting in increased stream gradient, reduced riparian area width, and isolation of the stream from its floodplain. The straightened channel has resulted in poor fish habitat. Moose Creek likely served as an important spawning and rearing tributary to French Creek prior to mining, but the impacts of mining have left the stream disconnected from the main stem French Creek.

French Creek is not confined by large dredge piles like Moose Creek; however, 4,000 feet of stream were straightened when mined and smaller dredge piles have acted as dikes preventing the stream from accessing the floodplain. Although the stream is reestablishing meander bends, this process is causing significant stream bank erosion. The construction of Highway 569 in the 1940s through the riparian area of French Creek has exacerbated these problems.

The goal of this project is to restore stream and floodplain function to Moose and French creeks impacted by placer mining activities. The objectives are to improve aquatic and riparian habitat and water quality to benefit fish and wildlife, restore fish passage, and improve wetlands through restoration of a natural channel and floodplain. The Deer Lodge Valley Conservation District is sponsoring this project. The project will be completed in 2017.

**Applicant Name:** Madison County

**Project Title:** North Willow Creek Reclamation Project

**Project Abstract**

Madison County is requesting \$499,828 in Reclamation and Development Grant Program funds to conduct the North Willow Creek Reclamation Project between June 2015 and October 2017. Historic mining in the Pony and Cataract creek drainages has negatively influenced the health of the watershed through stream sedimentation, degraded fisheries, and environmental contamination from heavy metals.

A unique opportunity exists through a recently launched partnership of non-profit organizations, local governments, state and federal agencies, environmental scientists, and the mining industry to reclaim the North Willow Creek subwatershed, sending marginally economic mine wastes to Golden Sunlight Mine for third party reprocessing and removing the material from the landscape. Public funds will allow these economically marginal mine wastes to be cleaned up at a fraction of the cost of in situ capping or repository placement, saving hard-earned taxpayer dollars.

This reclamation method allows for the additional removal of mine waste materials in conjunction with active re-mining efforts to improve the local environment at a watershed scale. Public benefits of this reclamation project include job creation, economic stimulus, improved water quality, enhanced fish and terrestrial wildlife habitat, public and private land restoration, and public health and safety improvements.

Activities completed during the project will include mine waste excavation, screen and crushing, hauling, reprocessing for gold, reclaiming all removal areas with native vegetation, including stream banks, and monitoring to determine success. Additional activities include bat friendly adit and shaft closures. The project is a mix of Bureau of Land Management, United States Forest Service, and private lands directly west of Pony in the North Willow Creek sub-watershed.

**Applicant Name:** McCone County

**Project Title:** Former McCone County Hospital Voluntary Petroleum Extraction

**Project Abstract**

McCone County proposes to voluntarily remediate petroleum contamination from beneath the former McCone County Hospital in Circle. Based on historic measurements, several feet of free product are present on top of the shallow groundwater, posing human health risks to on-site users and surrounding properties. The current landowner is operating a day care and apartments on the site and is concerned about the migration of vapors into the building. The property is surrounded by homes and a public school. McCone County is concerned about the migration of the petroleum to adjacent properties.

The petroleum release at the site was discovered in 1994 during removal of an 8,000-gallon underground fuel tank. The tank had holes and extensive corrosion. In 2008, a groundwater investigation was completed, which identified the plume of free product. With the exception of limited bailing, the free product remains. Intermittent groundwater monitoring has occurred under the direction of the DEQ. The DEQ has not directed the current owner to abate the contamination. The site has not progressed toward closure. The product thickness in each well has increased since initial discovery in 2008, and the County wants to see this problem addressed voluntarily.

The County proposes to implement free product recovery to remove petroleum on the groundwater, thus controlling any migration of the fuel. Project activities would include complete vapor intrusion monitoring of the building in an effort to demonstrate that people using the building are not exposed to elevated petroleum vapors, and if so, install a vapor mitigation system. The project would conclude with a detailed report discussing product removal effectiveness and exposure risks.

