



ENVIRONMENTAL, HEALTH, SAFETY,  
AND GOVERNMENT AFFAIRS

November 26, 1996

UPS NEXT DAY AIR TRACKING LABEL: 0959 501 239 3  
DELIVERY CONFIRMATION NO.: R100 0066 748

U.S. Nuclear Regulatory Commission  
Division of Waste Management, MST-7-J-9  
Attn. Mr. Joseph J. Holonich, Chief  
High Level Waste and Uranium  
Recovery Projects Branch  
11555 Rockville Pike  
Rockville, MD 20850

Re: Docket No. 40-8903  
License No. SUA-1471  
Soil Sampling Results

Dear Mr. Holonich:

As per a request by Mr. Ken Hooks Homestake Mining Company of California is pleased to submit laboratory results for the eleven (11) soil samples taken during the NRC site visit on October 2, 1996. Also included is a map showing the sample site locations.

If you have any additional questions regarding this information please contact me at the Grants, 505-287-4456. Thank you.

Sincerely,

HOMESTAKE MINING COMPANY OF CALIFORNIA

Roy R. Cellan  
Corporate Manager, Reclamation

Attachment

xc: C. Cain, Director, NRC Arlington, TX

9611290356 961126  
PDR ADOCK 04008903  
C PDR

HOMESTAKE MINING COMPANY  
650 CALIFORNIA STREET • SAN FRANCISCO • CA 94108-2788 (415) 981-8150

NLOS  
11

**ENERGY LABORATORIES, INC.**

P.O. BOX 3258 • CASPER, WY 82602 • PHONE (307) 235-0515

2393 SALT CREEK HIGHWAY • CASPER, WY 82601 • FAX (307) 234-1639

**LABORATORY ANALYSIS REPORT - HOMESTAKE MINING COMPANY**

Page 1 of 11

Sample I.D.:  
Laboratory I.D. #:  
Sample Matrix:  
Sample Date:  
Date Received:  
Report Date:

|                   |
|-------------------|
| 5062              |
| 96-58409          |
| Soil              |
| 10-02-96          |
| 10-08-96          |
| November 10, 1996 |

| Radiometric                     | Method | Detection Limit | Units | Results | Date Analyzed |
|---------------------------------|--------|-----------------|-------|---------|---------------|
| Uranium (U <sub>nat</sub> )     | 908.1  | 0.02            | pCi/g | 1.61    | 10-23-96      |
| Radium 226 (Ra <sub>226</sub> ) | 903.0  | 0.02            | pCi/g | 2.4     | 11-04-96      |
| Radium Precision ±              |        |                 |       | 0.2     |               |

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**LABORATORY ANALYSIS REPORT - HOMESTAKE MINING COMPANY**

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Sample I.D.:  
Laboratory I.D. #:  
Sample Matrix:  
Sample Date:  
Date Received:  
Report Date:

|                   |
|-------------------|
| 5063              |
| 96-58410          |
| Soil              |
| 10-02-96          |
| 10-08-96          |
| November 10, 1996 |

| Radiometric                     | Method | Detection Limit | Units | Results | Date Analyzed |
|---------------------------------|--------|-----------------|-------|---------|---------------|
| Uranium (U <sub>NaI</sub> )     | 908.1  | 0.02            | pCi/g | 2.14    | 10-23-96      |
| Radium 226 (Ra <sub>226</sub> ) | 903.0  | 0.02            | pCi/g | 1.5     | 11-04-96      |
| Radium Precision ±              |        |                 |       | 0.2     |               |

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**LABORATORY ANALYSIS REPORT - HOMESTAKE MINING COMPANY**

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Sample I.D.:

Laboratory I.D. #:

Sample Matrix:

Sample Date:

Date Received:

Report Date:

|                   |
|-------------------|
| 5064              |
| 96-58411          |
| Soil              |
| 10-02-96          |
| 10-08-96          |
| November 10, 1996 |

| Radiometric               | Method | Detection Limit | Units | Results | Date Analyzed |
|---------------------------|--------|-----------------|-------|---------|---------------|
| Uranium ( $U_{nat}$ )     | 908.1  | 0.02            | pCi/g | 2.11    | 10-23-96      |
| Radium 226 ( $Ra_{226}$ ) | 903.0  | 0.02            | pCi/g | 3.0     | 11-04-96      |
| Radium Precision ±        |        |                 |       | 0.2     |               |

