



United States Department of the Interior

GEOLOGICAL SURVEY
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IN REPLY REFER TO:

February 8, 1995

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WBS: 1.2.3.2.2.1
"PRELIMINARY DRAFT"

Attn: Peter M. Stephan, REECo, MS 523, Las Vegas, NV
Susan B. Jones, YMP, Las Vegas, NV
Mark Tynan, YMP WBS Manager, DOE, Las Vegas, NV

SUBJECT: PUBLICATIONS--Transmittal of abstract entitled, "Geophysical expression of the Ghost Dance fault, Yucca Mountain, Nevada", by D.A. Ponce and V.E. Langenheim

Interagency Agreement No. DE-AI08-92NV10874

Dear Wesley:

One copy of the subject abstract is enclosed for review in your office and concurrence for presentation and publication in the proceedings volume for the International High-Level Radioactive Waste Management Conference to be held May 1-5, 1995 in Las Vegas, Nevada

This report received technical review by Andrew Griscom and Robert Morin who were chosen because of their general knowledge of the work and techniques. A QA review was performed by Bob Scavuzzo, YMPB-QA Office, and a preliminary Policy review was performed by Bob Lewis, YMPB.

Technical data for this report have been submitted in accordance with YAP-SIII.3Q. The tracking number for the TDIF associated with these data is GS950208314212.003

This report was prepared under WBS number 1.2.3.2.2.1. There are no milestones associated with this report. Upon publication, this report will be submitted to OSTI in accordance with DOE order 1430.2, under distribution category UC-814.

Robert E. Lewis, Reports Improvement Officer
Yucca Mountain Project Branch
Larry R. Hayes, Chief YMPB

For:

Enclosures

cc w/o enclosures:

- LRC File 3.304-9 (P)
- M.P. Chornack, USGS, YMPB, Denver, CO
- D.A. Ponce, USGS, GD, Menlo Park, CA
- B.T. Brady, YMPB, Denver, CO
- R. Ritchey, YMPB, Denver, CO

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Reviewed by C. Hunter
1/24/95
W. Clay Hunter

**GEOPHYSICAL EXPRESSION OF THE GHOST DANCE FAULT,
YUCCA MOUNTAIN, NEVADA**

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ABSTRACT

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Gravity and ground magnetic data collected along surveyed traverses across Antler and Live Yucca Ridges, on the eastern flank of Yucca Mountain, Nevada, reveal small-scale faulting associated with the Ghost Dance and possibly other faults. These studies are part of an effort to evaluate faulting in the vicinity of a potential nuclear waste repository at Yucca Mountain.

I. INTRODUCTION

Gravity and ground magnetic data were collected along surveyed traverses across Antler and Live Yucca Ridges, on the eastern flank of Yucca Mountain, Nevada, as part of an effort to evaluate faulting in the vicinity of a potential nuclear waste repository at Yucca Mountain. Gravity and magnetic data reveal small-scale faulting associated with the

Ghost Dance fault (Fig. 1). Because the Ghost Dance fault has been identified within the potential repository area, its geophysical expression becomes important to the design and construction of underground facilities. ^{As well as to performance of a potential repository} The largest gravity and magnetic anomalies in the study area are associated with larger-scale north-south trending faults¹ such as the Solitario Canyon, Bow Ridge, and Paintbrush Canyon faults on the west and east flanks of Yucca Mountain.

II. GRAVITY AND MAGNETIC DATA

Detailed gravity data were collected along Antler and Live Yucca Ridges on the east flank of Yucca Mountain (Fig. 1) using LaCoste and Romberg gravity meters. Gravity meter performance and calibration factors were checked over a mountain gravity meter calibration loop. Gravity data were reduced using the Geodetic Reference System of 1967 and referenced to the International Gravity Standardization Net 1971 gravity datum. Gravity data were reduced to complete Bouguer anomalies using a reduction density of 2.00 g/cm³.