**Applicant Name:** Mile High Conservation District

**Project Title:** Conifer Encroachment Reduction in Southwest Montana

**Project Abstract**

Rocky Mountain Juniper and other conifers have been gradually encroaching into wet meadows and sagebrush and grassland communities in southwest Montana and throughout the West since the late 1800s. Existing studies have indicated that the onset of conifer encroachment was synchronous with the cessation of frequent surface fires, and has resulted in detrimental impacts to habitat and rural livelihoods in areas throughout Montana and the Intermountain West as conifers replace aspen and understory species more valued for browse and wildlife habitat. These impacts of conifer encroachment come with a corresponding impact to water availability.

The southwest Montana conifer encroachment working group was formed in response to observed effects of conifer encroachment in much of southwest. The working group proposes to develop and test a program that uses local Volunteer Fire Departments to assist with control of conifer encroachment for restoration of rangeland, forests, and headwaters water storage. The project area includes upper portions of the Browns Gulch watershed (tributary to the upper Clark Fork River watershed near Butte) and the upper Pipestone Creek watershed (tributary to the Jefferson River watershed near Whitehall).

The project proposed is a pilot to determine viability of conifer encroachment control at a watershed scale to restore natural processes. The project is patterned after a similar conifer encroachment control program in Oregon and the pilot will determine applicability in Montana. Developing this program will enhance Montana's economy by restoring rangeland forage and habitat, will protect water resources, improve wildlife habitat, and provide additional training for volunteer fire crews to promote public safety and welfare and improve protection of public resources of Montana's citizens and rural communities. This project would be completed by December 2017.

**Applicant Name:** Missoula County Community and Planning Services

**Project Title:** Martina Creek and Ninemile Creek Reclamation

**Project Abstract**

There is a long history of surface mining on Ninemile Creek and its tributaries. Following an initial gold rush in the late 1800s, mining with dragline dredges, hydraulic mining, and sluicing continued on Ninemile Creek and its tributaries until the late 1940s. The historic upper Ninemile Creek mining complex includes four miles of Ninemile Creek as well as four tributary confluence areas. Mining activity significantly altered the landscape and impacted hundreds of acres of the watershed.

Specific problems include piles of mine tailings that range from 12 to 40 feet tall, excessive erosion, and a lack of connectivity with the floodplain. Additionally, large settling ponds dot the landscape and many riparian areas have been replaced with unproductive soils dominated by noxious weeds. This massive disturbance resulted in the valley bottom being lowered by as much as 10 feet, causing major head-cutting up the tributaries. Furthermore, large pulses of sediment and bedload are slowly moving downstream, causing channel migration and instability. Bank erosion surveys show that an estimated 2,850 tons of sediment per year is entering Ninemile Creek due to mining impacts, causing problems downstream with bridges, roads, power lines, and private property.

This project is a cooperative effort between Missoula County, Trout Unlimited, and the Forest Service, with support from private landowners, state agencies, and local organizations. Planning and data collection efforts have taken place over the last six years throughout the Ninemile watershed to document impacts, evaluate alternatives, and develop conceptual design plans for this project. Goals for this project include improving water quality by reclaiming mining impacts on Martina Creek, a tributary to Ninemile Creek, and restoring nearly 3,500 feet of the Ninemile Creek main stem in the vicinity of Martina Creek. Construction will take place during summer and fall 2016.

**Applicant Name:** Montana Board of Oil and Gas Conservation

**Project Title:** 2015 Northeastern District Orphaned Well Plug & Abandonment & Site Restoration

**Project Abstract**

This purpose of this project is to properly plug orphaned oil/gas (bond forfeiture) wells, leaking orphaned abandoned wells, and to perform surface reclamation at these well sites. These wells in southeastern and eastern Montana are uneconomic and have the potential of causing damage to sub-surface formations, contaminate the state's surface and ground waters, contaminate the surface lands around each well, and contaminate the atmosphere.

The Board of Oil and Gas Conservation (BOGC) will eliminate the threat of contamination by soliciting bids to plug and abandon the wells. Under the supervision of BOGC staff, the successful bidder will properly plug and abandon each well, dispose of and/or remediate contaminants, and reclaim the surface location.

