BROWN AND CALDWELL

May 2, 1995

Mr. Keith Elliott
Regional Water Quality Control Board - Los Angeles Region
101 Centre Plaza Drive
Monterey Park, CA 91754

Subject: **Confirmation of Sampling Procedures**
Waste Discharge Requirements - Reservoir Closure
Former Wilmington Section of the Shell Wilmington Manufacturing Complex
1520 to 1622 East Sepulveda Boulevard, Carson, California
File No. 85-19 12/1116-22

Dear Mr. Elliott:

As required by the Waste Discharge Requirements (WDR), Order No. 94-112, Brown and Caldwell (BC) conducted "excavation monitoring" by sampling the floor material of Reservoirs No. 1 and 2 at the above-referenced site. The WDR require that representative soil samples be taken at an interval of once every 5,000 square feet across the floor of each reservoir. The excavation monitoring is required by the WDR for documentation purposes only.

BC began the excavation monitoring sampling in Reservoir No. 2 on April 3, 1995. At this time, the sampling procedure followed was: hand auger to an approximate depth of 2 feet below grade, collect each soil sample with the hand auger, transfer each sample to a glass jar, pack the jar tightly with each soil sample, tighten lid on jar, label each sample, and store samples on ice in a cooler until delivery to the laboratory.

On the morning of April 4, 1995, BC completed the sampling in Reservoir No. 2. In the afternoon, BC began sampling in Reservoir No. 1. Mr. Keith Elliott visited Reservoir No. 1 at approximately 2 pm on April 4. During the visit, the sampling procedure was discussed. Mr. Elliott stated that his preference was that samples to be analyzed for volatile organic compounds (VOCs) be collected in brass sleeves. Before the change in the sampling procedure was requested, BC had already collected samples R1-A through R1-H and R1-K using the sampling procedure described above. Samples collected thereafter, beginning on April 5, 1995, were collected using the drive-sampler with brass sleeves, as requested by Mr. Elliott.

Additionally, two samples were collected from the sump location in each reservoir at Mr. Elliott's request. These four samples were collected in brass sleeves with the drive-sampler.

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The benzene, toluene, ethylbenzene, and xylenes (BTEX) and total petroleum hydrocarbons (TPH) concentrations of the floor material samples are summarized in Tables 1 and 2. The samples that were collected in jars are denoted in the tables. The WDR limits are included for reference only. As indicated in the tables, one sample from Reservoir No. 1 and six samples from Reservoir No. 2 have not yet been collected because the concrete rubble piles have prevented access to these locations. Once the concrete has been crushed and spread across the floors, the remaining samples will be collected.

To verify the results of the samples collected in jars from Reservoir No. 2, an agreement was reached (in a phone conversation between Mr. Elliott, Mr. Mike Garcia of the Ralph M. Parsons Company (Shell representative), and Ms. Tonya Doughty of BC on April 4) to collect five duplicate samples in brass sleeves with the drive-sampler. The five locations were chosen randomly by Ms. Doughty using sketches of the sampling grids (see attached sketches). The duplicate samples were collected in brass sleeves during the next morning. The duplicate sample numbers are: R2-I, R2-M, R2-O, R2-W, and R2-HH for the samples collected in jars and R2-Ia, R2-Ma, R2-Oa, R2-Wa, and R2-HHa for the samples collected in brass sleeves.

Discussion

No BTEX or TPH concentrations were detected in the five samples collected in the glass jars nor in the five duplicate samples collected in the brass sleeves. It is significant to indicate that although no VOCs were detected in the jarred samples, VOCs were not detected at higher concentrations in the brass sleeve samples.

Further comparison of the effect of the sampling techniques on VOC concentrations was made using data collected at the site during a previous assessment of the reservoirs. The soil that was underlying the concrete and clay liners of the reservoirs has been characterized and documented by the floor material sampling (conducted in accordance with the WDR) and by drilling and sampling as documented in BC's report entitled, "Berm Material and Underlying Soil Characterization of Reservoirs 1 and 2, March 1994".

A comparison was made between the BTEX concentrations of the floor material samples that were collected in jars and samples collected in brass sleeves during drilling as documented in the report stated above. Floor material samples that were collected in jars and located close to a boring location were used in the comparison. In some locations, deeper samples collected from borings had to be used in the comparison because shallower data were not available. Tables 3 and 4 include the data used in the comparisons.