Ground magnetic data with the sensor at 8 ft (2.4 m) above the surface were also gathered along the two profiles (Fig. 1). A Geometrics portable proton precession magnetometer, model G-816, was used to collect data. Because the anomalies of interest were expected to be small (20 to 50 nT) ^{nanoteslas,} and the profile lines were long, a base station was periodically reoccupied to make corrections for diurnal time variations of the Earth's magnetic field.

III. RESULTS

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Previously collected magnetic data along traverse J82² (Fig. 1) and gravity and magnetic data collected along traverse WT-2³ in washes that cross the Ghost Dance fault indicate

that the Ghost Dance fault is characterized by both gravity and magnetic anomalies. Gravity and magnetic data along the WT-2 traverse (Fig. 2) indicate a small-amplitude gravity low in a broad area ^{which} ~~that~~ encompasses the Ghost Dance fault that may reflect a much broader zone of brecciation. Magnetic data (Fig. 2) reveal a distinctive low of about 400 nT (nanoteslas) associated with the fault.

Recently collected gravity and magnetic data along Antler Ridge and Live Yucca Ridge (Fig. 3) also indicate that the Ghost Dance fault is characterized by gravity and magnetic anomalies. Gravity data ^{along} the crest of Antler Ridge (Fig. 3) ^{reveal} a small-amplitude gravity low associated with the Ghost Dance fault similar to that along the WT-2 Wash traverse. In addition, gravity data reveal other possible faults such as the anomaly about 240 m east of the Ghost Dance fault (Fig. 3).

Magnetic data collected along the crest of Antler and Live Yucca Ridges (Fig. 3) reveal a magnetic low of about 80 nT associated with the Ghost Dance fault which is much smaller in amplitude than ^{that found in} the J82 or WT-2 traverses. This discrepancy suggests that the magnetic signatures of the Ghost Dance fault along traverse J82 and WT-2 (Fig. 1) are in part caused by magnetic terrain effects resulting from reversely magnetized rocks of the Tiva Canyon ^{Tuff} ~~Formation~~ in the canyon walls. In addition, gravity and magnetic data along Antler and Live Yucca Ridges indicate the presence of other small-amplitude anomalies that may reflect other small-scale faults.

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V. CONCLUSIONS

Gravity data combined with ground magnetic data can provide an effective exploration tool for delimiting small- and large-scale faulting and for tracing such faults under alluvial cover. These data supplemented with density data, magnetic property data, and two- and

three-dimensional modeling can provide additional structural information such as dip and vertical offset of faults.

ACKNOWLEDGMENTS

Prepared in cooperation with the U.S. Department of Energy (Interagency Agreement DE-AI08-~~78ET44-002~~^{92NY10874}). R.F. Sikora assisted in gravity data processing. The processed data are preliminary.

REFERENCES

1. D.A. Ponce, V.E. Langenheim, and R.F. Sikora, Gravity and magnetic data of Midway Valley, southwest Nevada: U.S. Geological Survey Open-File Report 93-540-A, documentation, 9 p. (1994). (NNA.940418.0157)
2. G.D. Bath, and C.E. Jahren, Interpretations of magnetic anomalies at a potential repository site located in the Yucca Mountain area, Nevada Test Site: U.S. Geological Survey Open-File Report 84-120, 40 p. (1984).
3. H.W. Oliver, and R.F. Sikora, 1994, Gravity and magnetic data across the Ghost Dance Fault in WT-2 Wash, Yucca Mountain, Nevada: U.S. Geological Survey Open-File Report 94-413-A, 22 p. (1994).

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*I think an effort should be made to incorporate previous papers on the detailed mapping along the GDF
Spangler & others 1993, Spangler & others 1994
(ANS papers) and list when appropriate
Pl. 11 - 4 text*

FIGURE CAPTIONS

Figure 1 Index map of Yucca Mountain and vicinity showing locations of gravity and magnetic traverses across the Ghost Dance fault. AR, Antler Ridge traverse; BRF, Bow Ridge ~~Fault~~; GDF, Ghost Dance fault; J82, J82 traverse; LYR, Live Yucca Ridge traverse; PCF, Paintbrush Canyon fault; SCF, Solitario Canyon fault; and WT-2, WT-2 Wash traverse.