The wells in this project produced oil, gas, and water. These wells were not plugged or were plugged in the past and are leaking water to the surface. Most of these wells were acquired by the BOGC from bond forfeitures where the operator either refused to plug the wells or could not afford to plug the wells and consequently, the bond was forfeited. Forfeited funds are insufficient to plug and restore the surface location for these wells. The operators are currently insolvent or long since defunct, responsibility for the wells and any potential environmental damage rests with the BOGC and the State. The wells will be properly plugged and abandoned when funding is made available.

The orphaned wells that present the highest potential to damage the environment because of leaking or loss of mechanical integrity will be plugged first. The project is estimated to take 24 months. The work will generally begin during the first suitable field season following the availability of funding.

**Applicant Name:** Montana Board of Oil and Gas Conservation

**Project Title:** 2015 Southern District Orphaned Well Plug & Abandonment & Site Restoration

**Project Abstract**

The purpose of this grant request is to provide funding to properly plug orphaned oil/gas (bond forfeiture) wells, leaking orphaned abandoned wells, and to perform surface reclamation at these well sites. These wells, which produced oil, gas, and water, are uneconomical and have the potential of causing damage to sub-surface formations, contaminating the state's surface and groundwater, contaminating the surface lands around each well, and ultimately contaminating the atmosphere.

The Board of Oil and Gas Conservation (BOGC) will eliminate the threat of contamination by soliciting bids to plug and abandon the wells. Under the BOGC supervision, the successful bidder will properly plug and abandon each well, dispose of and/or remediate contaminants, and reclaim the surface location. These wells were not plugged or were plugged in the past and are leaking water to the surface. Most of these wells were acquired by the BOGC from bond forfeitures where the operator either refused to plug the wells or could not afford to plug the wells and consequently, the bond was forfeited. Forfeited funds are insufficient to plug and restore the surface location for these wells. The operators are currently insolvent or long since defunct, responsibility for the wells and any potential environmental damage rests with the BOGC and the State. The wells will be properly plugged and abandoned when funding is made available.

The orphaned wells are located in southeastern and eastern Montana. The wells that present the highest potential to damage the environment because of leaking or loss of mechanical integrity will be plugged first. The project is estimated to take 24 months. The work will generally begin during the first suitable field season following the availability of funding.

**Applicant Name:** Montana Bureau of Mines and Geology

**Project Title:** Enhancing the Monitoring Infrastructure to Track Long-term Changes and Improve Management of the Fox Hills – Hell Creek Aquifer in Eastern Montana

**Project Abstract:**

The Fox Hills-Hell Creek (FHHC) aquifer underlies the Williston Basin and is an important source of water in eastern Montana, North Dakota, Saskatchewan, and Manitoba. In Montana, more than 1,800 FHHC wells obtain water from the FHHC. Circle, Baker, Wibaux, Broadus, Lambert, Ekalaka, Richey, Plevna, and Flaxville rely on it for municipal supply.

Widespread use and unregulated discharge of flowing wells has resulted in persistent water-level declines, especially in the Yellowstone River Valley. Declining water levels have also been recorded in North Dakota adjacent to Montana. The Yellowstone and Lower Missouri Basin Advisory Councils have recommended funding ongoing work towards resolving issues related to FHHC water-level declines. As oil and gas production and the population expands and demand for groundwater increases, the need for comprehensive and long-term systematic assessment becomes more urgent. The lack of FHHC monitoring data in areas of development is a major impediment to identify and assess groundwater-related risks.

Through the project, Montana Bureau of Mines and Geology seeks to install up to five dedicated monitor wells in the FHHC aquifer in eastern Montana. The wells will be used to make direct measurements of groundwater levels and water quality. The most useful groundwater measurements are obtained from dedicated monitoring wells with precise completions. Long-term, systematic measurements from such wells are foundational to understand the properties of aquifer systems.

