9.1 Water Resource-related Categories – Existing Conditions

This SS is located within a confined valley and is constrained on the north by the town of Idaho Springs and on the south by I-70. The town of Idaho Springs is located toward the middle of this SS. Clear Creek flows along the south side of I-70 near the upstream end of this SS then north of the highway as it flows through Idaho Springs. Clear Creek passes back over to the south side of the highway near the downstream end of the SS.

9.1.1 Water Quality

This section of Clear Creek is influenced by numerous point and nonpoint sources associated with historic mining activities, highway maintenance operations, slope erosion, and urban development.

Based on water quality analysis conducted by CDOW, ambient water quality criteria for zinc, cadmium, and copper (downstream from Spring Gulch) have periodically been exceeded in this SS. These metals are attributable to historic mining activities (CDOW, 1998). Copper concentrations detected by CDOW are likely high enough to result in periodic acute toxicity and the combination of copper and zinc concentrations is high enough that brown trout eggs may not hatch and brown trout growth may be negatively affected. A Total Maximum Daily Load (TMDL) for copper and zinc is being developed by the CDPHE Water Quality Control Division for a portion of this SS extending from the upstream end of the SS downstream to the Argo Mine Tunnel.

The geology in the entire Clear Creek drainage basin is characterized as mineral-laden (metals) which vary in richness. This SS of Clear Creek has experienced extensive mining and milling of metals-rich ore. Historic mining has occurred throughout this SS, and tailings have been deposited in and adjacent to Clear Creek.

Mining influence this SS is evidenced by mine drainage originating from the Big Five Mine near the west side of Idaho Springs and the Argo Mine along the north side of Idaho Springs (Figure 9-2). The Big Five Mine drainage pools near the north footprint of I-70 and drains beneath I-70 to Clear Creek. Argo Mine materials are adjacent to Clear Creek for approximately 0.5 mile (Figure 9-2). Other, smaller mining operations are scattered throughout and adjacent to Clear Creek within this SS. Portion of the town of Idaho Springs were built on mine wastes generated by over 50 years of mining.

The Argo Tunnel was constructed was constructed around the turn of the century to serve as a transportation or access route for numerous mines in the area (Yeh and Associates, Inc., 2001). The other service the tunnel provided was water drainage from deep mines. Prior to 1998, the greatest increase in dissolved metal concentrations in mainstem Clear Creek occurred where the Argo Tunnel discharge entered the creek. Through the EPA Superfund program, a water treatment plant was constructed by CDPHE and went into operation April 7, 1998. The plant treats an average flow of 300 gallons per minute of

drainage from the tunnel. Nearly all the metals are now being removed from the effluent prior to discharge into Clear Creek.

9.1.2 Hydrology/Hydraulics/Stream Morphology/Floodplains

Within SS 7, Clear Creek flows in an easterly direction at a gradient of approximately 3 percent. Numerous streams enter Clear Creek in this SS, including Virginia Canyon from the north and Soda Creek and Chicago Creek from the south.

9.1.3 Wetland and Riparian Ecosystems

Palustrine scrub/shrub wetlands occur infrequently in SS 7, and only adjacent to Clear Creek. Approximately 0.4 mile of wetlands less than 100 feet wide occur along Clear Creek in this SS. Riparian areas are limited in this section primarily due to channelization, urban development, and historic mining.

9.1.4. Aquatic-dependent Communities

CDOW fish population investigations conducted at three locations within this SS (i.e., immediately upstream from Idaho Springs, at Riverside Park, and below the Argo Tunnel discharge) indicate that brown trout is the dominant fish species in this SS. All three sampling locations have exhibited reduced populations of brown trout compared to upstream Clear Creek. Brown trout populations immediately upstream from Idaho Springs ranged from 100 fish-per-acre during the fall 1996 to approximately 225 fish-per-acre in fall 1992. Brown trout populations at the Riverside Park station ranged from 30 fish-per-acre to approximately 80 fish-per-acre in spring 1996. Brown trout populations at the stations downstream from the Argo Tunnel discharge had the fewest numbers of fish, with population estimates ranging from approximately 10 fish-per-acre in spring 1996 to about 70 fish-per-acre in spring 1998. Concentrations of copper and zinc within this SS may be negatively affecting the brown trout population. Physical habitat (lack of slower deep pools) within this SS may also have negative effects on the brown trout populations.

