UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

OCT 7 1996

Donald Chabot, Project Manager
Engelhard Corporation
Route 152
Plainville, Massachusetts 02762

SUBJECT: INSPECTION NO. 070-00139/96-002

Dear Mr. Chabot:

On July 30 and 31, 1996, Mark Roberts of this office conducted a safety inspection at the Engelhard Corporation facility in Plainville, Massachusetts. Activities with licensed material were previously authorized by the NRC license listed below. The inspection was limited to a review of decommissioning activities in progress at the facility. A copy of the NRC inspection report is enclosed. In addition, our inspection examined the activities covered in your correspondence dated August 5, 1996, which transmitted your contractor's results of gamma spectrometry analysis of selected soil samples. The findings of the inspection were discussed with you and your consultants Robert Berlin, Steve Graham and James Mayberry, at the conclusion of the inspection.

Within the scope of this inspection, no violations were identified. However, we would like to receive information concerning the resolution of the discrepancy relating to the discovery of two different calibration dates for radiation survey instrument # 86308 that is discussed in the inspection report.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter, the enclosed report and your reply will be placed in the Public Document Room.

Your cooperation with us is appreciated.

Sincerely,

Ronald R. Bellamy

Ronald R. Bellamy, Ph. D., Chief
Decommissioning and Laboratory Branch
Division of Nuclear Materials Safety

Docket No.: 070-00139
License No.: SNM-185 (Retired)

Enclosure:
Inspection Report No. 070-00139/96-002

cc w/enclosure:
Commonwealth of Massachusetts

James Mayberry, Radiation Safety Officer
Foster Wheeler Environmental Corporation
30 Taunton Street
Plainville, Massachusetts 02762

Robert Berlin
RR1 - 13 Sterling Pines
Tuxedo, New York 10987

Distribution: w/encl
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DATE	10/04/96		10/4/96					

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U.S. NUCLEAR REGULATORY COMMISSION
REGION I

INSPECTION REPORT

Report No.	070-00139/96-002
Docket No.	070-00139
License No.	SNM-185 (Retired)
Licensee:	Engelhard Corporation Route 152 Plainville, Massachusetts 02762
Facility Name:	Engelhard Corporation
Inspection At:	Route 152 Plainville, Massachusetts 02762
Inspection Conducted:	July 30 - 31, 1996

Inspectors: Mark Roberts — 10-4-96
Mark C. Roberts, Senior Health Physicist — date

Approved By: Ronald R. Bellamy — 10/4/96
Ronald R. Bellamy, Ph. D., Chief, Decommissioning and Laboratory Branch — date

Inspection Summary: Routine, announced safety inspection of remediation activities (NRC Inspection No. 070-00139/96-002).

Areas Inspected: Project Management, Radiation Protection, Remediation of interior areas, Instrumentation and radiation surveys.

Results: No violations or safety concerns were identified. The remediation contractor provided soil samples for analysis by the Region I laboratory. The results obtained were compared to the contractor's analyses and showed very good agreement. The remediation contractor was to examine an apparent discrepancy involving the two different calibration dates for the same radiation survey instrument.

DETAILS

1.0 Persons Contacted

* Donald Chabot, Project Manager, Engelhard Corporation
* Robert Berlin, Radiological Consultant
* Steve Graham, Senior Project Manager, Foster Wheeler Environmental Corporation (Foster Wheeler)
* James Mayberry, CHP, Project Radiation Safety Officer, Foster Wheeler

*Denotes those present at exit interview.

2.0 Background

The site is comprised of ten buildings on a 10 hectare (25 acre) site, adjacent to a small reservoir in southeastern Massachusetts. A subsidiary of the Engelhard Corporation, D.E. Makepeace, was licensed by the AEC to use enriched uranium in the production of fuel elements from the late 1950's until 1962. Activities with licensed material were limited to Buildings 1 and 2 (Attachment 1). Liquid effluent contaminated with uranium was discharged to an on-site septic system. The license also authorized the incineration of uranium wastes in an on-site incinerator.

Exterior uranium contamination was identified during characterization measurements for EPA regulated hazardous materials. Scoping and characterization measurements have identified uranium contamination exceeding the NRC criteria for release for unrestricted use in numerous areas in Building 2. The interior contamination is primarily limited to non-removable contamination on the concrete floors and contamination in floor drains and drain lines. Radiological surveys have not identified contamination in Building 1. The current decommissioning project is limited to the remediation of interior contaminated areas in preparation for eventual building demolition. The exterior contamination issues will be addressed in a separate phase of the project.

3.0 Project Management

Remediation of contaminated areas commenced in late June 1996. The remediation activities are being coordinated by a contractor to Engelhard, Foster Wheeler Environmental Corporation (the remediation contractor). A project manager for Foster Wheeler coordinates the project for the contractor and is the primary interface to Engelhard. A project radiation safety officer is in charge of radiological safety for the project. The remediation contractor also provides staffing for remediation activities, routine radiological surveys and waste handling. A sub-contractor, Hilbert Associates, provides analytical support through an off-site laboratory. Duplicate gamma spectrometry analyses are performed on approximately 10% of the soil samples by another outside laboratory as a quality check. A radiological contractor performed the characterization measurements and provides quality assurance measurements for the final surveys.

No safety concerns were identified.

4.0 Radiation Protection

Work in the radiological controlled area is controlled by a system of radiation work permits (RWPs). Each RWP describes a type of activity and the location where this activity is authorized. The RWP describes the radiological conditions, radiological survey frequency, training required, and protective clothing requirements. As of the date of the inspection, seven active RWPs were in use. The inspector used RWP # ENG-INT-004, a general entry and inspection RWP, for entry to the radiological controlled area during the inspection. The RWP appeared to contain appropriate and sufficiently detailed information for safe work in the radiological controlled area.

Air sampling is performed during remediation activities to monitor airborne concentrations of radioactive contaminants. Sampling is conducted with low-volume samplers (typically 70 liters per minute) for the duration of the work activities. The samples are held for a period 2-3 days prior to counting to allow for the decay of radon decay progeny on the air filter. All sample results available as of the date of the inspection have not indicated any significant airborne activity (<0.1 DAC (Derived Air Concentration)).

Radiation protection surveys are conducted by the remediation contractor as needed to support the remediation activities. In addition, removable contamination surveys are conducted daily in approximately fifteen locations, in areas that are expected to be clean, to ensure that the contamination control program is working effectively. The results of these surveys have not indicated any contamination outside the radiological controlled area.

Individuals exiting the controlled areas are required to perform a self-survey using a pancake GM detector coupled to a rate-meter. Equipment or material removed from the radiological controlled area is also surveyed by the individual removing the material.

No safety concerns were identified.

5.0 Remediation in Interior Areas

Because enriched uranium was utilized at the facility, an important preliminary action by the contractor was to perform alpha spectrometry analyses on a representative group of contaminated soil samples to establish the approximate enrichment of the uranium and to empirically determine a relative ratio of the concentration of uranium-234 (U-234) to the concentrations of uranium-235 (U-235) or uranium-238 (U-238) in the sample. During remediation activities, gamma spectrometry is used to identify concentrations of U-235 and U-238 in samples, primarily because it provides more rapid analytical results and is considerably less costly to perform. Because U-234 is not detectable in the gamma analysis, the empirically determined ratio is used to infer the U-234 concentration based on the gamma spectrometry results. The total uranium concentration can then be determined for a sample by summing the U-234, U-235, and U-238 concentrations. The average enrichment was

determined to be approximately 4% and the empirical ratio of U-234 to U-235 was determined to be 21.

The principle remediation activities that are being conducted are scabbling surface contamination in the concrete floors and lower walls, excising contamination from joints and seams in the floor, and removing contaminated piping beneath the floor. Mechanical scabbling devices that remove approximately 1/16th of an inch of the concrete surface are used to remediate most areas. These devices are air-operated and are equipped with a vacuum system to reduce potential airborne contaminants. Airborne concentrations of radiological particulates are also controlled by the use of local ventilation systems equipped with HEPA (High-Efficiency Particulate Air) filtration systems. HEPA-filtered vacuum cleaners are also used in coordination with the scabbling devices to remove larger debris pieces. Generally, about half the areas require more than one pass with the scabbling devices to remove contamination to levels that meet the NRC guidelines for release for unrestricted use. Contamination in seams and joints is removed by scabbling, use of jack hammers, or use of concrete saws to cut out portions of the floor. Waste generated by these remediation activities is stored in a locked room outside the radiological controlled area.

Based on a review of historical blueprints and physical observations, approximately twenty drain lines have been identified in the floor of Building 2. Each drain line terminates in the tunnel area of Building 2 or joins one of the lines that terminates in the tunnel. The open end of each line has been sealed with a foam sealant to prevent leakage of the contents into the tunnel area. Removal of the contaminated pipes is performed in a multi-step process to reduce the potential for contamination. If necessary, the concrete floor above the pipe is first remediated and surveyed to assure contamination levels meet the release criteria. Cuts are then made into the concrete floor and workers remove sections of the clean floor. Once the concrete is removed above the piping, the drain lines are excavated and removed. When a section of pipe has to be cut, the area beneath the pipe is covered so that the underlying soil is not contaminated by the contents of the pipe. Foam sealant is also used to prevent leakage after a pipe is cut. Contaminated piping is then wrapped in plastic sheets and removed to the locked waste storage area. The integrity of the piping excavated thus far has been good and there has been no soil contamination as a result of leaks or holes in the piping. Contaminated soil was excavated and removed from two locations under drain lines where adequate contamination control measures were not used during earlier modifications to the contaminated piping.

In some locations beneath the floor, drain lines are cross-connected with lateral sections of pipe. In these areas and in some of the locations where the imbedded piping cannot be readily removed, a larger piece of excavation equipment must be brought in to remove the pipe. The Engelhard representative and staff of the remediation contractor discussed the need to back-fill certain areas where piping has been removed with clean soil. This was necessary so that the excavation equipment could be maneuvered. The inspector stated that as long as an adequate number of samples have been collected from beneath the areas to

be back-filled and the analytical results from the samples show that the remaining soil meets the remediation guidelines, then the areas could be back-filled. The samples must also be available for subsequent confirmatory analysis by the NRC.

In order to evaluate the analytical laboratory capabilities of the contractor, the inspector requested that selected soil samples be sent to the Region I office for gamma spectrometry analysis. The results obtained would be compared to the contractor's analytical results. Both the NRC and contractor results from these samples appear in the table in Attachment 2. The NRC results show very good agreement with the Engelhard values. In general, the Engelhard results are slightly higher than the NRC values.

In area 2G of Building 2, contamination was found beneath floor tile. Apparently, the floor tile was installed after the floor became contaminated, because no contamination was found on the tile. In another location, clean pipes that were not part of any of the radiological processes have been removed from the lower wall area to enable scabbling of the floor and the lower wall. Surveys did not identify either internal or external contamination on this piping.

No safety concerns were identified.

6.0 Instrumentation and Radiological Surveys

Post-remediation surveys are conducted with a scaler/rate-meter equipped with a 425 cm^2 gas-flow proportional detector. The detector is used in the scanning mode following remediation to determine if sufficient decontamination has been conducted. Counts for fixed time periods are taken at grid intersections and in areas with elevated audible indications. Thin-window GM detectors are also used in the fixed counting time period mode in areas where the large area probe cannot be used. The gas-flow proportional detectors are used at a voltage setting where the beta particles are counted, because the true counting efficiency can be more reliably measured for beta particles versus alpha particles. Corrections are made for the beta versus alpha ratio.

The remediation contractor uses representative background counts for comparison to results in the remediated area. Background measurements for the gas-flow proportional detector and other detectors used in post-remediation surveys are made on a test patch of scabbled concrete flooring in an unaffected area. The contractor stated that this was likely a more representative measurement of background for these detectors because a scabbled surface was used. In one area in Building 2, the contractor identified an elevated background from ceramic wall tile. The contractor selected a similar area in an unaffected area in order to make background measurements for comparison to the tiled areas. Soil samples from unaffected areas of the site have also been collected and analyzed as representative background samples. Daily background and check source measurements (Sr-90 source) are performed each day an instrument is used. The inspector examined selected records for the period June 27, 1996 through July 27, 1996 and found the records to be complete.

In addition to surveys in areas where remediation has taken place, surveys have also been performed in the overhead areas following remediation of the floors. These surveys have measured only very isolated spots of contamination, limited to some of the metal fixtures near the ceiling. The surveys have not identified contamination on the ceiling.

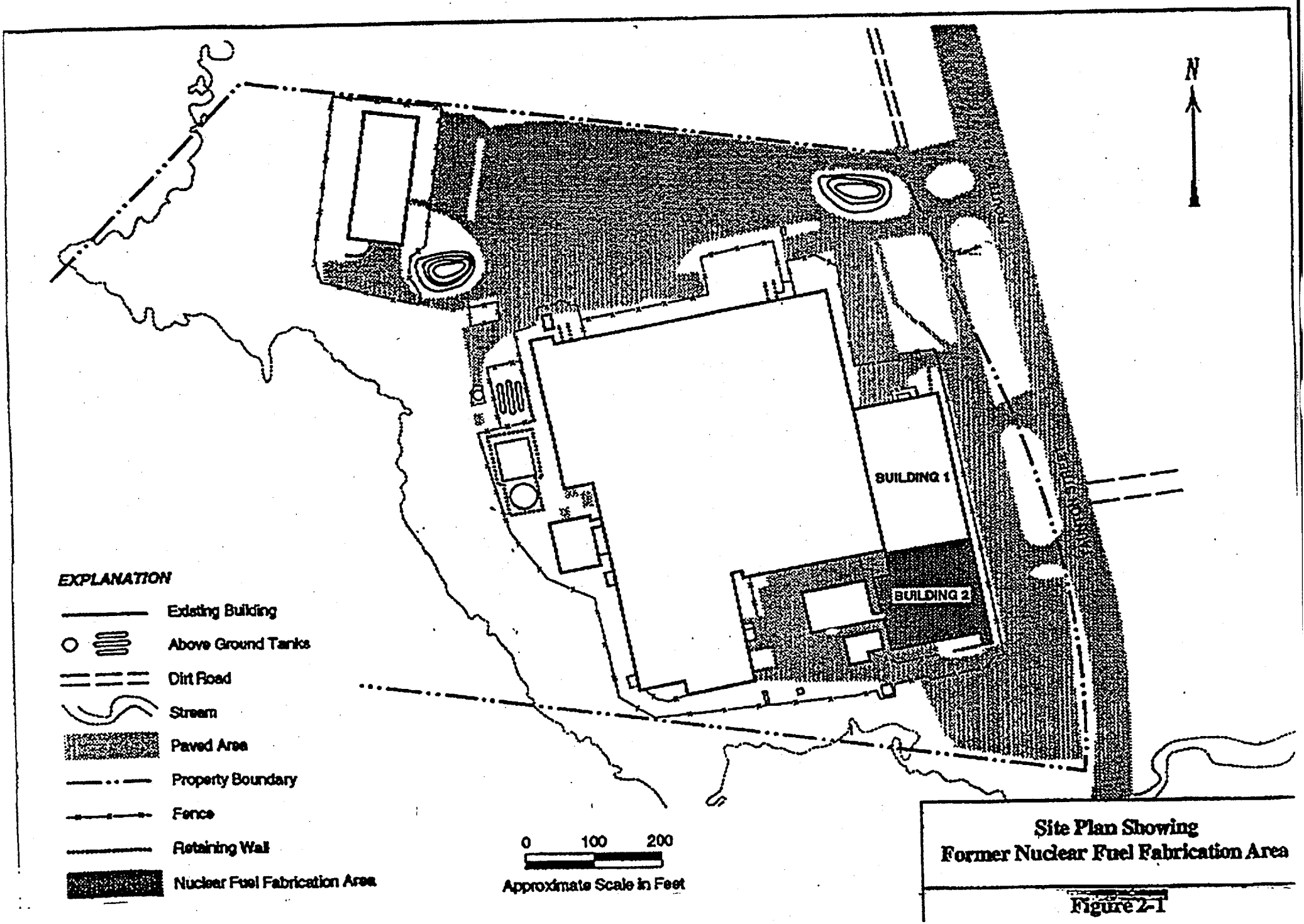
Staff from the radiological contractor make duplicate measurements in approximately 25% of the locations as a quality check. The inspector examined the calibration date on the floor monitor in use by the radiological contractor. The instrument had been calibrated on January 18, 1996 and the calibration due date was listed as April 18, 1996. Because the date of this inspection was later than the calibration due date, it appeared that the instrument in use was beyond the calibration date. Following further review of the radiological contractor's calibration procedure, the inspector determined that the April 18, 1996 date was likely an error because the radiological contractor's calibration frequency listed in their procedure was twelve months. The instrument was not out of calibration. The inspector requested that the proper calibration due date be placed on the instrument to avoid further confusion and voiced concern that this oversight was not previously recognized.