After completion, the wells will be surveyed, sampled, instrumented with water-level and water-quality data loggers, and incorporated into the state-wide groundwater monitoring network. Ongoing costs to service the new monitoring wells will be assumed by the Montana Ground Water Assessment Program. All data will be stored in the Ground Water Information Center (GWIC) database and readily assessable through the GWIC web site. The work will be done by the Montana Bureau of Mines and Geology over 24 months.

**Applicant Name:** Montana Bureau of Mines and Geology

**Project Title:** Enhancement of Montana's Manufacturing Growth through Production of Commodities from Remediation of Natural Resource Development Impacts

**Project Abstract:**

The Berkeley Pit Lake in Butte is a well-known body of water located at the headwaters of the Clark Fork and Columbia rivers. It is the extant remains of approximately 30 years of open-pit mining of low-grade copper deposits that also hosted an abundance of other metals and toxic elements. The pit became a Superfund site shortly after mining ceased. The Environmental Protection Agency promulgated a Record of Decision (ROD) which required the pit water be treated, so that it could be discharged into Silver Bow Creek without degradation of the water quality after the flooding pit reached a specified critical water level.

A treatment plant was designed and constructed in 2005 and its performance was validated in 2007. The plant uses a two-stage high density sludge lime precipitation process, which produces gypsum-saturated water with a pH above the 9.5 limit required for discharge. Further treatment to reduce the total dissolved solids (TDS) and to adjust the pH is required to avoid an adverse impact on creek water quality.

Previously, no attempts have been made to include selective metal recovery as part of the treatment process. However, successful recovery of zinc alone in a five million gallon per day treatment plant would generate approximately \$20,000 per day in zinc product. In the current treatment scenario, this zinc accumulates as additional waste..

Harvesting zinc and other metals in the pit, as well as other products like gypsum, to become marketable commodities will complement the sustainability of extractive resource development and enhance the growth of Montana manufacturing. This two-year project will include investigation into the feasibility of resource recovery using the latest technological developments in metals separation and assembly of a pilot plant to test for a three-month period.

**Applicant Name:** Montana Department of Environmental Equality

**Project Title:** Basin Creek Mine – Site Stability Project

**Project Abstract**

The Basin Creek Mine (BCM) is an inactive open-pit gold mine located approximately 17 miles southwest of Helena. BCM is located within the Upper Tenmile Creek Mining Area National Priorities List (NPL) site and the Basin Mining Area NPL site. BCM was operated historically as an open-pit heap leach facility. Approximately three million tons of ore were mined during its operation. Two cyanide heap leach pads were developed and are now closed. Three open pits were developed and two pits were backfilled. One open pit remains (Luttrell Repository) and is being used by the U. S. Environmental Protection Agency (EPA) as a mine waste repository for Superfund remedial activities within the two NPL sites.

Since April 2003, the DEQ has been managing the BCM and has been conducting ongoing mine closure activities. Site activities are conducted seasonally from mid-April through October. Access to the Luttrell Repository is necessary for the disposal of mining waste materials resulting from remedial activities in both the Basin Mining Area and the Upper Tenmile Creek Mining Area NPL sites. The BCM access road network is still needed for ongoing remedial activities in the Basin Mining Area and the Upper Tenmile Creek Mining Area NPL sites, but the access and haul roads are considerably oversized and are a significant source of off-site erosion and sedimentation of nearby streams. The size of the BCM haul roads should be reduced. Other roads within the BCM complex are no longer needed, and should be obliterated.

The project goals and objectives are to maintain erosional stability in reclaimed areas; achieve reclamation objectives for revegetation cover, production, and diversity; prioritize roads for reduction or obliteration to stabilize the site to prevent off-site erosion and sedimentation to surrounding surface waters. DEQ will hire an engineering firm to assist with road reduction design, and a phased prioritization of site reclamation sequencing. Upon completion of the road reduction design and site prioritization sequence, a competitive contract will be bid and let to begin construction. Due to inadequate funds, the Basin Creek Mine – Site Stability Project will be completed as a phased approach as funding becomes available. The initial phase (for which this grant is requested) will be completed within one year.

