ALBANY COUNTY, WYOMING

I-80 TELEPHONE CANYON

CASPER AQUIFER PROTECTION STUDY

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SUBMITTED BY: Trihydro Corporation

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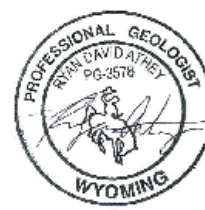

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EXECUTIVE SUMMARY

The Casper Aquifer is the water-bearing portion of the Casper Formation that provides water to residents of the City of Laramie and many residents of Albany County. The Casper Formation is highly fractured, faulted, and folded throughout its depth, including where it outcrops at ground surface. The highly fractured nature of the Casper Formation allows for aquifer recharge from infiltration from run-off of rain and snow. These recharge routes can also be points of entry for pollutants introduced at ground surface, making the water supply potentially vulnerable to contamination.

Interstate 80 (I-80) passes through the entire thickness of the Casper Formation through Telephone Canyon, including those areas connected to the Casper Aquifer, leaving it vulnerable to spills and pollutants associated with vehicle traffic. In particular, transport of hazardous materials through the Telephone Canyon portion of I-80 has been determined to be a potential threat to the water quality of the Casper Aquifer. As traffic volumes continue to increase annually on I-80 through Telephone Canyon, including vehicles transporting hazardous materials, the possibility of an aquifer-impacting spill may also increase.

The objective of this report is to go beyond the recommendations proposed in previous reports about the Casper Aquifer (2006 and 2008 Casper Aquifer Protection Plans [CAPP]), and provide possible emergency response and mitigation engineering recommendations, also with associated cost estimates, for addressing a hazardous material release within the Telephone Canyon portion of I-80 east of Laramie.

The following items were evaluated during the study to further evaluate the potential vulnerability of the Casper Aquifer to contamination from an accidental release of hazardous materials:

- Geology and hydrogeology of the study area
- Existing drainage infrastructure of I-80 within Telephone Canyon
- Accident data within the study area
- Contaminants of concern transported along I-80
- Other factors that may contribute to the release and/or mobilization of contaminants

Based on these evaluations, it was determined that the area of the I-80 Telephone Canyon corridor most vulnerable to contamination occurs near the bottom of the canyon, between mileposts 317 and 319. This area is more vulnerable than other areas due to increased fracturing created by faults. However, the area where the most accidents occur is between mileposts 319 and 322, up-gradient of the fractured area. For this reason, engineering controls installed up-gradient of the fractured area may help to minimize the amount of potentially impacted runoff that reaches this vulnerable area of the canyon in the event of an accidental release. These engineering controls may be in the form of detention ponds, hazardous spill basins, rock-lined channels, and other mitigative/preventive measures. Through evaluation of the contaminants of concern, it was determined that petroleum products and solvents represent the greatest risk to the Casper Aquifer due to the high number of loads that are transported on I-80, their relative toxicity, and mobility. These aspects should be taken into consideration when designing potential engineering controls for this area.

In addition to the engineering controls described above, it also recommended that a routine groundwater monitoring program be developed to establish baseline water quality conditions and screen for potential future impacts. It is also recommended that measures be undertaken to help prevent the occurrence of hazardous materials releases, such as variable speed limits and alternative road surfaces. An evaluation of the emergency spill response may also be beneficial to protecting the Casper Aquifer. This evaluation may include additional training for response personnel, acquisition of additional equipment, and enhancement of current response procedures.

1.0 INTRODUCTION

The Casper Aquifer is the water-bearing portion of the Casper Formation that provides water to residents of the City of Laramie and many residents of Albany County. For the City of Laramie, the Casper Aquifer provides approximately 60% of the annual municipal water supply. The remaining 40% is obtained from the Laramie River.

The Casper Formation is highly fractured, faulted, and folded throughout its depth, including where it outcrops at ground surface. The highly fractured nature of the Casper Formation allows for aquifer recharge from infiltration of run-off from rain and snowmelt. These recharge routes can also be points of entry for pollutants introduced at ground surface, making the water supply potentially vulnerable to contamination.

Along with the fractured and faulted structure of the Casper Formation and Aquifer, an additional point of vulnerability is the Telephone Canyon section of I-80 east of Laramie. In this area, I-80 cuts through the entire thickness of the Casper Formation, including those areas connected to the Casper Aquifer, leaving it potentially vulnerable to spills and pollutants associated with vehicle traffic (CAPP 2008). In particular, transport of hazardous materials through the Telephone Canyon portion of I-80 has been determined to be a potential threat with a high degree of impact to the water quality of the Casper Aquifer (CAPP 2008). As traffic volumes continue to increase annually on I-80 through Telephone Canyon, including vehicles transporting hazardous materials, the possibility of an aquifer-impacting spill may also increase. In addition, aquifer contamination could result from stormwater runoff containing metal particles from tires and brake pads, and oil, grease, gasoline and other automotive fluids deposited by I-80 traffic.

Previous studies of the Casper Aquifer commissioned by the City of Laramie and Albany County have determined that a hazardous material spill on I-80 east of Laramie through Telephone Canyon would likely constitute a severe threat to water quality (CAPP 2006, CAPP 2008). These same reports recommend that the City of Laramie and Albany County pursue additional investigation of hazardous material spill response, mitigation alternatives, and associated costs.

The objective of this report is to go beyond the recommendations proposed in the previous CAPP's from 2006 and 2008, and to provide possible emergency response and mitigation engineering recommendations, along with associated cost estimates, for addressing a hazardous material release within the Telephone Canyon section of I-80.

For purposes of this report, the term "study area" is defined as that section of I-80 from the top of Telephone Canyon near the Happy Jack exit (Exit 323) west to the Grand Avenue exit (Exit 316) and includes the area south and

southwest of I-80 to the Pope Springs and Soldier Springs well fields, collectively known as the “City Wells” (Figure 1). This report is not intended to duplicate efforts from existing city or county documents about the Casper Aquifer. The purpose of this report is to conduct an independent study to evaluate possible hazardous material spill response and mitigation measures in the study area using the existing CAPP documents as reference materials for this study. Specifically, this report will:

- Provide background information of the study area, including an overview of the geology, hydrogeology, hydrology, existing drainage structures, and regulatory history.
- Identify and prioritize areas of aquifer vulnerability and high vehicle accident probability.
- Identify the most frequent spill contaminants of concern.
- Outline options and associated costs for contamination prevention, response, and mitigation of hazardous materials releases.

2.0 BACKGROUND

2.1 HISTORY AND SITE DESCRIPTION

The City of Laramie owes much of its existence to the construction of the Union Pacific transcontinental railroad in the 1860's. As motorized vehicles replaced the railroad as the preferred mode of transportation, nation-wide highway construction expanded. In 1913, the Lincoln Highway was established as the first coast-to-coast automobile road. It stretched from Teaneck, New Jersey to San Francisco, California, passing through southern Wyoming, including Laramie. The Lincoln Highway became US Highway 30 in 1928 and was replaced by I-80 in the 1950's (www.tracksacrosswyoming.com/lincolnhighway 2010).

East from Laramie, I-80 ascends Sherman Hill through Telephone Canyon, a narrow passage rising over 1,100 feet in elevation in 5 miles with an average grade of 5%. Accommodation for I-80 through Telephone Canyon initially, and for widening of the highway in 1996, was made by enlarging several rock cuts, requiring extensive blasting operations (www.tracksacrosswyoming.com/lincolnhighway 2010).

The 1996 expansion of eastbound I-80 through Telephone Canyon added a third travel lane. Both eastbound and westbound travel lanes are paved with 11 inches of concrete and the shoulders are constructed of asphalt. Numerous underdrains carry snow melt and rain water away from the roadway and into a storm drain system installed down the canyon adjacent to the eastbound lanes (http://www.aaroads.com/west/i-080_wy.html 2010).

The City of Laramie and Albany County residents obtain water from two sources: the Casper Aquifer and the Laramie River. The conjunctive use of these two sources has allowed the City great flexibility to meet its municipal water demands. From 1868 to 1940, the City relied on the natural discharge from City Springs, Pope Springs, and Soldier Springs, that discharged water from the Casper Aquifer. This spring collection system only provided what the aquifer offered by way of natural discharge from the springs. In 1982, the City drilled a fourth well at the Pope Wellfield and installed two wells near City Springs to allow capture of the natural discharge and better control the flow of the springs. In 1998, a well was drilled at Soldier Springs and in 2000 the Spur Wellfield was developed with the installation and drilling of two wells 6 miles north of Laramie. The development of wellfields at the major springs at the western base of the Laramie Range provides the City the opportunity to take advantage of the storage characteristics of the Casper Aquifer. (WWC, 2006).

Two important pieces of natural and man-made infrastructure intersect in the Laramie area - the Casper Aquifer and I-80. I-80 passes directly over a susceptible area of the Casper Aquifer just southeast of the Grand Avenue exit. Transport of hazardous substances along this corridor presents the highest probability of risk with the highest potential for damage to Laramie's groundwater supply.

The presence of I-80 and increasing development pressures combined with the Casper Aquifer's vulnerability to contaminants resulted in designation of the Casper Aquifer Protection Area (CAPA) in the 2002 Casper Aquifer Protection Plan (CAPP). The 2002 CAPP was amended in 2006 and updated in 2008. The CAPA encompasses approximately 72 square miles that lie east of the City of Laramie and extend to the crest of the Laramie Range. The north and south boundaries are approximately 5 and 6 miles north and south, respectively, of the Laramie city limits. Delineation of the CAPA was based on the hydrogeologic setting and vulnerability mapping both of which contribute to defining risks to the drinking water source.

The potential risk to the Casper Aquifer from a vehicle-related hazardous material spill has prompted the City of Laramie and Albany County to procure a detailed study of mitigation alternatives to protect the aquifer from contamination. (http://www.ci.laramie.wy.us/cityservices/communitydevelopment/documents/Chapters1-6.pdf 2010).

2.2 CASPER AQUIFER GEOLOGY AND HYDROGEOLOGY

Existing documents about the Casper Aquifer (the 2006 and 2008 Casper Aquifer Protection Plans) provide detailed descriptions of the area geology and hydrogeology. This section provides a basic overview of these features as they apply to the study area. More detailed and thorough characterizations of the area geology and hydrogeology are also summarized in Appendix A of this report.

2.2.1 SURFACE GEOLOGY

The City of Laramie and the wells and springs serving the city are located within the Laramie basin. The basin is bounded on the west by the Medicine Bow Mountains, on the east by the Laramie Range, and on the south by the Front Range. To the north, the Laramie basin is bounded by a series of anticlines, or stratified geologic formations that slope downward on both sides from a common crest.

The Laramie Range, which bounds the Laramie basin on the east, lies immediately east of the Laramie City limits. Between 75 and 50 million years ago, the Laramie Range uplifted resulting in terrain that slopes westward down into

the Laramie valley. During the rise of the Laramie Range, stress and forces created faults and folds at the ground surface. Several major faults have been mapped in the Laramie area. These include the Lincoln, Soldier, Pope, Sherman Hills, Quarry, Jackrabbit, City Springs, and Spur faults. These major faults trend northeast to east-west. Numerous minor unnamed faults have also been mapped in this area.

Folds, or a layer or stack of flat surfaces that has been bent or curved by permanent deformation, are also observed in the Casper Formation. Most of the folds are east-west tending and some are associated with faults. These structural features include the Horse Creek, Jackrabbit, Spur, Soldier and Quarry monoclines.

As early as 1947, the potential role of faults and folds in supplying groundwater to historic springs and municipal wellfields in the Laramie area was recognized (Morgan, 1947; Huntoon, 1976). The occurrence of springs and the large water production at the municipal wellfields are believed to be related to a particular fault, fold, or fault/fold system.

2.2.2 SUB-SURFACE GEOLOGY

Several geologic formations, or distinctive rock units, are present in the Laramie area. Formations and units pertinent to the delineation of the CAPA include the sequence from the Sherman Granite upwards to the Satanka Shale (Figure 1). Following is a summary of these units.

Sherman Granite

The Precambrian Sherman Granite is an igneous rock that is exposed east of the crest of the Laramie Range (Figure 1). The Sherman Granite was formed by the slow cooling of magma (liquid rock) and is a large mass of interlocking minerals. The igneous Sherman Granite is distinctly different than the overlying formations which are layered sedimentary rocks.

Fountain Formation

The Fountain Formation is an irregularly distributed sedimentary rock that is thin (less than 50 feet thick) to absent in the Laramie area (Lundy, 1978). Where present, the Fountain Formation unconformably overlies the Precambrian rocks, like the Sherman Granite. Because of the inconsistent presence of the Fountain Formation, it is included with the overlying Casper Aquifer in the remainder of this report.

Casper Formation

The Pennsylvanian-Permian Casper Formation overlies the Fountain Formation, where the Fountain is present, or the Precambrian rocks where the Fountain is absent. The Casper Formation is approximately 700 feet thick and is composed of sandstones interbedded with limestone and minor amounts of shale. The Casper Formation is approximately 85% sandstone with limestone comprising the remainder of the formation. The Casper Formation is informally subdivided, from bottom to the top, into five members designated alpha, beta, gamma, delta, and epsilon. Each of these layers consists of sandstone and is bounded at the top by a layer of limestone (Lundy, 1978). The Casper Formation surfaces on the west flank of the Laramie Range, east of the City of Laramie (Figure 1).

Satanka Shale

The Satanka Shale unconformably overlies the Casper Formation and is predominantly red shale with interbedded siltstone and sandstone layers. The Satanka Shale is approximately 250 to 320 feet thick in the Laramie area. The lower 20 to 30 feet of the Satanka Shale has several red and white sandstone beds that are similar to sandstones of the underlying Casper Formation. The Satanka Shale comes to the surface along the western foothills of the Laramie Range and near the eastern boundary of the Laramie city limits.

2.2.3 CASPER AQUIFER HYDROGEOLOGY

The Casper Aquifer is the hydrogeologic unit of the Casper Formation that supplies water to the wells and springs used by the City of Laramie as a drinking water resource. The Sherman Granite provides an effective lower confining layer for the Casper Aquifer and the low permeability shales of the Satanka Formation provide an effective upper confining layer, when it is present in sufficient thickness. The permeability, the ability of a rock formation to transmit fluid, within the Casper sandstones is very large in contrast to the overlying and underlying geologic units. The Casper Aquifer is bounded above and below by effective confining units and is the sole source of groundwater for the city wells and springs (CAPP 2002).

The Casper Aquifer is comprised of porous sandstone and fractured sandstone and limestone. Flow within these materials includes porous and conduit flow. Porous flow occurs within the unfractured, permeable sandstones of the Casper Aquifer. Conduit flow occurs within the sandstones and limestones where the permeability has been enhanced by fractures and/or dissolution.

Permeability of the sandstones that comprise the Casper Formation is variable, with the greatest permeability occurring in the upper two sandstone members (epsilon and delta) and the lowest permeability occurring in the deepest sandstone member, the alpha member. Porous flow is responsible for providing water to wells on the order of 1 to 100 gallons per minute (gpm). Conduit flow is typically orders of magnitude greater than porous flow and is capable of yielding large quantities of water to wells, as demonstrated by the Laramie city wells and associated springs. Production from the city wells that penetrate the fractured aquifer is on the order of 1,500 to 2,500 gpm (CAPP 2002).

2.2.4 EXTENT OF THE CASPER AQUIFER

The vertical extent or depth of the Casper Aquifer varies depending on the geology. While the entire thickness of the Casper is not saturated with water except where it is confined by the Satanka Shale, there is some depth of the Casper Formation that is saturated throughout most of the area where it outcrops. The aquifer therefore extends from the crest of the Laramie Range to the west into the Laramie Basin. While the aquifer is present throughout the Laramie Basin, for the purposes of aquifer protection, the western edge of the aquifer's areal extent is approximately nine miles west of the western city limits. This western boundary is established because water quality from this point and continuing west, has a total dissolved solids (TDS) concentration of greater than 1,000 mg/L, which is not considered suitable for municipal use and provides a reasonable boundary for the aquifer. The Casper Aquifer extends approximately 50 miles north northwest of Laramie before it is interrupted by a thrust fault. To the south of Laramie, the Casper Aquifer extends past the Wyoming-Colorado border, a distance of at least 21 miles (CAPP 2002).

The study area, for purposes of this report, encompasses a portion of the Casper Aquifer. The study is confined to the right-of-way of I-80 between milepost 316.7 and 323.05. Figure 1 shows the study area in relation to Pope Springs and Soldier Springs wells, located south of I-80 and southeast of the City of Laramie, as well as the Turner Wells, located northwest of I-80.

2.2.5 CASPER AQUIFER RECHARGE

Recharge refers to the replenishment of the Casper Aquifer by infiltration of water derived from rainfall and snowmelt through the unsaturated zone. This process occurs, to some degree, wherever the Casper Formation is exposed at ground surface. Consequently, the entire surface exposure of the Casper Formation is assumed to be the recharge area for the Casper Aquifer.

Studies have shown surface water can infiltrate directly into sandstone (higher water permeability) exposed at ground surface; whereas, exposed limestone (lower permeability) tends to shed surface water. Additionally, infiltration into the subsurface is enhanced by fractures, joints, and faults exposed at the surface, particularly in drainage channels along fracture zones. It is assumed that the vast majority of recharge to the Casper Formation occurs in drainages. Studies have also indicated that recharge primarily occurs during the months of March through August, during which time spring runoff and summer storms occur. The average annual recharge to the Casper Aquifer has been estimated to be 1.4 inches per year; however, the annual recharge is highly variable (CAPP 2002).

The vast area of the Casper Aquifer available for recharge is a benefit for recharging the local water supply, but also allows many routes of travel for potential contaminants that may flow into drainages, faults, and fractures. Since many fractures occur in the study area, a hazardous material spill could travel the same path as recharge water and impact the city wells.

2.2.6 HYDRAULIC GRADIENT

Studies indicate that groundwater in the Casper Aquifer in the vicinity of Laramie generally flows from east to west, from areas of high elevation at the crest of the Laramie Range toward lower elevations within the Laramie basin (CAPP). The gradient has a slight northwesterly trend between Simpson Springs and City Springs and is altered locally to a more radial pattern in the vicinity of the city wells and the springs, which discharge large quantities of water from the Casper Aquifer. Flow patterns are also locally altered to some degree by the increased permeability resulting from fracturing associated with some faults and folds.

2.3 TELEPHONE CANYON HYDROLOGY

Telephone Canyon contains an ephemeral stream that is fed by spring flows and surface water runoff within the canyon. Twenty-three drainage basins contribute precipitation runoff volumes to Telephone Canyon and the I-80 corridor. Depending on the magnitude of the storm event, runoff volumes can be significant. The local hydrology is an important variable to this study, as stormwater runoff may impact actions taken to respond to or mitigate a hazardous material spill.

Hydrologic research of the study area included review of the Wyoming Department of Transportation's (WYDOT) Storm Drain Analysis Report (SDAR), which was prepared in July 1995 as part of the design efforts for the 1996 I-80 Telephone Canyon expansion. The analysis was performed based on standards outlined in WYDOT's Operating

Policy 18-6 Drainage Design for Highway Systems. The Telephone Canyon storm drain system was designed using a 50-year frequency design storm and evaluated for a 100-year frequency flood hazard.

The twenty-three drainage basins delineated along the Telephone Canyon section range in size from 22 to 324 acres. Peak runoff volumes for each drainage basin were calculated for the 50- and 100-year storm events. The SDAR focuses on the storm drain system, specifically on how it routes runoff from the drainage basins and the roadway. The storm drain system was designed using a storm drainage modeling program called the Hydrologic Routing Algorithm (HYDRA). Output files generated by HYDRA were reviewed to understand the peak runoff volumes and corresponding velocities for the various segments of the storm drain system. Details about the Telephone Canyon storm drainage system are further discussed in the following section.

2.4 EXISTING DRAINAGE STRUCTURES – TELEPHONE CANYON

WYDOT's 1995 SDAR presents recommendations for a storm drainage system in the Telephone Canyon portion of I-80. The storm drain analysis covers the Telephone Canyon section of I-80 from milepost 318.95 about 2 miles southeast of the Grand Avenue interchange and ends just east of the Happy Jack exit at milepost 324.06. Between mileposts 323 and 322, surface drainage is intercepted by drop inlets placed in the I-80 median ditch. The inlets discharge into pipe laterals that discharge into the main drainage channel in the canyon adjacent to the east bound lanes. This main channel alternates between unlined open channel flow and pipe flow throughout the storm drain system. Median drop inlets and edge drains are also located intermittently throughout the system to collect runoff and discharge to the main drainage features. Storm drain trunk lines start at milepost 322 and end at milepost 319.5. Pipe culverts are located throughout the system to convey drainage between the westbound and eastbound lanes. Two large reinforced concrete boxes are also used to convey stormwater.

The SDAR states that inundation of I-80 is anticipated to occur during a 100-year storm event; however, it states that the proposed storm drainage system is not anticipated to significantly increase the flood hazard to traffic or adjacent property. The 50-year peak design volume ranges from 235 to 918.5 cubic feet per second (cfs) between mileposts 322 and 319.5, with corresponding velocities of 6.3 to 11.8 feet per second (fps). At milepost 319.5, runoff is released to an unlined open channel with a slope of approximately 14 percent. Outlet protection was placed at this outfall to provide erosion protection from high velocity flows. As discussed in Section 3.0 of this report, the critical area at milepost 320 may experience velocities of around 21.3 fps in open channel flow. By the time runoff has collected at the bottom of Telephone Canyon at milepost 318.95, the volume is estimated to be 1,623 cfs (50-year storm event) with a

corresponding velocity of 13.6 fps in an unlined open channel section. The report doesn't explain where the runoff is conveyed from this point. It is reasonable to conclude from review of local mapping that the runoff continues to flow within in the drainage south of I-80 until it reaches the Laramie River.

3.0 AREAS OF CONCERN

A hazardous material spill in the Telephone Canyon portion of I-80 and east of the city wells represents a potentially significant threat to the municipal and private domestic water supplies for the City of Laramie and Albany County, respectively. Designing effective response and mitigation solutions to address a hazardous material spill in this area requires consideration of several variables, including:

- Geology – The areas between the city wells and the top of Telephone Canyon that are the most geologically vulnerable, and therefore amenable to transporting hazardous materials into the Casper Aquifer.
- Other Local Factors – Additional local factors that may influence how hazardous materials migrate through soils or geologic features, including:
    - Volumes of stormwater or snow melt runoff
    - Percent grade of the highway or drainage system in the area of the spill
    - Nature of the drainage system in the area (pipe or unlined channel)
- Accident Data – The areas between the city wells and the top of Telephone Canyon with the greatest likelihood of a single- or multiple-vehicle accident involving hazardous materials based on historical collision data.
- Contaminants of Concern Transported on I-80 – Assessment of the types and quantity of hazardous materials most likely to be spilled as a result of a single- or multiple-vehicle accident between the top of Telephone Canyon and the City wells.

Assessment of each of these variables will be discussed in the following sections. This information was compiled to identify the locations of potential greatest vulnerability within the study area, and may also used as the basis for emergency spill response and mitigation recommendations.

3.1 TELEPHONE CANYON GEOLOGY

The surface and subsurface geologic characteristics of the Telephone Canyon section of I-80 have the most influence on how hazardous material releases may be transported through the Casper Aquifer and possibly to the city wells.

Deformation, or the degree to which a geologic formation is faulted and folded, can create zones of fracturing that can enhance the secondary permeability of the formation. The higher the permeability, the faster water and contaminants move through the aquifer. The Casper formation has a high degree of deformation and fracturing. Because the I-80 corridor through Telephone Canyon passes through the entire thickness of the Casper formation, many of the deformities and fractures are exposed, providing multiple routes of entry for potential contaminants.

A vulnerability ranking of 1-3 was assigned to each one mile section of highway in the study area based on the number of mapped faults and folds (Figure 1) to assess the geologic vulnerability of the I-80 corridor to the west of and through Telephone Canyon. A ranking of 1 indicates little to no faulting in the formation and a 3 indicates the formation is highly faulted. Faults and folds that did not intersect the roadway were not considered in the evaluation.

The Casper Formation is divided into five water-bearing members or layers designated as alpha, beta, gamma, delta, and epsilon, from the deepest to the shallowest members, respectively. The permeability of these members decreases with depth, meaning the delta and epsilon members have the greatest permeability. The city wells pull water from the two upper and most permeable members of the formation, the delta and epsilon. For these reasons, vulnerability rankings for areas of the Telephone Canyon section of the I-80 corridor that intersect these upper two members were assigned the highest ranking of 3, while areas that intersect deeper members were given a ranking of 2. The results of this assessment are summarized in Section 3.4 below.

3.2 OTHER ENVIRONMENTAL FACTORS

Other environmental factors evaluated during the study included natural drainages and vertical grade. These factors contribute primarily to the mobility of potential contaminants.

Natural Drainages – drainages are important considerations in spill mitigation for two reasons. Drainages can potentially provide a path of travel (in the case of a liquid spill), increasing the area impacted by a spill and increasing cleanup costs. Drainages also present a means by which contaminants can be transmitted to groundwater more readily.

The impact of drainages within each one-mile section of Telephone Canyon was evaluated based on the 23 drainage basins mapped by WYDOT within the study area. A vulnerability ranking was assigned ranging from 1 to 3, with 1 indicating the absence of drainages and 3 representing the presence of numerous drainages. Drainages that did not intersect the roadway or were up gradient of the roadway were not considered in the evaluation.

Vertical Grade – vertical grade has the potential to influence the mobility of a contaminant once it has been released. In areas where the permeability of the formation has not been enhanced by fracturing (less vulnerable area), vertical grade can be a disadvantage in containment of a release because contaminants may be quickly transported to areas with higher permeability (more vulnerable areas). Contrarily, vertical grade can also be an advantage in a release situation, in that contaminants may be transported across areas of higher permeability quickly, thus allowing less vertical infiltration into the formation. In the case of the Telephone Canyon study area, it can generally be stated that the areas with the highest enhanced permeabilities are also the areas with the lowest vertical grades. Conversely, the areas with the steepest grades are also the areas with the least amount of enhanced permeability. For these reasons, vertical grade is viewed as mostly a disadvantage in this study.

Vertical grade was evaluated for each one-mile section of the roadway based on alignment drawings from WYDOT. The vertical grade of each section is expressed as a range, from least to greatest percent grade, across the section. A scale was developed based on the range of magnitude of the vertical grade within each one-mile section to provide a ranking for each section. For the reasons described in the previous paragraph, areas with steeper vertical grade were ranked as higher vulnerability because the mobility of potential contaminants is increased with steeper grades. A ranking of 1 was assigned to grades between 0 and 2 percent. A ranking of 2 was assigned to grades between 2 and 3 percent. A ranking of 3 was assigned to grades between 3 and 5 percent. In cases where the range of grade for the section spanned multiple rankings, the upper limit of the range was used to determine the ranking.

3.3 TELEPHONE CANYON ACCIDENT DATA

Accident data from April 2000 to March 2009 for the stretch of I-80/Telephone Canyon interstate between mileposts 316.7 and 323.05 was reviewed to determine where the majority of semi-truck accidents occur. Review of the accident data was focused on semi-truck accidents, due to the potential for these vehicles to be hauling hazardous materials that could represent a potential threat to the aquifer if released. The data were also evaluated to determine if the occurrence of truck accidents in Telephone Canyon varied seasonally. The accident data are presented in Appendix B.

Based on the April 2000 to March 2009 data, 135 accidents involving trucks occurred in Telephone Canyon. Thirty-five percent of the truck accidents (equivalent to 47 accidents) in Telephone Canyon occurred between mileposts 320 and 321 (Table 1). Of these 47 truck accidents, 40 of them occurred while traveling downhill, or in the westbound lane of I-80. The area of Telephone Canyon between mileposts 320 and 322 have the steepest grades and the tightest curves within the study area, which likely contributes to the higher accident rate. The data also show that most of the

accidents resulted from one of two causes, 1) a rear-end collision, or 2) a side swipe while one vehicle was trying to pass another vehicle.

It is important to note that accident data gathered for this study verifies the findings of the 2008 CAPP, which reviewed semi-truck accidents within Telephone Canyon between 1998 and 2006 and also showed the majority of semi-truck accidents overwhelmingly occurred between mileposts 320 and 321.

The data were also evaluated based on the seasonal variation of accidents in the study area. Of the total semi-truck accidents, the highest number occurred in the fall (September to November) and spring (March to May), when weather conditions tend to change most frequently and rapidly. Interestingly, the number of accidents decreased in the winter months (18 truck accidents), and it is assumed that this may be a result of drivers being more careful and possibly reducing speeds when conditions are known to be hazardous (Figure 2).

Knowing how accident patterns shift with seasonal variations is an important factor to keep in mind when implementing an emergency spill response plan, as precipitation and temperature tend to influence the mobility of contaminants. The fact that the majority of the semi-truck accidents occurred in spring or fall indicates that precipitation may have been a contributing factor in the incident. This is supported by the 2000-2009 accident data, which showed that 91 of the 135 accidents involving semi-trucks occurred when precipitation was present.

3.4 SUMMARY OF RANKED SECTIONS

Based on the criteria described above, each one mile section of I-80 through Telephone Canyon was given a score through summing the scores of each of the individual risk-ranking criteria described above. Risk-ranking scores for each roadway section are included as Table 2, and summarized below:

- **Milepost 317-318 (Total Score – 12)**
  - Delta and Epsilon members of Casper Formation (3)
  - High number of mapped faults (3)
  - High number of mapped drainages (3)
  - Low grade – 0 to 1% (1)
  - Number of truck accidents – 22 (2)

- **Milepost 318-319 (Total Score – 12)**
  - Beta, Gamma, and Delta members of Casper Formation (3)
  - High number of mapped faults (3)
  - High number of mapped drainages including drainage of Telephone Canyon (3)
  - Low to moderate grade – 0 to 2% (2)
  - Number of truck accidents – 11 (1)
- **Milepost 319-320 (Total Score – 9)**
  - Beta and Alpha members of Casper Formation (2)
  - No mapped faults; one mapped monoclinal fold (1)
  - No mapped drainages (1)
  - Steep grade – 3 to 5% (3)
  - Number of truck accidents – 15 (2)
- **Milepost 320-321 (Total Score – 10)**
  - Alpha member of Casper Formation (2)
  - No mapped faults; one mapped monoclinal fold (1)
  - No mapped drainages (1)
  - Steep grade – 4 to 5% (3)
  - Number of truck accidents – 47 (3)
- **Milepost 321-322 (Total Score – 10)**
  - Alpha member of Casper Formation (2)
  - One mapped fault (2)
  - No mapped drainages (1)
  - Steep grade – 4.5 to 5% (3)
  - Number of truck accidents – 23 (2)

- **Milepost 322-323 (Total Score – 9)**
  - Alpha member of Casper Formation (2)
  - No mapped faults (1)
  - No mapped drainages (1)
  - Moderate grade – 2 to 4% (3)
  - Number of truck accidents – 17 (2)

Although more accidents occurred in the section of I-80 between mileposts 320 and 321, this section appears to be generally less vulnerable to contaminant infiltration than other sections down-gradient. Deformation in this section is minor, occurring where the monocline intersects the highway. There are no drainages contributing to runoff. Steep grades in this section indicate that a release is likely to travel downhill from the release site with less potential infiltration into the aquifer. However, this increased possibility for rapid surface transport has the potential to affect other parts of Telephone Canyon, which will be further discussed in Section 4.0 of this report.