The remediation contractor's survey instruments are calibrated by GTS, Inc., an NRC licensee. Instruments are calibrated at intervals of six months. The inspector examined selected instruments and found all to have been calibrated within the last six months. However, one minor discrepancy was observed in the instrument calibration records for instrument No. 86308. The calibration date listed on the instrument was June 24, 1996. The calibration date for this instrument was listed as June 12, 1996 on the calibration record for the instrument. The project radiation safety officer stated that he would review the calibration records in order to resolve the discrepancy.

No safety concerns were identified.

7.0 Exit Interview

The results of the inspection were discussed with the individuals identified in Section 1.



Site Plan Showing
Former Nuclear Fuel Fabrication Area

Figure 2-1

ATTACHMENT 2

CONCENTRATIONS OF U-235 AND U-238 IN SOIL SAMPLES FROM THE ENGELHARD CORPORATION SITE PLAINVILLE, MASSACHUSETTS

SAMPLE ID NO.	NRC RESULTS (pCi/g ± 2σ) U-235	NRC RESULTS (pCi/g ± 2σ) U-238[1]	ENGELHARD RESULTS (pCi/g[2]) U-235	ENGELHARD RESULTS (pCi/g[3]) U-238[1]
2D-002	0.06 ± 0.03	1.3 ± 0.1	0.13	1.73
2H-001	21.7 ± 0.2	77.5 ± 1.4	24.63	101.05[4]
2H-003	<0.05	0.6 ± 0.3	0.03	0.36
2H-006	3.5 ± 0.1	18.6 ± 0.6	4.5	31.06[5]
2H-010	<0.05	0.2 ± 0.1	0.04	0.71
2H-014	0.09 ± 0.04	0.7 ± 0.2	0.06	0.67
2K-002	0.04 ± 0.03	0.2 ± 0.1	0.02	0.24
2K-004	2.54 ± 0.06	4.1 ± 0.2	3.98	4.9
2K-005	0.03 ± 0.03	0.2 ± 0.1	0.07	0.31
EP-SSRD60	<0.05	0.3 ± 0.1	0.03	1.74

[1]U-238 concentration inferred from Th-234 decay product.

[2]Uncertainty not reported.

[3]Uncertainty not reported.

[4]Engelhard independent laboratory results:
U-235 -- 28.94 pCi/g; U-238 -- 102.6 pCi/g.

[5]Engelhard independent laboratory results - split sample
U-235 -- 0.65 and 3.38 pCi/g; U-238 -- 3.3 and 17.9 pCi/g.

Region I FORM 304
(8/88)

U.S. NUCLEAR REGULATORY COMMISSION

SAMPLE RECORD SHEET

REGION I LABORATORY

LAB CONTROL NUMBER: 301817

ROUTINE / URGENT — DATE NEEDED

SAMPLE LOCATION: Engelhard Corp.

DATE ANALYSIS BEGAN | DATE COMPLETED | ANALYZED BY | DATE

COLLECTED BY: M. Roberts | DIVISION: DNMS | PHONE: 5094

CONTACT NOTIFIED | DATE | APPROVED BY: TDL | DATE: 9-11-96

SAMPLE NO.	SAMPLE DATE	SAMPLE HOUR	SAMPLE DESCRIPTION	ANALYZE FOR	INSTRUMENT USED	QUANTITY USED	DATE COUNTED	COUNT TIME	GROSS COUNT	BACK-GROUND	NET COUNT	Radionuclide	RESULT ±1σ * uCi/g
BKGD	7/24	1200	SOIL	γ spec	#1	946.8 g	8/20	60,000s				Pa-234m	(7±3)E-7
												Th-234	(2.5±1.0)E-7
												Ac-228	(5.28±0.16)E-7
												U-235	<5E-8

*Random uncertainties reported are 1 standard deviation, 1σ. small negative and other results ≤2σ are interpreted as including "zero" or as not detected. If appropriate, estimates of possible systematic errors are reported in parentheses.

(pink) 2. INSPECTOR

Region I FORM 304 (8/88)

U.S. NUCLEAR REGULATORY COMMISSION

SAMPLE RECORD SHEET

REGION I LABORATORY

LAB CONTROL NUMBER: 301817

ROUTINE / URGENT — DATE NEEDED:

SAMPLE LOCATION: Ennelbard (PLAINVILLE, MA SITE)

DATE ANALYSIS BEGAN: 08/19/96 — DATE COMPLETED: 08/21/96

ANALYZED BY: E. Santiago-Pagan — DATE: 08/22/96

COLLECTED BY: M. Roberts — DIVISION: DNMS — PHONE: 5094

CONTACT NOTIFIED — DATE:

APPROVED BY: TOK. — DATE: 9-5-96

SAMPLE NO.	SAMPLE DATE	SAMPLE HOUR	SAMPLE DESCRIPTION	ANALYZE FOR	INSTRUMENT USED	QUANTITY USED	DATE COUNTED	COUNT TIME	GROSS COUNT	BACK GROUND	NET COUNT		RESULT ±1σ* (uCi/g) DRY WT.
1	7/24	12:00	Soil 2D-002	Y SPEC		1034.5 g	8/19	10,000 s			.13	U-235	(6 ± 3) E-8
											1.73	Pa-234M	(1.27 ± 0.14) E-6
												Th-234	(3.6 ± 0.9) E-6
2	7/15	2:00	Soil 2H-001	Y SPEC	#1	991.9 g	8/19	6,000 s			24.6	U-235	(2.169 ± 0.015) E-5
											1.01	Pa-234M	(1.20 ± 0.03) E-4
												Th-234	(7.75 ± 0.14) E-5
3	7/15	2:00	Soil 2H-003	Y SPEC	#1	1148.6 g	8/19	0,000 s			.03	U-235	< 5 E-8
											.36	Pa-234M	(1.4 ± 0.6) E-6
												Th-234	(6 ± 3) E-7
4	7/	2:00	Soil 2H-006	Y SPEC	#1	998.3 g	8/20	0,000 s			4.5	U-235	(3.50 ± 0.09) E-6
											31.6	Pa-234M	(2.62 ± 0.16) E-5
												Th-234	(1.86 ± 0.06) E-5
5	7/15	12:00	Soil 2H-010	Y SPEC	2	1023.5 g	8/20	10,000 s			.04	U-235	< 5 E-8
											.71	Pa-234M	< 8 E-7
												Th-234	(1.9 ± 1.2) E-7
6	7/	12:00	Soil 2H-014	Y SPEC	#1	1074.5 g	8/20	0,000 s			.06	U-235	(9 ± 4) E-8
											.67	Pa-234M	< 8 E-7

*Random uncertainties reported are 1 standard deviation, 1σ. small negative and other results ≤ 2σ are interpreted as including "zero" or as not detected. If appropriate, estimates of possible systematic errors are reported in parentheses.

(pink) 2. INSPECTOR

Region I FORM 304 (8/88)

U.S. NUCLEAR REGULATORY COMMISSION

SAMPLE RECORD SHEET
REGION I LABORATORY

LAB CONTROL NUMBER: 301817

ROUTINE / URGENT — DATE NEEDED

SAMPLE LOCATION: Engelhard (PLAINVILLE, MA SITE)

DATE ANALYSIS BEGAN: 08/19/96

DATE COMPLETED: 08/21/96

ANALYZED BY: C. Santiago-Pagán DATE: 08/22/96

COLLECTED BY: M. Roberts DIVISION: DNMS PHONE: -5094

CONTACT NOTIFIED — DATE

APPROVED BY — DATE

SAMPLE NO.	SAMPLE DATE	SAMPLE HOUR	SAMPLE DESCRIPTION	ANALYZE FOR	INSTRUMENT USED	QUANTITY USED	DATE COUNTED	COUNT TIME	GROSS COUNT	BACKGROUND	NET COUNT		RESULT ± TU (uCi/g)
6	7/15	12:00	Soil	SPEC	#1	1074.5 g	8/20	10,000 s				Th-234	(7 ± 2) E-7
7	7/24	12:00	Soil 24.00	SPEC	#2	993.5 g	8/20	10,000 s			.02	U-235	(4 ± 3) E-8
											.24	Ra-226/M	< 8E-7
												Th-234	(1.8 ± 0.9) E-7
8	7/15	12:00	Soil 24.00	SPEC		1038.2 g	8/20	10,000 s			3.98	U-235	(2.54 ± 0.06) E-6
			24.00								4.9	Pa-234M	(6.4 ± 0.9) E-6
												Th-234	(4.09 ± 0.19) E-6
9	7/24	12:00	Soil 24.00	SPEC	#2	1019.7 g	8/21	10,000 s			.07	U-235	(3 ± 3) E-8
			pH 5.03									Ra-226/M	< 8E-7
												Th-234	(1.9 ± 1.0) E-7
			7.00										

*Random uncertainties reported are 1 standard deviation, 1σ. small negative and other results ≤ 2σ are interpreted as including "zero," or as not detected. If appropriate, estimates of possible systematic errors are reported in parentheses.

(pink) 2 2. INSPECTOR

Region I FORM 303 (8-88)

U.S. NUCLEAR REGULATORY COMMISSION

REQUEST FOR ANALYSIS

Region I Laboratory

LABORATORY USE ONLY

CONTROL NUMBER: 301817

SAMPLE LOCATION (LICENSEE): INGLEHARD CORPORATION

LICENSE NO.: 29

DOCKET NO.: (Alpha) 070-0013

SAMPLES SUBMITTED

#(TOTAL)	TYPE	VOLUME	WEIGHT
10	SOIL	1 LITER	VARIOUS

DATE SAMPLES SUBMITTED: 8-2-96

PRIORITY: [X] ROUTINE [ ] URGENT ***

SAMPLE COLLECTION INTERVAL

	MONTH	DAY	YEAR	TIME
START	8	1	96	X
STOP	8	1	96	X

INSPECTOR RESPONSIBLE: MARK ROBERTS

PHONE EXT: 5094

	ANALYSIS TO BE PERFORMED	LIST DESIRED LLD (Optional)		OTHER TYPE OF ANALYSIS (Specify)	LIST DESIRED LLD (Optional)
	GROSS ALPHA				
	GROSS BETA				
X	GAMMA SPEC	U-235 U-238			
	TRITIUM				
	CARBON-14				
	IODINE-125				

REMARKS: SAMPLES ALREADY IN MARINELLI BEAKERS

M. ROBERTS WILL GET SAMPLE WEIGHTS

NOTE: Samples will be discarded after analysis unless reasons are noted above in Remarks.

*** **FOR URGENT USE ONLY**— Signature Blocks below must be filled out by the Inspector's appropriate Section Chief and by the Chief, Effluents Radiation Protection Section BEFORE submitting this form to the Region I Laboratory.

SIGNATURE — APPROPRIATE NUCLEAR MATERIALS SAFETY SECTION CHIEF | DATE

SIGNATURE — CHIEF, EFFLUENTS RADIATION PROTECTION SECTION | DATE

(pink) 2. INSPECTOR

JUL 26 1994

License No. SNM-185 (Retired) Docket No. 070-00139

MEMORANDUM TO FILE: Englehard Corporation
Route 152
Plainville, Massachusetts

FROM: 7/20/94
Mark C. Roberts, Senior Health Physicist
Site Decommissioning Section
Division of Radiation Safety & Safeguards, Region I

SUBJECT: VISIT TO ENGLEHARD CORPORATION SITE IN PLAINVILLE, MASSACHUSETTS

Background

The D.E. Makepeace Division of Englehard Corporation, located in Plainville, Massachusetts, was previously licensed by the Atomic Energy Commission (AEC) to use enriched uranium for the fabrication of nuclear fuel elements. Licensed operations were conducted from the late 1950's through the early 1960's. Following the review of the licensee's radiological surveys of the facility, the AEC terminated the license and released the facility for unrestricted use. The Environmental Protection Agency (EPA) notified the NRC in late 1991 that radioactive contamination had been found in outdoor locations of the Plainville plant during a RCRA (Resource Conservation Recovery Act) hazardous waste characterization. The site is listed on the NRC Site Decommissioning Management Plan (SDMP). The NRC Project Manager is Jack Parrott.

Englehard has submitted characterization data and a remediation plan for the facility and is in the process of selecting a contractor for the remediation of the outside areas. The plan is under review by the NRC Project Manager. Remediation activities are expected to commence during the summer of 1994 following completion of contractor selection and review of the remediation plans.

Discussion and Observations

John D. Kinneman and Mark C. Roberts of Region I visited the Englehard site on May 9, 1994 and met with Donald Chabot, Senior Environmental Engineer and Englehard's Project Manager for the remediation of the site. Mr. Chabot briefed the Region I representatives on the proposed remediation actions and the anticipated time-frame for implementation. Following the discussions, Mr. Chabot conducted the Region I representatives on a tour of the site.

Licensed radioactive materials were used in Buildings 1 and 2, located at the southeast corner of the site. Although surveys and remediation were conducted at the time the license was terminated, there are areas inside the buildings, primarily former floor drain areas, that require

characterization. The site of the former incinerator and the leach field of the former septic system will also be the subject of further characterization, and remediation, if necessary.

Mr. Chabot stated that additional characterization and likely remediation would be required for EPA regulated hazardous wastes on the site (organic solvents and cadmium). There is the possibility that mixed waste (RCRA hazardous and radioactive wastes) will be generated during the remediation activities.

Englehard will send Region I a copy of the characterization and remediation plans. Mr. Chabot also stated that Englehard will include Region I on the distribution list for future documents and correspondence related to the remediation of the site. Mr. Chabot pointed out that the site is a Massachusetts Public Involvement Site and public meetings will be scheduled to discuss the site remediation.

Other Issues

The review of previously terminated licenses by Oak Ridge National Laboratory identified License No. SUB-172 (Docket No. 040-00768) as requiring additional review. Review of the file for that license indicates an Englehard Corporation site in nearby Attleboro, Massachusetts as an authorized place of use for depleted uranium. Mr. Chabot had no knowledge of the use of radioactive materials at the Attleboro location. He stated that he believed that the Attleboro location was the company's mailing address and corporate offices and that all use of licensed material was at the Plainville location.

Region I will track the review and implementation of the remediation plan and assure that appropriate inspections are scheduled and performed.

cc:
J. Joyner, RI
J. Austin, NMSS
J. Parrott, NMSS
Docket File License No. SUB-172

FOSTER WHEELER ENVIRONMENTAL CORPORATION

August 5, 1996

Mark C. Roberts, CHP
Senior Health Physicist
Nuclear Regulatory Commission, Region 1
475 Allendale Road
King of Prussia, PA 19406

SUBJECT: TRANSMITTING SOIL SAMPLE LOCATIONS AND ANALYSIS DATA FROM THE ENGELHARD PLAINVILLE, MA SITE FOR ANALYSIS

Dear Mr. Roberts:

Enclosed are maps depicting soil sample locations and a table presenting soil sample analysis results. These results are for the ten soil samples sent to you by way of Federal Express on August 1, 1996.

If you have any questions, please feel free to contact me at the Engelhard Project site, 508/643-1061.

Sincerely,

James Mayberry, CHP
Project Radiation Safety Officer

cc: S. Graham
D. Chabot
B. Berlin
File 1.2

Soil Sample Results
Engelhard Plainville MA Site
Interior Radiological Decontamination

Soil Sample Number	Sample Weights, g	Hilbert Associates Results			IEA Results	
		U-235, pCi/g	U-238, pCi/g	U-234, pCi/g[a]	U-235, pCi/g	U-238, pCi/g
2D-002	1034.5	0.13	1.73	2.66	ND[c]	ND[c]
2H-001	991.9	24.63	101.05	517.32	28.94	102.6
2H-003	1148.6	0.03	0.36	0.63	ND[c]	ND[c]
2H-006	998.3	4.5	31.06	94.52	0.65; 3.38[d,e]	3.3; 17.9[d,e]
2H-010	1023.5	0.04	0.71	0.82	ND[c]	ND[c]
2H-014	1074.5	0.06	0.67	1.24	ND[c]	ND[c]
2K-002	993.5	0.02	0.24	0.43	ND[c]	ND[c]
2K-004	1038.2	3.98	4.9	83.5	ND[c]	ND[c]
2K-005	1019.7	0.07	0.31	1.37	ND[c]	ND[c]
EP-SSRD60[b]	f	0.03	1.74	0.8	ND[c]	ND[c]

a. Calculated value. U-234 concentrations equal 21 times U-235 concentrations. For EP-SSRD60, the multiplier is 22 .

b. Background sample from building exterior investigations.

