AD_____

Award Number: DAMD17-99-2-9053

TITLE: Geologic Structure Detection by High Resolution Seismic Reflection Methods Near the Custer Hill Landfill

PRINCIPAL INVESTIGATOR: Donald Steeples

CONTRACTING ORGANIZATION: University of Kansas Center for Research, Incorporated
Lawrence, Kansas 66044-7552

REPORT DATE: October 2000

TYPE OF REPORT: Final

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 074-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	October 2000	Final (1 Oct 99 - 30 Sep 00)

4. TITLE AND SUBTITLE
Geologic Structure Detection by High Resolution Seismic Reflection Methods Near the Custer Hill Landfill

5. FUNDING NUMBERS
DAMD17-99-2-9053

6. AUTHOR(S)
Donald Steeples, Dr.

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
University of Kansas Center for Research, Incorporated
Lawrence, Kansas 66044-7552

E-MAIL:
dsteeples@ukans.edu

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for public release; Distribution unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT ***(Maximum 200 Words)***

A seismic reflection survey was undertaken to detect geologic faults near the Custer Hill landfill at Fort Riley, Kansas. The survey was terminated after initial testing revealed that shallow seismic reflection was not an appropriate technique for the site.

14. SUBJECT TERMS Shallow seismic reflection surveying

15. NUMBER OF PAGES 12

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	Unlimited

Table of Contents

The University of Kansas

Don W. Steeples
Department of Geology

September 13, 2000

Commander
Directorate of Environment and Safety
ATTN: AFZN-ES Blgdg. 407
Fort Riley, Kansas 66442-6016

ATTENTION OF Ms. Janet Wade:

This is a final technical report for our contract #DAMD17-99-2-9053 with your office. As per my discussions with Mr. Mike Green of your office last autumn and also a couple of weeks ago, our seismic reflection efforts at Custer Hill landfill failed. We tried all of the filter capabilities in our arsenal of processing software, including frequency-wavenumber filtering and frequency-amplitude filtering.

Attached are some representative seismograms from the testing that was done. We used a sledgehammer, a 30.06 rifle, and an 8-gauge Betsy Seisgun as seismic sources. We performed experiments at Well CH91-10 and Well CH99-11, but results were negative at both locations even though we used all of the experimental parameters that we could think of to try.

The final invoice has been sent, and the total cost was something less than $4,000, a small fraction of the $18,542 that was authorized.

I am sorry that this project did not provide the answers that you need to help solve the problems at the Custer Hill landfill. If you have questions, let me know.

Sincerely,

Don W. Steeples
McGee Distinguished Professor of Geophysics
The University of Kansas

Attachments: (8)

