Hendricks Milling, Boulder, Colorado

Sampling Plan

OBJECTIVE

The purpose of this study is to assess the nature and extent of the hazard, actual or potential, posed by the Hendricks site in Boulder, Colorado. Soils, surface water, groundwater and air samples collected under this plan will be analyzed for heavy metal and/or radiological constituents. Analytical results will serve as input data for the Hazard Ranking Model.

OBJECTIVE

In the spring of 1982, the Colorado Department of Health submitted this site to Region VIII as a candidate for possible cleanup under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA or Superfund). Candidate sites qualify for possible Superfund cleanup on the basis of the health or environmental hazards they pose. EPA is presently assessing candidate sites nationwide using a Hazard Ranking Model (HRM). HRM scores will be used to develop the National Priorities List of 400 Superfund sites. A proposed list is scheduled for publication in August 1982. Allied Chemical Company was apparently the originator of this tailings pond. The radioactive material was segregated as a byproduct in production of of acid grade fluorspar and placed into what became a tailings pond. In 1971, "low-income" housing was being constructed in Boulder, Colorado. During this construction, radium-contaminated material was uncovered. It was also placed on this tailings site.

Figure 1 is a location map. The site is located on East Valmont Road, Boulder County. Past surveys by CDH indicated radioactive contamination at this site. However, additional quantitative information is needed on the radionuclides causing the contamination. In addition, no sampling data exists for heavy metal contamination, often associated with mining and/or milling at this type of site.

TECHNICAL INFORMATION

The site involves mill tailings and contaminated soil. Ore, tailings, fines and other contaminated debris are scattered across the site.

The material of concern is fluorspar which contains significantly elevated radiation levels. Because both vanadium and uranium are toxic, they are elements of concern. Also of concern, are radium, thorium and radon decay products and Pb, Cr, Cd, As, Cu, Zn, Se and Mo, heavy metals associated with milling in this area.

This will probably be more a hazard than uranium — at least than is normally the case with uranium wastes.

5/13/82

There is a potential for surface water contamination. The site is located adjacent to surface water. Because the site occurs on alluvium, composed of silt, sand and gravel, the potential for contamination of alluvial groundwater also exists. Alluvial groundwater flow will tend in the direction of surface water flow.

OPERATIONS PLAN

The following tasks will be performed at the site to collect data required by the Hazard Ranking Model.

Task 1: Conduct Radiation Survey

Survey instruments will be used to identify the extent of contamination and locate "hot spots", points of extreme contamination.

Task 2: Identify Surface Drainage Patterns

Routes of surface flow and erosion will be determined by field observation.

Task 3: Identify Other Potential Sources of Contamination

Other sources of environmental contamination will be evaluated.

Task 4: Sample Soil

Based on tasks 1, 2, and 3, soil sampling locations will be selected. Five to 10 samples will be collected in and downgradient of areas of contamination and in surface drainages. At least one sample will be collected upgradient of the site. Soils will be sampled to a depth of six inches with a stainless steel spoon.

too deep! For a single sample composite

Task 5: Collect Surface Water Samples

If surface water runoff is present at the time of sampling because of a recent or ongoing precipitation, aqueous samples will be collected in the drainages. In addition, if either: (1) runoff into a major stream is occurring or (2) soil contamination is detected down to a stream by survey instruments, the stream will be sampled at three locations. Aqueous and sediment samples will be collected with a stainless steel dipper or bucket at points proximate, downgradient and upgradient of the contamination. The total number of locations for this task is estimated to be 6 aqueous and 6 sediment.

Valmont Reservoir aqueous and sediment sampling may be required depending on results of the contamination survey. The total number of locations for this task is estimated to be 4 aqueous and 4 sediment. This includes, control.

If this reservoir is of any size 4 sampling stations will be totally inadequate. The Reservoir should be of separate undertaking.

Task 6: Collect Ground Water Samples

The State Engineers' records will be searched for wells within a three-mile radius of the site. The sampling team will attempt to collect groundwater samples from these wells. Samples will probably be taken from pumps or taps. An electric sounder and stainless steel bailer will be available if needed.

