HOMESTAKE MINING COMPANY
GRANTS--OPERATION

Semi-Annual Environmental Report

July-December
1987

January-June
1988

July-December
1988

January-June
1989

U.S. Nuclear Regulatory Commission

Summary Report
Effluent Monitoring Records
For
HOMESTAKE MINING COMPANY-GRANTS OPERATION
Uranium Milling Facility

This report summarizes effluent monitoring data recorded for Homestake Mining Company of California Grants Operation (Homestake) uranium mill facility from January 1, 1989 through June 30, 1989. In some instances, data collected prior to this period is also included in the report because it was not available at the time Homestake submitted their previous semi-annual report. The submittal of this report to the appropriate Nuclear Regulatory Commission (NRC) Regional Office within 60 days after January 1, and July 1 for each year of operation is required for all uranium mill facilities pursuant to 10 CFR Part 40.65. The monitoring data included in this submittal and the report format, which includes comparisons of quantities of radioactive materials released during the reporting period to the regulatory standards, have been designed by Homestake representatives to satisfy the requirements of 10 CFR Part 40.65.

Homestake's monitoring and surveillance program for radioactive effluent releases at the Grants Operation was designed to insure the operation's compliance with 10 CFR Part 20, U.S. NRC Standards for Protection Against Radiation and closely approximates programs as described in NRC's Regulatory Guide 4.14, Radiological Effluent and Environmental Monitoring at Uranium Mills. Some additional effluent monitoring activities which differ from those presented in the Regulatory Guide 4.14 are required by Homestake's Radioactive Materials License (SUA-1471).

Effluent monitoring surveys which measure the release of windblown tailings to the unrestricted areas surrounding Homestake's mill are required pursuant to Amendment 19 of Homestake's Radioactive Materials License.

Specified submittal dates are set pursuant to Amendment 19 for NRC's receipt of the results of these surveys; consequently, this data is not included with this submittal. Radiological surveys which are included in this classification are annual gamma measurements and periodic Ra-226 soil concentration surveys to evaluate the land cleanup and interim stabilization program.

Homestake's groundwater monitoring program for compliance with NRC's requirements is included in Homestake's Source Material License (SUA-1471, Amendments 34 and 35). The requirements set fourth in Amendment 34 include the reporting of both radiological and non-radiological water quality parameters for specified wells, and water injection volumes of the groundwater cleanup program. The results for the monitoring requirements pursuant to Amendment 35 are required by NRC to be submitted by March 15, 1989 in the form of a license modification.

Homestake's effluent release monitoring program, which has already been provided to NRC including the above referenced ground water requirements, is being provided again with this submittal. Homestake hopes that this will facilitate NRC's review of this semi-annual effluent release monitoring report. Also, provided is an abbreviated outline which graphically illustrates the components of Homestake's effluent monitoring program (see Table 1).

ENVIRONMENTAL MONITORING PROGRAMS (summarized in Table 1, Pg. 10 & 11)

Air Quality Monitoring

1. Stack Sampling

   Effluents from the three yellow cake stacks (the dryer, roaster and packaging room stack) are sampled isokenetically on a quarterly basis for particulates. The particulates are analyzed for Natural

Uranium by HMC's analytical laboratory. A representative grab sample is collected semi-annually from two Crusher Building stacks and is analyzed for Natural Uranium, Radium-226 and Thorium-230. Stack samples will be collected only during periods of typical ore and yellow cake throughput. This is done for the reason that, during periods of no throughput, the stack circuits are not in operation in the mill's present operating mode. This should clearly define actual long term emissions as it is currently routine operating procedures not to be crushing ore or drying yellow cake 24-hours a day.

Homestake personnel have been trained by various means in the techniques of stack sampling, including training by U.S. Environmental Protection Agency and N.M. Environmental Improvement Division - Air Quality Control personnel, and various stack sampling sources. In-house training is also conducted on a periodic basis.

The U.S. Environmental Protection Agency's Standards of Performance for New Stationary Sources, Title 40 CFR Part 60, Appendix A, Method 5 is the procedure used by Homestake for isokenetic stack sampling.

2. Particulate Air Sampling

Homestake continuously samples total suspended particulates at five locations around their mill and tailing facilities (see Figure 1). Those locations identified as HMC-1, HMC-2 and HMC-3 are areas at the restricted area's boundary expected to have the highest

predictable concentrations of airborne radioactive particulates. The predominant wind direction is from the southwest; accordingly, HMC-1, HMC-2 and HMC-3 are generally located down wind from Homestake's tailing impoundment. The location identified as HMC-4 represents background conditions, as established by the New Mexico Environmental Improvement Division, and is located at the southwestern most corner of the restricted area. Location HMC-5 represents the site of the nearest residence expected to have the highest predicted airborne radionuclide concentration in the area of the Homestake mill.

Homestake uses a Sierra Instruments Model #305-200 High Volume Air Sampler, or the equivalent, to continuously sample the ambient air of the locations shown in Figure 1. The samples are collected on 8 inch by 10 inch Whatman glass fiber filters (or equivalent) which are changed weekly, or more frequently, as required by dust loading. Quarterly composites of the collected sample filters are prepared for each sampling station. The composite samples are analyzed quarterly for Natural Uranium, Radium-226, and Thorium-230 by Homestake's analytical lab, or an approved independent laboratory.

3. Gas Sampling

Radon gas concentrations are monitored on a continuous basis at the 5 locations identified in Figure 1. Terradex Corporation's track-etch passive radon monitors (PRM), or the equivalent, are used to continuously monitor radon gas at each sampling location. On a quarterly basis new alpha particle sensitive detectors are

placed at monitoring locations by Homestake personnel and the exposed detectors are retrieved and returned to Terradex Corporation for analysis. The technique by which the PRM detectors measure radon gas concentrations consists of exposing an alpha-particle sensitive plastic detector, which is mounted in a plastic container, to ambient air. The decay of radon gas contained in the ambient air causes imprint tracks on the alpha-sensitive detector which can then be counted at a later time. The radon gas concentration can subsequently be calculated by determining the number of tracks per unit area of the detector. A filter is placed over the container opening to inhibit the entrance of any alpha-emitting dust particles.

Water Quality Monitoring

Wells SV, SB, SE, SA, DB, DE, DG, DL, P, F, B, I, and BC are sampled on a quarterly frequency for pH, TDS, water level, Ca, MG, K, NA, HCO_3, CO_3, CL, SO_4 and cation-anion balance. Wells SV, SB, SE, SA, DB, DE, DG, DL, and P are sampled on a semi-annual frequency for chromium, molybdenum, radium-226 and radium-228, selenium, thorium 230, uranium, vanadium and pH. Additionally, the volumes of water injected and recovered as part of the ground-water cleanup program is monitored on a weekly frequency and the values are documented.

Biota and Soils Monitoring

1. Vegetation

Vegetation samples are collected on an annual basis at each of the

five locations identified in Figure 1. Vegetation samples will be composited for each sample location and will consist of species palatable to grazing animals that contribute to the human food chain. The composited samples are analyzed for Radium-226.

2. Soil

Soil samples are collected on an annual basis at each of the five locations identified in Figure 1. Representative composite samples to a depth of 15 centimeters are collected for each sample location and are analyzed for Natural Uranium and Radium-226.

Direct Radiation

Gamma exposure rates are continuously monitored through the use of thermoluminescent dosimeters (TLD) at each of the five locations identified in Figure 1. Each TLD badge consists of five LiF chips selected for uniform response, in a plastic holder. The plastic provides adequate protection from weather for these badges to be used out-of-doors. The TLD's are exchanged on a quarterly basis and analyzed by an approved, independent laboratory (currently Eberline Instrument Co.). The integrated levels of direct external radiation are recorded for each of the five locations.

Surface Contamination

1. Yellowcake Shipments

The amount of alpha emitting surface contamination deposited on the outside of yellowcake shipment barrels is monitored before shipments are allowed to leave the mill restricted area. A group of barrels from each yellowcake lot is randomly selected to be monitored for alpha emitting surface contamination. This is done

by randomly selecting a 100 cm^2 area on each barrel and wiping the area with a clean 47 mm Gelman fiber glass filter (or equivalent). The filters are then counted on an Eberline Sac 4 scintillation detector (or equivalent) and the amount of alpha activity removed from each barrel onto the filter is calculated.

2. Personnel Skin and Clothing

Each day, all persons who enter the restricted area and have access to, or have entered into the yellowcake precipitation and drying circuit building, are required to monitor themselves for alpha surface contamination before leaving the restricted area. The personnel survey is performed individually by each person for whom it is required as he/she exits the restricted area through the Security Guardhouse. The survey is performed by individuals by making a thorough sweep of the clothing and exposed skin (including the soles of shoes). Any excessive uranium concentrate contamination discovered as a result of the survey shall be washed off in one of the mill's change rooms.

On a quarterly schedule an unannounced spot check is made by a qualified member of the radiation safety staff during which time he/she conducts the personnel monitoring. An Eberline AC-3 hand-held surface alpha scintillation detector with an Eberline RM-20 scaler (or equivalent), is used to perform the personnel skin and clothing surface monitoring. Prior to placement at the Guardhouse, the instruments are evaluated and adjusted by a qualified technician according to background, efficiency, and operability. On a weekly basis the survey instrument efficiency and operability are checked by qualified technicians.

3. Survey of Equipment Prior to Release for Unrestricted Use

All equipment, that has potentially been contaminated with uranium or its decay products, must be monitored for removable surface alpha activity before it can be released for unrestricted use. All requests to remove equipment from the mill must be initiated with the Operations Superintendent. The Operations Superintendent contacts the Radiation Protection Administrator and they determine if the equipment in question could potentially have been contaminated. Any material that is determined to have the potential to have been contaminated must be surveyed and the levels detected must not exceed the levels identified in the U.S. Nuclear Regulatory Guide 8.30.

Management's policy at Homestake's uranium milling facility is to restrict the release of equipment, for which radiation surveys are required, to instances where there is a clearly demonstrated need related to company business.

TABLE 1. Homestake Environmental Radiological Monitoring Programs

Type of Sample	Number	Locations	Method	Frequency	Analytical Parameters
STACKS					
Particulates	3	YC Dryer Stack Vanadium Roaster Stack YC Packaging Room Area Stack	Isokenetic	Quarterly	Natural Uranium (Ra-226, & Th-230 July - June 1988)
Particulates	2	Crushing Circuit Stack	Representative Grab	Semi-annually	Natural Uranium, Radium-226, Thorium-230 stack flow
AIR					
Particulates	3	Locations at or near the site boundary and in different sectors that have the highest predicted concentrations of radioactive airborne particulates.	Continuous (High Vol.)	Weekly filter change or more frequently as required. Samples composited and analyzed quarterly.	Natural Uranium, Ra-226, Th-230
	1	Nearest Occupied Residence	Continuous (High Vol.)	Weekly filter change, or more frequently as required. Samples composited and analyzed quarterly.	Natural Uranium, Ra-226, Th-230
	1	Control Location	Continuous (High Vol)	Weekly filter change, or more frequently as required. Samples composited and analyzed quarterly.	Natural Uranium, Ra-226, Th-230
Radon Gas	5	Locations described in Air - Particulates	Continuous-Track-etch	Quarterly	Rn-222

TABLE 1. Homestake Environmental Radiological Monitoring Programs

Type of Sample	Number	Locations	Method	Frequency	Analytical Parameters
WATER					
Ground Water	1	Hydrologically up gradient of tailings impoundment (background)	Pumped-Grab	Quarterly Semi-Annual	See SUA-1471 Amendment 35
	11	Hydrologically down gradient and relatively close to the tailing impoundment.	Pumped-Grab	Quarterly Semi-Annual	See SUA-1471 Amendment 35
	1	Down gradient near the closest resident	Pumped-Grab	Quarterly Semi-Annual	See SUA-1471 Amendment 35
VEGETATION	5	Locations described in Air - Particulates	Grab	Annually	Ra-226
SOIL	5	Locations described in Air - Particulates	Grab	Annually	Ra-226
DIRECT RADIATION	5	Locations described in Air - Particulates	Continuous TLD	Quarterly	Gamma Exposure Rate
SURFACE	Variable	Yellowcake Product Shipment	Wipe	As Needed	Alpha Emitting Particulates
	Variable	Release of Equipment for unrestricted use	Wipe	As Needed	Same
	Variable	Skin & Clothing of applicable employees	Surface Alpha Scintillation	Every Day	Same

Lower Limit of Detection

Homestake representatives have calculated the Lower Limit of Detection (LLD) for each measurement system, where applicable, to more accurately evaluate concentrations of radioactive material measured in the environment surrounding the mill. The lower limit of detection is defined in the U.S. Nuclear Regulatory Guide 4.14 as the smallest concentration of radioactive material sampled that has a 95% probability of being detected, with only a 5% probability that a blank sample will yield a response interpreted to mean that radioactive material is present. Since the LLD is a function of sample volume, counting efficiency, radiochemical yield, etc., it varies for different sampling and analysis procedures.

For the individual measurement systems for which Homestake has calculated LLD's, the following formula was utilized:

$$LLD = \frac{4.66\ S_b}{3.7 \times 10^4\ EVY \exp(-\quad t)}$$

Where:

LLD is the lower limit of detection (microcuries per milliliter);

S_b is the standard deviation of the instrument background counting rate (counts per second);

3.7×10^4 is the number of disintegrations per second per microcurie;

E is the counting efficiency (counts per disintegration);

V is the sample volume (milliliters);

Y is the fractional radiochemical yield (when applicable);

is the radioactive decay constant for the particular radionuclide; and;

t is the elapsed time between sample collection and counting

The value of S_b used in the calculation of the LLD for a particular measurement system should be based on the actual observed variance of the instrument background counting rate rather than an unverified theoretically predicted variance.

Since the LLD is a function of sample volume, counting efficiency, radiochemical yield, etc,. it may vary for different sampling and analysis procedures. Also, whenever there is a significant change in the parameters of the measurement system, the LLD should be recalculated. The lower limits of detection which have been calculated for the individual monitoring systems utilized by Homestake included with this submittal are as follows:

U-nat in Air	2×10^{-16} uCi/ml
Ra-226,Th-230 in Air	3×10^{-18} uCi/ml
Rn-222	1 PCi/L
U-nat in Water	2×10^{-9} uCi/ml
Ra-226,Th-230 in water	2×10^{-10} uCi/ml
U-nat in soil	7×10^{-7} uCi/g
Ra-226, Th-230 in soil	0.2×10^{-7} uCi/g
U-nat in vegetation	7×10^{-7} uCi/kg

Ra-226, Th-230 in vegetation	1×10^{-7} uCi/kg
U-nat in stack effluent (isokinetic)	5×10^{-12} uCi/ml
Ra-226, Th-230 in stack effluent (isokinetic	7×10^{-14} uCi/ml
Ra-226, Th-230 in stack effluent (grab)	1×10^{-13} uCi/ml

An acceptable method for calculating lower limits of detection is described in the appendix of the U.S. NRC Regulatory Guide 4.14. The LLD's illustrated above were calculated using the method described in Regulatory Guide 4.14. No significant changes in the parameters of the measurement procedures were initiated since Homestake's last effluent monitoring report was submitted. Consequently, no changes are being reported for LLD's.