120 Lindley Hall • Lawrence, Kansas 66045-2124 • (785) 864-2730 • FAX (785) 864-5276
E-mail: dsteeples@ukans.edu

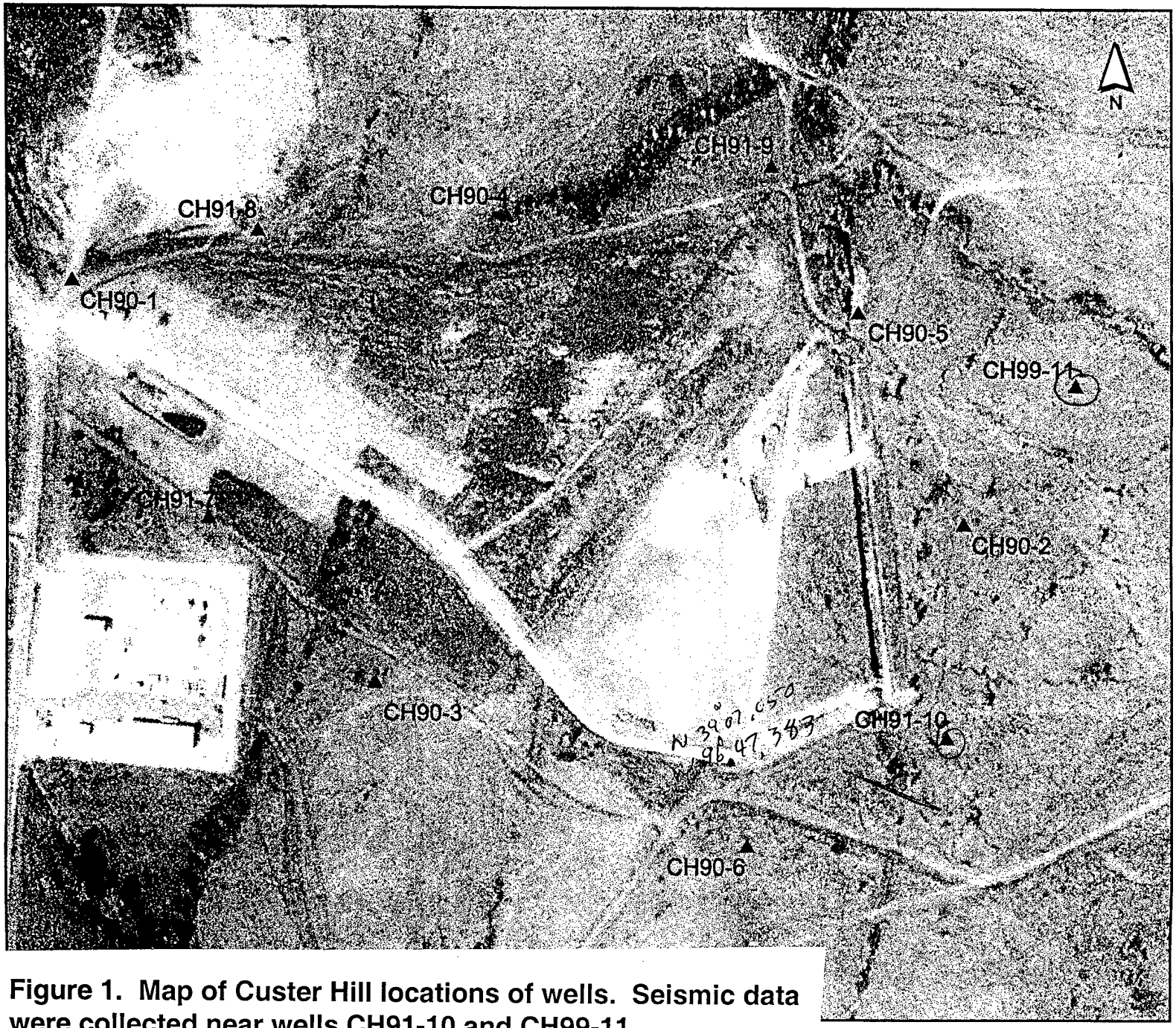
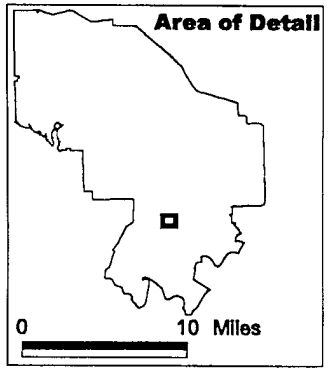


Figure 1. Map of Custer Hill locations of wells. Seismic data were collected near wells CH91-10 and CH99-11.

Background is 1992 Digital Orthophotography.

