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Explanation:

KAISER COAL COMPANY'S HYDROLOGIC BASELINE MONITORING PLANS FOR SUNNYSIDE NUMBER 5 MINE.

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Preliminary

Kaiser Coal Company's
Hydrologic Baseline Monitoring Plan
For
Sunnyside Number 5 Mine

Springs and streams in and adjacent to the permit area will be monitored for two years to gather baseline data on seasonal variations on flow and quality of water in the study area. After the data collected during the baseline phase has been analyzed, sampling sites and
frequencies for operational monitoring will be revised.

Stream Monitoring.

Stream channels in the study area will be monitored on a monthly basis. The monthly field analysis will include flow measurement, and measurement of pH and conductivity. Detailed laboratory analysis of water quality samples will be conducted quarterly. Most of the monitoring sites are located in intermittent or ephemeral drainages; this may result in the collection of no data during some months.

Locations of the monitoring points are shown on the attached map. A perennial monitoring point is located in Whitmore Canyon near the downstream permit boundary. Rock Creek will be monitored as an intermittent stream at a point upstream of the confluence with the left fork of the watershed. The upper reach of Bear Canyon, which is fed by several springs, will be monitored as an intermittent stream also. These three sites will be measured by current meter, portable parshall flume, or by volumetric means as flow conditions dictate.

Ephemeral stations are located near the mouths of A Canyon, B Canyon, C Canyon, and Bear Canyon. These stations consist of a crest gage and a single-stage sediment sampler. At monthly visits, the high water stage will be determined from the crest gage, and a stage-discharge relationship will be used to determine peak discharge. It is expected that most site visits to these stations will result in a record of a no-flow month.

Analysis of quarterly water samples at the perennial and intermi[illegible] sites will include determinations of the following paramet[illegible] Surface Water Parameter List. Analysi[illegible] the single stage sediment sampler[illegible] only include total suspended solids[illegible] will be submitted to the State [illegible] on a quarterly basis.

Spring

Representative springs and seeps in the permit boundary and

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Analysis of quarterly water samples at the perennial and intermittent sites will include determinations of the following parameters, as shown in Table 1, Surface Water Parameter List. Analysis of any samples collected by the single stage sediment samplers at the ephemeral sites will only include total suspended solids. Records of flow and quality will be submitted to the State Division of Oil, Gas and Mining on a quarterly basis.

Spring and Seep Monitoring.

Representative springs and seeps in the permit boundary and

adjacent area were picked for baseline monitoring after extensive inventories were conducted in October, 1985 and June, 1986. More than 50 percent of the springs encountered in the survey were in the Whitmore Canyon drainage and issued from the Colton Formation; the density and location of monitoring springs were picked accordingly. Very few springs or seeps were found in the Book Cliff drainages; therefore few monitoring points are located within that area. Considerations in picking the monitoring sites were based upon the following:

(1) the representativeness of the spring regarding geologic occurrence, and the representativeness of the flow rate and quality of the spring within that geologic occurrence;

(2) the use of the spring: high priority was given springs that were developed for livestock use, had evidence of extensive wildlife use, and/or had water rights associated with them;

(3) the significance of flow: seeps with flows measured in June, 1986 of less than one gallon per minute were considered to be poor monitoring sites; and

(4) the accessibility of the spring.

The monitoring sites chosen based upon the above considerations are shown on the attached map. An additional two sites currently being monitored by Kaiser are also shown on this map. A listing of the sites, along with the formation in which they occur is shown in Table 2. These sites will be monitored four times a year, during the summer/fall season at montly intervals (July, August, September, October). Flow, temperature, pH and conductivity will be measured in the field. Flow will be measured volumetrically or with a portable parshall flume depending upon quantity of flow. Samples will be taken at each visit and sent for laboratory analysis. Parameters for analysis are shown in Table 3.

Table 1. Surface Water Parameter List

Total Settleable Solids
Total Suspended Solids
Total Dissolved Solids

Aluminum
Arsenic
Barium
Bicarbonate
Boron
Cadmium
Calcium
Carbonate
Chloride
Chromium
Copper
Flouride
Iron
Lead
Magnesium
Total Magnesium
Mercury
Molybdenum
Nickel
Nitrate
Nitrogen
Nitrite
Phosphate
Potassium
Selenium
Sodium
Sulfate
Sulfide
Zinc
Cation/Anion Balance

Trace metals will be analyzed in both total and dissolved forms.

Table 2. Spring Monitoring Sites

S-57: Price River Formation
S-182: North Horn Formation
S-208: North Horn Formation
S-144: Colton Formation
S-147: Colton Formation
S-163: Colton Formation
S-172: Whitmore Canyon Alluvium
S-196: Whitmore Canyon Alluvium

Table 3. Parameter List for Spring Sites

Total Dissolved Solids
Total Hardness
Aluminum
Arsenic
Barium
Boron
Carbonate
Cadmium
Calcium
Chloride
Chromium
Copper
Fluoride
Iron
Lead
Magnesium
Manganese
Mercury
Nickel
Nitrogen: Ammonia
Nitrite
Nitrate
Potassium
Phosphate
Selenium
Sodium
Sulfate
Sulfide
Zinc

Trace Metals will be analyzed in dissolved form only.