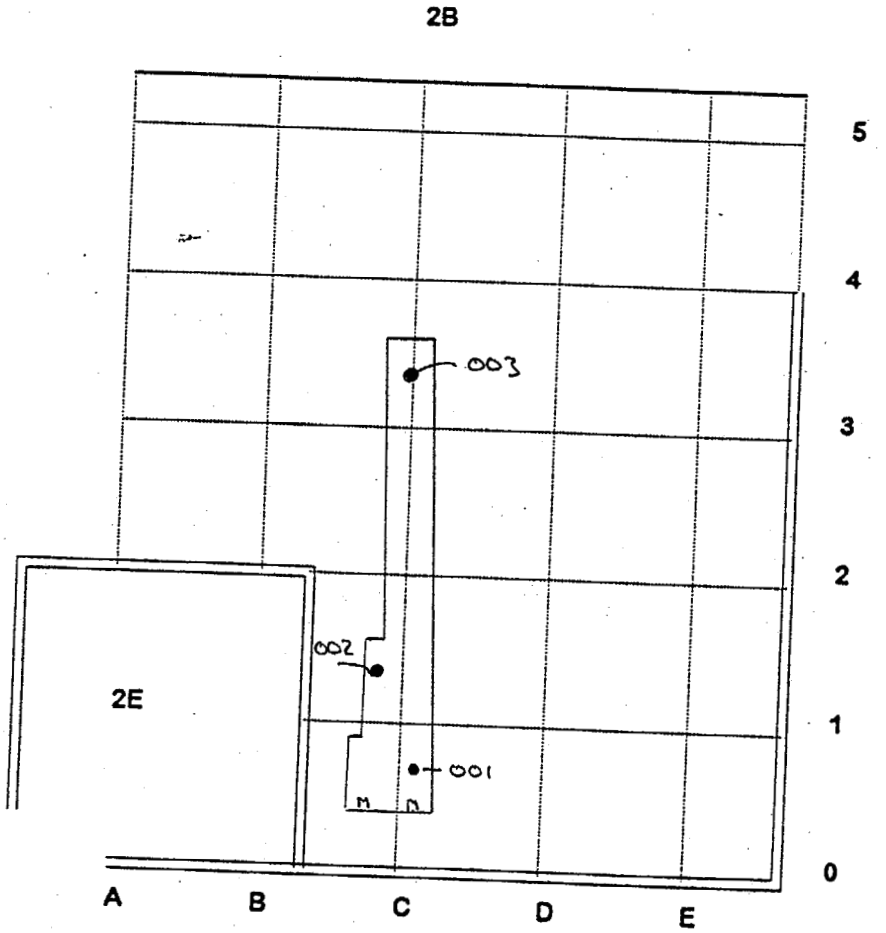
c. No Data. Analyses not performed.

d. Analyses performed on split samples 2H-001S and 2H-006S.

e. Sample duplicated at laboratory.

f. Sample weight written on cover of sample.

ENGELHARD PLANT
ROOM 2D

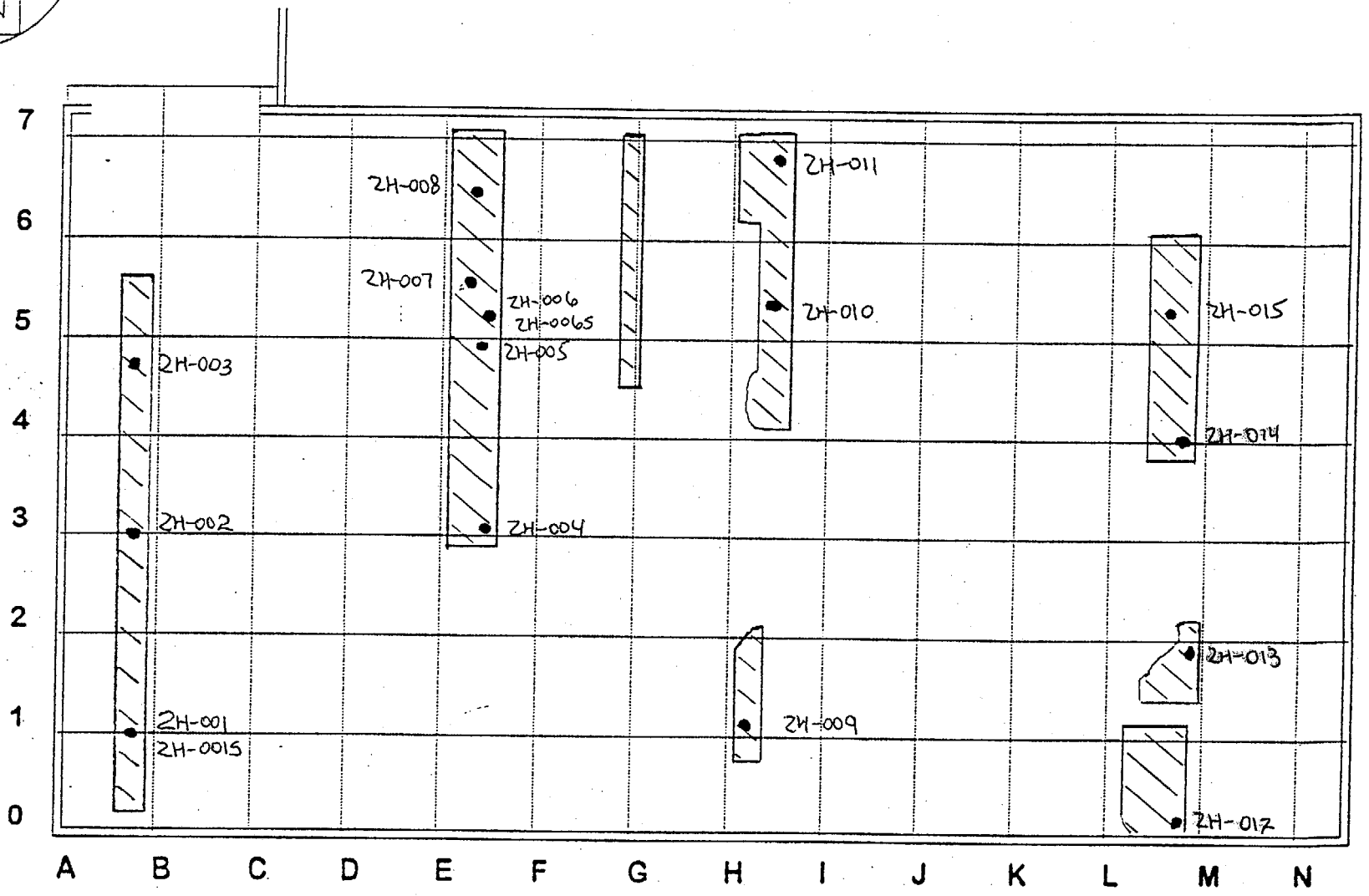


Notes:

1. Sample 002 is taken just below slab, where pipe was.
2. Samples 001, 003 are ~ 6" below slab where pipe was.

6' X 6' GRID

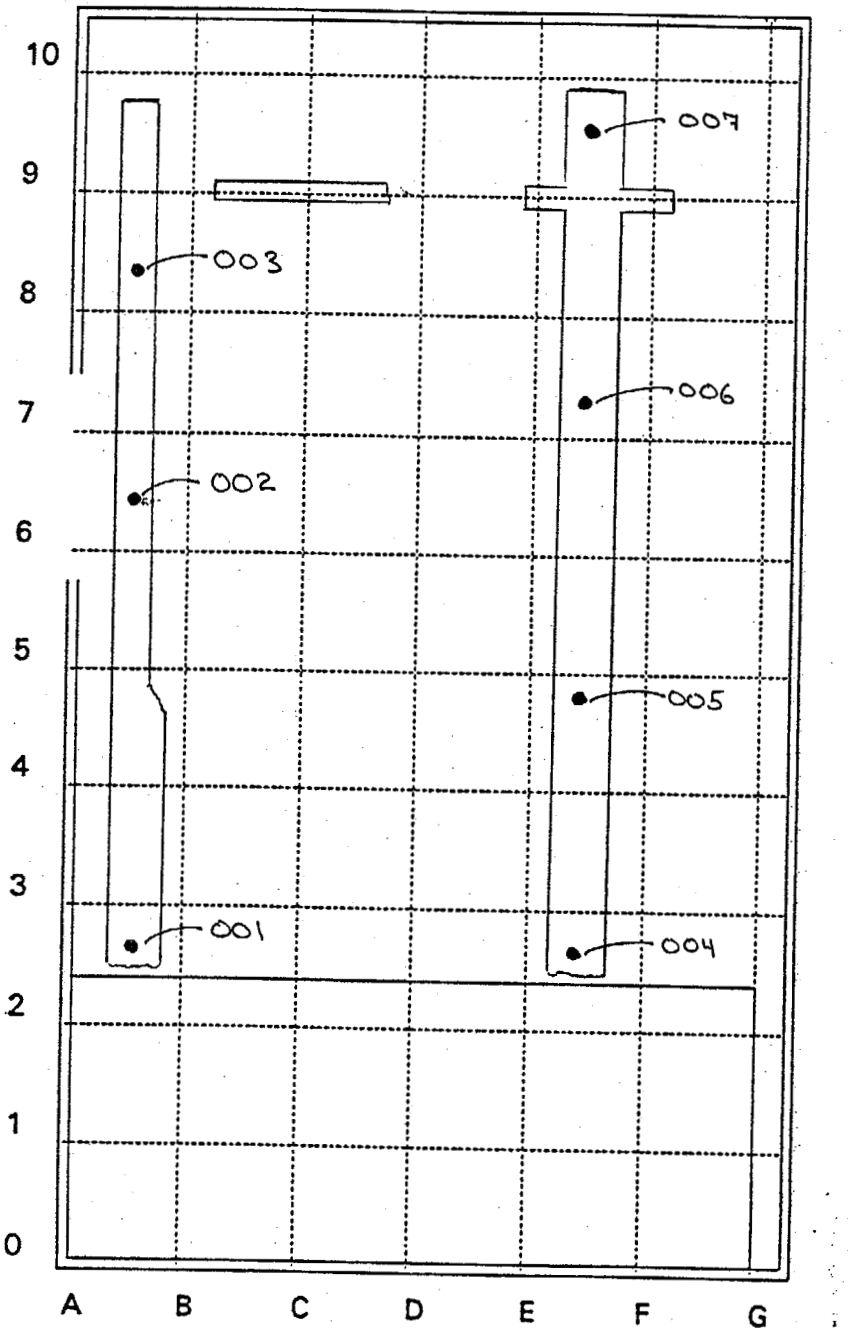
ENGELHARD PLANT
ROOM 2H



Note:

1. ⊘ the current removed concrete and piping as of 7-11-96

6' X 6' GRID



ENGELHARD PLANT
ROOM 2K

Soil Sample Locations

Note: Samples performed on 7-24-96, packaged into Manchellis.

6' X 6' GRID

FOSTER WHEELER ENVIRONMENTAL CORPORATION

August 1, 1996

Mark C. Roberts, CHP
Senior Health Physicist
Nuclear Regulatory Commission, Region 1
475 Allendale Road
King of Prussia, PA 19406

SUBJECT: TRANSMITTING SOIL SAMPLES FROM THE ENGELHARD PLAINVILLE, MA SITE FOR ANALYSIS

Dear Mr. Roberts:

Enclosed are the soil samples you requested during your visit to the Engelhard Plainville, MA site on July 31st. The samples include:

Sample ID	Grid Location
2D-002	Room 2D; B+1.5m, 1+0.5m
2H-001	Room 2H; A+1.5m, 1
2H-003	Room 2H; A+1.5m, 4+1.5m
2H-006	Room 2H; E+1m, 5+0.5m
2H-010	Room 2H; H+1m, 5+0.5m
2H-014	Room 2H; L+1.5m, 4
2K-002	Room 2K; A+1m, 6+1m
2K-004	Room 2K; E+1m, 2+1.5m
2K-005	Room 2K; E+1m, 4+1.5m
EP-SSRD60	Plant exterior

These samples have been analyzed by Hilbert Associates, Inc. Additionally, split samples of 2H-001 and 2H-006 have been analyzed by IEA, Inc. Analytical results will be transmitted to you under separate cover.

If you have any questions, please feel free to contact me at the Engelhard Project site, 508/643-1061.

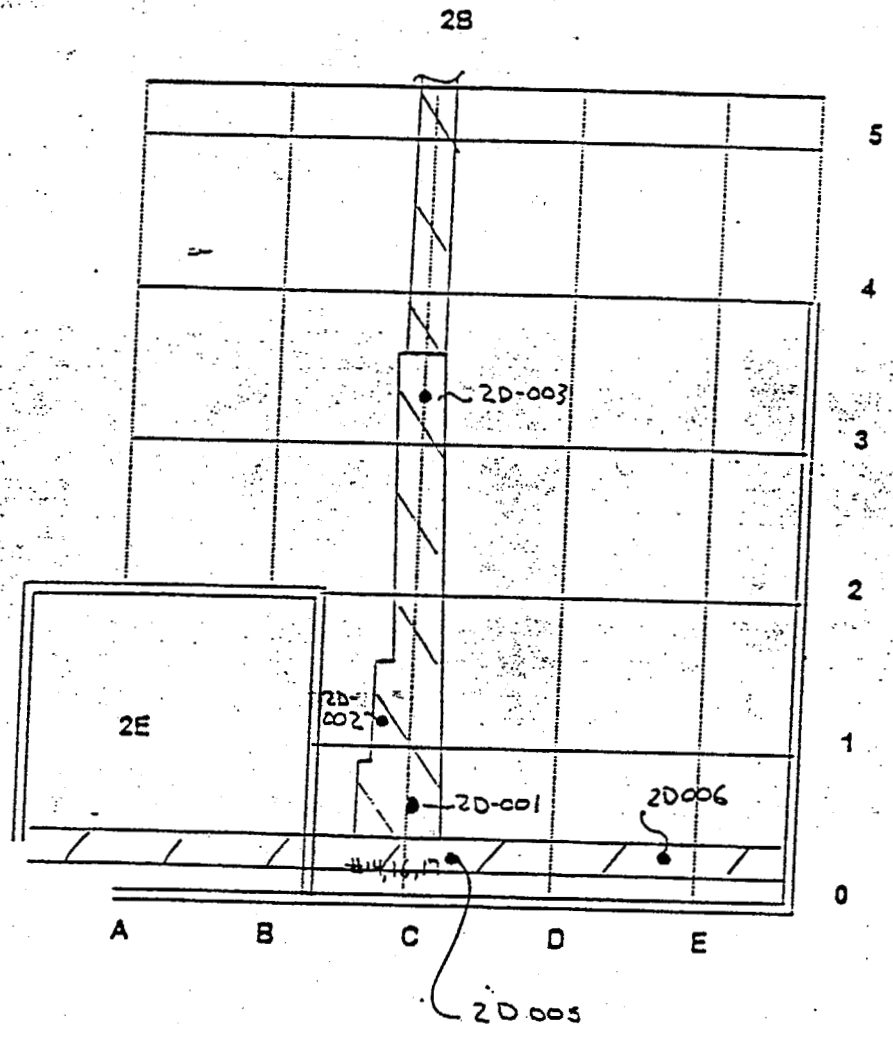
Sincerely,

James Mayberry, CHP
Project Radiation Safety Officer

cc: S. Graham
D. Chabot
B. Berlin

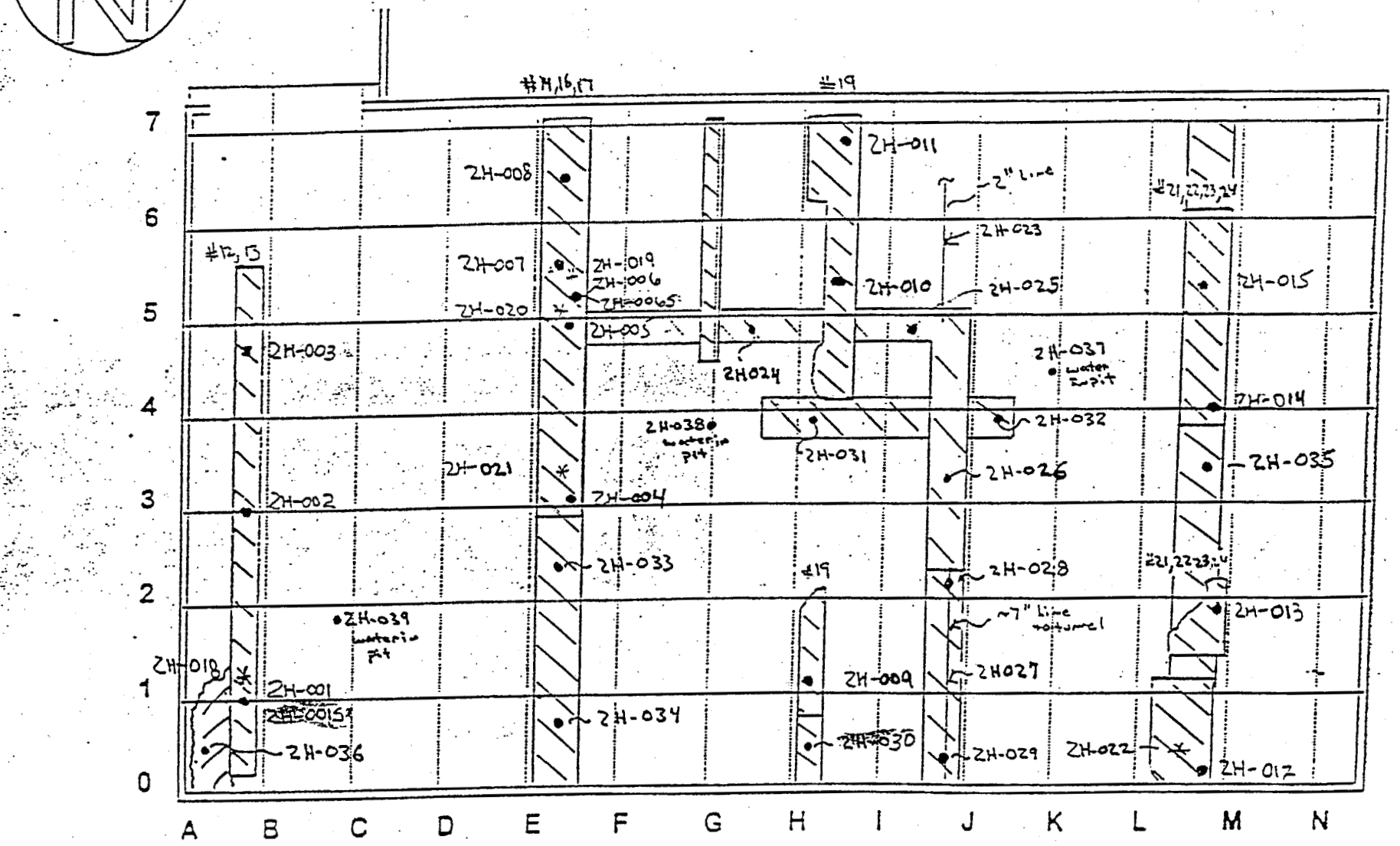
ENGELHARD PLANT
ROOM 2D

2D-004 - Dust in o/H on Light.