Conclusions

The summaries of Homestake's effluent monitoring program included in this submittal contain data for each of the regulated parameters released to unrestricted areas. 10 CFR Part 40.65 requires that Homestake submit it's effluent release monitoring data to the NRC within 60 days of the end of the six month period ending June 30, 1989. Homestake is submitting this report to fulfill the regulatory requirements cited above. For some monitoring systems, the data summaries which Homestake is submitting contain data collected after July 1, 1989. Homestake representatives feel that the inclusion of this additional monitoring data is important to more accurately identify any trends and demonstrate compliance with all appropriate regulatory requirements. Also, data which was not available for Homestake's previous effluent monitoring report is included in the summaries. Included in this report in Attachment 1 are summaries of the results of the effluent monitoring activities conducted by Homestake subsequent to those reported in the previous semi-annual report.

An evaluation of the radiological concentrations in effluents released and a comparison of those values to the licensee's previously reviewed design objectives of the Source Material License are required by 10 CFR Part 40.65 to be included in this submittal. In addition, Homestake is submitting evaluations of non-radiological constituents measured in the effluent releases in water as well as volumes of water injected as part of the ground-water cleanup program.

Homestake representatives have utilized two approaches in this report to demonstrate that the quantities of effluents released from the Grants Operation uranium milling facility satisfy the regulatory standards and meet the criteria of the Radioactive Materials License. The two data evaluation approaches are: 1) comparisons of effluent release values to Maximum Permissible

Concentration (MPC) and 2) graphic demonstrations. Both evaluation methods indicate that Homestake's releases to unrestricted areas generally are not markedly above background. Also, it is demonstrated in this report that the effluents released by Homestake's Grants Operation during the period of January 1 through June 30, 1989 do not exceed the allowable effluent release levels referenced in 10 CFR Part 20.

The data collected in many of Homestake's effluent monitoring program can be readily compared to maximum permissible concentrations (MPC) values. Homestake has included entries in the data summaries (Attachment 1) that represent effluent release concentrations as a fraction of MPC values. Homestake has not exceeded MPC values in any of their effluents monitored during the period covered by this report. Individual effluent monitoring programs results are more fully discussed in the following paragraphs.

The down-gradient ground water quality data did not differ significantly from the data submitted in Homestake's prior semi-annual effluent monitoring reports. The levels of uranium and Ra-226 found in the alluvial groundwaters down-gradient of the tailing disposal impoundment and within the restricted area of Homestake's Grants Operations are within the limits prescribed by pertinent regulatory requirements. In addition, up-gradient and down-gradient levels of radiological constituents found in the alluvial groundwaters indicate that Homestake's Ground Water Protection Program is effectively preventing the migration of contamination into groundwater by seepage from the tailing pile. Figures 5 and 6 illustrate a comparison of Ra-226 concentrations measured in ground waters down-gradient of the tailing pile to those measured in background wells.

Non-radiological water quality information is also included in this submittal. Homestake monitors a number of non-radiological parameters (see Page 5) in the ground water in the vicinity of their Grants facility. Sulfate (SO_4)

is a good indicator for the purpose of relating the general quality of the water sampled. Sulfate concentrations measured in the groundwater down gradient from the tailing disposal impoundment and within the operation's restricted area are generally equivalent to the concentrations existing in water up-gradient. This is a direct result of Homestake's Groundwater Protection Program. Other water quality parameters were also monitored in both the down-gradient and up-gradient groundwater; however, sulfate is the only non-radiological parameter that is graphically illustrated in this report (See Figure 7 & 8).

The groundwater quality data presented in this report clearly shows Homestake's groundwater protection efforts have been effective. The levels of dissolved solids in both the up-gradient and down-gradient groundwaters in the vicinity of Homestake's mill indicate that seepage from the tailing pile is being controlled and is not allowed to migrate away from the impoundment.

The Broadview Acres injection system was operated at an average rate of 211 gpm this semi-annual period, while the Murray Acres injection system averaged 229 gpm this period. The average water collection rate of the impoundment recovery wells of Homestake's ground water protection system was 303 gpm for the reporting period.

The airborne radiological particulate concentrations for samples collected at the restricted area boundary of Homestake's Grants operation during the period covered by this report exhibits levels well below MPC. The highest value recorded is a Th-230 concentration collected at location HMC 3 for Quarter 2, 1989 which is 12.1 percent of MPC. Rn-222 concentrations measured at the facility boundary, including background contributions of sources unrelated to Homestake's facility, range from 1.0 to 3.5 pCi/l. Average background during the period was 2.3 pCi/l. The boundary outdoor radon measurements included in this report exhibit levels that are lower compared to those reported in

Homestake's last report. In general the air quality monitoring data included in this report demonstrates that releases from Homestake's mill are quite small and far below levels which are allowed under 10 CFR Part 20.

Soil and Vegetation samples are collected on an annual basis under Homestake's Environmental Monitoring Program. Soil samples were not collected during the period covered by this submittal; however, Homestake has already submitted to NRC, pursuant to Amendment 19 of their Radioactive Materials License extensive data concerning the release of windblown tailings and clean-up activities (August 28, 1989 letter to Ray Hall of the NRC).

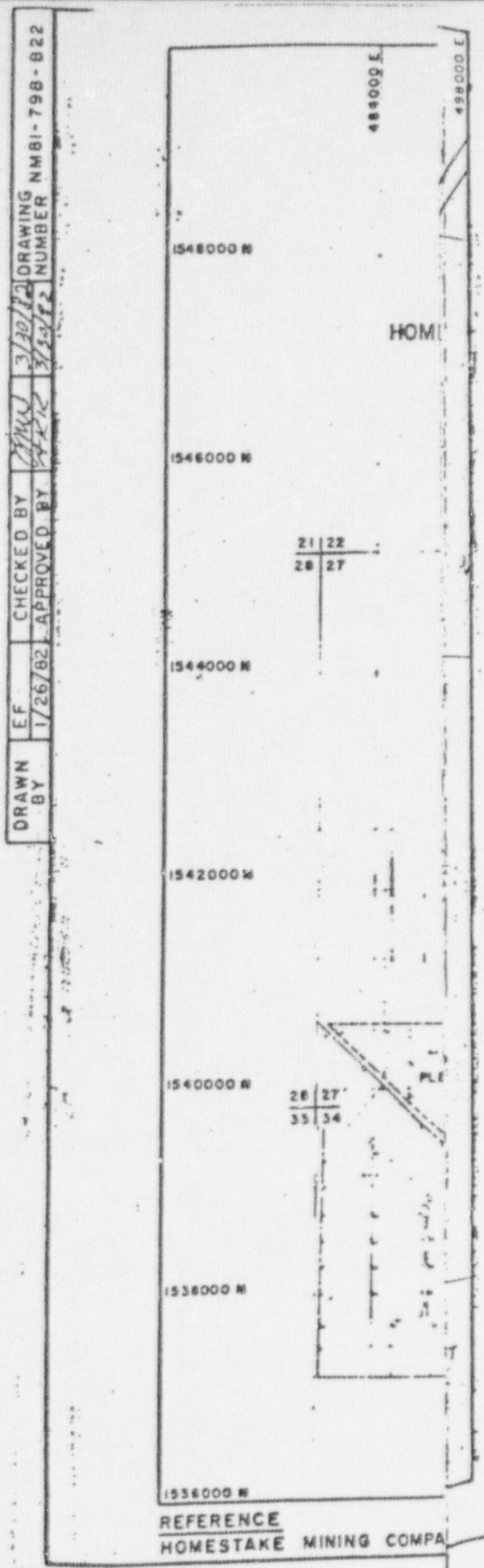
The graphic evaluation of effluent release monitoring data that Homestake is presenting herein consists of eight individual figures. The eight figures illustrate only a portion of the larger body of data included with this submittal; however, Homestake representatives believe that several important characteristics are clearly demonstrated by the graphics presented.

Figures 2, 3, & 4 are concerned with air quality at Locations HMC 3 and HMC 4 (for station locations, see figure 1). These figures illustrate a comparison of U-nat, Ra-226, and Rn-222 concentrations, respectively, at a down-wind station and the facility perimeter background. It is illustrated by this comparison that Homestake's effluent releases do not significantly contribute to the airborne radioactive particulate or radon gas concentrations of the surrounding environment.

Figures 5 & 6 illustrate the Ra-226 concentrations of two wells up-gradient of the tailings impoundment compared to Ra-226 concentrations in two wells down-gradient of the impoundment. The up-gradient wells are P and R and the down gradient wells are F and I (for locations, see figure 1). The two graphs indicate that the Ra-226 concentrations observed for the background and down-gradients wells were nearly equal and ground water is not being significantly impacted by seepage from the tailing pile.

Groundwater sulfate concentration data for background wells P and R, and down-gradient wells F and I are graphically illustrated in figures 7 & 8. The sulfate concentrations measured in groundwater samples collected during the reporting period show down-gradient concentrations lower than those sulfate levels observed in groundwater up-gradient from the tailing facility. Sulfate concentration is a good indicator for the other monitored parameters; consequently, Homestake is using only sulfate and Ra-226 data for their graphic illustrations of groundwater quality. Homestake believes that the Groundwater Protection Program in place at the Grants Operation is preventing seepage from migrating away from the tailing impoundment into the down-gradient groundwater which is clearly illustrated by the data included in this report.

The major portion of this report is concerned with radiological levels of effluent releases measured from January 1 through June 30, 1989. Homestake believes that the data contained in this report accurately describes the level of radiological and non-radiological releases to the environment from the Grants Operation uranium milling facility. Clearly, the effluent releases described in this report show that Homestake is satisfying all regulatory requirements and the conditions of their Radioactive Materials License.



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LEGEND

- ■ PERIMETER SAMPLING LOCATIONS (AIR, SOIL AND VEGETATION)
- ● BACKGROUND GROUNDWATER MONITOR WELLS
- ⊕ DOWNGRADIENT GROUNDWATER MONITOR WELLS
- ▲ NEAREST RESIDENT GROUNDWATER MONITOR WELL

NOTE: PERIMETER SAMPLING LOCATIONS SHOWN ARE APPROXIMATE.