Custer Hill Landfill

Well Locations



Legend

▲ Wells

Scale

1:5000

0 200 400 600 Feet

0 50 100 150 Meters

DYNAMAC CORPORATION

Brian A. Higgins

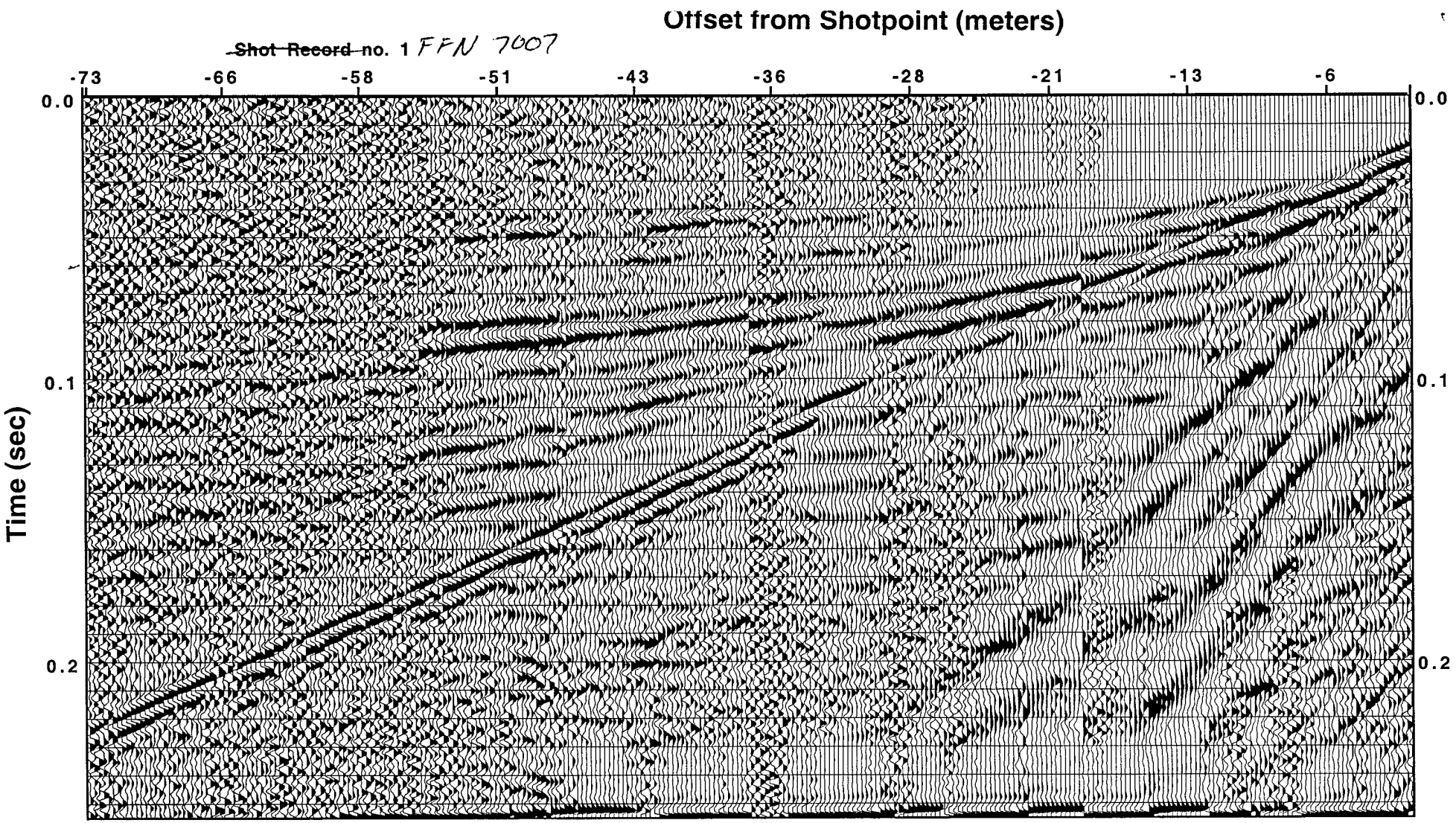


Figure 2. Seismic field records from well CH91-10. Source was a 30.06 rifle. Shots were progressively moved away from the geophones to provide a view of the total wavefield to a distance of 73 meters from the shotpoint. Geophone interval was 0.25 meter and digital sampling interval was 0.25 msec.