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**LABORATORY ANALYSIS REPORT - HOMESTAKE MINING COMPANY**

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Sample I.D.:  
Laboratory I.D. #:  
Sample Matrix:  
Sample Date:  
Date Received:  
Report Date:

|                   |
|-------------------|
| 5065              |
| 96-58412          |
| Soil              |
| 10-02-96          |
| 10-08-96          |
| November 10, 1996 |

| Radiometric               | Method | Detection Limit | Units | Results | Date Analyzed |
|---------------------------|--------|-----------------|-------|---------|---------------|
| Uranium ( $U_{nat}$ )     | 908.1  | 0.02            | pCi/g | 1.21    | 10-23-96      |
| Radium 226 ( $Ra_{226}$ ) | 903.0  | 0.02            | pCi/g | 1.4     | 11-04-96      |
| Radium Precision $\pm$    |        |                 |       | 0.2     |               |

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**LABORATORY ANALYSIS REPORT - HOMESTAKE MINING COMPANY**

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Sample I.D.:

Laboratory I.D. #:

Sample Matrix:

Sample Date:

Date Received:

Report Date:

5066

96-58413

Soil

10-02-96

10-08-96

November 10, 1996

| Radiometric                     | Method | Detection Limit | Units | Results | Date Analyzed |
|---------------------------------|--------|-----------------|-------|---------|---------------|
| Uranium (U <sub>nat</sub> )     | 908.1  | 0.02            | pCi/g | 1.37    | 10-23-96      |
| Radium 226 (Ra <sub>226</sub> ) | 903.0  | 0.02            | pCi/g | 1.8     | 11-04-96      |
| Radium Precision ±              |        |                 |       | 0.2     |               |

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**LABORATORY ANALYSIS REPORT - HOMESTAKE MINING COMPANY**

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Sample I.D.:  
Laboratory I.D. #:  
Sample Matrix:  
Sample Date:  
Date Received:  
Report Date:

|                   |
|-------------------|
| A-5067            |
| 96-58414          |
| Soil              |
| 10-02-96          |
| 10-08-96          |
| November 10, 1996 |

| Radiometric                     | Method | Detection Limit | Units | Results | Date Analyzed |
|---------------------------------|--------|-----------------|-------|---------|---------------|
| Uranium (U <sub>Nat</sub> )     | 908.1  | 0.02            | pCi/g | 1.96    | 10-23-96      |
| Radium 226 (Ra <sub>226</sub> ) | 903.0  | 0.02            | pCi/g | 4.1     | 11-04-96      |
| Radium Precision ±              |        |                 |       | 0.3     |               |



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**LABORATORY ANALYSIS REPORT - HOMESTAKE MINING COMPANY**

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Sample I.D.:

Laboratory I.D. #:

Sample Matrix:

Sample Date:

Date Received:

Report Date:

B-5067

96-58415

Soil

10-02-96

10-08-96

November 10, 1996

| Radiometric               | Method | Detection<br>Limit | Units | Results | Date<br>Analyzed |
|---------------------------|--------|--------------------|-------|---------|------------------|
| Uranium ( $U_{Nat}$ )     | 908.1  | 0.02               | pCi/g | 4.92    | 10-23-96         |
| Radium 226 ( $Ra_{226}$ ) | 903.0  | 0.02               | pCi/g | 6.4     | 11-04-96         |
| Radium Precision $\pm$    |        |                    |       | 0.4     |                  |



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**LABORATORY ANALYSIS REPORT - HOMESTAKE MINING COMPANY**

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Sample I.D.:

Laboratory I.D. #:

Sample Matrix:

Sample Date:

Date Received:

Report Date:

|                   |
|-------------------|
| S068              |
| 96-58416          |
| Soil              |
| 10-02-96          |
| 10-08-96          |
| November 10, 1996 |

| Radiometric                     | Method | Detection Limit | Units | Results | Date Analyzed |
|---------------------------------|--------|-----------------|-------|---------|---------------|
| Uranium (U <sub>nat</sub> )     | 908.1  | 0.02            | pCi/g | 2.34    | 10-23-96      |
| Radium 226 (Ra <sub>226</sub> ) | 903.0  | 0.02            | pCi/g | 5.9     | 11-04-96      |
| Radium Precision ±              |        |                 |       | 0.3     |               |

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**LABORATORY ANALYSIS REPORT - HOMESTAKE MINING COMPANY**

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Sample I.D.:

Laboratory I.D. #:

Sample Matrix:

Sample Date:

Date Received:

Report Date:

5069

96-58417

Soil

10-02-96

10-08-96

November 10, 1996

| Radiometric               | Method | Detection Limit | Units | Results | Date Analyzed |
|---------------------------|--------|-----------------|-------|---------|---------------|
| Uranium ( $U_{nat}$ )     | 908.1  | 0.02            | pCi/g | 0.6     | 10-23-96      |
| Radium 226 ( $Ra_{226}$ ) | 903.0  | 0.02            | pCi/g | 0.6     | 11-04-96      |
| Radium Precision $\pm$    |        |                 |       | 0.1     |               |

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**LABORATORY ANALYSIS REPORT - HOMESTAKE MINING COMPANY**

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Sample I.D.:

Laboratory I.D. #:

Sample Matrix:

Sample Date:

Date Received:

Report Date:

|                   |
|-------------------|
| 5070              |
| 96-58418          |
| Soil              |
| 10-02-96          |
| 10-08-96          |
| November 10, 1996 |

| Radiometric                     | Method | Detection Limit | Units | Results | Date Analyzed |
|---------------------------------|--------|-----------------|-------|---------|---------------|
| Uranium (U <sub>Nat</sub> )     | 908.1  | 0.02            | pCi/g | 0.6     | 10-23-96      |
| Radium 226 (Ra <sub>226</sub> ) | 903.0  | 0.02            | pCi/g | 0.5     | 11-04-96      |
| Radium Precision ±              |        |                 |       | 0.1     |               |



## RADIOCHEMICAL QUALITY ASSURANCE REPORT - HOMESTAKE MINING COMPANY

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Laboratory I.D.:  
Sample Matrix:  
Sample Date / Time:  
Date Received:  
Report Date:

|                   |
|-------------------|
| 96-58409-18       |
| Soil              |
| 10-02-96          |
| 10-08-96          |
| November 10, 1996 |

|               | Method | Duplicate<br>Precision<br>(Percent) | Spike<br>Recovery<br>(Percent) | LCS<br>Recovery<br>(Percent) | Method<br>Blank<br>(pCi/g) | Date<br>Analyzed | Analyst |
|---------------|--------|-------------------------------------|--------------------------------|------------------------------|----------------------------|------------------|---------|
| Laboratory #: |        | 96-58502                            | -                              | U-102                        | U-102                      |                  |         |
| Uranium:      | 908.1  | 100                                 | -                              | -                            | <0.02                      | 10-23-96         | TL      |
| Laboratory #: |        | 96-54982                            | 96-58418                       | RA-276                       | RA-276                     |                  |         |
| Radium 226:   | 903.0  | 91                                  | 95                             | 101                          | <0.02                      | 11-04-96         | RS      |

Report Approved By:  
lmh qc58409

Reviewed By:

Location: HMC Site, See Map for locations

Date Collected: Oct. 2, 1996

Date Sealed: Oct. 3, 1996

Date Read: Oct. 18, 1996

| SAMPLED BY AV AND JV. PREP SAMPLES PG. |               |                            |                            | 15 DAY READING SEALED        |                    |                        |                        | SOIL SAMPLES             |                     |                  |                              |      |
|--|---------------|----------------------------|----------------------------|------------------------------|--------------------|------------------------|------------------------|--------------------------|---------------------|------------------|------------------------------|------|
| LAB ID                                 | Samples ID.   | TOTAL COUNTS               |                            |                              | COUNT TIME SECONDS | CPS                    |                        |                          | TRUE SAMPLE CT. RAT | HMC Ra 226 pCi/g | Energy Wet Chem Ra 226 pCi/g |      |
|  |               | RA(ROI) 609KEV CH550-CH668 | TH(ROI) 911KEV CH861-CH961 | K(ROI) 1406KEV CH1338-CH1458 |                    | RA 609 KEV CH550-CH668 | TH 911 KEV CH861-CH961 | K 1460 KEV CH1338-CH1458 |                     |                  |                              |      |
| 5062                                   | NRC 1-D104086 | 3303                       | 1482                       | 1371                         | 1113               | 2.97                   | 1.33                   | 1.23                     | 1388.60             | 0.93             | 2.20                         | 2.40 |
| 5063                                   | NRC 2-E92059  | 3277                       | 1683                       | 1583                         | 1330               | 2.46                   | 1.27                   | 1.19                     | 1489.40             | 0.44             | 0.97                         | 1.50 |
| 5064                                   | NRC 3-D113213 | 6911                       | 2959                       | 2744                         | 2264               | 3.05                   | 1.31                   | 1.21                     | 1336.60             | 1.08             | 2.67                         | 3.00 |
| 5065                                   | NRC 4-D84033  | 3082                       | 1420                       | 1587                         | 1585               | 1.94                   | 0.90                   | 1.00                     | 1537.50             | 0.57             | 1.23                         | 1.40 |
| 5066                                   | NRC 5-D81097  | 3459                       | 1502                       | 1508                         | 1515               | 2.28                   | 0.99                   | 1.00                     | 1579.80             | 0.78             | 1.64                         | 1.80 |
| 5067 A                                 | NRC 6-D74063  | 3651                       | 1305                       | 1300                         | 1036               | 3.52                   | 1.26                   | 1.25                     | 1517.50             | 1.78             | 3.87                         | 4.10 |
| 5067 B                                 | NRC 7-D74077  | 8292                       | 2549                       | 2287                         | 1588               | 5.22                   | 1.61                   | 1.44                     | 1451.80             | 3.16             | 7.18                         | 6.40 |
| 5068                                   | NRC 8-D24072  | 6744                       | 2077                       | 2108                         | 1440               | 4.68                   | 1.44                   | 1.46                     | 1512.40             | 2.85             | 6.23                         | 5.90 |
| 5069                                   | NRC 9-E64223  | 2140                       | 1065                       | 1092                         | 1212               | 1.77                   | 0.88                   | 0.90                     | 1480.60             | 0.37             | 0.83                         | 0.60 |
| 5070                                   | NRC 10-E74254 | 1947                       | 1082                       | 1092                         | 1176               | 1.66                   | 0.92                   | 0.93                     | 1495.30             | 0.15             | 0.33                         | 0.50 |