FIGURE 1

PERIMETER SAMPLING AND GROUNDWATER WELL MONITORING LOCATIONS

PREPARED FOR

HOMESTAKE MINING COMPANY
GRANTS, NEW MEXICO

D'APPOLONIA

HOMESTAKE MINING COMPANY GRANTS
ENVIRONMENTAL RADIATION CONTROL

URANIUM microCi x 10-12 PER MILLILITER

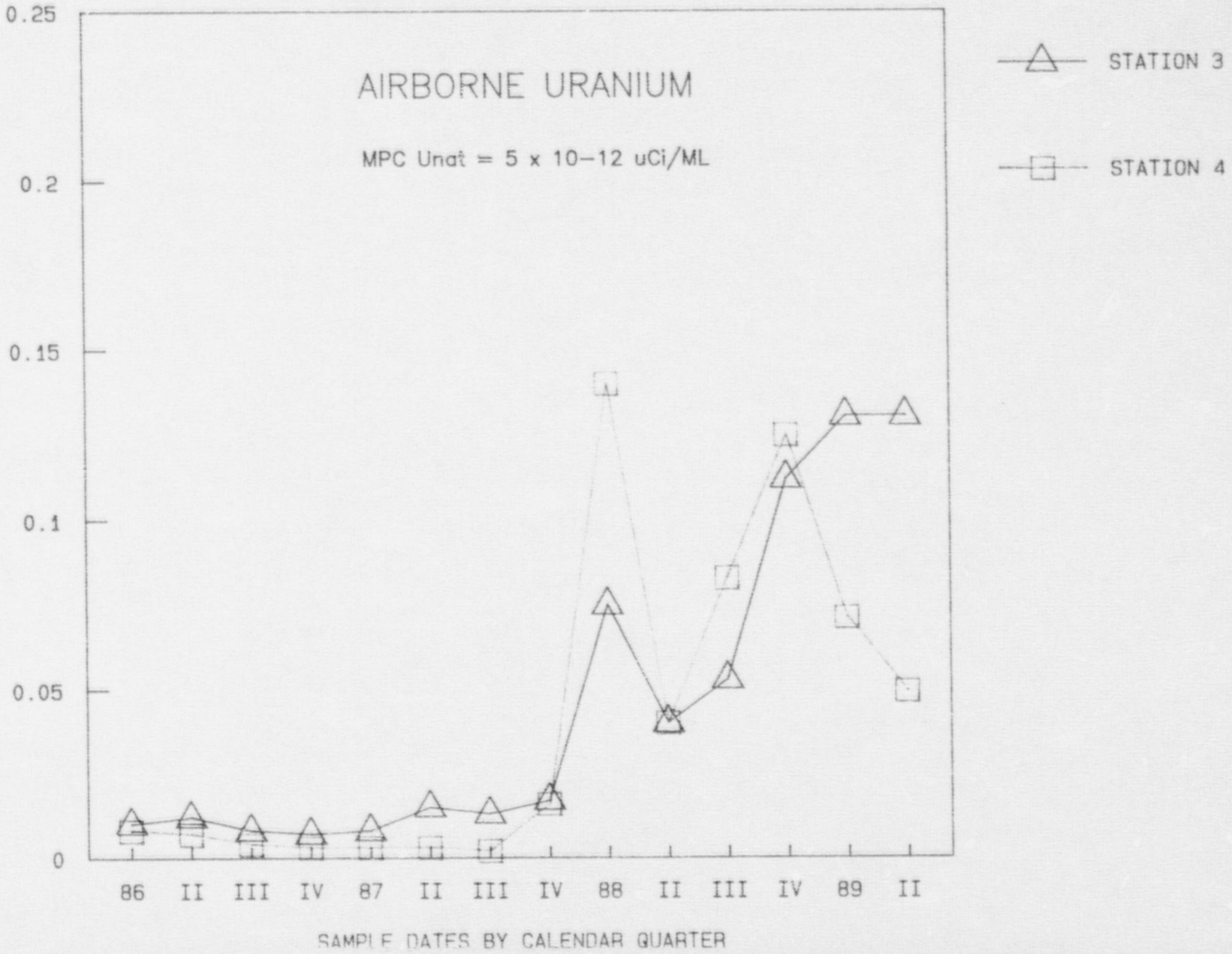

FIGURE 2

HOMESTAKE MINING COMPANY GRANTS
ENVIRONMENTAL RADIATION CONTROL

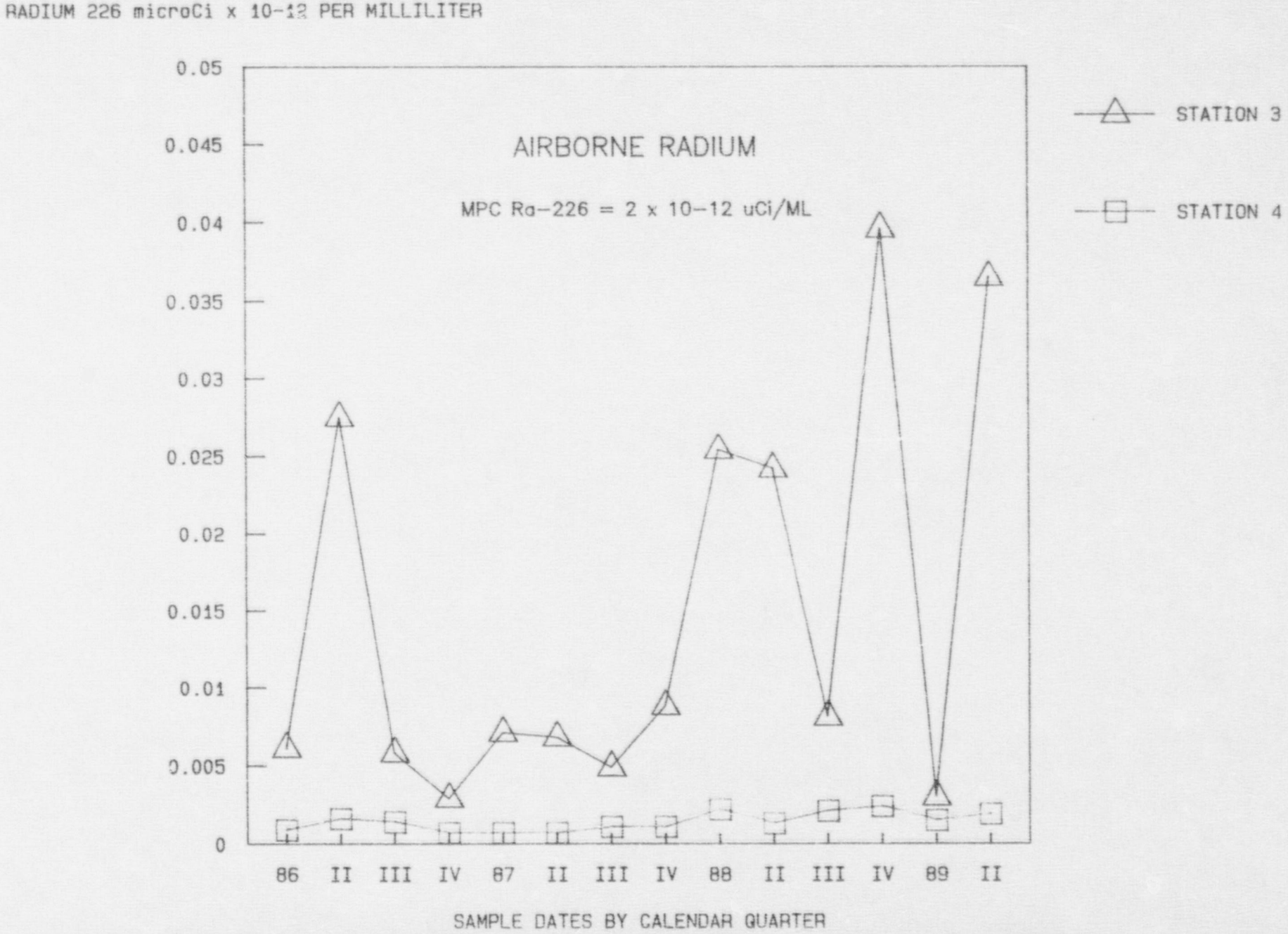

FIGURE 3

HOMESTAKE MINING COMPANY GRANTS
ENVIRONMENTAL RADIATION CONTROL

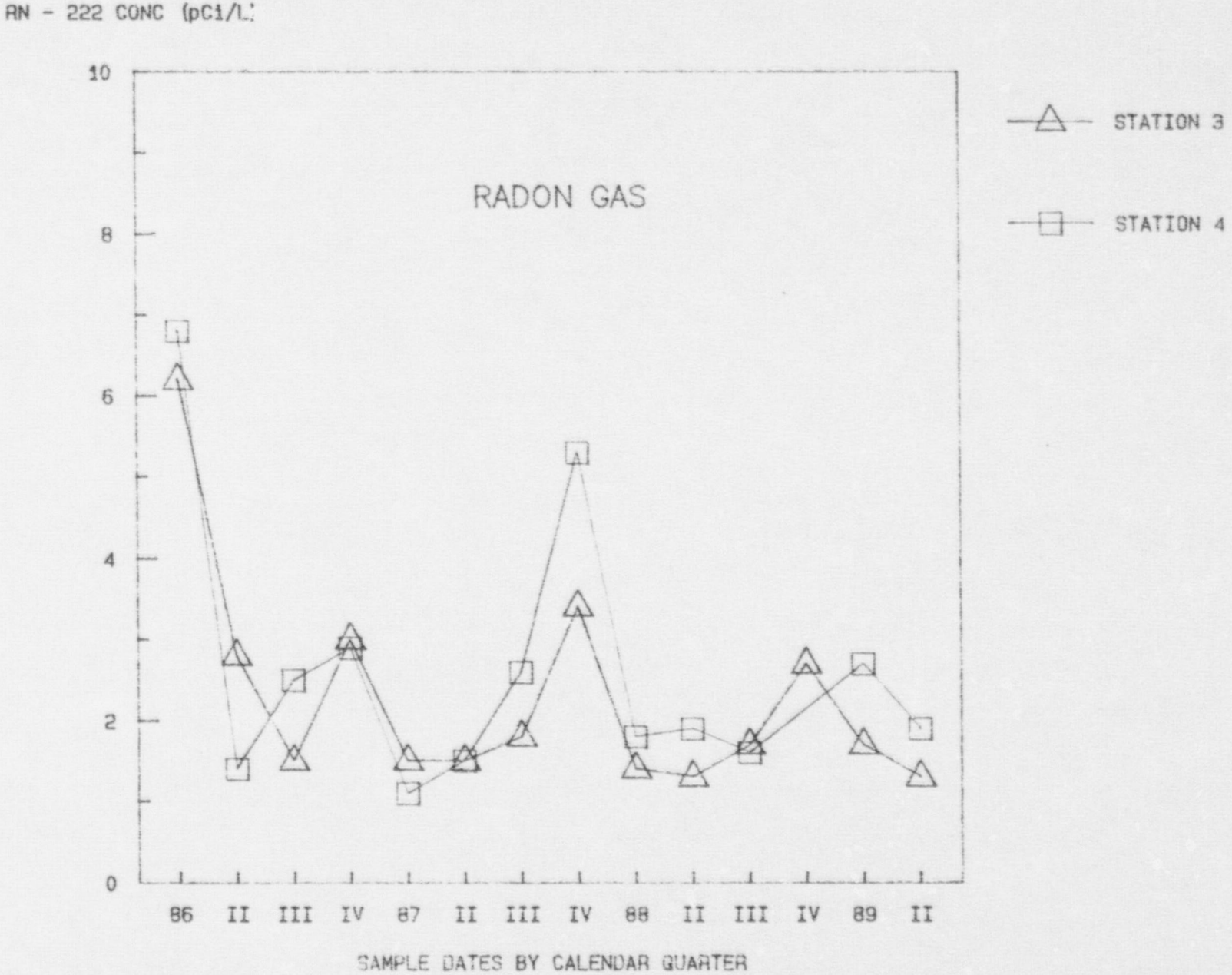

FIGURE 4

HOMESTAKE MINING COMPANY GRANTS
GROUND WATER QUALITY CONTROL

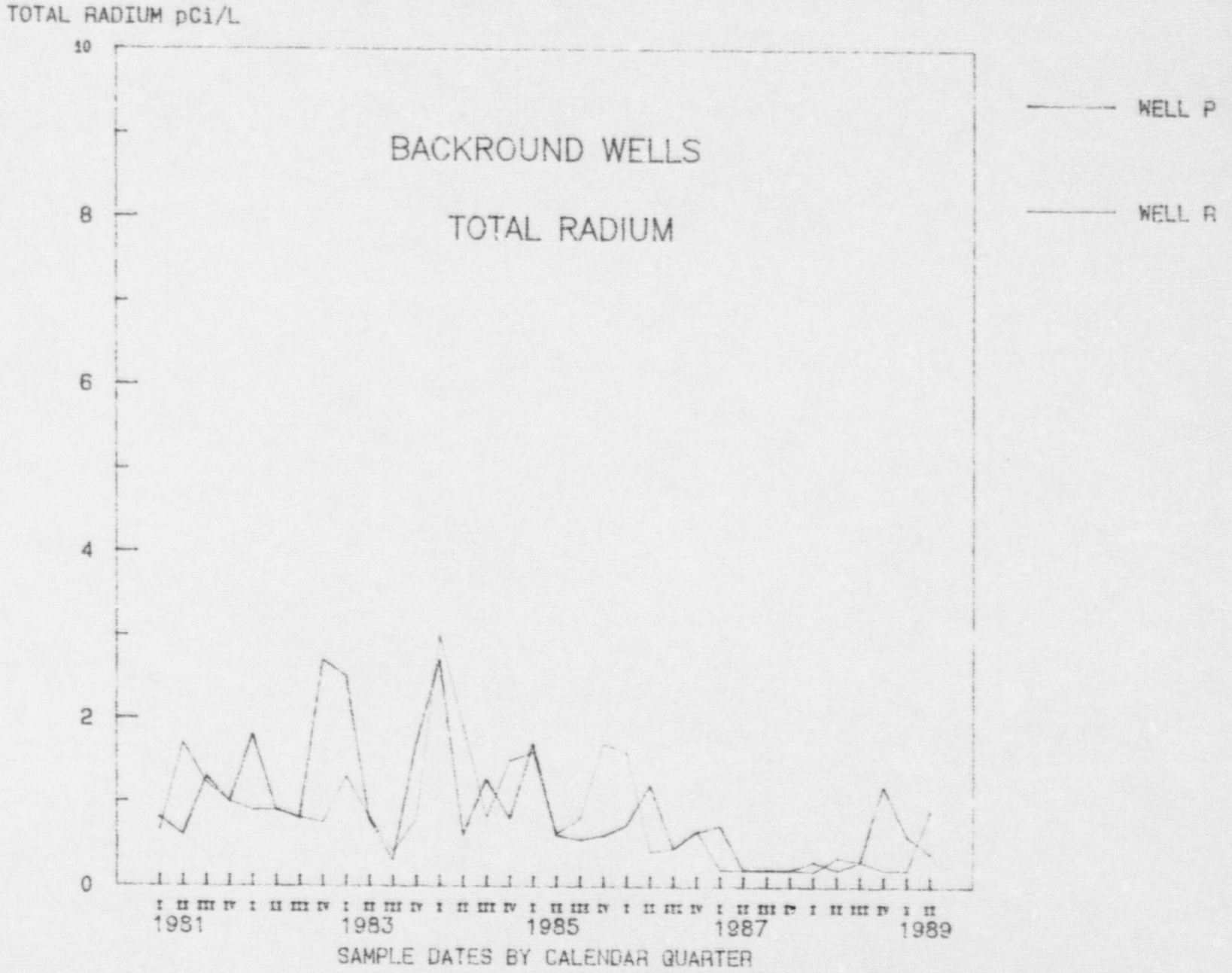

FIGURE 5

HOMESTAKE MINING COMPANY GRANTS
GROUND WATER QUALITY CONTROL

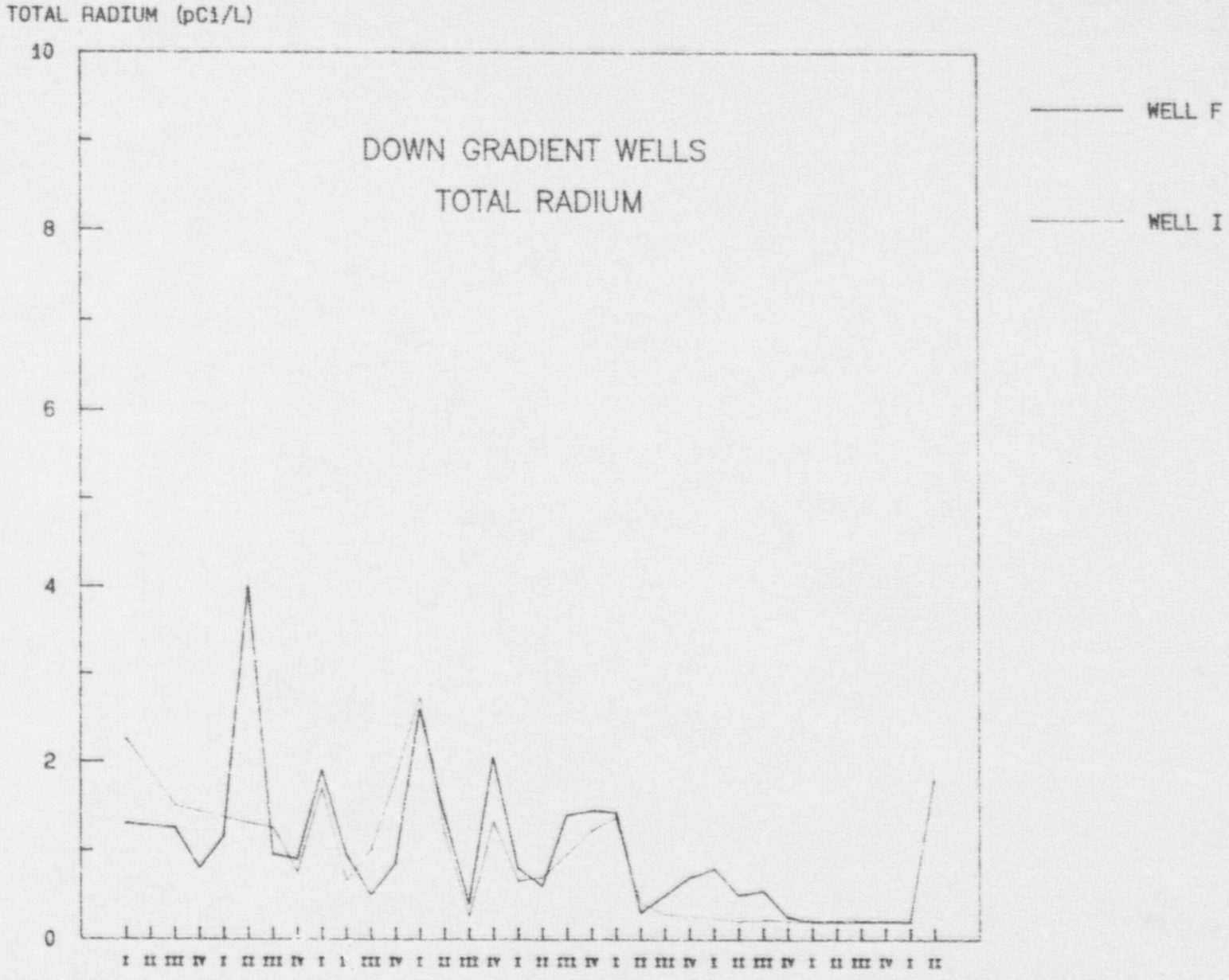

FIGURE 6

HOMESTAKE MINING COMPANY GRANTS
GROUND WATER QUALITY CONTROL

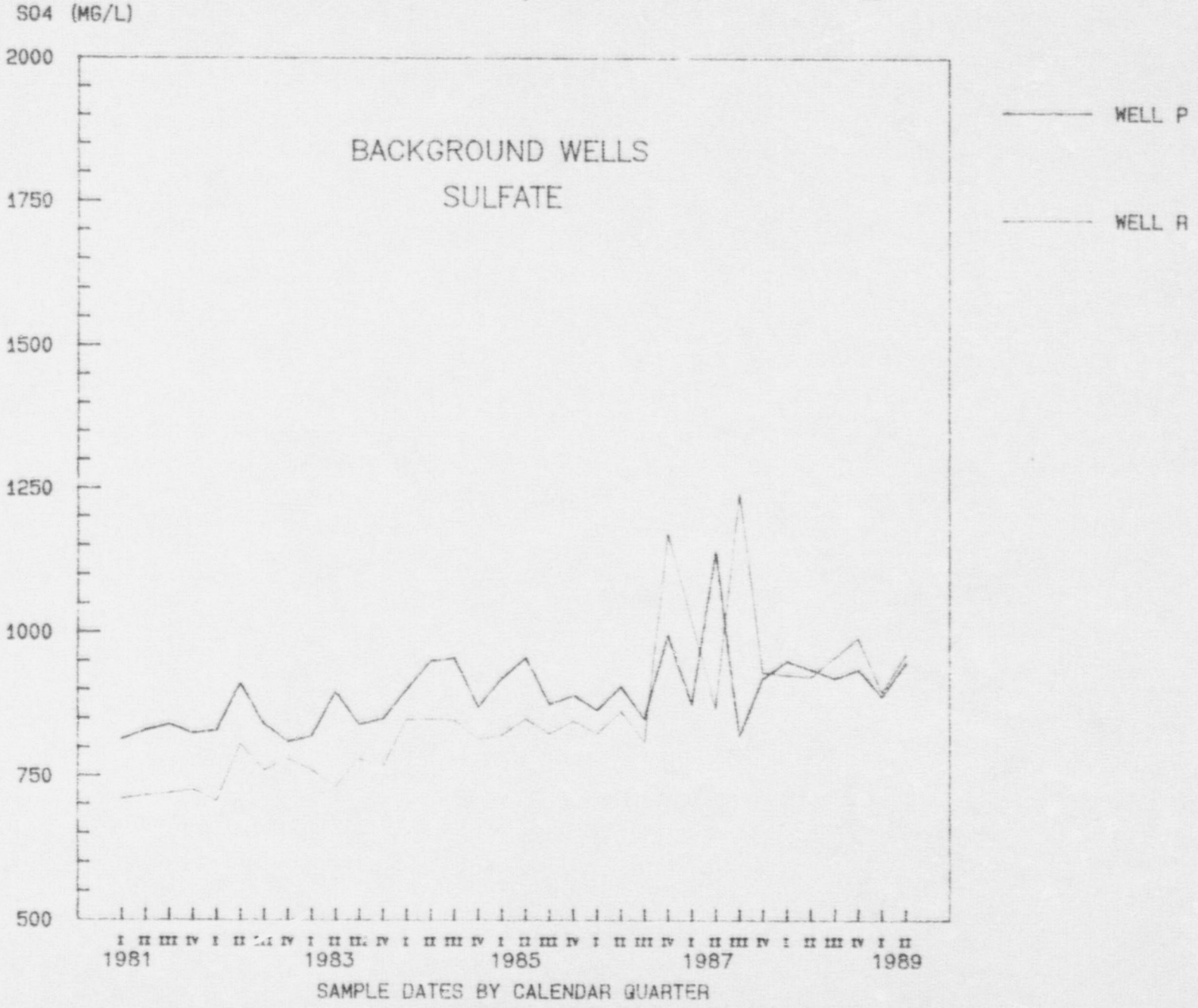

FIGURE 7

HOMESTAKE MINING COMPANY GRANTS
GROUND WATER QUALITY CONTROL

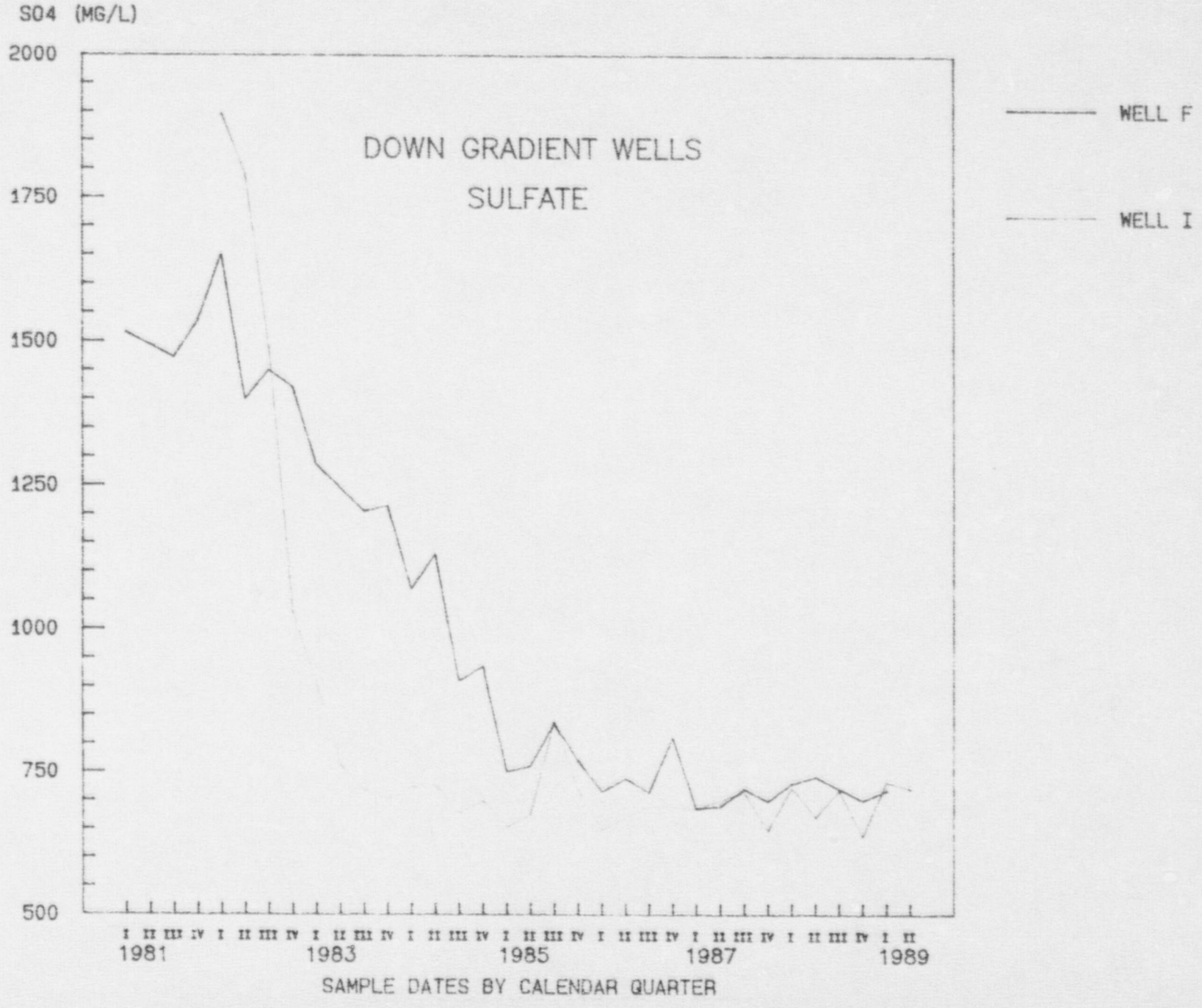

FIGURE 8

Effluent Monitoring Data Summary

Homestake Mining Company

Uranium Milling Facility

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08/04/89

HOMESTAKE MINING COMPANY - GRANTS

WELL WATER QUALITY DATA

(IN MG/L EXCEPT RA IN PCI/L)

Well_ID	DATE	LAB	CA	MG	K	NA	HCO3	CO3	CL	SO4	TDS	COND	ION_BAL
#1DEEPWELL	06/21/89	HMC	----	----	----	----	----	----	----	820.00	3670.00	----	----
#2DEEPWELL	06/21/89	HMC	----	----	----	----	----	----	----	749.00	3680.00	----	----
DB	01/17/89	HMC	644.00	69.00	12.00	2780.00	1680.00	< 10.00	567.00	5250.00	10400.00	12064.81	1.04
DB	01/17/89	BARR	432.00	145.00	11.10	2630.00	1370.00	< 1.00	609.00	5840.00	10500.00	----	0.92
DB	03/15/89	HMC	----	----	----	----	----	----	----	6830.00	----	14130.34	----
DB	04/12/89	HMC	653.00	88.00	13.00	3380.00	1930.00	< 10.00	745.00	6090.00	12700.00	13984.93	1.04
DB	05/18/89	HMC	----	----	----	----	----	----	----	6110.00	----	13407.63	----
DB	06/05/89	HMC	----	----	----	----	----	----	----	6620.00	----	10931.79	----
DE	01/17/89	HMC	151.00	13.00	10.00	3780.00	2290.00	82.00	479.00	5780.00	11960.00	14566.8	1.00