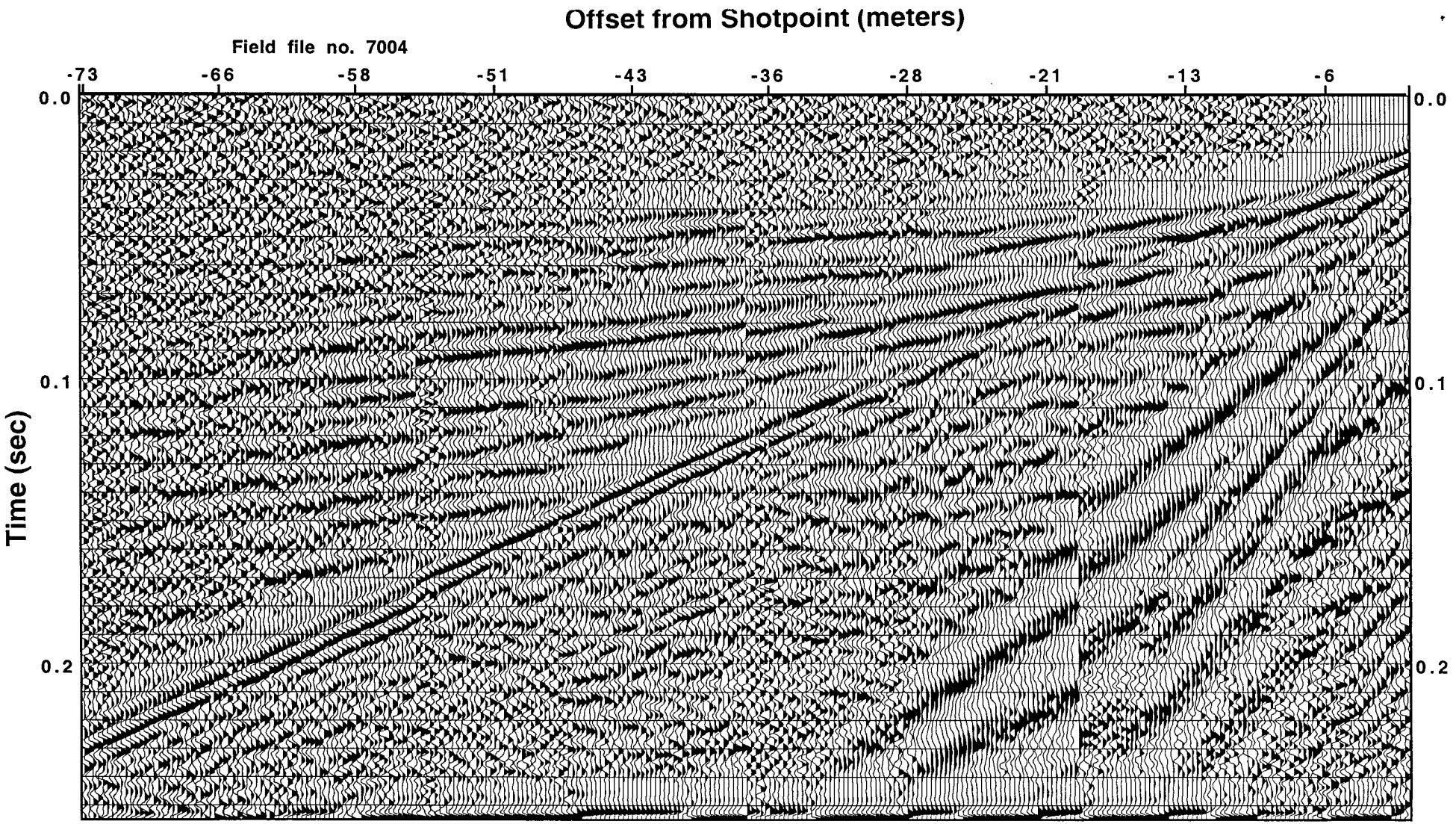


Figure 3. Seismic field records from well CH91-10. Source was a commercially available 8-gauge Betsy Seisgun. Shots were progressively moved away from the geophones to provide a view of the total wavefield to a distance of 73 meters from the shotpoint. Geophone interval was 0.25 meter and digital sampling interval was 0.25 msec.

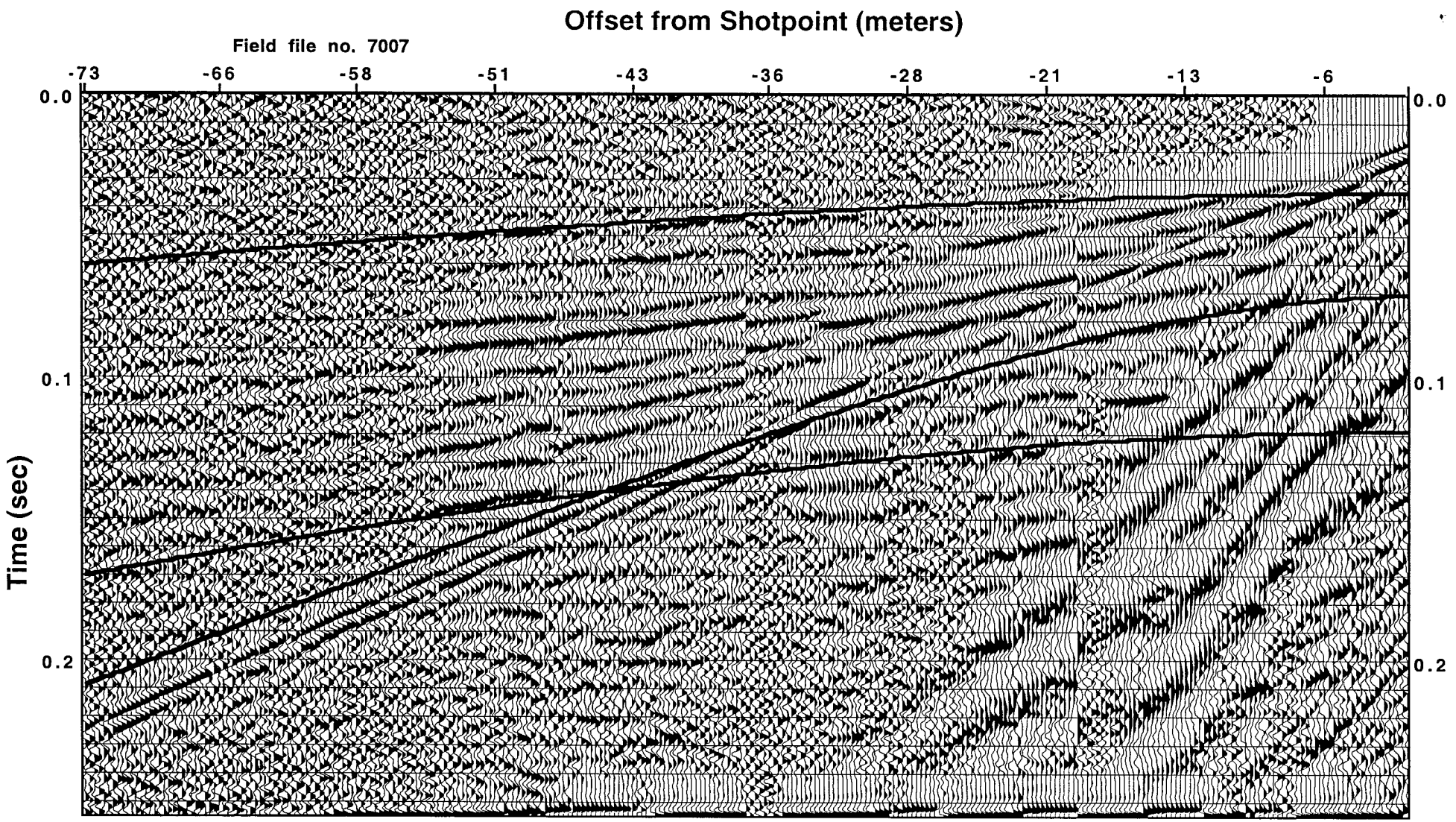


Figure 4. Expected seismic reflection times based on drill evidence are plotted on the data from Figure 2. No strong hints of reflections exist.

Shot Record No. 1 at Well No. CH99-11

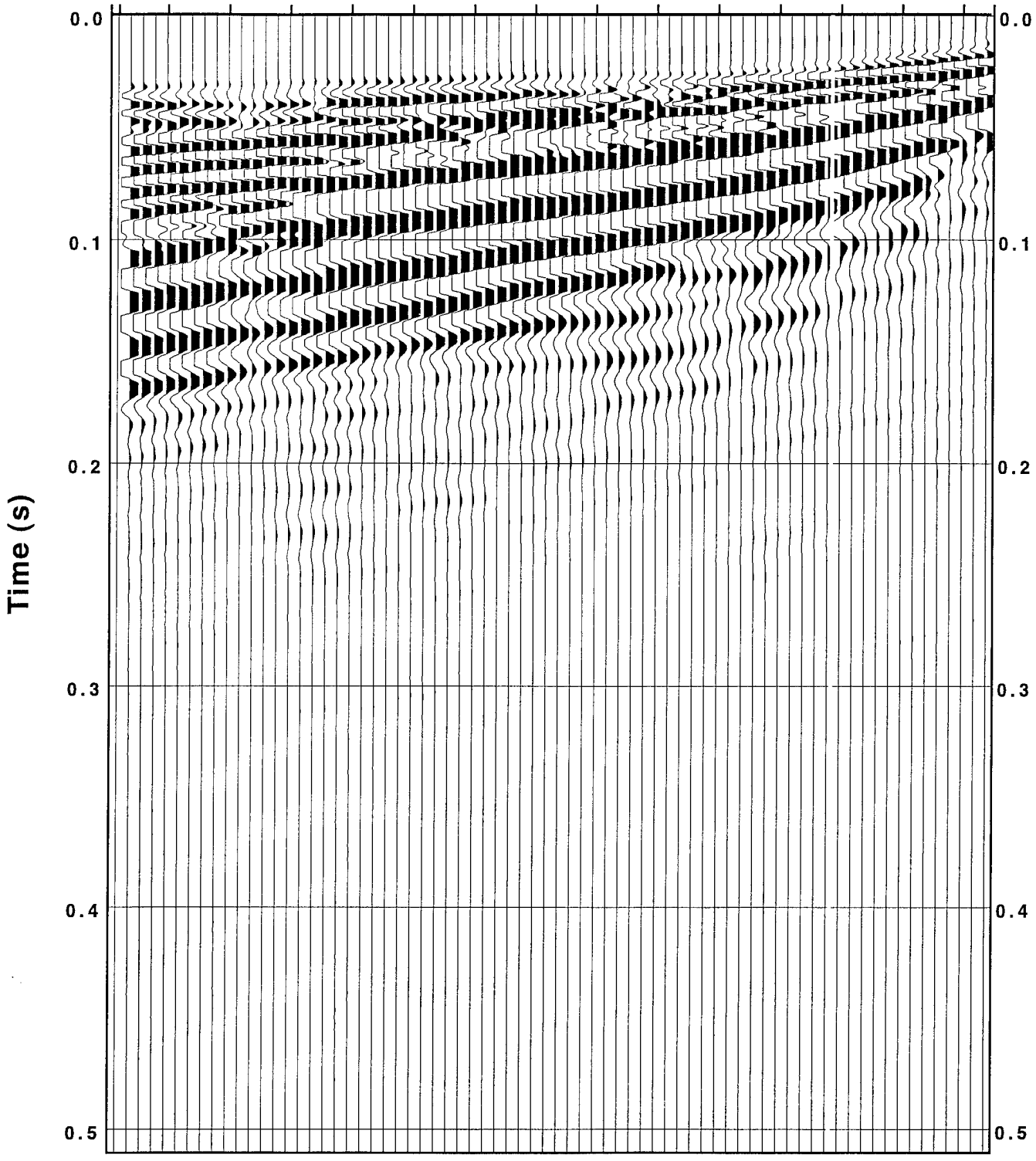


Figure 5. Field file from well CH99-11. Source distance to nearest geophone is 4 meters distance from farthest geophone is 21 meters. Source was a 30.06 rifle fired in a 0.3 meter deep hole.

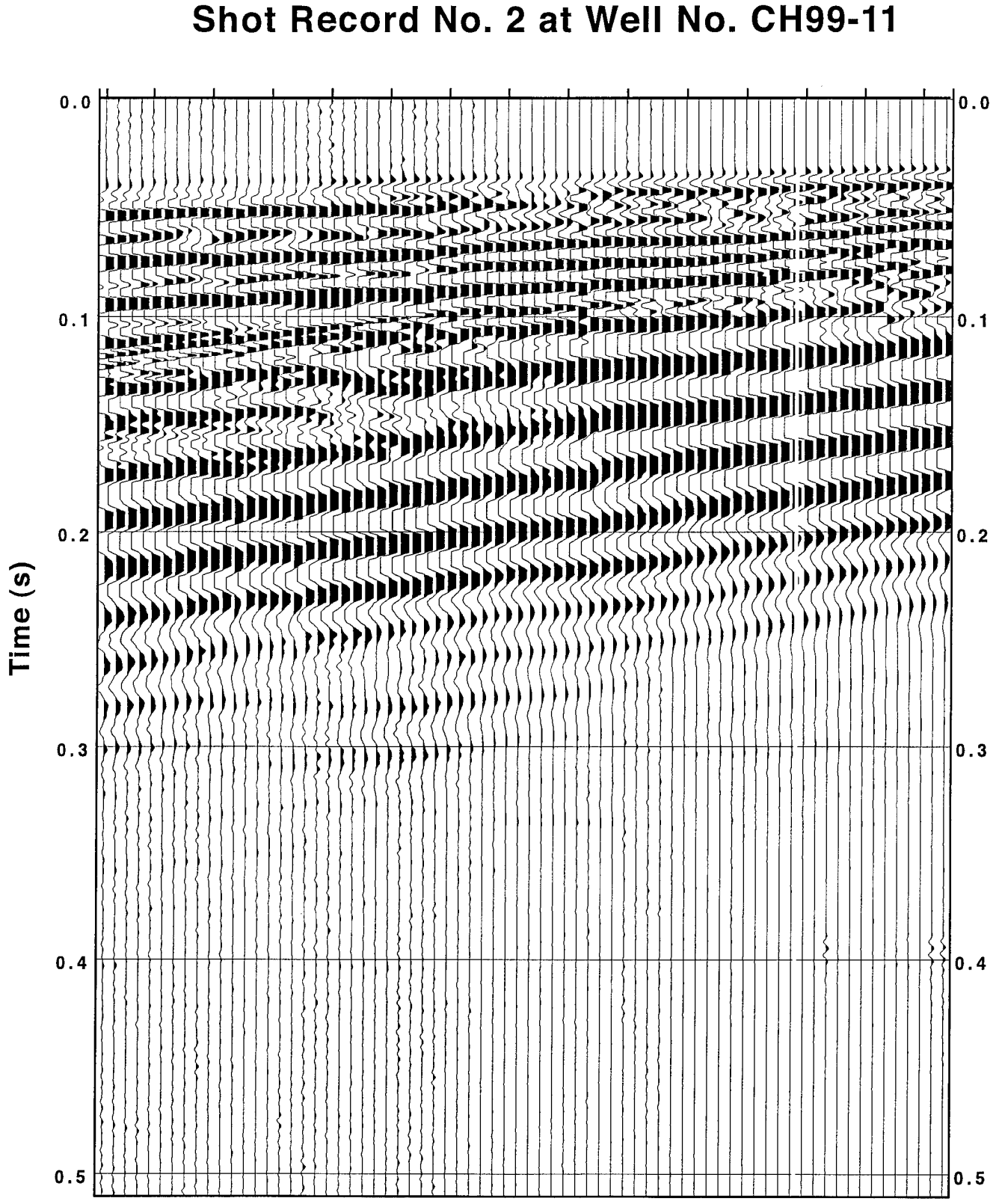


Figure 6. Field file from well CH99-11. Source distance to nearest geophone is 21.25 meters and distance from farthest geophone is 38 meters. Source was a 30.06 rifle fired in a 0.3 meter deep hole.