Figure 2 Gravity, and magnetic profiles along WT-2 Wash traverse. GDF, Ghost Dance fault.

Reference source for WT-2 traverse? It is in text, of course.

Figure 3 Gravity, and magnetic profiles along Antler Ridge. GDF, Ghost Dance fault.

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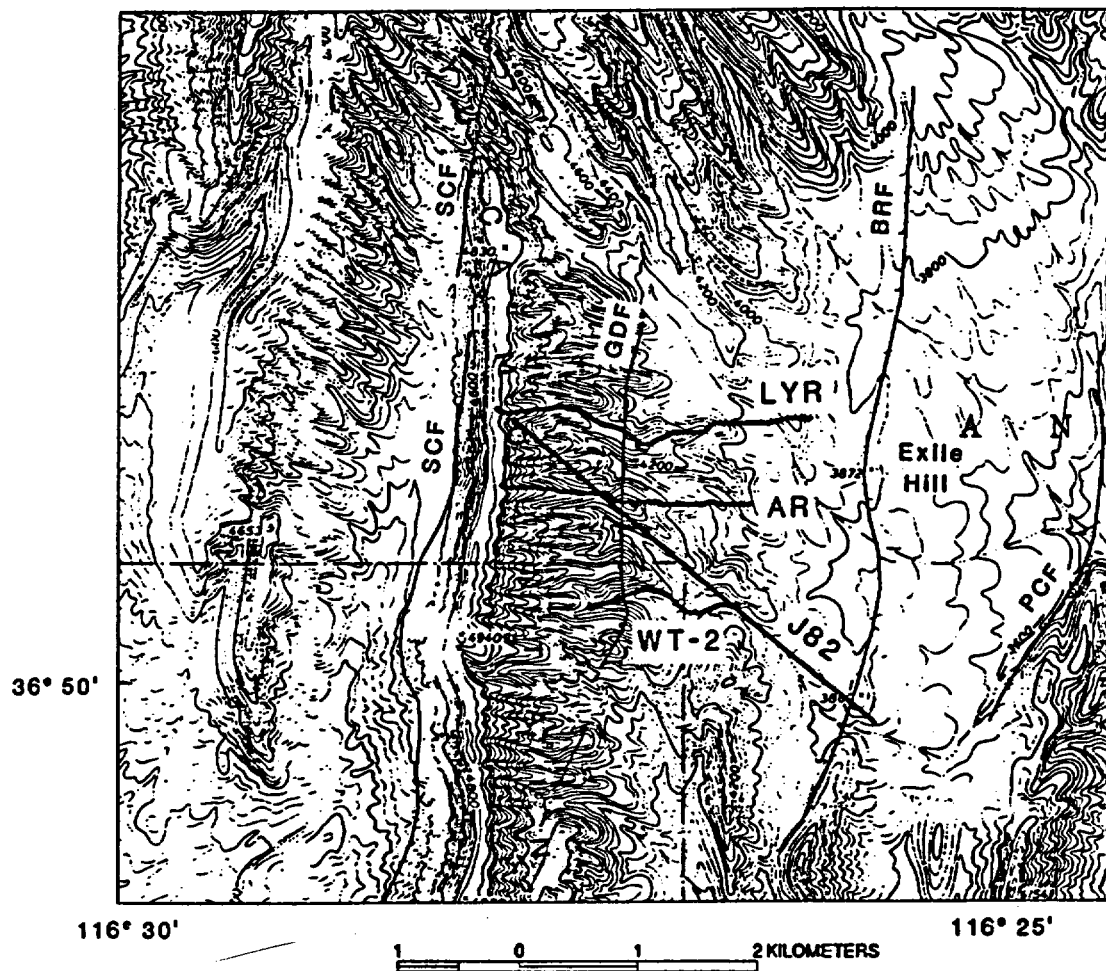


Figure 1 Index map of Yucca Mountain and vicinity showing locations of gravity and magnetic traverses across the Ghost Dance fault. AR, Antler Ridge traverse; BRF, Bow Ridge Fault; GDF, Ghost Dance fault; J82, J82 traverse; LYR, Live Yucca Ridge traverse; PCF, Paintbrush Canyon fault; SCF, Solitario Canyon fault; and WT-2, WT-2 Wash traverse.