DE	01/17/89	BARR	90.20	54.00	8.40	3750.00	1920.00	100.00	648.00	5900.00	11900.00	----	0.98
DE	03/15/89	HMC	----	----	----	----	----	----	----	6470.00	----	14676.80	----
DE	04/12/89	HMC	137.00	14.00	10.00	3670.00	2340.00	< 10.00	567.00	5790.00	11500.00	13834.69	0.99
DE	05/18/89	HMC	----	----	----	----	----	----	----	6370.00	----	14216.92	----
DE	06/05/89	HMC	----	----	----	----	----	----	----	6350.00	----	10826.67	----
DF	02/21/89	HMC	----	----	----	----	----	----	----	3460.00	----	7426.26	----
DF	03/15/89	HMC	----	----	----	----	----	----	----	3430.00	----	----	----
DF	04/12/89	HMC	656.00	73.00	8.00	1460.00	741.00	< 10.00	426.00	3390.00	6390.00	8006.88	1.08
DF	05/18/89	HMC	----	----	----	----	----	----	----	3530.00	----	7754.68	----
DF	06/05/89	HMC	----	----	----	----	----	----	----	3630.00	----	7517.64	----
DG	01/17/89	HMC	652.00	168.00	10.00	2670.00	1250.00	< 10.00	560.00	5870.00	10500.00	12064.81	1.02
DG	01/17/89	BARR	503.00	226.00	7.80	2500.00	1230.00	< 1.00	609.00	5750.00	11000.00	----	0.97
DG	03/15/89	HMC	----	----	----	----	----	----	----	5660.00	----	12218.95	----
DG	04/12/89	HMC	634.00	191.00	9.00	2830.00	1300.00	< 10.00	603.00	6200.00	10700.00	12318.27	1.02
DG	04/18/89	HMC	----	----	----	----	----	----	----	5720.00	----	12278.25	----
DG	06/05/89	HMC	----	----	----	----	----	----	----	5840.00	----	10977.64	----
DG	12/13/89	HMC	----	----	----	----	1010.00	----	----	----	----	----	----
DH	01/16/89	HMC	----	----	----	----	----	----	----	9570.00	----	19468.75	----
DH	02/21/89	HMC	----	----	----	----	----	----	----	10200.00	----	----	----
DH	03/15/89	HMC	----	----	----	----	----	----	----	9520.00	----	20186.20	----
DH	04/12/89	HMC	438.00	249.00	13.00	5420.00	2800.00	< 10.00	1030.00	9960.00	18400.00	22172.89	0.98
DH	05/18/89	HMC	----	----	----	----	----	----	----	10200.00	----	20277.51	----
DH	06/05/89	HMC	----	----	----	----	----	----	----	10400.00	----	11247.13	----
E2	05/25/89	HMC	----	----	----	----	----	----	876.00	3620.00	7670.00	9269.79	----
E2	05/25/89	HMC	----	----	----	----	----	----	496.00	3150.00	5940.00	7587.71	----

08/04/89.