**Applicant Name:** Montana Department of Environmental Quality

**Project Title:** Belt Water Treatment Project

**Project Abstract**

The objective of the Belt Water Treatment project is to mitigate impacts to Belt Creek from abandoned coal mines by treating discharges of acid mine drainage (AMD) to meet Department of Environmental Quality (DEQ) standards. Belt is located approximately 20 miles east-southeast of Great Falls in Cascade County.

Currently, the mine adits discharge contaminated water through the community of Belt before discharging to Belt Creek. The AMD is extremely acidic and contains numerous metals, including arsenic, beryllium, cadmium, chromium, iron, manganese, nickel, thallium, and zinc at concentrations exceeding DEQ human health and aquatic life standards.

A water treatment assessment was completed in 2012 to prioritize treatment of the 17 AMD discharges in the Great Falls Coal Field. The AMD discharges in Belt were identified as the highest priority for treatment due to the proximity of AMD to residential and high-use areas, and the potential resource value of Belt Creek to support multiple beneficial uses including boating, fishing and swimming. Bench-scale testing of conventional lime-based treatment of the AMD in Belt indicated highly favorable results in meeting DEQ-7 water quality standards.

This work will be incorporated in an engineering evaluation/corrective action alternatives analysis to compare technologies and identify cost-saving measures for AMD treatment and the management of generated sludges. The implementation of AMD treatment in Belt will include property acquisition work in 2014 and 2015, construction of the treatment plant and sludge disposal facilities in 2016, plant startup and testing in 2017, and optimization and operation of the treatment plant in 2018 and 2019. The goal is to achieve water quality standards for system discharges to Belt Creek in 2019.

**Applicant Name:** Montana Department of Environmental Quality

**Project Title:** Black Pine Mine – South Fork Lower Willow Creek Fluvially Deposited Mining Tailings

**Project Abstract:**

The Black Pine Mine (site) is located about 12 miles northwest of Philipsburg in Granite County. The work planned under this grant is a small piece of the overall Black Pine Mine Reclamation Project efforts led by the Department of Environmental Quality (DEQ) using American Smelting and Refining Company (ASARCO) settlement funds.

Settlement agreements with the State of Montana provided approximately \$17.3 million for the reclamation of Black Pine Mine designated properties and created the Montana Environmental Custodial Trust to own all former ASARCO properties in Montana. The Montana Environmental Trust Group (Trust), in turn, was formed to oversee the affairs of the Custodial Trust, as its trustee. DEQ's activities at the site are implemented consistent with the requirements and terms of the Consent Decree. Under the Consent Decree, both the ASARCO-owned property (Trust Designated Property) and funds to be used to clean up that property were transferred to the Trust. DEQ obtains funding from the Trust for the implementation of the environmental actions at the site. DEQ's use of the funding is subject to the requirements of the Consent Decree. The funds can only be used within the Trust Designated Property. Reclamation costs for the Black Pine Mine are estimated to exceed the \$17.3 million that are available.

The site consists of approximately 1,055 acres of patented mining claims and 157 unpatented lode claims on lands administered by the U.S. Forest Service (USFS), Beaverhead-Deerlodge National Forest. Mining began at the site in 1885 and continued, intermittently, into the 1990s. The site encompasses several historic and modern mining areas, including the Combination Mine Area of Concern (AOC), the Tim Smith Mine AOC, the Historic Mine AOC, and the Combination Mill AOC. The site is comprised of a variety of mining impacted lands including tailings, tailings impoundments, waste rock piles, mine adits and shafts, and fluvially deposited mill tailings on private property.

Recent DEQ sampling results show a clear increase in metals concentrations and loading to South Fork Lower Willow Creek (SFLWC) from the site located on Trust Designated Property through approximately six miles of private property to the Lower Willow Creek Reservoir. It is strongly suspected that contamination of the water column is from tailings dispersed in the riparian corridor of SFLWC.

The work associated with this grant would focus on those fluvially deposited tailings on private property downstream from the Combination Mill AOC and the USFS administered lands. A portion of the grant would be used to conduct grid sampling in the floodplain of SFLWC to identify the nature and extent of the contamination. This additional sampling is needed so that reclamation efforts and funds can be focused on the most contaminated areas.