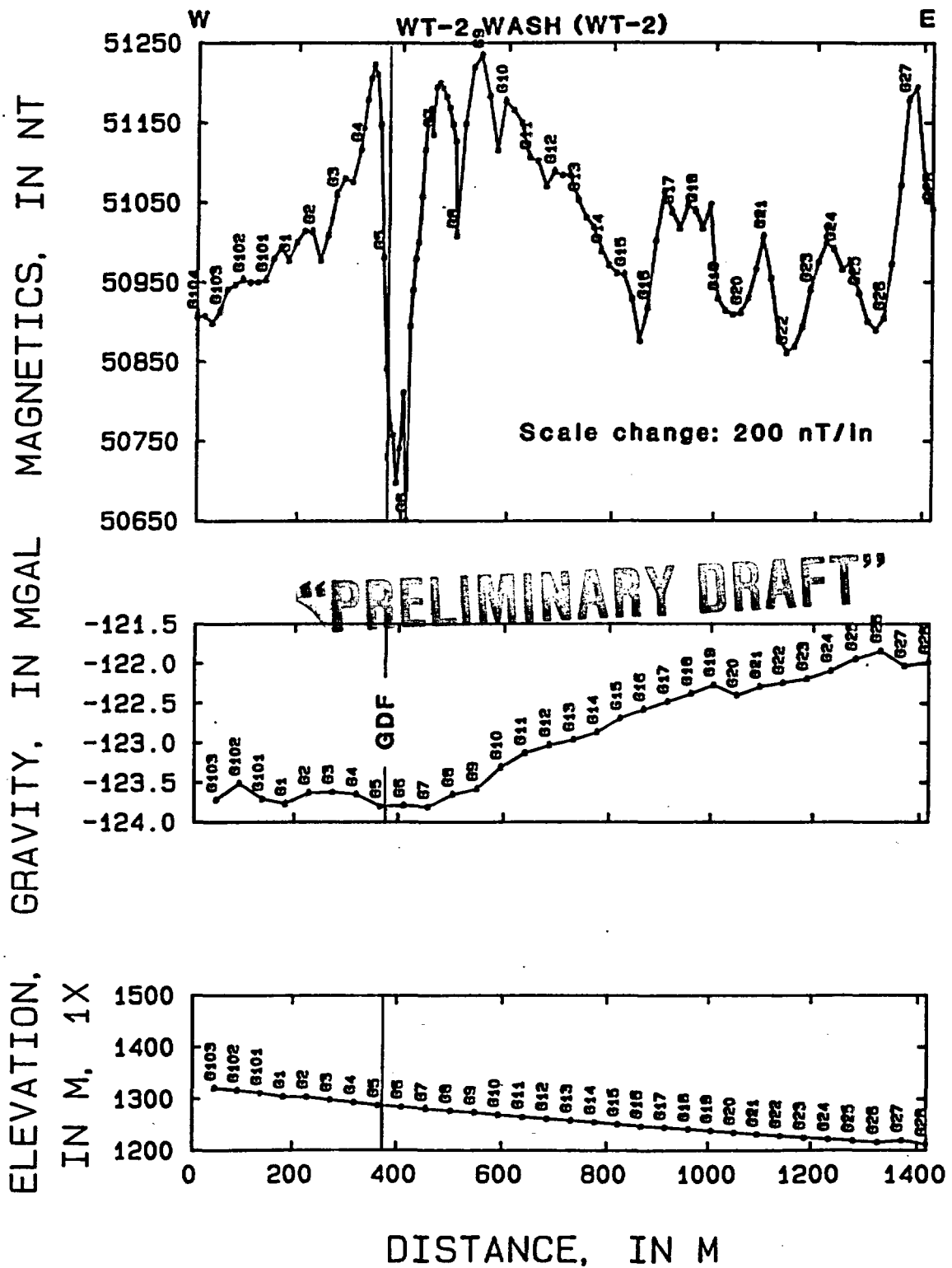


Figure 2 Gravity, and magnetic profiles along WT-2 Wash traverse. GDF, Ghost Dance fault.

