4.0 SUBSIDENCE IMPACTS

A positive limit angle of 60° from horizontal was assumed to estimate the effects of subsidence on the seeps and springs found during the field inventory. This limit angle was selected to conform with previous work completed by Coal Systems (1981) for Genwal Coal Company. This positive limit angle is considered conservative for estimating subsidence impacts since Dunrud (1976) found positive limit angles that varies from 69° in weak overburden to 75° or more in moderately strong overburden in geologically similar areas in the Book Cliffs mining district, Utah and the Sommerset mining district, Colorado. The lower positive limit angle assumed for this assessment indicates a greater area of disturbance from subsidence.

Mine plans for the Crandall Canyon Mine indicate that 80 percent extraction will occur throughout the mine, with the exception of barrier pillars at the lease boundaries. The barrier pillar at the southern lease boundary will be sufficiently wide to preclude subsidence along Crandall Creek, thus limiting subsidence in areas north of the creek.

Using a positive limit angle of 60°, the maximum area of potential subsidence was determined as shown in Figure 3. As noted by this figure, 11 seeps and springs were found during the field inventory in the area of potential subsidence. A comparison with Table 1 indicates that, with the exception of SP-46 and SP-47, all of these 11 issue from the Blackhawk Formation. The two exceptions issue as seeps from bedding planes in the Castlegate Sandstone.

The maximum flow encountered within the area of potential subsidence was 1 gallon per minute (SP-30). This flow occurs as diffuse seepage above the mine portals and is collected in a pipe and routed around the portals to prevent problems at the portal face. There were no signs of usage of this spring. The only remaining spring discovered in the area of potential subsidence with a flow sufficient to sample (SP-38) showed some signs of deer and elk usage, but had a flow of less than 1 gallon per minute. All other sources issued as seeps with flows too small to permit sampling.

Deer and elk tracts and droppings were noted in the vicinity of SP-38 and SP-42. Other than these two seeps, no other signs of usage were seen within the area of potential subsidence.

Based on this information, subsidence from mining in Tracts 1 and 2 will have minimal impacts on water supplies from seeps and springs in the vicinity of the mine. Wildlife usage of the area to be impacted is essentially nonexistent, indicating

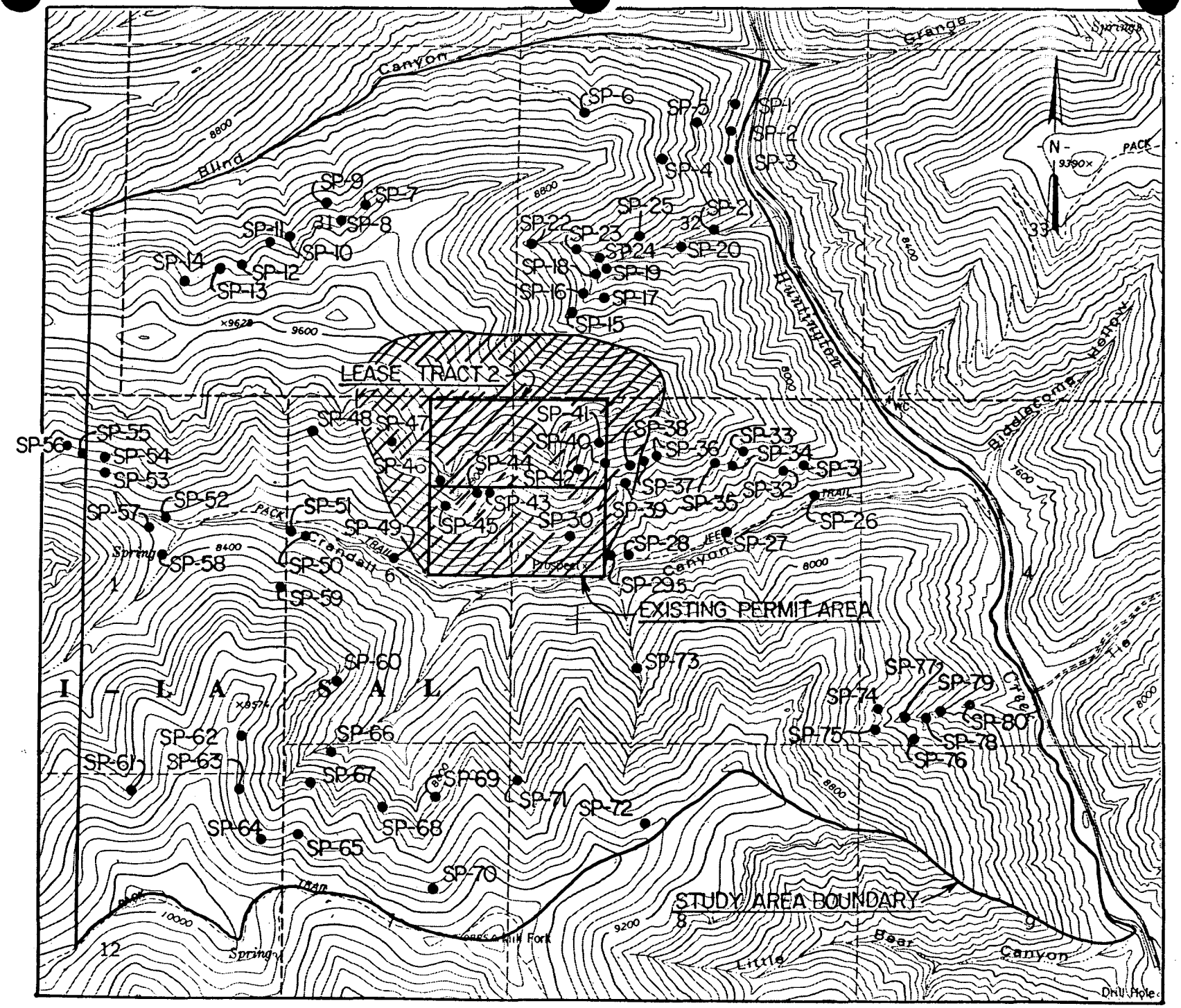

Figure 3. Maximum area of potential subsidence

that displacement of wildlife due to subsidence will be minimal. Flow rates encountered within the area of potential subsidence during the inventory were minimal, even though the field investigation was conducted shortly after the snow-melt period. Hence, the springs within the area of potential subsidence represent an insignificant resource to the local wildlife.