[illegible]

- Source and Background data

| DATE 10-17-96 | Ra226 SOURCE = |              | Ra226 Source |       | Ra226 Source |        | TH 232 Source = |              | TH 232 Source |               | KCL SOURCE =   |             | BKG (SUGAR) |             | 10-4-96       |               |
|---------------|----------------|--------------|--------------|-------|--------------|--------|-----------------|--------------|---------------|---------------|----------------|-------------|-------------|-------------|---------------|---------------|
|               | 25800 pCi      | Ra226 Source | 911KEV(ROI)  | CH961 | 1406KEV(ROI) | CH1458 | TH232 Source    | TH232 Source | TH232 Source  | TH232 Source  | 604.00 grams K | 911 KEV     | Ra226       | TH232       | K40           | 1406 KEV      |
| Source Read   |                | Ra226 Source | 911KEV(ROI)  | CH961 | 1406KEV(ROI) | CH1458 | TH232 Source    | TH232 Source | TH232 Source  | TH232 Source  | 604.00 grams K | 911 KEV     | Ra226       | TH232       | K40           | 1406 KEV      |
|               |                | 609KEV (ROI) |              |       |              |        | 609KEV (ROI)    | 911KEV(ROI)  | 1406KEV(ROI)  | 1406KEV(ROI)  | 609KEV (ROI)   | (ROI)       | (ROI)       | (ROI)       | (ROI)         | (ROI)         |
|               |                | CH549-CH658  |              | CH961 | CH1458       |        | CH549-CH658     | CH961-CH961  | CH1338-CH1458 | CH1338-CH1458 | CH549-CH658    | CH961-CH961 | CH549-CH549 | CH961-CH961 | CH1338-CH1458 | CH1338-CH1458 |
| TOTAL COUNTS  | 528642.00      | 111533.00    |              |       |              |        | 32400.00        | 22052.00     | 11933.00      | 11933.00      | 16210.00       | 13499.00    | 41068.00    | 23453.00    | 17762.00      |               |
| TIME SECONDS  | 54000.00       | 54000.00     |              |       |              |        | 7538.00         | 7538.00      | 7538.00       | 7538.00       | 2610.00        | 2610.00     | 54000.00    | 54000.00    | 54000.00      |               |
| COUNTS/SECOND | 9.790          | 2.0654       |              |       |              |        | 4.30            | 2.93         | 1.58          | 1.58          | 6.21           | 5.17        | 0.76        | 0.43        | 0.33          |               |



Hmc site,

HOMESTAKE MINING COMPANY  
EDF - 1 SOIL SAMPLES

Location See Attached Map for Locations  
 Date Sampled 10-2-96 Tech. H Tech J. U  
 Date Sealed 10-3-96 Tech. H Tech J. U  
 Date To Be Read 10-18-96

