PLAINTIFF'S EXHIBIT

UC-4910

UNION CARBIDE INTERNAL CORRESPONDENCE

[illegible] DIVISION

To: Mr. N. B. Haubold

Date: July 16, 1982

Organization: E/R-Occupational Health

Messrs: B.Kilgore/B.Davis
J. F. Frost
R. L. Beethe
R. F. Wolff

Subject: 1982 Industrial Hygiene Sampling Program - Plateau Mining Operations

The revised 1982 Industrial Hygiene Sampling Program is enclosed. I believe it incorporates the changes discussed at our last meeting in Uravan. If there are any questions please let me know.

H. B. Rhodes

H. B. Rhodes

HBR:vab
enclosure

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In examining the Figure it should be noted that an overexposure condition results from an interactior between two variables, i.e. the % silica in the dust and the dust concentration in the air. The following general observations can be made from the Figure.

1. With the exception of the Hecla Mine (where information is quite limited) there were extensive and repeated overexposure conditions.

2. There were substantial differences in the %silica and levels of respirable dust among the various mines.

   a. The Deremo, LaSal, Hecla, and Sunday gave essentially the same results for all of the 1981 sampling campaigns.

   b. The results at these locations ranged from the Sunday which had a low (3-5%) silica but a high (~2 mg/M^3) dust level to the Deremo with a high (~12%) silica and a low (0.75-1.0) mg/M^3) dust level. The LaSal and Hecla fell in between. It is notable that the Hecla had about the same percent silica as the Sunday but only about half the dust level so no overexposures were found. Also the two MSHA results for miners at LaSall/Snowball had about the same silica level, i.e. 5%, as the UCC samples but the respirable dust level was much lower.

3. The King Solomon and the Wilson/Silverbell showed substantial differences between the two campaigns reported. The former dropped about 1/3 in respirable dust while increasing in silica content by about a factor of 3. The latter dropped to roughly half the dust level and also about tripled in silica content.

4. There appears to be a fairly well defined inverse relationship between the respirable dust level and the silica content. The question is raised as to whether there is any obvious physical basis for such a trend, i.e. less silica means rock which drills faster and/or is dustier? Are there any clearly defined differences in drilling rates or rock characteristics between the various mines,even the different parts of the same mine?

It was also observed that the results for personal samples on above-ground workers and also the stationery samples both above and below ground tended to be generally below or very close to the silica detection limit of 0.03 mg. which was in effect when most of them were taken. A set taken in December, with the newer 0.01 mg limit was also still generally below this limit. Lightly loaded samples such as these actually produce very little positive information. Perhaps we should consider collecting samples for two or even three shifts on the same filter. This should at least give a better definition of the silica content of the dust. This can only be done, however, in areas where the respirable dust concentration is low enough so the total loading on the filter does not exceed about 1.5 mg.

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No serious attempt was made to try to relate the specific jobs being done by the individual miners to the observed exposure levels. The general observation can be made that the respirable dust concentrations for the miners was usually much higher than for surface personnel or for stationery samples in the haulways. This suggests point or small area dust sources rather than general air contamination.

The limited examination did, however, show some rather surprising results as illustrated by the 10/29/81 data for miners at the King Soloman. These data, taken at various locations in the same mine on the same day showed the following:

1. The driller and the mucker in location 1201 had roughly the same respirable dust exposure but in one case the silica was 19% and in the other it was 63%.

2. Two trammers, one from 1201 and one from 0401 had respirable dust exposures that differed by a factor of 8 and silica concentrations that differed by a factor of 6.

3. Two long-hole drillers at the same location, 1001, had about the same respirable dust exposure but the silica contents were 13 and 54%, i.e. different by a factor of 4.

The question whether there is a reasonable explanation for these results in the geology of the mine or in the mine operation needs to be examined carefully.

2.2 The 1982 Sampling Program

The sampling results for 1981 show the following situation:

Miners: With the exception of Hecla, frequent exposure conditions over the PEL were present in all of the mines. Silica contents gave toxic ratings of Class 2 or Class 3. This combination, with the exception of Hecla, results in the need for quarterly samples for about half of the miners.

Other Personnel: With a couple of exceptions, exposures to silica and respirable dust for other personnel appear to be fairly low but analytical/sampling limitations leave considerable uncertainty in the results. (The overall method is at the edge of its range of usability.) Sampling for two shifts on the same filter has been suggested in the program as a possible way to obtain more useful results but this obviously increases the sample collection load. Any reasonable suggested alternatives are certainly open for consideration.

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The question has been raised as to whether the 1981 results are reliable. Although the method has not given any apparent difficulties at other locations there are a number of areas of uncertainty which include:

1. Very high silica concentration readings from extremely wet mine locations.

2. Substantive differences between side-by-side samples in a test with a very limited scope.

3. A small number of MSHA samples which show considerably lower exposures than the UCC procedures.

4. Heavy diesel particulate loadings on the filters in addition to mineral dust.

5. The cyclones and filter holders are old and worn.

If the 1981 results are substantially correct we have a serious silica exposure problem at all or most of the mines. A high priority action program is now in progress to obtain an answer to this problem.

The program for 1982 suggested on 2/17/82 based on the application of the criteria described earlier (except for maintenance sampling) is shown in Tables 4 through 9 since it contains the summary of the exposures. As anticipated, this program is considerably larger than what was done in 1981. The comparison is shown in the following table:

Location	1981 Actual	1982 Proposed	Reference
King Solomon	17	72	Table 4
Sunday	22	74	Table 5
LaSal-Snowball	22	142	Table 6
Wilson-Silverbell	11	36	Table 7
Deremo	23	96	Table 8
Hecla	5	26	Table 9
	100	446	

If the UCC results are approximately correct it will be appropriate to sample at about this rate although a reduction of 75-125 samples per year could result from the approach described in Attachment 1. This can be finalized when the sample reliability question is settled.

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NOISE

The report of the Division SHOC Committee Meeting of January 1982 showed that a total of about 100 dosimeter samples during 1982 would be needed to meet minimum industrial hygiene program needs. The detailed "by-job" summary sheets were omitted, however, from the 2/17/82 proposed program. This documentation information has been reworked using the new semi-annual reporting forms and the results are given in Tables 10-15.

As the Tables show, noise dosimetry samples were collected for the Plateau Mining operations in 1979, 1980, and 1982. No samples were taken in 1981

The results show that underground workers (if hearing protection were not in use) would be subjected to exposures that almost always exceeded the 100% limit, frequently by a very large amount. The surface operations were generally (but not always) within the permissible exposure limit.

The numbers of samples taken by location for each of the past 3 1/2 years are listed in the following table. Results are divided as to whether the job descriptions monitored were primarily below or above ground. It will only be noted here that for the underground miners where exposure conditions consistantly exceed the PEL an average of only one sample has been collected to represent 15 man-years of exposure.

PLATEAU MINES

PERSONAL DOSIMETER SAMPLING SUMMARY

Job Assignments Basically Underground[1]

Location	Number of Workers Assigned[2]	1979	1980	1981	1st half 1982	Recommended 1982
Deremo	37	-	-	-	2	19
Hecla	10	0	0	0	1	6
King Solomon	26	5	2	0	0	15
LaSal/Snowball	64	4	14	0	2	31
Sunday	32	2	9	0	1	17
Wilson/Silerbell	13	0	0	0	1	7
	182	11	25	0	7	95

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All Other Job Assignments (3)

Deremo	17	0	0	0	2	6
Hecla	9	0	0	0	2	4
King Solomon	14	1	1	0	0	6
LaSal/Snowball	25	1	2	0	0	10
Sunday	12	0	1	0	1	4
Wilson/Silverbell	6	0	0	0	1	3
	83	2	4	0	6	33

Overall Total 128

(1) Miners, miner's helpers, shift leadmen, shift foremen, hoistmen (Deremo and LaSal)

(2) As given in 1982 General Industrial Hygiene Survey Form.

(3) All other job descriptions.

4. FORMALDEHYDE - (suspected human carcinogen, Toxic Class 3)

One set of samples (10) was collected in 1981 at the King Solomon. Results were generally low, i.e. range 0.003 - 0.013 ppm, G.M. = 0.005, G.S.D.= 1.6.

For 1982, select the mine (other than the King Solomon) that is judged to have the highest concentration of diesel exhaust fumes. Run the same kind of survey as was done at the King Solomon in 1981 during the third quarter. The need for further surveys at other locations will be determined from these results.

It was agreed at a meeting in May that one survey would be run. Priority is lower than for NO_2.

5. CARBON MONOXIDE - (Toxic Rating 3-4, TLV - 50 ppm)

No results were obtained during 1981. The program recommended for 1981 is still valid, i.e.

> "Survey every company mine at approximately Six month intervals. Spot checks during the course of sampling several times during the shifts, preferably hourly, should be made on jobs where CO could be a problem; such as miners, diesel haulage, and mechanics."

It was agreed that one survey of 10-20 badges would be run for each of seven mining locations

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6. NITROGEN DIOXIDE - (Toxic Rating 4, TLV 5 ppm Ceiling) IDLH Conc.= 50 ppm

Note particularly that NO_2 is subject to a ceiling not a TWA limit. Note also that MSHA 57.5-6(c) sets an employee withdrawal requirement for ceiling (C) contaminants::

> "(c) Employees shall be withdrawn from areas where there is present an airborne contaminant given a "C" designation by the Conference and the concentration exceeds the threshold limit value listed for that contaminant."

The badge surveys used during 1980 and 1981 provide a measurement of the full shift TWA exposure. With a full shift average of 5 ppm this level will obviously be exceeded at some times during the shift. The same will be true for a 4 ppm TWA and probably for even a 3 ppm TWA.

Badge surveys were made at Hecla, Deremo, and LaSal during 1981. Results were as follows, expressed in ppm:

Hecla	- 1, <1, 1, <1, 7, <1, 2, <1
Deremo	- 1, 3, 2, -, <1, 1, 3, 2, 2, -
LaSal/Snowball	- 3, 4, -, 3, 5, <1, 1, 1, 1, <1

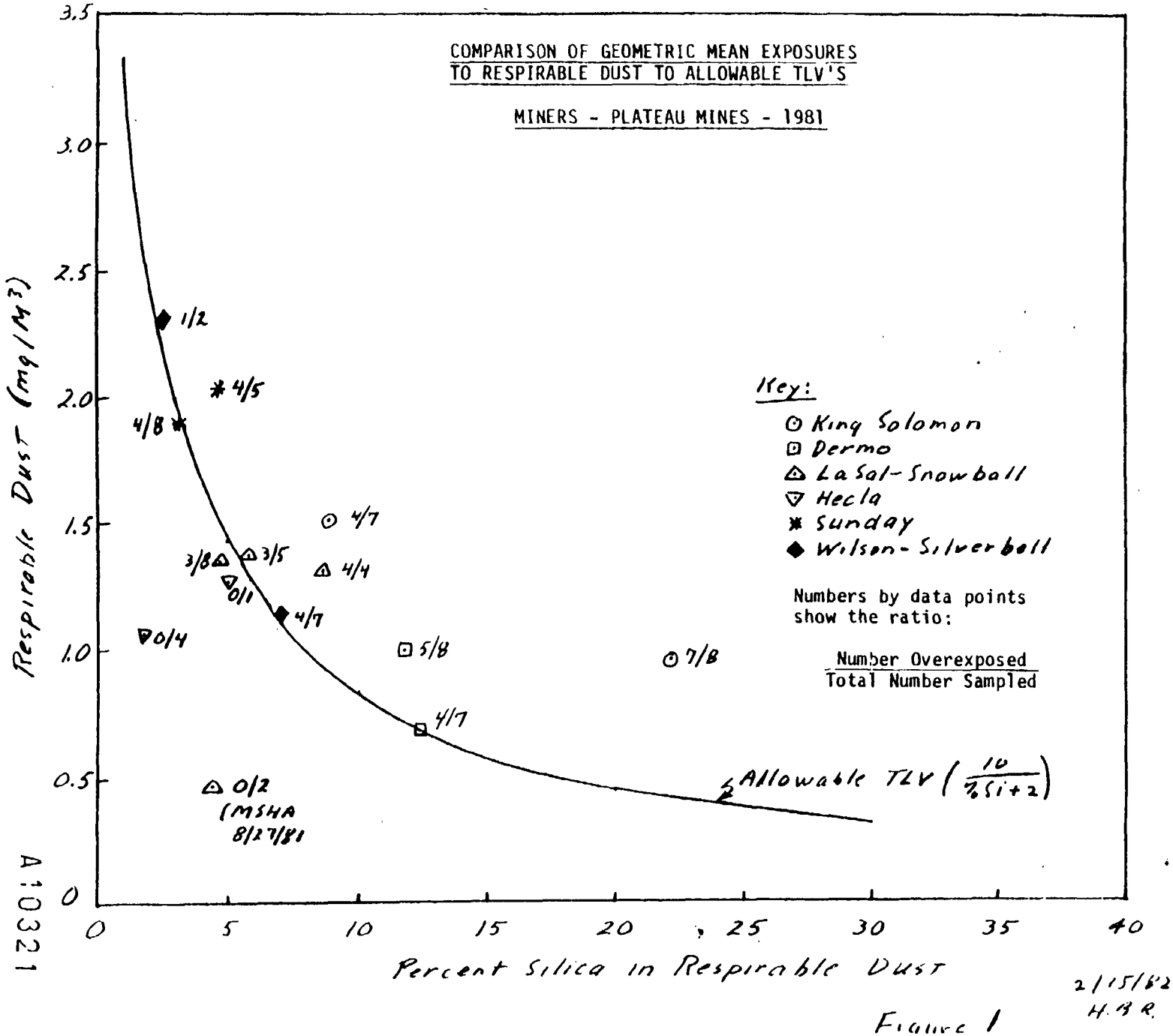
A more extensive survey was made in 1980 with the results listed in Table 16. The results are quite similar with 3, 4, and higher ppm TWA readings occurring with several samples at each location except Hecla.

The 2/17/82 proposed program recommended a monitoring interval of 4 times per year for jobs with expected significant exposures including diesel operators, some shop personnel, miners mucking in confined areas, as well as persons doing on-shift blasting. This was reduced to one round at each location at the May meeting in Uravan.

7. WELDING FUMES

The hazards from welding fumes depends largely on the type of material being welded and the specific local conditions. It is necessary to ascertain what fume ingredients are most likely and collect a limited number of area and personal samples to define whether a problem exists. An appropriate routine sampling schedule can be developed from results obtained.

Bishop has done some sampling during welding operations. The procedure and results will be provided as soon as received.



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2/15/82
H.B.R.

Figure 1

ATTACHMENT 1

SAMPLING FOR EXPOSURE MEASUREMENTS FOR MAINTENANCE PERSONNEL

1. JOB CHARACTERISTICS

Most Metals Division locations have a number of job classifications in the maintenance department, e.g., mechanics, electricians, metal fabricators, etc., with a substantial number of persons assigned to each classification. Although there are some exceptions, the most usual practice is to assign jobs that are done by a given classification to an individual in the classification largely at random. The assignment is made at the time the job is to be done to one of the members of the appropriate classification who is available at that time. Assignments on any given day may vary from a number of short jobs at a variety of plant locations to spending all day at a single place. The pattern and work locations can change extensively from day to day.

2. EXPOSURE MONITORING PROBLEMS

In most cases the maintenance department is called into the operations department because there is a problem with some piece of equipment. It is a non-routine situation and the potential for a short-term but very high exposure often exists. A number of epidemiological studies have found, however, that health effects among maintenance workers exceed those among production workers in the same plant, so exposure control is important for both groups.

The basic approach used to define sampling programs, i.e., sampling a statistically significant number of persons from a homogeneous group several times a year depending on the level of exposure and nature of the hazard, can be applied to the maintenance department but the random within and between day job assignment adds another dimension. In order to obtain meaningful data it would be necessary to sample all or almost all of each group

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ATTACHMENT 1
(continued)

for each campaign or to increase the number of campaigns per year. Since maintenance departments usually have a substantial number of people, this would give a large increase in the smapling load.

Another alternative to consider would be to keep records of each man's assignments in the manner that is now being done for the uranium miners. A number of locations appear to be doing this now for maintenance control but the incorporation of these records into the industrial hygiene program would be a substantial task. In the long run this may be the most efficient way to go but it is premature to consider it at this time.

3. PROPOSED SAMPLING PROGRAM APPROACH

In view of the size and complexities of a comprehensive sampling program for maintenance workers and the very serious resource limitations faced by the Division this year, the following more limited approach is recommended and has been used in the development of location sampling programs:

1. The number of workers to be sampled per campaign has been reduced to 1/3 - 1/2 of those obtained from the Corporate formula.

2. The number of campaigns per year has still been set by the nature of the hazard with some judgement weighting of the exposure levels which may be reached.

3. The location has been asked to identify the jobs where high exposures are known or are likely to occur. These specific jobs will be sampled as they occur to try to obtain the total number of samples recommended from Items 2 and 3, i.e.,(number per campaign) x(number of campaigns) = total annual samples.

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ATTACHMENT 1
(continued)

The foregoing approach is intended to meet the most urgent needs of worker protection. It defines where high exposures occur during maintenance operations and how high such exposures may be. The latter is particularly important because it determines what type of protective equipment needs to be worn, e.g., disposable filter, high efficiency filter or supplied air equipment. It is recognized that it requires more effort by the location in selecting the jobs to be sampled and in coordination between the maintenance department and the industrial hygiene personnel.

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TABLE 1

COMPARISON OF METALS DIVISION 1981
SAMPLING PROGRAM WITH CORPORA GUIDELINES

Number of Persons In Job Category	Metals Division 1981 Program Basis Number of Samples To Be Collected	Corporate Guidelines Minimum Number of Samples
1	1	1
2	2	2
3	2	2
4	2	2
5	2	3
6	2	3
7	2	4
8	2	4
9	2	5
10	3	5
11	3	6
12	3	6
13	3	7
14	3	7
15	4	8
16	4	8
17	4	9
18	4	9
19	4	10
20	5	10
21	5	10
22	5	11
23	5	11
24	5	11
25	6	11
26	6	12
27	6	12
28	6	12
29	6	12
30	7	13
31	7	13
32	7	13
33	7	13
34	7	14
35	8	14
36	8	14
37	8	14
38	8	15
39	8	15
40	9	15
50	11	18

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TABLE 2

SELECTION OF SAMPLING CAMPAIGN FREQUENCY

FREQUENCY CLASS	SAMPLING CRITERIA	SAMPLING FREQUENCY
1	Routine or frequent exposure to Toxic Class 4 substances.	3 months or less
2	Routine or frequent exposure to Toxic Class 3 and Class 2 substances at levels equal to or exceeding the permissible exposure levels (PEL).	
3	Routine exposure to Toxic Class 3 substances within the PEL.	3 to 6 months
4	Routine exposure to Toxic Class 2 substances at levels at or between the action level (1/2 PEL) and within the PEL.	
5	Routine exposure to Toxic Class 2 substances below the action level.	12 months
6	Routine exposure to Toxic Class 1 substances at levels at or above PEL.	
7	Recheck on areas with the potential for employee exposure regardless of levels previously found	24 months

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TABLE 3

GUIDELINE FOR SELECTION OF SAMPLING CAMPAIGN FREQUENCY

Routine or Frequent Exposure	Toxic Class 4 Sampling Frequency		Toxic Class 3 Sampling Frequency		Toxic Class 2 Sampling Frequency		Toxic Class 1 Sampling Frequency	
	Months	Exposure Class	Months	Exposure Class	Months	Exposure Class	Months	Exposure Class
At or above PEL (1)	3 or less	1	3 or less	2	3 or less	2	12	6
Within PEL (1)	3 or less	1	3 - 6	3	-	-	24	7
Between AL(2) and PEL(1)	3 or less	1	3 - 6	3	3 - 6	4	24	7
Below AL(2)	3 or less	1	3 - 6	3	12	5	24	7

(1) PEL - Permissible Exposure Limit

(2) AL - Action Level. Take as 1/2 of permissible exposure limit

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Directions for Use

1. Determine the toxic class for the material being evaluated.
2. Determine the general exposure level for the homogeneous worker group being evaluated. The geometric mean is a reasonable approximation but the range or confidence limits also need to be taken into account.
3. Enter the table at the appropriate exposure level (Item 2) and read across to the toxic class (Item 1). The proper frequency interval between sample campaigns, i.e. 3 months or less, 3-6 months, 12 months, or 24 months, is shown for each Toxic Class.
4. Each frequency interval has also been assigned a numerical class to facilitate its use in summarizing program requirements.

   (a.) Where exposure is infrequent or exposure judgement adjustments to the guidence in this Table are appropriate.

Illustrative Examples

1. Conditions

   Toxic Class 3 material
   Routine exposure above PEL

2. Read from Table

   Sampling frequency - 3 months or less
   Exposure Class 2

1. Conditions

   Toxic Class 2 material
   Routine exposure between AL and PEL.

2. Read from Table

   Sampling frequency - 3 to 6 months
   Exposure Class 4

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TABLE 1
SUMMARY OF EXPOSURES BY JOB CLASSIFICATION
-RESPIRABLE SILICA-

Location: Plateau Mines-Klaq Salomon
Prepared By: L. J. Rhodes
Date Prepared: 2/7/82

		1981										1982					
							Concentrations										
Job Description	# In Job	Samples Req.	Samples Done	Dates	Item	% Silica	Silica (mg/M³)*	Resp. Dust (mg/M³)	% OT	No. Over Exp.	No. Per Comp.	No. Of Comp.	Basis Toxic Class	Basis Exposure Class	Comments	Num Total
Miners	22	5	5	1/16/81	RANGE	5-11	0.06-0.22	1.11-1.59	157	1	11	4	3	2	Respirator use / personal sampling conducted from	44
					GM	8.3	0.13	1.51	—	—						
					GSD	1.3	1.6	1.3	—	—						
		5	8	10/29/81	RANGE	10-54	0.03-1.35	0.27-2.13	200	7						
					GM	22.2	0.21	0.36								
					GSD	2.0	3.0	2.3								
Miners' Helpers	2	2	1 Surface	1/15/81	-	18*	0.04	3.24	17		2	2	2 or 3?	3 4 5		4
Shift Foreman	2	2	-								2	2	2 or 3?	3, 4, 5?		4
Mine Foreman	1	1	-								1	2	2 or 3?	3, 4, 5?		2
Shift Leadman	2	2	-								2	2	2 or 3?	3 4 5?		4
Laborer	1	1	-								1	2	2 or 3?	3 4 5?		2
Maintenance Electrician	1	1	1 Surface & U.G.	1/20/81	-	10*	0.24	2.44	52	-	1	2	2 or 3?	3 or 4	Sample Type Sm Pkg on Same Filter?!	2
Maintenance Mechanic	5	2	2	1/20/81	RANGE	13-20*	<0.03-0.04	0.15-0.24	40	-	2	2	2 or 3?	3 or 5		4
					GM	19	0.03	0.19								
					GSD	1.1	1.2	1.1								
Maintenance Leadman	1	1	-								1	2	2 or 3?	3 4 5?		2
Mechanic (Surface?)	-	1	-		(Combines with Maintenance Mechanic)						1	2	2 or 3?	3 4 5?		2
Maintenance Foreman	1	1	-								1	2	2 or 3?	3 4 5?		2
Total:	40	19 + 2 = 21	17													

* All silica concentrations based on 0.03 mg or less silica on the filter.

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TABLE 5

SUMMARY OF EXPOSURES BY JOB CLASSIFICATION

-RESPIRABLE SILICA-

Location: Sunday
Prepared By: [illegible]
Date Prepared: 3-7-92

Job Description	# On Job	Samples Req.	Samples Done	Dates	Item	% Silica	Concentrations Silica (mg/M³)	Concentrations Resp. Dust (mg/M³)	% TLV	No. Over Exp.	No. Per Camp	No. Of Camp.	Basis Toxic Class	Basis Exposure Class	Comments	Annual Total
		1981									1982					
Miners	26	6	5	1/27	Range	2-19	.03-.28	1.47-3.40	124	4	12	4	2-3	2		48
					Gm	4.6	.10	2.04								
					GSD	2.4	2.3	1.5								
Miners	26	-	8	12/1	Range	2-9	.01-.21	.64-4.97	95	4						
					Gm	3.22	.06	1.98								
					GSD	1.6	2.4	1.8								
[illegible]	1	1	1	1/27	-	2*	.02	1.03	45	0	1	2	2 n 3	3 n 5		2
Shift Foreman	2	2	1	1/27	-	3*	.03	.9	45	0	2	2	2 n 3	3 n 5	[illegible]	2
[illegible]	1	1	1	1/14	-	14*	.03	.23	38	0	1	2	2 n 3	3 n 5	"	2
[illegible]	1	1	1	1/14	-	10*	.04	.45	53	0	1	2	2 n 3	3 n 4	"	2
[illegible]	1	1	1	1/14	-	13	.06	.35	72	0	1	2	3	3	"	2
[illegible]	5	3	1	1/14	-	8*	.05	.61	62	0	3	2	2 n 3	3 n 4	"	2
[illegible]	1	1	1	1/14	-	[illegible]	[illegible]	[illegible]			1	2	2 n 3	3, 4, 5?	"	2
[illegible]	3	2	1	1/14	-	1*	.03	3.29	100	[illegible]	2	4	2 n 3	2	—	8
[illegible]	3	2	1	1/14	-	10*	.05	.52	63	0	2	2	2 n 3	3 n 4	"	4
Totals	44	1982: 40	22													74

* Silica concentrations based on 0.03 mg a less silica on the filter

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TABLE 6

SUMMARY OF EXPOSURES BY JOB CLASSIFICATION

-RESPIRABLE SILICA-

Location: W. S. P./Sweet Home

Prepared By: [illegible]

Date Prepared: 2-7-83

		1981									1982					
							Concentrations									
Job Description	# On Job	Samples Tech	Samples Zone	Dates	Item	% Silica	Silica (mg/M³)	Resp. Dust (mg/M³)	% TLV	No. Over Exp	No. Per Class	No. Of Class.	Basis Toxic Class	Basis Exposure Class	Comments	Total
Miners	42	9	7	2/16-3/17	Range	3-14	.00-.17	.74-3.5	122	4/9	15	4	2-3	2		60
					GM	9.6	.11	1.32								
					GSD	2.0	1.6	1.7								
Miners	42		5	3/27	Range	5-8	.03-.14	.53-2.15	101	3/5						
					GM	5.7	.07	1.38								
					GSD	1.2	1.8	1.7								
Miners	42		8	11/12-11/18	Range	3-12	.01-.55	.66-VW	89	3/8						
					GM	4.8	.06	1.35								
					GSD	2.4	4.0	1.8								
Maintenance	3	2	—								3	4	2-3	2?		12
Surface Miners	11	3	3	11/12-11/18	Range	2-8	.02-.14	1.37-3.36	103	2/3	6	4	2	2		24
					GM	4.0	.07	1.93								
					GSD	2.0	2.9	1.7								
Surface Miners	6	2	1	11/18	-	2	.02	9	36	0	3	2	2 or 3?	2 or 5		6
Surface Miners	1	1	—								1	2	2 or 3?	3, 4 or 5?	[illegible]	2
Surface Miners	1	1	—								1	2	2 or 3?	3, 4 or 5?	"	2
Surface Miners	1	1	—								1	2	2 or 3?	3, 4 or 5?	"	2
Surface Miners	1	1	—								1	2	2 or 3?	3, 4 or 5?	"	2
Maintenance Miners	13	3	—								7	2	2 or 3?	3, 4 or 5?	"	14

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TABLE 5

SUMMARY OF EXPOSURES BY JOB CLASSIFICATION

-RESPIRABLE SILICA-

Location: [illegible]
Prepared By:
Date Prepared:

Page 2 of 2

Job Description	# On Job	1981 Samples Req.	1981 Samples Done	Dates	Item	% Silica	Concentrations Silica (mg/M³)	Concentrations Resp. Dust (mg/M³)	% TLV	No. Over Exp.	1982 No. Per Camp	No. Of Camp.	Basis Toxic Class	Basis Exposure Class	Comments	Total
Maint Electrician	0		–								–	–	–	–	–	
Electricians	2	2	–								2	1	2 or 3?	3,4,5?	"	4
Huistmen	2	2	–								2	2	2 or 3?	3,4,5?	"	4
Laborers	3	2	1	11/17	–	6	0.12	2.15	168	1/1	2	4	2	2	–	8
Rodman	1	1	–								1	2	2 or 3?	3,4,5?	"	2
Carpenter	2	0	–								0	–	–	–	–	
Totals	84	3072 =60	22													142

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TABLE 7
SUMMARY OF EXPOSURES BY JOB CLASSIFICATION
-RESPIRABLE SILICA-

Location: Union Scientific
Prepared By: W.B. Sproule
Date Prepared: 2-7-83

Job Description	# On Job	Samples Req.	Samples Done	Dates	Item	% Silica	Concentrations 1981 Silica (mg/m³)	Concentrations 1981 Resp. Dust (mg/M³)	% TLV	No. Over Exp.	1982 No. Per Camp	1982 No. Of Camp.	1982 Basis Toxic Class	1982 Basis Exposure Class	Comments	6 mo. Grad
Miners	12	3	2	2/24	Range	2-3	.05-.08	1.79-3.59	111	1	6	4	3	2		24
					GM	2.45	.06	2.31								
					GSD	1.3	1.4	1.9								
Miners	12	-	7	11/12	Range	3-14	.02-.34	.11-2.74	95	4						
					GM	7.0	.08	1.12								
					GSD	1.3	2.4	2.3								
Shaft Laborer	0	-	1	2/24	-	14*	.04	.26	43	0	-	-	-	-	-	
Plant Mechanic	2	2	1	2/24	-	11*	.03	.23	30	0	2	2	3 a 3	3 a 5	Collect sample on 3 shifts	4
Plant Operator	0	-	-								-	-	-	-	-	
Maintenance Foreman	1	1	-								1	2	2 a 3?	3,4,5?	"	2
Mine Foreman	1	1	-								1	2	2 a 3?	3,4,5?	"	2
Shaft Timber	0		-								-	-	-	-	-	
Electrician	1	1	0	1/24	-	Insufficient Sample					1	2	2 a 3?	3,4,5?	"	2
Maintenance Foreman	1	1	-								1	2	2 a 3?	3,4,5?	"	2
Totals	19	9 x 2 = 18	11													36

* Silica concentrations based on 0.03 mg or less silica on filter.

A:0332
X416979

TABLE 8

SUMMARY OF EXPOSURES BY JOB CLASSIFICATION

-RESPIRABLE SILICA-

Location: Selma
Prepared By:
Date Prepared: 2-7-83

		1981									1982					
		Samples					Concentrations						Basis			
Job Description	# In Job	Reg.	Zone	Dates	Item	% Silica	Silica (mg/M³)	Resp. Dust (mg/M³)	% TLV	No. Over Exp.	No. Per Camp	No. Of Camp.	Toxic Class	Exposure Class	Comments	Annual TWA
Miner	31	7	7	2/13 - 2/14	RAM	6-56	0.03-0.4	0.5-1.2	79	4	13	4	3	2		52
					Gm	12.9	0.09	3.7	—	—						
					GSO	1.9	2.2	1.5	—	—						
Miner	31	7	8	2/15	RAM	4-19	0.02-0.1	0.2-2.1	126	5						
					Gm	11.6	0.11	1.0	—	—						
					GSO	1.7	2.2	2.1	—	—						
Miner Helper	0	-	-	-	—	—	-	—	—							
Supt. Foreman	2	1	1	2/13	-	17	.23	1.34	260	1	2	4	3	2		8
Supt. Foreman	2	2	1	2/13	-	21*	.07	.32	74	0	2	2	2 or 3	3 or 4	Collect 2 shifts - 1 area 1 area	4
Hoistman	2	2	1	2/11	-	33*	.03	.08	29	0	2	2	2 or 3	3 or 5	" "	4
Lineman	0	-	-													
Track Foreman	2	2	1	2/11	-	13*	.03	.22	32	0	2	2	2 or 3	3 or 5	"	4
Mine Electrician	2	1	1	2/11	-	16	.05	3.4	62	0	2	2	3	3	"	4
Mine Maintenance	6	2	0		-	—	-	—	—	-	3	2	2 or 3	3, 4, 5?		6
Swamper	1	1	1	2/11	-	5*	.03	.33	34	0	1	2	2 or 3	3 or 5	"	2
Mine Shop	1	1	-	—	-	—	—	—	—	—	1	2	2 or 3	3, 4, 5?	"	2
Mine Electric	1	1	—	—	-	—	-	—	-	—	1	2	2 or 3	3, 4, 5?	"	2

A 10333

X 416980

TABLE 3

SUMMARY OF EXPOSURES BY JOB CLASSIFICATION

-RESPIRABLE SILICA-

Location: [illegible]
Prepared By: _____
Date Prepared: _____

Page 2 of 2

Job Description	# On Job	1981 Samples Req.	1981 Samples Done	Dates	Item	% Silica	Concentrations Silica (mg/M³)	Concentrations Resp. Dust (mg/M³)	% TLV	No. Over Exp.	1982 No. Per Camp	No. Of Camp.	Basis Toxic Class	Basis Exposure Class	Comments	Annual Total
[illegible]	1	1	1	2/11	–	20*	.03	.14	31	0	1	2	2 or 3	3 or 5	Collect & [illegible] on same [illegible]	2
[illegible]	2	2	1	2/11	–	33*	.04	.13	44	0	2	2	2 or 3	3 or 5	" "	4
[illegible]	1		–								1	2	2 or 3	3,4,5?		2
Totals	54	26 + 2 = 52	34 [illegible]													96

* Silica concentrations based on [illegible] mg or less silica on filter.

A10334

X416981

TABLE 9

SUMMARY OF EXPOSURES BY JOB CLASSIFICATION

-RESPIRABLE SILICA-

Location: Hecla
Prepared By: H B [illegible]
Date Prepared: 2-9-82

Job Description	# On Job	1981 Samples Req.	1981 Samples Done	Dates	Item	% Silica	Concentrations Silica (mg/M³)	Concentrations Resp. Dust (mg/M³)	% TLV	No. Over Exp.	1982 No. Per Camp	No. Of Camp.	Basis Toxic Class	Basis Exposure Class	Comments	Total
Miners	8	2	1	2/3	-	5	.07	1.27	93	0	4	2	2(1)	4		8
Miners	3	-	4	11/20	Range	1-2	<.01-.03	.85-1.25	8 39	0						
					GM	1.68	.02	1.06								
					GSD	1.4	1.7	1.2								
Miners Helpers	1	1	—								1	2	2?	4?		2
Shift Foreman	1	1	—								1	2	2?	4?		2
Mine Superintendent	0	—	—								—	—	—	—	—	
Mechanic	1	1	—								1	2	2?	4 or 5?		2
Maint Lieutenant	1	1	—								1	2	2?	4 or 5?		2
Maint Mechanic	1	1	-								1	2	2?	4 or 5?		2
Electrician	1	1	—								1	2	2?	4 or 5?		2
Hoistman	2	2	-								1	2	2?	4 or 5?		2
Laborers	2	2	-								1	2	2?	4 or 5?		2
Lieutenant	1	1	—								1	2	2?	4 or 5?		2
Totals	19	13x2 =26	5													26

(1) Maximum silica content in any sample was 7%.

A10335

X416982

TABLE 10

SEMI-ANNUAL SUMMARIES OF EXPOSU | I-ANNUAL SUMMARIES OF EXPOSU

BY JOB CLASSIFICATION | BY JOB CLASSIFICATION

RECOMMENDED INDUSTRIAL HYGIENE SAMPLING PROGRAM FOR NOISE

Location: Dermo
Prepared By: H.S. Neals, Ill. Alvis
Dates Prepared: 7/13/82 . 7/13/82

Year: 1979 & 1980
Material/Agent: NOISE
PEL (TLV): 100% (90dAA- 8 Hrs)

Year: 1982
Material/Agent: NOISE
PEL (TLV): 100% (90dAA- 8 Hrs)

Job Description	# On Job	Sampling Req. (1)	Sampling Done	Results Range % (dBA)	Results C.M. (%)	Results G.S.D.	Results dBA Equiv. C.M.%	Results Over Exp. Ratio	Sampling Req. (1)	Sampling Done	Results Range % (dBA)	Results C.M. (%)	Results G.S.D.	Results dBA Equiv. C.M.%	Results Over Exp. Ratio	Sampling # Per Comp.	Sampling Comp. Per Yr.	Sampling Total Per Yr.	Basis Term Class	Basis Freq. Class	Comments
Miners	31									1	109.9 (90.6)	109.9	—	96.6	1/1	13	1	13	—	—	
Miners Helpers	0															-	-	—	-	-	
Sh. & Ld. Leadmen	2															2	1	2	-	-	
Sh. & Ld. Foremen	2															2	1	2	—	-	
Hoistmen	2									1	161.6 (93.5)	161.6	—	93.5	1/1	2	1	2	—	-	Hoistmen Underground
Carpenters	0															—	—	—	—	—	
Maintenance Leadmen	2																				
Maintenance Electricians	2																				
Maintenance Mechanics	6															4	1	4	—	—	See Att. 1 for prop. basis.
Surveyors	1																				
Maintenance Foremen	1																				
Mine Foremen	1															1	1	1	—	—	
Mine Superintendent	1															—	—	—	—	—	
Engineers Assistant	2															1	1	1	—	—	See Att. 1 for prop. basis.
Safety Engineer	1																				
TOTAL	54		0							2								15			
			0																		

(1) Total samples required annually.

Form USCS/ATLB-OH-82-5

A 10336
X4165983

TABLE 11

SEMI-ANNUAL SUMMARIES OF EXPOSURE BY JOB CLASSIFICATION

Location: Hecla
Prepared By: K A Rhodes
Dates Prepared: 7/13/82

Year: 1974/1980
Material/Agent: NOISE
PEL (TLV): 100% (90 dBA - 8 hrs)

SEMI-ANNUAL SUMMARIES OF EXPOSURE BY JOB CLASSIFICATION

Year: 1982
Material/Agent: NOISE
PEL (TLV): 100% (90 dBA - 8 hrs)

RECOMMENDED INDUSTRIAL HYGIENE SAMPLING PROGRAM FOR _____

Job Description	# On Job	Samples Req. (1)	Samples Done	Results Range % (dBA)	Results C.M. (%)	Results G.S.D.	Results dBA Equiv. of C.M. %	Results Over Exp. Ratio	Samples Req. (1)	Samples Done	Results Range % (dBA)	Results C.M. (%)	Results G.S.D.	Results dBA Equiv. of C.M. %	Results Over Exp. Ratio	Sampling # Per Comp.	Sampling Comp. Per Yr.	Sampling Total Per Yr.	Basis Times Class	Basis Freq. Class	Comments
Miners	8									1	113.479 (140.7)	113.479	—	140.7	1/1	4	1	4	—	—	
Miners Helpers	1															1	1	1	—	—	
Shift Foremen	1															1	1	1	—	—	
Mine Supt	0															—	—	—	—	—	
Mechanics	1																				
Maintenance Leadmen	1																				
Maintenance Mechanics	1																				
Electricians	1															4	1	4	—	—	See Att. for proj. basis.
Hoistmen	2									1	11.3 (72.1)	11.3	—	72.3	0/1						
Laborers	2									1	51.1 (65.2)	51.1	—	65.2	0/1						
Leadmen	1																				
Total	19									3								10			

(1) Total samples required during the ... program

Form ... page ... Form ...