This comparison shows the similarity in the BTEX concentrations between the samples. In some cases, the BTEX concentrations of samples collected in jars were even higher than those collected in brass sleeves. The range of the sample comparisons are delimited by the following:

from R1-E (2') and R1-B8 (0-1.5') where the ethylbenzene, toluene, and xylenes concentrations were higher in the jarred sample and benzene was not detected in the jarred sample, but was slightly higher than the detection limit in the brass sleeve sample;

to R2-W (2') and R2-B4 (0-1.5'), where the BTEX concentrations were higher in the brass sleeve sample.

Conclusion

Due to the following, resampling is not recommended:

1) The soil that was underlying the concrete and clay liners has been characterized and the results have been documented in BC's report entitled, "Berm Material and Underlying Soil Characterization of Reservoirs 1 and 2, March 1994";

2) The data from the floor material sampling (excavation monitoring) indicate that the VOC concentrations of the duplicate samples collected in brass sleeves were not higher than the concentrations of the samples collected in jars; and

3) The samples collected in jars (excavation monitoring) are comparable to the samples collected in brass sleeves during the previous assessment.

If you have any questions, please contact me at (818) 577-1020.

Very truly yours,

BROWN AND CALDWELL

Tonya M. Doughty
Project Manager

Attachment

cc: Mike Garcia, The Ralph M. Parsons Company
Tom Maher, Shell Oil Company
Robert Hastings, Shell Oil Company

[illegible]

TABLE 1
Phase II - Reservoir 1
Summary of Analytical Results of Floor Material Samples (Page 1 of 2)

Sample ID	R1-A (jar)	R1-B (jar)	R1-C (jar)	R1-D (jar)	R1-E (jar)	R1-F (jar)	R1-G (jar)	R1-H (jar)	WDR Limit
Volatile Hydrocarbons, EPA Method 8020, mg/kg									
Benzene	<1	0.18	0.17	<0.5	<0.1	0.21	<0.1	<0.5	0.1
Ethylbenzene	1.8	0.77	1.5	2.7	1.2	0.70	<0.1	1.9	2.9
Toluene	2.2	1.1	0.4	2.6	0.95	0.94	<0.1	1.1	4.2
Xylenes	7.5	4.1	6.6	12	6.0	3.6	<0.1	7.8	1.7
Total Petroleum Hydrocarbons, EPA Method 8015 Modified, mg/kg									
C6-C12	620	230	370	810	300	240	14	1,900	1,000
C13-C22	26,000	14,000	15,000	18,000	14,000	16,000	850	13,000	10,000
C23-C28	11,000	4,400	5,800	5,600	5,600	6,800	240	3,400	15,000

Sample ID	R1-I	R1-J	R1-K (jar)	R1-L	R1-M	R1-N	R1-O	R1-P	WDR Limit
Volatile Hydrocarbons, EPA Method 8020, mg/kg									
Benzene	7.1	<0.1	<0.1	<1	2.2	NOT	3.9	<0.1	0.1
Ethylbenzene	1.7	<0.1	<0.1	1.7	6.1	SAMPLED	1.9	<0.1	2.9
Toluene	1.0	<0.1	<0.1	1.9	3.1	YET	1.1	<0.1	4.2
Xylenes	5.2	0.33	<0.1	5.7	32		4.2	<0.1	1.7
Total Petroleum Hydrocarbons, EPA Method 8015 Modified, mg/kg									
C6-C12	720	100	<10	710	960		710	27	1,000
C13-C22	20,000	<100	<100	40,000	17,000		17,000	<100	10,000
C23-C28	7,100	<100	<100	23,000	6,700		5,900	<100	15,000

Notes: < Indicates that compound was not detected at specified detection limit.
WDR = Waste Discharge Requirements

TABLE 1
Phase II - Reservoir 1
Summary of Analytical Results of Floor Material Samples (Page 2 of 2)

Sample ID	R1-Q	R1-R	R1-S	R1-T	R1-U	R1-V	R1-W	R1-X	WDR Limit
Volatile Hydrocarbons, EPA Method 8020, mg/kg									
Benzene	<1	<1	0.13	<1	1.6	0.22	<1	<0.5	0.1
Ethylbenzene	1.4	1.8	1.9	2.7	2.3	1.7	1.6	2.5	2.9
Toluene	<1	2.5	0.87	2.4	0.79	1.0	2.5	2.9	4.2
Xylenes	6.1	10	5.9	12	11	5.9	7.5	13	1.7
Total Petroleum Hydrocarbons, EPA Method 8015 Modified, mg/kg									
C6-C12	780	1,000	33	1,500	680	390	780	900	1,000
C13-C22	13,000	18,000	9,100	26,000	16,000	8,000	11,000	24,000	10,000
C23-C28	4,900	6,400	4,900	7,300	6,000	2,900	3,000	7,100	15,000

Sample ID	R1-Y	R1-Z	R1-AA	R1-BB	R1-SUMP1	R1-SUMP2	WDR Limit
Volatile Hydrocarbons, EPA Method 8020, mg/kg							
Benzene	<1	1.0	<0.5	<0.5	<1	<0.5	0.1
Ethylbenzene	1.9	2.4	2.0	0.86	1.5	<0.5	2.9
Toluene	2.7	2.9	2.3	2.0	1.8	0.65	4.2
Xylenes	9.4	12	9.2	6.0	7.9	2.8	1.7
Total Petroleum Hydrocarbons, EPA Method 8015 Modified, mg/kg							
C6-C12	1,000	640	620	330	640	190	1,000
C13-C22	23,000	39,000	16,000	3,700	36,000	5,100	10,000
C23-C28	7,700	21,000	5,600	1,400	18,000	3,300	15,000

Notes: < Indicates that compound was not detected at specified detection limit.
WDR = Waste Discharge Requirements

TABLE 2
Phase II - Reservoir 2
Summary of Analytical Results of Floor Material Samples (Page 1 of 3) *

Sample ID	R2-A	R2-B	R2-C	R2-D	R2-E	R2-F	R2-G	R2-H	WDR Limit
Volatile Hydrocarbons, EPA Method 8020, mg/kg									
Benzene	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<1	0.1
Ethylbenzene	3.6	<0.1	<0.1	<0.1	<0.1	<0.1	2.4	4.5	2.9
Toluene	4.4	<0.1	<0.1	<0.1	<0.1	<0.1	1.7	6.5	4.2
Xylenes	19	<0.1	<0.1	<0.1	<0.1	<0.1	6.6	26	1.7
Total Petroleum Hydrocarbons, EPA Method 8015 Modified, mg/kg									
C6-C12	990	<10	44	<10	<10	<10	510	1,300	1,000
C13-C22	16,000	<100	<100	<100	<100	<100	2,200	15,000	10,000
C23-C28	4,900	<100	<100	<100	<100	<100	1,100	3,600	15,000

Sample ID	R2-I	R2-J	R2-K	R2-L	R2-M	R2-N	R2-O	R2-P	WDR Limit
Volatile Hydrocarbons, EPA Method 8020, mg/kg									
Benzene	<0.1	<0.1	NOT	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
Ethylbenzene	<0.1	<0.1	SAMPLED	<0.1	<0.1	<0.1	<0.1	<0.1	2.9
Toluene	<0.1	<0.1	YET	<0.1	<0.1	<0.1	<0.1	<0.1	4.2
Xylenes	<0.1	0.42		<0.1	<0.1	<0.1	<0.1	<0.1	1.7
Total Petroleum Hydrocarbons, EPA Method 8015 Modified, mg/kg									
C6-C12	<10	100		<10	<10	<10	<10	<10	1,000
C13-C22	<100	160		<100	<100	<100	<100	<100	10,000
C23-C28	<100	<100		<100	<100	<100	<100	<100	15,000

Notes: < Indicates that compound was not detected at specified detection limit.
WDR = Waste Discharge Requirements
All samples for Reservoir No. 2 were collected in jars, except for R2-SUMP1 and R2-SUMP2, which were collected in brass sleeves.

TABLE 2
Phase II - Reservoir 2
Summary of Analytical Results of Floor Material Samples (Page 2 of 3)

Sample ID	R2-Q	R2-R	R2-S	R2-T	R2-U	R2-V	R2-W	R2-X	WDR Limit
Volatile Hydrocarbons, EPA Method 8020, mg/kg									
Benzene	<0.1	NOT	NOT	<1	<0.1	<0.1	<0.1	<0.1	0.1
Ethylbenzene	<0.1	SAMPLED	SAMPLED	4.5	<0.1	<0.1	<0.1	<0.1	2.9
Toluene	<0.1	YET	YET	4.1	<0.1	<0.1	<0.1	<0.1	4.2
Xylenes	<0.1			12	<0.1	<0.1	<0.1	<0.1	1.7
Total Petroleum Hydrocarbons, EPA Method 8015 Modified, mg/kg									
C6-C12	<10			1,200	<10	<10	<10	<10	1,000
C13-C22	<100			9,800	<100	<100	<100	<100	10,000
C23-C28	<100			2,200	<100	<100	<100	<100	15,000

Sample ID	R2-Y	R2-Z	R2-AA	R2-BB	R2-CC	R2-DD	R2-EE	R2-FF	WDR Limit
Volatile Hydrocarbons, EPA Method 8020, mg/kg									
Benzene	NOT	NOT	<1	<0.5	0.75	<10	<0.1	<0.1	0.1
Ethylbenzene	SAMPLED	SAMPLED	1.0	1.3	5.2	<10	<0.1	<0.1	2.9
Toluene	YET	YET	<1	0.60	8.1	12	<0.1	<0.1	4.2
Xylenes			5.3	3.4	24	54	<0.1	<0.1	1.7
Total Petroleum Hydrocarbons, EPA Method 8015 Modified, mg/kg									
C6-C12			1,400	920	1,500	5,600	<10	<10	1,000
C13-C22			7,500	14,000	28,000	52,000	<100	<100	10,000
C23-C28			4,500	6,300	18,000	10,000	<100	<100	15,000

Notes: < Indicates that compound was not detected at specified detection limit.
WDR = Waste Discharge Requirements
All samples for Reservoir No. 2 were collected in jars, except for R2-SUMP1 and R2-SUMP2, which were collected in brass sleeves.

TABLE 2
Phase II - Reservoir 2
Summary of Analytical Results of Floor Material Samples (Page 3 of 3)

Sample ID	R2-GG	R2-HH	R2-II	R2-JJ	R2-SUMP1	R2-SUMP2	WDR Limit
Volatile Hydrocarbons, EPA Method 8020, mg/kg							
Benzene	NOT	<0.1	<0.1	<0.1	1.3	0.59	0.1
Ethylbenzene	SAMPLED	<0.1	1.1	<0.1	5.9	2.8	2.9
Toluene	YET	<0.1	0.15	<0.1	10	4.7	4.2
Xylenes		<0.1	1.8	<0.1	34	13	1.7
Total Petroleum Hydrocarbons, EPA Method 8015 Modified, mg/kg							
C6-C12		<10	240	<10	1,200	1,000	1,000
C13-C22		<100	3,600	<100	22,000	20,000	10,000
C23-C28		<100	1,800	<100	4,500	3,000	15,000

Notes: < Indicates that compound was not detected at specified detection limit.
WDR = Waste Discharge Requirements
All samples for Reservoir No. 2 were collected in jars, except for R2-SUMP1 and R2-SUMP2, which were collected in brass sleeves.

TABLE 3
Comparison of Analytical Results from Drilling and Floor Material Sampling
Reservoir 1

Sample ID Sample Depth	R1-E (2')	R1-B8 (0-1.5')	R1-G (2')	R1-B6 (0-1.5')	R1-K (2')	R1-B9 (13.5-15')	R1-C (2')	R1-B7 (13-15.5')
Sample Method	jar	brass sleeve	jar	brass sleeve	jar	brass sleeve	jar	brass sleeve
Volatile Hydrocarbons, EPA Method 8020, mg/kg								
Benzene	<0.1	0.19	<0.1	<0.1	<0.1	<0.1	0.17	<0.1
Ethylbenzene	1.2	0.40	<0.1	<0.1	<0.1	<0.1	0.4	<0.1
Toluene	0.95	0.93	<0.1	<0.1	<0.1	<0.1	1.5	<0.1
Xylenes	6.0	5.3	<0.1	<0.1	<0.1	<0.1	6.6	<0.1

TABLE 4
Comparison of Analytical Results from Drilling and Floor Material Sampling
Reservoir 2

Sample ID Sample Depth	R2-M (2')	R2-B8 (0-1.5')	R2-O (2')	R2-B9 (0-1.5')	R2-W (2')	R2-B4 (0-1.5')	R2-J (2')	R2-B6 (13-15.5')
Sample Method	jar	brass sleeve	jar	brass sleeve	jar	brass sleeve	jar	brass sleeve
Volatile Hydrocarbons, EPA Method 8020, mg/kg								
Benzene	<0.1	<0.1	<0.1	<0.1	<0.1	0.16	<0.1	<0.1
Ethylbenzene	<0.1	<0.1	<0.1	<0.1	<0.1	1.0	<0.1	0.44
Toluene	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	<0.1	0.12
Xylenes	<0.1	0.37	<0.1	<0.1	<0.1	6.4	0.42	1.5

Note: < Indicates that compound was not detected at specified detection limit.
R1-E: sample collected from the stated depth in jar during floor material sampling.
R1-B8: sample collected from the stated depth in brass sleeve during drilling.

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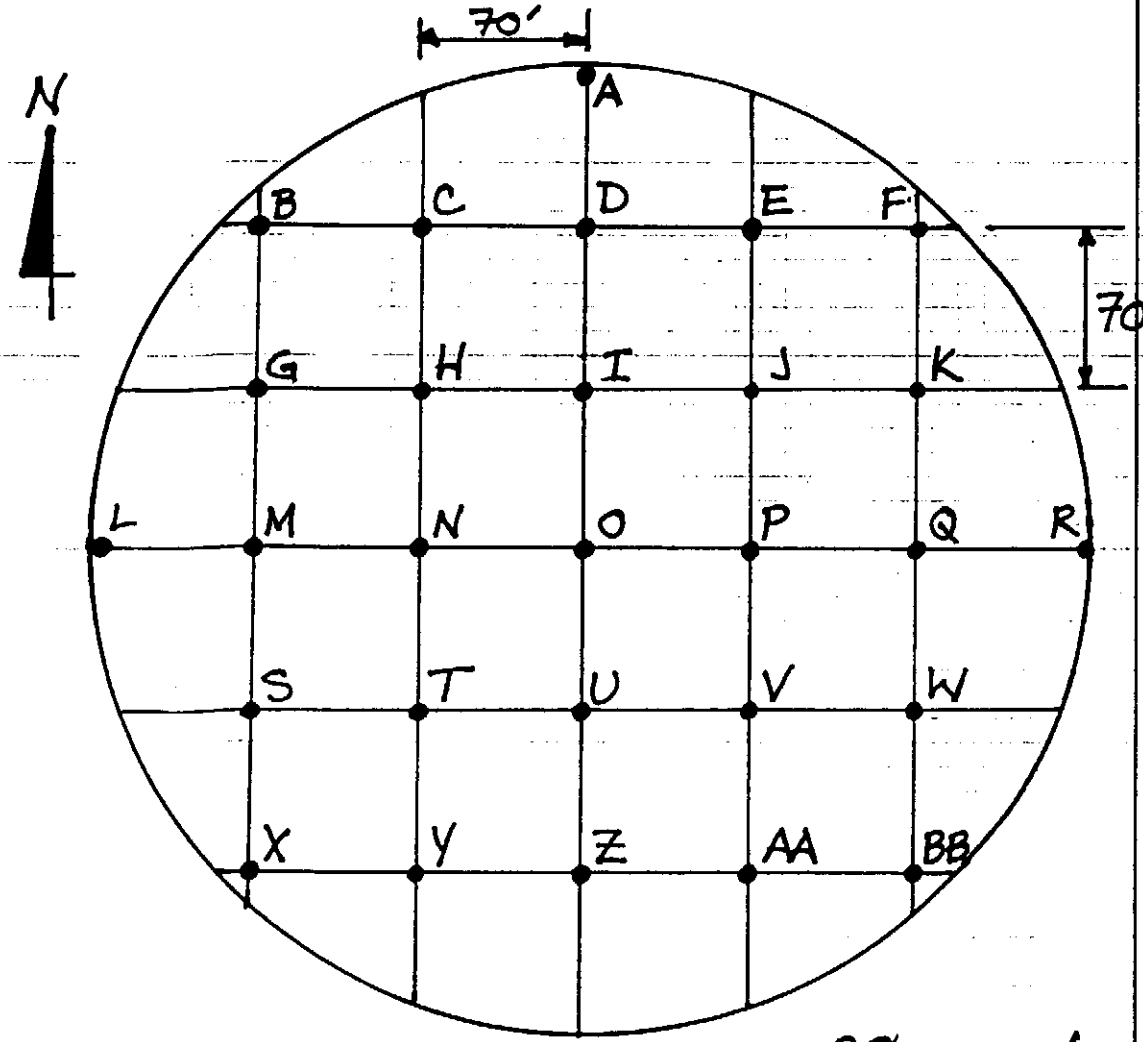
REFERENCES/NOTES

FILE NO. 85-19

FLOOR SAMPLING FOR SHELL RESERVOIRS

RESERVOIR 1



= 28 samples

DATE CHECKED	CHECKED BY	JOB NUMBER	BY	DATE	CALC. NO.	SHEET NO.
		1116-21	TMD	12/7/94		1/2

PROJECT: Shell Reservoirs

SUBJECT:

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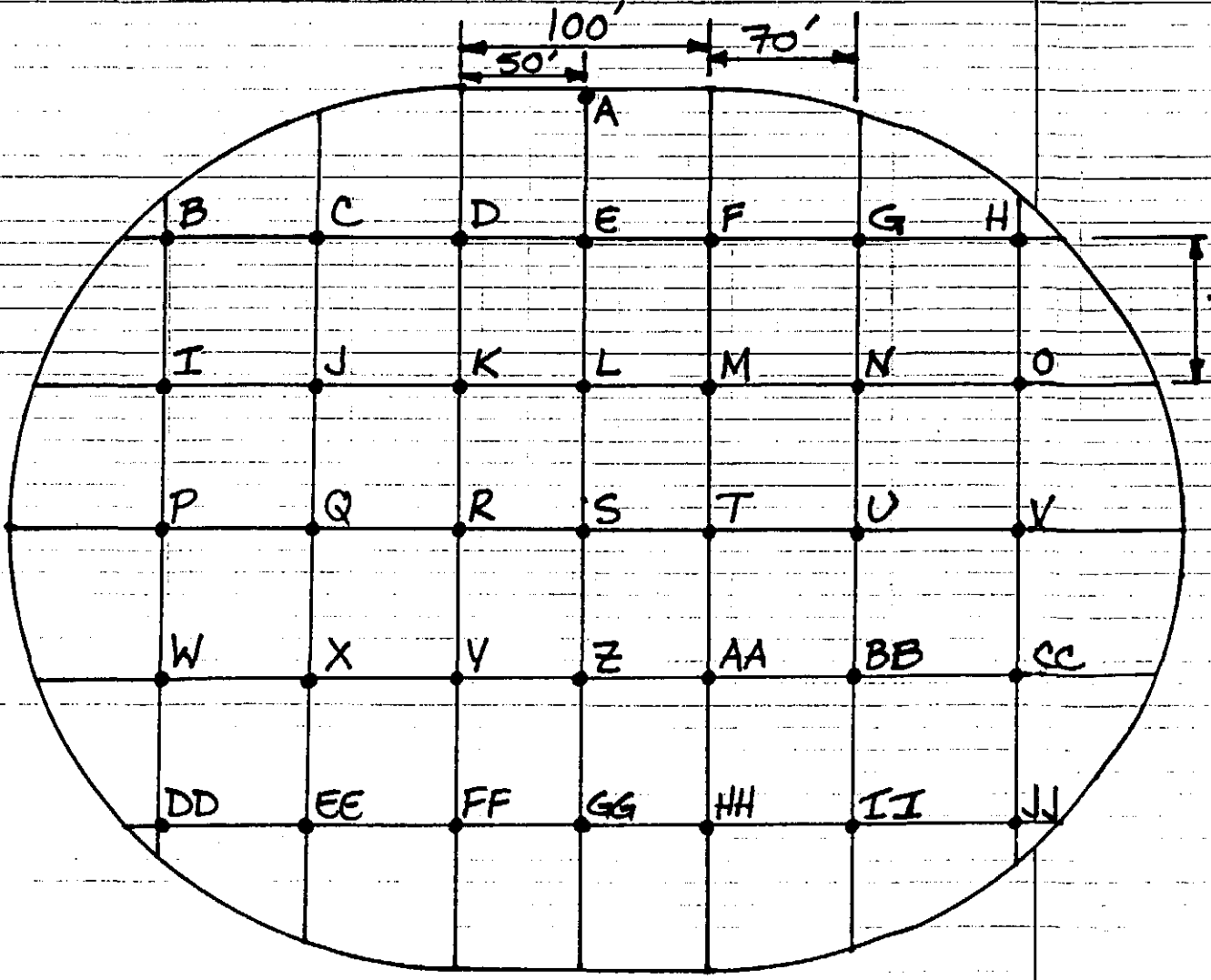
REFERENCES/NOTES

RESERVOIR 2



= 36 samples

DATE CHECKED	CHECKED BY	JOB NUMBER	BY	DATE	CALC. NO.	SHEET NO. 2/2

PROJECT

SUBJECT

GEN 021-3/6/85