The brook trout population decreased in the main stem of Clear Creek between 1989 and 1996. CDOW 1997 and 1998 sampling resulted in only three brook trout downstream from the West Fork of Clear Creek.

CDOW has stocked Snake River cutthroat trout in SS 7. As a result, these fish have been found throughout this SS. According to CDOW, the Snake River cutthroat trout do not reproduce in Clear Creek, but populations have historically been maintained by stocking. Stocking was curtailed in 1995 (CDOW, 1998). Longnose suckers have also been occasionally collected from this SS.

9.2 Issues

9.2.1 Historical Mining (Mineral) Influences

Water draining from mine tunnels, mine dumps, and tailings piles are often acidic and contain high levels of metals which can seep into Clear Creek or be carried into the stream by stormwater runoff (EPA, 1997). Disturbance of these areas through excavation activities not associated with mining (e.g., I-70 construction or municipal development) result in the oxidation of these minerals and eventual transport to Clear Creek.

Additionally, numerous mine adits occur west and north of Idaho Springs. Discharge from many of these adits contributes to the metals loading of Clear Creek.

9.2.2 Adjacent Land Use

Development associated with the town of Idaho Springs has increased the potential for point and nonpoint source discharges to Clear Creek. This development has also increased the potential for disturbing mineralized geology within the area.

9.2.3 Highway-related Construction, Operation and Maintenance Activities

Accidents involving the transportation of hazardous materials on I-70 impact Clear Creek. Because I-70 is a designated hazardous materials transportation route, the potential exists for such incidences to occur within this SS.

Highway runoff containing chemical deicers used for winter maintenance on I-70 may be entering Clear Creek. The runoff may affect the total dissolved solids and metals concentrations throughout SS 7.

Based on a review of current aerial photographs and wetland maps, construction of I-70 has eliminated or encroached upon less than 1 acre of wetlands adjacent to Clear Creek.

9.2.4 Sedimentation

Sand from CDOT winter maintenance operations on US 6 and I-70 and stormwater flow from municipalities (Idaho Springs), in addition to erosion of cut and fill slopes and nonvegetated streambanks, contribute to the sediment load in Clear Creek. The gradient within this SS increases the transport of these particles downstream.

9.2.5 Channelization/Downcutting

Because of the confined valley associated with Clear Creek within this SS, the stream has been extensively channelized or encroached as a result of urban development and I-70 construction (Figure 9-2). Of the 3 miles of Clear Creek within this SS, nearly all (97 percent) has been channelized either by highway construction, mining activities, or the town of Idaho Springs. Approximately 1.7 miles (57 percent) has been channelized or encroached on from highway development. Approximately 1.2 miles (40 percent) has been channelized or encroached on due to mining activities. The natural morphology of this reach of Clear Creek is described as a B2/B3/C3 high gradient narrow (small floodplain and entrenched) mountain stream with coarse substrate and sinuosity typically greater than 1.2 (Rosgen, 1996). The historic sinuosity estimated for SS 7 is 1.18. Current sinuosity is estimated at 1.12, further indicating that the sinuosity has been negatively affected by channelization. Although channelization has occurred as a result of the construction of I-70, overall stream habitat conditions have improved, based on a review of historic photographs depicting the physical degradation of the stream resulting from placer mining.

The extensive (97 percent) channelization or encroachment of highway construction and mining within this SS has affected fish habitat. However, based on the review of historic photographs, habitat conditions appear to be improved over those created by placer mining.

Based on a review of current aerial photographs and wetland maps, construction of I-70 has eliminated or encroached upon less than 1 acre of wetlands adjacent to Clear Creek.

9.2.6 Habitat Reduction and Fragmentation

Development within this SS has been extensive over the past 100 years. This area has experienced mining, milling, and urban development that have eliminated wetlands/riparian areas throughout this SS.

9.2.7 Water-based Recreation

Channelization associated with the construction of I-70 has enhanced the conditions for rafting and kayaking in Clear Creek by increasing depth and velocity of stream flow. Although channelization may have affected the quality of fish habitat throughout this section, habitat conditions appear to be improved over those present during and immediately after placer mining. Angling is also a major form of recreation within this SS.

Additional recreations opportunities within this segment include parks and picnicking areas within Idaho Springs.