3.5 CONTAMINANTS OF CONCERN

This section reviews and evaluates the types and frequency of vehicle-related waste generated from traffic through the I-80 study area that could impact the Casper Aquifer and city and residential wells. Two potential sources of contamination to the Casper Aquifer were evaluated: non-point sources and point sources. In this study, these two sources of contaminants will be defined as follows:

1. Non-point source contaminants are generated on a regular basis in relatively small quantities by many individual sources throughout an area. Though individual non-point source contaminants concentrations may seem less significant, they can accumulate over time and result in environmental impact. Unlike point source contaminants, the origin of non-point source contaminants is difficult to trace to any one particular location or incident and are regional in extent. For this study, non-point source contaminants will be considered to originate collectively from the volume of traffic moving daily through Telephone Canyon. In this study, non-point source contaminants include particulates and metals from tire and brake pad wear; oil, gas, antifreeze, and transmission fluid from engine leaks; and road de-icing materials.

2. Point source contaminants are considered to be generated from a specific location. For this study, point sources indicate releases of vehicle fluids and hazardous material cargo originating at the point of impact from car and

truck accidents. As it relates to this study, point sources have the potential to be generally larger volume releases which occur in sporadic, isolated incidences. Point sources were evaluated through a multiple-step process that included a review of Department of Transportation (DOT) placard data for commercial trucks entering Wyoming.

3.5.1 NON-POINT SOURCE CONTAMINANTS

According to a Transportation Research Board of the National Academies (TRBNA) 2002 report, non-point source pollution from roads and traffic are estimated to affect the ecology of more than 1/5 of the US land area. Furthermore, total non-rail miles travelled in the US is expected to grow 2 percent per year between 2010 and 2025 (TRBNA 2002). In Wyoming, truck traffic is growing faster than the national average at a rate of 3 percent per year (Samuel 2009). Therefore, it is important to consider the non-point sources of contaminants along the I-80 corridor for future planning purposes. Based on a literature review, the primary contaminants of concern from non-point sources are as follows:

- Leakage of brake fluid, antifreeze compounds, lubricating oil, engine oil and grease (Ball 1991, USEPA 2001).
- Releases of metals (i.e. zinc, copper, nickel, cadmium, chromium, and iron) from the abrasion of tires and brake pads can cause impacts to soil. The potential for these constituents to migrate to groundwater must also be considered (TRBNA 2002).
- Road de-icing materials.

Although the discrete impacts from these contaminants may be small, the large amounts of truck and car travel along I-80 and resulting cumulative impacts may have the potential to affect water quality of the Casper Aquifer. The TBRNA report indicates that while short term impacts from non-point sources related to cars have been well studied, long term impacts and the methods of reducing these impacts are not as well understood (TBRNA 2002).

3.5.2 POINT SOURCE CONTAMINANTS

To determine the types of contaminants that may be released as point sources, information was gathered from the Wyoming Highway Patrol (WHP) about the types and frequency of commercial cargo transported along the I-80 corridor and associated highways over a period of time (Smith, personal communication). The data set contained hazardous placard data for semi-trucks entering I-80 and Interstate 25 (I-25) at the Cheyenne, Wyoming weigh stations from January 1, 2010 through May 31, 2010. However, it is important to note that these data only account for roughly 60 percent of I-80 truck traffic for the following reasons:

- Many of the trucks entering Wyoming do not have to stop at the weigh stations as some trucks operate on an electronic pass system.
- Intrastate truck traffic does not pass through weigh stations.

To account for the incomplete data set for I-80, placard data for the same time frame from I-25 was also included. It is assumed that some of the semi-trucks that enter Wyoming from I-25 will also travel on I-80. Broadening this data set to include I-25 reduces the uncertainty that a contaminant of concern was omitted.

Placard number definitions were identified from the US Department of Transportation Pipeline and Hazardous Materials Safety Administration's website (USDOT 2008). The original placard information provided by the WHP is found in Appendix C. While every attempt was made to identify all placard numbers, those below 1000 and above 4000 could not be determined and were removed from the data set. The WHP did indicate that some unidentifiable placard numbers could be a result of human error. A list of placard numbers and their associated cargo are shown in Appendix C.

After the placard numbers were identified for truck traffic along I-80 and I-25, the following characteristics of the hazardous cargo were evaluated to determine the applicability of the cargo to this particular study (Appendix D).

1. If a placard number appeared less than 25 times in the combined I-80 and I-25 data set, it was excluded from further evaluation.
2. Only placard numbers indicating solid or liquid state cargo were retained in the data set for further evaluation. Gas-phase cargo was excluded from further evaluation. Gases are volatile, making them less likely to contaminate groundwater. However, if the placard indicated the cargo is a gas dissolved in solution, it was retained for further evaluation.
3. If the placard indicated the cargo was an essential nutrient, it was eliminated from further evaluation. The essential nutrients that were eliminated from this evaluation include elemental nitrogen, carbon dioxide, and sulfur. Carbon dioxide was eliminated from this discussion because it is unlikely to be present in concentrations that are harmful to humans in groundwater from a point source. Although nitrogen levels in groundwater are regulated and can have human health impacts, the primary source of nitrogen contamination is from other non-point sources not associated with this study. Sulfur is a naturally occurring element found in rocks, soils, and minerals and is

essential for human life. EPA does not regulate sulfur under the Safe Drinking Water Act other than by a secondary aesthetic-based standard, such as odor created by the presence of hydrogen sulfide.

4. If the placard description was too general to determine the specific chemical characteristics to be used in a hazardous ranking system, it was eliminated from the data set. Such placard descriptions included "corrosive liquid" or "elevated temperature liquid."

Cargo retained for further evaluation in this study was classified by general class of contaminant; i.e. petroleum, agriculture, household, etc (Appendix D). Each type of cargo that was retained for the study was evaluated to determine which may pose the highest risk for the Casper Aquifer according to the following criteria:

1. Number of Occurrences – this provides insight into which types of cargo are transported through Telephone Canyon most frequently. The most commonly transported cargo would theoretically have the greatest potential to be involved in an accident that could impact the Casper Aquifer. The I-80 and I-25 weigh station data presumably underrepresented the number of petroleum product loads that actually travel through Telephone Canyon on I-80, as many of these are intrastate loads and do not pass through the weigh stations. The weigh station data did show the magnitude of occurrences of petroleum product loads greatly exceeded the occurrences of any other type of cargo. It was concluded that if actual data of cargo types traveling through Telephone Canyon were obtained, it would still show that relative to the occurrence of all other types of cargo, petroleum products would dominate in frequency.

2. Toxicity – this is an indicator of the degree of harm a substance could pose to human health and the environment. Toxicity of each cargo was ranked on a qualitative scale from "not-toxic" to "toxic." Toxicity assessments were made using data collected from material safety data sheets (MSDS), USEPA guidance documents, and other relevant data.

3. Solubility – this parameter determines the amount of substance that can be dissolved in a given amount of solvent, such as water. Cargo solubility is important to this study in the event a spill occurs during a precipitation or runoff event. It is important to note that solubility is dependent on various factors, including: pH, temperature, and pressure; therefore, solubility numbers were considered at normal temperature and pressure (25° C and 1 atm). It is acknowledged that cargo truck accidents in Telephone Canyon may occur at temperatures considerably lower than 25° C, impacting solubility. Each cargo retained for analysis was ranked on a qualitative scale from "insoluble" to "high solubility" based on data collected from the literature.

4. Viscosity – this is a measure of a fluid's resistance to flow. As with solubility, viscosity is dependent on various factors including temperature, pressure, and shear stress; therefore, normal temperature and pressure (25° C and 1 atm) were assumed. Again, it is recognized that accidents could occur when temperatures are far below 25° C, which could impact viscosity. Where viscosity is concerned, colder temperatures provide an advantage for spill response measures by increasing viscosity and slowing fluid flow. Viscosity was also ranked on a qualitative basis from "low viscosity" to "high viscosity," based on actual viscosity values obtained from the literature.

It is important to note that while viscosity and solubility measurements are important, they cannot solely account for the ability of a contaminant to enter and be transported with groundwater. Potential contaminant fate and transport factors such as biodegradation, dispersion, and retardation were not considered for discrete constituents.

After the number of cargo occurrences and the qualitative values for toxicity, solubility, and viscosity were determined for the contaminants listed in Appendix D, the contaminants were assigned a score for each criterion, refer to Table 3 below. The scores were then averaged across all four criteria to obtain a final score. The average score was considered an approximate measure of potential to impact the Casper Aquifer; however, it should be noted that this was a qualitative evaluation and that the results should be interpreted as such. Contaminants with the highest score likely pose a greater risk than contaminants with lower scores.

3.6 SUMMARY – CONTAMINANTS OF CONCERN

Five of the fourteen contaminants of concern listed in this study were considered petroleum products. Also consistent with this evaluation, the TRBNA noted that while gasoline, diesel, and home heating fuel are the most common hazardous cargo transported in trucks, other common hazardous cargo includes paints, batteries, swimming pool chemicals, and radioactive waste (TRBNA 2005). The number of occurrences of the contaminants of concern grouped by general category is presented on Figure 4.

Based on the results of the non-point and point source evaluation, releases of petroleum products and solvents may have the most potential to impact to the Casper Aquifer along I-80 study section (Telephone Canyon). Petroleum products, and specifically gasoline and diesel, were ranked as the highest risk following the methodology detailed for this evaluation. This result is consistent with a TRBNA study that stated that "gasoline and other petroleum products are estimated to account for about 40% of hazardous materials shipped" and that "66% of petroleum products are shipped by truck" (TRBNA 2005). It is also assumed that of all the petroleum products, gasoline and diesel are most

likely to be released in the largest quantities. Many gasoline and diesel transports carry full tankers in addition to a loaded pup trailer (often termed a Rocky Mountain double). The combined tanker and pup trailer volume is approximately 12,000 gallons; therefore, this may represent the worst case spill volume from a single vehicle. It is also important to consider that a spill could contain a mixture of gasoline and diesel, as both products are often carried in separate compartments within one tanker. Albany County has kept county-wide disaster records since 1948. In that time, Albany County documented one 200 gallon diesel fuel spill in the Telephone Canyon portion of I-80 in 2001 that did not result in any identifiable impact to the Casper Aquifer (Albany County Hazard Mitigation Plan 2004). The occurrence of only one incident in Telephone Canyon between 1948 and the date of this report may indicate to some that the possibility of a hazardous material spill impacting the Casper Aquifer is remote. However, given I-80 traffic volume increases in recent years, particularly commercial vehicles, and the projected continued increase in traffic volume, the likelihood of a hazardous material spill impacting the Casper Aquifer increases every year.

Although radioactive (nuclear) waste is transported through the study area and, if released, may pose a considerable threat to the aquifer, it was not identified as one of the contaminants of concern. It was assumed that procedures and protocols for transport of radioactive waste are such that the probability of a release is extremely low. The Nuclear Regulatory Commission (NRC) sets regulations regarding packaging and transporting radioactive materials. The NRC must approve any package used for shipping nuclear material before shipment. If the package meets NRC requirements, the NRC issues a Radioactive Material Package Certificate of Compliance (CoC) to the organization requesting approval of a package. Organizations are authorized to ship radioactive material in a package approved for use under the general licensing provisions of 10 CFR Part 71.

For a transportation package to be certified by the NRC, it must be shown by actual test or computer analysis to withstand a series of accident conditions. The tests are performed in sequence to determine their cumulative effects on one cask. Before any shipment can occur, the shipper is required to review the package CoC to determine if any testing or maintenance is required. The shipper may be required to check or change package seals and other components or perform leak testing. In addition, the shipper must take radiation measurements at specific locations on and around the package to make sure that the levels are below the required limits. These requirements are in addition to applicable Department of Transportation requirements such as placarding, route selection, driver training, and package labeling, marking, and other documentation.

4.0 AQUIFER PROTECTION CONTROL OPTIONS

This section reviews some possible control options for protection of the Casper Aquifer from contaminants resulting from the Telephone Canyon section of I-80. The options range from administrative to engineering controls. Many of these concepts have been discussed in the 2006 and 2008 CAPPs. This study will expand upon some of those concepts, make new recommendations, and provide high-level cost estimates for each when available. Control options will be discussed under each of the following categories:

- Methods to Assess Impacts to the Casper Aquifer
- Spill Prevention Measures
- Emergency Spill Response
- Engineering Controls

4.1 METHODS TO ASSESS IMPACTS TO THE CASPER AQUIFER

Section 3 of this report identified non-point sources of pollution from traffic within the study area as having possible impacts to the Casper Aquifer. As described, releases from non-point sources associated with this study are likely to be produced in low concentrations on a day-to-day basis, but over time may concentrate to create soil and groundwater contamination problems.

One of the best methods to determine the impact of non-point sources to groundwater over time is to establish a comprehensive groundwater monitoring well network and periodic monitoring plan. Such a program was recommended for the Casper Aquifer in the 2006 and 2008 CAPP's to detect groundwater impact from myriad point and non-point sources within the CAPA.

It is suggested that consideration be given to the installation and regular sampling of monitoring wells upgradient or east of the City wells most likely to be impacted by groundwater pollutants released in Telephone Canyon, specifically the Soldier Springs and Pope Springs wells. A groundwater monitoring well network and monitoring plan will be beneficial to:

1. Establish baseline water quality parameters.
2. Identify incremental changes or water quality “creep” that may result from the infiltration of non-point source pollutants.
3. Allow for early mitigation measures in the event contamination appears in one of the up-gradient monitoring or “sentinel” wells.

The 2008 CAPP proposed locations for monitoring wells to the east of the city wells and also recommended a sampling plan. It is recommended that additional site-specific investigations be conducted to accurately determine optimal monitoring well locations specific to the I-80 Telephone Canyon study area. It is also recommended that these wells be monitored quarterly for inorganic compounds listed in the National Primary and Secondary Drinking Water Standards, petroleum hydrocarbons, conductivity, temperature and water level. If petroleum hydrocarbons are detected, testing for additional organics should be initiated. Quarterly testing allows for early detection of contaminants and tracking of background seasonal variations in water quality. This list of monitoring parameters may be expanded if deemed necessary upon further technical investigation.

Figure 4 shows locations to consider for monitoring well locations. Table 4 shows the estimated cost for four monitoring wells, access easements, and purchase of property surrounding each well. Assumptions are listed at the top of the table. The estimated cost for this option is $470,000.

In addition to the monitoring program described above, further study should be undertaken to better understand the complex groundwater transport mechanisms present in the Casper Formation in the Telephone Canyon area. Previous studies have investigated fracture permeability in the area of the City supply wells, and informal dye testing was conducted in the 1990’s. These studies showed that enhanced permeability in the Casper Formation east of Laramie may increase groundwater velocity, which can decrease the time required for contaminants to migrate over a given distance. However, these studies were not specific to the Telephone Canyon area and did not address releases at ground surface. Similar studies designed specifically for and conducted in the Telephone Canyon area may allow stakeholders to better identify locations of aquifer features that are more vulnerable to contaminant infiltration and transport.

4.2 SPILL PREVENTION MEASURES

One way to reduce the possibility of contamination of the Casper Aquifer from Telephone Canyon is to take measures to minimize the occurrence of spills to the extent possible. In Telephone Canyon, spills generally occur as a result of vehicle accidents. The most significant spills are likely to be the result of an accident involving a semi-truck. A reduction in vehicle and specifically semi-truck accidents would also reduce the likelihood of a hazardous material spill in Telephone Canyon. Collaboration with WYDOT is essential to this effort since they have authority over interstate travel in Wyoming. Two options that may be worthy of consideration to reduce the potential for accidents, and resulting spills, include: variable speed limit signs and alternative road surfaces.

4.2.1 VARIABLE SPEED LIMIT SIGNS

Most of the accidents occurring within Telephone Canyon can be correlated to excessive speed, especially during precipitation events when road conditions are slick. Implementation of more stringent speed controls in Telephone Canyon could reduce the number of collisions and the potential for hazardous material spills.

WYDOT has recently taken steps to control speeds on another notably hazardous section of I-80. They have installed variable speed limit signs on a 52-mile stretch of I-80 between the cities of Laramie and Rawlins. According to a WYDOT press release, the variable speed limit signs allow the Transportation Management Center to reduce the speed limit in 5 mph increments to as low as 35 mph as weather and road conditions warrant (http:/dot.state.wy.us October 2010).

For the 52-mile section of I-80 between Laramie and Rawlins, WYDOT collected collision data for the past three severe weather seasons under various speed limit scenarios – no speed limit reduction (75 miles per hour (mph)), 65 mph seasonal speed limit reduction, and mix of seasonal and variable speed limits. Overall, the total number of collisions per severe weather season decreased as the use of seasonal and variable speed limits signs increased. From that same data set, WYDOT also saw a similar decline in the number of collisions involving commercial vehicles from 183 in the winter of 2007-2008 to 51 in the winter of 2009-2010. Speed sensor data from WYDOT also shows that speed limit compliance rates increase when speed limits are posted on variable speed limit signs than on the 65 mph seasonal speed limit signs.

Two years ago, WYDOT established a year-round speed limit of 65 mph for westbound traffic from the Happy Jack interchange to the bottom of Telephone Canyon as a measure to reduce the number of accidents in this reach of I-80.

With the apparent success of variable speed limit signs on I-80 between Laramie and Rawlins, a similar system might prove valuable for the Telephone Canyon portion of I-80 as an accident reduction/spill prevention measure. WYDOT has indicated that a project to install variable speed limit signs between Cheyenne and Laramie, including in Telephone Canyon, is expected to be in place for the severe weather season of 2011-2012 (Gould, J., personal communication October 27, 2010).

4.2.2 ALTERNATIVE ROAD SURFACES

The high volume of traffic, especially the truck traffic through Telephone Canyon, polishes the limestone roadway over time making the pavement slick when wet. In August 2010, WYDOT resurfaced segments of Telephone Canyon with Novachip, a resurfacing treatment, to help address fast-traveling vehicles in wet conditions (http://www.laramieboomerang.com/articles/2010/07/15/news/doc4c3e967533396292778685.txt). The Novachip treatment is used to improve skid resistance and durability over traditional road surfacing methods. WYDOT resurfaced 2 miles of the westbound lane of Telephone Canyon in 2007 and included 3 more miles in the westbound lane and 5 miles in the eastbound lane in the August 2010 project. Continued advancements in road surfaces to improve vehicle traction and safety are important spill mitigation and aquifer protection measures by reducing vehicle accidents.

4.3 SPILL RESPONSE MEASURES

While spill prevention measures are important to minimizing the occurrence of accidents involving hazardous material transport, even the best precautions can't prevent every accident. In the event of a hazardous material spill, having an emergency response plan in place and a trained and skilled emergency response team to carry out the plan are important.

The City of Laramie and Albany County revised the Albany County Hazard Mitigation Plan in 2004. This plan describes the possible environmental and man-made disasters that are likely to occur in southeast Wyoming, which could impact human health, critical facilities, infrastructure, and private property. Steps to be taken in an emergency spill response situation in Telephone Canyon should occur in the following order:

1. Notify 911 to mobilize first responder emergency services.

   If a hazardous material spill occurs in Telephone Canyon, emergency response teams, other appropriate authorities and possibly the public, need to be notified quickly. Reporting of any accident in Telephone Canyon would most

likely come as a cell phone call to 911 by another motorist. The 2008 CAPP recommended that Albany County and the City of Laramie coordinate with WYDOT to post additional signs along I-80 in Telephone Canyon to notify travelers they are passing through a water supply protection area. The sign should also alert the public to immediately report spills by calling 911. The 911 dispatch will mobilize ambulance and fire services, both of which should be prepared for dealing with released hazardous substances. The Laramie Fire Department is well-staffed to respond to hazardous material spills. They have 20 out of 43 firefighters who have achieved the highest National Fire Protection Association Hazmat Certification, the Technical Level, which requires a minimum of 80 hours of specialized training. Some have received additional advanced training at the American Railroad Institute School in Pueblo, CO (http://www.hazmatmag.com/issues/story.aspx?aid=1000363299&type=Print%20Archives).

2. Identify the spill and its extent and control the spill as best as possible.

   The Laramie and Albany County hazardous materials emergency response teams need to be supplied with the proper equipment to control various hazardous materials. The Laramie Fire Department should be equipped with spill containment materials to address the contaminants of concern identified in Section 3.0. The most likely hazardous materials to be released in Telephone Canyon are petroleum products, specifically gasoline or diesel fuel or a combination of the two, since tanker trucks often carry both types of fuel in separate compartments within one tanker. The worst case volume of petroleum product to be spilled would be a volume of 12,000 gallons, assuming release of material from a full tanker and a pup trailer.

3. If the spill involves a tanker truck that is still leaking hazardous material, contact an emergency response environmental services contractor to pump the remaining material out of the tanker. Therefore, a contract should be established with an emergency response environmental contractor which specifies less than a two-hour response time.

4. If the spill poses an imminent threat to the Casper Aquifer, first responders should notify the appropriate local authorities.

5. Once the spill is contained, contact a hazardous materials remediation contractor to clean up the site.

   - Purchase emergency response equipment, truck w/spill supplies.
   - Install spill response equipment and supply sheds at strategic locations in Telephone Canyon - Absorbent pads, booms, etc., drain protectors and covers.

fine, but "potential" is more than just cracks

4.4 ENGINEERING CONTROLS

The emergency response recommendations described above are important for the immediate response to a spill. Additional engineering controls may also be warranted to facilitate longer term containment and cleanup. When evaluating engineering controls for spill mitigation within Telephone Canyon, areas of high infiltration and mobility need to be addressed regarding contaminant transport so that structures may be installed to help facilitate emergency response in the case of a release. Engineering controls should be implemented to protect areas with the highest potential for contaminant infiltration. Areas of higher vertical grade have a lower potential for infiltration; therefore less protection is necessary in these areas. However, areas with higher vertical grade create the potential for increased mobility. Engineering controls that decrease the mobility of spills should be considered in these areas.

Additional engineering design and further evaluation of risks and costs should be conducted prior to selection, design, and construction of possible engineering controls. The effectiveness of engineering controls vary depending on the contaminant that is spilled. The engineering controls discussed below will provide effective mitigation for petroleum products, which were previously discussed as a high ranking hazard. The engineering controls should also provide effective mitigation for the non-point source contaminants. Examples of possible containment facilities which could be considered for installation within Telephone Canyon include:

1. Hazardous spill basins (HSB) - HSB's are shallow basins with an outlet control structure that can block the entire cross-sectional area of flow. Hazardous spill basins are designed to contain hazardous materials in the event of an accidental spill. During normal operation, stormwater runoff flows unimpeded through the basin. In the event of a spill, the outlet control structure is manually closed, preventing discharge from the basin. Some outlet control structures may be closed remotely. HSBs may be shaped like a pond or a channel. Sluice gates or sand bags are typically used to block the basin outlet. Some HSBs are marked by a sign with instructions to personnel on how to contain a spill. The HSB outlet control structure may be designed to provide detention in some applications. The determination of these strategic locations is typically based on concentrated truck usage areas such as; parking sites at rest areas, weight stations, and runaway ramps, as well as for highway segments in close proximity to particularly sensitive areas such as outstanding resource waters and water supply sources. An HSB may be constructed in the runoff channel near a segment of concern such that potential spill runoff would be directed through a facility (basin) where the flow could be interrupted and temporarily stored to prevent hazardous material from reaching a particularly sensitive area. Examples of HSB's installed in other parts of the country are shown in Appendix E.

Figure 5 shows possible locations for HSBs and rock checks with a supply shelter location included for emergency response supplies. The supply shelter is shown at a snowplow turnout located at milepost 321.54, which is in close proximity to the segment of roadway that experiences the highest frequency of truck accidents. The location of this supply shelter should be evaluated to optimize the availability of supplies to response teams in the event of a spill. It may be beneficial to have multiple supply shelters at the top and bottom of the canyon in the event that access is limited due to an accident blocking traffic. Table 5 presents a conceptual construction cost estimate based on the assumptions at the top of the table. Further study and site investigations are recommended to locate and size the HSBs and rock checks within the canyon. The estimated cost to implement this option is $230,000.

2. Rock lined channels with check dams sized for large spill volume - The potential project area already contains grass and rock swales. Checks and liners could be installed with minor earthwork. This would be especially applicable in the extremely rocky sections where excavation would be difficult. If only rock checks were installed there would be very little maintenance involved to keep the containment systems functioning. If overflow pipes were added, the system would still function even if they were clogged, but not at design efficiency for small storms. Additional upstream detention might be required if the checks were installed in existing channels that had been sized for a specific design storm. The detention ponds would serve as a surge buffer to control the amount of runoff.

3. Detention ponds with lined sediment\pollutant forebays - A sediment forebay is a small pool located near the inlet of a storm basin or other stormwater management facility. These devices are designed as initial storage areas to trap and settle out sediment and heavy pollutants before they reach the main basin. Installing an earth berm, gabion wall, or other barrier near the inlet to cause stormwater to pool temporarily can form the pool area. Sediment forebays serve as a pretreatment feature on a stormwater pond and can greatly reduce the overall pond maintenance requirements. These small, relatively simple devices add a water quality benefit beyond what is accomplished by the basin itself. Forebays also make basin maintenance easier and less costly by trapping sediment in one small area where it is easily removed, and preventing sediment buildup in the rest of the facility. With heavier, coarse sediments confined to the forebay area of a basin, maintenance is simpler and less costly. Sediment forebays therefore also act to extend the life of the stormwater pond. They can be installed in wet and dry basin designs.

   The cost of a sediment forebay depends on its design requirements. Some forebays are incorporated into the wet pond pool area, while others are separate smaller pools. Design features such as impermeable liners (ease

cleanout), baffles, and embankment materials will affect the ultimate cost of the forebay. An example of a detention pond is shown in Appendix E.

4. Swirl concentrators with oil/water separators – A swirl concentrator uses vortex flow to separate and remove solids from runoff. The influent pipes of swirl concentrators are oriented tangentially to the concentrator to induce a swirling flow regime. Flow currents direct solids to the center and bottom of the unit, where they are held in a sump for removal. Some concentrators are configured to trap oil and floatables as well.

   One example of this type of structure is the StormceptorMAX$_{TM}$. This proprietary structure is a precast concrete vault that can be sized to meet runoff demand and water quality objectives. The structure traps free oils and sediment for later removal. This type of structure may be useful in areas where the larger footprint of a detention pond is not feasible. Based on estimates from the Federal Highway Administration, the installation cost for the Stormceptor product ranges from $10,600 to $47,000 depending on size and location. The estimated cleaning cost ranges from $420 to $700 per cleaning. The cleaning includes pumping, dewatering, and disposing of solids. Further information regarding this product can be found in Appendix E.

Another option addresses the area of highest hydrogeologic vulnerability (milepost 318.5) where the stormwater runoff from the canyon accumulates. As described in Section 2.4, flows to this portion of the storm drain system may exceed 1,600 cfs during a 50-year storm event. This amount of water may be difficult to contain at a point upstream of the vulnerable area. Therefore, an additional option to mitigate impacts from a release in this area is to line the open channel area with concrete (Shotcrete) and collect the stormwater in a detention pond further downstream in areas that are less vulnerable to infiltration to the aquifer. The discharge channel would be lined from milepost 319 to approximately one-quarter mile past where it crosses I-80 at 318.5 as shown on Figure 6. The conceptual level construction cost estimate for this option is shown in Table 6. An access and maintenance easement and purchase of property for the detention pond are also included. The estimated cost to implement this option is $3 million.

The control options described above are examples that could be implemented/constructed within Telephone Canyon to assist in mitigating impacts to the Casper Aquifer from contaminants in the event of a release. Some integrated combination of these controls may be implemented depending on design aspects and cost considerations. Additionally, a maintenance program would need to be developed that defines the agency(s) responsible for providing the personnel, funding, and scheduling for performing the maintenance so that these structures are capable of performing to their full potential.

5.0 SUMMARY AND RECOMMENDATIONS

The objective of this report is to go beyond the recommendations proposed in previous reports about the Casper Aquifer (2006 and 2008 CAPP's) and provide further evaluation regarding the nature and potential for hazardous materials released within the Telephone Canyon portion of I-80 east of Laramie to impact the Casper Aquifer. As part of the study, the following factors were evaluated:

1. Geology of the study area and other factors (i.e. hydrology, grade, etc.) to determine the areas that are most vulnerable to infiltration of contaminants from a potential release.
2. Vehicle accident data within Telephone Canyon to evaluate the areas where releases are most likely to occur.
3. Potential contaminants of concern to determine the contaminants most likely to be released in a spill and their associated risk and mobility properties.

Based on the items evaluated, it was determined that the stretch of I-80 from milepost 317 to 319 is the most vulnerable to contaminants infiltrating the Casper Aquifer. This stretch likely has the highest permeability due to enhancement from faulting and fracturing. The majority of the accidents involving trucks occurred between milepost 319 and 321. The rate of accidents within the stretch is likely due to steep grades and tight curves (designed for 65 mph). Petroleum products such as gasoline and diesel are the most commonly transported material within Telephone Canyon. These products are often carried in loads of approximately 12,000 gallons.

Based on the conclusions summarized above, the following possible recommendations are proposed to assist in protection of the Casper Aquifer and in responding to an accidental release of hazardous materials along I-80 within Telephone Canyon. These recommendations are listed in order of priority based on the evaluations of this study.

1. Develop a monitoring plan and system of monitoring wells to assist in assessing impacts to the aquifer. This would also allow for advanced identification of potential impacts, so that the City has time to adjust its groundwater use plan (i.e. switch to different pumping wells, install new wells, etc.), and/or install pretreatment to address the possible impacts. Estimated cost to implement is $470,000.
2. Develop and enhance existing accident prevention measures in order to reduce the possibility of a spill in the Telephone Canyon Study area. Possible accident/spill prevention measures may include:

- Variable speed limits
- Alternative road surfaces

3. Develop and enhance existing spill response measures to more effectively address possible releases, and reduce the potential for impacts to migrate to the aquifer. Examples of possible spill response enhancements include:
   - Preparing and implementation a more-comprehensive spill response plan, which specifically considers and addresses the risks associated with the Telephone Canyon study area.
   - Provide additional training for existing response personnel, specifically targeted to the Telephone Canyon study area.
   - Staging of spill response materials in or near Telephone Canyon to be readily available for use in the event of a spill.
   - Contracting with an emergency response environmental contractor to further decrease the time required to respond and mitigate potential spills/releases within Telephone Canyon.
4. Design and implement engineering controls to assist with containment and mitigation of hazardous materials spills. Example controls evaluated as part of this study include:
   - Hazardous spill basins
   - Rock lined channels with check dams
   - Detention ponds with lined sediment\pollutant forebays
   - Swirl concentrators with oil/water separators
   - Concrete-lined channels

Estimated cost $230,000 to $3 million depending on scope/size of engineering control measures.

The measures described above are examples of structures that could be constructed within Telephone Canyon to assist with spill control and mitigation. Some integrated combination of these control structures, in association with administrative controls, may be implemented, depending on design aspects and cost considerations.