Task 7: Collect Air Samples

If occupied buildings are found on or adjacent to a site, radon sampling will be initiated.

ANALYTICAL PARAMETERS

Temperature, conductivity and pH measurements of aqueous samples will be performed in the field.

All samples, aqueous and solid, will be analyzed for heavy metals: V, Pb, Cr, Cd, As, Cu, Se, Mo and Zn. All aqueous samples will be analyzed, in addition, for TDS, TSS, gross alpha and beta. Selected aqueous and soil samples will be analyzed for radionuclides, radium 226, thorium 232, and uranium 238. The table below summarizes the maximum types and numbers of laboratory analyses, including duplicates and blanks.

	Aqueous	Solid	Total
Heavy metals (V, Pb, Cr, Cd, As, Cu, Zn)	8	22	30
TDS, TSS, gross alpha & beta	8	0	8
Radionuclides	3	6	9
Total:	19	28	47

QUALITY ASSURANCE

The tasks discussed in this section will be performed to insure that the data generated by the study will be accurate and defensible.

Upgradient samples will be collected at each site and of each medium. This establishes background levels for the contaminants of concern.

Field instruments will be calibrated daily against a known standard.

Duplicates and blanks will be sampled for each site. One field blank will be prepared daily. At least one aqueous and one soil duplicate will be collected.

no such animal!

Decontamination of sampling and survey equipment, as well as the outside of sample containers, will consist of a soap wash, triple tap water rinse, triple distilled-deonized water rinse and air drying.

EPA chain of custody and document control procedures will be adhered to at all times.

LOGISTICS

Sampling dates:
August 4-5, 1982

Sampling team:
Judith Wong, 8AW-WM
Martha Rosenberg, 8AW-WM
Paul Wagner, 8AW-RC

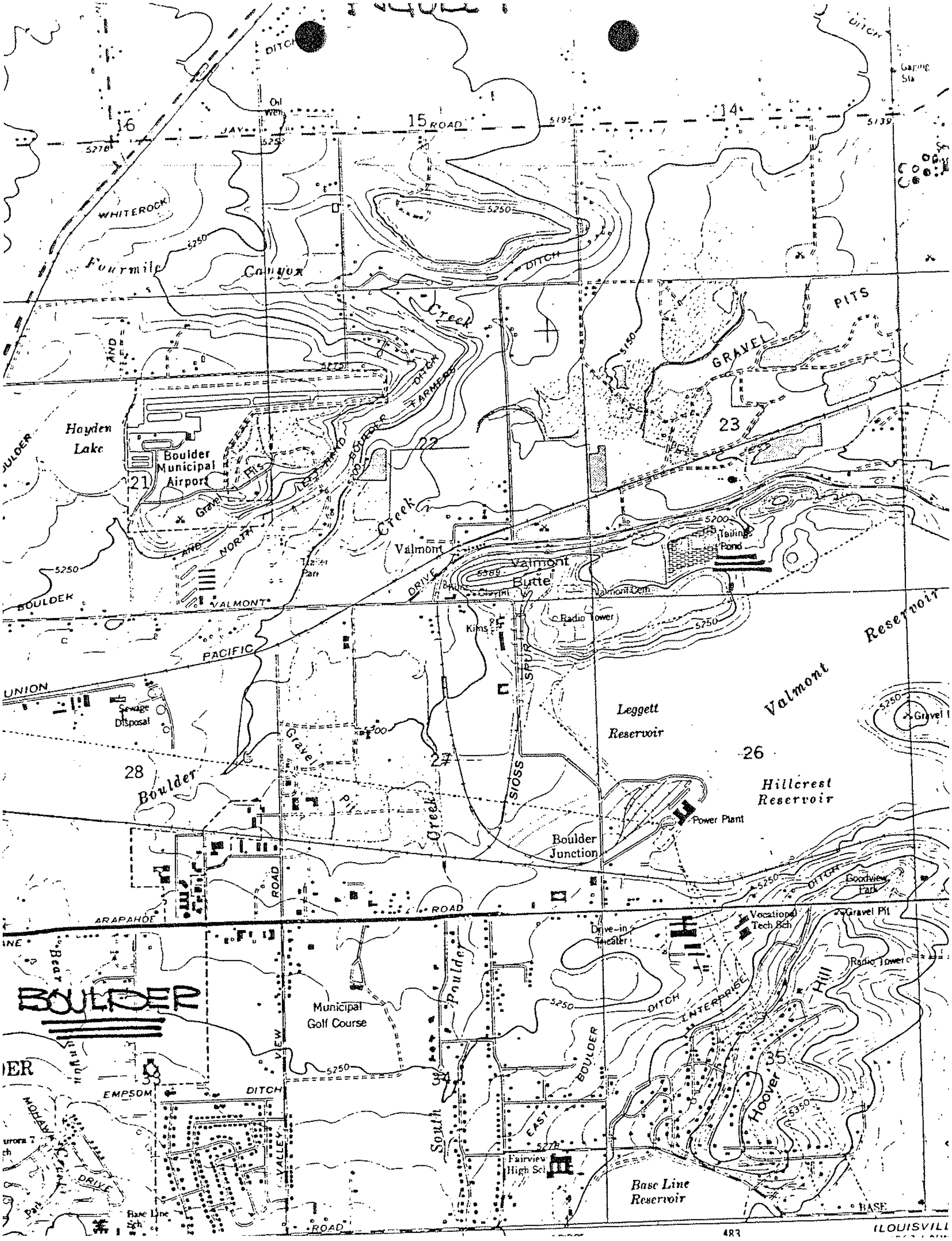
The following people will be notified at least 5 days prior to sampling:
Keith Schwab, DPO
Region 8 Lab
Other laboratories, as needed