Form UCC/NTLD-CH-82-5

A:03337
X4116984

TABLE 12

SEMI-ANNUAL SUMMARIES OF EXPOS' II-ANNUAL SUMMARIES OF EXPOSU RECOMMENDED INDUSTRIAL HYGIENE SAMPLING PROGRAM FOR _____

BY JOB CLASSIFICATION

BY JOB CLASSIFICATION

Location: King Solomon

Prepared By: HA Plumb, RP Lewis

Dates Prepared: 7/13/82, 7/13/82

Year: 1979 1980

Material/Agent: NOISE

PEL (TLV): 100% (90 dBA - 8 Hrs)

Solomon

Year: 1982

Material/Agent: NOISE

PEL (TLV): 100% (90 dBA - 8 Hrs)

Job Description	# On Job	Samples Req. (1)	Samples Done	Results Range % (dBA)	Results C.M. (%)	Results G.S.D.	Results dBA Equiv. C.M. %	Results Over Exp. Ratio	Samples Req. (1)	Samples Done	Results Range % (dBA)	Results C.M. (%)	Results G.S.D.	Results dBA Equiv. C.M. %	Results Over Exp. Ratio	Samples # Per Comp.	Samples Comp. Per Yr.	Samples Total Per Yr.	Bona Tasks Class	Bona Freq. Class	Comments
Miners	22	(19)	5	94-156.2 (89.8-104)	284	2.9	99.7	4/5								11	1	11	—	—	
		(1.)	2	707-844 (102-102.6)	783	1.2	104.8	2/2													
Miners Helpers	2															2	1	2	—	—	
Shift Foremen	2															2	1	2	—	—	
Mine Foremen	1																				
Shift Leadman	2																				
Laborer	1																				
Maintenance Electrician	1																				See AHI
Maintenance Mechanic	6	(10)	1	6.4 (76.2)	6.4	—	70.2	0/1								6	1	6	—	—	for prog. risk bas
		(1.)	1	3.4 (65.7)	3.7	—	65.7	0/1													
Maintenance Lead man	1																				
Mechanic	1																				
Maintenance Foreman	1																				
Total	40		6/3															21			

No results reported

(1) Total samples required annually.

Form UPC/AHI 5-(N)-82-5

A1047988

A1047988

TABLE 13

SEMI-ANNUAL SUMMARIES OF EXPOSURES BY JOB CLASSIFICATION

ANNUAL SUMMARIES OF EXPOSURES BY JOB CLASSIFICATION

RECOMMENDED INDUSTRIAL HYGIENE SAMPLING PROGRAM FOR _____

Location: L.S.I. / Seward
Prepared By: H. Linder, P.E., C.I.H.
Dates Prepared: 7/11/82 7/11/82

Year: 1979 / 1980
Material/Agent: Noise
PEL (TLV): 100% (90 dBA - 8 Hrs)

Seward
Year: 1982
Material/Agent: Noise
PEL (TLV): 100% (90 dBA - 8 Hrs)

Job Description	# On Job	Samples Req. (1)	Samples Done	Results Range % (dBA)	Results C.M. (%)	Results C.S.D.	Results dBA Equiv. of C.M.%	Results Over Exp. Ratio	Samples Req. (1)	Samples Done	Results Range % (dBA)	Results C.M. (%)	Results C.S.D.	Results dBA Equiv. of C.M.%	Results Over Exp. Ratio	# Per Comp.	Samples Comp. Per Yr.	Samples Total Per Yr.	Basis Task Class	Basis Freq. Class	Comments
Miners	42	(79)	2	106-95[91-100]	498.2	1.9	101.4	2/2		2	328-156[101-111]	6.99	2.7	105.7	2/2	16	1	16	–	–	
		(80)	9	28.2-90.6[89-100]	2.14	1.8	95.5	7/9													
Miners-Learner	3	(81)	1	129.4 (91.9)	139.4	–	91.9	1/1								2	1	2	–	–	
Miners-Helpers	11	(79)	1	237.6 (95.9)	337.8	–	95.9	1/1								6	1	6	–	–	
		(81)	4	139-167[76-99.4]	125.9	4.5	91.7	3/4													
Shift Foreman	6															3	1	3	–	–	
Maintenance Foreman	1																				
Prep Foreman	1																				
Mine Superintendent	1																				See AH.1 for prog. basis.
Mechanics	1															10	1	10			
Maintenance Mechanics	13																				
Maintenance Electrician	0																				
Electrician	2	(79)	1	30.7 (81.5)	30.7	–	81.5	0/1													
Hoistman	2	(79)	1	278.9 (97.4)	278.9	–	97.4	1/1								2	1	2	–	–	
Laborers	3	(80)	2	6.6-63 [78-87]	34.2	5.0	78.5	0/1													
Rodman	1															7	1	7	–	–	See AH.1 for prog. basis.
Carpenter	2																				
Total	89	(79)	5							2								41			
		(80)	16																		
LHD (Area)			4	109-94.0[96.6-106]	24.3	2.7	96.4	4/4													
Commuter House (Area)			4	349-347[96.6-99]	285.3	1.2	97.6	4/4													

(1) Total samples required annually.

Form 1910.1001 6-04-82-S

X41598 6

CC

TABLE 14

SEMI-ANNUAL SUMMARIES OF EXPOSUI-ANNUAL SUMMARIES OF EXPOSUI RECOMMENDED INDUSTRIAL HYGIENE SAMPLING PROGRAM FOR _____

BY JOB CLASSIFICATION BY JOB CLASSIFICATION

Location: Sunday

Prepared By: NB Peterson, HA Peterson

Dates Prepared: 7/13/82

Year: 1979 & 1980

Material/Agent: NOISE

PEL (TLV): 100% (90 dBA - 8 Hrs)

Year: 1982

Material/Agent: NOISE

PEL (TLV): 100% (90 dBA - 8 Hrs)

Job Description	# On Job	Samples Req. (1)	Samples Done	Results Range % (dBA)	Results C.M. %	Results G.S.D.	Results dBA Equiv. of C.M. %	Results Over Exp. Ratio	Samples Req. (1)	Samples Done	Results Range % (dBA)	Results C.M. %	Results G.S.D.	Results dBA Equiv. of C.M. %	Results Over Exp. Ratio	Samples # Per Comp.	Samples Comp. Per Yr.	Samples Total Per Yr.	Basis Basis Class	Basis Freq. Class	Comments
Miners	26'	(5)	2	29[-154%] (93-116)	21.2	16.6	112	2/2		1	1646 (110.2)	1646	—	110.2	1/1	12	1	12	—	—	
		(5)	7	241-903 (96.9-146)	419.5	1.7	100.3	7/7													
Miners Helpers	1'															1	1	1	—	—	
Shift Foremen	2'	(5)	1	99.8 (90)	99.8	—	90.0	0/1								2	1	2	—	—	
Maintenance Foremen	1	(5)	1	57.6 (86)	57.6	—	86	0/1													
Mine Foremen	1																				
Electrician	1																				
Maintenance Mechanic	5															4	1	4	—	—	
Maintenance Helper	1																				
Mechanic	3									1	6.9 (70.7)	6.9	—	70.7	0/1						
Laborers	3'	(5)	1	8629 (122.2)	8629	—	122.2	1/1								2	1	2	—	—	
Total	44'	(5)	2							2								21			
		(10)	10																		
LHD's (Area)		(5)	2	361-495 (97-101.5)	359	1.6	99.2	2/2													

(1) Total samples required annually.

