Appendix C – Big Mesa MDWCA Source Water Protection Plan

Discussion of Potential Contaminant Sources and Best Management Practices for Big Mesa MDWCA

Appendix C offers a brief description of potential contaminant sources the SWP Tem found in the course of developing the Big Mesa MDWCA SWP Plan. It describes the way in which they could threaten the water source and outlines BMPs. *BMPs (best management practices)* are the actions that can be taken within the Source Water Protection Area to help reduce the potential risks of contamination to the community's source water.

Abandoned structures

Abandoned buildings may contribute to blight, illegal activity, degradation of neighborhoods, and be a risk to first responders, the community, and children that live in the area. Many have asbestos insulation, asbestos floor and ceiling tile, lead-based paint, and biological hazards such as mold or animal feces. Abandoned commercial or industrial buildings may have hazardous waste, oil, polychlorinated biphenyls (PCBs), or chemicals such as mercury and acids. Whether any of these hazards could affect source water depends on the nature of the hazard, distance, and direction to the well, soil permeability, and other factors.

The hazardous materials found in abandoned building often require special handling when the buildings are going to be dismantled or demolished. Prior to demolition, inspection, hazardous material abatement, and customized demolition techniques might be necessary to ensure that human health and the environment are protected. The EPA brownfields program is a resource in such circumstances. Additionally, if EPA finds that a site containing abandoned chemicals presents an immediate and substantial threat to public health and safety, EPA can work with the community to take corrective action.

Agricultural / farming practices

The use of pesticides, herbicides, fertilizers, and manures can cause field leaching or runoff into surface and ground water. The two main components of fertilizer that are of greatest concern to source water quality are nitrogen and phosphorus. Nitrogen fertilizer is biologically transformed to nitrate that is highly soluble in water and can readily be absorbed and used by plants. Soluble nitrate is highly mobile and can move with water through the soil. Excess fertilizer use and poor application methods on these fields can cause fertilizer movement into surface and groundwater.

One approach that could cut excess use of agricultural chemicals is planting native plants and grasses, which would need less fertilizer and water. Any chemicals that are used should be properly selected and applied appropriately. The application of chemicals should be timed with periods of greatest crop uptake. The use of chemicals should be avoided near wells, drainages, and any type of surface waters. Items should be safely stored and disposed by following the directions on the label. Bulk storage of these substances should be avoided. Irrigation water should be managed so that runoff and leaching can be minimized.

Animal corrals / pens and watering / feeding areas

Animal waste originates from a variety of sources; the most obvious comes from livestock animals. Corrals, pens, and areas where livestock are kept can concentrate their waste. A study performed in the U.S. shows that animal waste is generated at a rate 13 times greater than human waste. The environment can be affected by livestock waste through direct discharges, open feedlots, animal housing, and pastures. The greatest health concern from animal waste consists of pathogens such as Cryptosporidium and Giardia lamblia. Animal waste may also have solids that increase turbidity and decrease the aesthetic value of water. There is increasing evidence to suggest that domesticate animals in concentrated numbers may be responsible for elevated levels of hormones in some water sources.

Diverting clean water away from manure piles is one way to avoid contamination of precipitation and surface runoff as it enters drinking water sources. Composting can help in eliminating and reducing the volume of manure. Compost sites should be located away from the SWP Areas to prevent leaching during precipitation events. They should also be placed on flat surfaces to prevent water collection or runoff. Composting should take place at proper temperatures and at a proper amount of time to kill the pathogens.

Cemeteries

Upon death, human remains are typically cremated or inhumed (buried), with inhumation usually occurring in cemeteries. Decomposition of inhumed bodies results in leachates (liquids), typically made up of water, protein, fat, mineral salts, and carbohydrates, potential microbial pathogens, and in some cases other chemical products such as heavy metals (for example, mercury from amalgam dental fillings), Leachates may include embalming fluids, materials from the coffin and from clothing, or ornaments/decorations laid with the body. Over time, leachates seep into soil and can potentially contaminate ground or surface water.

The quantity of leachate seeping into soil and groundwater is directly attributable to the size of the cemetery and number of burials, how often coffins are used, surrounding soil type, site topography, and siting of the cemetery in relation to ground or surface water that could transport leachates away from grave sites. To avoid contamination of nearby water sources from leachates, cemeteries typically have setback distances, i.e., regulations or by-laws that stipulate how far from water sources, drainage, and ditches cemeteries must be situated.

Drainages (acequias / rivers / streams)

Rivers and streams, arroyos, ditches, and acequias are intimately linked with their adjacent groundwater formations (groundwater under the influence of surface water). Therefore, it is possible for contaminants such as pesticides, fertilizers, and salts to enter the aquifer system through these waterways. Contaminants such as pesticides, fertilizers, and salts, can enter the aquifer system through arroyos, canals, drainages, and irrigation ditches, as well as streams and creeks.