The field equipment required for this study are:
radiation survey instruments and samplers
thermometer, pH and conductivity meters
stainless steel spoons, dippers, buckets, and bailer
electric sounder
two orchard sprayers for decontamination
camera and film

Document control and chain of custody procedures require:
field notebook
sample tags, laboratory services request forms
traffic reports (if contract lab)
chain of custody forms and seals
ice chests

SAFETY PLAN

Protective equipment and clothing for the sampling team will consist of chemically resistant coveralls, steel-toed boots, hard hats, and safety glasses. Gauntlet length neoprene gloves will be used when collecting samples Neoprene boots and respirators with particulate cartidges will be available if needed.



Oil Well
16
15
14
JAY
ROAD
5278
5195
5139
DITCH
Gaging Sta
WHITEROCK
Fourmile
Canyon
Creek
5250
DITCH
GRAVEL
PITS
5150
5272
FARMERS
LEFT HAND
BOULDER
Hayden Lake
Boulder Municipal Airport
21
Gravel Pits
AND NORTH
5200
22
23
Valmont
Valmont Butte
5369
Tailing Pond
Valmont Cem
Radio Tower
Kims
DRIVE
BOULDER
VALMONT
PACIFIC
UNION
Sewage Disposal
SPUR
Leggett Reservoir
Valmont Reservoir
26
27
28
Boulder
Gravel Pit
Creek
SIOSS
Hillcrest Reservoir
Power Plant
Boulder Junction
ROAD
ARAPAHOE
Goodview Park
Vocational Tech Sch
Gravel Pit
Drive-in Theater
Radio Tower
Hoover Hill
35
ENTERPRISE
DITCH
BOULDER
Bear Canyon
Municipal Golf Course
VIEW
VALLEY
South Boulder
EAST BOULDER
EMPSON
DITCH
5276
5350
Fairview High Sch
Base Line Reservoir
Base Line Sch
DRIVE
BASE
ROAD
483
LOUISVILL

ADDENDUM TO THE
HENDRICKS MILLING SAMPLING PLAN

Background

Mining in Central City, Colorado has resulted in a radioactive contamination problem. Uranium ore bodies were mined in conjunction with precious and base-metals ores, particularly gold mining. Pitchblend has been shipped from the Central City area since 1872. Most of this ore was used as a source of radium before 1917.

Fluorite ores of the Jamestown District (adjacent to Central City) contain base metal sulfides and some uranium ore.