A.C.C. + 3

X4169887

TABLE 15

SEMI-ANNUAL SUMMARIES OF EXPOSU
BY JOB CLASSIFICATION

Location: Wilson / Silverbell
Prepared By: H A [illegible], H A [illegible]
Dates Prepared: 7/13/62, 7/13/62

Year: 1979 & 1960
Material/Agent: NOISE
PEL (TLV): 100% (90 dBA - 8 Hrs)

II-ANNUAL SUMMARIES OF EXPOSI
BY JOB CLASSIFICATION

/ Silverbell
[illegible]
/62

Year: 1962
Material/Agent: NOISE
PEL (TLV): 100% (90 dBA - 8 Hrs)

RECOMMENDED INDUSTRIAL HYGIENE SAMPLING PROGRAM FOR NOISE

Job Description	# On Job	Samples Req. (1)	Samples Done	Results Range % (dBA)	Results G.M. (%)	Results G.S.D.	Results dBA Equiv. of G.M.%	Results Over Exp. Ratio	Samples Req. (1)	Samples Done	Results Range % (dBA)	Results G.M. (%)	Results G.S.D.	Results dBA Equiv. of G.M.%	Results Over Exp. Ratio	Samples # Per Comp.	Samples Comp. Per Yr.	Samples Total Per Yr.	Basis Toxic Class	Basis Freq. Class	Comments
Miners	12									1	107,864 (140.4)	107,864	—	140.4	1/1	6	1	6	—	—	
Shift Leadmen	0															—	—	—	—	—	
Maintenance Mechanic	2															*					
Maintenance Electrician	0															—	—	—	—	—	
Maintenance Leadman	1															*					
Mine Foremen	1															1	1	1	—	—	
Shift Foreman	0															—	—	—	—	—	
Hoistmen	1															*					
Maintenance Foremen	1															*					
Rear Shovel Operator	1									1	290.7 (97.7)	290.7	—	97.7	1/1	1	1	1	—	—	
Totals	19		0 / 0							2								10			
																*2	1	2	—	—	For total group see Att. 1 for program basis.

No results [illegible]

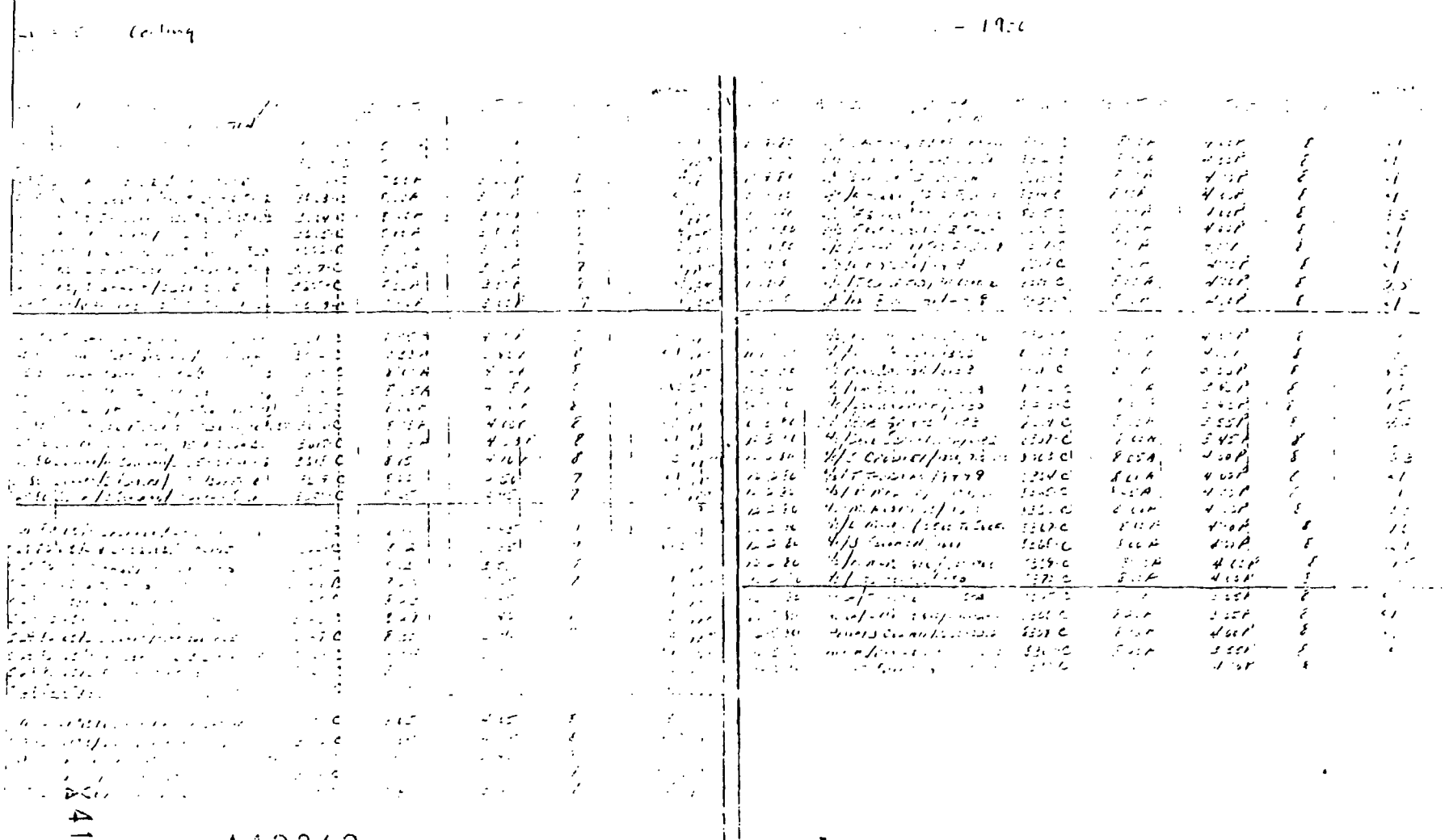
(1) Total samples required annually.

Form [illegible]

Form UCC/WTLS-OH-82-5

A10341

X416988



A10342

A416989