It is difficult to prevent nonpoint PSOCs in these waterways. Involving the individuals living near arroyos and drainages in outreach activities about the SWP Areas would be beneficial. Encouraging

proper irrigation techniques, if appropriate, could decrease the risk of surface contaminants from entering the groundwater. In addition, the Big Mesa MDWCA, in cooperation with others, such as ranchers and federal and state land managing entities could check the condition of arroyos and drainages and follow the BMPs to prevent any contamination.

Forestlands / open space / rangeland

Livestock and wildlife grazing may occur on private, state, and federal lands within the Big Mesa MDWCA SWP Area. Grazing can affect riparian health, stream-channel conditions, and water quality. The most common water quality impacts include pathogen contamination, sedimentation, and increased water temperatures from loss of vegetative stream coverage around perennial streams. Grazing activities with the highest potential for direct and indirect impacts to water resources include long-term concentrated grazing in riparian areas, and trampling/trailing near water sources.

Sources of nonpoint source pollution associated with forestry activities include removal of streamside vegetation, road construction and use, timber harvesting. Excessive amounts of sediment in a water body can negatively affect water quality, increase turbidity, and reduce the ability of aquatic organisms to survive. Harvesting trees in the area beside a stream can affect water quality by reducing the stream bank shading that regulates water temperature and by removing vegetation that stabilizes the stream banks. These changes can harm aquatic life by limiting sources of food, shade, and shelter.

Aspects of planning to limit water quality impacts in forestry activities include managing timber harvesting and thinning; setting up streamside management areas; managing road construction, layout, use, and maintenance; and the timing of these activities.

See the discussion below on *Ranching and farming*.

Hazardous household waste

Products like motor oil, pesticides, left-over paint or paint cans, mothballs, flea collars, weed killers, household cleaners, and CFL light bulbs have materials that, if improperly used, stored, or disposed of, may inadvertently contaminate the water. Pharmaceuticals – over-the-counter drugs and prescription medications, particularly hormones, antibiotics, and cancer medications –can enter the environment, and ultimately drinking water systems. Unmetabolized drugs can pass through humans and animals and enter the environment. In the past, people were advised to flush unused and expired medications down sinks or toilets, which can contaminate groundwater.

Follow product instructions for storing and disposing of household chemicals. Contact *Earth911* for information on locations that receive or recycle various materials. Some pharmacies/drug stores and local police stations accept old or unused pharmaceuticals. The Drug Enforcement Agency organizes *Drug Take Back* Days twice yearly.

Illegal dumping (especially in/near arroyos, drainages, and streams)

Arroyos, riverside drains, ditches, acequias, and streams are intimately linked with their adjacent groundwater formations (groundwater under the influence of surface water). They are also

convenient locations to illegally dump sewage and trash. Therefore, it is possible for contaminants to enter the aquifer through these waterways. Pesticides, fertilizers, salts, automotive and refrigerant fluids, and human waste are contaminants associated with activities that typically occur close to waterways.

Household waste, inorganic and organic chemicals and metals are examples of PSOCs that could stem from illegally dumped debris pile.

Debris piles should be cleaned-up and disposed of at a proper waste handling facility as soon as possible. Additionally, "no dumping" signage should be posted in the immediate area of these locations where debris pile to discourage further dumping. Information about illegal dumping should be included in any SWP Plan public outreach activities.

Historic landfill

Historic landfills largely were unregulated before the 1970s, often unlined, with no leachate management and inadequate records of the waste they contain. Precipitation and ground water seeping through solid waste produces *leachate*. *Leachate* is water contaminated as it migrates through solid waste, picking up various organic and inorganic substances. Leachate that seeps from a landfill can contaminate the ground water beneath it. Normally this contaminated ground water, or plume, follows the natural movement of the groundwater, extending the contamination farther.

Landfill Gas may result from the biological decomposition of organic material under anaerobic conditions. Methane, a component of landfill gas, is ignitable at concentrations between 5 percent and 15 percent by volume in air. Due to its volatility and low density, methane can displace oxygen and may act as an asphyxiating agent in confined spaces. Gas can migrate through subsurface soils and accumulate in or under structures. Modern landfill gas is documented to have 43 volatile organic contaminants as well as mercury vapor. Uncontrolled land disposal sites would conceivably generate similar substances. Localized geology and the age of individual land disposal sites would determine whether contaminants continue to off-gas from the sites.

The following are recommended steps to assess the potential for contaminants in a historic landfill:

- Identify historic disposal sites.
- Identify possible uses and materials disposed of in the landfill.
- Define populations that may be at risk from historic disposal practices.
- Estimate users and uses of groundwater near the sites.
- Identify areas of potential air releases from historic fill activities.
- Lay the groundwork for future investigations that will target identified risks.

It is important to find groundwater users and the types of waste dumped into wetlands, drainages, or on the ground surface. Over time, the waste can form leachate that migrates to water bearing strata, carrying contaminants with it.

Outdoor recreation – Land activities

Camping, hiking, horseback riding, and off-road-vehicle use where legal, can pose threats to forested lands and streams. Some undesirable impacts include severely eroded soils, user-created unplanned roads, disrupted wetland ecosystems, as well as general habitat destruction and degraded water quality throughout forested lands. Untreated human waste from campers can enter and contaminate the water system.

Generally, the impact of recreationists on water biology and chemistry is limited spatially to the areas closest to the recreation sites and temporally, occurring only during occupation of the sites. However, these impacts continue as long as the activities do. Camping sites along streams can be associated with physical and chemical impacts to the water regime, including increased soil compaction and a loss of vegetative cover which can result in higher runoff, and erosion rates. Biological and chemical changes from camping and hiking activities on water resources also can impact water quality. Specifically, studies have monitored levels of bacteria (e.g., fecal coliform bacteria), protozoans, and viruses such as Giardia, or Cryptosporidium. Improper disposal of human and pet waste can contaminate drinking water or harm human health through direct contact or through transmission of bacteria and viruses, although studies suggest that this potential is relatively small.

Outdoor recreation – Water activities

Along a lake shore, residences may be associated with lake access via private boat launches, docks or slips, and shore access for personal watercraft. These boating facilities may also be available for the general public. Boating and physical contact can introduce petroleum products and other volatile organic compounds (VOC's) into the reservoir from marine engines. Both human waste and garbage can also be an issue with boating. Although personal and non-motorized watercraft such as canoes, kayaks, rowboats, and small sailboats eliminate the risk of petroleum products, they increase the likelihood of human wastes being released into the lake. Houseboats are no longer allowed on Conchas Lake.

In addition to pet and human waste, petroleum products, and the improper disposal of garbage and other solid wastes, recreational activities can also increase the risk of the introduction of aquatic invasive species. Motorboats and personal watercraft are both considered a route for invasive species to travel from water body to water body.

Ranching and farming

Ranching activities, including livestock (cattle) grazing can impact riparian health, stream-channel conditions and water quality. Common water quality impacts include pathogen contamination, sedimentation, and increased water temperatures from loss of vegetative stream coverage.

Farmers and ranchers can reduce erosion and sedimentation by applying management practices that control the volume and flow rate of runoff water, keep the soil in place, and reduce soil transport. To reduce the impacts of grazing on water quality, farmers and ranchers can adjust grazing intensity, keep livestock out of sensitive areas, give alternative sources of water and shade, and promote revegetation of ranges, pastures, and riparian zones. Deferred rotation is a grazing

management scheme in which cattle are rotated through several pastures to prevent over-grazing. This practice allows for a greater variety of vegetation and ensures that the vegetation can achieve greatest growth during periods when no grazing occurs, which results in healthier riparian areas. Placing salt blocks at a distance from water sources will also keep cattle from trampling riparian areas and lessen the potential for pathogens. Pasture or grazing management methods are available to keep livestock away from bodies of water. Fencing can be used to prevent damage to stream banks and to prevent livestock from defecating in or near streams and wells. Supplying alternate water sources and hardened stream crossings for livestock will help in reducing the impact on water quality.

Roads (paved / unpaved)

Both paved and unpaved road surfaces accumulate pollutants deposited from vehicles during travel. Typical pollutants associated with roads are nutrients, metals, oils and grease, salts, and volatile organic compounds. Road drainage systems also collect contaminants from atmospheric deposition, soil erosion, street dirt and liter, leaf litter and animal waste. Many of the substances that accumulate on roadways are toxic and have negative health effects on humans and the environment. When a storm event happens, these pollutants are washed from the road surface into nearby surface waters, or infiltrate groundwater. This is true especially for paved, impervious roads, but pollutants also accumulate and run from dirt roads. Potential spills of hazardous materials and fuels during transport or vehicular accidents are also a risk to water quality.

Transportation corridor

In addition to the typical pollutant associated with paved and unpaved roads, transportation corridors generally have powerlines and other utilities alongside the road. Maintaining the roads during adverse weather can require the application of road salt or other de-icing materials. Common pollutants include automotive waste, diesel fuels, gasoline, metals, organic/inorganic chemicals, pathogens, PCB's, pesticides, sewage, stormwater runoff, and trash. Offal and other byproducts from hunting and fishing sometimes are dumped at rest stops or along the road.

Salvage areas

Salvage areas, where used motor vehicles and other machines or appliances are stored or dismantled, may have a variety of potential contaminants on site. Generally, these may affect groundwater and surface water through stormwater runoff. Oils, volatile organics, and other compounds can also soak into the ground and be carried into the aquifer.

Pollutants in salvage areas vary, and various factors influence the extent they can affect water quality. BMPs designed to prevent or minimize pollutants from entering stormwater runoff can include regular cleanup, collection, and containment of debris in storage areas.

Good housekeeping practices include setting up ways to reduce the possibility of mishandling materials or equipment. These practices include a schedule for regular pickup and disposal of garbage and waste materials and routine inspections of drums, tanks, and containers for leaks and structural conditions.

Limit erosion on areas of the site that may be subject to erosion due to topography, activities, soils, cover, materials, or other factors. Erosion control can include seeding, mulching, and sodding to prevent soil from becoming dislodged. Sediment control can include silt fences, sediment ponds, and stabilized entrances trap sediment after it has eroded. Implement erosion control measures first and use sediment control to back-up erosion control. Control the direction and flow of runoff at a salvage yard. Examples of runoff management practices for salvage facilities include berms or drainage ditches on the property line to prevent runoff onto, and run-on from, neighboring properties and berms for uncovered outdoor storage of soiled parts, engine blocks, and above-ground liquid storage.

Septic and other wastewater systems

Ground water contaminants from improperly maintained or poorly constructed wastewater systems include coliform bacteria, nitrates, and household hazardous waste. These and other contaminants from septic tanks can cause waterborne disease outbreaks and other serious health effects.

Contamination from septic systems is the primary means by which groundwater is contaminated in New Mexico. Septic tank owners should continuously monitor the operation of their septic system. Septic tanks should be pumped and inspected periodically. Water conservation can also prevent the septic system from filling up too quickly and causing the leach field to fail. The state of New Mexico requires that individuals obtain a septic tank permit from the NMED before they install septic systems. NMED also has established setback requirements for the siting of septic systems. Septic tanks must be at least 100 feet from a community wellhead and the leach field must be at least 200 feet from the wellhead.

Water supply wells / water treatment plant

The easiest way to contaminate an aquifer is by surface runoff running down the well casing into the aquifer. This is a consideration when water supply wells share the same aquifer. The risk of contamination is greater for abandoned and unused wells where proper care of the well might no longer be maintained. It might also be greater with private wells and wells used for irrigation and stock, which are not regulated in the State of New Mexico.

Ensure that private wellheads have intact integrity and the area 200-500 feet around the wellheads are free of PSOCs. Eliminate any PSOCs and work with private well owners to improve and maintain their wellheads.

To the extent possible, secure the public water system's treatment plant and intake. Make sure to follow storage and use instructions for treatment chemicals.

Wildfire and postfire debris flow

Wildfire has the potential to negatively impact drinking water systems by damaging infrastructure and negatively effecting water quality. Postfire impacts can include flooding, debris flows, and landslides. The effect of wildfire on a watershed can be highly variable, depending on the nature of the wildfire and the watershed. See below for a section relating specifically to these issues.

Wildlife and livestock

Big Mesa and the surrounding areas are home to many types of wildlife –birds, small mammals such as beaver and rodent species, and large mammals including deer, elk, and bears. These animals can impact riparian health, stream-channel conditions and water quality, although typically these impacts are minimal. The most common water quality impacts from wildlife and livestock are pathogen contamination, sedimentation, and increased water temperatures from loss of vegetative stream coverage. Grazing activities with the highest potential for direct and indirect impacts to water resources include long-term concentrated grazing in riparian areas, and trampling/trailing near water sources. Direct bank damage may add large amounts of sediment directly into streams, especially in wet meadow streams or erosive topography that is prone to gully formation. Wild birds and small mammals also can introduce microorganisms into a water supply through direct contact or from watershed runoff. Wildlife commonly associated with microbial contamination of drinking water supplies include deer, beavers, muskrats, rodents, and geese.

Farmers and ranchers can reduce erosion and sedimentation by applying management practices that control the volume and flow rate of runoff water, keep the soil in place, and reduce soil transport. To reduce the impacts of grazing on water quality, farmers and ranchers can adjust grazing intensity, keep livestock out of sensitive areas, give alternative sources of water and shade, and promote revegetation of ranges, pastures, and riparian zones. Deferred rotation is a grazing management scheme in which cattle are rotated through several pastures to prevent over-grazing. This practice allows for a greater variety of vegetation and ensures that the vegetation can achieve greatest growth during periods when no grazing occurs, which results in healthier riparian areas. Placing salt blocks at a distance from water sources will also keep cattle from trampling riparian areas and lessen the potential for pathogens. Pasture or grazing management methods are available to keep livestock away from bodies of water. Fencing can be used to prevent damage to stream banks and to prevent livestock from defecating in or near streams and wells. Supplying alternate water sources and hardened stream crossings for livestock will help in reducing the impact on water quality.