| Lab ID | SAMPLE ID         | GROSS WEIGHT | TARE WEIGHT | SAMPLE WEIGHT | Ra-226<br>TOTAL COUNTS<br>CH1530-CH1540 | Ra-226<br>TOTAL COUNTS<br>RA(ROI)609KEV<br>CH550-CH560 | RA-226<br>TOTAL COUNTS<br>CH670-CH680 | Th-230<br>TOTAL COUNTS<br>TH(ROI)911KEV<br>CH861-CH901 | K-40<br>TOTAL COUNTS<br>K(ROI)1406KEV<br>CH1338-CH1458 | COUNT<br>TIME<br>(SECONDS) | Ra-226<br>pCi/g<br>FROM<br>GAMMA |
|--------|-------------------|--------------|-------------|---------------|---|--|---------------------------------------|--|--|----------------------------|----------------------------------|
| 5062   | #1-D10222         | 1527.6       | 138.8       | 1388.6        | 265                                     | 3303   | 170                                   | 1482   | 1371   | 1113                       |                                  |
| 5063   | #2-E10111         | 1627.7       | 138.3       | 1489.4        | 299                                     | 3277   | 182                                   | 1683   | 1583   | 1330                       |                                  |
| 5064   | #3-D11319         | 1477.6       | 139.0       | 1338.6        | 473                                     | 6911   | 336                                   | 2959   | 2744   | 2264                       |                                  |
| 5065   | #4-D08223         | 1676.8       | 139.3       | 1537.5        | 266                                     | 3082   | 167                                   | 1420   | 1587   | 1585                       |                                  |
| 5066   | #5-D0818          | 1719.5       | 139.7       | 1579.8        | 283                                     | 3459   | 194                                   | 1502   | 1508   | 1515                       |                                  |
| A-5067 | #6-D0738          | 1655.9       | 138.4       | 1517.5        | 267                                     | 3651   | 150                                   | 1305   | 1300   | 1036                       |                                  |
| B-5067 | #6-D0738          | 1596.8       | 139.0       | 1457.8        | 550                                     | 8292   | 356                                   | 2549   | 2287   | 1588                       |                                  |
| 5068   | #7-D02210         | 1651.6       | 134.2       | 1517.4        | 218                                     | 6744   | 331                                   | 2077   | 2108   | 1440                       |                                  |
| 5069   | #8-AS1.1 E10.2    | 1619.1       | 138.5       | 1480.6        | 201                                     | 2140   | 123                                   | 1065   | 1092   | 1212                       |                                  |
| 5070   | #9-AS1.1+50 E14.2 | 1633.8       | 138.5       | 1495.3        | 170                                     | 1947   | 121                                   | 1082   | 1092   | 1176                       |                                  |

Date Read 10-18-96 Tech. H Tech J. U Tech \_\_\_\_\_

Comments \_\_\_\_\_

## Calibration of a Canberra S-35+ MCA

1.) Place the calibration standard on NaI detector inside the cave.

Date: 10-18-96  
10-16-96

2.) Check the settings of the 35+ MCA:

- a.) ADC gain set at:
- b.) ADC offset set at:
- c.) Course gain set at:
- d.) Fine gain set at:
- e.) LLD set at:
- f.) Memory switch is set at:
- g.) Vertical range is set at:

Tech : Adrian Vena  
Source : CS 137  
4.44 uCi  
2150 / 90  
10-26-90  
HV Supply : 0.90

3.) Turn on ROI (Regions of Interest) check that:

- ROI #1 begins at:
- ROI #1 ends at:
- ROI #2 begins at:
- ROI #2 ends at:
- ROI #3 begins at:
- ROI #3 ends at:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4.) Make sure Live Time is set for \_\_\_\_\_ seconds.

5.) Place the 35+ in the collect mode by depressing the collect button.

6.) After 120 seconds check with the cursor that the peak is in channel. 10-16-96 130 Seconds

10-18-96 121

659 662 = 3  
660 662 = 2

7.) Visually inspect the spectrum to insure that no other peaks are in the same area of the ROI's, and that the peaks are completely in the ROI's.

8.) The spectrum having meet the above criteria will continue counting and the results placed in the QA document.

9.) Should the spectrum not meet the above criteria, or the results be more than 10% or 2 sigma from the mean the supervisor will be notified.

## Calibration of a Canberra S-35+ MCA

1.) Place the calibration standard on NaI detector inside the cave.

Date: 10-18-96  
10-16-96

2.) Check the settings of the 35+ MCA:

- a.) ADC gain set at:
- b.) ADC offset set at:
- c.) Course gain set at:
- d.) Fine gain set at:
- e.) LLD set at:
- f.) Memory switch is set at:
- g.) Vertical range is set at:

Tech : Adrian Vena  
Source : CS 137  
4.44 uCi  
2150 / 90  
10-26-98  
HV Supply : 0.90

3.) Turn on ROI (Regions of Interest) check that:

ROI #1 begins at: \_\_\_\_\_

ROI #1 ends at: \_\_\_\_\_

ROI #2 begins at: \_\_\_\_\_

ROI #2 ends at: \_\_\_\_\_

ROI #3 begins at: \_\_\_\_\_

ROI #3 ends at: \_\_\_\_\_

4.) Make sure Live Time is set for \_\_\_\_\_ seconds.