Reference source?

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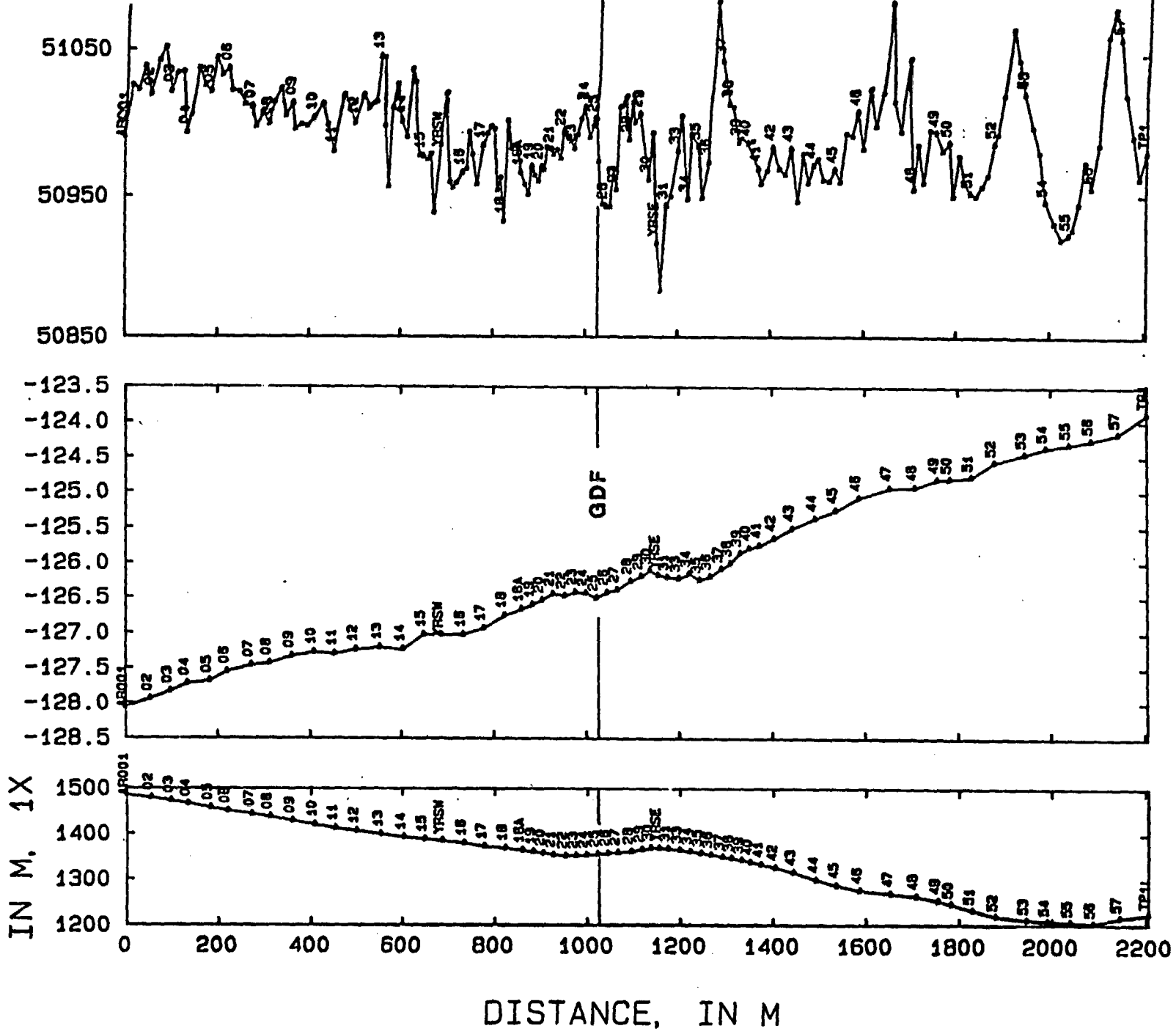