Objective

The objective of the sampling is to assess the potential public health and environmental hazard posed by radioactive-contaminated mining materials at selected sites in the Central City/Jamestown Districts. The sampling results will be used to score the sites using the Hazard Ranking Model.

Procedure

The sampling will take place during the sampling of Hendricks Milling, August 4 and 5. The sampling protocol will be identical, conducted by the same personnel conducting the Hendricks Milling sampling.

The following table summarizes the number and kinds of samples:

	Aqueous	Solid	Total
Heavy metals (V, Pb, Cr, Cd, As, Cu, Zn)	16	20	36
TDS, TSS, gross alpha & beta	12	0	12
Radionuclides	6	6	12
Total:	34	26	60

Description of the Sampling Sites

Four mining locations will be sampled. A brief description of each follows.

Mine A: This mine was relatively small and produced high grade ore (Figure 1). About 38 cubic meters of wastes remain around the shaft and gamma exposure rates of 400 uR/hr were measured. Erosion of the wastes into the nearby wash was evident. Wind erosion is probably minimal. The mine shaft remains open but filled with water.

Mine B: This mine was principally a fluorspar producer; however, uranium ore was also produced and sold (Figure 2). The mine shaft remains open to the atmosphere. Mine wastes, adjacent to the shaft, occupy about 800 m^2. Gamma exposure rates on the waste pile ranged from 60-80 uR/hr. Extensive water erosion of the wastes has occurred and has produced exposure rates below the waste piles, ranging from 40-100 uR/hr. Wind erosion of the wastes is probable minimal.

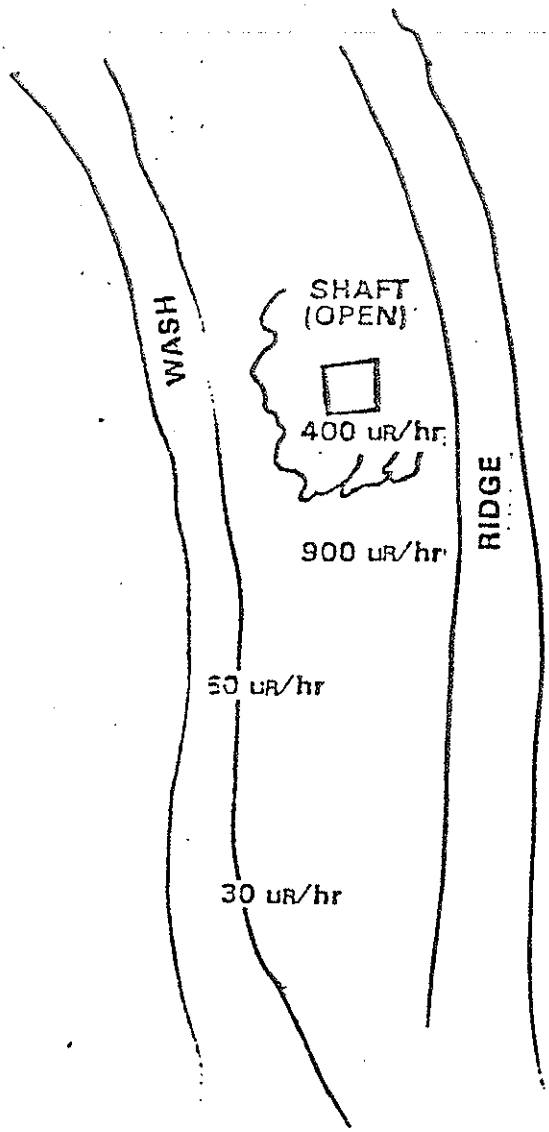
Mine C: The mine (Figure 3) was located adjacent to the highway just south of Jamestown, Colorado. The mine entry has been covered by a landslide. About 460 cubic meters of wastes over an area of about 400 m^2, are present on the site. Exposure rates near the entry were about 100 uR/hr and ranged from 40-60 uR/hr near the highway.

Mine D: This mine was relatively small and the entry remains open (Figure 4). Exposure rates near the entry ranged from 100-600 uR/hr. Exposure rates on the mine access road were about 70 uR/hr. Piles containing mine wastes occupy about 0.1 hectare with a volume of 150 cubic meters. Water and wind erosion of the wastes was evident.

In summary, all sites exhibit water and wind erosion problems. Dwellings may be built on or near the mine wastes. Surface and groundwater contamination is very possible. Direct contact is also possible because the areas of contamination are unfenced and there are no warning signs.

The facility was inspected several years ago by John Hardaway; I did some data do myself. If additional sampling is planned - no objection. However, all the data should be compiled. I am attaching my data file for the Jamestown Mine Study. Please see that the file is returned to me.

Waste Volume = 38m³
Surface Area = 0.04 Hectare

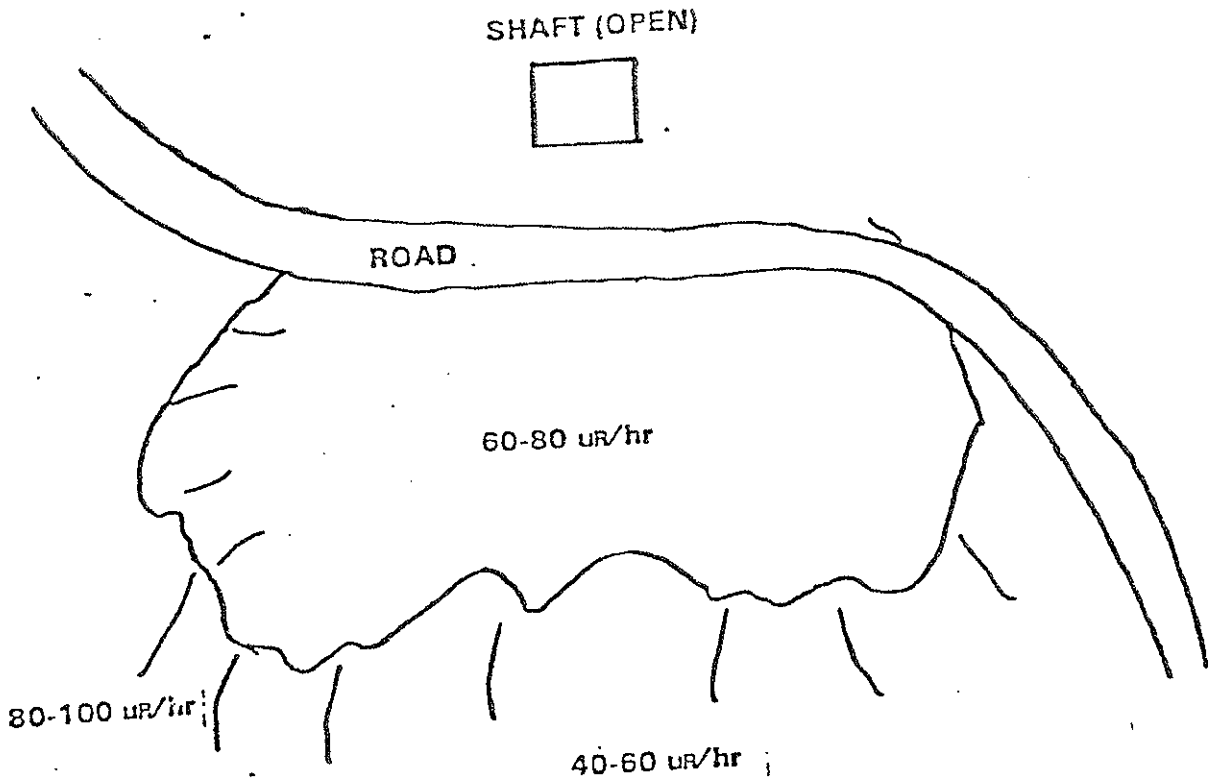


Plan view of inactive underground uranium mine A, related waste rock piles, and surface gamma exposure rates, Central City District, Colorado

FIGURE 1

Waste Volume = 1700m³

Surface Area = 0.1 Hectare



Plan view of inactive underground uranium mine B, related waste rock piles, and surface gamma exposure rates, Central City District, Colorado