HOMESTAKE MINING COMPANY - GRANTS
WELL WATER QUALITY DATA
(IN MG/L EXCEPT RA IN PCI/L)

WELL_ID	DATE	LAB	CA	MG	K	NA	HCO3	CO3	CL	SO4	TDS	COND	ION_BAL
SA	01/12/89	BMC	423.00	44.00	10.00	1130.00	697.00	< 10.00	227.00	2520.00	4380.00	5591.10	1.05
SA	01/12/89	BARR	333.00	91.80	8.90	1060.00	651.00	< 1.00	265.00	2710.00	4720.00	----	0.95
SA	01/17/89	BMC	363.00	26.00	10.00	1070.00	589.00	< 10.00	213.00	2400.00	4180.00	----	1.01
SA	03/15/89	BMC	----	----	----	----	----	----	----	2360.00	----	5416.97	----
SA	04/12/89	BMC	386.00	42.00	8.00	1110.00	689.00	< 10.00	220.00	2500.00	4460.00	5604.81	1.02
SA	05/18/89	BMC	----	----	----	----	----	----	----	2680.00	----	5488.12	----
SA	06/05/89	BMC	----	----	----	----	----	----	----	2560.00	----	5369.75	----
SB	01/12/89	BMC	415.00	25.00	14.00	2450.00	1660.00	< 10.00	319.00	4520.00	8590.00	10339.58	0.99
SB	01/12/89	BARR	282.00	105.00	13.60	2390.00	1350.00	< 1.00	407.00	4970.00	8870.00	----	0.93
SB	03/15/89	BMC	----	----	----	----	----	----	----	4820.00	----	11086.43	----
SB	04/12/89	BMC	412.00	46.00	14.00	2550.00	1750.00	< 10.00	390.00	4720.00	9320.00	11428.65	0.98
SB	05/18/89	BMC	----	----	----	----	----	----	----	5020.00	----	10215.34	----
SB	06/05/89	BMC	----	----	----	----	----	----	----	4240.00	----	8806.38	----
SC	01/16/89	BMC	----	----	----	----	----	----	----	7780.00	----	17368.76	----
SC	02/21/89	BMC	----	----	----	----	----	----	----	7530.00	----	16599.22	----
SC	03/15/89	BMC	----	----	----	----	----	----	----	7060.00	----	16408.00	----
SC	04/14/89	BMC	153.00	33.00	17.00	5000.00	3020.00	120.00	709.00	7640.00	15000.00	17662.93	0.98
SC	05/18/89	BMC	----	----	----	----	----	----	----	8330.00	----	17621.46	----
SC	06/05/89	BMC	----	----	----	----	----	----	----	7870.00	----	11383.86	----
SE	01/17/89	BMC	350.00	7.00	8.00	742.00	494.00	< 10.00	170.00	1820.00	3200.00	4021.60	0.99
SE	01/17/89	BARR	262.00	83.80	7.10	675.00	401.00	< 1.00	207.00	1700.00	3350.00	----	1.03
SE	03/15/89	BMC	----	----	----	----	----	----	----	1750.00	----	3880.26	----
SE	04/12/89	BMC	349.00	25.00	7.00	708.00	456.00	< 10.00	142.00	1750.00	3100.00	3956.21	1.04
SE	05/18/89	BMC	----	----	----	----	----	----	----	1750.00	----	3600.91	----
SE	06/05/89	BMC	----	----	----	----	----	----	----	1770.00	----	3842.17	----
DL	01/17/89	BMC	266.00	61.00	31.00	13700.00	6030.00	210.00	1480.00	21400.00	38900.00	37534.98	1.04
DL	01/17/89	BARR	115.00	274.00	31.70	11400.00	5190.00	< 1.00	1720.00	21500.00	39400.00	----	0.90
DS	01/16/89	BMC	----	----	----	----	----	----	----	5000.00	----	11086.43	----
DS	02/21/89	BMC	----	----	----	----	----	----	----	5730.00	----	12129.55	----
DS	03/15/89	BMC	----	----	----	----	----	----	----	5310.00	----	12071.91	----
DS	04/12/89	BMC	401.00	53.00	11.00	2950.00	1400.00	< 10.00	621.00	5320.00	10400.00	12781.62	1.01
DS	05/18/89	BMC	----	----	----	----	----	----	----	5420.00	----	12665.98	----
DS	06/05/89	BMC	----	----	----	----	----	----	----	5760.00	----	10954.28	----
SV	01/11/89	BMC	38.00	30.00	20.00	5830.00	3040.00	294.00	780.00	8740.00	17100.00	20584.89	0.98
SV	01/11/89	BARR	31.10	90.40	20.20	5530.00	2520.00	472.00	881.00	8540.00	17100.00	----	0.96
SV	06/05/89	BMC	----	----	----	----	----	----	----	4790.00	----	10511.33	----
B	03/29/89	BMC	666.00	39.00	7.00	420.00	443.00	< 10.00	206.00	1990.00	3290.00	3849.65	1.00
B	05/17/89	BMC	623.00	45.00	7.00	496.00	427.00	< 10.00	220.00	1970.00	3660.00	4135.83	1.04

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HOMESTAKE MINING COMPANY - GRANTS
WELL WATER QUALITY DATA
(IN MG/L EXCEPT RA IN PCI/L)

WL_ID	DATE	LAB	CA	MG	K	NA	HCO3	CO3	CL	SO4	TDS	COND	ION_BAL
BC	03/27/89	HMC	403.00	28.00	6.00	387.00	886.00	< 10.00	99.00	1460.00	2310.00	3054.19	0.82
BC	05/24/89	HMC	479.00	31.00	6.00	383.00	403.00	10.00	118.00	1530.00	2500.00	3233.03	1.03
DK	03/27/89	HMC	35.00	22.00	15.00	7250.00	4530.00	1480.00	816.00	8840.00	21300.00	24308.85	0.97
DI	03/29/89	HMC	87.00	103.00	28.00	10000.00	4560.00	554.00	1630.00	13700.00	29000.00	29369.10	1.06
FB	04/04/89	HMC	----	----	----	----	----	----	142.00	1020.00	1800.00	2293.44	----
FB	06/13/89	HMC	341.00	1.00	4.00	252.00	----	----	142.00	1990.00	3470.00	2252.10	----
I	02/22/89	HMC	256.00	21.00	4.00	270.00	423.00	< 10.00	170.00	732.00	1240.00	2335.53	0.97
I	05/17/89	HMC	287.00	22.00	4.00	292.00	494.00	< 10.00	199.00	720.00	1660.00	2386.15	1.00
EM	05/25/89	HMC	----	----	----	----	----	----	726.00	3580.00	6650.00	8170.45	----
SM	03/30/89	HMC	----	----	----	----	----	----	1210.00	13200.00	28700.00	29491.77	----
B1	04/27/89	HMC	----	----	----	----	----	----	220.00	2570.00	4590.00	5322.95	----
DP	03/29/89	HMC	682.00	12.00	5.00	1150.00	691.00	< 10.00	638.00	2740.00	5560.00	6384.59	0.98
SO	03/30/89	HMC	----	----	----	----	----	----	479.00	8860.00	14700.00	16553.20	----
SD4	01/16/89	HMC	----	----	----	----	----	----	----	4680.00	----	6686.68	----
SD4	02/21/89	HMC	----	----	----	----	----	----	----	4780.00	----	10470.53	----
SD4	03/15/89	HMC	----	----	----	----	----	----	----	4650.00	----	10420.87	----
SD4	04/12/89	HMC	428.00	79.00	12.00	2430.00	1420.00	22.00	355.00	4650.00	8890.00	10827.15	1.02
SD4	05/18/89	HMC	----	----	----	----	----	----	----	4770.00	----	10470.72	----
SD4	06/05/89	HMC	----	----	----	----	----	----	----	4770.00	----	9879.88	----
DA 2	01/16/89	HMC	----	----	----	----	----	----	----	4870.00	----	7533.81	----
DA 2	02/21/89	HMC	----	----	----	----	----	----	----	4150.00	----	9972.86	----
DA 2	03/15/89	HMC	----	----	----	----	----	----	----	4640.00	----	10225.64	----
DA 2	04/12/89	HMC	486.00	44.00	11.00	2430.00	1450.00	< 10.00	496.00	4470.00	8940.00	22519.99	1.02
DA 2	05/18/89	HMC	----	----	----	----	----	----	----	4820.00	----	10853.80	----
DA 2	06/05/89	HMC	----	----	----	----	----	----	----	5500.00	----	5486.82	----
SQ	01/16/89	HMC	----	----	----	----	----	----	----	6500.00	----	----	----
SQ	02/21/89	HMC	----	----	----	----	----	----	----	6370.00	----	14658.74	----
SQ	03/15/89	HMC	----	----	----	----	----	----	----	6270.00	----	14607.56	----
SQ	04/12/89	HMC	248.00	37.00	12.00	3770.00	2500.00	< 10.00	461.00	6470.00	12400.00	14607.56	0.95

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HOMESTAKE MINING COMPANY - GRANTS

WELL WATER QUALITY DATA

(IN MG/L EXCEPT RA IN PCI/L)

WELL_ID	DATE	LAB	CA	MG	K	NA	HCO3	CO3	CL	SO4	TDS	COND	ION_BAL
SQ	05/18/89	HMC	----	----	----	----	----	----	----	7070.00	----	15195.32	----
SQ	06/05/89	HMC	----	----	----	----	----	----	----	7070.00	----	10954.28	----
SR	01/16/89	HMC	----	----	----	----	----	----	----	9430.00	----	20422.20	----
SR	02/21/89	HMC	----	----	----	----	----	----	----	9550.00	----	----	----
SR	03/05/89	HMC	----	----	----	----	----	----	----	8770.00	----	21187.43	----
SR	04/12/89	HMC	124.00	51.00	20.00	6210.00	3450.00	288.00	1030.00	9070.00	18100.00	20807.24	0.99
SR	05/18/89	HMC	----	----	----	----	----	----	----	9440.00	----	21069.14	----
SR	06/05/89	HMC	----	----	----	----	----	----	----	9550.00	----	11598.65	----
DV	06/05/89	HMC	----	----	----	----	----	----	----	4760.00	----	9401.63	----
SUB1	01/30/89	HMC	----	----	----	----	----	----	191.00	720.00	1580.00	2469.86	----
SUB 2	01/25/89	HMC	----	----	----	----	----	----	170.00	659.00	1530.00	2345.94	----
SUB 3	01/30/89	HMC	----	----	----	----	----	----	191.00	718.00	1450.00	2516.09	----
0434	03/07/89	HMC	25.00	1.00	2.00	463.00	232.00	18.00	78.00	835.00	1440.00	2158.57	0.90
0453	01/25/89	HMC	----	----	----	----	----	----	199.00	830.00	1640.00	2778.76	----
490	01/23/89	PMC	278.00	33.00	5.00	312.00	492.00	< 10.00	184.00	813.00	1730.00	2510.57	0.99
490	06/15/89	HMC	----	----	----	----	----	----	184.00	790.00	1630.00	2402.06	----
492	01/19/89	HMC	239.00	16.00	5.00	312.00	343.00	< 10.00	170.00	856.00	1380.00	2442.71	0.94
493	01/19/89	HMC	----	----	----	----	----	----	43.00	625.00	1110.00	1721.53	----
493	06/15/89	HMC	----	----	----	----	----	----	57.00	580.00	1150.00	1680.18	----
494	01/19/89	HMC	----	----	----	----	----	----	184.00	782.00	1870.00	2510.57	----
494	06/15/89	HMC	----	----	----	----	----	----	177.00	810.00	1520.00	2520.27	----
DD	01/11/89	HMC	547.00	39.00	9.00	408.00	326.00	< 10.00	60.00	1880.00	2740.00	3460.51	1.04
DD	01/11/89	BABB	422.00	109.00	7.30	361.00	300.00	< 1.00	76.40	1810.00	3260.00	----	1.03
DD	03/29/89	HMC	----	----	----	----	----	----	67.00	1920.00	2830.00	3466.80	----
DD	06/13/89	HMC	----	----	----	----	----	----	76.00	1870.00	4250.00	3360.36	----
P	01/11/89	HMC	248.00	9.00	6.00	275.00	277.00	< 10.00	43.00	889.00	1670.00	2035.60	1.03
P	01/11/89	BABB	197.00	41.00	4.90	232.00	251.00	1.00	63.50	858.00	1660.00	----	0.98
P	05/16/89	HMC	282.00	3.00	6.00	292.00	304.00	< 10.00	50.00	946.00	1620.00	2118.81	1.03

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HOMESTAKE MINING COMPANY - GRANTS

WELL WATER QUALITY DATA

(IN MG/L EXCEPT RA IN PCI/L)

W	D	DATE	LAB	CA	MG	K	NA	HCO3	CO3	CL	SO4	TDS	COND	ION_BAL
R		01/11/89	HMC	329.00	9.00	7.00	295.00	249.00	< 10.00	50.00	1100.00	2000.00	2335.53	1.05
R		01/11/89	BARR	253.00	51.50	5.90	259.00	218.00	< 1.00	58.30	1070.00	2000.00	----	1.03
R		05/16/89	HMC	357.00	6.00	7.00	300.00	260.00	< 10.00	64.00	1150.00	1430.00	2449.87	1.04
R		01/11/89	HMC	248.00	6.00	4.00	255.00	187.00	< 10.00	43.00	895.00	1640.00	1923.38	1.04
R		01/11/89	BARR	190.00	34.00	3.10	226.00	147.00	< 1.00	46.60	876.00	1560.00	----	1.01
R		05/16/89	HMC	261.00	6.00	4.00	256.00	195.00	< 10.00	50.00	960.00	1390.00	1964.52	1.01
AW		01/11/89	HMC	312.00	38.00	5.00	348.00	297.00	< 10.00	170.00	1070.00	1980.00	2426.14	1.00
AW		02/21/89	HMC	----	----	----	----	----	----	----	925.00	----	2525.25	----
AW		03/15/89	HMC	----	----	----	----	----	----	----	970.00	----	2523.28	----
AW		04/10/89	HMC	348.00	8.00	5.00	327.00	392.00	< 10.00	170.00	943.00	2010.00	2649.44	1.04
AW		05/18/89	HMC	----	----	----	----	----	----	----	988.00	----	2648.43	----
AW		06/05/89	HMC	----	----	----	----	----	----	----	1150.00	----	3030.96	----
AW		06/27/89	HMC	----	----	----	----	----	----	184.00	948.00	1690.00	2367.43	----
WCW		01/05/89	HMC	----	----	----	----	----	----	57.00	818.00	1550.00	2340.47	----
WCW		04/07/89	HMC	38.00	3.00	2.00	488.00	285.00	16.00	57.00	844.00	1380.00	2144.78	0.96
WR2		01/16/89	HMC	----	----	----	----	----	----	----	897.00	----	2573.83	----
WR2		02/21/89	HMC	----	----	----	----	----	----	----	891.00	----	2537.56	----
WR2		03/15/89	HMC	----	----	----	----	----	----	----	935.00	----	2584.89	----
WR2		04/10/89	HMC	348.00	9.00	6.00	337.00	454.00	< 10.00	184.00	911.00	1960.00	2648.51	1.03
WR2		05/16/89	HMC	----	----	----	----	----	----	----	948.00	----	2622.03	----
WR2		06/05/89	HMC	----	----	----	----	----	----	----	922.00	----	----	----
WR2		06/27/89	HMC	----	----	----	----	----	----	199.00	900.00	1400.00	2634.63	----
WR3		01/16/89	HMC	----	----	----	----	----	----	----	1080.00	----	2918.48	----
WR3		02/21/89	HMC	----	----	----	----	----	----	----	1100.00	----	2871.49	----
WR3		03/15/89	HMC	----	----	----	----	----	----	----	1160.00	----	2869.29	----
WR3		04/17/89	HMC	354.00	30.00	6.00	402.00	422.00	< 10.00	199.00	1120.00	2220.00	2985.82	1.04
WR3		05/18/89	HMC	----	----	----	----	----	----	----	1140.00	----	3053.39	----
WR3		06/05/89	HMC	----	----	----	----	----	----	----	1230.00	----	3158.08	----
WR5		01/16/89	HMC	----	----	----	----	----	----	----	1760.00	----	----	----
WR5		02/21/89	HMC	----	----	----	----	----	----	----	1840.00	----	4084.44	----
WR5		03/15/89	HMC	----	----	----	----	----	----	----	1870.00	----	4149.98	----
WR5		04/17/89	HMC	449.00	31.00	7.00	683.00	470.00	< 10.00	206.00	1910.00	3510.00	4249.05	1.02
WR5		05/18/89	HMC	----	----	----	----	----	----	----	2010.00	----	4289.71	----
WR5		06/05/89	HMC	----	----	----	----	----	----	----	1980.00	----	4490.31	----
WR5		06/13/89	HMC	454.00	2.00	7.00	723.00	525.00	< 10.00	191.00	1850.00	3340.00	4289.57	1.03
WR7		06/13/89	HMC	260.00	1.00	4.00	267.00	342.00	< 10.00	157.00	745.00	1390.00	2052.60	0.96