Shot Record No. 3 at Well No. CH99-11

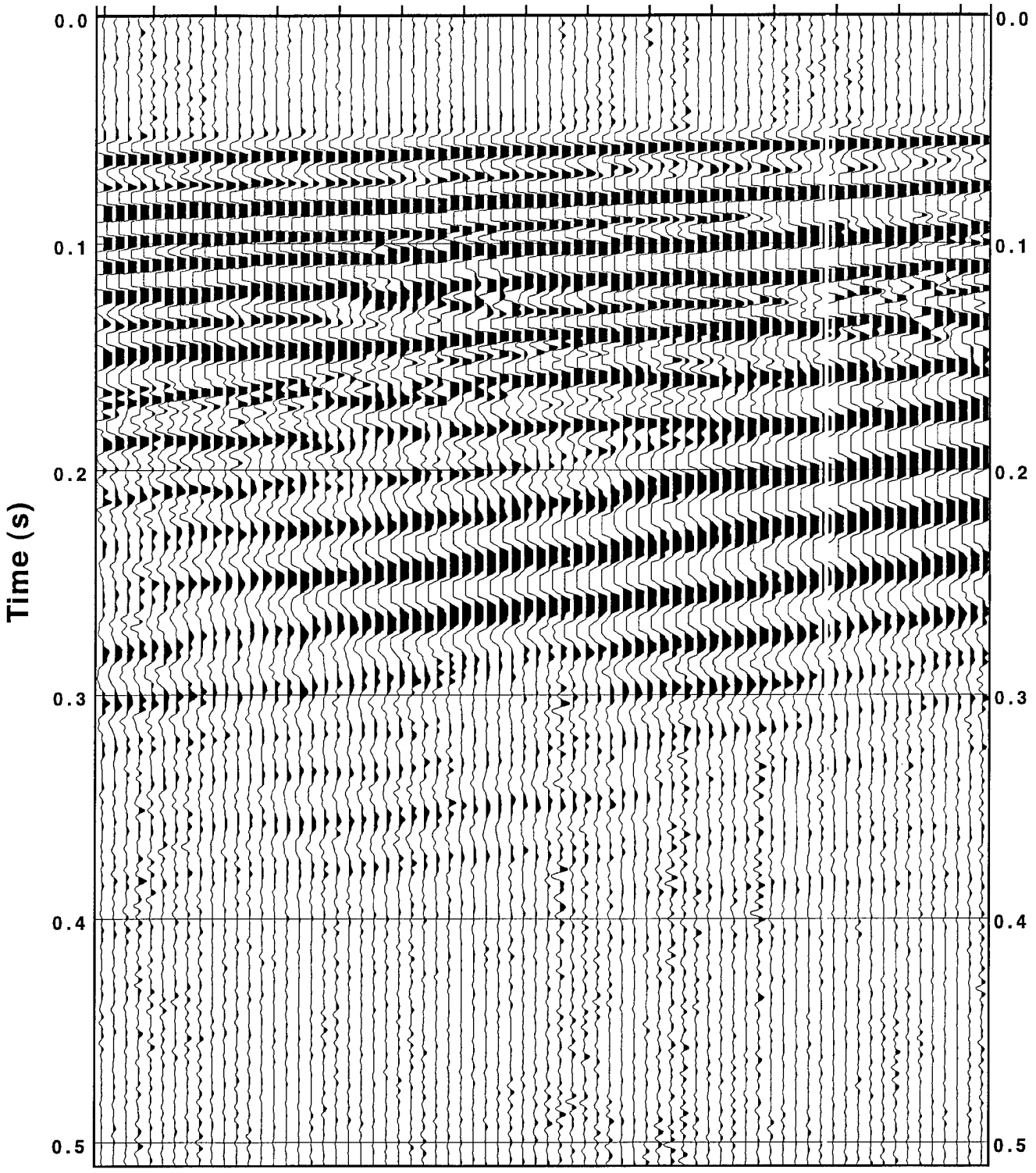


Figure 7. Field file from well CH99-11. Source distance to nearest geophone is 38.25 meters and distance from farthest geophone is 55 meters. Source was a 30.06 rifle fired in a 0.3 meter deep hole.

Oct 14th

DATE: ~~Sept 26-27~~, 99	FILE #	Source Loc	1ST Rec Loc	LAST Rec Loc	COMMENTS
OBSERVER Schmeissner	7000	19m	0m	17.75m	Betsy 256 ms, change 512 ms, rec
PROJECT ~~DOE~~ Walkaways	7001	19m			
~~DOE grant, new site tests~~	7002	37m			
LOCATION ~~Great Bend, Ks.~~ Ft. Riley	7003	55m			
	7004	73m			
Well CH91-10	7005	90m	moved from 91	because of clutch	
SOURCE: ~~22 rifle shots~~ Betsy	7006	90m			30.06
Interval: ~~0.1 meter~~ ~~0.75 ms~~	7007	73m			30.06
stack: no ~18m walkaway	7008	55m			
	7009	37m			
SEISMOGRAPH Geometrics	7010	19m			
Active channels ~~48~~ 72					
Filters out					
Sample interval 0.25 msec					
Other 256 ms					
GEOPHONES: Mark Prod					
Model L-40A freq ~~100 Hz~~ 28 Hz					
Interval ~~0.10 meter~~ 0.25 m					
Spikes 5.5 in					
Other					
WEATHER CONDITIONS windy ~15 mph					
SOIL CONDITIONS dry					
DATA DESCRIPTION Fair-poor					

Map/ Geometry Diagram