The DEQ will conduct this reclamation work, which is one phase of the overall Black Pine Mine Reclamation Project efforts being conducted by the DEQ and the Trust. The project is anticipated to be completed by fall 2018. This project is a joint effort between DEQ, Granite Conservation District, and Beaverhead-Deerlodge National Forest.

**Applicant Name:** Montana Department of Environmental Quality

**Project Title:** Landusky Bio-Reactor Rehabilitation

**Project Abstract:**

The Department of Environmental Quality (DEQ) is responsible for implementing the reclamation program at the Landusky Mine. Pegasus Gold Corporation conducted open pit mining at the Landusky Mine before declaring bankruptcy in 1998. This project would upgrade an existing treatment facility by replacing spent media in the bio-treatment plant and modernize the system by adding state-of-the-art technology that will result in more efficient operations while reducing requirements for nutrient addition.

The facility to be upgraded treats water that collects in the reclaimed mine's leach pads. A bio-treatment facility was originally constructed in 2001 to remove nitrate and selenium from these waters. When the treatment system was designed, it was anticipated to be needed for approximately 10 years, by which time residual nitrate concentrations in the leach pads were expected to decline to levels not requiring treatment. However, nitrate concentrations remain elevated (up to 350 milligrams per liter). Assessment of the three bio-reactor tanks during 2012 resulted in tank three being taken off-line because accumulated sludge was causing the treated effluent to be odorous and black in color. The media in tanks one and two were estimated to have residual lifespans of three and two years, respectively. DEQ replaced the media in tanks BR-2 and BR-3 during 2013–2014.

The goals of this project are to enhance the existing bio-reactor's ability to remove nitrate and selenium, and to significantly extend its operational life. The objectives are to replace corroded components in bio-reactor BR-1, replace the treatment media, re-inoculate it with new microbes, and to convert it to an electro-biochemical reactor.

The site is located fifty miles southwest of Malta, adjacent to the southern boundary of the Fort Belknap Indian Reservation, in Section 14, Township 25 North, Range 24 East, Phillips County. This project would take approximately 5 months.

**Applicant Name:** Montana Department of Environmental Quality

**Project Title:** Mitigation of Threat to Harlowton Public Drinking Water Supply

**Project Abstract**

The Department of Environmental Quality (DEQ) is investigating petroleum contamination in Harlowton. Investigations to date show that releases of petroleum hydrocarbons from multiple suspect and unknown sources have impacted the groundwater beneath a large portion of Harlowton. Free and dissolved phase petroleum hydrocarbons threaten the Thompson Supply Well, Harlowton's primary drinking water supply well. Free product has been present in monitoring well MW-16 located about 180 feet northeast of the Thompson Supply Well. Free product or elevated concentrations of dissolved phase contamination are present in other nearby monitoring wells. Water samples obtained from the Thompson Supply Well have reported detections of benzene, 1,2, DCA, and toluene. The presence of these chemicals in the Thompson Supply Well indicates a direct connection with a plume of refined petroleum.

The project area comprises an area of about six city blocks in Harlowton. The area extends from B Avenue on the west, eastward along 2<sup>nd</sup> Street NW to Lewistown Avenue, and north along Central Avenue up to Fourth Street. Within this area are eight former gas stations, a former Ford garage, a former car dealership, a former bulk plant, an active gas station, and the Wheatland County Shop. The Wheatland County Sheriff's Department also had underground storage tanks. These are all potential sources of the petroleum contamination underlying Harlowton. DEQ has identified three sources (Bob's Chevron, Croston's Exxon, and the Engineer's Depot) that have contributed to the petroleum plume and has pursued individual cleanups at those facilities. Many other suspected sources have not been incontrovertibly identified as contributing sources. When viable responsible parties are identified, they must investigate and clean up contamination from their facilities. If a source cannot be attributed to viable responsible parties, other sources of funding are needed to continue to address the contamination.

The project goals are to mitigate the threat to the Thompson Supply Well by chemical oxidation or other appropriate technology and continue to recover free product with the existing free product recovery system, thus reducing environmental impacts associated with the petroleum releases. Additional goals include identifying the sources of the dissolved and free product plumes, and determining if there are vapor intrusion risks. DEQ Remediation Division will be the lead agency for this project. All work will be coordinated with the City of Harlowton and Wheatland County. Injection well installation near monitoring well MW-15 should take approximately two months. Initial treatment should be completed within nine months. Groundwater treatment proximal to the County Courthouse/Thompson Supply Well is scheduled for May 2016. Chemical oxidation will last approximately seven months (one month for injection and six months of chemical reaction). The free product recovery phase of the project will continue for the project duration. Groundwater monitoring well sampling and monitoring will occur on an annual basis during the award period.

**Applicant Name:** Montana Department of Environmental Quality

**Project Title:** Sand Coulee Acid Main Drainage Source Control

**Project Abstract**

The objective of this project is to mitigate ongoing discharges of acid mine drainage (AMD) from abandoned coal mines surrounding the community of Sand Coulee. Sand Coulee is located approximately 10 miles southeast of Great Falls in Cascade County.

The abandoned mine workings act as groundwater drains which dewater the overlying Kootenai sandstone and discharge contaminated water to tributaries of Sand Coulee Creek. The AMD is extremely acidic and contains numerous metals, including arsenic, cadmium, chromium, iron, manganese, nickel, thallium, and zinc at concentrations exceeding DEQ standards. The AMD has contaminated groundwater in the shallow aquifers around Sand Coulee. Natural downward leakage, fractures, and well bores have distributed the AMD to the underlying Madison aquifer, as indicated by recent groundwater investigations.

The proposed mitigation is source control implemented by intercepting the groundwater in the Kootenai sandstone before it enters the mine workings. The stratigraphy and hydrogeology of the area are both favorable for a groundwater interception strategy. Two well designs will be constructed and evaluated for effectiveness during this project. They consist of: (1) a sub-horizontal well producing from the basal Kootenai sandstone and discharging to ground surface, and (2) a vertical well discharging unimpacted groundwater from the Kootenai sandstone to the Madison aquifer. While each design is potentially effective, implementation in the field is necessary to test actual effectiveness, determined by reductions in the AMD discharges.

This approach is the preferred alternative as it treats the source instead of the symptoms of the mine discharges. It provides a technically and financially viable solution by reducing or eliminating expenditures required for continual treatment of the AMD.

**Applicant Name:** Roosevelt County

**Project Title:** Kenco Refinery Highest-Priority Cleanup

**Project Abstract**

The Former Kenco Refinery is located in Roosevelt County on the Fort Peck Reservation in northeastern Montana. Roosevelt County and the Assiniboine & Sioux Tribes are enthusiastic about current plans to redevelop the site as a refinery and energy campus. This grant will fund the highest priority cleanup activities that are crucial to facility redevelopment.

The refinery operated from 1962 until 1985, primarily producing jet fuel. After the refinery closed, much of the equipment was removed, with the exception of some tanks that still contained refining liquids. Environmental assessment began at the facility in 1996 to understand the nature of contamination at the site. The most recent investigation, completed using EPA Brownfields Assessment Grant funds from the Great Northern Development Corporation (GNDC), profiled the volume and contents of aboveground tanks, identified areas of surface soil and shallow groundwater contamination, and evaluated cleanup alternatives for the facility. This grant would complete the cleanup activities most vital to protecting human health and facilitating development of the property.

Due to recent oil development, the local landowner, in cooperation with the County, the Assiniboine & Sioux Tribes, and GNDC, is proposing development of a new energy campus at the site. The development would provide numerous jobs and increased tax revenues for the County and State. The owner has worked closely with the County, Tribes, and GNDC to quantify environmental concerns, and to develop a mutually-beneficial redevelopment plan for the facility. The cleanup activities proposed for this project are: the removal and disposal of the contents of aboveground storage tanks, excavation of surface soil in four distinct areas of the facility, and design of a free product recovery system for the Railcar Loading Rack area.

The project would be completed within one year of grant award.