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HOMESTAKE MINING COMPANY - GRANTS
WELL WATER QUALITY DATA
(IN MG/L EXCEPT RA IN PCI/L)

W. ID	DATE	LAB	CA	MG	K	RA	HCO3	CO3	CL	SO4	TDS	COND	ION_BAL
MW9	05/22/89	HMC	----	----	----	----	----	----	133.00	698.00	1440.00	2057.93	----
MW11	05/23/89	HMC	----	----	----	----	----	----	155.00	705.00	1030.00	2132.90	----
A1	04/25/89	HMC	----	----	----	----	----	----	461.00	2580.00	5150.00	6174.18	----
C	01/18/89	HMC	----	----	----	----	----	----	184.00	1630.00	2540.00	3848.70	----
C	04/24/89	HMC	----	----	----	----	----	----	206.00	1650.00	3120.00	3859.27	----
DC	05/24/89	HMC	----	----	----	----	----	----	199.00	1440.00	2780.00	3423.86	----
E	02/22/89	HMC	----	----	----	----	----	----	----	1890.00	----	3746.97	----
E	04/19/89	HMC	439.00	35.00	5.00	567.00	227.00	< 10.00	241.00	1760.00	315.00	3757.07	1.04
E	05/18/89	HMC	----	----	----	----	----	----	248.00	1820.00	3180.00	3887.55	----
E	05/18/89	HMC	----	----	----	----	----	----	----	1890.00	----	3887.55	----
E	06/05/89	HMC	----	----	----	----	----	----	----	1950.00	----	3789.69	----
J	05/17/89	HMC	----	----	----	----	----	----	355.00	2370.00	3390.00	4945.62	----
N	02/22/89	HMC	----	----	----	----	----	----	64.00	1508.00	2670.00	2972.63	----
O	02/22/89	HMC	----	----	----	----	----	----	128.00	----	2340.00	2882.15	----
S	03/30/89	HMC	----	----	----	----	----	----	1420.00	15600.00	26700.00	28471.50	----
T	03/28/89	HMC	----	----	----	----	----	----	993.00	7770.00	13700.00	17662.93	----
W2	03/30/89	HMC	----	----	----	----	----	----	199.00	732.00	1260.00	2467.93	----
W2	06/13/89	HMC	276.00	16.00	9.00	308.00	586.00	< 10.00	187.00	723.00	1610.00	2714.72	0.95
W	05/23/89	HMC	----	----	----	----	----	----	166.00	686.00	159.00	2326.40	----
Z	01/16/89	HMC	----	----	----	----	----	----	----	1390.00	----	3154.21	----
Z	02/22/89	HMC	----	----	----	----	----	----	----	1370.00	----	2991.86	----
Z	04/19/89	HMC	344.00	25.00	5.00	426.00	238.00	< 10.00	227.00	1290.00	2420.00	3091.59	1.01
Z	05/18/89	HMC	----	----	----	----	----	----	----	1360.00	----	3094.11	----
Z	06/05/89	HMC	----	----	----	----	----	----	----	1410.00	----	3100.66	----
Z	06/14/89	HMC	330.00	2.00	4.00	440.00	243.00	< 10.00	206.00	1230.00	2040.00	3150.26	1.00

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HOMESTAKE MINING COMPANY - GRANTS

WELL WATER QUALITY DATA

(IN MG/L EXCEPT RA IN PCI/L)

WI	D	DATE	LAB	CA	MG	K	NA	HCO3	CO3	CL	SO4	TDS	COND	ION_BAL
CW2		01/23/89	HMC	----	----	----	----	----	----	28.00	486.00	930.00	1628.83	----
CW2		04/24/89	HMC	----	----	----	----	----	----	36.00	603.00	1230.00	1601.38	----
CW3		01/24/89	HMC	----	----	----	----	----	----	57.00	820.00	1420.00	2284.27	----
CW3		04/25/89	HMC	----	----	----	----	----	----	57.00	867.00	1620.00	2270.95	----
CW4		01/18/89	HMC	----	----	----	----	----	----	113.00	915.00	1620.00	2442.71	----
CW4		04/24/89	HMC	----	----	----	----	----	----	121.00	988.00	1860.00	2391.03	----
MC		04/04/89	HMC	----	----	----	----	----	----	35.00	759.00	1140.00	1782.91	----
MC		06/13/89	HMC	----	----	----	----	----	----	57.00	776.00	2480.00	1589.71	----
PW		05/25/89	HMC	----	----	----	----	----	----	204.00	1490.00	2760.00	3460.51	----
D1		01/25/89	HMC	----	----	----	----	----	----	191.00	1730.00	2970.00	3984.14	----
D1		04/27/89	HMC	----	----	----	----	----	----	213.00	1730.00	3270.00	3954.58	----
EP		01/18/89	HMC	----	----	----	----	----	----	177.00	2460.00	2160.00	3515.44	----
EP		04/27/89	HMC	----	----	----	----	----	----	206.00	1570.00	2940.00	3485.39	----
JC		02/22/89	HMC	----	----	----	----	----	----	----	2250.00	----	4504.00	----
JC		04/19/89	HMC	465.00	25.00	7.00	693.00	251.00	< 10.00	291.00	2050.00	3550.00	4311.40	1.02
JC		05/18/89	HMC	----	----	----	----	----	----	----	2250.00	----	----	----
JC		06/05/89	HMC	----	----	----	----	----	----	----	2170.00	----	4700.82	----
0802		01/31/89	HMC	----	----	----	----	----	----	----	810.00	----	2040.08	----
0802		02/28/89	HMC	----	----	----	----	----	----	----	804.00	----	2138.52	----
0802		03/31/89	HMC	----	----	----	----	----	----	156.00	815.00	1480.00	2003.29	----
0802		04/28/89	HMC	----	----	----	----	----	----	----	856.00	----	2265.50	----
0802		05/31/89	HMC	271.00	0.40	5.00	300.00	244.00	< 10.00	145.00	861.00	1590.00	2279.87	1.21
0802		06/26/89	HMC	----	----	----	----	----	----	156.00	798.00	1230.00	2118.81	----
0804		01/31/89	HMC	----	----	----	----	----	----	----	889.00	----	2086.31	----
0804		02/28/89	HMC	----	----	----	----	----	----	----	714.00	----	2086.31	----
0804		05/30/89	HMC	293.00	10.00	5.00	300.00	407.00	< 10.00	163.00	771.00	1510.00	2270.95	1.04
0804		06/26/89	HMC	----	----	----	----	----	----	170.00	723.00	1270.00	2270.95	----
0815		06/28/89	HMC	----	----	----	----	----	----	85.00	856.00	1550.00	2261.78	----
0832		03/31/89	HMC	112.00	3.00	5.00	207.00	333.00	< 10.00	57.00	412.00	890.00	1292.72	0.94

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HOMESTAKE MINING COMPANY - GRANTS
WELL WATER QUALITY DATA
(IN MG/L EXCEPT RA IN PCI/L)

WELL_ID	DATE	LAB	CA	MG	K	NA	HCO3	CO3	CL	SO4	TDS	COND	ION_BAL
0840	03/30/89	HMC	486.00	3.00	7.00	427.00	284.00	< 10.00	191.00	1600.00	2660.00	3310.64	0.99
0844	03/31/89	HMC	----	----	----	----	----	----	220.00	1610.00	3110.00	3867.63	----
0844	06/14/89	HMC	----	----	----	----	----	----	234.00	1690.00	2690.00	3954.58	----
845	03/31/89	HMC	----	----	----	----	----	----	99.00	1700.00	2770.00	3659.66	----
845	06/14/89	HMC	----	----	----	----	----	----	101.00	1760.00	3020.00	3707.92	----
0902	04/13/89	HMC	419.00	11.00	9.00	393.00	222.00	< 10.00	184.00	1440.00	4040.00	3037.25	1.00
0931	01/18/89	HMC	----	----	----	----	----	----	277.00	724.00	1990.00	3091.59	----

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HOMESTAKE MINING COMPANY - GRANTS

WELL WATER QUALITY DATA

(IN MG/L EXCEPT RA IN PCI/L)

WELL_ID	DATE	LAB	PH	URAT	MO	SE	NO3	RA226	PUMP_RATE	BAIL_VOL	P_P
DB	01/17/89	BMC	7.90	31.00	45.50	2.12	17.40	0.20	----	----	----
DB	01/17/89	BARR	7.63	20.80	33.70	1.92	8.70	0.20	----	----	----
DB	02/16/89	BMC	----	34.80	----	----	----	----	----	----	----
DB	03/15/89	BMC	----	34.60	----	----	----	----	----	----	1440.00
DB	04/12/89	BMC	8.00	34.30	47.70	3.38	9.60	0.10	----	----	1440.00
DB	05/18/89	BMC	----	36.50	----	----	----	----	8.00	----	1440.00
DB	06/05/89	BMC	----	36.70	----	----	----	----	----	----	1440.00
DE	01/17/89	BMC	8.00	35.90	55.50	3.00	38.80	0.20	----	----	----
DE	01/17/89	BARR	8.53	29.40	41.90	2.41	10.70	0.10	----	----	----
DE	02/16/89	BMC	----	33.10	----	----	----	----	----	----	----
DE	03/15/89	BMC	----	34.60	----	----	----	----	----	----	1440.00
DE	04/12/89	BMC	8.60	31.80	47.30	2.67	9.50	1.10	----	----	1440.00
DE	05/18/89	BMC	----	34.80	----	----	----	----	8.60	----	1440.00
DE	06/05/89	BMC	----	35.40	----	----	----	----	----	----	1440.00
DF	02/21/89	BMC	----	15.90	----	----	----	----	13.00	----	1440.00
DF	04/12/89	BMC	7.60	16.00	13.50	2.92	13.60	0.10	----	----	1440.00
DF	05/18/89	BMC	----	16.80	----	----	----	----	20.20	----	1440.00
DF	06/05/89	BMC	----	16.60	----	----	----	----	----	----	1440.00
DG	01/17/89	BMC	7.20	36.70	31.80	2.04	57.80	0.20	----	----	----
DG	01/17/89	BARR	7.37	35.50	23.30	1.44	44.50	0.10	----	----	----
DG	02/16/89	BMC	----	35.60	----	----	----	----	----	----	----
DG	03/15/89	BMC	----	36.00	----	----	----	----	----	----	1440.00
DG	04/12/89	BMC	7.50	34.80	30.30	1.51	39.80	0.10	----	----	1440.00
DG	04/18/89	BMC	----	35.90	----	----	----	----	----	----	----
DG	06/05/89	BMC	----	35.20	----	----	----	----	----	----	1440.00
DH	01/16/89	BMC	----	76.70	----	----	----	----	----	----	1440.00
DH	02/21/89	BMC	----	77.20	----	----	----	----	12.00	----	1440.00
DH	03/15/89	BMC	----	66.40	----	----	----	----	----	----	----
DH	04/12/89	BMC	7.70	75.90	88.80	2.85	28.60	1.00	----	----	1440.00
DH	05/18/89	BMC	----	76.90	----	----	----	----	15.40	----	1440.00
DH	06/05/89	BMC	----	77.20	----	----	----	----	----	----	1440.00
EZ	05/25/89	BMC	8.00	27.80	38.60	0.71	72.80	----	5.00	----	20.00
EZ	05/25/89	BMC	7.60	24.30	36.40	1.04	----	----	3.00	----	30.00
EZ	05/25/89	BMC	----	----	----	----	50.80	----	----	----	----
SA	01/12/89	BMC	7.50	12.70	13.50	0.75	18.20	0.40	----	----	----
SA	01/17/89	BARR	7.55	13.70	10.80	0.55	10.70	< 0.01	----	----	----
SA	01/17/89	BMC	8.30	10.60	11.00	0.71	31.90	0.11	----	----	----
SA	02/16/89	BMC	----	11.40	----	----	----	----	----	----	----
SA	03/15/89	BMC	----	11.20	----	----	----	----	----	----	1440.00

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HOMESTAKE MINING COMPANY - GRANTS

WELL WATER QUALITY DATA

(IN MG/L EXCEPT RA IN PCI/L)

WE	DATE	LAB	PH	UNAT	MO	SE	NO3	RA226	PUMP_RATE	BAIL_VOL	F_P
SA	04/12/89	HMC	7.70	10.40	12.00	0.47	13.80	0.40	----	----	----
SA	05/18/89	HMC	----	12.60	----	----	----	----	8.00	----	1440.00
SA	06/05/89	HMC	----	11.50	----	----	----	----	----	----	1440.00
SB	01/12/89	HMC	8.10	28.20	48.40	0.68	20.30	0.20	----	----	----
SB	01/12/89	BARR	7.55	27.60	37.20	0.51	7.40	< 0.01	----	----	----
SB	02/16/89	HMC	----	27.30	----	----	----	----	----	----	----
SB	03/15/89	HMC	----	25.70	----	----	----	----	----	----	1440.00
SB	04/12/89	HMC	8.00	26.70	44.60	0.84	16.70	0.10	----	----	1440.00
SB	05/18/89	HMC	----	25.40	----	----	----	----	32.00	----	1440.00
SB	06/05/89	HMC	----	24.00	----	----	----	----	----	----	1440.00
SC	01/16/89	HMC	----	42.80	----	----	----	----	----	----	1440.00
SC	02/21/89	HMC	----	39.90	----	----	----	----	18.00	----	1440.00
SC	03/15/89	HMC	----	37.10	----	----	----	----	----	----	1440.00
SC	04/14/89	HMC	7.70	43.20	57.80	1.16	7.80	3.90	----	----	1440.00
SC	05/18/89	HMC	----	43.70	----	----	----	----	22.00	----	1440.00
SC	06/05/89	HMC	----	43.50	----	----	----	----	----	----	1440.00
SE	01/17/89	HMC	8.00	5.60	6.96	1.43	9.60	0.60	----	----	----
SE	01/17/89	BARR	7.49	6.41	5.65	0.82	7.10	0.20	----	----	----
SE	02/16/89	HMC	----	5.09	----	----	----	----	----	----	----
SE	03/15/89	HMC	----	4.83	----	----	----	----	----	----	1440.00
SE	04/12/89	HMC	7.90	4.83	6.43	1.10	7.50	0.10	----	----	1440.00
SE	05/18/89	HMC	----	4.41	----	----	----	----	16.00	----	1440.00
SE	06/05/89	HMC	----	4.58	----	----	----	----	----	----	1440.00
DL	01/17/89	HMC	8.40	195.00	323.00	2.43	38.20	0.20	----	----	----
DL	01/17/89	BARR	8.10	208.00	147.00	1.44	4.90	0.20	----	----	----
DS	01/16/89	HMC	----	26.70	----	----	----	----	----	----	1440.00
DS	02/21/89	HMC	----	29.90	----	----	----	----	5.00	----	1440.00
DS	03/15/89	HMC	----	26.50	----	----	----	----	----	----	1440.00
DS	04/12/89	HMC	7.80	28.40	43.30	2.82	14.10	1.00	----	----	1440.00
DS	05/18/89	HMC	----	30.10	----	----	----	----	7.60	----	1440.00
DS	06/05/89	HMC	----	31.40	----	----	----	----	----	----	1440.00
SV	01/11/89	HMC	----	----	----	----	----	0.20	----	----	----
SV	01/11/89	HMC	9.00	48.60	80.30	3.36	27.60	----	----	----	----
SV	01/11/89	BARR	8.84	56.00	58.20	2.10	10.00	< 0.04	----	----	----
SV	06/05/89	HMC	----	27.80	----	----	----	----	----	----	1440.00
B	03/29/89	HMC	7.50	0.51	0.04	1.97	15.20	0.20	----	22.80	19.00
B	05/17/89	HMC	7.70	1.34	0.30	1.47	16.40	0.60	3.50	----	20.00
BC	03/27/89	HMC	7.40	0.41	0.05	0.01	0.40	0.20	----	24.00	----