5.) Place the 35+ in the collect mode by depressing the collect button.

6.) After 120 seconds check with the cursor that the peak is in channel. 10-16-96 130 Seconds

10-18-96

121

659  $\frac{662}{662} = \frac{3}{2}$   
660

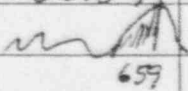
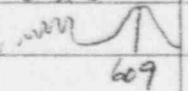
7.) Visually inspect the spectrum to insure that no other peaks are in the same area of the ROI's, and that the peaks are completely in the ROI's.

8.) The spectrum having meet the above criteria will continue counting and the results placed in the QA document.

9.) Should the spectrum not meet the above criteria, or the results be more than 10% or 2 sigma from the mean the supervisor will be notified.

HOMESTAKE MINING COMPANY  
EDF - 1 SOIL SAMPLES

Location \_\_\_\_\_  
 Date Sampled \_\_\_\_\_ Tech. \_\_\_\_\_ Tech. \_\_\_\_\_  
 Date Sealed \_\_\_\_\_ Tech. \_\_\_\_\_ Tech. \_\_\_\_\_  
 Date To Be Read \_\_\_\_\_

| Lab ID   | SAMPLE ID     | GROSS WEIGHT | TARE WEIGHT | SAMPLE WEIGHT | Ra-226<br>TOTAL COUNTS<br>CH530-CH540 | Ra-226<br>TOTAL COUNTS<br>RA(ROI)609KEV<br>CH550-CH660                              | RA-226<br>TOTAL COUNTS<br>CH670-CH680 | Th-230<br>TOTAL COUNTS<br>TH(ROI)911KEV<br>CH861-CH981 | K-40<br>TOTAL COUNTS<br>K(ROI)1406KEV<br>CH1338-CH1458 | COUNT TIME<br>(SECONDS) | Ra-226<br>pCi/g<br>FROM<br>GAMMA |
|----------|---------------|--------------|-------------|---------------|---------------------------------------|---|---------------------------------------|--|--|-------------------------|----------------------------------|
| 10-11-96 | Sugar         |              |             |               | 4547                                  | 40479   | 3327                                  | 22987  | 16754  | 54000                   |                                  |
| 10-16-96 | KS 137 source |              |             |               | 1752                                  | 186137  | 44653                                 | 690  | 55   | 130                     |                                  |
|          |               |              |             |               |                                       |  |                                       |  |  |                         |                                  |
| 10-17-96 | Ra-226 source |              |             |               | 24873                                 | 528642  | 16281                                 | 111533   | 78358  | 54000                   |                                  |
|          |               |              |             |               |                                       |  |                                       |  |  |                         |                                  |
| 10-18-96 | Sugar BRC     |              |             |               | 4902                                  | 41069   | 3196                                  | 23453  | 17762  | 54000                   |                                  |
| 10-18-96 |               |              |             |               | 1781                                  | 186149  | 44661                                 | 686  | 57   | 121                     |                                  |
|          |               |              |             |               |                                       |   |                                       |  |  |                         |                                  |

Date Read \_\_\_\_\_ Tech. \_\_\_\_\_ Tech. \_\_\_\_\_ Tech. \_\_\_\_\_

Comments \_\_\_\_\_

Location: HMC Site, See Map for locations

Date Collected: Oct. 7, 1996

Date Sealed: Oct. 8, 1996

Date Read: Oct. 23, 1996

SAMPLED BY AV AND JV. PREP SAMPLES RG.

15 DAY READING SEALED

SOIL SAMPLES

| LAB<br>ID | Samples<br>ID. | TOTAL COUNTS   |                |                | COUNT TIME<br>SECONDS | CPS         |             |               | SAMPLE<br>WT. | TRUE<br>SAMPLE<br>CT. RAT | HMC<br>Ra 226<br>pCi/g | Energy<br>Wet Chem<br>Ra 226<br>pCi/g |
|-----------|----------------|----------------|----------------|----------------|-----------------------|-------------|-------------|---------------|---------------|---------------------------|------------------------|---------------------------------------|
|           |                | RA(ROI) 609KEV | TH(ROI) 911KEV | K(ROI) 1406KEV |                       | RA 609 KEV  | TH 911 KEV  | K 1460 KEV    |               |                           |                        |                                       |
|           |                | CH550-CH668    | CH861-CH961    | CH1338-CH1458  |                       | CH550-CH668 | CH861-CH961 | CH1338-CH1458 |               |                           |                        |                                       |
| 5071      | NRC 11-C32124  | 81141          | 26455          | 26275          | 19067                 | 4.26        | 1.39        | 1.38          | 1543.20       | 2.43                      | 5.19                   | 4.70                                  |
| 5071      | NRC 11-C32124  | 9252           | 2949           | 2972           | 2170                  | 4.26        | 1.36        | 1.37          | 1543.20       | 2.50                      | 5.35                   |                                       |