FIGURE 2

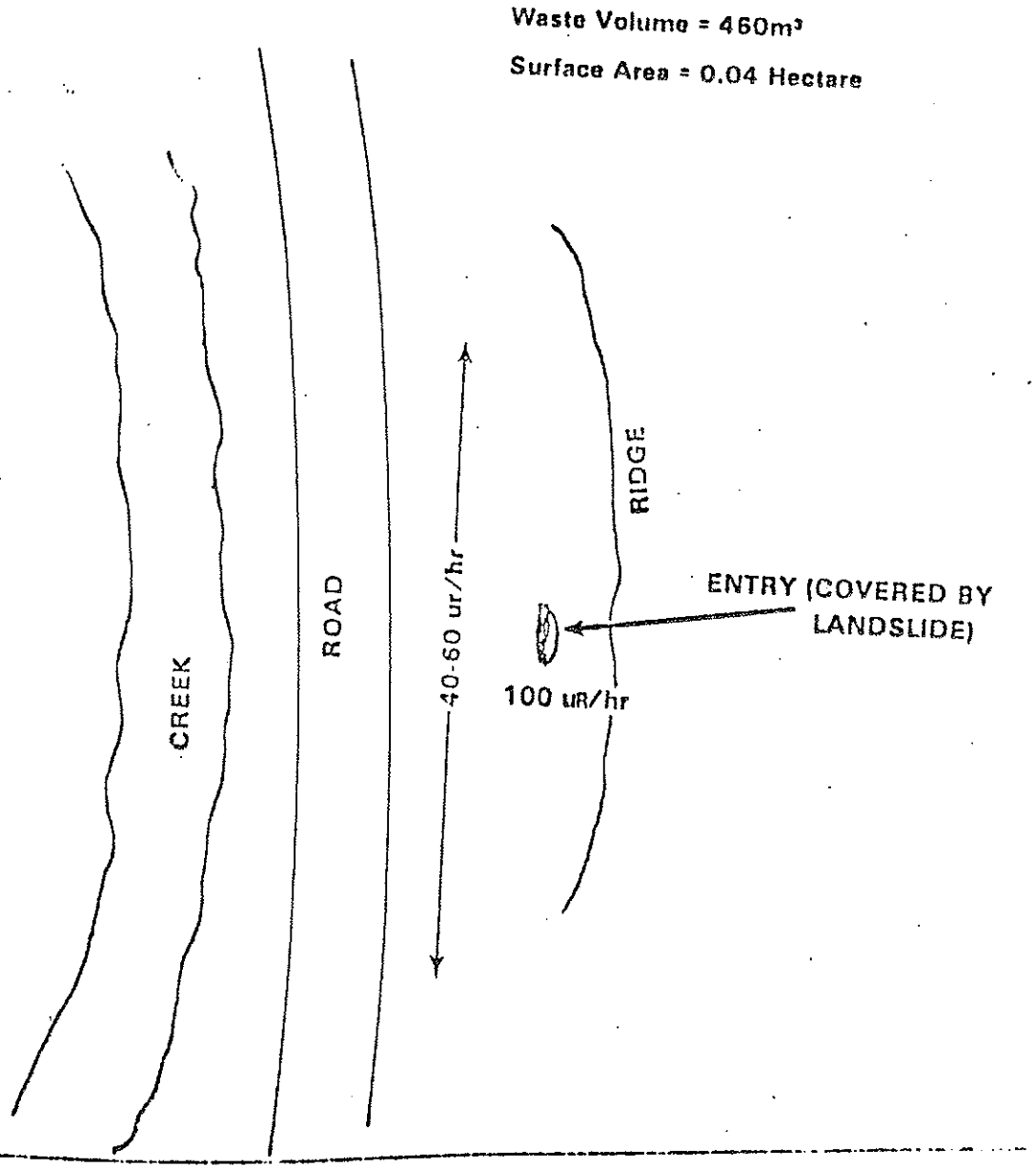
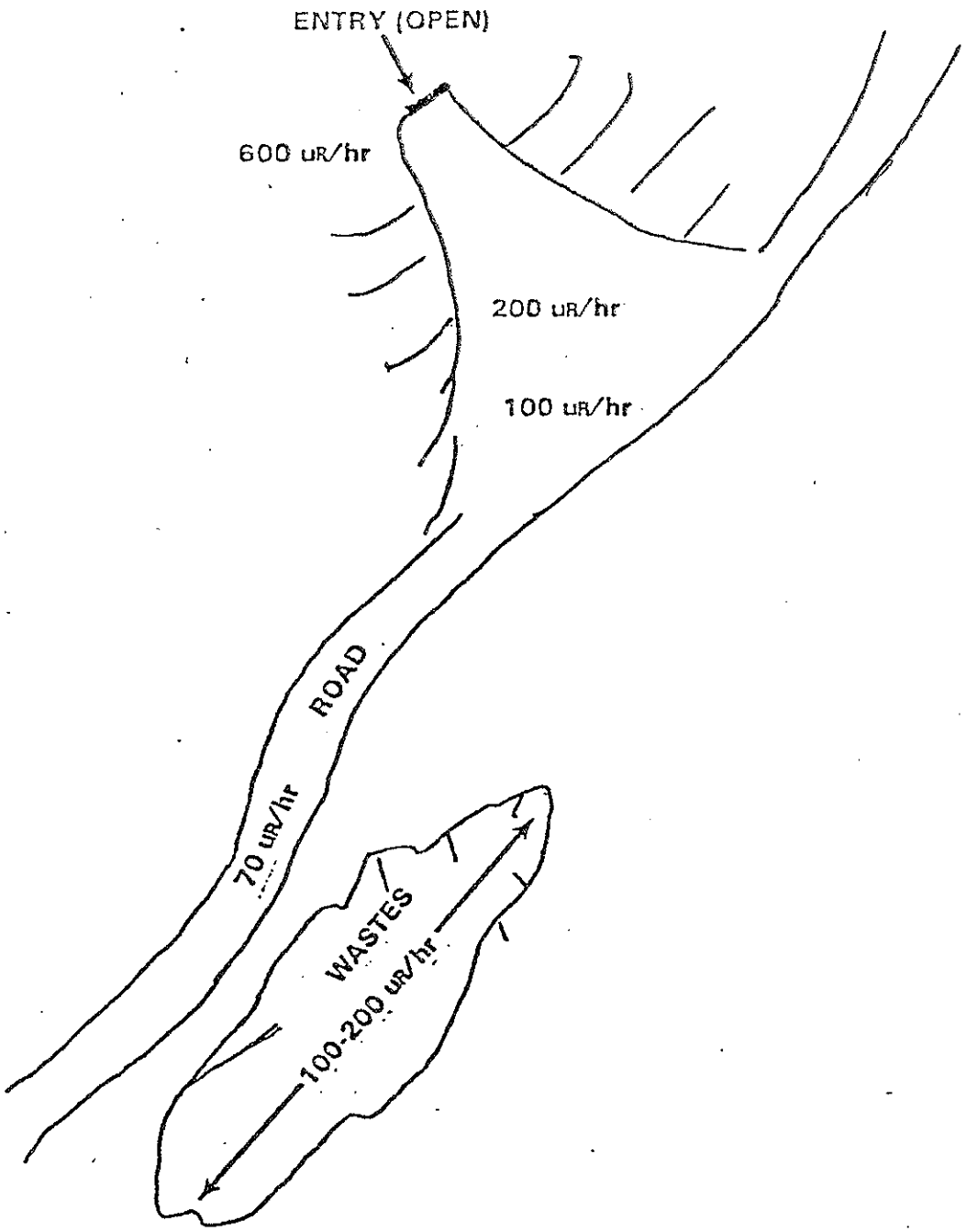


FIGURE 3

Plan view of inactive underground fluorspar uranium mine [illegible], related waste rock piles, and surface gamma exposure rates, near Jamestown, Colorado

Waste Volume = 150m³

Surface Area = 0.1 Hectare



Plan view of inactive underground uranium mine D, related waste rock piles, and surface gamma exposure rates, Central City District, Colorado

FIGURE 4