ENGELHARD PLANT

ROOM 2H



Note:

1. ⊘ the current removed concrete and piping as of 7-11-96
2. 2H-016 → natural gravel sample for background
   2H-017 → overhead sample

÷ 19 → pipe number

o 2H-001 → soil sample number

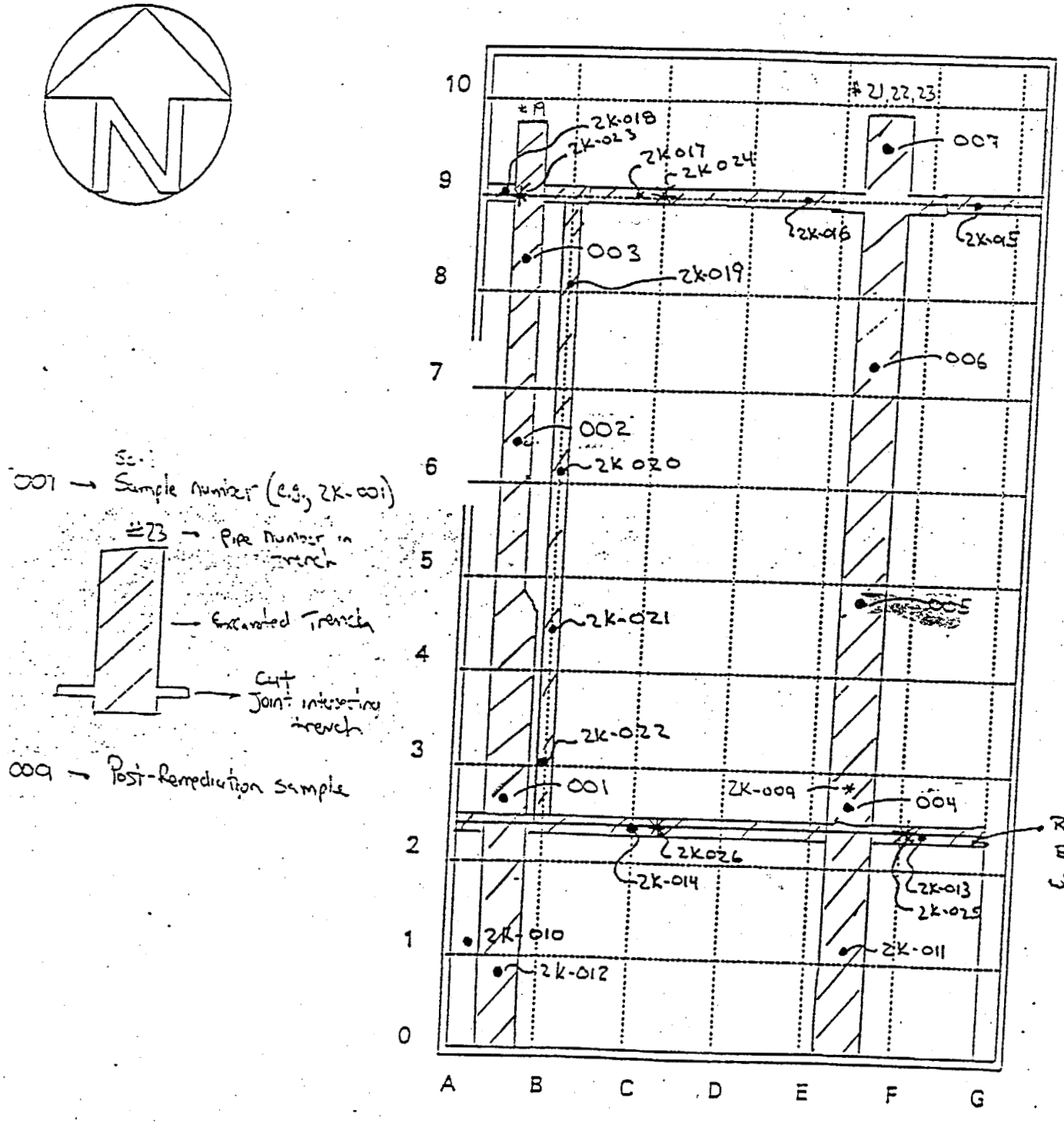
* 2H-018 → post-remediation soil sample number

ENGELHARD PLANT
ROOM 2K

Soil Sample Locations

Note: Samples performed on 7-24-96, packaged into Manwallis.

2K-008 – Overhead dust Sample
2K-010 – Soil found Beneath South Concrete pad During pipe removal

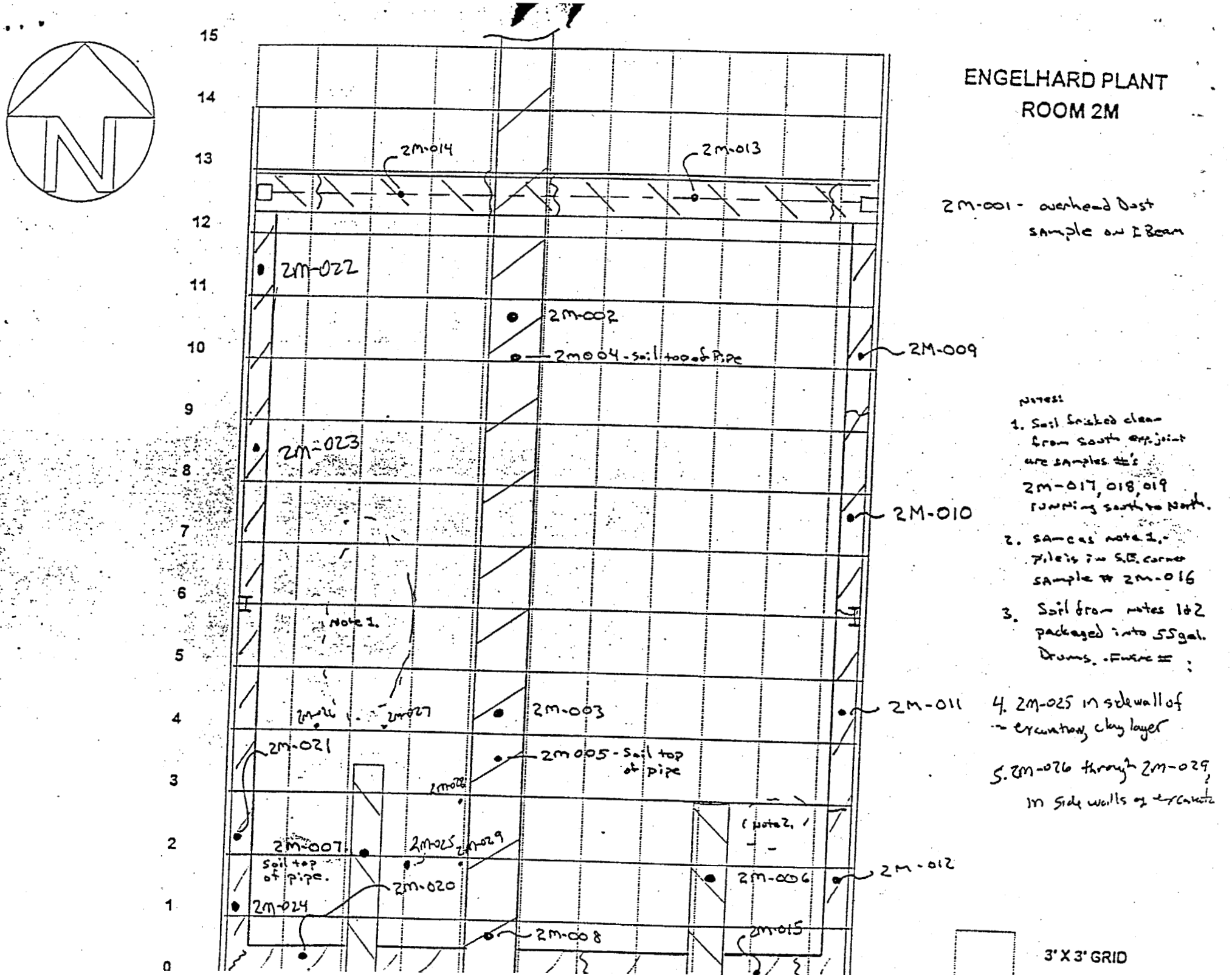


Removed 6" to 8" of Platform to access Exp. Joint or original floor surface, which was then removed.

001 → Sample number (e.g., 2K-001)

#23 → Pipe number in trench

009 → Post-Remediation sample



ENGELHARD PLANT
ROOM 2M

2M-001 - overhead Dust sample on I Beam

Notes:

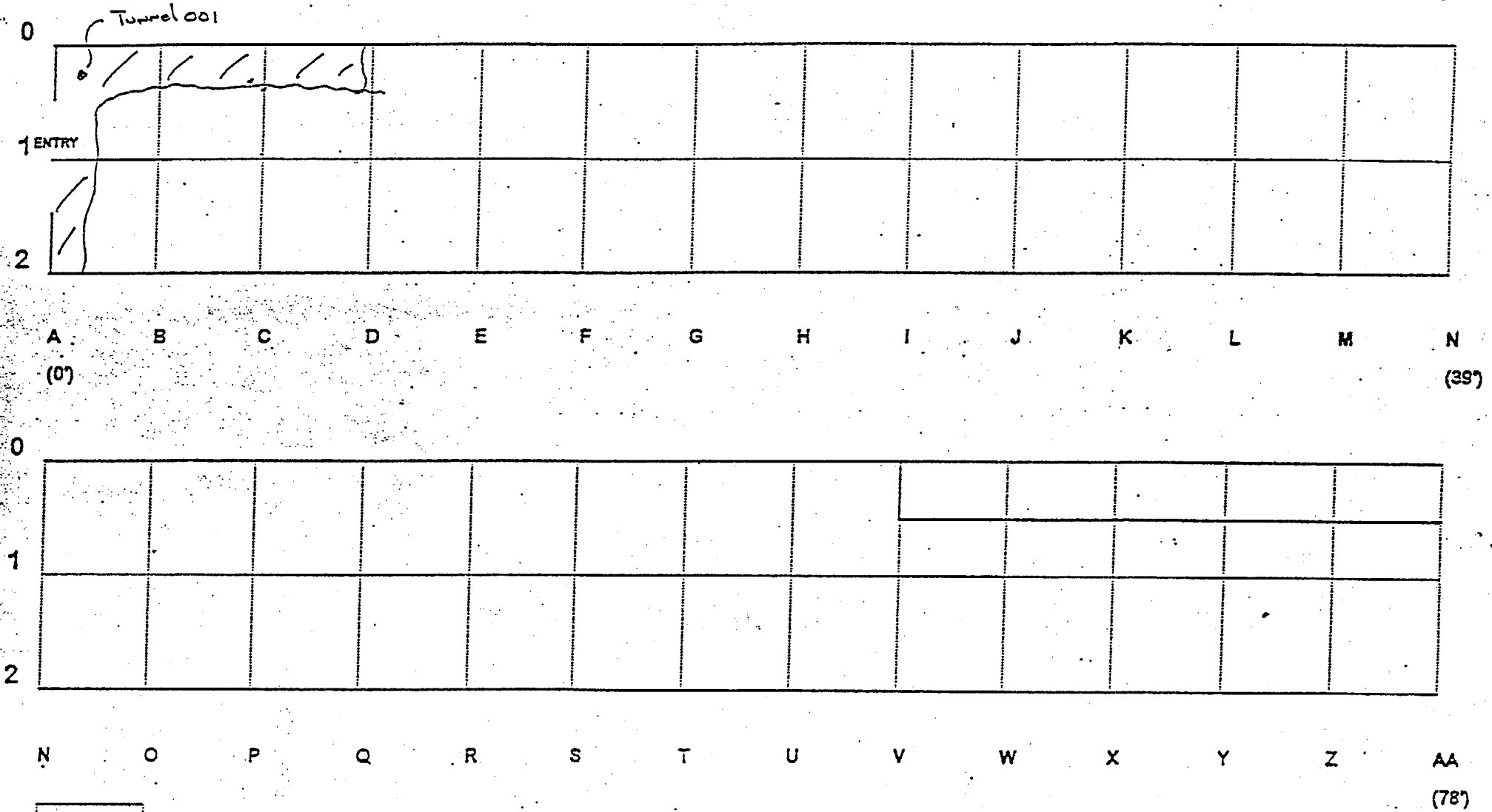
1. Soil bricked clean from South exp. joint are samples #'s 2M-017, 018, 019 running south to North.
2. Same as note 1. - File is in S.E. corner sample # 2M-016
3. Soil from notes 1 & 2 packaged into 55 gal. Drums. - Future
4. 2M-025 in sidewall of excavation, clay layer
5. 2M-026 through 2M-029 in side walls of excavate

ENGELHARD PLANT TUNNEL

Tunnel-02, along N foundation wall excavation: 302 pCi/g

Tunnel-03, @ removed pipe in ramp floor: 360 pCi/g

Tunnel-04, @ removed crack in tunnel floor: 664 pCi/g



SEP 12 1996

Docket No.: 070-00139 License No.: SNM-185 (Terminated)

James Mayberry
Project Radiation Safety Officer
Foster Wheeler Environmental Corporation
30 Taunton Street
Plainville, Massachusetts 02762

SUBJECT: RETURN OF SOIL SAMPLES FROM THE ENGELHARD CORPORATION SITE IN PLAINVILLE, MASSACHUSETTS

Dear Mr. Mayberry:

In accordance with our telephone conversation of September 11, 1996, the NRC is returning soil samples obtained from the Engelhard Corporation site in Plainville, Massachusetts. The samples were sent to our office following the July 30-31 NRC inspection (NRC Inspection No. 070-00139/96-002) at our request. We have analyzed the samples and will report the results in the inspection report for this inspection.

Should you have any further questions you can contact me at (610) 337-5094. Your cooperation with us is appreciated.