[illegible]



## Source and Background data

| DATE 10-17-96 | RA226 SOURCE =<br>25900 pCi                 | TH 232 Source=<br>9625.00 pCi               | KCL SOURCE =<br>604.00 grams K                | BKG (SUGAR)<br>TH232                     | 10-4-96<br>K40                          |
|---------------|---|---|---|--|---|
| Source Read   | RA226 Source<br>911KEV (ROI)<br>CH861-CH961 | TH232 Source<br>609KEV (ROI)<br>CH549-CH658 | TH232 Source<br>911KEV (ROI)<br>CH1338-CH1458 | RA226<br>1406 KEV 809 KEV<br>(ROI) (ROI) | 1406 KEV<br>(ROI)                       |
| TOTAL COUNTS  | 529642.00                                   | 78358.00                                    | 11933.00                                      | 13498.00                                 | CH1338-CH1458<br>CH1338-1458 (C/S) / PC |
| TIME SECONDS  | 54000.00                                    | 54000.00                                    | 7538.00                                       | 2510.00                                  | 22453.00                                |
| COUNTS/SECOND | 9.790                                       | 1.45  | 1.58  | 5.17                                     | 54000.00                                |
|               |   |   |   | 16.04                                    | 0.33                                    |



HOMESTAKE MINING COMPANY  
EDF - 1 SOIL SAMPLES

Location See map for Location  
Date Sampled 10-3-96 Tech. AK Tech JL  
Date Sealed 10-8-96 Tech.            Tech             
Date To Be Read 10-23-96

[illegible]

Date Read \_\_\_\_\_ Tech. \_\_\_\_\_ Tech \_\_\_\_\_ Tech \_\_\_\_\_

Comments \_\_\_\_\_

## Calibration of a Canberra S-35+ MCA

1.) Place the calibration standard on NaI detector inside the cave.

Date: 10-23-96

2.) Check the settings of the 35+ MCA:

- a.) ADC gain set at:
- b.) ADC offset set at:
- c.) Course gain set at:
- d.) Fine gain set at:
- e.) LLD set at:
- f.) Memory switch is set at:
- g.) Vertical range is set at:

|             |                         |
|-------------|-------------------------|
| <u>2048</u> | Tech : <u>744</u>       |
| <u>10</u>   | Source : <u>CS 137</u>  |
| <u>8.44</u> | <u>4.44 MCA</u>         |
| <u>0</u>    | <u>2150 190</u>         |
| <u>111</u>  | <u>10-24-90</u>         |
| <u>14K</u>  | HV Supply : <u>0-90</u> |

3.) Turn on ROI (Regions of Interest) check that:

- ROI #1 begins at: \_\_\_\_\_
- ROI #1 ends at: \_\_\_\_\_
- ROI #2 begins at: \_\_\_\_\_
- ROI #2 ends at: \_\_\_\_\_
- ROI #3 begins at: \_\_\_\_\_
- ROI #3 ends at: \_\_\_\_\_

4.) Make sure Live Time is set for \_\_\_\_\_ seconds.

5.) Place the 35+ in the collect mode by depressing the collect button.

6.) After 120 seconds check with the cursor that the peak is in channel.

137 Seconds  
123

661 662 = 1  
644 2

7.) Visually inspect the spectrum to insure that no other peaks are in the same area of the ROI's, and that the peaks are completely in the ROI's.

8.) The spectrum having meet the above criteria will continue counting and the results placed in the QA document.

9.) Should the spectrum not meet the above criteria, or the results be more than 10% or 2 sigma from the mean the supervisor will be notified.