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HOMESTAKE MINING COMPANY - GRANTS

WELL WATER QUALITY DATA
(IN MG/L EXCEPT RA IN PCI/L)

WELL_ID	DATE	LAB	PH	UNAT	MO	SE	NO3	RA226	PUMP_RATE	BAIL_VOL	P_P
BC	05/24/89	HMC	7.40	0.32	0.03	0.01	13.00	0.80	----	----	----
DM	03/27/89	HMC	9.50	58.50	80.50	1.02	45.30	1.90	----	24.00	----
DZ	03/29/89	HMC	9.00	92.40	90.90	3.73	14.80	0.30	2.00	----	20.00
FE	04/04/89	HMC	8.00	0.15	0.01	0.11	5.20	----	18.50	----	20.00
FE	06/13/89	HMC	----	0.12	0.01	0.10	----	0.20	15.00	----	21.00
I	02/22/89	HMC	7.60	0.08	< 0.01	0.01	2.10	0.20	15.00	----	20.00
I	05/17/89	HMC	7.60	0.03	< 0.01	< 0.01	1.50	1.80	22.00	----	20.00
KM	05/25/89	HMC	7.90	25.30	26.10	0.90	52.00	----	4.00	----	25.00
SM	03/30/89	HMC	8.10	107.00	117.00	2.51	11.30	----	14.50	----	23.00
B1	04/27/89	HMC	7.80	7.63	9.25	0.62	8.00	----	20.00	----	79.00
D9	03/29/89	HMC	7.50	9.41	7.25	9.63	21.10	0.10	15.00	----	20.00
SO	03/30/89	HMC	8.00	70.00	87.30	2.87	26.80	----	8.00	----	20.00
SD4	01/16/89	HMC	----	27.70	----	----	----	----	----	----	1440.00
SD4	02/21/89	HMC	----	29.90	----	----	----	----	12.00	----	1440.00
SD4	03/15/89	HMC	----	25.70	----	----	----	----	----	----	1440.00
SD4	04/12/89	HMC	8.40	26.30	36.50	1.33	19.80	0.10	----	----	1440.00
SD4	05/18/89	HMC	----	30.50	----	----	----	----	13.50	----	1440.00
SD4	06/05/89	HMC	----	24.80	----	----	----	----	----	----	1440.00
DA 2	01/16/89	HMC	----	18.10	----	----	----	----	----	----	1440.00
DA 2	02/21/89	HMC	----	14.40	----	----	----	----	2.00	----	1440.00
DA 2	03/15/89	HMC	----	19.10	----	----	----	----	----	----	1440.00
DA 2	04/12/89	HMC	8.00	16.10	31.60	1.05	20.40	0.10	----	----	1440.00
DA 2	05/18/89	HMC	----	22.00	----	----	----	----	10.00	----	1440.00
DA 2	06/05/89	HMC	----	21.10	----	----	----	----	----	----	1440.00
SQ	01/16/89	HMC	----	36.90	----	----	----	----	----	----	----
SQ	02/21/89	HMC	----	37.60	----	----	----	----	4.00	----	1440.00
SQ	03/15/89	HMC	----	35.20	----	----	----	----	----	----	----
SQ	04/12/89	HMC	8.20	35.20	55.20	1.14	13.20	0.10	----	----	1440.00
SQ	05/18/89	HMC	----	41.60	----	----	----	----	25.00	----	1440.00
SQ	06/05/89	HMC	----	39.90	----	----	----	----	----	----	1440.00

HOMESTAKE MINING COMPANY - GRANTS
WELL WATER QUALITY DATA
(IN MG/L EXCEPT RA IN PCI/L)

WELL ID	DATE	LAB	PH	UNAT	MO	SE	NO3	RA226	PUMP_RATE	BAIL_VOL	P_P
SE	01/16/89	HMC	----	50.00	----	----	----	----	----	----	1440.00
SE	02/21/89	HMC	----	49.90	----	----	----	----	30.00	----	1440.00
SE	03/05/89	HMC	----	51.60	----	----	----	----	----	----	1440.00
SE	04/12/89	HMC	8.90	48.80	70.70	2.24	24.60	0.70	----	----	1440.00
SE	05/18/89	HMC	----	51.30	----	----	----	----	23.00	----	1440.00
SE	06/05/89	HMC	----	51.30	----	----	----	----	----	----	1440.00
TW	06/05/89	HMC	----	27.80	----	----	----	----	----	----	1440.00
SUB1	01/30/89	HMC	7.90	0.37	0.05	0.02	2.50	----	15.00	----	20.00
SUB 2	01/25/89	HMC	7.80	0.35	0.01	0.01	1.10	----	17.00	----	20.00
SUB 3	01/30/89	HMC	7.80	0.62	0.01	0.01	1.20	----	15.00	----	20.00
0434	03/07/89	HMC	8.60	0.04	0.01	0.16	1.20	0.10	20.00	----	30.00
0453	01/25/89	HMC	7.80	< 0.01	0.01	0.01	1.40	----	16.00	----	20.00
490	01/23/89	HMC	7.50	0.30	0.21	0.02	2.00	0.20	14.00	----	20.00
490	06/15/89	HMC	7.50	0.44	----	< 0.01	1.50	----	18.00	----	20.00
492	01/19/89	HMC	7.70	0.37	0.02	0.05	3.80	0.10	18.00	----	20.00
493	01/19/89	HMC	8.60	0.07	0.01	0.06	1.00	----	14.00	----	20.00
493	06/15/89	HMC	8.30	0.04	----	0.01	0.70	----	30.00	----	30.00
494	01/19/89	HMC	7.30	0.49	0.12	0.04	3.00	----	8.00	----	20.00
494	06/15/89	HMC	7.50	0.47	----	0.02	5.10	----	20.00	----	23.00
DD	01/11/89	HMC	7.70	0.08	0.01	0.01	10.40	0.20	----	----	----
DD	01/11/89	BARR	7.42	0.20	0.01	0.03	12.10	< 0.01	----	----	----
DD	03/29/89	HMC	7.90	0.08	0.01	< 0.01	6.20	----	15.50	----	20.00
DD	06/13/89	HMC	----	0.06	< 0.01	< 0.01	----	----	14.00	----	21.00
P	01/11/89	HMC	7.60	0.03	0.01	0.11	4.90	0.60	----	----	----
P	03/17/89	BARR	7.66	0.04	0.02	0.09	6.30	0.20	----	----	----
P	05/16/89	HMC	8.10	0.03	0.01	0.08	3.80	0.40	0.22	----	35.00

HOMESTAKE MINING COMPANY - GRANTS

06/04/89

WELL WATER QUALITY DATA
(IN MG/L EXCEPT RA IN PCI/L)

WELL_ID	DATE	LAB	PH	URAT	MO	SE	NO3	RA226	PUMP_RATE	BAIL_VOL	P_P
Q	01/11/89	HMC	7.60	0.03	0.01	0.20	10.10	0.20	----	----	----
Q	01/11/89	BARR	7.65	0.05	0.01	0.16	12.60	0.30	----	----	----
Q	05/16/89	HMC	7.90	0.31	< 0.01	0.14	7.90	0.60	20.00	----	30.00
R	01/11/89	HMC	7.90	0.02	0.01	0.09	5.80	0.20	----	----	----
R	01/11/89	BARR	7.73	0.02	0.01	0.09	7.10	0.10	----	----	----
R	05/16/89	HMC	8.10	0.04	0.01	0.11	4.60	0.90	12.00	----	60.00
AW	01/11/89	HMC	8.20	1.02	0.30	0.16	6.00	1.40	----	----	----
AW	02/21/89	HMC	----	0.93	----	----	----	----	20.00	----	1440.00
AW	03/15/89	HMC	----	0.96	----	----	----	----	----	----	1440.00
AW	04/10/89	HMC	7.80	0.60	0.21	0.18	3.60	0.10	20.00	----	1440.00
AW	05/18/89	HMC	----	0.87	----	0.15	----	----	18.00	----	1440.00
AW	06/05/89	HMC	----	1.61	----	0.19	----	----	----	----	1440.00
AW	06/27/89	HMC	7.60	1.14	----	----	3.50	----	20.00	----	1440.00
WCW	01/05/89	HMC	8.30	0.03	----	< 0.01	0.30	----	6.00	----	30.00
WCW	04/07/89	HMC	8.40	0.03	0.01	< 0.01	1.10	0.30	6.00	----	40.00
WB2	01/16/89	HMC	----	0.70	----	----	----	----	----	----	1440.00
WB2	02/21/89	HMC	----	0.72	----	----	----	----	32.00	----	1440.00
WB2	03/15/89	HMC	----	0.72	----	----	----	----	----	----	1440.00
WB2	04/10/89	HMC	7.50	0.51	0.20	0.10	2.20	0.10	----	----	1440.00
WB2	05/18/89	HMC	----	0.55	----	0.09	----	----	31.00	----	1440.00
WB2	06/05/89	HMC	----	0.61	----	0.09	----	----	----	----	1440.00
WB2	06/27/89	HMC	7.60	0.68	----	0.05	2.20	----	----	----	1440.00
WB3	01/16/89	HMC	----	1.87	----	----	----	----	----	----	1440.00
WB3	02/21/89	HMC	----	1.87	----	----	----	----	30.00	----	1440.00
WB3	03/15/89	HMC	----	1.87	----	----	----	----	----	----	1440.00
WB3	04/17/89	HMC	7.70	1.98	0.64	0.28	6.80	0.50	29.00	----	1440.00
WB3	05/18/89	HMC	----	1.72	----	0.28	----	----	29.00	----	1440.00
WB3	06/05/89	HMC	----	2.04	----	0.27	----	----	----	----	1440.00
WB5	01/16/89	HMC	----	6.78	----	----	----	----	----	----	1440.00
WB5	02/21/89	HMC	----	6.53	----	----	----	----	27.50	----	1440.00
WB5	03/15/89	HMC	----	7.38	----	----	----	----	----	----	1440.00
WB5	04/17/89	HMC	7.70	7.15	5.52	0.77	10.80	0.10	29.00	----	1440.00
WB5	05/18/89	HMC	----	7.21	----	0.80	----	----	20.60	----	1440.00
WB5	06/05/89	HMC	----	7.55	----	0.95	----	----	----	----	1440.00
WB5	06/13/89	HMC	7.70	7.89	6.20	0.98	10.40	0.20	----	----	----
WB7	06/13/89	HMC	7.70	0.02	< 0.01	0.08	2.40	2.00	16.50	----	22.00
WB9	05/23/89	HMC	7.70	0.06	0.01	0.00	3.50	----	22.00	----	77.00

06/09/89*

HOMESTAKE MINING COMPANY - GRANTS

WELL WATER QUALITY DATA

(IN MG/L EXCEPT RA IN PCI/L)

WELL ID	DATE	LAB	PH	UNAT	MO	SE	NO3	RA226	PUMP_RATE	BAIL_VOL	P_P
WELL	05/23/89	HMC	7.90	0.14	0.05	0.13	3.60	----	22.00	----	12.00
A1	04/25/89	HMC	7.60	6.11	29.00	4.08	16.00	----	----	16.00	----
C	01/16/89	HMC	7.50	0.93	0.24	0.73	3.80	----	4.00	----	30.00
C	04/24/89	HMC	7.10	1.09	0.29	0.49	3.30	----	3.00	----	90.00
EC	05/24/89	HMC	7.90	0.06	0.02	0.16	38.80	----	----	----	----
E	02/22/89	HMC	----	0.09	----	0.51	----	----	8.50	----	1440.00
E	04/19/89	HMC	7.90	0.10	0.02	0.51	6.90	0.10	----	----	1440.00
E	05/18/89	HMC	7.40	0.03	0.01	0.55	8.80	----	7.50	----	1440.00
E	05/18/89	HMC	----	0.03	----	0.54	----	----	4.30	----	1440.00
E	06/05/89	HMC	----	0.15	----	0.51	----	----	----	----	----
J	05/17/89	HMC	7.30	2.37	7.58	0.83	11.90	----	3.00	----	10.00
N	02/22/89	HMC	8.00	0.02	0.02	0.08	9.60	----	2.00	----	20.00
O	02/22/89	HMC	8.10	< 0.01	0.01	0.24	2.00	----	16.50	----	20.00
S	03/30/89	HMC	9.20	67.40	72.80	3.34	24.70	----	2.50	----	----
T	03/28/89	HMC	7.90	19.80	2.17	4.51	144.00	----	7.00	----	40.00
W2	03/30/89	HMC	7.50	0.01	0.01	0.01	1.80	----	14.00	----	80.00
W2	06/13/89	HMC	7.60	< 0.01	< 0.01	< 0.01	1.20	1.00	15.00	----	20.00
W	05/23/89	HMC	7.60	0.05	0.01	0.01	1.90	----	22.00	----	30.00
[illegible]	01/16/89	HMC	----	1.02	----	----	----	----	----	----	1440.00
[illegible]	02/22/89	HMC	----	0.93	----	0.35	----	----	10.50	----	1440.00
[illegible]	04/19/89	HMC	7.90	0.87	1.36	0.31	5.50	0.10	----	----	1440.00
[illegible]	05/18/89	HMC	----	0.93	----	0.33	----	----	11.80	----	1440.00
[illegible]	06/05/89	HMC	----	1.36	----	0.29	----	----	----	----	< 1440.00
[illegible]	06/14/89	HMC	7.80	1.02	1.40	0.33	5.20	0.20	----	----	----
[illegible]W2	01/23/89	HMC	8.60	0.07	0.02	< 0.01	0.60	----	9.00	----	213.00
[illegible]W2	04/24/89	HMC	7.90	< 0.01	0.02	< 0.01	0.40	----	10.00	----	91.00

HOMESTAKE MINING COMPANY - GRANTS

06/04/89

WELL WATER QUALITY DATA
(IN MG/L EXCEPT RA IN PCI/L)

WELL_ID	DATE	LAB	PH	UNAT	MO	SE	NO3	RA226	PUMP_RATE	BAIL_VOL	P_P
CW3	01/24/89	HMC	8.20	< 0.01	0.01	0.01	0.50	----	11.00	----	188.00
CW3	04/25/89	HMC	8.40	< 0.01	0.02	0.01	0.30	----	12.00	----	233.00
CW4	01/18/89	HMC	7.60	0.62	0.22	0.12	0.90	----	30.00	----	185.00
CW4	04/24/89	HMC	7.30	0.68	0.19	0.08	0.50	----	40.00	----	125.00
MC	04/04/89	HMC	8.10	0.01	0.01	0.05	1.40	----	15.00	----	23.00
MC	06/13/89	HMC	----	----	----	0.02	----	----	----	----	----
MC	06/13/89	HMC	----	0.02	0.01	----	----	----	14.50	----	20.00
PW	05/25/89	HMC	7.80	3.82	2.06	0.49	9.80	----	4.50	----	40.00
D1	01/25/89	HMC	7.60	4.92	4.36	0.70	6.50	----	16.00	----	20.00
D1	04/27/89	HMC	7.40	4.92	4.44	0.60	----	----	20.00	----	65.00
BP	01/18/89	HMC	7.30	1.59	0.30	0.69	5.90	----	16.00	----	33.00
BP	04/27/89	HMC	7.60	1.53	0.33	0.58	4.50	----	20.00	----	180.00
JC	02/22/89	HMC	----	3.99	----	0.80	----	----	6.00	----	1440.00
JC	04/19/89	HMC	7.50	3.05	7.25	0.65	9.90	0.10	----	----	1440.00
JC	05/18/89	HMC	----	3.39	----	0.69	----	----	5.60	----	1440.00
JC	06/05/89	HMC	----	3.86	----	0.67	----	----	----	----	----
DBD2	01/31/89	HMC	----	0.03	----	0.01	----	----	5.00	----	31.00
DBD2	02/25/89	HMC	----	0.03	----	0.01	----	----	10.00	----	----
DBD2	03/31/89	HMC	8.30	0.02	0.01	0.01	0.90	----	6.00	----	25.00
DBD2	04/28/89	HMC	----	0.04	----	0.02	----	----	5.00	----	30.00
DBD2	05/31/89	HMC	7.90	0.02	< 0.01	0.01	3.40	0.20	20.00	----	30.00
DBD2	06/26/89	HMC	8.00	0.04	----	0.01	2.40	----	6.00	----	30.00
DBD4	01/31/89	HMC	----	0.02	----	0.01	----	----	5.00	----	10.00
DBD4	02/26/89	HMC	----	0.04	----	0.01	----	----	6.00	----	----
DBD4	05/30/89	HMC	7.40	0.02	< 0.01	0.01	3.60	2.00	6.00	----	30.00
DBD4	06/26/89	HMC	7.60	0.06	----	< 0.01	1.20	----	6.00	30.00	14.00
DB15	06/28/89	HMC	8.20	0.03	----	0.02	3.60	----	13.00	----	32.00
DB32	03/31/89	HMC	7.80	0.01	0.01	< 0.01	0.20	0.30	10.00	----	90.00
DB40	03/30/89	HMC	7.70	0.05	0.01	0.08	3.00	0.10	6.00	----	20.00

08/04/89

HOMESTAKE MINING COMPANY - GRANTS

WELL WATER QUALITY DATA

(IN MG/L EXCEPT RA IN PCI/L)

WE)	DATE	LAB	PH	UNAT	MO	SE	NO3	RA226	PUMP_RATE	BAIL_VOL	P_P
0844	03/31/89	HMC	6.10	0.07	< 0.01	0.01	3.80	----	13.50	----	21.00
0844	06/14/89	HMC	7.30	0.10	0.01	< 0.01	3.40	----	12.00	----	22.00
846	03/31/89	HMC	8.20	0.02	< 0.01	0.01	4.10	----	11.00	----	23.00
846	06/14/89	HMC	7.40	0.05	< 0.01	0.02	3.70	----	9.50	----	20.00
0902	04/13/89	HMC	----	----	----	----	----	0.20	----	----	----
0902	04/13/89	HMC	7.30	0.04	< 0.01	0.79	6.00	----	6.00	----	45.00
0931	01/18/89	HMC	8.30	0.03	0.03	0.01	0.80	----	9.00	----	142.00

HOMESTAKE MINING COMPANY - GRANTS OPERATION
Isokinetic Stack Sampling

Stack I.D.	Parameter	Conc U-nat Sampling Date	Emission Rate ($uCi/ft.^3$)	Activity Emission Rate (uCi/Hr)	Mass Emission (Lbs U_3O_8/Hr)	Percent Isokinetic
YC Dryer	U-nat	02/14/89	0.729×10^{-3}	36.1	0.141	102
	Ra-226	02/14/89	0.334×10^{-7}	0.017	NA	102
	Th-230	02/14/89	0.240×10^{-4}	1.19	NA	102
	U-nat	06/14/89	0.654×10^{-3}	32.6	0.127	102
	Ra-226	06/14/89	0.258×10^{-6}	0.013	NA	102
	Th-230	06/14/89	0.180×10^{-4}	0.899	NA	102
Vanadium	U-nat	02/15/89	0.542×10^{-3}	30.3	0.118	102
	Ra-226	02/15/89	0.364×10^{-6}	0.020	NA	102
	Th-230	02/15/89	0.228×10^{-4}	1.27	NA	102
	U-nat	06/01/89	0.220×10^{-3}	13.1	0.0509	96
	Ra-226	06/01/89	0.499×10^{-6}	0.030	NA	96
	Th-230	06/01/89	0.167×10^{-4}	0.994	NA	96
YC. Pkg. Rm.	U-nat	02/28/89	0.611×10^{-3}	223	0.870	109
	Ra-226	02/28/89	0.906×10^{-6}	0.331	NA	109
	Th-230	02/28/89	0.758×10^{-4}	27.7	NA	109
	U-nat	06/07/89	0.148×10^{-3}	50.2	0.196	102
	Ra-226	06/07/89	0.220×10^{-6}	0.075	NA	102
	Th-230	06/07/89	0.184×10^{-4}	6.27	NA	102

Note: The systematic error for the fluorometric uranium analytical procedure used for the determination of stack emissions rates is 5%.

LLD		
U-nat	5×10^{-12} uCi/ml	or 1.4×10^{-7} uCi/Ft.^{3}
RA-226	7×10^{-14} uCi/ml	or 2.1×10^{-9} uCi/Ft.^{3}
Th-230	7×10^{-14} uCi/ml	or 2.1×10^{-9} uCi/Ft.^{3}

HOMESTAKE MINING COMPANY - GRANTS OPERATION

Alpha Surface Contamination
Yellowcake Shipments

Shipment Number	Survey Date	Drum No.'s Monitored	Average Surface Alpha Value (dpm/100 cm²)	Trailer Gamma Survey (mR/hr.)
MT-29	2-1-89	27,21,19,12 Rear Trailer	38	0.97
MT-30	2-3-89	13,15,8,2 Rear Trailer	37	1.30
MT-31	3-1-89	34,24,14,4 Rear Trailer	97	0.80
MT-32	3-3-89	40,29,18,3 Rear Trailer	40	1.00
MT-33	3-6-89	37,22,12,4 Rear Trailer	15	1.10
MT-34	3-8-89	15,25,32,41 Rear Trailer	39	1.60
MT-35	4-3-89	15,24,34,40 Rear Trailer	91	1.80
MT-36	4-5-89	31,23,28,17 Rear Trailer	212	1.40
MT-37	4-7-89	11,18,30,27 Rear Trailer	73	1.70
MT-38	4-10-89	30,29,25,20 Rear Trailer	27	1.40

Maximum Permissible Concentration

1000- dpm/100 cm²

Alpha Surface Contamination
Yellowcake Shipments
(Continued)

Shipment Number	Survey Date	Drum No.'s Monitored	Average Surface Alpha Value (dpm/100 cm²)	Trailer Gamma Survey (mR/hr.)
HMC-15 Tr. #49235	4-24-89	23,24,40,34 Rear Trailer	22	2.00
HMC-15 Tr. #49061	4-24-89	15,19,11,7 Rear Trailer	25	1.90
MT-39	5-1-89	38,29,26,13 Rear Trailer	42	1.60
MT-40	5-3-89	27,20,11,3 Rear Trailer	111	1.20
MT-41	5-5-89	29,18,8,1 Rear Trailer	101	1.30
MT-42	6-5-89	5,15,25,35 Rear Trailer	73	1.40
MT-43	6-7-89	34,24,14,4 Rear Trailer	46	1.50
MT-44	6-9-89	3,21,28,41 Rear Trailer	42	1.40
MT-45	6-12-89	41,28,16,7 Rear Trailer	28	1.50
MT-46	6-14-89	6,16,29,38 Rear Trailer	50	1.80

Maximum Permissible Concentration

1000- dpm/100 cm²

HOMESTAKE MINING COMPANY

Quarterly Passive Radon Gas Monitoring Results

Date	Location	Concentration (pCi/l)							
		1 Qtr.	Ser. #	2nd Qtr.	Ser. #	3rd Qtr.	Ser. #	4th Qtr.	Serial #
1989	HMC 1 North Outer Perimeter	1.0	964 576	1.2	968 225				
1989	HMC 2 NE Outer Perimeter	1.5	964 467	1.9	968 226				
1989	HMC 3 East Outer Perimeter	1.7	964 468	1.3	968 238				
1989	HMC 4 Background	2.7	965 870	1.9	968 239				
1989	HMC 5 N. of Nearest Residence	2.9	965 871	3.5	968 240				

HOMESTAKE MINING COMPANY

Quarterly TLD Perimeter Badge Survey

Date	Badge No.	LOCATION	Concentration mrem/week			
			1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1989	0001	HMC 1 North Outer Perimeter	3.58	3.06		
1989	0002	HMC 2 NE Outer Perimeter	4.03	4.42		
1989	0003	HMC 3 East Outer Perimeter	4.06	4.35		
1989	0004	HMC 4 Background	NA*	2.35		
1989	0005	HMC 5 N. of Nearest Residence	3.01	3.22		

* Lost Monitor

HOMESTAKE M. ING COMPANY

Perimeter Particulate Air Sampling

MPC U Nat = 5 x 10^{-12} uc/ml
MPC Th 230 = 3 x 10^{-13} uc/ml
MPC Ra 226 = 2 x 10^{-12} uc/ml
MPC Pb 210 = 8 x 10^{-12} uc/ml

Plant: Grants Operation

Samples Taken By: Ernest Padilla

Date	Sample Location	Total Sampling Volume (liters)	Assay				Pb-210	Unat	Th-230	Ra-226
			pCi Pb	g x 10^{-7} U	pCi Th	pCi Ra	uc x 10^{-12}/ml	uc x 10^{-12}/ml	uc x 10^{-13}/ml	uc x 10^{-12}/ml
2-30-89 to 3-31-89	HMC 1	1.434 x 10^8	Not Required	NA	NA	NA	Not Required			
2-30-89 to 3-31-89	HMC 2	1.434 x 10^8	"	9970	380±20	410±10	"	0.0160	0.1060	0.0114
2-30-89 to 3-31-89	HMC 3	1.173 x 10^8	"	66700	980± 30	880±20	"	0.1306	0.3343	0.00300
2-30-89 to 3-31-89	HMC 4	1.406 x 10^8	"	43600	280±10	53±5	"	0.0712	0.0797	0.0015
2-30-89 to 3-31-89	HMC 5	1.405 x 10^8	"	61400	400±20	80±7	"	0.1003	0.1139	0.0023
3-31-89 to 4-30-89	HMC1	1.362 x 10^8	"	7210	400±20	370±10	"	0.0122	0.1175	0.0109
3-31-89 to 4-30-89	HMC 2	1.302 x 10^8	"	8520	590±20	600±20	"	0.0150	0.1813	0.0184
3-31-89 to 4-30-89	HMC 3	1.260 x 10^8	"	71700	1140±20	1150±30	"	0.1306	0.3618	0.0365
3-31-89 to 4-30-89	HMC 4	1.284 x 10^8	"	27600	230±10	60±6	"	0.0494	0.0716	0.0019
3-31-89 to 4-30-89	HMC 5	1.332 x 10^8	"	31400	290±10	63±6	"	0.0541	0.0871	0.0019

ATTACHMENT 1
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HOMESTAKE MINING COMPANY - GRANTS OPERATION

Ore Crusher Stack - Grab Sample

Stack Emission Velocity

VS = 2500 ft./min. average stack velocity

Stack Cross Sectional Area

$A = (16666\ in^2)\ (1\ ft.^2/144\ in^2)$

$= 11.57\ ft^2$

Sample Collection Parameters

Date: February 9, 1989

Time: 166 min.

Pump Serial No. 0583/Cal. Factor 0.72

Observed Flow rate: 50 LPM

Actual Flow rate: 36 LPM

Total Volume Sampled: 5976 L

Particulate Analysis

Sample Conc.	Stack Emission	MPC (At the Property Boundary)
632 ug U_3O_8	7.16×10^{-11} uCi/ml U-nat	5×10^{-12} uCi/ml U-nat
250 ± 10 pCi Ra-226	4.18×10^{-11} uCi/ml Ra-226*	2×10^{-12} uCi/ml Ra-226
190 ± 10 pCi Th-230	3.17×10^{-11} uCi/ml Th-230*	3×10^{-13} uCi/ml Th-230

Stack Emission Rate

$VR = (2500\ ft/min)\ (11.57\ ft.^2)$

$= 28,925\ ft.^3/min.$

Radioactive Emission Rate

RER = (Conc.) (ER)

Where:

Conc. is radionuclide concentration of the emission effluent

ER is the stack emission rate

RER for U-nat = $(7.16 \times 10^{-11})(28925)(28320)(60)(1 \times 10^{6})$

= 3.52×10^{6} pCi/hr.

Where:

Conc. = 7.16×10^{-11} uCi/ml U-nat

ER = 28925 $ft.^{3}$/min.

28320 $ml/ft.^{3}$

60 Min/hr.

1×10^{6} pCi/uCi

RER for Ra-226 = 2.05×10^{6} pCi/hr.

Where:

Conc. = 4.18×10^{-11} uCi/ml Ra-226

RER for Th-230 = 1.56×10^{6} pCi/hr.

Where:

Conc. = 3.17×10^{-11} uCi/ml Th-230