Sincerely,

ORIGINAL SIGNED BY:

Mark C. Roberts, CHP
Senior Health Physicist
Decommissioning and Laboratory Branch
Division of Nuclear Materials Safety

Docket No.: 070-00139

License No.: SNM-185 (Retired)

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OFFICIAL RECORD COPY

ENSERCH ENVIRONMENTAL CORPORATION

Interoffice Correspondence

TO L. Skoski DATE Sept. 15, 1994

FROM G. Markt GM

SUBJECT **ENGLEHARD GPR SURVEY**

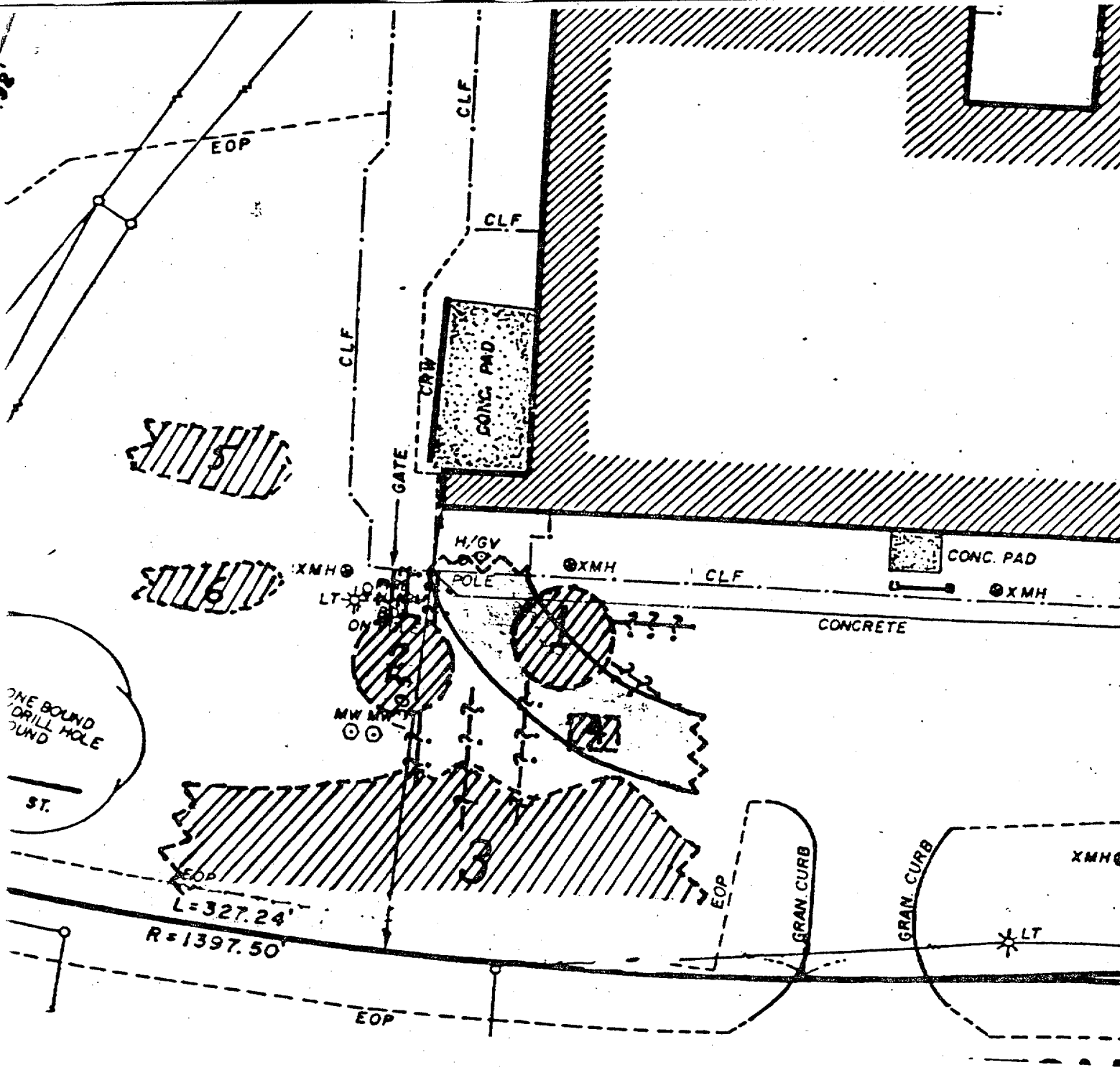
Further interpretation of GPR data collected at the Englehard Site was conducted in an effort to better define anomalous areas of the site previously identified in my memorandum to your attention dated August 15, 1994. Data collected with the 450 Mhz transducer offered higher resolution of subsurface features than the other transducers used at the site. These data were, therefore, selected for further enhancement and examination and were initially corrected for low frequency electronic noise and DC offset. Select data were then low pass filtered at 70% of the Nyquist Frequency and high pass filtered at 20% of the Nyquist Frequency. Data were then re-plotted and presented in Appendix A using an exponential gain function in grey scale with a threshold setting so as to display highly reflected energy in color.

Re-examination of these enhanced data reveal the potential on-site existence of a shallow reflective subsurface zone, four medium to deep reflective subsurface zones and eight subsurface pipes (Figure 1). GPR data collected over the shallow reflective zone may be indicative of a former road traversing the survey area and may be consistent with a thickening of surface pavement in this area. Medium to deep reflective zones 1 and 2 may potentially correspond to subsurface septic tanks. The actual boundaries for these zones remain somewhat vague, however, and boundaries depicted in Figure 1 represent the most likely areas of the subsurface septic tanks based upon analyses of these data. The potential for the existence of a subsurface septic tank existing beneath zone #1 is higher than that beneath zone #2. Reflective zone #3 may correspond to an area of anomalous soil conditions, possibly related to the existence of a leaching field.

As previously mentioned in a memorandum to your attention dated August 15, 1994, electromagnetic contrast between subsurface features of interest and ambient geologic media is subtle, at best, and further ground truthing of these data is warranted.

cc: Steve Graham
Project File

memo915



Legend:

Shallow reflective zone

Medium to deep reflective zone

Suspected pipe

N

Scale: 1" = 40 feet

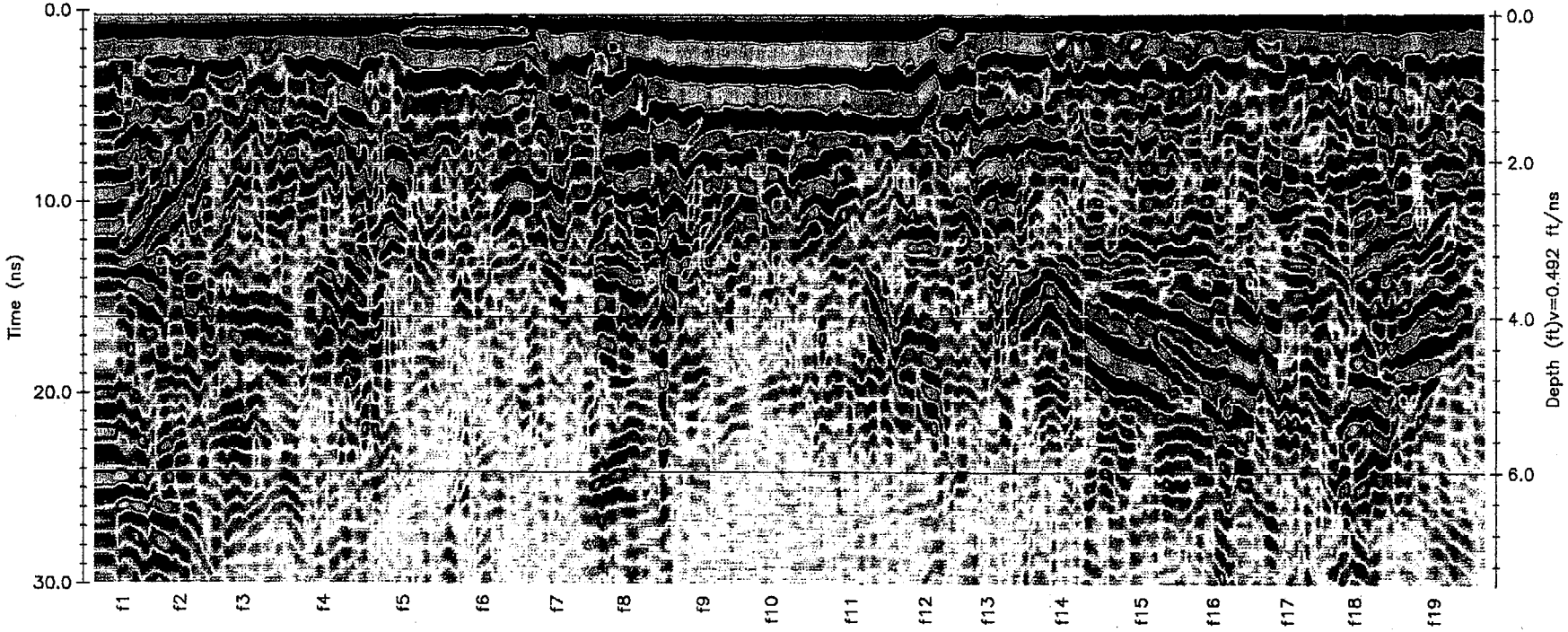
Figure 1: Site map displaying interpretation of GPR data collected.

APPENDIX A

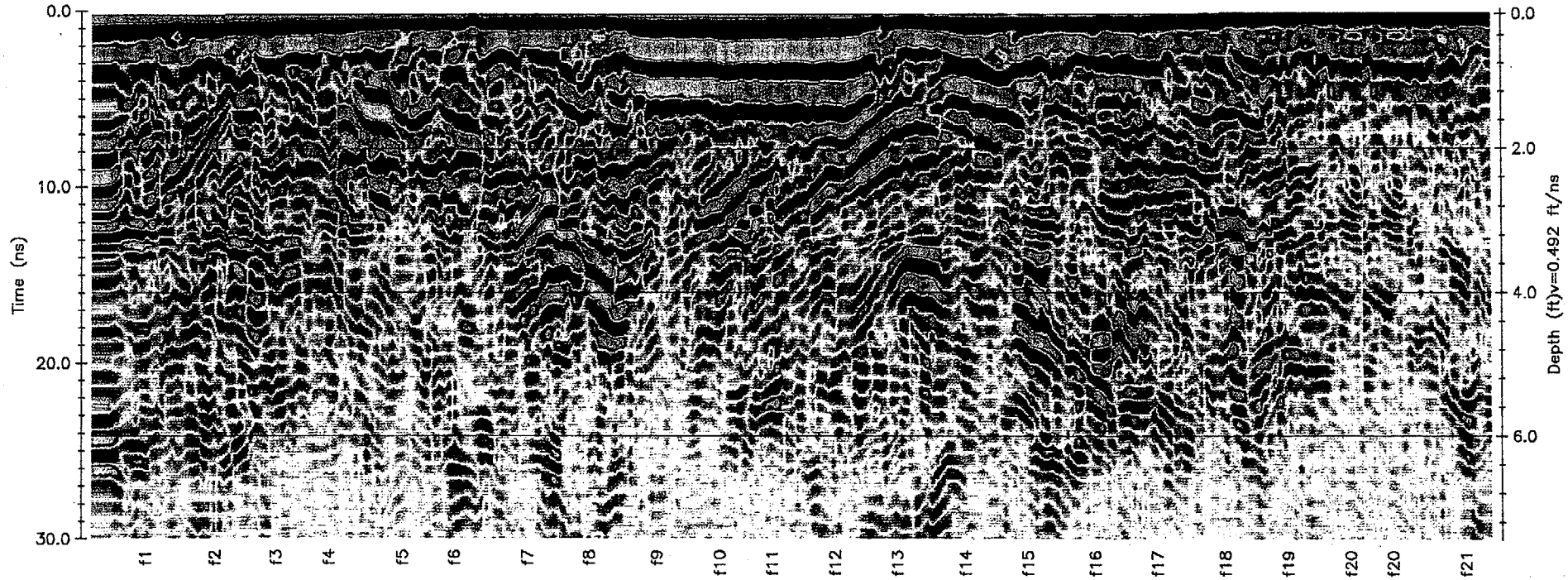
PROCESSED GPR

DATA ACQUIRED WITH 450 Mhz TRANSDUCER

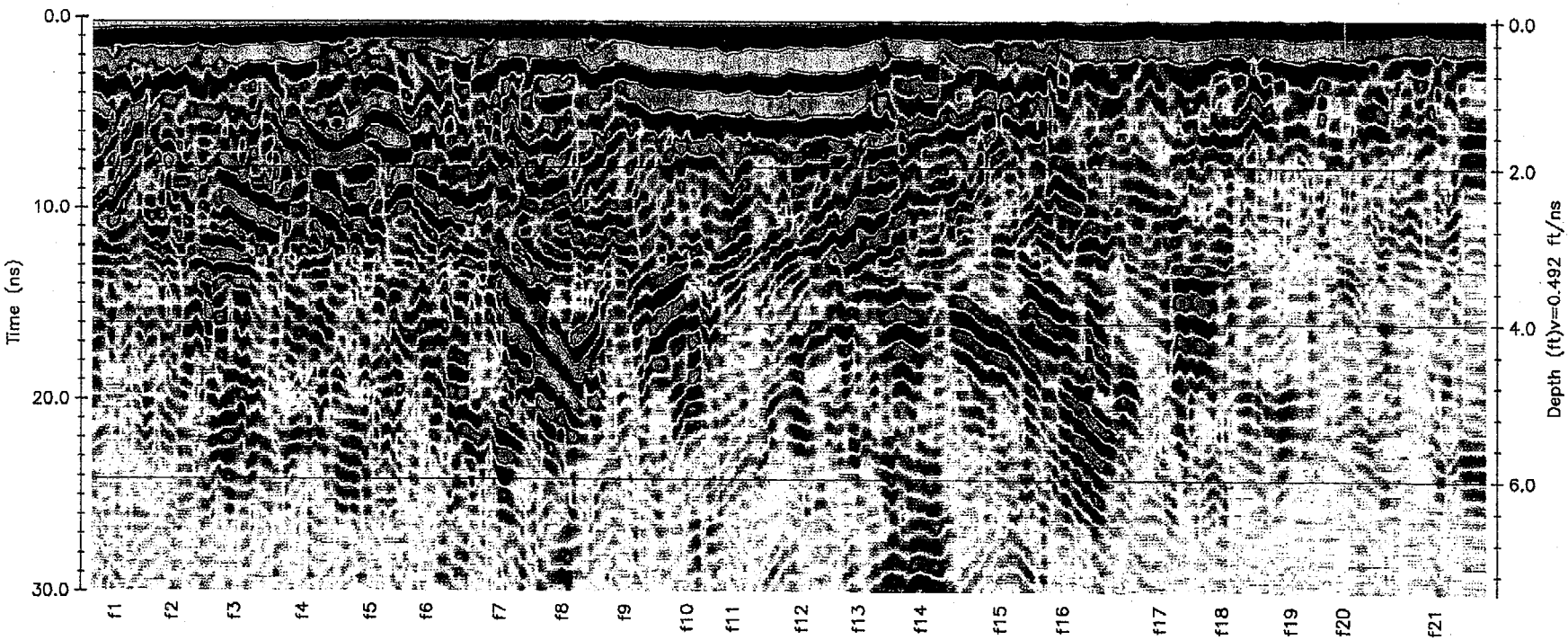
Scan EN2 Taken along LINE 2 w/ 450 mHz Transducer.
DC Shifted, Low Pass Filtered @ 70% of Nyquist Frequency
and High Pass Filtered @ 20 % of Nyquist Frequency.
Highly reflective areas appear in color.



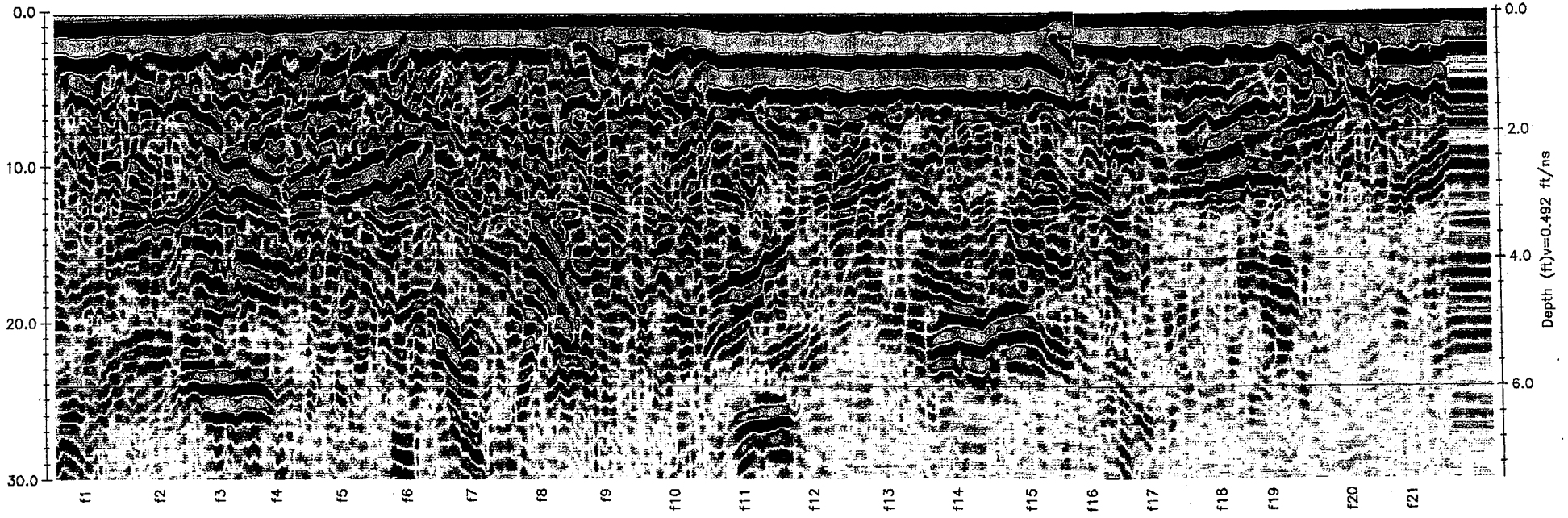
Scan EN3 Taken along LINE 3 w/ 450 mHz Transducer.
DC Shifted, Low Pass Filtered @ 70% of Nyquist Frequency
and High Pass Filtered @ 20 % of Nyquist Frequency.
Highly reflective areas appear in color.