# HOMESTAKE MINING COMPANY

## EDF - 1 SOIL SAMPLES

Location \_\_\_\_\_

Date Sampled \_\_\_\_\_ Tech. \_\_\_\_\_ Tech \_\_\_\_\_

Date Sealed \_\_\_\_\_ Tech. \_\_\_\_\_ Tech \_\_\_\_\_

Date To Be Read \_\_\_\_\_

| Lab ID  | SAMPLE ID | GROSS WEIGHT | TARE WEIGHT | SAMPLE WEIGHT | Ra-226<br>TOTAL COUNTS<br>CH530-CH540 | Ra-226<br>TOTAL COUNTS<br>RA(RO1)609KEV<br>CH550-CH660 | RA-226<br>TOTAL COUNTS<br>CH670-CH680 | Th-230<br>TOTAL COUNTS<br>TH(RO1)911KEV<br>CH861-CH961 | K-40<br>TOTAL COUNTS<br>K(RO1)1406KEV<br>CH1338-CH1458 | COUNT TIME<br>(SECONDS) | Ra-226<br>pCi/g<br>FROM<br>GAMMA |
|---------|-----------|--------------|-------------|---------------|---------------------------------------|--|---------------------------------------|--|--|-------------------------|----------------------------------|
| 10246   | Surjan    |              |             |               | 1866                                  | 16155  | 1273                                  | 9097   | 6867   | 21079                   |                                  |
| 103196  | Ra 226    |              |             |               | 24471                                 | 524757   | 16052                                 | 111376   | 75659  | 54000                   |                                  |
| 1103116 | Cs 137    |              |             |               | 1543                                  | 139721<br>661  | 45461                                 | 534  | 54   | 137                     |                                  |
|         |           |              |             |               |                                       |  |                                       |  |  |                         |                                  |
|         |           |              |             |               |                                       |  |                                       |  |  |                         |                                  |
|         |           |              |             |               |                                       |  |                                       |  |  |                         |                                  |
|         |           |              |             |               |                                       |  |                                       |  |  |                         |                                  |
|         |           |              |             |               |                                       |  |                                       |  |  |                         |                                  |
|         |           |              |             |               |                                       |  |                                       |  |  |                         |                                  |
|         |           |              |             |               |                                       |  |                                       |  |  |                         |                                  |
|         |           |              |             |               |                                       |  |                                       |  |  |                         |                                  |

Date Read \_\_\_\_\_ Tech. \_\_\_\_\_ Tech \_\_\_\_\_ Tech \_\_\_\_\_

Comments \_\_\_\_\_

**ENERGY LABORATORIES, INC.**

P.O. BOX 3258 • CASPER, WY 82602 • PHONE (307) 235-0515

2393 SALT CREEK HIGHWAY • CASPER, WY 82601 • FAX (307) 234-1639

**LABORATORY ANALYSIS REPORT - HOMESTAKE MINING COMPANY**

Page 1 of 2

Sample I.D.:

Laboratory I.D. #:

Sample Matrix:

Sample Date:

Date Received:

Report Date:

|                   |
|-------------------|
| 5071              |
| 96-58503          |
| Soil              |
| 10-03-96          |
| 10-10-96          |
| November 10, 1996 |

| Radiometric                     | Method | Detection Limit | Units | Results | Date Analyzed |
|---------------------------------|--------|-----------------|-------|---------|---------------|
| Uranium (U <sub>nat</sub> )     | 908.1  | 0.02            | pCi/g | 2.27    | 10-24-96      |
| Radium 226 (Ra <sub>226</sub> ) | 903.0  | 0.02            | pCi/g | 4.7     | 11-06-96      |
| Radium Precision ±              |        |                 |       | 0.3     |               |



## RADIOCHEMICAL QUALITY ASSURANCE REPORT - HOMESTAKE MINING COMPANY

Page 2 of 2

Laboratory I.D.:  
Sample Matrix:  
Sample Date / Time:  
Date Received:  
Report Date:

|                   |
|-------------------|
| 96-58503          |
| Soil              |
| 10-03-96          |
| 10-10-96          |
| November 10, 1996 |

|               | Method | Duplicate<br>Precision<br>(Percent) | Spike<br>Recovery<br>(Percent) | LCS<br>Recovery<br>(Percent) | Method<br>Blank<br>(pCi/g) | Date<br>Analyzed | Analyst |
|---------------|--------|-------------------------------------|--------------------------------|------------------------------|----------------------------|------------------|---------|
| Laboratory #: |        | 96-58957                            | 96-58947                       | U-104                        | U-104                      |                  |         |
| Uranium:      | 908.1  | 100                                 | 98                             | 92                           | <0.02                      | 10-24-96         | TL      |
| Laboratory #: |        | 96-59652                            | 96-58761                       | RA-282                       | RA-282                     |                  |         |
| Radium 226:   | 903.0  | 98                                  | 99                             | 112                          | <0.02                      | 11-06-96         | RS      |

Report Approved By:  
lmh qc58503

Reviewed By: