

**U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT**

**NUCLEAR WASTE TECHNICAL REVIEW BOARD
PANEL ON STRUCTURAL GEOLOGY & GEOENGINEERING**

**SUBJECT: SUMMARY OF LATHROP WELLS
STUDIES: PROGRESS AND
FUTURE DIRECTION**

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**ALEXIS PARK HOTEL
SEPTEMBER 14 - 16, 1992**

Lathrop Wells Center Summation of Studies

Presented series of overview talks

- **Individual investigators**
- **New data, new interpretations**
- **Not done but progressing (pleased, even excited about results)**
- **Resolve differences with data
it is working**

Lathrop Wells Center Summation of Studies

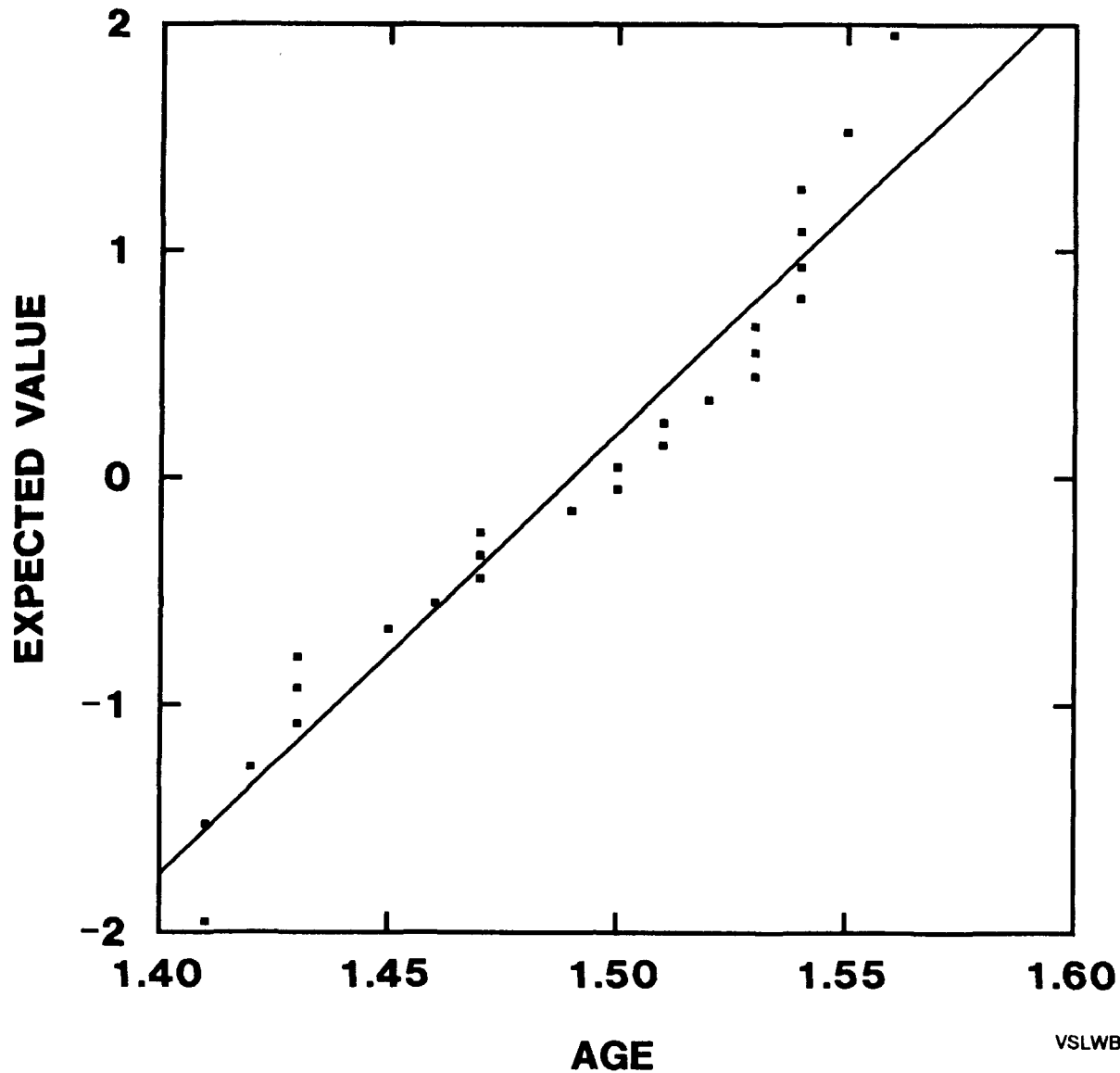
(Continued)

Continued difficulties with K-Ar and $^{40}\text{Ar}/^{39}\text{Ar}$ data

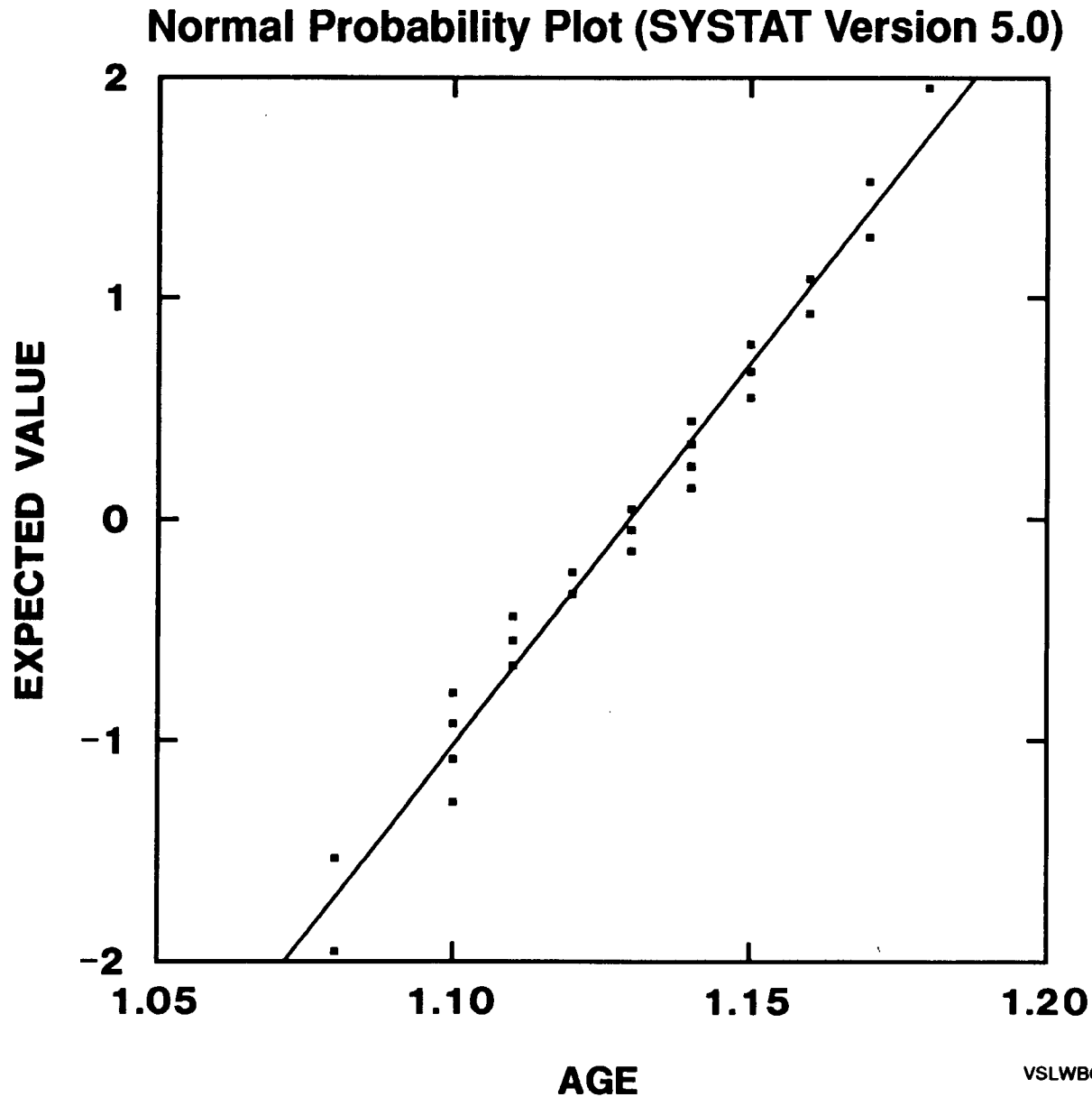
- **Problem: data interpretations, not analyses or methods**
 - **Data range: too large for analytical error**
 - **Non-gaussian distribution**
 - **Positively skewed**
 - **Influential cases in regression calculations**
 - **Selective removal of samples**
 - **Improper use of weighted mean**
 - **Excess Ar**
- **Future directions:**
 - **Upper Bound age of center (>150 ka)**
 - **QA data set**
 - **$^{40}\text{Ar}/^{39}\text{Ar}$ ages of lithic fragments**
 - **More careful definition of assumptions, uncertainty data**
 - **Mineral separations**

$^{40}\text{Ar}/^{39}\text{Ar}$ Ages of the Bandelier Tuff Lower Member Spell et al. (1990)

Normal Probability Plot (SYSTAT Version 5.0)

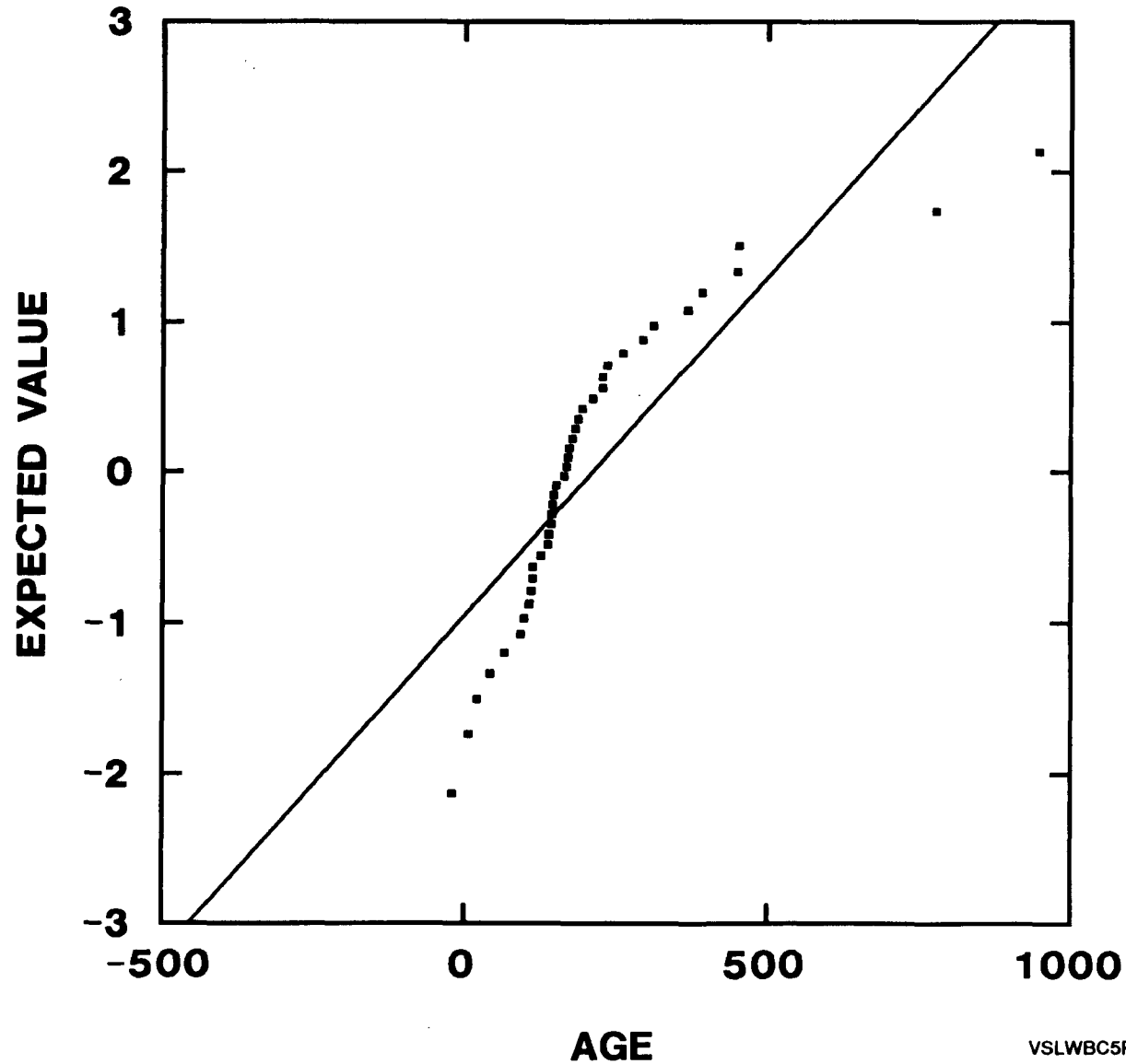


$^{40}\text{Ar}/^{39}\text{Ar}$ Ages of the Bandelier Tuff Upper Member Spell et al. (1990)



$^{40}\text{Ar}/^{39}\text{Ar}$ Ages: Lathrop Wells Center Turrin et al. (1991)

Normal Probability Plot (SYSTAT Version 5.0)



Comparison of Variance Weighted Data Sets

⁴⁰Ar/³⁹Ar Method

	Turrin et al. (1991)	Turrin et al. (1991) Outliers Removed	Spell et al. (1990) Bandelier Tuff (Upper Member)	Spell et al. (1990) Bandelier Tuff (Lower Member)
Number of Cases	40	36	26	26
Minimum	-20	-20	1.08	1.4
Maximum	947	392	1.18	1.6
Mean	211	162	1.13	1.49
Median	186	149	1.13	1.50
Variance	34647	8222	.001	.002
Standard Deviation	186	91	.028	.048
Skewness (G1)	2.3	0.5	-0.5	-.31
	ka	ka	Ma	Ma

Lathrop Wells Center Summation of Studies

U-Th disequilibrium

- **Problems:**
 - **Analytical problems overcome**
 - **Mineral separations**
 - **Expensive, time-consuming measurements**
- **Future directions:**
 - **Decision on utility of method - - next few months**

Lathrop Wells Center Summation of Studies

Cosmogenic He age determinations

- **Problems:**
 - **Minimum ages**
 - **Calibration of production rate**
 - **Age of main cone**
- **Future directions:**
 - **Technique looks promising**
 - **QA hurdles overcome**
 - **65 ka convergence?**
He, ³⁶Cl, K-Ar mineral separations

Resolution =



More data



Calibration Sites

Lathrop Wells Center Summation of Studies

(Continued)

Thermoluminescence

- **Experiment Snake River Plains: good results < 30 ka**
- **Reproducible numbers**
- **Problems:**
 - **Calibration > 30 ka**
 - **Inconsistent with ^3He (Forman not satisfied with sample)**
 - **Coarse sand**
- **Future directions:**
 - **Experiments to test applications of method**
 - **Understand mechanisms of young ages**
 - **Calibration sites for comparison**

Significance of Lathrop Wells Studies Are the Different Interpretations Important?

Eruption models: monogenetic versus polycyclic

- **Both models require multiple events**
- **Repository perspective:**
 - **Semantic versus substance**
 - **Multiple pulses**

Key => Polycyclic model factored into E3

- **Sufficient merit to polycyclic model to continue testing**
 - **Paleomagnetic data is inconclusive**
 - **Must examine all models, particularly conservative models**
 - **Timing of multiple events still unknown**

Summary of Lathrop Wells Studies (We are Getting There)

- **Encouraged by progress**
 - **Somewhat slow but steady**
 - **End is in sight; particularly with access to quarry property**
 - **Analogous features at other volcanic centers**

Summary of Lathrop Wells Studies (We are Getting There)

(Continued)

- **Investigators must be objective about results**
 - **Point out strengths and weaknesses of methods**
 - **Separate constraints, assumptions, speculations**
 - **Propose, test, revise...(repeat)**
- **Plea for professional objectivity**
 - **Maintain perspective of *risk* impact**
 - **Obtain fully qualified data**
 - **Be prepared to accept bounds versus resolution**
 - **Differences of opinion are healthy**
 - * **Alternative models important for the YMP**
 - **Differences can be established without *polarization***

FY 93 Priorities

- **Geochronology studies**
 - **Continue (possibly wrap-up) Lathrop Wells studies**
 - **Detailed studies**
 - **Sleeping Butte**
 - **Crater Flat**
- **Field studies**
 - **Crater Flat mapping**
 - **Volume calculations**
 - **Pliocene Centers**
- **Probability studies**
 - **Issue resolution: major emphasis**
 - **E1-E2 tables**
- **Effects**
 - **Field analogues**
 - **E3 constraints**
- **Review of Geophysical data**