Additional items to consider for a future study or during design include a phased approach to implement the recommend measures and controls, maintenance over a specified period of time (such as 20 years), and additional funding and/or grant sources for both initial implementation and long-term maintenance. Additionally, care should be taken to integrate the administrative controls (speed limits, road surface, spill response plans, etc.), engineering controls (retention structures, spill response equipment, etc.), and monitoring plan (groundwater wells/monitoring, sediment monitoring, etc.) selected by the City/County in to one comprehensive system that strives to reduce the potential risks to the Casper Aquifer associated with the I-80/Telephone Canyon study area.

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TABLES

TABLE 1A. TOTAL ACCIDENTS BY MILEPOST
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

M.P.	Total Accidents	Truck Accidents	% of Total	Other Accidents	% of Total
316.7 - 318	100	22	22%	78	78%
318 - 319	49	11	22%	38	78%
319 - 320	94	15	16%	79	84%
320 - 321	166	47	28%	119	72%
321 - 322	84	23	27%	61	73%
322 - 323.05	115	17	15%	98	85%
Total	608	135	22%	473	78%

TABLE 1B. TRUCK ACCIDENTS BY SEASON
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

	Spring		Summer		Fall		Winter		
M.P.	(Mar-May)	% of Total	(Jun-Aug)	% of Total	(Sep-Nov)	% of Total	(Dec-Feb)	% of Total	Total
316.7 - 318	7	32%	5	23%	5	23%	5	23%	22
318 - 319	3	27%	2	18%	5	45%	1	9%	11
319 - 320	3	20%	6	40%	5	33%	1	7%	15
320 - 321	13	28%	17	36%	12	26%	5	11%	47
321 - 322	5	22%	5	22%	11	48%	2	9%	23
322 - 323.05	7	41%	1	6%	5	29%	4	24%	17
Total	38	28%	36	27%	43	32%	18	13%	135

TABLE 2. QUALITATIVE RANKING BY SECTION
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

Mile Marker	Casper Member Ranking[1]	Deformation Ranking[2]	Drainages Ranking[3]	Vertical Grade	Vertical Grade Ranking[4]	Truck Accidents	Accident Ranking[5]	Total Score
317-318	3	3	3	0-1%	1	22	2	12
318-319	3	3	3	0-2%	2	11	1	12
319-320	2	1	1	3-5%	3	15	2	9
320-321	2	1	1	4-5%	3	47	3	10
321-322	2	2	1	4.5-5%	3	23	2	10
322-323	2	1	1	2-4%	3	17	2	9

1 - Highway section intersecting Delta and Epsilon members of the Casper Formation were assigned a 3. Other sections assigned a 2.
2 - Qualitative ranking based on number of mapped faults and folds.
3 - Qualitative ranking based on the number drainages contributing to and removing water from the highway section.
4 - Ranking based on maximum grade within each section. Ranking 1: 0-2% Ranking 2: 2-3% Ranking 3: 3-5%
5 - Ranking based on number of accidents involving trucks between 2000 and 2010. Ranking 1: less than 15. Ranking 2: 15 to 25.
Ranking 3: greater than 25.

TABLE 3. SCORING VALUES FOR QUALITATIVE ASSESSMENT OF CARGO OCCURRENCES
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

Criteria	Qualitative Metric	Score
Number of Occurrences	<100	1
	100-1000	2
	>1000	3
Toxicity	Non-toxic	1
	Low toxicity	2
	Low to moderate toxicity	3
	Moderate toxicity	4
	Toxic	5
Solubility	Insoluble	1
	Miscible	2
	Low solubility	3
	Soluble	4
	High solubility	5
Viscosity	NA	1
	High viscosity	2
	Viscous	3
	Low viscosity	4

Note: Scoring values given for the qualitative assessment of the number of cargo occurrences on I-80 and I-25.

TABLE 4. COST ESTIMATE - MONITORING WELLS
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

Assumptions:

1. 4-inch
2. drill depth of 200' to 300'
3. Quarterly sampling and testing

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Mobilization	LS	1	$ 24,000.00	$ 24,000.00
2	4-inch Monitoring Well	EA	4	$ 60,000.00	$ 240,000.00
3	Easement (access to wells)	LS	1	$ 20,000.00	$ 20,000.00
				Construction	$ 284,000.00
				Contingency (25%)	$ 71,000.00
				Subtotal	**$ 355,000.00**
				Professional Engineering (15%)	$ 53,250.00
				Construction Engineering (10%)	$ 35,500.00
				Subtotal	**$ 88,750.00**
				6% inflation (2012)	$ 26,625.00
				Total	**$ 470,375.00**
				Quarterly Sampling, Testing, and Reporting	**$ 8,000.00**

TABLE 5. COST ESTIMATE - HAZARDOUS SPILL BASINS (HSB), ROCK CHECKS, AND SPILL RESPONSE SHELTER
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

Assumptions:

1. 20,000 gallon capacity per basin - use 3
2. 25' x 25' bottom, 3' deep with 3:1 side slopes
3. excavate and rock line channels 50 upstream and downstream of check dam location
4. Monthly inspections and routine maintenance
5. Precast concrete aboveground shelter located at snow plow turnout at MP 321.5. Include 1 supply kit

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Mobilization	LS	1	$ 12,650.00	$ 12,650.00
2	Unclassified Excavation	CY	300	$ 20.00	$ 6,000.00
3	Rock Excavation	CY	60	$ 30.00	$ 1,800.00
4	HDPE Liner (60 mil)	SF	4800	$ 1.25	$ 6,000.00
5	18 inch x 18 inch sluice gate w/structure	EA	3	$ 14,200.00	$ 42,600.00
6	Rock Line Channel and Install Rock Check	LF	500	$ 125.00	$ 62,500.00
7	Precast Concrete Above Ground Shelter (7'x7')	EA	1	$ 5,400.00	$ 5,400.00
8	Haz-Mat Extra Large Response Cart Kit	EA	1	$ 2,200.00	$ 2,200.00
				Construction	$ 139,150.00
				Contingency (25%)	$ 34,787.50
				Subtotal	**$ 173,937.50**
				Professional Engineering (15%)	$ 26,090.63
				Construction Engineering (10%)	$ 17,393.75
				Subtotal	**$ 43,484.38**
				6% inflation (2012)	$ 13,045.31
				Total	**$ 230,467.19**
				Annual Maintenance	**$ 25,000.00**

Haz-Mat kit includes:
100 - HAZ-MAT Mat Pads
36 - 46" HAZ-MAT Socks
15 - HAZ-MAT Pillows
2 - 5 lb. Bags HAZ-MAT Pulp
7 - 3" x 10' HAZ-MAT Socks
2 - 5" x 10' HAZ-MAT Socks
30 - Temporary Disposal Bags and Ties
1 - Emergency Response Guidebook
1 - Instruction Manual
6 - Tamper-proof Labels

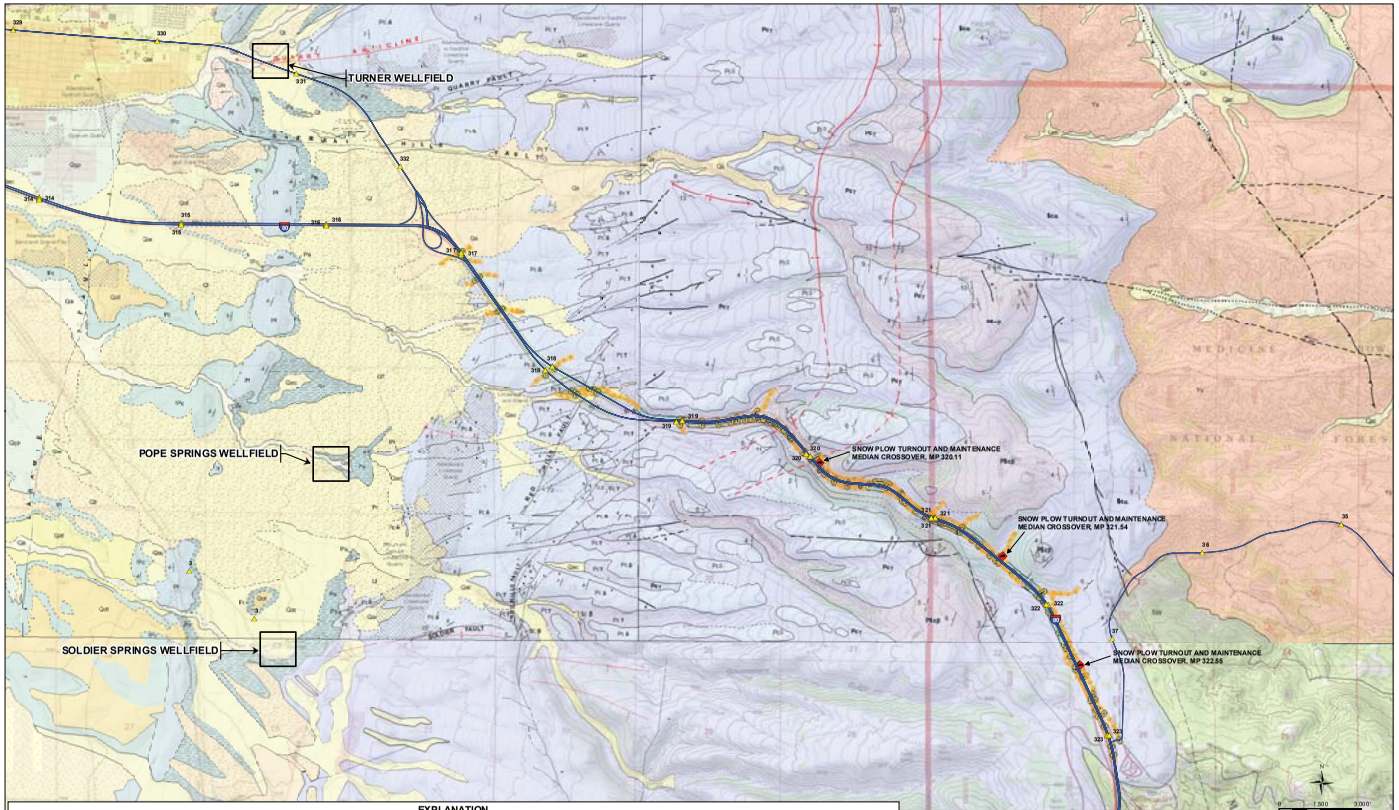
TABLE 6. COST ESTIMATE - SHOTCRETE-LINED CHANNEL AND DETENTION POND
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

Assumptions:

1. Concrete line open channel from approx. mp 319 along channel for 1 mile to northwest
2. trapezoidal channel with 12' bottom, 2H:1V sideslopes, 6' deep
3. 100' easement for channel and 1 acre area for detention pond

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Mobilization	LS	1	$ 140,000.00	$ 140,000.00
2	Shotcrete-lined channel (3000 psi, 3" thick)	SF	219500	$ 6.55	$ 1,437,725.00
3	Easement (100' wide, on west side of I-80)	AC	3.5	$ 5,000.00	$ 17,500.00
4	Detention Pond (40,000 gallons or 0.12 ac-ft)	LS	1	$ 100,000.00	$ 100,000.00
5	Purchase 1 acre of land	AC	1	$ 100,000.00	$ 100,000.00
				Construction	$ 1,795,225.00
				Contingency (25%)	$ 448,806.25
				Subtotal	**$ 2,244,031.25**
				Professional Engineering (15%)	$ 336,604.69
				Construction Engineering (10%)	$ 224,403.13
				Subtotal	**$ 561,007.81**
				6% inflation (2012)	$ 168,302.34
				Total	**$ 2,973,341.41**
				Annual Maintenance	**$8,000**

FIGURES



EXPLANATION

- MILE POSTS
- MANHOLES
- SNOW PLOW TURNOUT AND MAINTENANCE MEDIAN CROSSOVER
- AREA OF HIGHEST ACCIDENT FREQUENCY
- AREA OF HIGHEST HYDROGEOLOGIC VULNERABILITY
- OPEN CHANNEL
- RUNOFF, DRAINAGE PATH
- STORM DRAIN, CULVERT
- Alluvial deposits (Holocene)
- Mixed alluvium and colluvium (Holocene/Pleistocene)
- Colluvium (Holocene/Pleistocene)
- Landslide deposits (Holocene/Pleistocene)
- Windblown sand deposits (Holocene/Pleistocene)
- Mixed alluvium and terrace deposits (Holocene/Pleistocene)
- Alluvial fan deposits (Holocene/Pleistocene)
- Older alluvial fan deposits (Holocene/Pleistocene)
- Older terrace deposits (Holocene/Pleistocene)
- Older terrace deposits (Holocene/Pleistocene)
- Terrace deposits (Holocene/Pleistocene)
- Gypsite deposits (Holocene/Pleistocene)
- Cloverly Formation (Lower Cretaceous)
- Morrison Formation (Upper and Middle Jurassic)
- Forelle Limestone (Permian)
- Satanka Shale (Permian)
- Chugwater Formation (Triassic and Permian)
- Casper Epsilon member (Permian)
- Casper Delta member (Permian)
- Casper Gamma member (Permian)
- Casper Beta member (Permian and Pennsylvanian)
- Casper Alpha Member (Pennsylvanian)
- Laramie Mountains anorthosite and norite
- Older Proterozoic metasedimentary and metavolcanics rocks in the Laramie Mountains
- Sherman Granite

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FIGURE 1

STUDY AREA
MP 317 TO MP 323

I-80 TELEPHONE CANYON
CASPER AQUIFER PROTECTION STUDY
LARAMIE, WYOMING

Drawn By: PH	Checked By: RA	Scale: 1" = 1500'	Date: 2/19/10	File: Laramie_Aquifer_Study.mxd

FIGURE 2. TRUCK ACCIDENTS BY SEASON
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

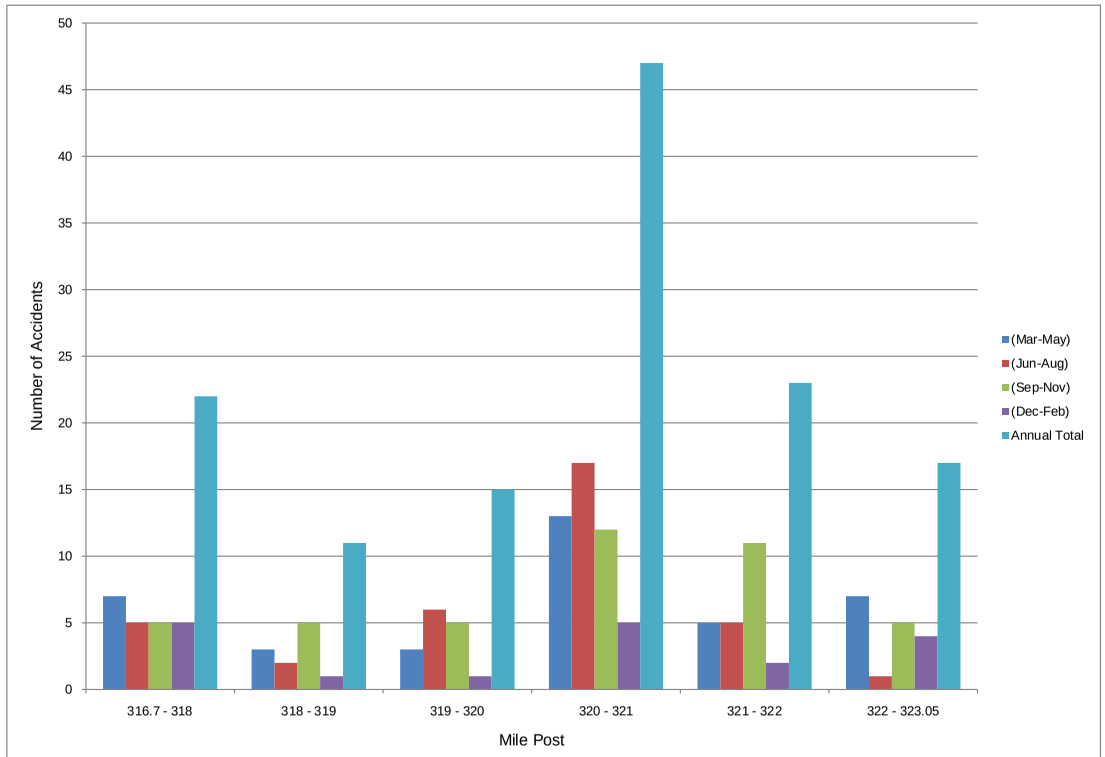
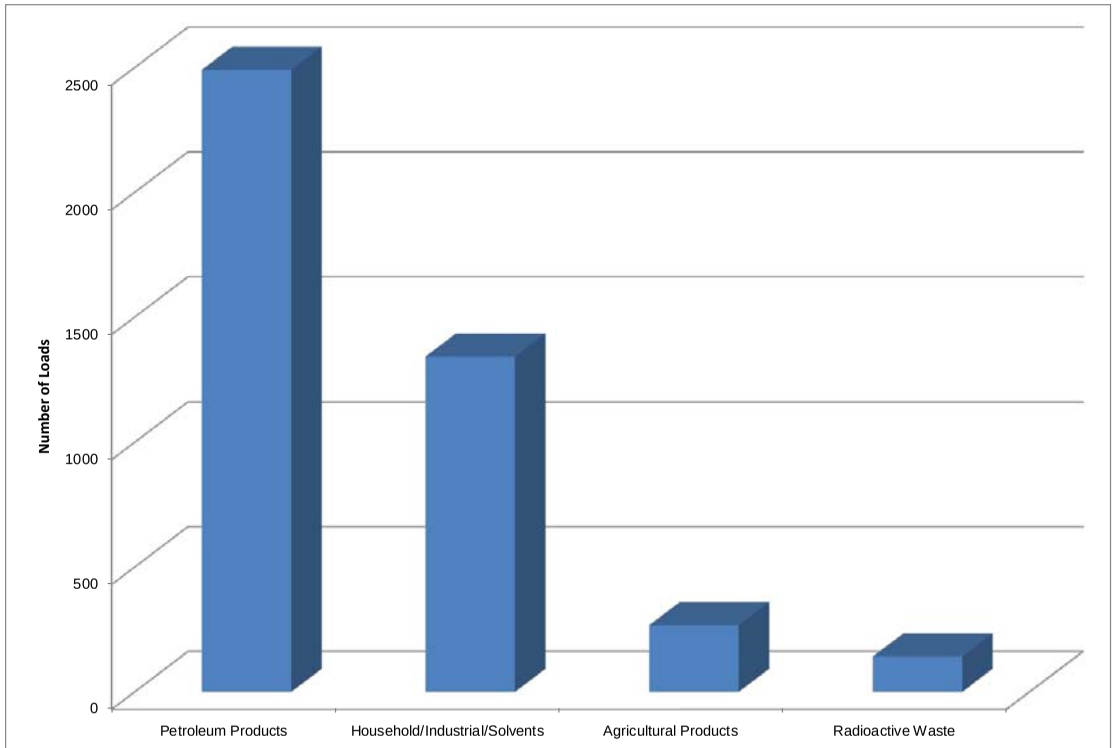


FIGURE 3. TOTAL OCCURRENCE OF CONTAMINANTS OF CONCERN
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING



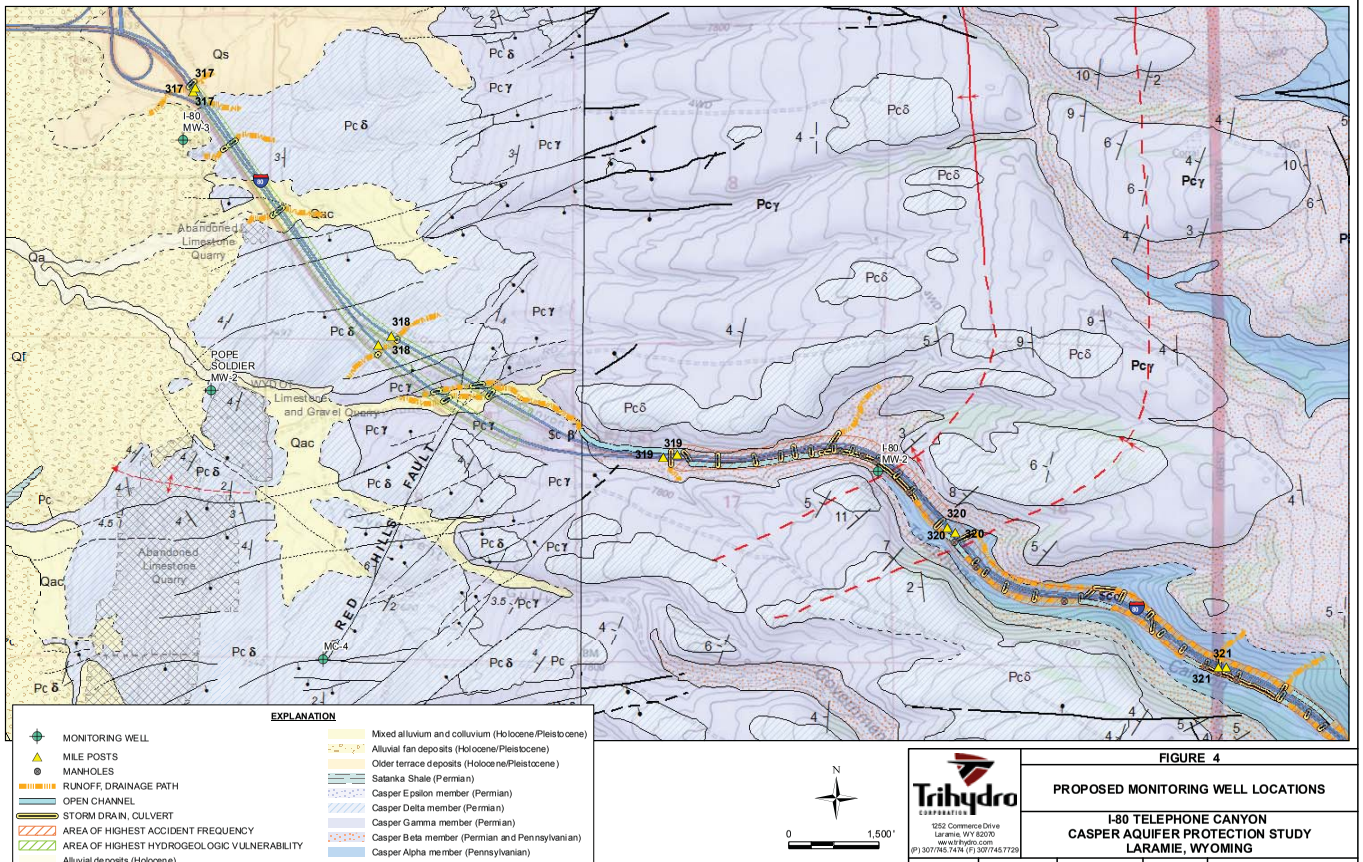


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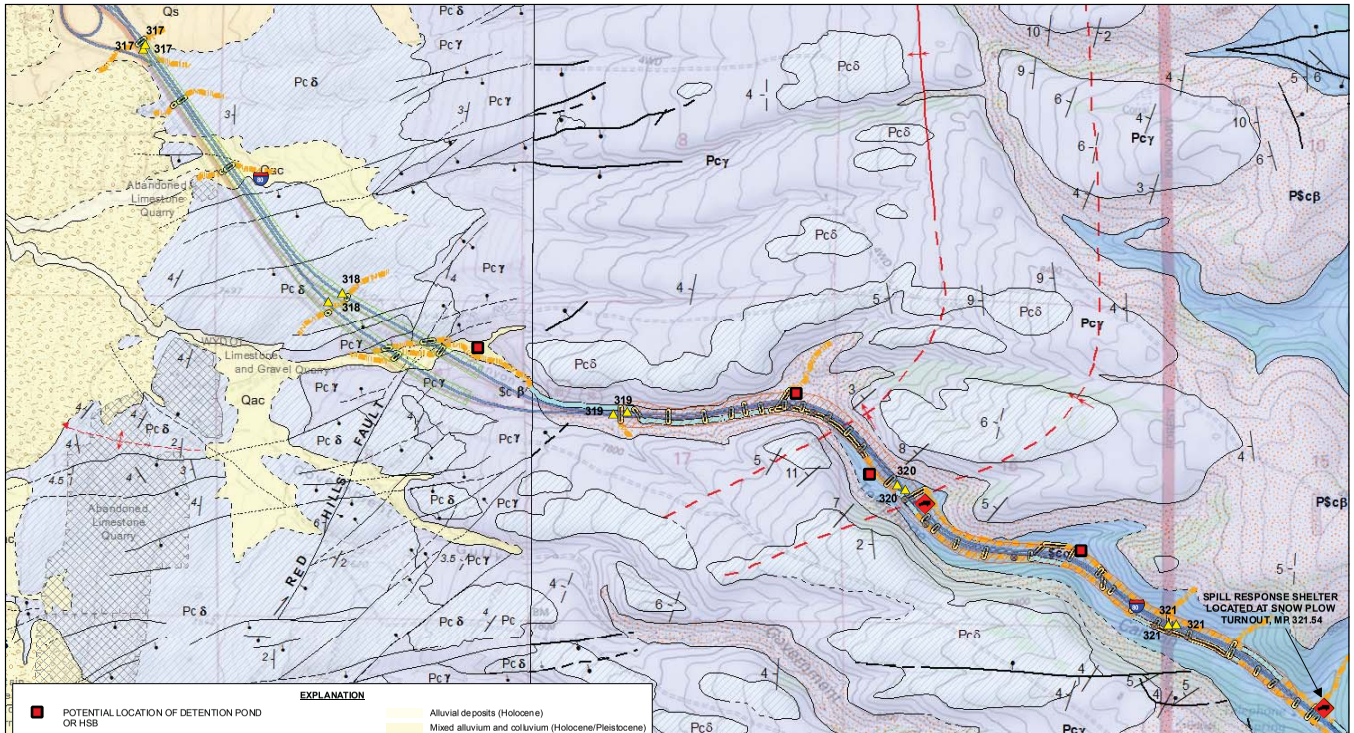
FIGURE 4

PROPOSED MONITORING WELL LOCATIONS

I-80 TELEPHONE CANYON
CASPER AQUIFER PROTECTION STUDY
LARAMIE, WYOMING

Drawn By: PH | Checked By: RA | Scale: 1" = 1500' | Date: 11/11/10 | File: Laramie_Aquifer_StudyDrainageFig5.mxd



NOTE: 5 ROCK CHECKS ARE ASSUMED TO BE STRATEGICALLY LOCATED FOR COST ESTIMATING PURPOSES.

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FIGURE 5

PROPOSED HAZARDOUS SPILL BASINS, ROCK CHECKS, AND SPILL RESPONSE SHELTER LOCATIONS

I-80 TELEPHONE CANYON
CASPER AQUIFER PROTECTION STUDY
LARAMIE, WYOMING

Drawn By: PH	Checked By: RA	Scale: 1" = 1500'	Date: 11/11/10	File: Laramie_Aquifer_StudyDrainageFig2.mxd

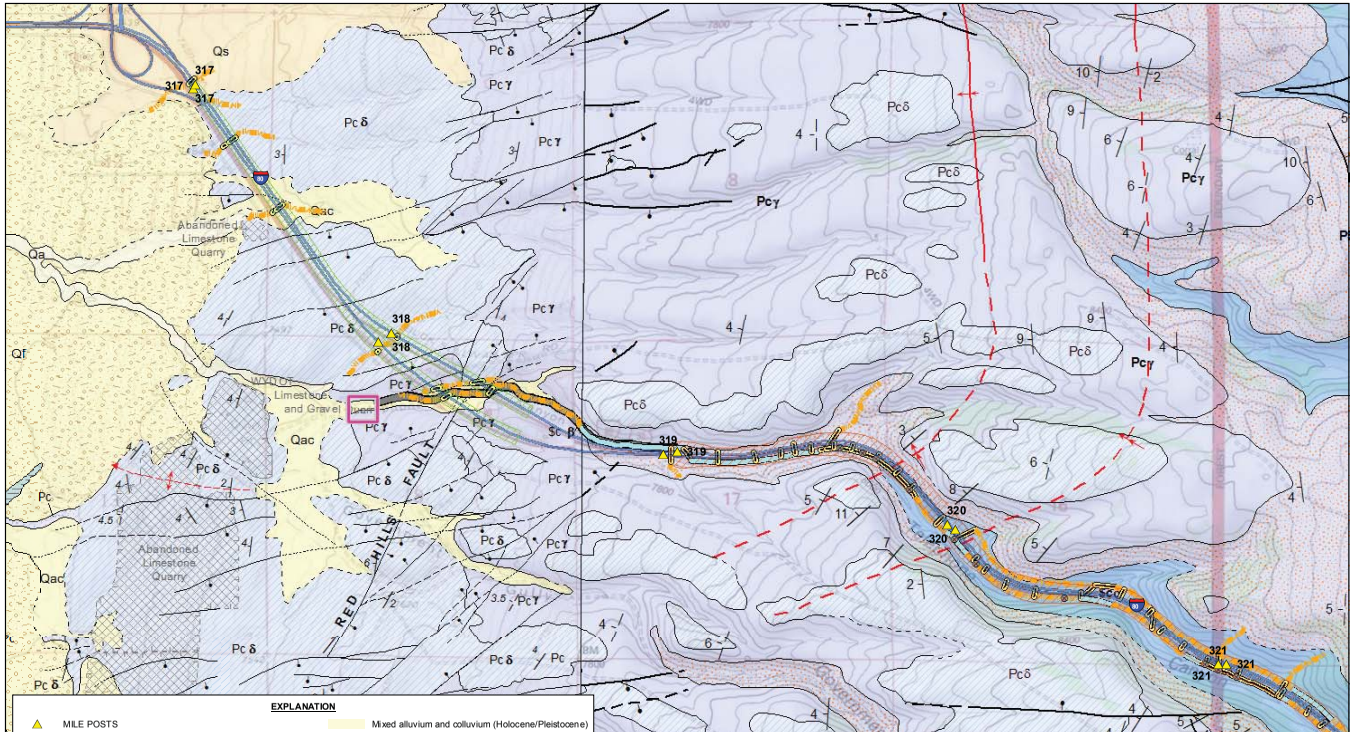

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FIGURE 6

PROPOSED SHOTCRETE-LINED CHANNEL AND DETENTION POND LOCATIONS

I-80 TELEPHONE CANYON
CASPER AQUIFER PROTECTION STUDY
LARAMIE, WYOMING

Drawn By: PH	Checked By: RA	Scale: 1" = 1500'	Date: 11/11/10	File: Laramie_Aquifer_StudyDrainageFig6.mxd

APPENDIX A

BEDROCK GEOLOGY DESCRIPTIONS

APPENDIX A. BEDROCK GEOLOGY DESCRIPTIONS

Stratigraphy

The bedrock at the site includes the Satanka, Casper, and Fountain Formations, which are underlain by Precambrian igneous and metamorphic rocks. The Satanka Shale unconformably overlies the Casper and Fountain Formations, which unconformably overlie the Precambrian rocks. However, the Fountain Formation is irregularly distributed and can be absent in the area under investigation near Laramie. Where the Fountain formation is absent, the Casper Formation directly overlies the Precambrian rocks. These formations have a gentle westward dip (2-8°), with the greatest dips in the eastern portions of the study area (Lundy, 1978). Additional formations overlie the Satanka Shale and can be found west of the study area. In addition to the bedrock, some Quaternary deposits are present in the west and northwest portions of the study area; the deposits consist of alluvium, colluvium, and aeolian sands.

The Satanka Shale is the basal component of the Chugwater Group. This formation outcrops in the western portions of the study area. The formation consists of red shales, sandy shales, siltstone, interbedded sandstone, and gypsum beds (in the upper 80 feet). The formation is mid-Permian in age and has an approximate thickness of 250-320 feet (CAPP, 2008). The red shale beds also can contain foraminifera and pelecypods (Chen and Boyd, 1997).

The Casper Formation consists of poorly sorted, subarkosic sandstone interbedded with limestone, dolomite, and minor amounts of shale. The formation is Pennsylvanian to Permian in age and is approximately 700 feet thick (CAPP, 2008). The limestone and dolomite beds thin to the south and west of the study area and are more continuous in the upper portions of the formation, while the lower ~300 feet of the aquifer contains less continuous beds. The continuous limestone beds have been used to subdivide the Casper Formation into five members (alpha, beta, gamma, delta and epsilon), each of which are bounded above and below by a limestone/dolomite bed (CAPP, 2008). At its base, the Casper Formation intertongues with the Fountain Formation. The Fountain Formation is scarce in the study area. Where present, it is an arkosic sandstone with some siltstone. Thicknesses range from 50-0 feet.

Precambrian rocks underlie the Casper and/or Fountain Formations and are composed of granite, gneiss, anorthosite, and gabbro. These rocks have, since there formation, been intruded by a granitic formation known as the Sherman Granite. The Precambrian rocks are present at the surface at far eastern portions of the study area.

Hydrogeology

The four main bedrock units found at the site combine to form the confining and water bearing zones of the Casper aquifer at the site. The Satanka and Precambrian Formations act as the upper and lower confining layers, respectively, and the Casper and Fountain Formations serve as the water bearing formations. However, the Fountain Formation is scarce with decreasing abundance in the northern sections of the aquifer (Lundy, 1978).

The Precambrian igneous and metamorphic rocks are composed of granitic gneiss, anorthosite, gabbro, and are intruded by the Sherman Granite. These rocks form the basal confining layer for the Casper Aquifer, as little to no hydraulic interaction occurs between the Precambrian rocks and the overlying Casper Aquifer. Some areas that are fractured exchange water with the Casper aquifer, but this exchange is infrequent and only occurs within the lower portions of the Casper Aquifer (Frost and Toner, 1996). The groundwater present in the fractured areas of the Precambrian rocks is minimal but can sometimes be extracted for domestic purposes (CAPP, 2008).

The Satanka Shale is composed of a low-permeability shale. Where unfractured and with adequate thickness, the shale acts as the upper confining layer for the Casper Aquifer (CAPP, 2008). This upper confining layer isolates the Casper Aquifer from hydrological influences above the Satanka-Casper Formation contact.

The Casper Formation is combination of sandstone interbedded with limestone beds of variable extent and thickness. The limestone beds are largely impermeable when unfractured. Some of the limestone beds (many of which have been mapped by Benniran (1970)) are horizontally continuous through the Casper Formation. These beds are interpreted by Lundy (1978) to delineate upper and lower confining layers of five hydrologic zones within the formation. These zones are suggested to be hydraulically independent of each other due to the low permeability of the limestone and differences in hydrostatic pressure within each zone.

In the areas where the limestone beds are intact and continuous, each hydrologic zone can be viewed as if it were a subaquifer within the Casper Aquifer. The sandstone portions of each of the subaquifers have hydraulic conductivities ranging from 0.01-3.8 ft/day. However, fractures within the formation increase the hydraulic conductivities to 17-40 ft/day (Lundy, 1978). The fractures often continue throughout the vertical extent of the Casper Aquifer and can hydraulically connect the five hydrologic zones. Therefore the second range of hydraulic conductivities represents the variability for the entire Casper Aquifer when fractured.

The five zones in the Casper Aquifer are delineated as alpha, beta, gamma, delta, and epsilon (from bottom to top). The permeability of the members decreases with depth, giving the delta and epsilon zones the greatest permeability (CAPP, 2008). Where overlain by the Satanka Shale, the zones are all considered to be confined aquifers. However, east of the Satanka Shale's extent, each zone of the Casper Aquifer eventually becomes unconfined.

Structure

The relevant geologic structure in the area is related to two folding and faulting events: compression during the Laramide uplift and extension during a relaxation of compressional forces. The compression that was experienced 80-35 million years ago created monoclines and reverse faults with a north to northwest strike and dips of 80-90° to the west (Lundy, 1978; CAPP, 2008). Strike-slip motion has been documented on some reverse faults (Ver Ploeg, 1995), suggesting that the past movement of the faults was oblique, not only dip-slip. The extensional forces created normal

faults that occurred after the compressional forces; only a relative age for the normal faults in the Laramie area has been determined (Lundy, 1978). The normal faults have a northeast to east strike and a dip of 60-80° to the northwest.

The structure in the study area includes several mapped normal faults that cross the I-80 corridor. Four mapped normal faults are shown to cross the interstate and several others exist near the study area (Lundy, 1978; WWC, 1982). The nearest mapped reverse fault begins approximately one mile south of the interstate. Additional faults may be present in the study area, but have not been mapped due to Quaternary surface cover and/or minimal displacement.

The Pilot Hill Monocline and an unnamed syncline are present at the eastern end of the study area. The Pilot Hill Monocline begins at the eastern portion of the study area and has beds dipping 3-6° to the west. Dips are the steepest directly on the west side of where the monocline begins, and the dip decreases moving to the west (Lundy, 1978). The syncline is present at the Happy Jack interchange and is associated with the Lincoln Normal Fault, which comes within 0.25 mi of the interstate but does not cross it. The syncline's axis is northwest-southeast and plunges to the northwest (Lundy, 1978).

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APPENDIX B

ACCIDENT DATA

APPENDIX B. ACCIDENT DATA

M. P.	HIGHWAY ROUTE SIGN	DATE	TIME	REPORT NUMBER	# INJURED	# KILLED	LIGHTING	COLLISION TYPE	JUNCTION RELATION	FIRST HARMFUL EVENT	M. P.	ROAD CONDITIONS	DRIVER CONDITION	DIRECTION OF TRAVEL	VEHICLE TYPE
320.30	I-80	4/2/00	700	0005025	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Parked Motor Vehicle	320.30	Ice/Frost	Apparently Normal	West	Heavy Truck > 26,000
320.30	I-80	4/2/00	632	0005628	0	0	Dawn	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	320.30	Ice/Frost	Unknown	West	Heavy Truck > 26,000
320.30	I-80	4/2/00	630	0005626	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Parked Motor Vehicle	320.30	Ice/Frost	Unknown	West	Construction Vehicle
320.30	I-80	4/2/00	631	0005627	0	0	Dawn	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	320.30	Ice/Frost	Unknown	West	Heavy Truck > 26,000
320.50	I-80	4/2/00	645	0005913	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Parked Motor Vehicle	320.50	Ice/Frost	Unknown	West	Heavy Truck > 26,000
321.90	I-80	4/3/00	700	0005271	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	321.90	Ice/Frost	Unknown	East	Passenger
317.80	I-80	4/7/00	950	0005280	0	0	Daylight	Unknown	Non-Junction	Other Traffic Sign Support	317.80	Wet	Other	East	Passenger
316.70	I-80	4/14/00	1600	0005586	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	316.70	Dry	Unknown	East	Passenger
316.70	I-80	4/19/00	1725	0005919	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	316.70	Dry	Unknown	South	Passenger
316.89	I-80	4/23/00	2350	0006223	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Parked Motor Vehicle	316.89	Dry	Unknown	West	Heavy Truck > 26,000
316.70	I-80	5/3/00	1350	0006500	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	316.70	Dry	Unknown	East	Passenger
317.50	I-80	5/17/00	830	0007245	0	0	Daylight	Unknown	Non-Junction	Delineator Post	317.50	Wet	Unknown	West	Passenger
317.75	I-80	5/18/00	1245	0007088	1	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	317.75	Dry	Apparently Normal	West	Passenger
319.00	I-80	6/11/00	515	0008397	0	0	Dawn	Unknown	Non-Junction	Deer	319.00	Dry	Apparently Normal	West	Heavy Truck > 26,000
322.00	I-80	6/13/00	930	0008738	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	322.00	Wet	Unknown	West	Passenger
319.45	I-80	6/26/00	1315	0009139	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	319.45	Dry	Unknown	West	Heavy Truck > 26,000
322.70	I-80	7/4/00	2250	0010006	0	0	Darkness Unlighted	Other	Non-Junction	Motor Vehicle in Transport on Roadway	322.70	Dry	Apparently Normal	East	Passenger
317.84	I-80	7/24/00	130	0008899	0	0	Darkness Unlighted	Unknown	Non-Junction	Deer	317.84	Dry	Apparently Normal	West	Heavy Truck > 26,000
317.11	I-80	7/30/00	1522	0011484	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	317.11	Dry	Unknown	West	Heavy Truck > 26,000
322.20	I-80	8/20/00	1100	0012666	1	0	Daylight	Unknown	Non-Junction	Fire/Explosion	322.20	Dry	Apparently Normal	East	Passenger
322.40	I-80	9/12/00	1735	0013866	2	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	322.40	Dry	Unknown	East	PU
321.00	I-80	9/13/00	2100	0013619	0	0	Darkness Unlighted	Unknown	Non-Junction	Deer	321.00	Dry	Unknown	West	Passenger
321.00	I-80	9/13/00	2200	0013867	3	0	Darkness Unlighted	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	321.00	Dry	Unknown	West	Heavy Truck > 26,000
317.20	I-80	9/22/00	2000	0013977	0	1	Daylight	Unknown	Non-Junction	Overturn/Rollover	317.20	Ice/Frost	Unknown	East	PU
319.50	I-80	9/22/00	1215	0014204	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.50	Slush	Apparently Normal	East	Passenger Van
320.60	I-80	9/22/00	1246	0014205	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.60	Slush	Unknown	West	Passenger
316.70	I-80	9/24/00	1105	0014573	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	316.70	Slush	Unknown	East	Passenger
318.75	I-80	10/19/00	1900	0015945	0	0	Dusk	Unknown	Non-Junction	Deer	318.75	Dry	Unknown	West	Passenger
319.50	I-80	10/24/00	1840	0016278	0	0	Dusk	Unknown	Non-Junction	Guardrail Face	319.50	Slush	Unknown	West	Passenger
318.50	I-80	10/26/00	920	0016324	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	318.50	Dry	Fell Asleep, Fainted	West	Heavy Truck > 26,000
319.50	I-80	10/31/00	1845	0017070	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	319.50	Ice/Frost	Other	West	Heavy Truck > 26,000
319.80	I-80	10/31/00	1835	0016745	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	319.80	Ice/Frost	Apparently Normal	West	Heavy Truck > 26,000
320.55	I-80	11/3/00	1325	0017183	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.55	Ice/Frost	Unknown	West	Passenger
317.85	I-80	11/5/00	2145	0017186	0	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	317.85	Ice/Frost	Unknown	East	Passenger
322.10	I-80	11/7/00	1204	0017076	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	322.10	Wet	Unknown	East	Heavy Truck > 26,000
318.90	I-80	11/8/00	1930	0017197	0	0	Darkness Unlighted	Unknown	Non-Junction	Deer	318.90	Dry	Apparently Normal	West	Passenger
321.00	I-80	11/22/00	2130	0018470	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	321.00	Dry	Unknown	West	Heavy Truck > 26,000
320.61	I-80	11/29/00	825	0019555	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.61	Ice/Frost	Unknown	East	PU
320.80	I-80	11/30/00	1155	0018949	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.80	Dry	Unknown	West	Passenger
316.70	I-80	12/6/00	745	0019566	4	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	316.70	Ice/Frost	Apparently Normal	East	Heavy Truck > 26,000
317.50	I-80	12/15/00	1605	0019947	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	317.50	Ice/Frost	Unknown	East	Passenger
317.90	I-80	12/16/00	1943	0020311	0	0	Darkness Unlighted	Unknown	Non-Junction	Fence (including Post)	317.90	Ice/Frost	Unknown	East	Passenger
317.40	I-80	12/20/00	325	0020644	0	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	317.40	Ice/Frost	Unknown	East	PU
317.85	I-80	12/22/00	20	0020648	1	0	Darkness Unlighted	Unknown	Non-Junction	Delineator Post	317.85	Ice/Frost	Unknown	West	Passenger
323.05	I-80	12/25/00	1334	0020968	0	0	Daylight	Unknown	Intersection Related	Overturn/Rollover	323.05	Ice/Frost	Unknown	West	Passenger
320.60	I-80	1/2/01	1335	0100237	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.60	Ice/Frost	Unknown	East	PU
316.71	I-80	1/13/01	1310	0100968	1	0	Daylight	Unknown	Non-Junction	Delineator Post	316.71	Ice/Frost	Unknown	West	Passenger
319.80	I-80	1/13/01	1320	0100573	1	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.80	Ice/Frost	Unknown	East	PU
318.70	I-80	1/15/01	2050	0100969	1	0	Darkness Unlighted	Unknown	Non-Junction	Other Traffic Sign Support	318.70	Dry	Unknown	West	PU
320.15	I-80	1/17/01	105	0100960	0	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	320.15	Ice/Frost	Unknown	West	Heavy Truck > 26,000

M. P.	HIGHWAY ROUTE SIGN	DATE	TIME	REPORT NUMBER	# INJURED	# KILLED	LIGHTING	COLLISION TYPE	JUNCTION RELATION	FIRST HARMFUL EVENT	M. P.	ROAD CONDITIONS	DRIVER CONDITION	DIRECTION OF TRAVEL	VEHICLE TYPE
317.39	I-80	1/30/01	1235	0101612	0	0	Daylight	Head On (Front to Front)	Non-Junction	Motor Vehicle in Transport on Roadway	317.39	Dry	Apparently Normal	East	Heavy Truck > 26,000
321.75	I-80	2/7/01	800	0102262	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	321.75	Snow	Unknown	West	PU
320.00	I-80	2/11/01	1200	0103080	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.00	Ice/Frost	Unknown	East	Passenger
316.70	I-80	2/13/01	2220	0103005	0	0	Darkness Unlighted	Unknown	Non-Junction	Raised Median or Curb	316.70	Ice/Frost	Unknown	West	PU
322.64	I-80	2/21/01	805	0103555	2	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	322.64	Ice/Frost	Unknown	East	PU
322.72	I-80	2/21/01	719	0103365	0	0	Daylight	Unknown	Non-Junction	Other Traffic Sign Support	322.72	Ice/Frost	Unknown	East	Passenger
322.30	I-80	3/5/01	350	0103763	0	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	322.30	Dry	Unknown	West	Passenger
316.70	I-80	3/11/01	840	0104061	2	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	316.70	Wet	Unknown	East	Passenger
320.15	I-80	3/11/01	1745	0104062	0	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	320.15	Ice/Frost	Unknown	East	Medium Truck
322.30	I-80	3/12/01	1350	0104304	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	322.30	Dry	Fell Asleep, Fainted	Northwest	Passenger
316.70	I-80	3/16/01	2000	0104372	0	0	Darkness Lighted	Unknown	Non-Junction	Delineator Post	316.70	Dry	Apparently Normal	West	Passenger
319.60	I-80	3/19/01	1330	0104720	2	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	319.60	Dry	Unknown	West	Passenger Van
320.04	I-80	3/30/01	800	0105036	2	1	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.04	Ice/Frost	Unknown	West	Passenger
318.60	I-80	4/4/01	2005	0105439	0	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	318.60	Dry	Unknown	West	Heavy Truck > 26,000
318.90	I-80	4/9/01	2115	0105754	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	318.90	Snow	Unknown	West	PU
319.55	I-80	4/9/01	50	0105753	0	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	319.55	Dry	Unknown	West	Heavy Truck > 26,000
318.80	I-80	4/10/01	635	0105695	0	0	Daylight	Sideswipe Opposite Direction (Meeting)	Non-Junction	Parked Motor Vehicle	318.80	Snow	Unknown	West	Passenger Van
321.75	I-80	4/10/01	1845	0105697	0	0	Dusk	Unknown	Non-Junction	Guardrail Face	321.75	Slush	Unknown	East	PU
322.50	I-80	4/10/01	1745	0105696	0	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	322.50	Ice/Frost	Unknown	Northwest	Passenger
322.50	I-80	4/10/01	1845	0106101	2	0	Dusk	Sideswipe Same Direction (Passing)	Non-Junction	Parked Motor Vehicle	322.50	Ice/Frost	Unknown	West	Passenger
323.05	I-80	4/10/01	1245	0105755	0	0	Daylight	Unknown	Non-Junction	Other Traffic Sign Support	323.05	Ice/Frost	Unknown	West	Passenger
320.26	I-80	4/12/01	1945	0105703	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	320.26	Ice/Frost	Unknown	East	Passenger
322.80	I-80	4/13/01	100	0105708	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	322.80	Ice/Frost	Unknown	West	Passenger
322.71	I-80	5/3/01	231	0106737	0	0	Darkness Lighted	Unknown	Non-Junction	Guardrail Face	322.71	Ice/Frost	Unknown	East	PU
323.05	I-80	5/4/01	1500	0106739	0	0	Daylight	Head On (Front to Front)	Non-Junction	Parked Motor Vehicle	323.05	Wet	Unknown	East	Unknown
321.10	I-80	5/20/01	1850	0107699	2	0	Daylight	Unknown	Non-Junction	Guardrail Face	321.10	Ice/Frost	Unknown	West	Passenger
321.10	I-80	5/25/01	1653	0107702	4	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	321.10	Dry	Unknown	West	PU
320.80	I-80	5/26/01	1815	0108087	2	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.80	Slush	Unknown	West	Passenger Van
320.80	I-80	5/26/01	1815	0108088	4	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.80	Slush	Unknown	West	Passenger
321.80	I-80	5/26/01	1815	0108542	3	0	Daylight	Unknown	Non-Junction	Guardrail Face	321.80	Slush	Unknown	West	Passenger
319.00	I-80	5/30/01	230	0107925	0	0	Darkness Unlighted	Unknown	Non-Junction	Fire/Explosion	319.00	Dry	Apparently Normal	East	Passenger Van
319.60	I-80	5/31/01	1730	0108092	1	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.60	Dry	Fell Asleep, Fainted	West	Passenger
318.75	I-80	6/11/01	600	0108445	0	0	Dawn	Unknown	Non-Junction	Deer	318.75	Dry	Apparently Normal	East	Passenger
316.70	I-80	6/12/01	1355	0108802	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	316.70	Dry	Unknown	West	Passenger
316.70	I-80	6/12/01	1430	0109281	0	0	Daylight	Unknown	Non-Junction	Building or Other Structure Wall	316.70	Dry	Other	West	Heavy Truck > 26,000
321.00	I-80	6/28/01	1430	0109593	0	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	321.00	Dry	Apparently Normal	West	Passenger
320.15	I-80	7/1/01	800	0109596	2	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.15	Dry	Apparently Normal	Northwest	MC > 150 cc
320.10	I-80	7/18/01	1220	0110923	2	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.10	Dry	Unknown	West	Passenger
322.20	I-80	8/6/01	215	0111861	0	0	Darkness Unlighted	Unknown	Non-Junction	Elk	322.20	Dry	Apparently Normal	East	Passenger
319.08	I-80	9/5/01	1008	0113746	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.08	Dry	Unknown	West	Passenger
320.05	I-80	9/9/01	1140	0113834	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.05	Dry	Unknown	West	Passenger
320.71	I-80	9/23/01	1712	0115134	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.71	Dry	Unknown	West	PU
323.00	I-80	10/4/01	945	0115141	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	323.00	Dry	Apparently Normal	East	Passenger
321.75	I-80	10/12/01	630	0115712	1	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	321.75	Ice/Frost	Unknown	Northwest	Passenger Van
321.80	I-80	10/12/01	2135	0115710	2	0	Darkness Unlighted	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	321.80	Dry	Unknown	East	Passenger
317.90	I-80	10/15/01	700	0116061	0	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	317.90	Snow	Unknown	West	Heavy Truck > 26,000
318.55	I-80	10/20/01	2134	0116067	1	0	Darkness Unlighted	Unknown	Non-Junction	Deer	318.55	Dry	Apparently Normal	West	Passenger Van
321.00	I-80	10/20/01	715	0116062	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	321.00	Dry	Unknown	West	Heavy Truck > 26,000
321.41	I-80	10/26/01	2135	0116397	1	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	321.41	Dry	Unknown	West	Passenger
322.50	I-80	10/31/01	730	0116566	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	322.50	Dry	Suspected Alcohol Use	East	Heavy Truck > 26,000

M. P.	HIGHWAY ROUTE SIGN	DATE	TIME	REPORT NUMBER	# INJURED	# KILLED	LIGHTING	COLLISION TYPE	JUNCTION RELATION	FIRST HARMFUL EVENT	M. P.	ROAD CONDITIONS	DRIVER CONDITION	DIRECTION OF TRAVEL	VEHICLE TYPE
318.03	I-80	11/2/01	1257	0116833	1	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	318.03	Dry	Ill (sick)	West	Heavy Truck > 26,000
320.85	I-80	11/7/01	2030	0117710	0	0	Darkness Unlighted	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	320.85	Ice/Frost	Unknown	West	Heavy Truck > 26,000
323.00	I-80	11/8/01	315	0117363	0	0	Darkness Lighted	Sideswipe Same Direction (Passing)	Non-Junction	Parked Motor Vehicle	323.00	Ice/Frost	Unknown	West	Passenger
318.70	I-80	11/9/01	345	0117127	1	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	318.70	Dry	Unknown	West	Passenger
322.00	I-80	11/15/01	1700	0117717	0	0	Dusk	Unknown	Non-Junction	Deer	322.00	Dry	Apparently Normal	East	Passenger
316.70	I-80	11/18/01	1242	0117720	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	316.70	Ice/Frost	Unknown	East	Passenger
322.50	I-80	11/18/01	1200	0117544	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	322.50	Ice/Frost	Unknown	East	Passenger
320.10	I-80	11/23/01	1526	0118037	1	0	Daylight	Unknown	Non-Junction	Cut Slope	320.10	Ice/Frost	Unknown	East	Heavy Truck > 26,000
320.10	I-80	11/23/01	1526	0118036	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.10	Ice/Frost	Unknown	East	Passenger Van
321.91	I-80	11/23/01	1515	0118691	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	321.91	Ice/Frost	Unknown	West	Passenger
320.00	I-80	11/27/01	1400	0118699	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	320.00	Ice/Frost	Unknown	West	Passenger
320.50	I-80	11/30/01	1349	0118705	1	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.50	Ice/Frost	Unknown	West	Passenger
319.61	I-80	12/28/01	1615	0115466	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.61	Ice/Frost	Unknown	West	Passenger
317.61	I-80	12/29/01	125	0120667	0	0	Darkness Unlighted	Unknown	Non-Junction	Fence (including Post)	317.61	Ice/Frost	Unknown	East	Passenger Van
319.50	I-80	1/1/02	1000	0200193	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.50	Snow	Unknown	East	Passenger
320.00	I-80	1/1/02	900	0200191	2	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	320.00	Ice/Frost	Unknown	West	PU
320.40	I-80	1/1/02	1000	0200587	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	320.40	Ice/Frost	Apparently Normal	West	Passenger
317.10	I-80	1/4/02	925	0200493	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	317.10	Ice/Frost	Other	East	Heavy Truck > 26,000
320.95	I-80	1/9/02	2200	0200503	0	0	Darkness Unlighted	Unknown	Non-Junction	Barricade	320.95	Ice/Frost	Unknown	East	Passenger
320.70	I-80	1/13/02	1825	0200725	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Parked Motor Vehicle	320.70	Ice/Frost	Unknown	East	PU
320.65	I-80	2/8/02	1410	0202318	3	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.65	Ice/Frost	Unknown	West	Passenger
321.00	I-80	2/8/02	1503	0202104	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	321.00	Ice/Frost	Unknown	West	Passenger
321.40	I-80	2/14/02	1049	0202450	1	0	Daylight	Head On (Front to Front)	Non-Junction	Motor Vehicle in Transport on Roadway	321.40	Ice/Frost	Unknown	West	Heavy Truck > 26,000
322.11	I-80	2/16/02	1910	0202664	1	0	Darkness Unlighted	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	322.11	Dry	Unknown	East	PU
321.51	I-80	2/18/02	1800	0202829	0	0	Dusk	Unknown	Non-Junction	Guardrail Face	321.51	Ice/Frost	Unknown	East	Passenger
319.50	I-80	3/1/02	300	0203799	0	0	Darkness Unlighted	Unknown	Non-Junction	Earth Embankment/Berm	319.50	Ice/Frost	Apparently Normal	West	Passenger
317.90	I-80	3/8/02	1015	0200494	1	0	Daylight	Unknown	Non-Junction	Fence (including Post)	317.90	Ice/Frost	Unknown	East	PU
321.95	I-80	3/8/02	655	0203859	0	0	Daylight	Unknown	Non-Junction	Barricade	321.95	Ice/Frost	Unknown	East	PU
320.75	I-80	3/16/02	800	0204241	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.75	Wet	Unknown	West	PU
317.10	I-80	4/5/02	1415	0202520	0	0	Daylight	Angle Direction not Specified	Non-Junction	Motor Vehicle in Transport on Roadway	317.10	Dry	Unknown	West	PU
319.00	I-80	4/6/02	330	0205738	0	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	319.00	Dry	Unknown	West	Passenger
319.11	I-80	4/18/02	2002	0206173	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	319.11	Ice/Frost	Unknown	West	Passenger
319.85	I-80	4/18/02	1548	0206174	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	319.85	Oil/Fuel	Unknown	East	PU
318.50	I-80	4/19/02	745	0206276	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	318.50	Ice/Frost	Unknown	West	Passenger
320.70	I-80	4/19/02	2320	0206179	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	320.70	Ice/Frost	Apparently Normal	East	Passenger
322.04	I-80	4/20/02	5	0206184	2	0	Darkness Unlighted	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	322.04	Ice/Frost	Unknown	West	Heavy Truck > 26,000
322.04	I-80	4/20/02	130	0206190	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	322.04	Ice/Frost	Other	West	Passenger Van
319.00	I-80	4/25/02	145	0206587	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	319.00	Dry	Apparently Normal	West	Heavy Truck > 26,000
320.70	I-80	5/16/02	1210	0208398	1	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.70	Wet	Unknown	West	Passenger
320.10	I-80	5/24/02		0208369	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.10	Slush	Unknown	East	Heavy Truck > 26,000
321.80	I-80	5/24/02	45	0207829	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	321.80	Ice/Frost	Unknown	East	PU
317.00	I-80	6/21/02	1630	0209834	0	0	Daylight	Unknown	Non-Junction	Other NON-Fixed Object	317.00	Dry	Unknown	West	Passenger
318.70	I-80	6/28/02	1710	0209837	2	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	318.70	Dry	Apparently Normal	East	Passenger Van
318.70	I-80	6/29/02	2225	0210236	1	0	Darkness Unlighted	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	318.70	Dry	Fell Asleep, Fainted	West	MC > 150 cc
320.80	I-80	6/29/02	2245	0210237	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	320.80	Dry	Unknown	West	Heavy Truck > 26,000
320.35	I-80	6/30/02	750	0209839	3	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.35	Dry	Unknown	West	Passenger
318.50	I-80	7/18/02	1450	0211146	0	0	Daylight	Unknown	Non-Junction	Earth Embankment/Berm	318.50	Dry	Apparently Normal	East	Passenger Van
322.55	I-80	7/21/02	2010	0211148	0	0	Daylight	Other	Non-Junction	Motor Vehicle in Transport on Roadway	322.55	Dry	Unknown	West	Passenger
321.91	I-80	7/29/02	1010	0211911	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	321.91	Dry	Unknown	West	Passenger
320.80	I-80	7/31/02	1125	0211908	0	0	Daylight	Unknown	Non-Junction	Barricade	320.80	Dry	Apparently Normal	West	Passenger