Figure 3 Gravity, and magnetic profiles along Antler Ridge. GDF, Ghost Dance fault.

**Summary deadline:
Postmarked by
Friday
November 11, 1994**



**1995 International
High-Level Radioactive Waste
Management Conference**

November 1-5, 1995 - Las Vegas, Nevada

Progressive Technology

Conference Host:

Howard R. Hughes College of Engineering, University of Nevada, Las Vegas

Sponsors:

American Nuclear Society and the American Society of Civil Engineers

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Cooperating Organizations:

American Association of Engineering Societies, American Chemical Society, American Institute of Chemical Engineers, American Medical Association, American Society for Testing and Materials, American Society for Quality Control, American Society of Mechanical Engineers, Center for Nuclear Waste Regulatory Analysis, Edison Electric Institute, Geological Society of America, Health Physics Society, Institute of Nuclear Materials Management, National Conference of State Legislatures, Society of Mining Engineers, U.S. Department of Energy, U.S. Geological Survey, U.S. Nuclear Regulatory Commission, University of Nevada Medical School, American Institute of Mining, Metallurgical, and Petroleum Engineers, American Underground-Space Association, Atomic Energy Council Radwaste Administration, Atomic Energy of Canada Ltd., British Nuclear Fuels Ltd., Chinese Institute of Civil and Hydraulic Engineering, Commission of the European Communities, Conseil National des Ingenieurs et des Scientifiques de France, Electric Power Research Institute, Her Majesty's Inspectorate of Pollution, Institution of Civil Engineers, Institution of Engineers-Australia, Institution of Engineers of Ireland, Japan Society of Civil Engineers, Korea Advanced Energy Research Institute, Korean Society of Civil Engineers, National Association of Corrosion Engineers, National Society of Professional Engineers, Nationale Genossenschaft fur die Lagerung Radioaktiver Abfalle (NAGRA), Organization for Economic Cooperation and Development (OECD)-Nuclear Energy Agency, Power Reactor and Nuclear Fuel Development Corp., Swedish Nuclear Fuel and Waste Management Company, Swedish Nuclear Power Inspectorate, Swiss Society of Engineers and Architects, Verein Deutscher Ingenieure, Ministerio de Industria y Energia-Uruguay.

This is the official call for summaries for the 1995 International High-Level Radioactive Waste Management Conference. You are encouraged to submit summaries of papers describing work that is **NEW, SIGNIFICANT** and **RELEVANT** to the theme of the meeting. To facilitate an adequate review, your summary must be received at ANS Headquarters by November 11, 1994. The Technical Program Committee will then review your summary and will notify you of their decision by the middle of December. Authors of accepted summaries will be sent guidelines for preparation of final summaries on camera-ready mats. Summaries, on camera-ready mats, will be due at ANS Headquarters no later than February 1, 1995. You will present your work in an oral or poster session at the meeting and are expected to register for the meeting. Camera-ready summaries will be required for presentation and inclusion in the conference proceedings. It is your responsibility to protect classified or proprietary information.

Program:

The conference will be an international forum for presentation and discussion of scientific and technical information related to progress in understanding the characteristics of systems that will receive, transport, store, and dispose of wastes within the purview of the Office of Civilian Radioactive Waste Management and similar organizations in other nations. The program will include technical sessions and substantive plenary sessions that discuss technical issues and applications of professional disciplines in natural, engineered, institutional and integrated systems. Summaries will be presented in both oral and poster sessions.