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PINNACLE
LABORATORIES

PL I.D. 104036

May 18, 2001

NMED DOE OB
P.O. Box 1663, MS J993
Los Alamos, NM 87545

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Project Name/Number: HWBR-22

Attention: Michael Dale

On 04/09/01, Pinnacle Laboratories Inc., (ADHS License No. AZ0592 pending), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

All analyses were performed by University of Miami, Miami, FL.

If you have any questions or comments, please do not hesitate to contact us at (505) 344-3777.

H. Mitchell Rubenstein, Ph.D.
General Manager

MR:jt

Enclosure



11666



May 10, 2001

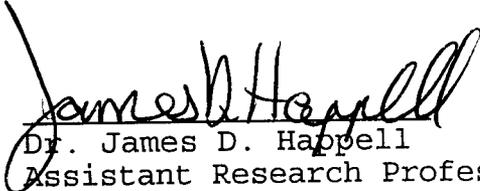
TRITIUM LABORATORY

Data Release #01-051
Job # 1467

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NMED-DOE-OB
TRITIUM SAMPLES

Project # HWBR-22


Dr. James D. Happell
Assistant Research Professor

Distribution:

Michael Dale
NMED-DOE-OB
P.O. Box 1663, MSJ 993
Los Alamos, NM 87545

Pinnacle Laboratories, Inc.
Attn: Mitch Rubenstein
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Rosenstiel School of Marine and Atmospheric Science
Tritium Laboratory
4600 Rickenbacker Causeway
Miami, Florida 33149-1098
Phone: (305) 361-4100
Fax: (305) 361-4112
email: tritium@rsmas.miami.edu

GENERAL COMMENTS ON TRITIUM RESULTSTritium Scale (New)

Tritium concentrations are expressed in TU, where 1 TU indicates a T/H ratio of 10^{-18} . The values refer to the new tritium scale of U.S. National Institute of Science and Technology (formerly NBS), and based on their tritium water standard #4926 as measured on 1961/09/03 and again 1978/09/03, and age-corrected with the new half-life of 12.43 years, i.e., $\lambda = 5.576\% \text{ year}^{-1}$. In this scale, 1 TU is 7.088 dpm/kg H₂O, or 3.193 pCi/kg H₂O, or 0.1181 Bq/kg H₂O (Bq = disint/sec). 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 sample arrival 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).

Through 31 December 1993, we reported tritium values in the "old" scale using the half-life 12.26 years, i.e., $\lambda = 5.65\% \text{ year}^{-1}$. In that old scale, 1 TU(old) is 7.186 dpm/kg H₂O, 3.237 pCi/kg H₂O. To convert from the new scale back to the old at any given point in time, multiply the listed TU(new)-values by F, where

$$F = 0.9645 - (\text{year}-1990) \times 0.0008$$

i.e. for 1994 the factor is 0.9613. The formula is correct within 0.02% between 1962 and 1999. To convert data from the old scale to the new, divide by F.

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.

Reliability of results

Refer to Services Rendered (Tritium), Section II.8, in the "Tritium Laboratory Price Schedule; Procedures and Standards; Advice on Sampling". Tritium efficiencies and background values are different in the nine counters and values are corrected for cosmic intensity, gas pressure and other parameters. For tritium, the efficiency is typically 1.00 cpm per 100 TU (direct counting). At 50x enrichment, the efficiency is equivalent to 1.00 cpm per 2 TU. The background is about 0.3 cpm, known to about ± 0.02 cpm. Our reported results include not only the Poisson statistics, but also other experimental uncertainties such as enrichment error, etc.

References

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.

Taylor, C.B., and W. Roether, A uniform scale for reporting low-level tritium measurements in water, *Int. J. Appl. Radiat. Isot.*, 33, 377-382, 1982.

Client: NMED-DOE-OB
Recvd : 01/04/04
Job# : 1467
Final : 01/05/09

Proj.# HWBR-ZZ

Purchase Order: 104036
Contact: M. Dale, 505/672-0449, -0466 (F)
P.O. Box 1663, MS J993
Los Alamos, NM 87545

Cust	LABEL	INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
NMED-	R-22-2-031201	DIRECT	1467.01	010312	500	DIR	-3 *	3
NMED-	R-22-1-031301	DIRECT	1467.02	010312	250	DIR	1 *	3

* Average of duplicate runs

WEST EXPONE

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**PINNACLE
LABORATORIES**

Full
Yes No

COPY

Bill NMED-DOE OVERSIGHT BUREAU
To: 2044 A Galisteo St.
Santa Fe, NM 87502

Date	Invoice
5/18'01	81678

Custom *Katerina*

Original
BALAN
*This invoice is part of
the project that I
signed off a day or so ago.
Do I need to fill out another
form? Let me know*
John

Number	Terms	Project
	Net 30	PIN ALB-810

Quantity		Rate	Amount
2	I	180.00	360.00
	NM Gross Receipts Tax	5.8125%	20.93
Accession #: 104036 Contract #: 80-667-55-02099 Authorized By: Michael Dale		TOTAL:	380.93

Remit to: Pinnacle Laboratories, Inc.
2709-D Pan American Freeway NE
Albuquerque, NM 87107