M. P.	HIGHWAY ROUTE SIGN	DATE	TIME	REPORT NUMBER	# INJURED	# KILLED	LIGHTING	COLLISION TYPE	JUNCTION RELATION	FIRST HARMFUL EVENT	M. P.	ROAD CONDITIONS	DRIVER CONDITION	DIRECTION OF TRAVEL	VEHICLE TYPE
320.80	I-80	8/16/02	805	0212911	2	0	Daylight	Unknown	Non-Junction	Rock, Boulder, Rock Slide	320.80	Dry	Fell Asleep, Fainted	West	Passenger
317.50	I-80	8/22/02	100	0213064	1	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	317.50	Dry	Unknown	West	Passenger
321.05	I-80	8/22/02	655	0213500	2	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	321.05	Dry	Apparently Normal	West	Heavy Truck > 26,000
320.00	I-80	9/7/02	1700	0214033	0	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	320.00	Dry	Unknown	West	Passenger
320.86	I-80	9/7/02	712	0213874	0	2	Daylight	Unknown	Non-Junction	Cut Slope	320.86	Dry	Suspected Alcohol Use	West	Passenger
321.00	I-80	9/22/02	130	0214836	0	0	Darkness Unlighted	Unknown	Non-Junction	Deer	321.00	Dry	Apparently Normal	West	Passenger
320.80	I-80	9/29/02	740	0215347	1	0	Daylight	Unknown	Non-Junction	Barricade	320.80	Dry	Unknown	West	Heavy Truck > 26,000
320.85	I-80	10/3/02	1535	0215489	0	0	Daylight	Unknown	Non-Junction	Cut Slope	320.85	Ice/Frost	Unknown	West	Passenger
321.85	I-80	10/3/02	2200	0215501	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	321.85	Ice/Frost	Unknown	West	Passenger
322.10	I-80	10/3/02	1545	0215502	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	322.10	Ice/Frost	Unknown	West	Passenger
320.50	I-80	10/4/02	545	0215816	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.50	Ice/Frost	Unknown	East	Passenger
321.78	I-80	10/7/02	1500	0213054	0	0	Daylight	Unknown	Non-Junction	Fire/Explosion	321.78	Dry	Apparently Normal	East	Motor Home
318.10	I-80	10/26/02	1510	0217521	2	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	318.10	Dry	Unknown	West	Heavy Truck > 26,000
323.00	I-80	11/3/02	1026	0217825	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	323.00	Wet	Apparently Normal	West	Passenger
316.70	I-80	11/15/02	220	0218386	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	316.70	Ice/Frost	Suspected Alcohol Use	Southeast	Passenger
321.00	I-80	11/20/02	2349	0218715	0	0	Darkness Unlighted	Unknown	Non-Junction	Rock, Boulder, Rock Slide	321.00	Dry	Apparently Normal	West	Heavy Truck > 26,000
319.71	I-80	11/21/02	1000	0218714	0	0	Daylight	Unknown	Non-Junction	Barricade	319.71	Ice/Frost	Unknown	East	PU
319.20	I-80	11/23/02	2135	0218712	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	319.20	Ice/Frost	Unknown	East	Passenger
319.50	I-80	11/23/02	2205	0218717	0	0	Darkness Unlighted	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	319.50	Ice/Frost	Unknown	East	Heavy Truck > 26,000
320.40	I-80	11/23/02	642	0218713	0	0	Daylight	Unknown	Non-Junction	Barricade	320.40	Oil/Fuel	Apparently Normal	West	Passenger
320.45	I-80	11/23/02	630	0219435	2	0	Dawn	Unknown	Non-Junction	Guardrail End	320.45	Ice/Frost	Unknown	West	Passenger
321.50	I-80	11/24/02	1454	0219152	1	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	321.50	Ice/Frost	Unknown	Northwest	Passenger
319.80	I-80	11/30/02	1014	0219129	0	0	Daylight	Unknown	Non-Junction	Barricade	319.80	Ice/Frost	Unknown	East	Passenger
318.50	I-80	12/4/02	900	0219547	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	318.50	Wet	Apparently Normal	West	Passenger
322.06	I-80	12/4/02	2215	0219548	0	0	Darkness Unlighted	Unknown	Non-Junction	Barricade	322.06	Ice/Frost	Unknown	West	Passenger
322.50	I-80	12/15/02	1900	0220314	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	322.50	Ice/Frost	Unknown	Northwest	Passenger
319.70	I-80	12/18/02	1255	0220594	0	0	Daylight	Unknown	Non-Junction	Barricade	319.70	Ice/Frost	Apparently Normal	East	Passenger
316.70	I-80	12/23/02	2005	0219196	0	0	Darkness Lighted	Unknown	Non-Junction	Overturn/Rollover	316.70	Dry	Suspected Alcohol Use	East	PU
320.60	I-80	1/2/03	1436	0300175	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	320.60	Dry	Suspected Alcohol Use	West	PU
320.70	I-80	1/10/03	640	0300343	0	0	Dawn	Unknown	Non-Junction	Barricade	320.70	Ice/Frost	Unknown	East	Passenger
321.00	I-80	1/10/03	706	0300342	0	0	Dawn	Unknown	Non-Junction	Guardrail Face	321.00	Ice/Frost	Apparently Normal	East	Passenger
319.70	I-80	1/12/03	719	0300895	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.70	Ice/Frost	Apparently Normal	East	Passenger
319.60	I-80	1/17/03	1050	0300956	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.60	Ice/Frost	Unknown	East	Passenger
320.00	I-80	1/18/03	1225	0300921	0	0	Daylight	Unknown	Non-Junction	Barricade	320.00	Ice/Frost	Unknown	West	Passenger
316.70	I-80	1/28/03	1042	0301428	1	0	Daylight	Unknown	Non-Junction	Earth Embankment/Berm	316.70	Slush	Unknown	East	Passenger
321.60	I-80	2/7/03	1430	0302104	0	0	Daylight	Unknown	Non-Junction	Rock, Boulder, Rock Slide	321.60	Dry	Unknown	West	Passenger Van
319.70	I-80	2/22/03	1700	0302705	0	0	Daylight	Unknown	Non-Junction	Barricade	319.70	Ice/Frost	Apparently Normal	East	PU
320.15	I-80	2/24/03	45	0303804	0	0	Darkness Unlighted	Unknown	Non-Junction	Other Traffic Sign Support	320.15	Ice/Frost	Unknown	West	Passenger
319.70	I-80	2/25/03	1627	0303116	0	0	Daylight	Unknown	Non-Junction	Barricade	319.70	Ice/Frost	Unknown	East	Passenger
320.70	I-80	3/1/03	2115	0303123	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	320.70	Ice/Frost	Unknown	East	Passenger
322.10	I-80	3/4/03	730	0303457	1	0	Daylight	Unknown	Non-Junction	Fire/Explosion	322.10	Snow	Apparently Normal	East	Heavy Truck > 26,000
322.50	I-80	3/7/03	2140	0303465	0	0	Darkness Lighted	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	322.50	Ice/Frost	Unknown	West	Passenger Van
316.70	I-80	3/8/03	910	0303998	2	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	316.70	Ice/Frost	Unknown	West	Passenger
317.20	I-80	3/14/03	1240	0304000	3	0	Daylight	Angle Direction not Specified	Non-Junction	Motor Vehicle in Transport on Roadway	317.20	Dry	Unknown	East	Passenger
320.52	I-80	3/17/03	1735	0304325	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.52	Ice/Frost	Apparently Normal	West	Passenger
320.80	I-80	3/17/03	1730	0304889	1	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.80	Ice/Frost	Unknown	West	Passenger
321.20	I-80	3/17/03	945	0304020	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	321.20	Ice/Frost	Unknown	West	PU
320.10	I-80	3/21/03	135	0304392	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	320.10	Ice/Frost	Unknown	East	PU
321.00	I-80	3/21/03	945	0304830	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	321.00	Dry	Apparently Normal	East	Heavy Truck > 26,000
316.70	I-80	3/24/03	620	0304836	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	316.70	Slush	Unknown	West	Passenger

M. P.	HIGHWAY ROUTE SIGN	DATE	TIME	REPORT NUMBER	# INJURED	# KILLED	LIGHTING	COLLISION TYPE	JUNCTION RELATION	FIRST HARMFUL EVENT	M. P.	ROAD CONDITIONS	DRIVER CONDITION	DIRECTION OF TRAVEL	VEHICLE TYPE
321.60	I-80	3/24/03	810	0304837	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	321.60	Snow	Unknown	West	Passenger
321.10	I-80	3/28/03	1308	0304894	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	321.10	Ice/Frost	Unknown	East	Passenger
318.55	I-80	3/29/03	707	0304851	2	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	318.55	Ice/Frost	Unknown	West	Passenger Van
318.60	I-80	3/29/03	705	0304852	4	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	318.60	Ice/Frost	Unknown	West	Passenger
316.70	I-80	4/15/03	1730	0305891	0	0	Daylight	Unknown	Non-Junction	Guardrail End	316.70	Slush	Unknown	East	Passenger
318.10	I-80	4/15/03	1710	0305892	2	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	318.10	Slush	Unknown	East	Passenger
319.20	I-80	4/15/03	1840	0305509	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.20	Slush	Unknown	East	PU
320.55	I-80	4/15/03	1840	0305499	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	320.55	Slush	Unknown	West	Heavy Truck > 26,000
321.00	I-80	4/15/03	1745	0305893	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	321.00	Snow	Apparently Normal	East	Heavy Truck > 26,000
322.00	I-80	4/15/03	1810	0306046	0	0	Daylight	Unknown	Non-Junction	Earth Embankment/Berm	322.00	Ice/Frost	Unknown	West	PU
320.40	I-80	4/19/03	1045	0305895	1	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.40	Wet	Unknown	East	Passenger
323.00	I-80	5/10/03	40	0306873	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	323.00	Ice/Frost	Apparently Normal	West	Passenger
318.00	I-80	5/25/03	1807	0307948	0	0	Daylight	Unknown	Non-Junction	Other NON-Fixed Object	318.00	Dry	Apparently Normal	West	Passenger
318.40	I-80	5/30/03	835	0307775	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	318.40	Dry	Fell Asleep, Fainted	West	PU
320.00	I-80	5/30/03	1502	0307784	2	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.00	Wet	Unknown	West	Heavy Truck > 26,000
322.20	I-80	6/6/03	1558	0308111	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	322.20	Wet	Unknown	West	Passenger
320.15	I-80	6/16/03	1120	0308925	2	0	Daylight	Unknown	Non-Junction	Building or Other Structure Wall	320.15	Dry	Unknown	West	PU
316.70	I-80	6/17/03	1723	0308844	1	4	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	316.70	Dry	Unknown	West	Heavy Truck > 26,000
323.02	I-80	7/3/03	230	0309565	0	0	Darkness Unlighted	Unknown	Non-Junction	Deer	323.02	Dry	Apparently Normal	West	Passenger
316.88	I-80	7/16/03	1350	0310435	0	1	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	316.88	Dry	Unknown	East	MC > 150 cc
320.00	I-80	8/7/03	1155	0311699	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	320.00	Dry	Apparently Normal	West	Heavy Truck > 26,000
320.60	I-80	8/27/03	1350	0312775	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.60	Wet	Unknown	West	Passenger
320.30	I-80	9/6/03	1630	0313573	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.30	Wet	Unknown	West	Heavy Truck > 26,000
320.20	I-80	9/8/03	2020	0317812	1	0	Dusk	Unknown	Non-Junction	Guardrail Face	320.20	Wet	Unknown	West	Heavy Truck > 26,000
320.20	I-80	9/8/03	2020	0313550	1	0	Dusk	Unknown	Non-Junction	Guardrail Face	320.20	Wet	Apparently Normal	West	Passenger
317.35	I-80	9/19/03	954	0314151	0	0	Daylight	Unknown	Non-Junction	Cut Slope	317.35	Dry	Apparently Normal	East	Passenger
320.56	I-80	9/21/03	500	0314718	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	320.56	Dry	Unknown	West	Heavy Truck > 26,000
320.82	I-80	9/21/03	1340	0314234	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	320.82	Dry	Unknown	West	Heavy Truck > 26,000
320.75	I-80	10/3/03	1930	0315061	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	320.75	Dry	Unknown	Southeast	Heavy Truck > 26,000
319.30	I-80	10/31/03	1005	0316318	0	0	Daylight	Unknown	Non-Junction	Earth Embankment/Berm	319.30	Ice/Frost	Unknown	West	Passenger
319.50	I-80	10/31/03	1633	0317085	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Parked Motor Vehicle	319.50	Ice/Frost	Unknown	West	Heavy Truck > 26,000
319.50	I-80	10/31/03	919	0316769	0	0	Daylight	Unknown	Non-Junction	Earth Embankment/Berm	319.50	Ice/Frost	Unknown	West	PU
323.00	I-80	11/2/03	100	0317439	0	0	Darkness Lighted	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	323.00	Ice/Frost	Unknown	North	Passenger
320.15	I-80	11/4/03	1410	0316350	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.15	Ice/Frost	Unknown	East	Passenger
323.05	I-80	11/13/03	2245	0318462	2	0	Darkness Lighted	Head On (Front to Front)	Non-Junction	Parked Motor Vehicle	323.05	Dry	Unknown	East	Heavy Truck > 26,000
322.60	I-80	11/16/03	1820	0318240	3	0	Darkness Lighted	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	322.60	Dry	Suspected Alcohol Use	West	PU
316.70	I-80	11/22/03	1045	0319174	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	316.70	Ice/Frost	Unknown	East	Heavy Truck > 26,000
317.00	I-80	11/22/03	1115	0319164	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	317.00	Ice/Frost	Unknown	East	Passenger
317.25	I-80	11/22/03	814	0319173	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	317.25	Ice/Frost	Other	East	Heavy Truck > 26,000
322.85	I-80	11/22/03	1435	0318305	0	0	Daylight	Unknown	Non-Junction	Fire/Explosion	322.85	Snow	Apparently Normal	East	Motor Home
318.79	I-80	11/23/03	918	0318687	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	318.79	Ice/Frost	Suspected Alcohol Use	West	PU
323.05	I-80	11/23/03	1630	0318686	3	0	Daylight	Other	Intersection Related	Motor Vehicle in Transport on Roadway	323.05	Ice/Frost	Apparently Normal	West	Heavy Truck > 26,000
320.00	I-80	11/29/03	1410	0319186	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.00	Ice/Frost	Apparently Normal	West	Passenger
320.50	I-80	11/29/03	2055	0319994	1	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Parked Motor Vehicle	320.50	Ice/Frost	Unknown	West	Passenger
320.50	I-80	11/29/03	2000	0319199	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	320.50	Ice/Frost	Unknown	West	PU
320.50	I-80	11/29/03	230	0319187	3	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	320.50	Ice/Frost	Unknown	West	Passenger
320.00	I-80	12/5/03	2205	0319978	0	0	Darkness Unlighted	Unknown	Non-Junction	Earth Embankment/Berm	320.00	Ice/Frost	Unknown	West	Passenger
323.00	I-80	12/8/03	45	0321488	0	0	Darkness Lighted	Unknown	Non-Junction	Guardrail Face	323.00	Ice/Frost	Unknown	West	Other Bus
316.70	I-80	12/14/03	1435	0320641	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	316.70	Dry	Fell Asleep, Fainted	East	PU
322.97	I-80	12/15/03	1055	0320642	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	322.97	Snow	Unknown	East	Passenger

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316.70	I-80	12/27/03	2010	0321547	1	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	316.70	Dry	Fell Asleep, Fainted	East	Passenger
320.00	I-80	1/2/04	700	0400051	0	0	Dawn	Unknown	Non-Junction	Other NON-Fixed Object	320.00	Ice/Frost	Apparently Normal	East	Heavy Truck > 26,000
320.00	I-80	1/2/04	700	0400052	0	0	Daylight	Unknown	Non-Junction	Other NON-Fixed Object	320.00	Ice/Frost	Apparently Normal	Southeast	Passenger
321.00	I-80	1/3/04	2000	0400055	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	321.00	Ice/Frost	Unknown	West	Passenger
319.60	I-80	1/5/04	1100	0400726	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	319.60	Snow	Unknown	West	Passenger
321.70	I-80	1/5/04	925	0400618	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	321.70	Snow	Unknown	West	Passenger
322.80	I-80	1/5/04	945	0400314	2	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	322.80	Ice/Frost	Unknown	West	PU
322.70	I-80	2/11/04	725	0402578	2	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	322.70	Ice/Frost	Unknown	West	Heavy Truck > 26,000
322.70	I-80	2/11/04	725	0402319	4	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	322.70	Wet	Apparently Normal	West	Passenger
320.40	I-80	2/19/04	1815	0402653	2	0	Darkness Unlighted	Unknown	Non-Junction	Earth Embankment/Berm	320.40	Ice/Frost	Unknown	West	Passenger
320.50	I-80	2/19/04	1030	0402980	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.50	Ice/Frost	Unknown	East	Passenger
316.70	I-80	2/29/04	1445	0403099	0	0	Daylight	Unknown	Non-Junction	Other Traffic Sign Support	316.70	Ice/Frost	Unknown	East	Passenger
316.70	I-80	2/29/04	445	0401412	0	0	Darkness Unlighted	Unknown	Non-Junction	Delineator Post	316.70	Ice/Frost	Unknown	North	Passenger
320.30	I-80	3/15/04	700	0404257	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.30	Wet	Unknown	East	Passenger
322.10	I-80	3/27/04	2340	0404671	0	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	322.10	Ice/Frost	Unknown	East	Passenger
320.70	I-80	4/7/04	1545	0405089	1	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.70	Dry	Fell Asleep, Fainted	West	Passenger
319.00	I-80	4/9/04	1750	0405224	0	0	Dusk	Unknown	Non-Junction	Cut Slope	319.00	Ice/Frost	Unknown	South	PU
319.70	I-80	4/9/04	1940	0405200	0	0	Daylight	Unknown	Non-Junction	Cut Slope	319.70	Ice/Frost	Unknown	East	PU
321.50	I-80	4/9/04	1900	0405078	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	321.50	Ice/Frost	Unknown	West	Passenger
322.00	I-80	4/9/04	1854	0405199	0	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	322.00	Ice/Frost	Apparently Normal	West	Heavy Truck > 26,000
322.50	I-80	4/9/04	855	0405278	3	0	Daylight	Angle Direction not Specified	Non-Junction	Motor Vehicle in Transport on Roadway	322.50	Ice/Frost	Apparently Normal	West	Passenger
316.70	I-80	4/10/04	230	0405203	0	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	316.70	Ice/Frost	Apparently Normal	West	PU
318.00	I-80	4/11/04	1135	0402219	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	318.00	Ice/Frost	Unknown	East	PU
323.00	I-80	4/11/04	2230	0405295	0	0	Darkness Lighted	Unknown	Driveway Related	Other Traffic Sign Support	323.00	Ice/Frost	Unknown	Northeast	Heavy Truck > 26,000
321.60	I-80	4/12/04	910	0405284	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	321.60	Slush	Unknown	West	Passenger
323.05	I-80	4/12/04	145	0405206	0	0	Darkness Lighted	Angle Direction not Specified	Intersection Related	Motor Vehicle in Transport on Roadway	323.05	Ice/Frost	Unknown	East	Heavy Truck > 26,000
320.68	I-80	4/25/04	1645	0406111	0	1	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	320.68	Dry	Suspected Alcohol Use	East	MC > 150 cc
319.56	I-80	5/4/04	313	0406593	2	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	319.56	Dry	Fell Asleep, Fainted	East	Medium Truck
322.70	I-80	5/4/04	2009	0406594	0	0	Daylight	Unknown	Non-Junction	Fire/Explosion	322.70	Dry	Apparently Normal	East	PU
323.01	I-80	5/10/04	635	0406596	0	0	Daylight	Unknown	Non-Junction	Fire/Explosion	323.01	Dry	Apparently Normal	East	Passenger
320.10	I-80	6/19/04	1725	0409032	1	0	Daylight	Angle Direction not Specified	Non-Junction	Motor Vehicle in Transport on Roadway	320.10	Wet	Unknown	West	Heavy Truck > 26,000
322.20	I-80	6/19/04	1949	0408631	2	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	322.20	Wet	Unknown	West	Passenger
319.70	I-80	6/20/04	715	0408624	2	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.70	Wet	Unknown	East	Medium Truck
322.40	I-80	6/23/04	145	0408999	0	0	Darkness Unlighted	Unknown	Non-Junction	Deer	322.40	Dry	Apparently Normal	East	Passenger
320.20	I-80	6/25/04	1830	0409041	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.20	Wet	Unknown	East	Passenger
320.14	I-80	6/26/04	1552	0409036	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.14	Slush	Unknown	West	Heavy Truck > 26,000
320.40	I-80	6/26/04	1530	0409531	1	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	320.40	Ice/Frost	Unknown	West	Passenger
321.00	I-80	6/26/04	1600	0409530	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Parked Motor Vehicle	321.00	Ice/Frost	Unknown	West	Passenger
318.91	I-80	7/11/04	325	0410097	0	0	Darkness Unlighted	Unknown	Non-Junction	Deer	318.91	Dry	Apparently Normal	East	PU
320.30	I-80	7/17/04	655	0410749	2	0	Daylight	Unknown	Non-Junction	Cut Slope	320.30	Dry	Suspected Alcohol Use	West	Passenger
320.00	I-80	7/19/04	1640	0411580	1	0	Daylight	Unknown	Non-Junction	Barricade	320.00	Wet	Unknown	Northeast	Heavy Truck > 26,000
320.68	I-80	8/2/04	1645	0411917	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.68	Wet	Unknown	West	Passenger Van
319.20	I-80	8/7/04	315	0411921	0	0	Darkness Unlighted	Unknown	Non-Junction	Deer	319.20	Dry	Apparently Normal	East	Passenger
320.00	I-80	8/17/04	1935	0412485	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	320.00	Dry	Apparently Normal	West	MC > 150 cc
320.18	I-80	8/17/04	1400	0412496	1	1	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.18	Wet	Unknown	West	Heavy Truck > 26,000
317.50	I-80	8/20/04	1230	0413122	0	0	Daylight	Unknown	Non-Junction	Other Fixed Object	317.50	Dry	Unknown	East	PU
316.70	I-80	8/27/04	2336	0412876	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	316.70	Dry	Suspected Alcohol Use	East	Passenger
323.05	I-80	9/12/04	1230	0414198	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Parked Motor Vehicle	323.05	Dry	Unknown	Northwest	Unknown
321.30	I-80	9/20/04	2218	0414162	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	321.30	Slush	Unknown	West	Passenger
321.19	I-80	9/21/04	1345	0414552	1	0	Daylight	Angle Direction not Specified	Non-Junction	Motor Vehicle in Transport on Roadway	321.19	Wet	Suspected Alcohol Use	West	Passenger

M. P.	HIGHWAY ROUTE SIGN	DATE	TIME	REPORT NUMBER	# INJURED	# KILLED	LIGHTING	COLLISION TYPE	JUNCTION RELATION	FIRST HARMFUL EVENT	M. P.	ROAD CONDITIONS	DRIVER CONDITION	DIRECTION OF TRAVEL	VEHICLE TYPE
322.00	I-80	9/21/04	805	0414200	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	322.00	Slush	Unknown	West	Passenger
319.50	I-80	9/30/04	1055	0415306	1	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.50	Wet	Unknown	West	Passenger
320.70	I-80	10/6/04	1450	0415700	0	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	320.70	Ice/Frost	Unknown	West	Heavy Truck > 26,000
320.80	I-80	10/6/04	1450	0415311	0	0	Daylight	Unknown	Non-Junction	Other Fixed Object	320.80	Slush	Unknown	West	Passenger Van
320.80	I-80	10/6/04	1446	0415309	0	0	Daylight	Angle Direction not Specified	Non-Junction	Motor Vehicle in Transport on Roadway	320.80	Slush	Unknown	North	Heavy Truck > 26,000
320.80	I-80	10/6/04	1445	0415721	1	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.80	Slush	Unknown	East	PU
320.80	I-80	10/6/04	1445	0415308	1	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.80	Slush	Unknown	West	PU
319.50	I-80	10/31/04	1740	0416297	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.50	Ice/Frost	Unknown	West	Passenger Van
320.80	I-80	10/31/04	1410	0416542	5	0	Daylight	Rear End (Front to Rear)	Non-Junction	Parked Motor Vehicle	320.80	Ice/Frost	Unknown	West	Passenger
321.00	I-80	10/31/04	1450	0416249	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	321.00	Ice/Frost	Unknown	West	Passenger
321.90	I-80	10/31/04	1415	0416487	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	321.90	Ice/Frost	Unknown	Southwest	Passenger
321.90	I-80	10/31/04	1420	0416573	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	321.90	Ice/Frost	Unknown	Southwest	Passenger
321.90	I-80	10/31/04	1418	0417168	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	321.90	Wet	Unknown	West	Passenger
318.70	I-80	11/4/04	627	0417150	1	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	318.70	Dry	Apparently Normal	West	Passenger
322.33	I-80	11/17/04	2330	0417820	0	0	Darkness Unlighted	Unknown	Non-Junction	Deer	322.33	Dry	Apparently Normal	West	Heavy Truck > 26,000
316.70	I-80	11/20/04	436	0417827	0	0	Darkness Unlighted	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	316.70	Ice/Frost	Unknown	East	Heavy Truck > 26,000
316.70	I-80	11/20/04	440	0417826	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	316.70	Ice/Frost	Apparently Normal	West	Passenger Van
320.66	I-80	11/20/04	1220	0417725	5	0	Daylight	Unknown	Non-Junction	Earth Embankment/Berm	320.66	Ice/Frost	Unknown	East	Passenger Van
322.75	I-80	11/26/04	1454	0417619	4	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	322.75	Ice/Frost	Unknown	East	Passenger Van
319.00	I-80	12/15/04	1205	0420394	2	0	Daylight	Head On (Front to Front)	Non-Junction	Parked Motor Vehicle	319.00	Ice/Frost	Apparently Normal	East	Passenger Van
319.00	I-80	12/15/04	1155	0420679	1	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.00	Ice/Frost	Unknown	East	PU
321.36	I-80	12/15/04	1149	0419619	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	321.36	Ice/Frost	Unknown	East	Passenger
322.41	I-80	12/15/04	1200	0419618	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	322.41	Ice/Frost	Unknown	East	PU
320.70	I-80	12/19/04	1520	0419667	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.70	Dry	Unknown	West	Passenger
321.85	I-80	12/22/04	2040	0420441	0	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	321.85	Snow	Unknown	West	Passenger
319.65	I-80	12/27/04	1315	0417959	1	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.65	Dry	Unknown	East	Passenger
323.00	I-80	12/30/04	829	0420890	0	0	Daylight	Unknown	Non-Junction	Barricade	323.00	Snow	Unknown	West	Passenger
319.60	I-80	1/8/05	830	0501083	0	0	Daylight	Unknown	Non-Junction	Earth Embankment/Berm	319.60	Ice/Frost	Unknown	East	Passenger
319.60	I-80	1/8/05	834	0500113	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.60	Ice/Frost	Unknown	East	Passenger
321.20	I-80	1/17/05	524	0500662	2	1	Darkness Unlighted	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	321.20	Dry	Apparently Normal	West	Heavy Truck > 26,000
323.05	I-80	1/23/05	110	0501360	0	0	Darkness Unlighted	Unknown	Intersection	Overturn/Rollover	323.05	Dry	Unknown	West	Passenger
319.50	I-80	1/30/05	1830	0501980	0	0	Darkness Unlighted	Unknown	Non-Junction	Earth Embankment/Berm	319.50	Ice/Frost	Unknown	West	Passenger
320.40	I-80	1/30/05	1750	0501916	1	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	320.40	Ice/Frost	Unknown	East	PU
320.80	I-80	1/30/05	1840	0501361	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	320.80	Ice/Frost	Unknown	West	Passenger
322.80	I-80	1/31/05	1711	0501433	0	0	Dusk	Unknown	Non-Junction	Earth Embankment/Berm	322.80	Dry	Fell Asleep, Fainted	West	Passenger
317.00	I-80	2/7/05	2230	0502176	0	0	Darkness Lighted	Unknown	Non-Junction	Earth Embankment/Berm	317.00	Ice/Frost	Apparently Normal	East	Passenger Van
321.69	I-80	3/1/05	1435	0503283	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	321.69	Ice/Frost	Unknown	West	Passenger
321.80	I-80	3/1/05	1435	0503303	2	0	Daylight	Unknown	Non-Junction	Other Fixed Object	321.80	Ice/Frost	Unknown	West	Passenger
322.00	I-80	3/1/05	1725	0503281	0	0	Daylight	Unknown	Non-Junction	Barricade	322.00	Ice/Frost	Unknown	West	PU
322.90	I-80	3/1/05	1512	0503251	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	322.90	Snow	Unknown	West	Passenger
323.00	I-80	3/25/05	840	0504530	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	323.00	Dry	Apparently Normal	West	Passenger
320.60	I-80	4/9/05	1941	0505631	2	0	Dusk	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	320.60	Ice/Frost	Unknown	West	Heavy Truck > 26,000
317.50	I-80	4/10/05	245	0505614	0	0	Darkness Unlighted	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	317.50	Ice/Frost	Apparently Normal	East	Heavy Truck > 26,000
322.20	I-80	4/14/05	1205	0505615	1	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	322.20	Dry	Unknown	West	PU
317.55	I-80	4/18/05	635	0505664	0	0	Dawn	Unknown	Non-Junction	Deer	317.55	Dry	Unknown	Southeast	PU
317.35	I-80	4/27/05	2110	0505886	0	0	Darkness Unlighted	Unknown	Non-Junction	Other Traffic Sign Support	317.35	Ice/Frost	Unknown	East	PU
320.80	I-80	4/27/05	2138	0505885	1	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	320.80	Ice/Frost	Apparently Normal	West	PU
321.70	I-80	4/29/05	2144	0505889	1	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	321.70	Ice/Frost	Unknown	East	Passenger
319.80	I-80	4/30/05	944	0505894	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.80	Snow	Unknown	East	Passenger
320.40	I-80	4/30/05	835	0506320	0	0	Daylight	Angle Direction not Specified	Non-Junction	Motor Vehicle in Transport on Roadway	320.40	Ice/Frost	Unknown	West	Passenger

M. P.	HIGHWAY ROUTE SIGN	DATE	TIME	REPORT NUMBER	# INJURED	# KILLED	LIGHTING	COLLISION TYPE	JUNCTION RELATION	FIRST HARMFUL EVENT	M. P.	ROAD CONDITIONS	DRIVER CONDITION	DIRECTION OF TRAVEL	VEHICLE TYPE
320.60	I-80	5/2/05	1420	0506322	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.60	Dry	Unknown	West	Passenger
319.40	I-80	5/6/05	2055	0507251	1	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	319.40	Wet	Unknown	West	Heavy Truck > 26,000
322.80	I-80	5/10/05	1740	0506884	0	0	Daylight	Other	Non-Junction	Motor Vehicle in Transport on Roadway	322.80	Wet	Unknown	West	Passenger
320.50	I-80	5/11/05	1715	0506916	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.50	Ice/Frost	Unknown	West	Passenger
319.40	I-80	5/30/05	1150	0508114	0	0	Daylight	Unknown	Non-Junction	Fire/Explosion	319.40	Dry	Apparently Normal	East	Other Bus
320.50	I-80	5/30/05		0508051	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	320.50	Wet	Unknown	West	Passenger
318.00	I-80	6/3/05	1345	0507934	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	318.00	Wet	Unknown	West	Heavy Truck > 26,000
320.30	I-80	6/15/05	351	0508722	0	0	Darkness Unlighted	Unknown	Non-Junction	Deer	320.30	Dry	Apparently Normal	West	Passenger
322.20	I-80	7/9/05	1255	0510986	0	0	Daylight	Unknown	Non-Junction	Fire/Explosion	322.20	Dry	Apparently Normal	East	Motor Home
320.90	I-80	7/10/05	2118	0510486	0	0	Darkness Unlighted	Unknown	Non-Junction	Deer	320.90	Dry	Apparently Normal	West	Passenger
318.00	I-80	7/11/05	100	0510311	0	0	Darkness Unlighted	Unknown	Non-Junction	Deer	318.00	Dry	Apparently Normal	West	Heavy Truck > 26,000
318.30	I-80	7/11/05	2115	0510298	0	0	Darkness Unlighted	Unknown	Non-Junction	Deer	318.30	Dry	Apparently Normal	West	Passenger
320.10	I-80	7/14/05	1915	0510314	0	0	Daylight	Unknown	Non-Junction	Barricade	320.10	Wet	Unknown	West	PU
319.90	I-80	7/16/05	903	0510316	1	0	Daylight	Unknown	Non-Junction	Barricade	319.90	Dry	Other	West	Passenger
318.65	I-80	7/25/05	1500	0511345	0	0	Daylight	Unknown	Non-Junction	Deer	318.65	Wet	Apparently Normal	East	Passenger
320.30	I-80	8/13/05	1715	0512422	2	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.30	Wet	Unknown	West	Passenger Van
323.05	I-80	8/23/05	1200	0512908	0	0	Daylight	Unknown	Non-Junction	Deer	323.05	Dry	Apparently Normal	West	Passenger Van
320.70	I-80	9/8/05	1845	0513867	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.70	Dry	Apparently Normal	West	Passenger
320.30	I-80	9/9/05	1330	0514290	0	0	Daylight	Unknown	Non-Junction	Building or Other Structure Wall	320.30	Dry	Unknown	West	Passenger
321.40	I-80	9/9/05	550	0513868	0	0	Darkness Unlighted	Unknown	Non-Junction	Deer	321.40	Dry	Apparently Normal	West	Heavy Truck > 26,000
319.40	I-80	9/11/05	1918	0514387	1	0	Dusk	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	319.40	Dry	Unknown	West	Passenger
319.00	I-80	9/28/05	818	0515038	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.00	Dry	Ill (sick)	West	PU
320.30	I-80	10/4/05	1731	0515500	1	0	Daylight	Unknown	Non-Junction	Barricade	320.30	Snow	Unknown	East	Passenger
321.00	I-80	10/4/05	1754	0515501	0	0	Dusk	Unknown	Non-Junction	Guardrail Face	321.00	Snow	Unknown	West	Passenger
319.70	I-80	10/7/05	535	0515572	4	0	Darkness Unlighted	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	319.70	Dry	Unknown	West	Heavy Truck > 26,000
316.70	I-80	10/9/05	1025	0515534	5	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	316.70	Wet	Unknown	East	Passenger Van
323.00	I-80	10/9/05	2149	0515612	0	0	Darkness Lighted	Unknown	Non-Junction	Guardrail Face	323.00	Ice/Frost	Unknown	West	PU
320.00	I-80	10/21/05	1545	0516437	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.00	Ice/Frost	Unknown	West	Passenger
318.45	I-80	10/24/05	1	0516224	0	0	Darkness Lighted	Unknown	Non-Junction	Deer	318.45	Dry	Apparently Normal	West	PU
319.80	I-80	10/28/05	612	0516266	1	0	Darkness Unlighted	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	319.80	Dry	Unknown	East	Passenger
318.00	I-80	10/30/05	840	0516259	0	0	Daylight	Unknown	Non-Junction	Delineator Post	318.00	Dry	Apparently Normal	East	PU
319.00	I-80	10/30/05	845	0516294	0	0	Daylight	Unknown	Non-Junction	Deer	319.00	Dry	Apparently Normal	West	Passenger Van
319.50	I-80	11/14/05	1125	0518482	0	0	Daylight	Unknown	Non-Junction	Earth Embankment/Berm	319.50	Slush	Unknown	East	Passenger
323.00	I-80	11/18/05	900	0518150	0	0	Daylight	Unknown	Non-Junction	Barricade	323.00	Dry	Apparently Normal	East	PU
316.80	I-80	11/27/05	906	0518785	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	316.80	Ice/Frost	Unknown	West	Passenger
322.20	I-80	12/7/05	615	0519598	1	0	Dawn	Unknown	Non-Junction	Guardrail Face	322.20	Snow	Unknown	East	PU
319.50	I-80	12/12/05	1100	0520326	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	319.50	Dry	Unknown	West	Passenger
319.70	I-80	12/16/05	2155	0520659	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	319.70	Snow	Unknown	East	Passenger
320.60	I-80	12/16/05	943	0520329	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.60	Ice/Frost	Unknown	East	Passenger
320.30	I-80	12/18/05	900	0520662	2	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.30	Ice/Frost	Unknown	East	PU
319.60	I-80	12/20/05	2125	0520835	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	319.60	Ice/Frost	Unknown	East	Passenger
321.10	I-80	12/24/05	920	0520670	0	0	Daylight	Unknown	Non-Junction	Delineator Post	321.10	Dry	Unknown	West	PU
318.80	I-80	1/22/06	641	0601342	0	0	Dawn	Unknown	Non-Junction	Earth Embankment/Berm	318.80	Dry	Unknown	West	Passenger
320.90	I-80	1/28/06	1415	0601348	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	320.90	Dry	Apparently Normal	East	Passenger
317.12	I-80	2/1/06	1915	0601872	0	0	Darkness Unlighted	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	317.12	Ice/Frost	Unknown	West	Heavy Truck > 26,000
321.30	I-80	2/5/06	1435	0601942	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	321.30	Slush	Unknown	East	Passenger
319.80	I-80	2/9/06	1837	0601875	1	0	Darkness Unlighted	Angle Direction not Specified	Non-Junction	Motor Vehicle in Transport on Roadway	319.80	Snow	Unknown	East	Passenger
321.90	I-80	2/10/06	1605	0601943	0	0	Daylight	Unknown	Non-Junction	Other Fixed Object	321.90	Snow	Unknown	East	Passenger
316.70	I-80	2/11/06	1110	0602688	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	316.70	Dry	Apparently Normal	East	Passenger
322.20	I-80	2/15/06	1413	0601997	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	322.20	Snow	Unknown	West	Passenger

M. P.	HIGHWAY ROUTE SIGN	DATE	TIME	REPORT NUMBER	# INJURED	# KILLED	LIGHTING	COLLISION TYPE	JUNCTION RELATION	FIRST HARMFUL EVENT	M. P.	ROAD CONDITIONS	DRIVER CONDITION	DIRECTION OF TRAVEL	VEHICLE TYPE
318.00	I-80	3/6/06	837	0603160	0	0	Daylight	Unknown	Non-Junction	Delineator Post	318.00	Dry	Unknown	West	Passenger Van
316.70	I-80	3/8/06	1634	0604388	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	316.70	Ice/Frost	Unknown	East	Passenger
322.20	I-80	3/21/06	1925	0604859	2	0	Darkness Unlighted	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	322.20	Ice/Frost	Apparently Normal	West	Passenger
318.70	I-80	3/28/06	2032	0605564	0	0	Darkness Unlighted	Unknown	Non-Junction	Earth Embankment/Berm	318.70	Dry	Unknown	West	Passenger
320.00	I-80	4/4/06	2145	0606349	0	0	Darkness Unlighted	Other	Non-Junction	Motor Vehicle in Transport on Roadway	320.00	Dry	Apparently Normal	West	Passenger
316.70	I-80	4/24/06	903	0605887	0	0	Daylight	Unknown	Intersection Related	Utility Pole/Light Support	316.70	Snow	Unknown	East	PU
320.00	I-80	4/30/06	1710	0605946	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.00	Wet	Unknown	West	Heavy Truck > 26,000
318.30	I-80	5/28/06	415	0608333	2	0	Darkness Unlighted	Unknown	Non-Junction	Deer	318.30	Dry	Apparently Normal	East	Heavy Truck > 26,000
320.80	I-80	5/28/06	1705	0608401	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.80	Wet	Apparently Normal	West	Heavy Truck > 26,000
319.50	I-80	5/30/06	1921	0608451	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	319.50	Dry	Unknown	East	Passenger
316.99	I-80	6/1/06	1324	0609284	1	0	Daylight	Sideswipe Opposite Direction (Meeting)	Non-Junction	Motor Vehicle in Transport on Roadway	316.99	Dry	Fatigued	East	Passenger
320.00	I-80	6/10/06	1655	0609402	2	0	Daylight	Unknown	Non-Junction	Barricade	320.00	Dry	Unknown	West	Heavy Truck > 26,000
322.00	I-80	6/10/06	1455	0609368	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	322.00	Dry	Unknown	East	PU
320.10	I-80	6/11/06	1810	0609287	2	0	Daylight	Unknown	Non-Junction	Building or Other Structure Wall	320.10	Wet	Unknown	West	Passenger
320.45	I-80	6/11/06	1840	0609564	1	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	320.45	Wet	Unknown	West	Heavy Truck > 26,000
319.80	I-80	6/12/06	1330	0609376	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	319.80	Dry	Unknown	West	Passenger
319.50	I-80	6/14/06	1040	0609405	0	0	Daylight	Unknown	Non-Junction	Antelope	319.50	Dry	Apparently Normal	East	Passenger
320.80	I-80	6/27/06	1650	0611052	0	0	Daylight	Unknown	Non-Junction	Cut Slope	320.80	Dry	Unknown	West	PU
320.10	I-80	7/9/06	609	0610501	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.10	Wet	Unknown	West	Heavy Truck > 26,000
320.20	I-80	7/9/06	928	0611053	3	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.20	Wet	Unknown	West	PU
320.20	I-80	7/19/06	1705	0611145	0	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	320.20	Wet	Unknown	West	Heavy Truck > 26,000
320.00	I-80	7/22/06	2045	0610411	4	0	Dusk	Unknown	Non-Junction	Overturn/Rollover	320.00	Dry	Unknown	East	Passenger
319.40	I-80	7/25/06	1632	0612131	0	0	Daylight	Unknown	Non-Junction	Earth Embankment/Berm	319.40	Wet	Unknown	West	Passenger
319.00	I-80	7/30/06	1320	0612197	5	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	319.00	Dry	Unknown	West	Passenger
320.20	I-80	7/31/06	2250	0612215	2	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	320.20	Wet	Unknown	West	Passenger
320.90	I-80	8/6/06	1035	0613056	0	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	320.90	Dry	Apparently Normal	East	Motor Home
323.00	I-80	8/12/06	1700	0613860	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	323.00	Wet	Apparently Normal	East	Passenger
319.20	I-80	8/13/06	1750	0613137	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	319.20	Wet	Unknown	West	Passenger
319.50	I-80	8/13/06	1750	0613679	0	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	319.50	Wet	Unknown	West	Heavy Truck > 26,000
320.00	I-80	8/13/06	1800	0613870	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	320.00	Wet	Apparently Normal	West	Heavy Truck > 26,000
320.50	I-80	8/13/06	1800	0613869	3	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	320.50	Wet	Apparently Normal	West	PU
319.20	I-80	8/14/06	1523	0613645	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	319.20	Dry	Unknown	East	Passenger
320.10	I-80	8/16/06	1456	0613871	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.10	Wet	Apparently Normal	West	Heavy Truck > 26,000
317.00	I-80	8/20/06	105	0613650	0	0	Darkness Unlighted	Unknown	Non-Junction	Other NON-Fixed Object	317.00	Dry	Apparently Normal	East	Passenger
317.10	I-80	8/22/06	1737	0613714	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	317.10	Dry	Fell Asleep, Fainted	West	Heavy Truck > 26,000
320.10	I-80	8/26/06	1720	0613718	0	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	320.10	Wet	Unknown	West	Heavy Truck > 26,000
320.50	I-80	8/27/06	1400	0615890	2	0	Daylight	Other	Non-Junction	Motor Vehicle in Transport on Roadway	320.50	Wet	Unknown	West	Heavy Truck > 26,000
319.80	I-80	9/11/06	1600	0615437	1	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.80	Wet	Unknown	Northeast	PU
320.70	I-80	9/23/06	305	0615601	2	1	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	320.70	Ice/Frost	Unknown	East	Passenger
323.05	I-80	9/28/06	1650	0616123	1	0	Daylight	Rear End (Front to Rear)	Intersection Related	Motor Vehicle in Transport on Roadway	323.05	Dry	Unknown	South	Passenger
319.50	I-80	10/1/06	1055	0615991	0	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	319.50	Dry	Other	West	Passenger Van
321.50	I-80	10/9/06	1949	0616475	0	0	Dusk	Unknown	Non-Junction	Earth Embankment/Berm	321.50	Ice/Frost	Unknown	West	Heavy Truck > 26,000
322.20	I-80	10/9/06	1923	0616474	2	0	Dusk	Angle Direction not Specified	Non-Junction	Motor Vehicle in Transport on Roadway	322.20	Wet	Unknown	Northeast	Passenger
322.90	I-80	10/10/06	330	0616038	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	322.90	Ice/Frost	Unknown	Northwest	Passenger
320.80	I-80	10/16/06	120	0616481	2	0	Darkness Unlighted	Unknown	Non-Junction	Rock, Boulder, Rock Slide	320.80	Dry	Other	West	Passenger
318.80	I-80	10/17/06	1635	0616630	1	0	Daylight	Unknown	Non-Junction	Other NON-Fixed Object	318.80	Ice/Frost	Unknown	West	Heavy Truck > 26,000
321.50	I-80	10/19/06	2232	0617566	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	321.50	Dry	Unknown	West	PU
321.50	I-80	10/20/06	1650	0617500	1	0	Daylight	Unknown	Non-Junction	Guardrail Face	321.50	Ice/Frost	Unknown	West	PU
317.50	I-80	10/26/06	900	0617578	1	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	317.50	Ice/Frost	Unknown	West	Heavy Truck > 26,000
321.20	I-80	11/4/06	1911	0619030	0	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	321.20	Dry	Unknown	West	Passenger

M. P.	HIGHWAY ROUTE SIGN	DATE	TIME	REPORT NUMBER	# INJURED	# KILLED	LIGHTING	COLLISION TYPE	JUNCTION RELATION	FIRST HARMFUL EVENT	M. P.	ROAD CONDITIONS	DRIVER CONDITION	DIRECTION OF TRAVEL	VEHICLE TYPE
320.70	I-80	11/5/06	700	0617670	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	320.70	Wet	Unknown	East	PU
318.60	I-80	11/9/06	1810	0619383	1	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	318.60	Dry	Unknown	West	Passenger
320.56	I-80	11/12/06	245	0619079	0	0	Darkness Unlighted	Rear End (Front to Rear)	Non-Junction	Parked Motor Vehicle	320.56	Ice/Frost	Apparently Normal	West	Heavy Truck > 26,000
320.90	I-80	11/12/06	330	0619387	0	0	Darkness Unlighted	Angle Direction not Specified	Non-Junction	Parked Motor Vehicle	320.90	Ice/Frost	Unknown	West	Heavy Truck > 26,000
321.60	I-80	11/12/06	250	0619101	3	1	Darkness Unlighted	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	321.60	Ice/Frost	Unknown	West	Heavy Truck > 26,000
321.80	I-80	11/12/06	245	0619386	0	0	Darkness Unlighted	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	321.80	Ice/Frost	Apparently Normal	West	Heavy Truck > 26,000
321.80	I-80	11/12/06	230	0619078	0	0	Darkness Unlighted	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	321.80	Ice/Frost	Apparently Normal	West	Heavy Truck > 26,000
317.30	I-80	11/14/06	2330	0619390	0	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	317.30	Ice/Frost	Unknown	East	Passenger
319.70	I-80	11/22/06	1325	0620010	1	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	319.70	Dry	Unknown	East	MC > 150 cc
323.00	I-80	11/26/06	402	0620676	1	0	Darkness Unlighted	Unknown	Non-Junction	Rock, Boulder, Rock Slide	323.00	Dry	Unknown	North	Legacy - Emergency Vehicle
319.00	I-80	12/11/06	1007	0621102	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	319.00	Ice/Frost	Unknown	East	PU
316.70	I-80	12/16/06	715	0621117	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	316.70	Ice/Frost	Other	Northeast	Passenger
317.03	I-80	12/16/06	650	0621114	0	0	Dawn	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	317.03	Snow	Other	West	Passenger
317.40	I-80	12/16/06	815	0621115	0	0	Daylight	Unknown	Non-Junction	Fence (including Post)	317.40	Snow	Unknown	East	PU
322.00	I-80	12/17/06	2200	0621143	4	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	322.00	Ice/Frost	Unknown	East	PU
317.65	I-80	12/28/06	1830	0622593	5	0	Darkness Unlighted	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	317.65	Ice/Frost	Unknown	West	PU
316.70	I-80	1/9/07	1030	0700135	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	316.70	Ice/Frost	Unknown	East	Passenger
316.80	I-80	1/21/07	1355	0701090	0	0	Daylight	Unknown	Non-Junction	Utility Pole/Light Support	316.80	Ice/Frost	Unknown	East	Passenger
322.00	I-80	1/27/07	430	0702106	1	0	Darkness Unlighted	Unknown	Non-Junction	Guardrail Face	322.00	Ice/Frost	Unknown	West	Passenger
316.70	I-80	2/1/07	1631	0702093	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	316.70	Snow	Unknown	West	Passenger
316.70	I-80	2/14/07	1630	0702986	1	0	Daylight	Unknown	Non-Junction	Raised Median or Curb	316.70	Ice/Frost	Unknown	Northwest	PU
319.75	I-80	2/14/07	720	0703071	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	319.75	Ice/Frost	Unknown	East	PU
319.90	I-80	2/14/07	740	0703075	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	319.90	Ice/Frost	Unknown	East	PU
321.00	I-80	2/14/07	1316	0703327	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	321.00	Ice/Frost	Apparently Normal	East	Passenger
317.00	I-80	2/16/07	714	0701745	0	2	Daylight	Unknown	Non-Junction	Overturn/Rollover	317.00	Ice/Frost	Unknown	East	Heavy Truck > 26,000
317.60	I-80	2/16/07	710	0703085	0	0	Dawn	Unknown	Non-Junction	Delineator Post	317.60	Ice/Frost	Unknown	East	Passenger
318.00	I-80	2/16/07	739	0703083	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	318.00	Ice/Frost	Unknown	East	Heavy Truck > 26,000
316.70	I-80	2/24/07	1015	0703576	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	316.70	Snow	Unknown	East	Passenger
317.42	I-80	3/2/07	1915	0704218	0	0	Darkness Unlighted	Head On (Front to Front)	Non-Junction	Motor Vehicle in Transport on Roadway	317.42	Dry	Unknown	East	Heavy Truck > 26,000
316.70	I-80	3/18/07	2012	0705020	0	0	Darkness Lighted	Unknown	Non-Junction	Guardrail Face	316.70	Dry	Suspected Alcohol Use	North	PU
316.70	I-80	3/24/07	1529	0704939	2	0	Daylight	Head On (Front to Front)	Non-Junction	Motor Vehicle in Transport on Roadway	316.70	Ice/Frost	Unknown	South	PU
319.00	I-80	3/24/07	1530	0704961	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	319.00	Slush	Apparently Normal	East	Passenger
321.80	I-80	3/24/07	1205	0704963	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	321.80	Snow	Unknown	West	Heavy Truck > 26,000
322.00	I-80	3/24/07	1315	0704938	2	0	Daylight	Angle Direction not Specified	Non-Junction	Motor Vehicle in Transport on Roadway	322.00	Ice/Frost	Unknown	West	Heavy Truck > 26,000
323.01	I-80	4/2/07	735	0706338	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	323.01	Ice/Frost	Unknown	East	PU
316.70	I-80	4/14/07	1450	0707232	0	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	316.70	Dry	Unknown	Southwest	MC > 150 cc
323.00	I-80	5/3/07	1640	0707808	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	323.00	Dry	Unknown	East	Heavy Truck > 26,000
320.00	I-80	5/5/07	1115	0708330	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	320.00	Ice/Frost	Unknown	East	Passenger
320.78	I-80	5/5/07	2115	0707357	0	0	Darkness Unlighted	Unknown	Non-Junction	Barricade	320.78	Ice/Frost	Unknown	East	PU
318.50	I-80	5/6/07	211	0707382	1	0	Darkness Unlighted	Angle Direction not Specified	Non-Junction	Motor Vehicle in Transport on Roadway	318.50	Ice/Frost	Unknown	East	Heavy Truck > 26,000
323.00	I-80	5/6/07	530	0707333	0	0	Dawn	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	323.00	Ice/Frost	Unknown	West	Construction Vehicle
316.70	I-80	5/7/07	1222	0708337	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	316.70	Dry	Unknown	West	Passenger
321.00	I-80	5/8/07	410	0708339	0	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	321.00	Ice/Frost	Unknown	West	Heavy Truck > 26,000
321.00	I-80	5/8/07	410	0708340	0	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	321.00	Ice/Frost	Unknown	West	Heavy Truck > 26,000
320.00	I-80	5/28/07	2150	0709299	4	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	320.00	Wet	Unknown	West	Heavy Truck > 26,000
320.75	I-80	6/11/07	1830	0710503	7	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	320.75	Wet	Unknown	West	Passenger Van
322.05	I-80	6/11/07	230	0709865	0	0	Darkness Unlighted	Unknown	Non-Junction	Elk	322.05	Dry	Apparently Normal	East	Passenger
321.00	I-80	6/20/07	520	0709984	0	0	Dawn	Unknown	Non-Junction	Deer	321.00	Dry	Apparently Normal	West	Heavy Truck > 26,000
321.40	I-80	7/1/07	1345	0710508	1	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	321.40	Dry	Unknown	West	Passenger
320.10	I-80	7/4/07	1710	0711798	1	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	320.10	Wet	Unknown	West	Heavy Truck > 26,000

M. P.	HIGHWAY ROUTE SIGN	DATE	TIME	REPORT NUMBER	# INJURED	# KILLED	LIGHTING	COLLISION TYPE	JUNCTION RELATION	FIRST HARMFUL EVENT	M. P.	ROAD CONDITIONS	DRIVER CONDITION	DIRECTION OF TRAVEL	VEHICLE TYPE
322.30	I-80	7/4/07	430	0711893	0	0	Darkness Unlighted	Unknown	Non-Junction	Elk	322.30	Dry	Apparently Normal	East	Passenger
322.30	I-80	7/4/07	400	0710595	0	0	Darkness Unlighted	Unknown	Non-Junction	Elk	322.30	Dry	Apparently Normal	East	Heavy Truck > 26,000
321.00	I-80	7/19/07	1245	0712369	0	0	Daylight	Unknown	Non-Junction	Other NON-Fixed Object	321.00	Dry	Other	West	PU
320.10	I-80	7/22/07	2010	0712370	0	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	320.10	Wet	Unknown	West	Heavy Truck > 26,000
321.40	I-80	7/23/07	1735	0711861	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	321.40	Wet	Unknown	West	PU
321.50	I-80	7/23/07	1723	0712371	0	0	Daylight	Unknown	Non-Junction	Barricade	321.50	Wet	Unknown	West	Heavy Truck > 26,000
321.50	I-80	8/1/07	1945	0713692	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	321.50	Wet	Unknown	West	Heavy Truck > 26,000
319.65	I-80	8/2/07	2020	0714471	1	0	Dusk	Unknown	Non-Junction	Guardrail Face	319.65	Wet	Unknown	West	Heavy Truck > 26,000
319.50	I-80	8/14/07	1433	0713751	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Parked Motor Vehicle	319.50	Wet	Unknown	West	Heavy Truck > 26,000
319.50	I-80	8/14/07	1430	0714746	0	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.50	Wet	Unknown	West	Heavy Truck > 26,000
318.00	I-80	8/20/07	520	0713778	0	0	Dawn	Unknown	Non-Junction	Deer	318.00	Dry	Unknown	West	Passenger Van
320.30	I-80	9/1/07	1140	0715703	0	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	320.30	Dry	Unknown	West	Passenger
320.80	I-80	9/9/07	1335	0715897	1	0	Daylight	Unknown	Non-Junction	Rock, Boulder, Rock Slide	320.80	Wet	Fell Asleep, Fainted	West	Passenger
318.50	I-80	10/6/07	432	0717428	0	0	Darkness Unlighted	Unknown	Non-Junction	Deer	318.50	Dry	Apparently Normal	East	Heavy Truck > 26,000
319.10	I-80	10/9/07	1400	0717403	0	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	319.10	Dry	Unknown	West	PU
323.05	I-80	10/13/07	1700	0718058	2	0	Daylight	Angle Direction not Specified	Intersection	Motor Vehicle in Transport on Roadway	323.05	Wet	Unknown	East	Passenger
322.00	I-80	10/20/07	2040	0718882	0	0	Daylight	Unknown	Non-Junction	Barricade	322.00	Ice/Frost	Apparently Normal	West	Passenger
318.40	I-80	10/21/07	45	0718348	0	0	Darkness Unlighted	Unknown	Non-Junction	Overturn/Rollover	318.40	Ice/Frost	Unknown	East	Passenger
319.70	I-80	10/23/07	822	0718350	0	0	Daylight	Unknown	Non-Junction	Overturn/Rollover	319.70	Dry	Unknown	West	Passenger
316.70	I-80	10/25/07	1	0719122	0	0	Darkness Lighted	Unknown	Non-Junction	Other NON-Fixed Object	316.70	Dry	Unknown	South	PU
321.70	I-80	11/3/07	1945	0719533	0	0	Darkness Lighted	Unknown	Non-Junction	Guardrail Face	321.70	Dry	Apparently Normal	East	Heavy Truck > 26,000
317.95	I-80	11/4/07	30	0719534	0	0	Darkness Unlighted	Unknown	Non-Junction	Delineator Post	317.95	Dry	Unknown	East	Passenger
317.20	I-80	11/16/07	1434	0720183	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	317.20	Dry	Unknown	East	Passenger
323.00	I-80	11/20/07	2145	0721349	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	323.00	Snow	Unknown	West	Passenger
323.00	I-80	11/29/07	1820	0720769	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	323.00	Dry	Unknown	West	PU
322.50	I-80	12/2/07	1734	0721365	0	0	Darkness Lighted	Unknown	Non-Junction	Guardrail Face	322.50	Ice/Frost	Unknown	East	PU
323.00	I-80	12/16/07	530	0723292	0	0	Darkness Lighted	Sideswipe Same Direction (Passing)	Driveway Related	Parked Motor Vehicle	323.00	Ice/Frost	Unknown	North	Heavy Truck > 26,000
318.00	I-80	12/21/07	940	0723402	0	0	Daylight	Unknown	Non-Junction	Guardrail End	318.00	Snow	Unknown	East	Passenger Van
319.50	I-80	12/21/07	929	0723407	1	0	Daylight	Unknown	Non-Junction	Guardrail Face	319.50	Ice/Frost	Apparently Normal	West	Passenger
320.50	I-80	12/21/07	1030	0722943	0	0	Daylight	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	320.50	Ice/Frost	Apparently Normal	West	Heavy Truck > 26,000
320.00	I-80	12/26/07	1400	0723302	0	0	Daylight	Unknown	Non-Junction	Delineator Post	320.00	Ice/Frost	Other	West	Passenger
318.20	I-80	12/29/07	1600	0723922	0	0	Daylight	Unknown	Non-Junction	Other Non-Collision (MC Loss of Control)	318.20	Dry	Unknown	West	Passenger
320.50	I-80	1/9/08	1700	200801888	0	0	Darkness Unlighted	Not a Collision w/2 Vehicles in Transport	Non-Junction	Guardrail Face	320.50	Ice/Frost	Apparently Normal	West	Passenger
320.00	I-80	1/10/08	230	200804029	2	0	Darkness Unlighted	Not a Collision w/2 Vehicles in Transport	Non-Junction	Earth Embankment/Berm	320.00	Sand of Icy Road	Apparently Normal	West	Heavy Truck > 26,000
319.60	I-80	1/18/08	1145	200801896	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Non-Junction	Snow Embankment	319.60	Snow	Apparently Normal	East	Passenger
319.65	I-80	1/28/08	515	200804803	0	0	Darkness Unlighted	Not a Collision w/2 Vehicles in Transport	Non-Junction	Overturn/Rollover	319.65	Ice/Frost	Apparently Normal	East	SUV
317.00	I-80	2/2/08	1645	200802166	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Non-Junction	Other Traffic Barrier (includes temporary)	317.00	Ice/Frost	Apparently Normal	East	PU
320.50	I-80	2/2/08	804	200802165	1	0	Daylight	Not a Collision w/2 Vehicles in Transport	Non-Junction	Concrete Traffic Barrier/Jersey Barrier	320.50	Ice/Frost	Apparently Normal	West	SUV
320.50	I-80	2/2/08	1715	200805161	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Non-Junction	Guardrail Face	320.50	Snow	Apparently Normal	West	Passenger
322.75	I-80	2/2/08	1930	200805160	0	0	Darkness Lighted	Not a Collision w/2 Vehicles in Transport	Non-Junction	Guardrail Face	322.75	Ice/Frost	Apparently Normal	West	Cargo Van
323.00	I-80	2/20/08	232	200806619	0	0	Darkness Unlighted	Not a Collision w/2 Vehicles in Transport	Non-Junction	Fire/Explosion	323.00	Dry	Apparently Normal	West	Motor Home
319.75	I-80	2/21/08	1425	200806681	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Non-Junction	Concrete Traffic Barrier/Jersey Barrier	319.75	Ice/Frost	Apparently Normal	East	SUV
320.50	I-80	3/3/08	2130	200803409	0	0	Darkness Unlighted	Not a Collision w/2 Vehicles in Transport	Non-Junction	Concrete Traffic Barrier/Jersey Barrier	320.50	Ice/Frost	Apparently Normal	West	Passenger
320.50	I-80	3/3/08	2130	200803411	0	0	Darkness Unlighted	Not a Collision w/2 Vehicles in Transport	Non-Junction	Concrete Traffic Barrier/Jersey Barrier	320.50	Ice/Frost	Apparently Normal	West	Heavy Truck > 26,000
320.00	I-80	3/5/08	25	200805504	0	0	Darkness Unlighted	Other	Non-Junction	Parked Motor Vehicle	320.00	Ice/Frost	Apparently Normal	East	Heavy Truck > 26,000
323.00	I-80	3/6/08	825	200807670	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Unknown	Cut Slope	323.00	Ice/Frost			
318.50	I-80	3/7/08	2314	200803416	1	0	Darkness Unlighted	Not a Collision w/2 Vehicles in Transport	Non-Junction	Overturn/Rollover	318.50	Dry	Suspected Alcohol Use	West	Passenger
323.00	I-80	3/15/08	830	200804050	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Non-Junction	Guardrail End	323.00	Ice/Frost	Apparently Normal	West	Passenger
318.80	I-80	3/27/08	435	200805505	0	0	Darkness Unlighted	Not a Collision w/2 Vehicles in Transport	Non-Junction	Jackknife	318.80	Ice/Frost	Apparently Normal	East	PU
320.70	I-80	3/28/08	1350	200805512	2	0	Daylight	Not a Collision w/2 Vehicles in Transport	Non-Junction	Rock, Boulder, Rock Slide	320.70	Dry	Apparently Normal	West	Passenger

M. P.	HIGHWAY ROUTE SIGN	DATE	TIME	REPORT NUMBER	# INJURED	# KILLED	LIGHTING	COLLISION TYPE	JUNCTION RELATION	FIRST HARMFUL EVENT	M. P.	ROAD CONDITIONS	DRIVER CONDITION	DIRECTION OF TRAVEL	VEHICLE TYPE
322.00	I-80	3/30/08	1600	200821294	2	0	Dusk	Rear End (Front to Rear)			322.00	Ice/Frost			
323.00	I-80	3/30/08	1730	200805523	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Non-Junction	Concrete Traffic Barrier/Jersey Barrier	323.00	Ice/Frost	Apparently Normal	West	PU
317.43	I-80	4/9/08	2115	200805531	0	0	Darkness Unlighted	Not a Collision w/2 Vehicles in Transport	Crossover Related	Utility Pole/Light Support	317.43	Snow	Apparently Normal	East	Heavy Truck > 26,000
321.50	I-80	4/9/08	2036	200811300	0	0	Darkness Unlighted	Not a Collision w/2 Vehicles in Transport	Non-Junction	Concrete Traffic Barrier/Jersey Barrier	321.50	Snow	Apparently Normal	East	Passenger
321.60	I-80	4/9/08	1900	200811189	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Non-Junction	Concrete Traffic Barrier/Jersey Barrier	321.60	Snow	Apparently Normal	East	Light Truck
322.92	I-80	4/16/08	1900	200805544	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Non-Junction	Delineator Post	322.92	Wet	Apparently Normal	East	SUV
322.55	I-80	4/17/08	115	200805545	0	0	Darkness Lighted	Not a Collision w/2 Vehicles in Transport	Non-Junction	Snow Embankment	322.55	Ice/Frost	Apparently Normal	East	PU
322.05	I-80	4/26/08	930	200806977	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Non-Junction	Barricade	322.05	Snow	Apparently Normal	West	PU
319.80	I-80	5/1/08	1930	200806981	0	0	Dusk	Not a Collision w/2 Vehicles in Transport	Non-Junction	Concrete Traffic Barrier/Jersey Barrier	319.80	Ice/Frost	Apparently Normal	East	Passenger
320.30	I-80	5/1/08	1745	200806980	0	0	Dusk	Not a Collision w/2 Vehicles in Transport	Non-Junction	Concrete Traffic Barrier/Jersey Barrier	320.30	Ice/Frost	Apparently Normal	East	Passenger
320.95	I-80	5/1/08	1740	200806982	0	0	Daylight	Angle (Front to Side), Opposing Direction	Non-Junction	Concrete Traffic Barrier/Jersey Barrier	320.95	Ice/Frost	Apparently Normal	East	PU
316.70	I-80	5/4/08	1840	200806993	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Thru Roadway	Cable Barrier	316.70	Dry	Apparently Normal	West	Heavy Truck > 26,000
320.00	I-80	5/10/08	1046	200813219	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Non-Junction	Concrete Traffic Barrier/Jersey Barrier	320.00	Snow	Apparently Normal	East	PU
320.00	I-80	5/21/08	2250	200807948	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Non-Junction	Motor Vehicle in Transport on Roadway	320.00	Wet	Apparently Normal	East	Passenger
317.10	I-80	5/22/08	1335	200808175	1	0	Daylight	Not a Collision w/2 Vehicles in Transport	Ramp	Overturn/Rollover	317.10	Wet	Emotional (ie. depressed, angry)	East	Heavy Truck > 26,000
317.10	I-80	5/22/08	1530	200808169	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Non-Junction	Guardrail Face	317.10	Other	Apparently Normal	West	Passenger
317.10	I-80	5/22/08	1320	200808168	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Non-Junction	Cargo/Equipment Loss of Shift	317.10	Wet	Apparently Normal	East	Heavy Truck > 26,000
321.30	I-80	5/26/08	2345	200807955	0	0	Darkness Unlighted	Not a Collision w/2 Vehicles in Transport	Non-Junction	Concrete Traffic Barrier/Jersey Barrier	321.30	Slush	Apparently Normal	East	Passenger
320.50	I-80	6/2/08	315	200814842	0	0	Darkness Unlighted	Not a Collision w/2 Vehicles in Transport	Thru Roadway	Overturn/Rollover	320.50	Dry	Apparently Normal	West	Heavy Truck > 26,000
320.05	I-80	6/6/08	1327	200809083	0	0	Daylight	Rear End (Front to Rear)	Non-Junction	Motor Vehicle in Transport on Roadway	320.05	Snow	Apparently Normal	West	Passenger
321.00	I-80	6/21/08	1910	200809092	1	0	Daylight	Not a Collision w/2 Vehicles in Transport	Non-Junction	Concrete Traffic Barrier/Jersey Barrier	321.00	Dry	Suspected Alcohol Use	West	Passenger
323.00	I-80	6/21/08	355	200808638	0	0	Darkness Unlighted			Elk	323.00	Dry	Apparently Normal		
318.10	I-80	6/23/08	2048	200809095	0	0	Dusk			Antelope	318.10	Dry	Apparently Normal		
322.00	I-80	6/24/08	54	200809096	0	0	Darkness Unlighted			Elk	322.00	Dry	Apparently Normal		
317.30	I-80	8/1/08	1535	200811112	1	0	Daylight	Not a Collision w/2 Vehicles in Transport	Non-Junction	Guardrail Face	317.30	Dry	Fell Asleep, Fainted	West	SUV
319.40	I-80	8/3/08	1400	200810675	1	0	Daylight	Not a Collision w/2 Vehicles in Transport	Non-Junction	Concrete Traffic Barrier/Jersey Barrier	319.40	Wet	Apparently Normal	East	PU
320.50	I-80	8/6/08	2339	200811116	0	0	Darkness Unlighted	Not a Collision w/2 Vehicles in Transport	Non-Junction	Cargo/Equipment Loss of Shift	320.50	Dry	Apparently Normal	West	Medium Truck
321.35	I-80	8/31/08	1628	200812424	1	1	Daylight	Not a Collision w/2 Vehicles in Transport	Thru Roadway	Overturn/Rollover	321.35	Wet	Apparently Normal	Southwest	Heavy Truck > 26,000
323.00	I-80	8/31/08	1245	200822818	0	0	Daylight	Not a Collision w/2 Vehicles in Transport			323.00	Dry			
316.75	I-80	9/15/08	440	200813050	0	0	Darkness Lighted	Not a Collision w/2 Vehicles in Transport	Non-Junction	Guardrail Face	316.75	Dry	Apparently Normal	East	Passenger
318.00	I-80	9/25/08	630	200813915	0	0	Dawn			Deer	318.00	Dry	Apparently Normal		
321.00	I-80	10/11/08	300	200815135	1	0	Darkness Unlighted	Not a Collision w/2 Vehicles in Transport	Unknown	Concrete Traffic Barrier/Jersey Barrier	321.00	Ice/Frost	Apparently Normal	East	SUV
323.00	I-80	10/18/08	310	200815944	0	0	Darkness Unlighted			Elk	323.00	Dry	Apparently Normal		
319.65	I-80	11/5/08	1618	200815950	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Unknown	Barricade	319.65	Ice/Frost	Apparently Normal	East	PU
319.70	I-80	11/5/08	1536	200815945	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Unknown	Concrete Traffic Barrier/Jersey Barrier	319.70	Ice/Frost	Apparently Normal	East	SUV
321.20	I-80	11/14/08	150	200816341	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Unknown	Motor Vehicle in Transport on Roadway	321.20	Ice/Frost	Apparently Normal	West	Heavy Truck > 26,000
322.60	I-80	11/24/08	1058	200817193	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Unknown	Fire/Explosion	322.60	Dry	Apparently Normal	East	PU
316.70	I-80	11/30/08	1330	200817512	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Unknown	Cable Barrier	316.70	Ice/Frost	Apparently Normal	East	Passenger
320.60	I-80	12/8/08	1205	200821109	1	0	Daylight	Not a Collision w/2 Vehicles in Transport	Unknown	Barricade	320.60	Wet	Apparently Normal	East	SUV
322.00	I-80	12/8/08	2000	200818307	0	0	Darkness Unlighted	Sideswipe Same Direction (Passing)	Unknown	Motor Vehicle in Transport on Roadway	322.00	Snow	Apparently Normal	West	Passenger
323.00	I-80	12/14/08	655	200818689	0	0	Dawn	Angle (Front to Side), Opposing Direction	Unknown	Parked Motor Vehicle	323.00	Snow	Apparently Normal	North	Heavy Truck > 26,000
321.00	I-80	12/18/08	1434	200819892	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Unknown	Concrete Traffic Barrier/Jersey Barrier	321.00	Ice/Frost	Apparently Normal	West	Passenger
321.00	I-80	12/19/08	2152	200819914	0	0	Darkness Unlighted	Not a Collision w/2 Vehicles in Transport	Unknown	Concrete Traffic Barrier/Jersey Barrier	321.00	Wet	Suspected Alcohol Use	West	Passenger
320.80	I-80	12/21/08	307	200819919	2	0	Darkness Unlighted	Rear End (Front to Rear)	Unknown	Motor Vehicle in Transport on Roadway	320.80	Ice/Frost	Apparently Normal	West	Heavy Truck > 26,000
320.50	I-80	12/28/08	630	200819925	0	0	Darkness Unlighted	Not a Collision w/2 Vehicles in Transport	Unknown	Concrete Traffic Barrier/Jersey Barrier	320.50	Ice/Frost	Apparently Normal	East	Passenger
323.00	I-80	12/28/08	850	200821032	1	0	Daylight	Not a Collision w/2 Vehicles in Transport	Thru Roadway	Overturn/Rollover	323.00	Ice/Frost	Apparently Normal	West	PU
319.60	I-80	1/9/09	915	200900411	0	0	Daylight	Head On (Front to Front)	Unknown	Concrete Traffic Barrier/Jersey Barrier	319.60	Snow	Apparently Normal	East	Passenger
322.60	I-80	1/10/09	745	200900416	0	0	Daylight	Rear End (Front to Rear)	Unknown	Motor Vehicle in Transport on Roadway	322.60	Wet	Apparently Normal	West	Heavy Truck > 26,000
319.50	I-80	1/25/09	1928	200901079	0	0	Darkness Unlighted	Rear to Front (Normally Backing)	Thru Roadway	Motor Vehicle in Transport on Roadway	319.50	Ice/Frost	Apparently Normal	East	Passenger
319.60	I-80	1/25/09	1120	200902070	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Thru Roadway	Jackknife	319.60	Ice/Frost	Apparently Normal	West	Heavy Truck > 26,000

APPENDIX B. ACCIDENT DATA

M. P.	HIGHWAY ROUTE SIGN	DATE	TIME	REPORT NUMBER	# INJURED	# KILLED	LIGHTING	COLLISION TYPE	JUNCTION RELATION	FIRST HARMFUL EVENT	M. P.	ROAD CONDITIONS	DRIVER CONDITION	DIRECTION OF TRAVEL	VEHICLE TYPE
317.40	I-80	1/27/09	1000	200901080	0	0	Daylight	Rear to Side (Normally Backing)	ange Area Intersection F	Motor Vehicle in Transport on Roadway	317.40	Dry	Unknown	East	Medium Truck
319.90	I-80	2/7/09	155	200901572	1	0	Darkness Unlighted	Not a Collision w/2 Vehicles in Transport	Thru Roadway	Overturn/Rollover	319.90	Snow	Suspected Alcohol Use	East	PU
317.40	I-80	2/9/09	1241	200901880	0	0	Daylight	Rear End (Front to Rear)	Thru Roadway	Motor Vehicle in Transport on Roadway	317.40	Dry	Apparently Normal	East	Passenger Van
321.25	I-80	2/14/09	1405	200902369	0	0	Daylight	Not a Collision w/2 Vehicles in Transport	Thru Roadway	Concrete Traffic Barrier/Jersey Barrier	321.25	Snow	Apparently Normal	East	SUV
319.60	I-80	2/16/09	1357	200902372	0	0	Daylight	Angle Same Direction (Front to Side)	Thru Roadway	Motor Vehicle in Transport on Roadway	319.60	Ice/Frost	Apparently Normal	East	Passenger
319.70	I-80	2/16/09	1252	200901884	0	0	Daylight	Angle Direction not Specified	Thru Roadway	Motor Vehicle in Transport on Roadway	319.70	Slush	Apparently Normal	East	SUV
316.70	I-80	3/24/09	840	200904629	0	0	Daylight	Angle Same Direction (Front to Side)	Thru Roadway	Motor Vehicle in Transport on Roadway	316.70	Ice/Frost	Apparently Normal	East	Passenger
323.00	I-80	3/25/09	1904	200905528	0	0	Dusk	Not a Collision w/2 Vehicles in Transport	Thru Roadway	Concrete Traffic Barrier/Jersey Barrier	323.00	Ice/Frost	Apparently Normal	East	Light Truck

APPENDIX C

PLACARD DATA

WYOMING Whp HIGHWAY PATROL

MAKING A DIFFERENCE

DAVE FREUDENTHAL
Governor

JOHN F. COX
Director, WYDOT

COL. SAM D. POWELL
Administrator

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Cheyenne WY 82009-3340
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1 TR, 1 TT, 1 FT	2
1 TR, 1 TT, 1 ST, 1 FT	3
1 TR, 4 BUS	1
1 TR, 1 TT, 1 ST, 1 FT, 1 BUS	1

Cheyenne I-25 1/1/10 - 5/11/10

PLACARD HAZARDOUS MATERIALS

0002	3	0003	8	0004	1	0008	8
0009	3	0012	4	0015	1	0034	5
0042	2	0044	3	0059	1	0065	2
0137	1	0183	1	0190	1	0195	1
0197	2	0236	1	0241	8	0242	2
0257	1	0279	1	0300	1	0321	2
0328	1	0332	6	0334	1	0335	1
0336	3	0339	2	0341	1	0344	1
0387	1	0397	2	0410	1	1001	58
1002	1	1005	3	1013	1	1017	4
1018	3	1024	1	1030	1	1040	1
1046	11	1048	1	1049	7	1053	1
1057	21	1065	1	1066	9	1070	2
1071	1	1072	4	1073	41	1075	226
1077	7	1079	2	1121	1	1123	2
1133	5	1139	1	1170	7	1176	1
1190	1	1192	1	1193	5	1197	6
1198	1	1199	1	1202	68	1203	1,047
1206	1	1210	7	1212	3	1213	1
1219	14	1226	1	1230	6	1245	1
1247	1	1260	1	1263	85	1265	1
1267	255	1268	10	1274	4	1275	1
1280	4	1284	1	1287	1	1294	1
1307	6	1325	7	1355	1	1367	1
1383	2	1418	1	1426	1	1427	1
1440	1	1479	2	1486	1	1493	4
1593	1	1595	1	1641	1	1690	1
1710	1	1719	8	1727	1	1742	1
1759	3	1760	41	1785	1	1789	3
1790	2	1791	35	1793	1	1803	1
1805	13	1810	1	1813	2	1814	9
1819	1	1823	3	1824	17	1830	30
1835	12	1837	1	1857	1	1863	55
1866	10	1883	1	1884	1	1894	1
1897	2	1903	3	1908	11	1912	1
1942	2	1944	1	1946	1	1950	3
1951	21	1953	1	1954	4	1956	7
1958	1	1959	1	1960	1	1961	1
1962	1	1963	20	1966	1	1968	1
1972	2	1973	1	1977	138	1983	1
1987	10	1989	2	1992	5	1993	585
1997	3	2014	1	2015	2	2017	1
2031	5	2067	3	2078	1	2079	2
2087	1	2187	50	2191	1	2196	3
2199	1	2201	7	2203	1	2211	1
2259	1	2283	1	2320	1	2363	1
2381	3	2400	1	2426	1	2460	1

2465	1	/	2468	2	/	2672	6	/	2674	1
2676	1	/	2686	1	/	2693	13	/	2735	11
2763	1	/	2769	1	/	2789	1	/	2790	1
2794	34	/	2795	2	/	2796	2	/	2800	2
2801	1	/	2810	19	/	2815	1	/	2871	1
2880	5	/	2902	4	/	2911	1	/	2912	15
2915	2	/	2916	4	/	2919	2	/	2920	1
2922	4	/	2924	14	/	2949	1	/	2984	1
2990	1	/	2991	6	/	3009	1	/	3017	1
3022	1	/	3028	1	/	3038	1	/	3065	1
3066	2	/	3077	8	/	3082	34	/	3090	2
3092	1	/	3093	1	/	3099	1	/	3109	1
3113	2	/	3129	1	/	3148	1	/	3149	1
3161	7	/	3162	1	/	3163	1	/	3190	3
3220	1	/	3252	1	/	3257	73	/	3260	2
3262	2	/	3264	15	/	3265	5	/	3266	8
3267	20	/	3268	1	/	3286	1	/	3287	1
3288	2	/	3291	1	/	3295	1	/	3296	1
3297	1	/	3321	9	/	3327	1	/	3332	1
3336	1	/	3337	1	/	3352	1	/	3356	1
3375	1	/	3378	2	/	3393	1	/	3412	1
3432	3	/	3511	1	/	5288	1	/	6472	1
8082	1	/	9212	1						

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LOCATIONS REPORTED 1 11
0241 11

REQUESTED BY: WTDSMITHR RICHARD SMITH

TIME REQUESTED: 2010/05/12 09:00

LOCATIONS: 0241

EMPLOYEES: < ALL >

COMMODITIES: < ALL >

ITEMS:

1 TT, 1 ST, 2 BUS	2
2 TR, 1 TT	2
1MTR, 3 TT	5
2 TR, 2 TT	1
1 TR, 1 TT, 1 FT	2
1 TT, 2 ST	1
3 TR, 1 TT	2
1 TR, 2 TT	1

Cheyenne I-80 1/1/10 - 5/11/10

PLACARD HAZARDOUS MATERIALS

0006	4	/	0012	19	/	0015	1	/	0027	1
0034	1	/	0042	6	/	0044	6	/	0048	2
0054	1	/	0065	1	/	0081	1	/	0093	4
0096	1	/	0105	1	/	0129	1	/	0161	4
0168	3	/	0171	1	/	0183	2	/	0195	1
0226	1	/	0231	1	/	0241	6	/	0254	1
0255	1	/	0276	1	/	0288	1	/	0292	2
0300	7	/	0301	1	/	0312	1	/	0321	10
0327	1	/	0330	1	/	0332	3	/	0333	1
0334	1	/	0335	1	/	0336	2	/	0337	2
0339	19	/	0360	2	/	0367	2	/	0373	1
0397	3	/	0403	1	/	0409	1	/	0417	2
0431	1	/	0440	3	/	0441	2	/	0444	1
0470	1	/	1001	5	/	1002	7	/	1004	1
1005	11	/	1006	1	/	1008	1	/	1013	7
1016	3	/	1017	1	/	1018	1	/	1028	1
1030	18	/	1033	1	/	1035	1	/	1044	11
1046	19	/	1048	5	/	1049	1	/	1050	1
1053	1	/	1055	1	/	1057	7	/	1066	9
1068	1	/	1072	7	/	1073	3	/	1075	251
1077	4	/	1079	1	/	1090	18	/	1098	1
1119	1	/	1123	2	/	1133	58	/	1136	1
1139	5	/	1149	1	/	1150	1	/	1155	1
1166	1	/	1170	16	/	1180	1	/	1184	1
1186	2	/	1188	1	/	1193	4	/	1195	1
1196	1	/	1197	42	/	1200	1	/	1202	1
1203	200	/	1206	3	/	1210	30	/	1213	1
1219	15	/	1230	4	/	1238	2	/	1239	1
1245	1	/	1247	1	/	1250	3	/	1251	1
1261	1	/	1263	228	/	1264	1	/	1265	3
1266	1	/	1267	71	/	1268	10	/	1274	1
1275	1	/	1276	1	/	1292	1	/	1293	2
1294	4	/	1295	3	/	1307	3	/	1325	2
1333	1	/	1361	1	/	1366	1	/	1383	3
1384	1	/	1397	8	/	1401	1	/	1402	1
1418	1	/	1436	1	/	1444	3	/	1446	5
1448	1	/	1457	1	/	1477	1	/	1479	5
1483	1	/	1486	2	/	1489	1	/	1493	35
1500	2	/	1557	1	/	1580	3	/	1593	4
1648	3	/	1654	1	/	1660	1	/	1689	1
1690	1	/	1707	1	/	1716	1	/	1719	20
1727	1	/	1741	3	/	1744	3	/	1750	1
1759	5	/	1760	127	/	1762	1	/	1778	1
1779	1	/	1781	1	/	1789	16	/	1790	2
1791	3	/	1805	20	/	1810	1	/	1814	13
1823	14	/	1824	22	/	1826	2	/	1830	34
1832	1	/	1835	7	/	1838	2	/	1856	1

1863	4	/	1866	49	/	1888	2	/	1893	1
1897	8	/	1903	13	/	1908	4	/	1942	2
1950	10	/	1951	1	/	1953	3	/	1954	1
1955	1	/	1956	15	/	1957	1	/	1959	1
1963	10	/	1974	1	/	1977	1	/	1982	2
1987	28	/	1992	6	/	1993	182	/	2014	7
2031	1	/	2056	1	/	2079	2	/	2111	1
2150	1	/	2187	29	/	2188	1	/	2191	1
2192	1	/	2196	2	/	2199	1	/	2201	1
2203	2	/	2206	1	/	2211	3	/	2212	1
2213	2	/	2265	1	/	2277	3	/	2283	3
2292	1	/	2302	1	/	2311	1	/	2312	1
2315	1	/	2320	1	/	2381	3	/	2391	1
2408	1	/	2424	1	/	2426	1	/	2428	1
2448	33	/	2451	1	/	2464	1	/	2468	5
2482	1	/	2491	3	/	2531	1	/	2588	1
2630	1	/	2644	1	/	2672	3	/	2674	1
2686	1	/	2693	1	/	2699	1	/	2717	1
2725	1	/	2729	1	/	2734	2	/	2735	9
2749	1	/	2757	3	/	2766	1	/	2783	1
2789	3	/	2790	1	/	2791	1	/	2794	92
2795	5	/	2796	16	/	2797	2	/	2800	3
2801	3	/	2805	1	/	2810	7	/	2852	1
2857	1	/	2874	2	/	2878	1	/	2880	5
2890	1	/	2902	1	/	2908	7	/	2910	5
2912	38	/	2913	1	/	2915	7	/	2916	2
2917	3	/	2919	2	/	2920	2	/	2922	14
2924	7	/	2926	2	/	2928	1	/	2932	1
2977	4	/	2990	3	/	3006	1	/	3010	1
3017	5	/	3018	2	/	3020	1	/	3028	1
3055	1	/	3065	1	/	3066	7	/	3077	14
3080	1	/	3082	41	/	3089	1	/	3090	1
3092	1	/	3099	1	/	3107	1	/	3109	1
3129	1	/	3130	2	/	3134	3	/	3139	2
3145	1	/	3149	22	/	3159	3	/	3161	6
3162	1	/	3163	3	/	3164	2	/	3171	5
3178	1	/	3214	1	/	3216	1	/	3220	2
3238	1	/	3253	1	/	3254	1	/	3257	5
3259	1	/	3260	3	/	3261	3	/	3262	13
3263	1	/	3264	20	/	3265	25	/	3266	68
3267	24	/	3268	2	/	3286	1	/	3287	2
3288	5	/	3291	7	/	3295	1	/	3296	4
3306	1	/	3312	1	/	3321	89	/	3327	6
3328	1	/	3337	2	/	3340	1	/	3341	1
3342	3	/	3352	2	/	3362	1	/	3363	1
3378	5	/	3383	1	/	3393	2	/	3394	8
3412	1	/	3432	12	/	3480	1	/	3632	1
3706	1	/	3712	1	/	3867	1	/	4082	1
5970	1	/	6221	1	/	7726	1	/	9391	1

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LOCATIONS REPORTED 1 14
0240 14

REQUESTED BY: WTDSMITHR RICHARD SMITH

TIME REQUESTED: 2010/05/12 08:52

APPENDIX D

CONTAMINANT OF CONCERN EVALUATION DATA

APPENDIX D-1. ELIMINATION/RETENTION PROCESS FOR TRUCK CARGO, I-25
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

Location	Placard ID	Number of Occurrences	Cargo	Are there at least 25 Occurrences?	Is the Cargo NOT a gas (in the form it is being transferred in)?	Is the Cargo NOT an essential Nutrient or NOT considered too generic to determine characteristics?	Retained For Further Evaluation?
I-25	1001	58	Acetylene; dissolved acetylene	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-25	1046	11	Helium; compressed	Yes; Retained (occurrences include I-80 and I-25)	No, Eliminated	NA	No, Eliminated
I-25	1057	21	Lighter refills (cigarettes) (flammable gas); Lighters (cigarettes) (flammable gas)	Yes; Retained (occurrences include I-80 and I-25)	Yes, Retained	Yes, Retained	Yes, Retained
I-25	1073	41	Refrigerated oxygen	Yes, Retained	No, Eliminated	NA	No, Eliminated
I-25	1075	226	Butane; butane mixture; butylene; isobutane; isobutane mixture; isobutylene; liquefied petroleum gas; LPG; petroleum gasses; propane; propane mixture; propylene	Yes, Retained	No, Eliminated	NA	No, Eliminated
I-25	1202	68	Diesel fuel; fuel oil; gas oil; heating oil, light	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-25	1203	1047	Gasohol; gasoline; motorspirit; petrol	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-25	1219	14	Isopropanol; isopropyl alcohol	Yes; Retained (occurrences include I-80 and I-25)	Yes, Retained	Yes, Retained	Yes, Retained
I-25	1263	85	Paint (flammable); Paint related material (flammable)	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-25	1267	255	Petroleum crude oil	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-25	1268	10	Petroleum distillates/products, n.o.s.	No, Eliminated	NA	NA	No, Eliminated
I-25	1760	41	Chemical kit; Compound, cleaning liquid (corrosive); Compound, tree or weed killing, liquid (corrosive); Corrosive liquid, n.o.s.; Ferrous chloride, solution; Medicines, corrosive, liquid, n.o.s.; Titanium sulfate, solution	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-25	1791	35	Hypochlorite solution; Hypochlorite solution, with more than 5% available Chlorine	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-25	1805	13	Phosphoric acid, liquid/solid/solution	Yes; Retained (occurrences include I-80 and I-25)	Yes, Retained	Yes, Retained	Yes, Retained
I-25	1824	17	Sodium hydroxide, solution	Yes; Retained (occurrences include I-80 and I-25)	Yes, Retained	Yes, Retained	Yes, Retained

APPENDIX D-1. ELIMINATION/RETENTION PROCESS FOR TRUCK CARGO, I-25
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

Location	Placard ID	Number of Occurrences	Cargo	Are there at least 25 Occurrences?	Is the Cargo NOT a gas (in the form it is being transferred in)?	Is the Cargo NOT an essential Nutrient or NOT considered too generic to determine characteristics?	Retained For Further Evaluation?
I-25	1830	30	Sulfuric acid, with more than 51% acid	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-25	1835	12	Tetramethylammonium hydroxide, solution	No, Eliminated	NA	NA	No, Eliminated
I-25	1863	55	Fuel, aviation, turbine engine	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-25	1866	10	Resin solution	No, Eliminated	NA	NA	No, Eliminated
I-25	1908	11	Chlorite solution; Chlorite solution, with more than 5% available Chlorine	No, Eliminated	NA	NA	No, Eliminated
I-25	1951	21	Argon, refrigerated liquid (cryogenic liquid)	No, Eliminated	NA	NA	No, Eliminated
I-25	1963	20	Helium, refrigerated liquid (cryogenic liquid)	Yes; Retained (occurrences include I-80 and I-25)	No, Eliminated	NA	No, Eliminated
I-25	1977	138	Nitrogen, refrigerated liquid (cryogenic liquid)	Yes, Retained	Yes, Retained	No, Eliminated	No, Eliminated
I-25	1987	10	Alcohols, n.o.s.; denatured alcohol	No, Eliminated	NA	NA	No, Eliminated
I-25	1993	585	Combustible liquid, n.o.s.; Compound, cleaning liquid (flammable); Diesel fuel; Flammable liquid, n.o.s.; Fuel oil; Medicines, flammable, liquid, n.o.s.; Refrigerating machine	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-25	2187	50	Carbon dioxide, refrigerated liquid	Yes, Retained	Yes, Retained	No, Eliminated	No, Eliminated
I-25	2693	13	Bisulfites, aqueous solution, n.o.s.; Bisulfites, inorganic, aqueous solution, n.o.s.; Bisulphites, aqueous solution, n.o.s.; Bisulphites, inorganic, aqueous solution, n.o.s.	No, Eliminated	NA	NA	No, Eliminated
I-25	2753	11	N-Ethylbenzyltoluidines, liquid/solid	No, Eliminated	NA	NA	No, Eliminated
I-25	2794	34	Batteries, wet, filled with acid	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-25	2810	19	Buzz; BZ; Compound, tree or weed killing, liquid (toxic); CS; DC; GA; GB; GD; GF; H; HD; HL; HN-1; HN-2; HN-3; L (lewisite); lewisite; mustard; mustard lewisite; poison B, liquid, n.o.s.; poisonous liquid, n.o.s.; poisonous liquid, n.o.s. (inhalation hazard zone A); Poisonous liquid, n.o.s. (Inhalation Hazard Zone B); Poisonous liquid, organic, n.o.s.; Poisonous liquid, organic, n.o.s. (Inhalation Hazard Zone A); Poisonous liquid, organic, n.o.s. (Inhalation Hazard Zone B); sarin; soman; tabun; thickened GD; toxic liquid, n.o.s.; Toxic liquid, n.o.s. (Inhalation Hazard Zone A); Toxic liquid, n.o.s. (Inhalation Hazard Zone B); Toxic liquid, organic, n.o.s.; Toxic liquid, organic, n.o.s. (Inhalation Hazard Zone A); Toxic liquid, organic, n.o.s. (Inhalation Hazard Zone B); VX; CX	No, Eliminated	NA	NA	No, Eliminated
I-25	2912	15	Radioactive material, low specific activity (LSA), n.o.s.; Radioactive material, low specific activity (LSA-I) non fissile or fissile-excepted	No, Eliminated	NA	NA	No, Eliminated
I-25	2924	14	Flammable liquid, corrosive, n.o.s	No, Eliminated	NA	NA	No, Eliminated
I-25	3082	34	Hazardous waste, liquid, n.o.s.; other regulated substances, liquid, n.o.s.	Yes, Retained	Yes, Retained	No, Eliminated	No, Eliminated
I-25	3257	73	Elevated temperature liquid, n.o.s., at or above 100°C (212°F), and below its flash point	Yes, Retained	Yes, Retained	No, Eliminated	No, Eliminated

APPENDIX D-1. ELIMINATION/RETENTION PROCESS FOR TRUCK CARGO, I-25
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

Location	Placard ID	Number of Occurrences	Cargo	Are there at least 25 Occurrences?	Is the Cargo NOT a gas (in the form it is being transferred in)?	Is the Cargo NOT an essential Nutrient or NOT considered too generic to determine characteristics?	Retained For Further Evaluation?
I-25	3264	15	Corrosive liquid, acidic, inorganic, n.o.s.	Yes; Retained (occurrences include I-80 and I-25)	Yes, Retained	No, Eliminated	No, Eliminated
I-25	3265	5	Corrosive liquid, acidic, organic, n.o.s.	Yes; Retained (occurrences include I-80 and I-25)	Yes, Retained	No, Eliminated	No, Eliminated
I-25	3266	8	Corrosive liquid, basic, inorganic, n.o.s.	Yes; Retained (occurrences include I-80 and I-25)	Yes, Retained	No, Eliminated	No, Eliminated
I-25	3267	20	Corrosive liquid, basic, organic, n.o.s.	Yes; Retained (occurrences include I-80 and I-25)	Yes, Retained	No, Eliminated	No, Eliminated

APPENDIX D-2. ELIMINATION/RETENTION PROCESS FOR TRUCK CARGO, I-80
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

Location	Placard ID	Number of Occurrences	Cargo	Are there at least 25 Occurrences?	Is the Cargo NOT a gas?	Is the Cargo NOT an essential Nutrient or NOT considered too generic to determine characteristics?	Retained For Further Evaluation?
I-80	1001	5	Acetylene; dissolved acetylene	No; Eliminated	NA	NA	no, Eliminated
I-80	1002	7	Compressed air	No; Eliminated	NA	NA	no, Eliminated
I-80	1005	11	Anhydrous ammonia	No; Eliminated	NA	NA	no, Eliminated
I-80	1006	1	Argon; compressed argon	No; Eliminated	NA	NA	no, Eliminated
I-80	1008	1	Boron Triflouride; compressed Boron Triflouride	No; Eliminated	NA	NA	no, Eliminated
I-80	1013	7	Carbon dioxide; compressed	No; Eliminated	NA	NA	no, Eliminated
I-80	1016	3	carbon monoxide; compressed	No; Eliminated	NA	NA	no, Eliminated
I-80	1017	1	Chlorine	No; Eliminated	NA	NA	no, Eliminated
I-80	1018	1	Chlorodifluoromethane; Refrigerent gas R-22	No; Eliminated	NA	NA	no, Eliminated
I-80	1028	1	Dichlorodifluoromethane	No; Eliminated	NA	NA	no, Eliminated
I-80	1030	18	1,1-Difluoroethane; Difluoroethane; Refrigerant gas R-152a	No; Eliminated	NA	NA	no, Eliminated
I-80	1033	1	Dimethyl ether	No; Eliminated	NA	NA	no, Eliminated
I-80	1035	1	Ethane; compressed	No; Eliminated	NA	NA	no, Eliminated
I-80	1044	11	Fire extinguishers with liquefied gas; with compressed gas	No; Eliminated	NA	NA	no, Eliminated
I-80	1046	19	Helium; compressed	Yes; Retained (occurrences include I-80 and I-25)	No, Eliminated	NA	no, Eliminated
I-80	1048	5	Anhydrous hydrogen bromide	No; Eliminated	NA	NA	no, Eliminated
I-80	1049	1	hydrogen; compressed	No; Eliminated	NA	NA	no, Eliminated
I-80	1050	1	Anhydrous hydrogen chloride	No; Eliminated	NA	NA	no, Eliminated
I-80	1053	1	Hydrogen sulfide; Hydrogen sulphide	No; Eliminated	NA	NA	no, Eliminated
I-80	1055	1	Isobutylene	No; Eliminated	NA	NA	no, Eliminated
I-80	1057	7	Lighter refills (cigarettes) (flammable gas); Lighters (cigarettes) (flammable gas)	Yes; Retained (occurrences include I-80 and I-25)	Yes, Retained	Yes, Retained	Yes, Retained
I-80	1066	9	Nitrogen; compressed	No; Eliminated	NA	NA	no, Eliminated

APPENDIX D-2. ELIMINATION/RETENTION PROCESS FOR TRUCK CARGO, I-80
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

Location	Placard ID	Number of Occurrences	Cargo	Are there at least 25 Occurrences?	Is the Cargo NOT a gas?	Is the Cargo NOT an essential Nutrient or NOT considered too generic to determine characteristics?	Retained For Further Evaluation?
I-80	1072	7	Oxygen; compressed	No; Eliminated	NA	NA	no, Eliminated
I-80	1073	3	Refrigerated oxygen	No; Eliminated	NA	NA	no, Eliminated
I-80	1075	251	Butane; butane mixture; butylene; isobutane; isobutane mixture; isobutylene; liquefied petroleum gas; LPG; petroleum gasses; propane; propane mixture; propylene	Yes, Retained	No, Eliminated	NA	no, Eliminated
I-80	1077	4	Propylene	No; Eliminated	NA	NA	no, Eliminated
I-80	1079	1	Sulfur dioxide	No; Eliminated	NA	NA	no, Eliminated
I-80	1090	18	Acetone	No; Eliminated	NA	NA	no, Eliminated
I-80	1098	1	Allyl alcohol	No; Eliminated	NA	NA	no, Eliminated
I-80	1123	2	Butyl acetates	No; Eliminated	NA	NA	no, Eliminated
I-80	1133	58	Adhesives (flammable)	Yes, Retained	Yes, Retained	No, Eliminated	no, Eliminated
I-80	1136	1	Coal tar distillates, flammable	No; Eliminated	NA	NA	no, Eliminated
I-80	1139	5	Coating solution	No; Eliminated	NA	NA	no, Eliminated
I-80	1149	1	Butyl ethers; dibutyl ethers	No; Eliminated	NA	NA	no, Eliminated
I-80	1150	1	1,2-dichloroethylene; dichloroethylene	No; Eliminated	NA	NA	no, Eliminated
I-80	1155	1	Diethyl ether; ethyl ether	No; Eliminated	NA	NA	no, Eliminated
I-80	1166	1	Dioxolane	No; Eliminated	NA	NA	no, Eliminated
I-80	1170	16	Ethanol; ethanol, solution; ethyl alcohol; ethyl alcohol solution	No; Eliminated	NA	NA	no, Eliminated
I-80	1180	1	Ethyl butyrate	No; Eliminated	NA	NA	no, Eliminated
I-80	1184	1	Ethylene dichloride	No; Eliminated	NA	NA	no, Eliminated
I-80	1188	1	Ethyl glycol monomethyl ether	No; Eliminated	NA	NA	no, Eliminated
I-80	1193	4	Ehtyl methyl ketone; methyl ethyl ketone	No; Eliminated	NA	NA	no, Eliminated
I-80	1195	1	Ethyl propionate	No; Eliminated	NA	NA	no, Eliminated
I-80	1196	1	Ethyltrichlorosilane	No; Eliminated	NA	NA	no, Eliminated
I-80	1197	42	Extracts, flavoring, liquid	Yes, Retained	Yes, Retained	No, Eliminated	no, Eliminated
I-80	1202	1	Diesel fuel; fuel oil; gas oil; heating oil, light	No; Eliminated	NA	NA	no, Eliminated
I-80	1203	200	Gasohol; gasoline; motorspirit; petrol	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-80	1206	3	Heptanes	No; Eliminated	NA	NA	no, Eliminated
I-80	1210	30	Ink, printers, flammable	Yes, Retained	Yes, Retained	No, Eliminated	no, Eliminated

APPENDIX D-2. ELIMINATION/RETENTION PROCESS FOR TRUCK CARGO, I-80
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

Location	Placard ID	Number of Occurrences	Cargo	Are there at least 25 Occurrences?	Is the Cargo NOT a gas?	Is the Cargo NOT an essential Nutrient or NOT considered too generic to determine characteristics?	Retained For Further Evaluation?
I-80	1213	1	Isobutyl acetate	No; Eliminated	NA	NA	no, Eliminated
I-80	1219	15	Isopropanol; isopropyl alcohol	Yes; Retained (occurrences include I-80 and I-25)	Yes, Retained	Yes, Retained	Yes, Retained
I-80	1230	4	Methanol	No; Eliminated	NA	NA	no, Eliminated
I-80	1238	2	Methyl chloroformate	No; Eliminated	NA	NA	no, Eliminated
I-80	1239	1	Methyl chloromethyl ether	No; Eliminated	NA	NA	no, Eliminated
I-80	1245	1	Methyl isobutyl ketone	No; Eliminated	NA	NA	no, Eliminated
I-80	1247	1	Methyl methacrylate monomer, stabilized	No; Eliminated	NA	NA	no, Eliminated
I-80	1250	3	Methyltrichlorosilane	No; Eliminated	NA	NA	no, Eliminated
I-80	1251	1	Methyl vinyl ketone, stabilized	No; Eliminated	NA	NA	no, Eliminated
I-80	1261	1	Nitromethane	No; Eliminated	NA	NA	no, Eliminated
I-80	1263	228	Paint (flammable); Paint related material (flammable)	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-80	1264	1	Paraldehyde	No; Eliminated	NA	NA	no, Eliminated
I-80	1265	3	Isopentane; n-Pentane; pentanes	No; Eliminated	NA	NA	no, Eliminated
I-80	1266	1	Perfumery products, with flammable solvents	No; Eliminated	NA	NA	no, Eliminated
I-80	1267	71	Petroleum crude oil	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-80	1268	10	Petroleum distillates/products, n.o.s.	No; Eliminated	NA	NA	no, Eliminated
I-80	1274	1	n-Propanol; normal propyl alcohol	No; Eliminated	NA	NA	no, Eliminated
I-80	1275	1	Propionaldehyde	No; Eliminated	NA	NA	no, Eliminated
I-80	1276	1	n-Propyl acetate	No; Eliminated	NA	NA	no, Eliminated
I-80	1292	1	Ethyl silicate; Tetraethyl silicate	No; Eliminated	NA	NA	no, Eliminated
I-80	1293	2	Tinctures, medicinal	No; Eliminated	NA	NA	no, Eliminated
I-80	1294	4	Toluene	No; Eliminated	NA	NA	no, Eliminated
I-80	1295	3	Trichlorosilane	No; Eliminated	NA	NA	no, Eliminated
I-80	1307	3	Xylenes	No; Eliminated	NA	NA	no, Eliminated
I-80	1325	2	Flammable solid, n.o.s.; fusee (rail or highway); medicines, flammable, solid, n.o.s.	No; Eliminated	NA	NA	no, Eliminated
I-80	1333	1	Cerium, slabs, ingots or rods	No; Eliminated	NA	NA	no, Eliminated

APPENDIX D-2. ELIMINATION/RETENTION PROCESS FOR TRUCK CARGO, I-80
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

Location	Placard ID	Number of Occurrences	Cargo	Are there at least 25 Occurrences?	Is the Cargo NOT a gas?	Is the Cargo NOT an essential Nutrient or NOT considered too generic to determine characteristics?	Retained For Further Evaluation?
I-80	1364	1	Cotton waste, oily	No; Eliminated	NA	NA	no, Eliminated
I-80	1366	1	Diethylzinc	No; Eliminated	NA	NA	no, Eliminated
I-80	1383	3	Aluminum powder, pyrophoric; Pyrophoric alloy, n.o.s.	No; Eliminated	NA	NA	no, Eliminated
I-80	1384	1	Sodium dithionite; Sodium hydrosulfite	No; Eliminated	NA	NA	no, Eliminated
I-80	1397	8	Aluminum phosphide	No; Eliminated	NA	NA	no, Eliminated
I-80	1401	1	Calcium	No; Eliminated	NA	NA	no, Eliminated
I-80	1402	1	Calcium carbide	No; Eliminated	NA	NA	no, Eliminated
I-80	1418	1	Magnesium alloys powder	No; Eliminated	NA	NA	no, Eliminated
I-80	1436	1	Zinc powder	No; Eliminated	NA	NA	no, Eliminated
I-80	1444	3	Ammonium persulphate	No; Eliminated	NA	NA	no, Eliminated
I-80	1446	5	Barium nitrate	No; Eliminated	NA	NA	no, Eliminated
I-80	1448	1	Barium permanganate	No; Eliminated	NA	NA	no, Eliminated
I-80	1457	1	Calcium peroxide	No; Eliminated	NA	NA	no, Eliminated
I-80	1477	1	Nitrates, inorganic, n.o.s.	No; Eliminated	NA	NA	no, Eliminated
I-80	1479	5	Oxidizing solid, n.o.s.	No; Eliminated	NA	NA	no, Eliminated
I-80	1483	1	Peroxides, inorganic, n.o.s.	No; Eliminated	NA	NA	no, Eliminated
I-80	1486	2	Potassium nitrate	No; Eliminated	NA	NA	no, Eliminated
I-80	1489	1	Potassium perchlorate	No; Eliminated	NA	NA	no, Eliminated
I-80	1493	35	Silver nitrate	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-80	1500	2	Sodium nitrite	No; Eliminated	NA	NA	no, Eliminated
I-80	1557	1	Arsenic compound, solid, n.o.s.; Arsenic compound, solid, n.o.s., inorganic; Arsenic sulfide; Arsenic trisulfide	No; Eliminated	NA	NA	no, Eliminated
I-80	1580	3	Chloropicrin	No; Eliminated	NA	NA	no, Eliminated
I-80	1593	4	Dichloromethane; Methylene chloride	No; Eliminated	NA	NA	no, Eliminated
I-80	1648	3	Acetonitrile; Methyl cyanide	No; Eliminated	NA	NA	no, Eliminated
I-80	1654	1	Nicotine	No; Eliminated	NA	NA	no, Eliminated
I-80	1660	1	Nitric oxide	No; Eliminated	NA	NA	no, Eliminated
I-80	1689	1	Sodium cyanide	No; Eliminated	NA	NA	no, Eliminated
I-80	1690	1	Sodium fluoride	No; Eliminated	NA	NA	no, Eliminated

APPENDIX D-2. ELIMINATION/RETENTION PROCESS FOR TRUCK CARGO, I-80
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

Location	Placard ID	Number of Occurrences	Cargo	Are there at least 25 Occurrences?	Is the Cargo NOT a gas?	Is the Cargo NOT an essential Nutrient or NOT considered too generic to determine characteristics?	Retained For Further Evaluation?
I-80	1707	1	Thallium compound, n.o.s.	No; Eliminated	NA	NA	no, Eliminated
I-80	1716	1	Acetyl bromide	No; Eliminated	NA	NA	no, Eliminated
I-80	1719	20	Caustic alkali liquid, n.o.s.	No; Eliminated	NA	NA	no, Eliminated
I-80	1760	127	Chemical kit; Compound, cleaning liquid (corrosive); Compound, tree or weed killing, liquid (corrosive); Corrosive liquid, n.o.s.; Ferrous chloride, solution; Medicines, corrosive, liquid, n.o.s.; Titanium sulfate, solution	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-80	1789	16	Hydrochloric acid; Muriatic acid	No; Eliminated	NA	NA	no, Eliminated
I-80	1805	20	Phosphoric acid, liquid/solid/solution	Yes; Retained (occurrences include I-80 and I-25)	Yes, Retained	Yes, Retained	Yes, Retained
I-80	1814	13	Caustic potash, liquid/solution; Potassium hydroxide, solution	No; Eliminated	NA	NA	no, Eliminated
I-80	1823	14	Caustic soda, bead/flake/granular/solid; sodium hydroxide, bead/dry/flake/granular/solid	No; Eliminated	NA	NA	no, Eliminated
I-80	1824	22	Sodium hydroxide, solution	Yes; Retained (occurrences include I-80 and I-25)	Yes, Retained	Yes, Retained	Yes, Retained
I-80	1830	34	Sulfuric acid, with more than 51% acid	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-80	1866	49	Resin solution	Yes, Retained	Yes, Retained	No, Eliminated	no, Eliminated
I-80	1888	2	questionable	No; Eliminated	NA	NA	no, Eliminated
I-80	1950	10	Aerosols; Aerosol dispensors	No; Eliminated	NA	NA	no, Eliminated
I-80	1956	15	Accumulators, pressurized, pneumatic or hydraulic; compressed gas	No; Eliminated	NA	NA	no, Eliminated
I-80	1963	10	Helium, refrigerated liquid (cryogenic liquid)	Yes; Retained (occurrences include I-80 and I-25)	No, Eliminated	NA	no, Eliminated
I-80	1987	28	Alcohols, n.o.s.; denatured alcohol	Yes, Retained	Yes, Retained	No, Eliminated	no, Eliminated
I-80	1993	182	Combustible liquid, n.o.s.; Compound, cleaning liquid (flammable); Diesel fuel; Flammable liquid, n.o.s.; Fuel oil; Medicines, flammable, liquid, n.o.s.; Refrigerating machine	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-80	2187	29	Carbon dioxide, refrigerated liquid	Yes, Retained	Yes, Retained	No, Eliminated	no, Eliminated
I-80	2448	33	Sulfur, molten	Yes, Retained	Yes, Retained	No, Eliminated	no, Eliminated

APPENDIX D-2. ELIMINATION/RETENTION PROCESS FOR TRUCK CARGO, I-80
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

Location	Placard ID	Number of Occurrences	Cargo	Are there at least 25 Occurrences?	Is the Cargo NOT a gas?	Is the Cargo NOT an essential Nutrient or NOT considered too generic to determine characteristics?	Retained For Further Evaluation?
I-80	2794	92	Batteries, wet, filled with acid	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-80	2796	16	Battery fluid, acid	No; Eliminated	NA	NA	no, Eliminated
I-80	2912	38	Radioactive material, low specific activity, n.o.s.; radioactive material, low specific activity non fissile or fissile-excepted	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-80	2922	14	Corrosive liquid, poisonous, n.o.s.; Corrosive liquid, toxic, n.o.s.; Sodium hydrosulfide, solution	No; Eliminated	NA	NA	no, Eliminated
I-80	3077	14	Environmentally hazardous substances, solid, n.o.s.; hazardous waste, solid, n.o.s.; other regulated substances	No; Eliminated	NA	NA	no, Eliminated
I-80	3082	41	Hazardous waste, liquid, n.o.s.; other regulated substances, liquid, n.o.s.	Yes, Retained	Yes, Retained	No, Eliminated	no, Eliminated
I-80	3149	22	Hydrogen peroxide and Peroxyacetic acid mixture, with acid(s), water and not more than 5% Peroxyacetic acid, stabilized	No; Eliminated	NA	NA	no, Eliminated
I-80	3262	13	Corrosive solid, basic, inorganic, n.o.s.	No; Eliminated	NA	NA	no, Eliminated
I-80	3264	20	Corrosive liquid, acidic, inorganic, n.o.s.	Yes; Retained (occurrences include I-80 and I-25)	Yes, Retained	No, Eliminated	no, Eliminated
I-80	3265	25	Corrosive liquid, acidic, organic, n.o.s.	Yes, Retained	Yes, Retained	No, Eliminated	no, Eliminated
I-80	3266	68	Corrosive liquid, basic, inorganic, n.o.s.	Yes, Retained	Yes, Retained	No, Eliminated	no, Eliminated
I-80	3267	24	Corrosive liquid, basic, organic, n.o.s.	Yes; Retained (occurrences include I-80 and I-25)	Yes, Retained	No, Eliminated	no, Eliminated
I-80	3321	89	Radioactive material, low specific activity (LSA-II) non fissile or fissile-excepted	Yes, Retained	Yes, Retained	Yes, Retained	Yes, Retained
I-80	3432	12	Polychlorinated biphenyls, solid	No; Eliminated	NA	NA	no, Eliminated

APPENDIX D-3. SUMMARY CONTAMINANT OF CONCERN EVALUATION
CASPER AQUIFER PROTECTION STUDY, I-80 TELEPHONE CANYON, ALBANY COUNTY, WYOMING

Cargo	Number of Occurrences	Chemical Category	Toxicity		Solubility[1]		Viscosity[2]		Assumptions/Comments	Score
			Value	Reference	Value	Reference	Value	Reference		
Diesel fuel; fuel oil; gas oil; heating oil, light	68	Petroleum product	Toxic	TPHCWG	Low solubility	TPHCWG	High viscosity	Gates	Most conservative of aliphatic C10-C35 and aromatics C10-C21	2.75
Gasohol; gasoline; motorspirit; petrol, Lighter refills (cigarettes) (flammable gas); Lighters (cigarettes) (flammable gas)	1275	Petroleum product	Toxic	TPHCWG	Low solubility	TPHCWG	Low viscosity	Gates	Aliphatic C6 - C10 used as a surrogate; because lighter fluid contains aliphatic hydrocarbons in the same carbon range, the two placard numbers were combined.	3.75
Isopropanol; isopropyl alcohol	29	Household products/Industry (Solvent)	Low toxicity	USEPA	High solubility	DOW	Viscous	Fisher Scientific	Isopropanol is a widely used solvent; primary concern with a large release is fire danger, due to its flammability	2.75
Petroleum crude oil	326	Petroleum product	Toxic	TPHCWG	Low solubility	TPHCWG	High viscosity	Gates	TPH-ORO was used to represent the entire range of TPH fractions since the lighter fractions are represented in gasoline and diesel fuel (for comparison purposes)	3
Phosphoric acid, liquid/solid/solution	33	Household products/Industry	Toxic	Science Lab	Soluble	Science Lab	Viscous	CNTech	Viscosity range is for greater than 85 percent phosphoric acid	3.25
Sodium hydroxide, solution	39	Household products/Industry	Toxic	Science Lab	High solubility	Science Lab	Viscous	BASF	Based on 50% solution with water	3.5
Fuel, aviation, turbine engine	55	Petroleum product	Toxic	TPHCWG	Low solubility	TPHCWG	Viscous	Gates	Most conservative of the aliphatic/aromatic ranges	3
Combustible liquid, n.o.s.; Compound, cleaning liquid (flammable); Diesel fuel; Flammable liquid, n.o.s.; Fuel oil; Medicines, flammable, liquid, n.o.s.; Refrigerating machine	767	Petroleum product	Toxic	TPHCWG	Low solubility	TPHCWG	High viscosity	Gates	Most conservative of aliphatic C10-C35 and aromatics C10-C21; Because this Placard number is used for petroleum products and solvents, information for both scenarios was provided	3
Combustible liquid, n.o.s.; Compound, cleaning liquid (flammable); Diesel fuel; Flammable liquid, n.o.s.; Fuel oil; Medicines, flammable, liquid, n.o.s.; Refrigerating machine	767	Household products/Industry (Solvent)	Toxic	USEPA	Low solubility	USEPA	Low viscosity	Chemistry	Because this Placard number is used for petroleum products and solvents, information for both scenarios was provided; In discussion with solvent remediation experts, the constituent Tetrachloroethylene (PCE) was selected as a surrogate for general solvents. It is typically found at solvent sites, and is usually the	3.5
Acetylene; dissolved acetylene	63	Industry	Not toxic to humans		Soluble	CRC handbook	Low viscosity	CRC handbook	Shipped in acetone or dimethylformamide (DMF)	2.5
Paint (flammable); Paint related material (flammable)	313	Household products/Industry	Moderate toxicity	USEPA	Low solubility	USEPA	Viscosity decreases with time and shear stress (< 1)	Physics Handbook	Toluene used as a surrogate; did not as some lead based paint, or non-toxic or low-VOC paint	3
Hypochlorite solution; Hypochlorite solution, with more than 5% available Chlorine	35	Household products/Industry	Low to moderate toxicity	Science Lab	Soluble	Science Lab	Low viscosity	Science Lab	Hypochlorite solution is > 92 percent water	3
Batteries, wet, filled with acid	126	Household products/Industry	Toxic	Unigybattery	High solubility	Unigybattery	Not tested; see sulfuric acid	Unigybattery	Typical constituent composition of a lead-acid battery: lead, sulfuric acid, antimony, arsenic, polypropylene	3.75
Chemical kit; Compound, cleaning liquid (corrosive); Compound, tree or weed killing, liquid (corrosive); Corrosive liquid, n.o.s.; Ferrous chloride, solution; Medicines, corrosive, liquid, n.o.s.; Titanium sulfate, solution	168	Agriculture	Low toxicity	Mindfully	Miscible	Newsomseed	Low viscosity	Mindfully	Based on industry-accepted MSDS sheets. Assumed generic weed and tree compound killers.	2.5
Sulfuric acid, with more than 51% acid	64	Agriculture	Toxic	Chemicalland 21	Miscible	Chemicalland21	Viscous	BASF	Viscosity range is for 75 to 90 percent sulfuric acid	2.75
Silver nitrate	35	Agriculture	Low to moderate toxicity	PAN and Science lab	High Solubility	LennTech	Low viscosity	Jones and Colvin		3.25
Radioactive material, low specific activity, n.o.s.; radioactive material, low specific activity non fissile or fissile-excepted	53	Radioactive material	Low toxicity	DOE	Insolubile	US NRC	NA - Solid		Assume LSA-I and/or LSA-II (US NRC, usually in a solid form)	1.25
Radioactive material, low specific activity (LSA-II) non fissile or fissile-excepted	89	Radioactive material	Low toxicity	DOE	Soluble	US NRC	Low viscosity	Physics Handbook	Per the definition of LSA-II, assumed in water (US NRC).	2.75

Notes:
- It is important to note that for the purposes of this study, the qualitative assessments of toxicity, viscosity, and solubility are relative to the contaminants listed in this table.
- Because viscosity and solubility is dependent on other variables such as temperature and pressure, it was assumed normal ambient pressure and a temperature of 20-25 degrees Celsius.
- If there is a tie in the score, priority is given to toxicity, then number of occurrences.

[1] - For solubility, 0-1 g/L is low solubility, 1-30 g/L is soluble, and >30 g/L is very soluble.
[2] - For viscosity, low viscosity is < 2 mPa s; viscous is 2-40 mPa s, and > 40 mPa s is high viscosity.

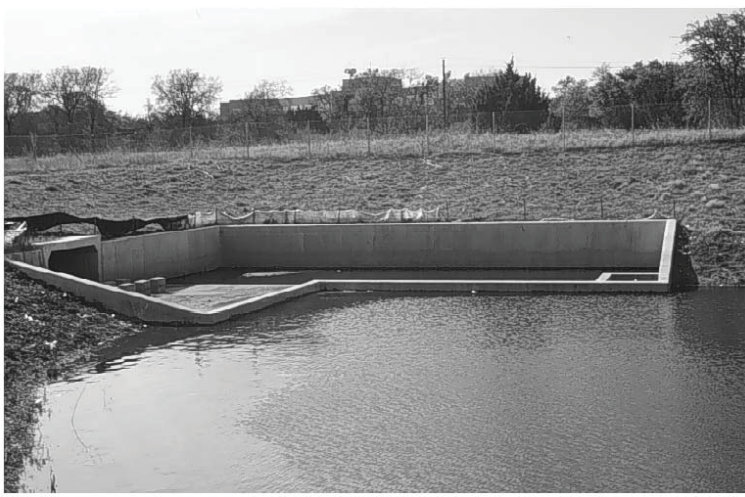
US NRC - http://www.nrc.gov/reading-rm/basic-ref/glossary/low-specific-activity.html
CRC Handbook - CRC Handbook of Chemistry and Physics. David R. Lide, Ed. 2009. CRC Press
DOE - http://www.sandia.gov/rp/SAFE_RAW/GLOSSARY/LSA.HTM
The Physics Handbook - http://physics.info/viscosity/
PAN - http://www.pesticidenlib.org/Detail_Chemical.jsp?Rec_Id=PC34332
LennTech - http://www.lenntech.com/periodic/water/silver/silver-and-water.htm
Science Lab - http://www.sciencelab.com/msds.php?msdsid=9927461L, http://www.sciencelab.com/page/S/PVAR/23060/SL51694, http://www.sciencelab.com/msds.php?msdsid=9927393, http://www.sciencelab.com/msds.php?msdsid=9924999
Jones and Colvin - http://pubs.acs.org/doi/abs/10.1021/je01859a030
BASF - http://www.inorganics.basf.com/p02/CAPportal/en_GB/portal/Anorganische_Basen_/content/Produktgruppen/Anorganische_Basen_(Laugen)/Produktinformationen/Schwefelsaeure, http://www.inorganics.basf.com/p02/CAPportal/en_GB/portal/Anorganische_Basen_/content/Produktgruppen/Anorganische_Basen_(Laugen)/Produktinformationen/Natronlauge
Unigybattery - http://unigybattery.com/assets/faiswia.pdf
Chemicalland21 - http://chemicalland21.com/industrialchem/inorganic/sulfuric%20acid.htm
USEPA - http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
TPHCWPG- Total Petroleum Hydrocarbon Criteria Working Group Series. 1997. Volume 3 Selection of Representative TPH Fractions based on Fate and Transport Considerations (www.aehs.com)
TPHCWPG- Total Petroleum Hydrocarbon Criteria Working Group Series. 1997. Volume 4 Development of Fraction Specific Reference Doses (RfD) and Reference Concentrations (RfC) for Total Petroleum Hydrocarbons (TPH) (www.aehs.com)
TPHCWPG- Total Petroleum Hydrocarbon Criteria Working Group Series. 1997. Volume 5. Human Health Risk-Based Evaluation of Petroleum Contaminated Sites: Implementation of the Working Group Approach. (www.aehs.com)
Gates - http://www.gates.com/brochure.cfm?brochure=2625&location_id=3046
Mindfully - http://www.mindfully.org/Pesticide/Monsanto-Roundup/MSDS-Dos27008.htm
Newsomseed - http://www.newsomseed.com/Herbicides_files/2,%204-D%20MSDS.pdf
DOW - http://www.dow.com/productsafety/finder/iso.htm
Fisher Scientific - http://130.15.90.246/Chri-Sang%20Lab%20MSDS-Fisher/Isopropanol(MSDS).htm
CNTech - http://www.nanotech.wisc.edu/CNT_LAB S/MSDS Acids/MSDS%20Phosphoric%20acid.htm
Chemistry - http://www.chemistry.patent-invent.com/chemistry/toxic_materials/tetrachloroethylene.html

APPENDIX E

ENGINEERING CONTROL EXAMPLES

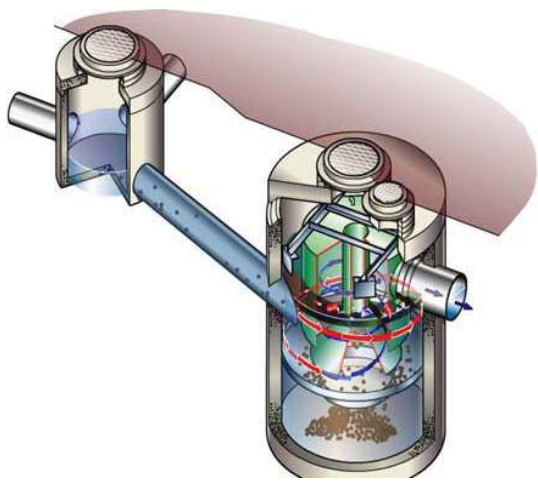
APPENDIX E. EXAMPLES OF ENGINEERING CONTROLS

Detention pond (background) with forebay (foreground)



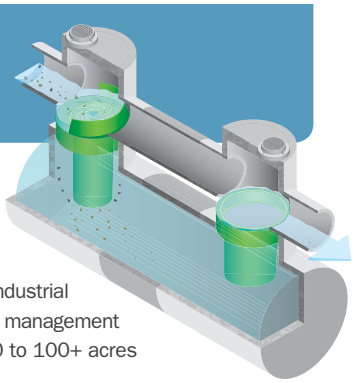
Concrete lined detention pond in Austin, TX

Hazardous Spill Basin



Swirl Concentrator

StormceptorMAX®



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One StormceptorMAX can provide protection for an entire neighbourhood, a full-scale industrial plant or other large developments.

Unique, comprehensive site coverage

- Increased sedimentation chamber extends horizontally rather than vertically
- Non-turbulent treatment environment allows oil to rise and sediment to settle
- Industrial spill protection in dry and wet conditions
- Patented scour prevention technology contains captured oil and sediment for secure storage and easy removal
- Ideal for industrial or residential sites with established infrastructure

Design flexibility

- Modular and expandable, depending on the site's size and water quality objective
- Lower chamber can be constructed of different materials, depending on site conditions
- May be used as part of a stormwater treatment train, complimenting BMPs such as ponds or swales

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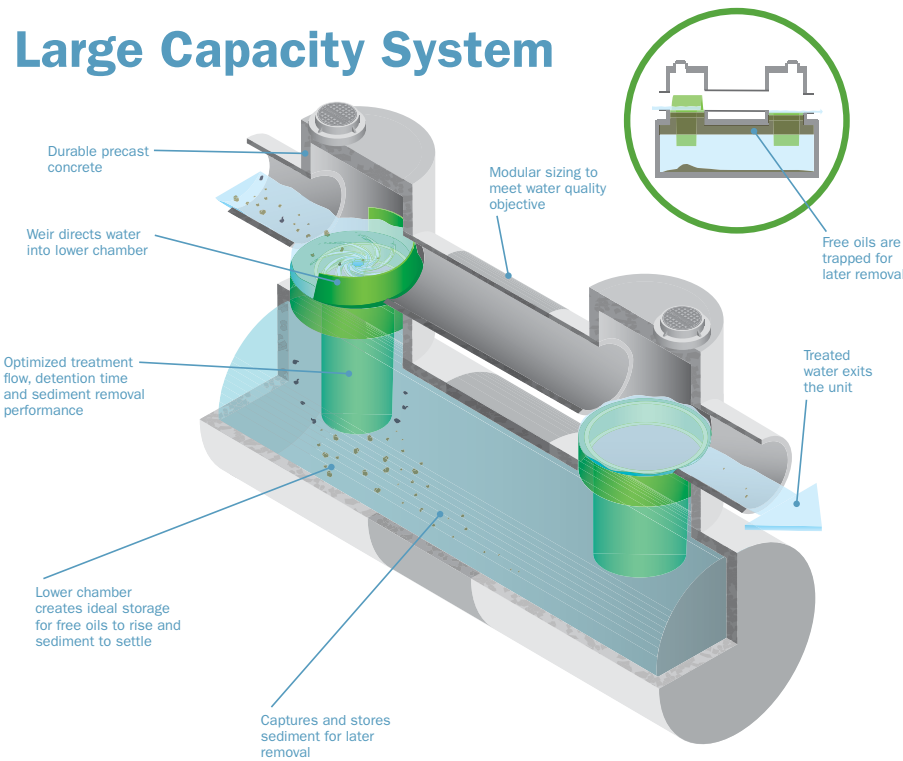
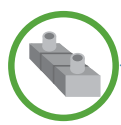


Pre-Cast Pipe Construction

Reliable and easy to install



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Larger volume-to-length ratio allows for treatment in a smaller footprint

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