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September 20, 1989

TRITIUM LABORATORY

Data Release #89-52
Job #228

UNOCAL GEOTHERMAL DIVISION
TRITIUM SAMPLES

AFE-490922


H. G. Ostlund
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Distribution:

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GENERAL COMMENTS ON TRITIUM RESULTSTritium Scales

The tritium concentrations are expressed in TU, where 1 TU indicates a T/H ratio of 10^{-18} . The values refer to the old, internationally-adopted scale of U.S. National Bureau of Standards (NBS), which is based on their tritium water standard #4926 as measured on 1961/09/03, and age-corrected with the old half-life of 12.26 years, i.e., $\lambda = 5.65\% \text{ year}^{-1}$. In this scale, 1 TU is 7.186 dpm/kg H_2O , or 3.237 pCi/kg H_2O . TU values are calculated for date of sample collection, REFDATE in the table, as provided by the submitter. If no such date is available, date of arrival of sample at our laboratory is used. The stated errors, eTU, are one standard deviation (1 sigma) including all conceivable contributions.

In the table, QUANT is quantity of sample received, and ELYS is the amount of water taken for electrolytic enrichment. DIR means direct run (no enrichment).

It has been found lately that a better value for the half-life is 12.43 years, i.e., $\lambda = 5.576\% \text{ year}^{-1}$. This will cause a change in the TU scale, which is still based on the same NBS standard (#4926) as of the same date, 1961/09/03 (Mann *et al.*, 1982). In the new scale, 1 TU(N) is 7.088 dpm/kg H_2O , 3.193 pCi/kg H_2O . As of mid-1989, the numerical TU values were 3.8% higher in the new scale than in the old, and the difference is slowly increasing with time.

Very low tritium values

In some cases, negative TU values are listed. Such numbers can occur because the net tritium count rate is, in principle, the difference between the count rate of the sample and that of a tritium-free sample (background count or blank sample). Given a set of "unknown" samples with no tritium, the distribution of net results should become symmetrical around 0 TU. The negative values are reported as such for the benefit of allowing the user unbiased statistical treatment of sets of the data. For other applications, 0 TU should be used.

Mann, W.B., M.P. Unterweger, and B.M. Coursey, Comments on the NBS tritiated-water standards and their use, *Int. J. Appl. Radiat. Isot.*, 33, 383-386, 1982.

Client: UNOCAL CORPORATION
Recvd : 89/09/05
Job# : 228
Final : 89/09/19

Purchase Order: AFE-490922
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Cust LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
UNOCAL-MEDICINE LAKE	228.01	890815	1000	275	8.49	0.28
UNOCAL-PAYNE SPRINGS	228.02	890815	1000	275	18.5	0.6
UNOCAL-MED LAKE WATER WELL	228.03	890815	1000	270	8.74	0.29
UNOCAL-3117-081489-1745	228.04	890814	1000	275	0.10	0.09
UNOCAL-3117-081789-1115	228.05	890817	1000	275	0.01	0.09



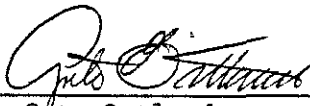
October 25, 1989

TRITIUM LABORATORY

Data Release #89-57
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UNOCAL GEOTHERMAL DIVISION
TRITIUM SAMPLES

AFE-490922



H. Göte Ostlund
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GENERAL COMMENTS ON TRITIUM RESULTSTritium Scales

The tritium concentrations are expressed in TU, where 1 TU indicates a T/H ratio of 10^{-18} . The values refer to the old, internationally-adopted scale of U.S. National Bureau of Standards (NBS), which is based on their tritium water standard #4926 as measured on 1961/09/03, and age-corrected with the old half-life of 12.26 years, i.e., $\lambda = 5.65\% \text{ year}^{-1}$. In this scale, 1 TU is 7.186 dpm/kg H_2O , or 3.237 pCi/kg H_2O . TU values are calculated for date of sample collection, REFDATE in the table, as provided by the submitter. If no such date is available, date of arrival of sample at our laboratory is used. The stated errors, eTU, are one standard deviation (1 sigma) including all conceivable contributions.

In the table, QUANT is quantity of sample received, and ELYS is the amount of water taken for electrolytic enrichment. DIR means direct run (no enrichment).

It has been found lately that a better value for the half-life is 12.43 years, i.e., $\lambda = 5.576\% \text{ year}^{-1}$. This will cause a change in the TU scale, which is still based on the same NBS standard (#4926) as of the same date, 1961/09/03 (Mann *et al.*, 1982). In the new scale, 1 TU(N) is 7.088 dpm/kg H_2O , 3.193 pCi/kg H_2O . As of mid-1989, the numerical TU values were 3.8% higher in the new scale than in the old, and the difference is slowly increasing with time.

Very low tritium values

In some cases, negative TU values are listed. Such numbers can occur because the net tritium count rate is, in principle, the difference between the count rate of the sample and that of a tritium-free sample (background count or blank sample). Given a set of "unknown" samples with no tritium, the distribution of net results should become symmetrical around 0 TU. The negative values are reported as such for the benefit of allowing the user unbiased statistical treatment of sets of the data. For other applications, 0 TU should be used.

Mann, W.B., M.P. Unterweger, and B.M. Coursey, Comments on the NBS tritiated-water standards and their use, *Int. J. Appl. Radiat. Isot.*, 33, 383-386, 1982.

Client: UNOCAL 76
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Final : 89/10/24

Purchase Order: AFE 490922
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Cust LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
UNOCAL-3117-082489-1200	232.01	890824	1000	275	0.05	0.10
UNOCAL-3117-082689-1000	232.02	890826	1000	275	0.13	0.09
UNOCAL-3117-082889-1405	232.03	890828	1000	275	-0.01	0.09

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Sample	GGCID	Del180	Del180 Dup	DelD	DelD Dup	
3117-081489-1414	4623-1	-9.04		-97.35	-100.53	98.9
3117-081489-1530	4623-2	-8.61		-98.95	-99.41	99.2
3117-081489-1735	4623-3	-9.01		-100.53	-95.92	98.2
3117-081489-1834 STM	4623-4	-12.43		-111.82	-111.53	111.7
3117-081489-1920	4623-5	-9.11		-100.15	-101.88	101.0
3117-081589-1210	4623-6	-9.19		-101.16	-101.31	101.2
3117-081589-1515	4623-7	-9.38		-102.96	-103.30	103.1
3117-081689-1215	4623-8	-9.25		-103.35	-104.11	103.7
3117-081789-1115	4623-9	-9.44	94 -9.37	-101.29	-104.35	102.8
3117-081889-1000	4623-10	-9.38		-100.46	-99.71	100.1
3117-081989-1515	4623-11	-9.18		-100.42	-103.33	101.9
3117-082189-1230	4623-12	-9.19		-100.80	-100.70	100.8
4623-DL1-248				-215*		
4623-DH1-246				4*		
4623-DL2-246				-214*		
4623-DH2-248				5*		
4560-DI-2-258		-14.64*				
4560-DI-1-258		-14.56*				
4623-DI-2-248		-14.60*				
OSH4623-DI3-248 (-14.		-14.64*				

Sample	GGCID	Del180	Del180 Dup	DelD	DelD Dup
3117-082489-1040	4664-1	-9.1		-97	97 -97
3117-082589-1240	4664-2	-9.1		-109	110 -111
3117-082689-0740	4664-3	-9.1		-107	107 -107
3117-082789-0945	4664-4	-9.3		-107	107.5 -108
3117-082889-1210	4664-5	-9.3	-9.2	-101	101 -101
3117-082489-1200S	4664-6	-12.5		-109	107.5 -107
3117-082589-1150S	4664-7	-12.4		-104	104 -104
3117-082689-0955S	4664-8	-12.6		-108	106.5 -105
3117-082789-0920S	4664-9	-12.3		-108	107 -106
3117-082889-1410S	4664-10	-12.3	12.4 -12.5	-110	109.5 -109
688-090789-1115	4664-11	-8.1		-92	93 -94
688-090789-1500	4664-12	-8.1		-92	92.5 -93
688-090889-0915	4664-13	-8.2		-93	93 -93
688-090889-1540	4664-14	-8.1		-95	93.5 -92
688-090989-1000	4664-15	-8.3	-8.2	-93	93.5 -94
688-090989-1415	4664-16	-8.3		-95	95 -95
688-090989-1700	4664-17	-8.2		-94	94 -94
688-091089-0910	4664-18	-8.2		-96	96 -96
688-091089-1140	4664-19	-8.3		-97	96.5 -96
688-091089-1615	4664-20	-8.3		-96	97.5 -99
688-091189-1850	4664-21	-8.7		-94	94.5 -95
4664-DI1-272		-14.65*			
4664-DI1-269		-14.64*			
4664-DH-1-270				4*	
4664-DL-2-270				-215*	
4664-DL-1-270				-215*	
4664-DH-2-270				5*	
4664-NH-1-300				36*	
4664-NH-2-300				33*	