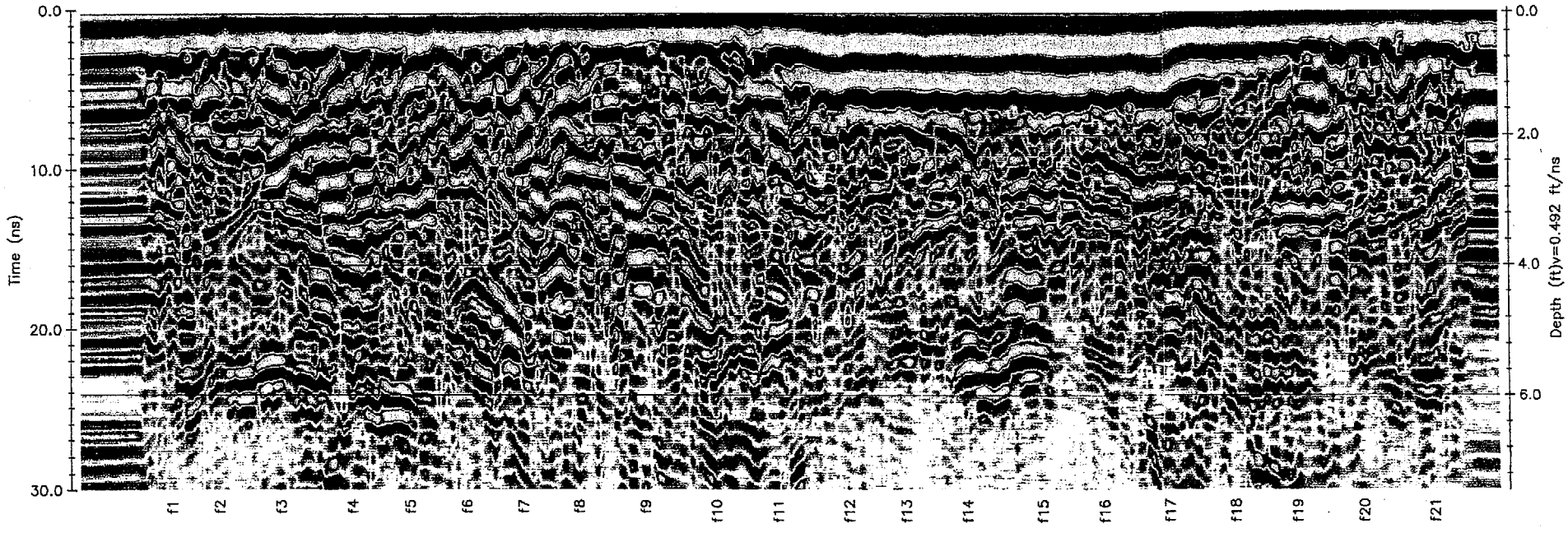
Scan EN4 Taken along LINE 4 w/ 450 mHz Transducer.
DC Shifted, Low Pass Filtered @ 70% of Nyquist Frequency
and High Pass Filtered @ 20 % of Nyquist Frequency.
Highly reflective areas appear in color.



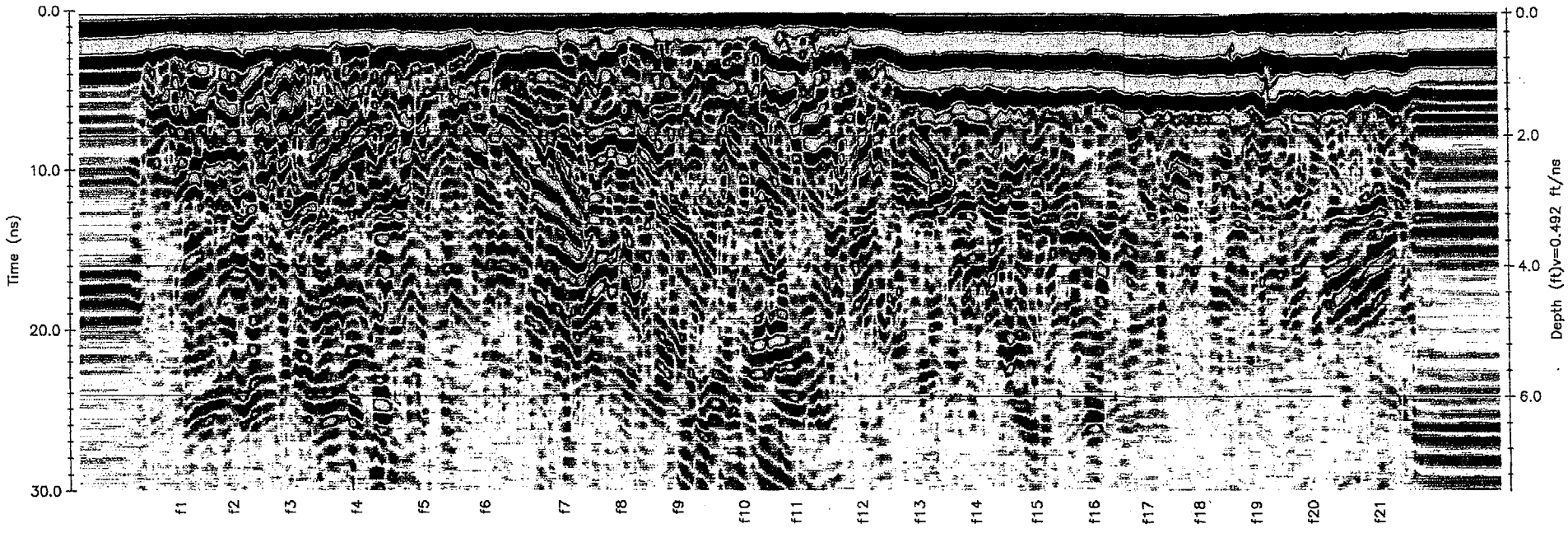
Scan EN6 Taken along LINE 6 w/ 450 mHz Transducer.
DC Shifted, Low Pass Filtered @ 70% of Nyquist Frequency
and High Pass Filtered @ 20 % of Nyquist Frequency.
Highly reflective areas appear in color.



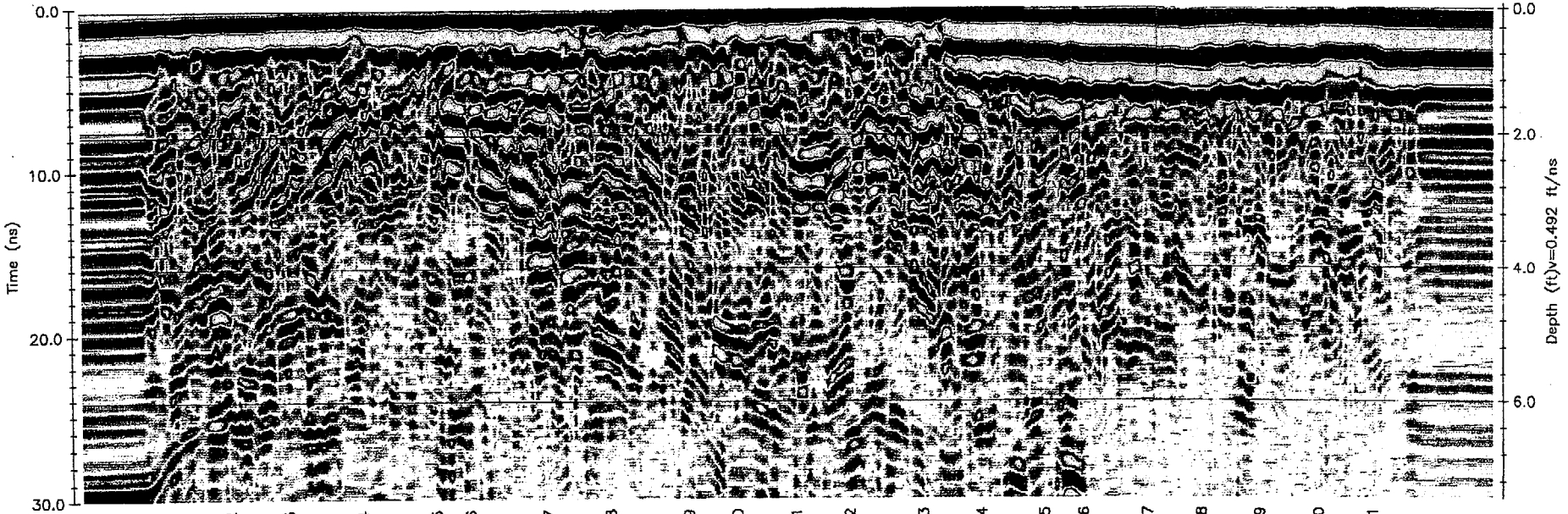
Scan EN8 Taken along LINE 8 w/ 450 mHz Transducer.
DC Shifted, Low Pass Filtered @ 70% of Nyquist Frequency
and High Pass Filtered @ 20 % of Nyquist Frequency.
Highly reflective areas appear in color.



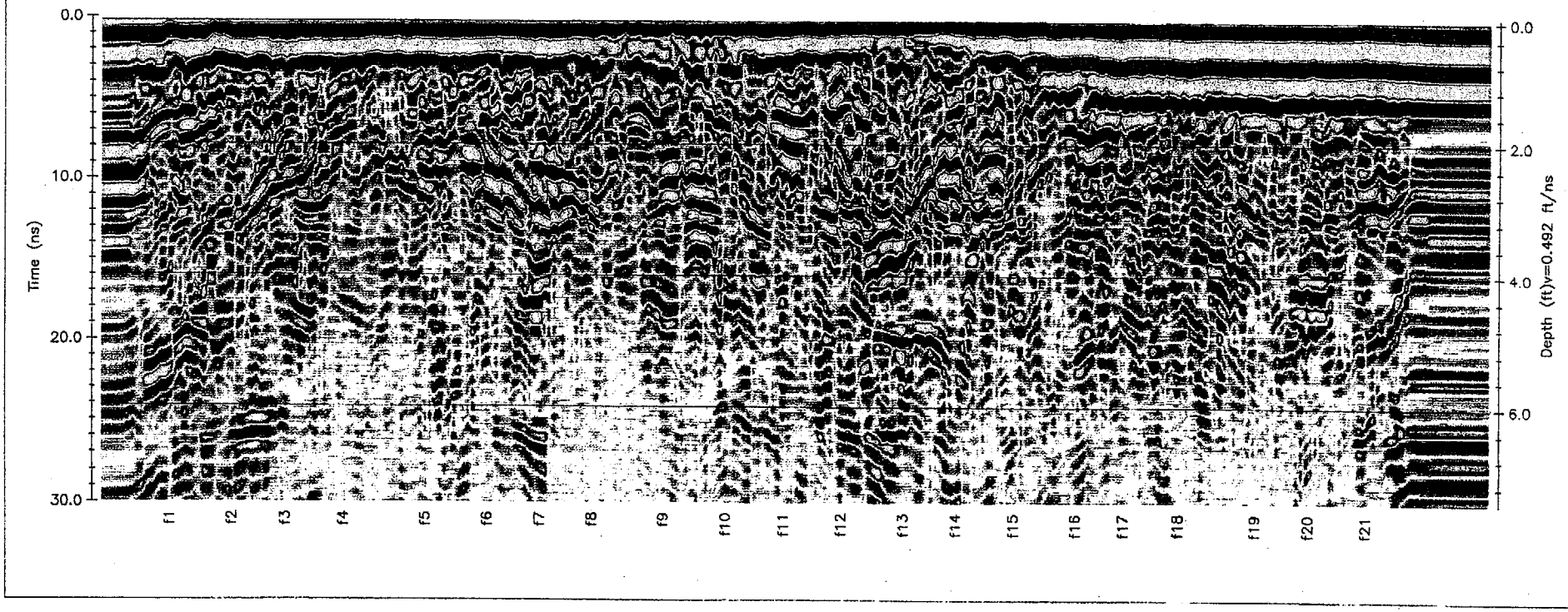
Scan EN9 Taken along LINE 9 w/ 450 mHz Transducer.
DC Shifted, Low Pass Filtered @ 70% of Nyquist Frequency
and High Pass Filtered @ 20 % of Nyquist Frequency.
Highly reflective areas appear in color.



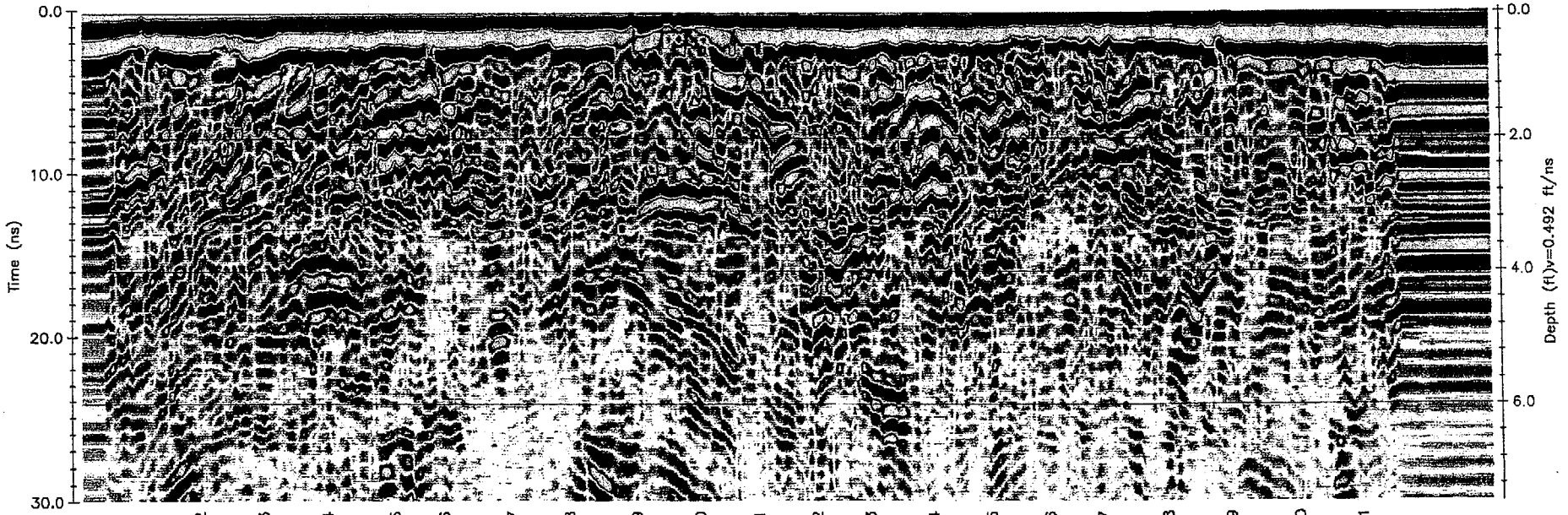
Scan EN10 Taken along LINE 10 w/ 450 mHz Transducer.
DC Shifted, Low Pass Filtered @ 70% of Nyquist Frequency
and High Pass Filtered @ 20 % of Nyquist Frequency.
Highly reflective areas appear in color.



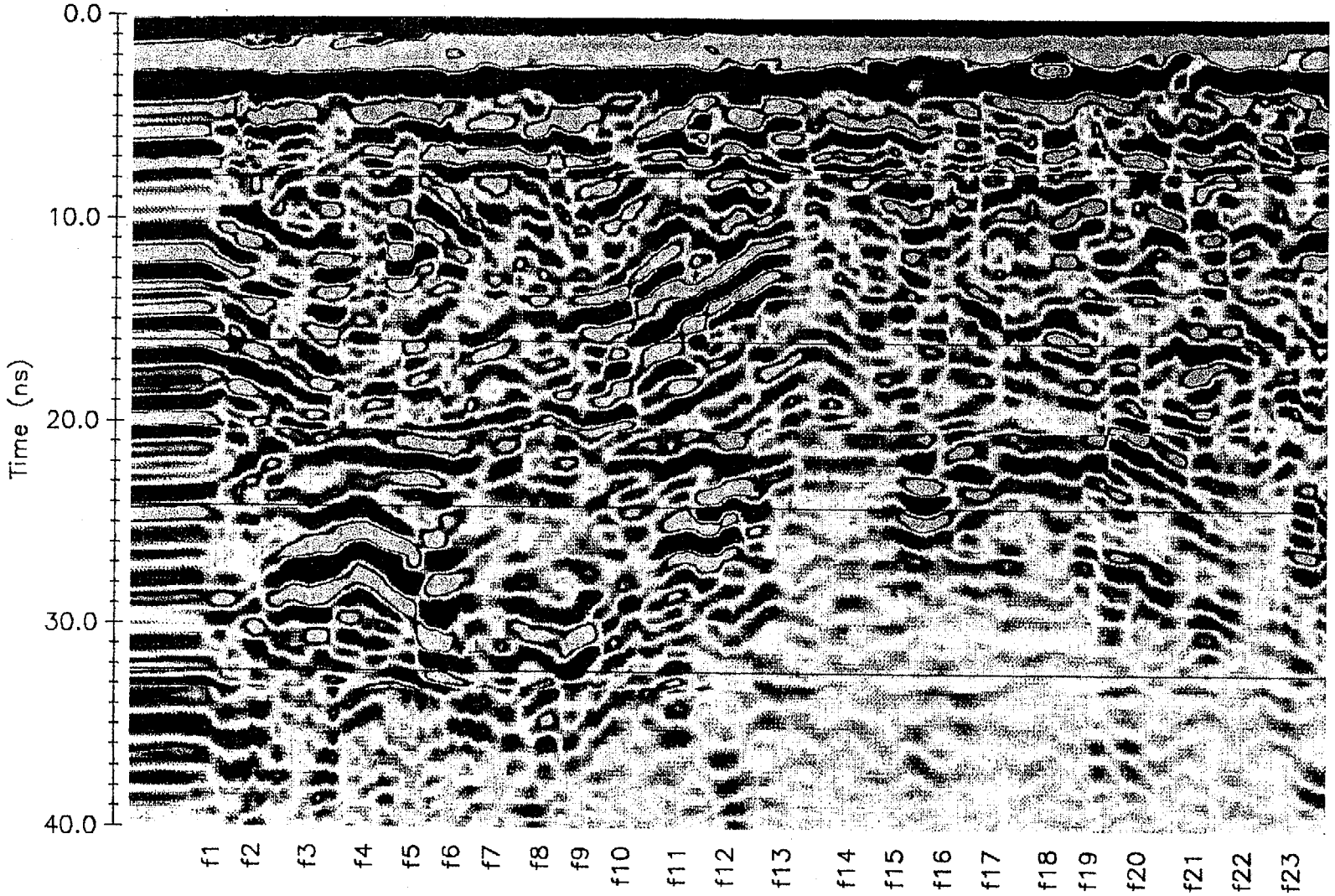
Scan EN11 Taken along LINE 11 w/ 450 mHz Transducer.
DC Shifted, Low Pass Filtered @ 70% of Nyquist Frequency
and High Pass Filtered @ 20 % of Nyquist Frequency.
Highly reflective areas appear in color.



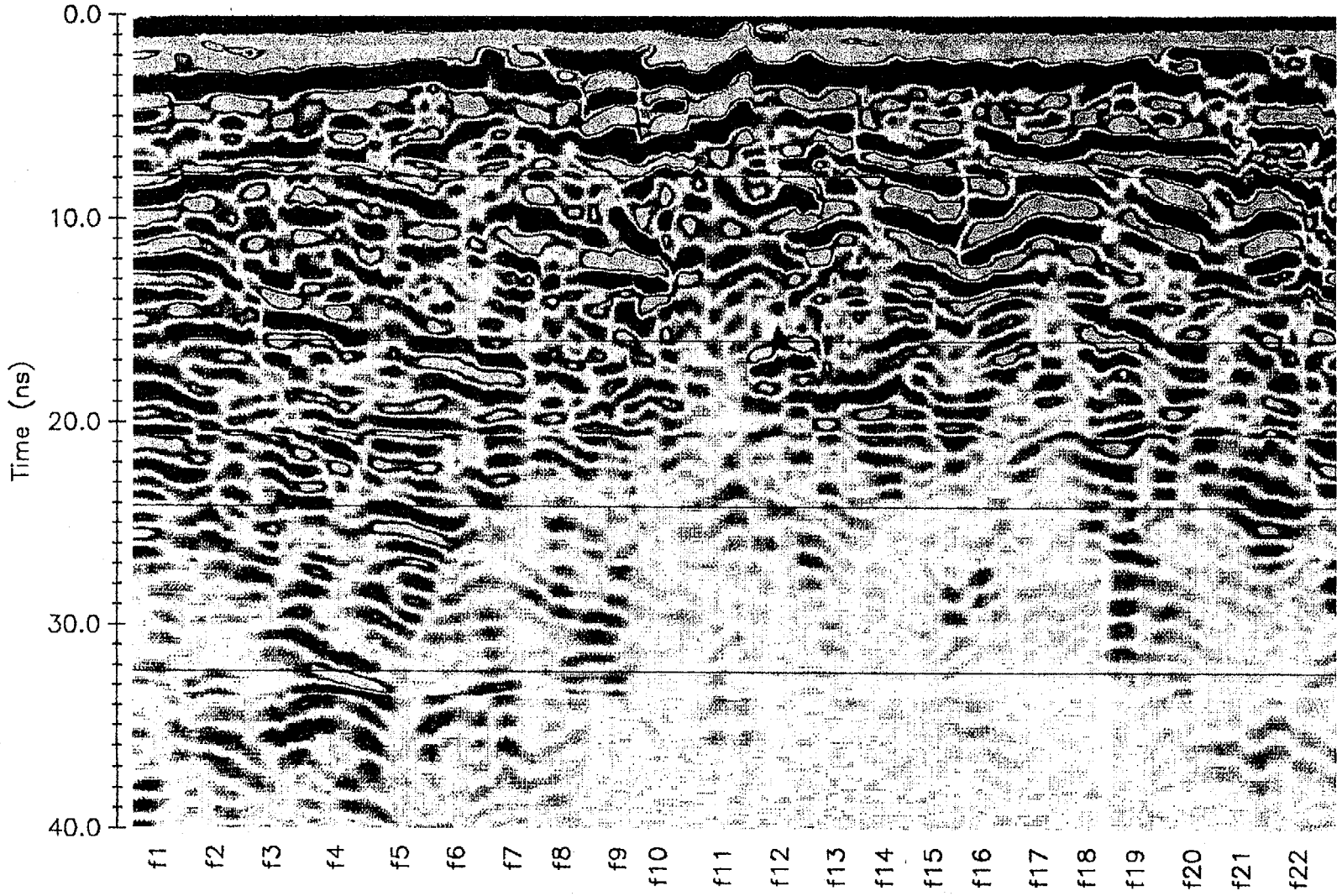
Scan EN12 Taken along LINE 12 w/ 450 mHz Transducer.
DC Shifted, Low Pass Filtered @ 70% of Nyquist Frequency
and High Pass Filtered @ 20 % of Nyquist Frequency.
Highly reflective areas appear in color.



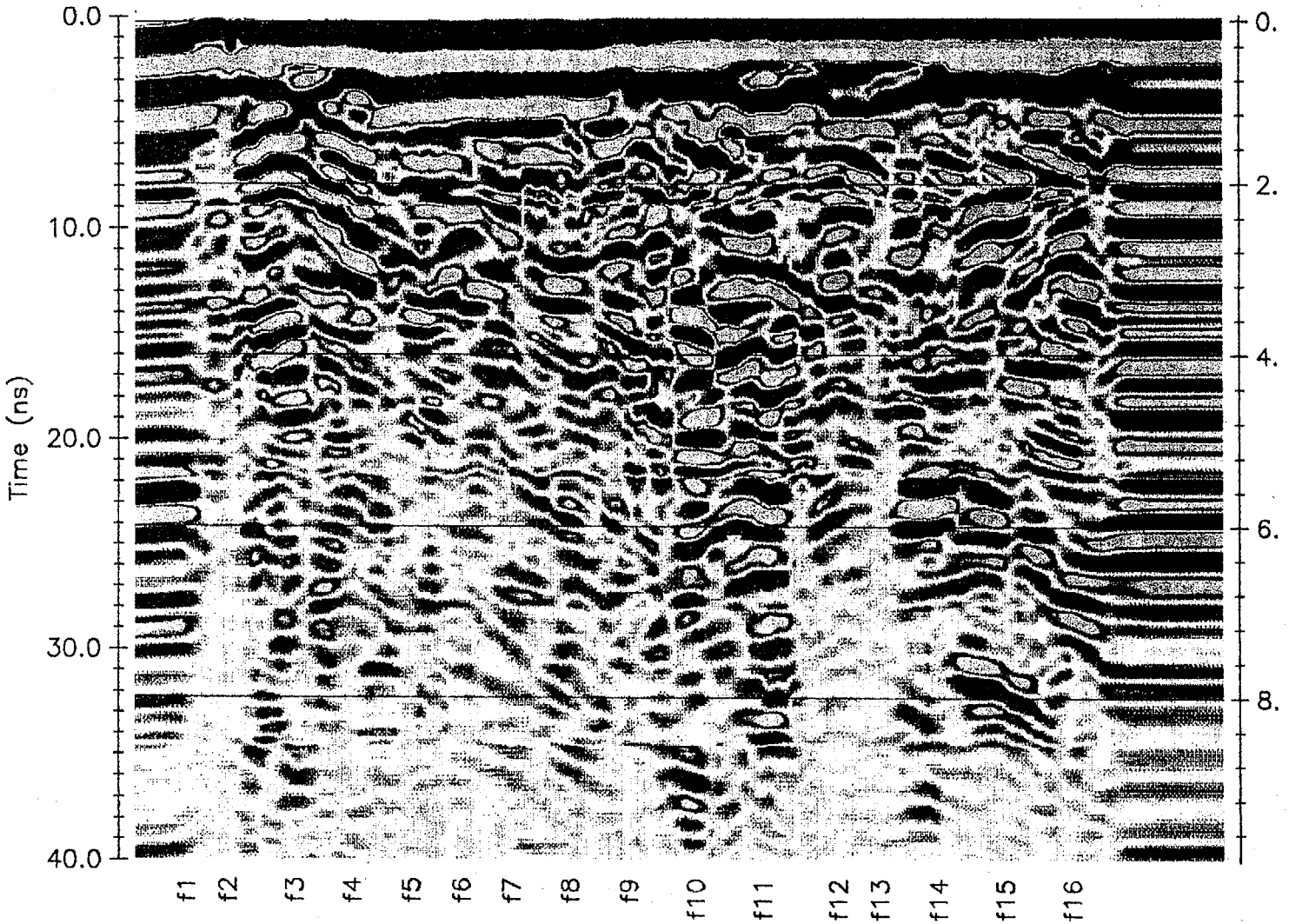
Scan EN14 Taken along LINE 14 w/ 450 mHz Transducer.
Highly reflective areas appear in color.



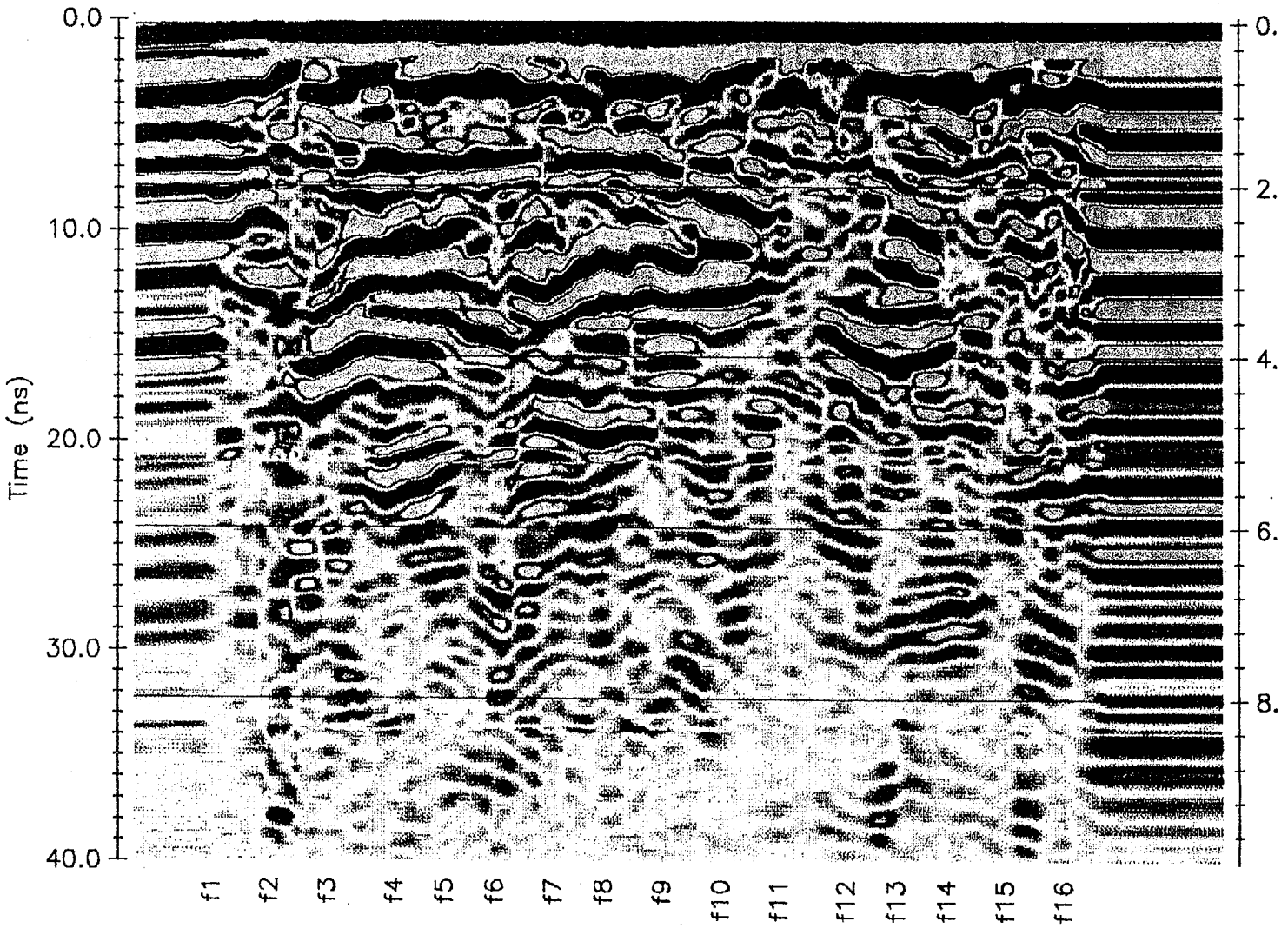
Scan EN15 Taken along LINE 15 w/ 450 mHz Transducer.
Highly reflective areas appear in color.



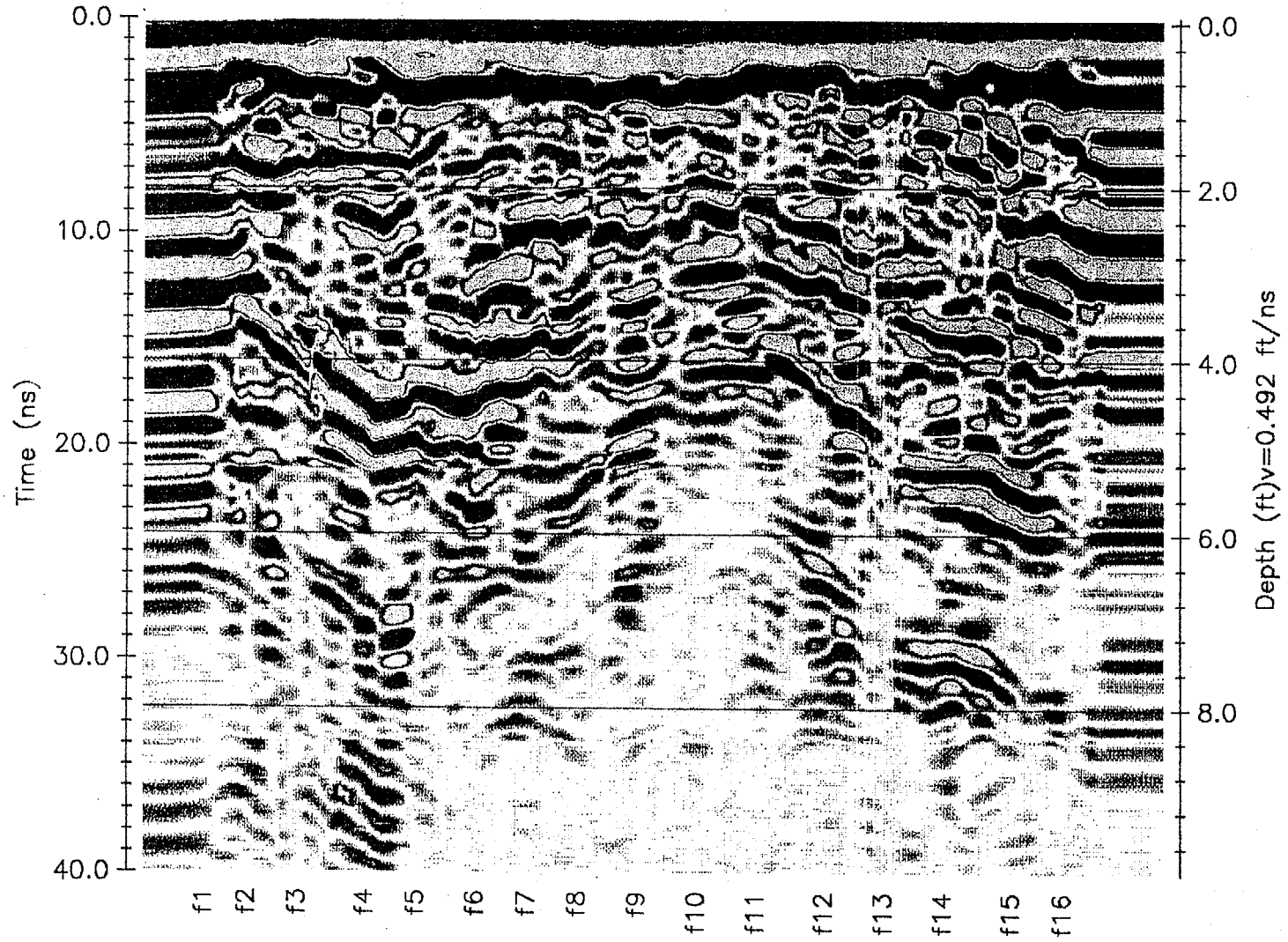
Scan EN16 Taken along LINE 16 w/ 450 mHz Transducer.
Highly reflective areas appear in color.



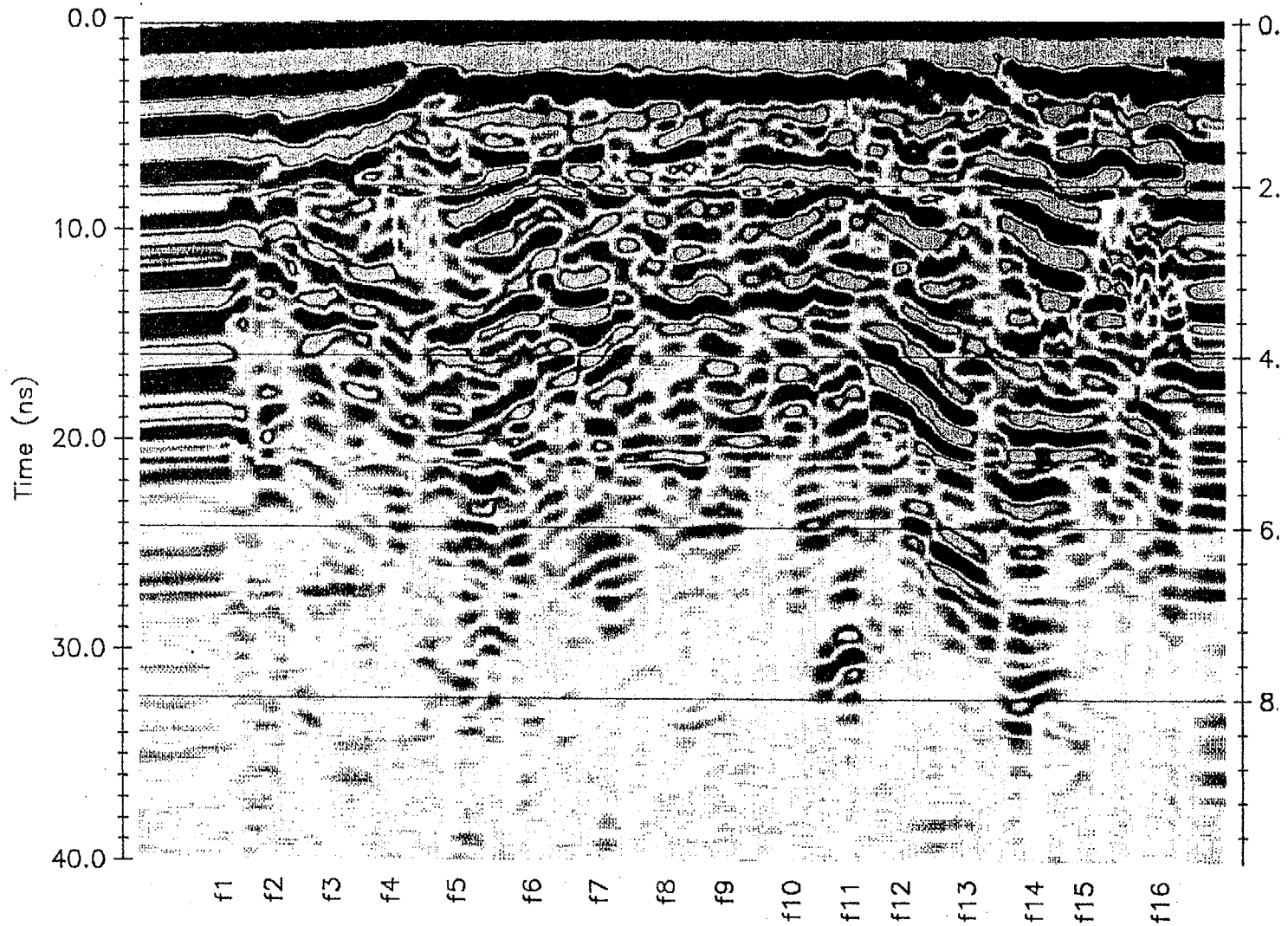
Scan EN17 Taken along LINE 17 w/ 450 mHz Transducer.
Highly reflective areas appear in color.



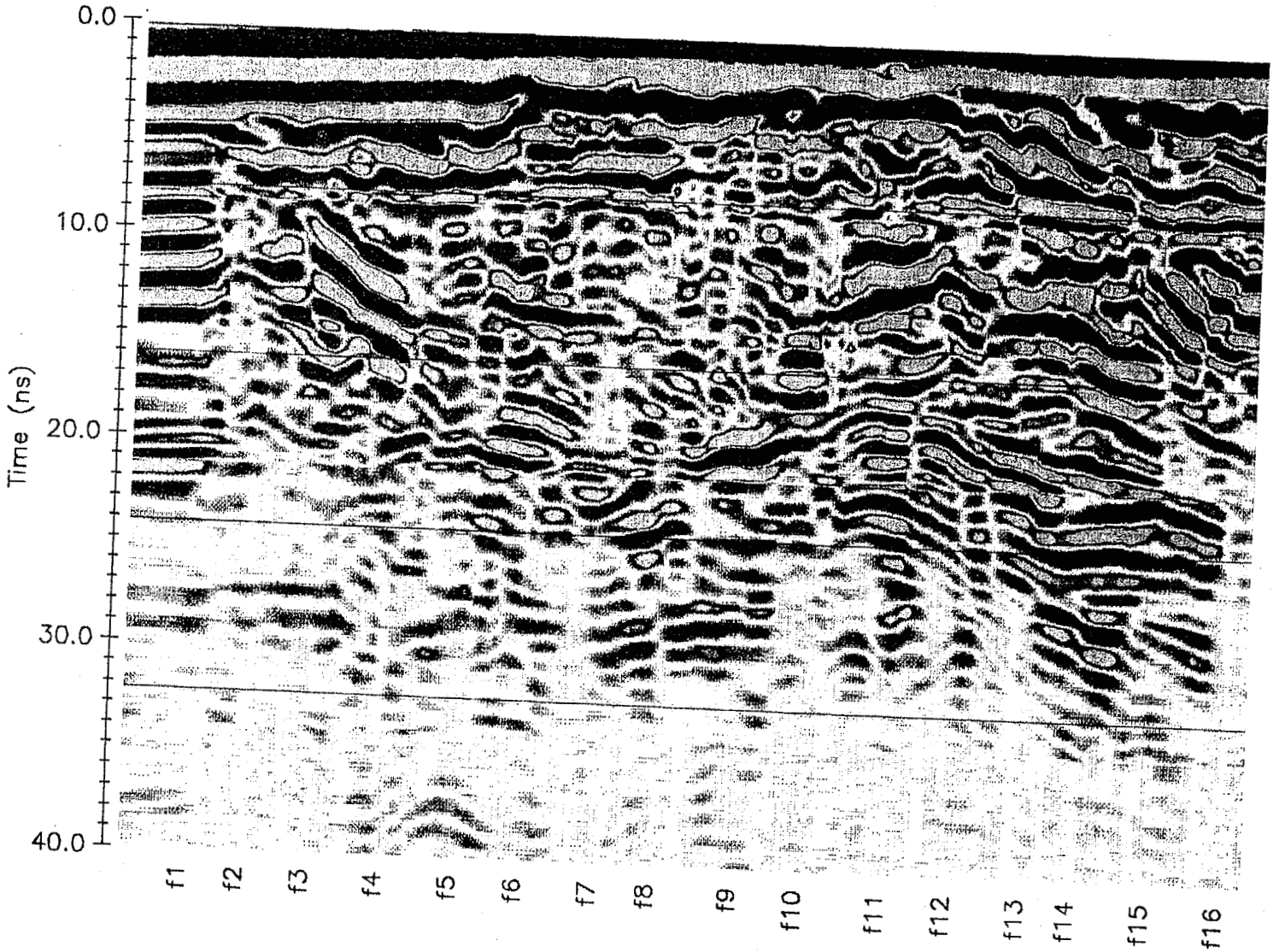
Scan EN18 Taken along LINE 18 w/ 450 mHz Transducer.
Highly reflective areas appear in color.



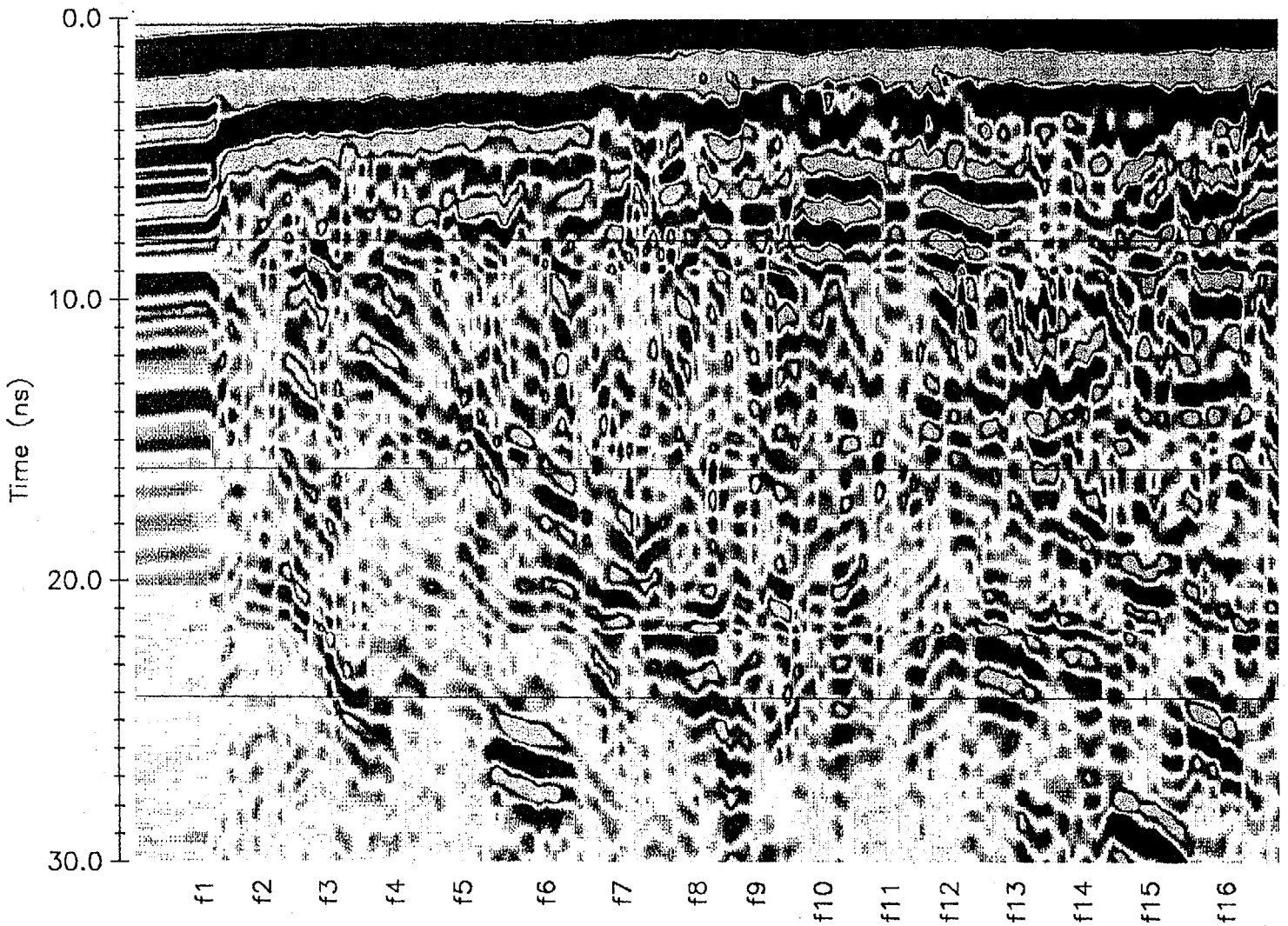
Scan EN19 Taken along LINE 19 w/ 450 mHz Transducer.
Highly reflective areas appear in color.



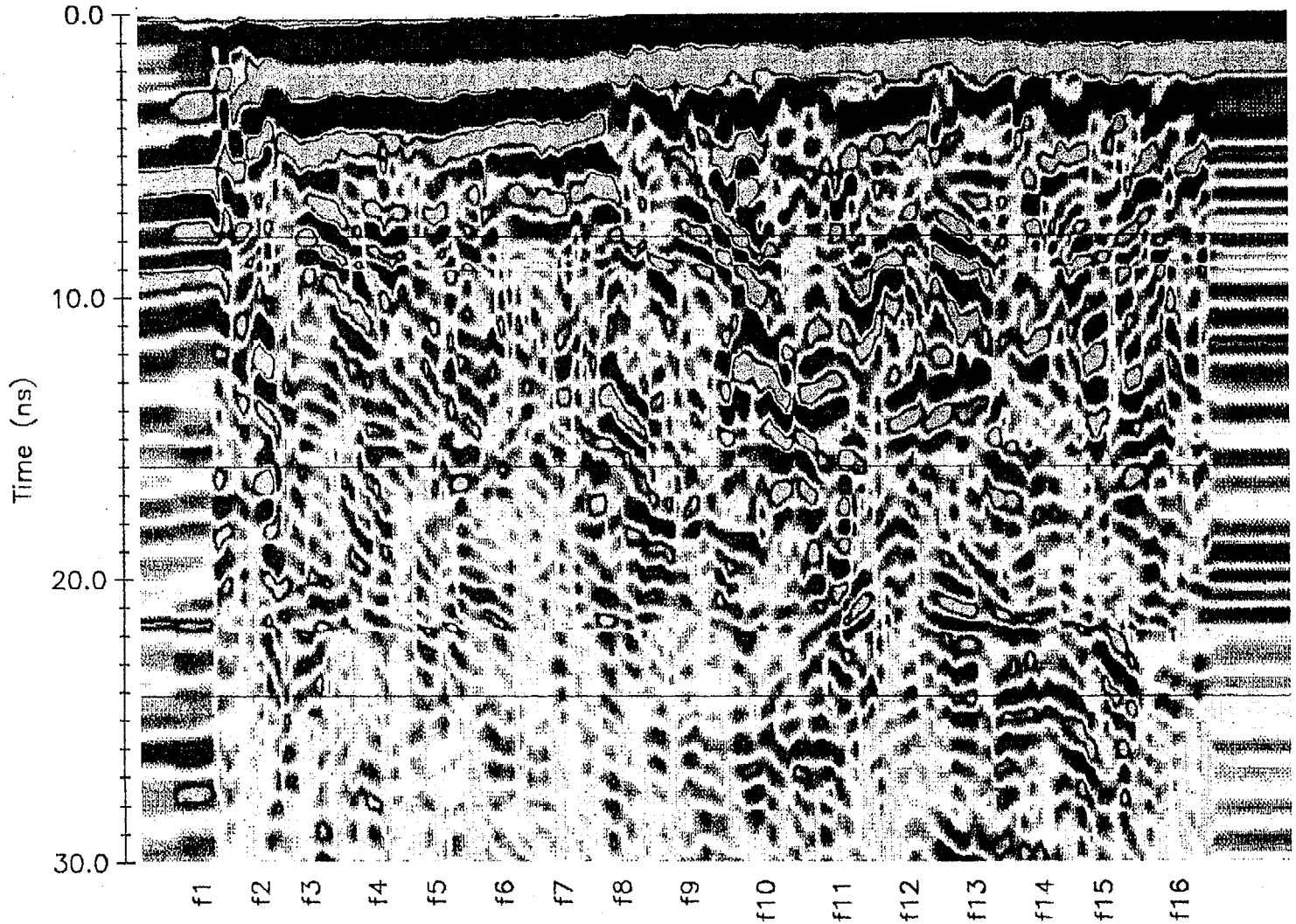
Scan EN20 Taken along LINE 20 w/ 450 mHz Transducer.
Highly reflective areas appear in color.



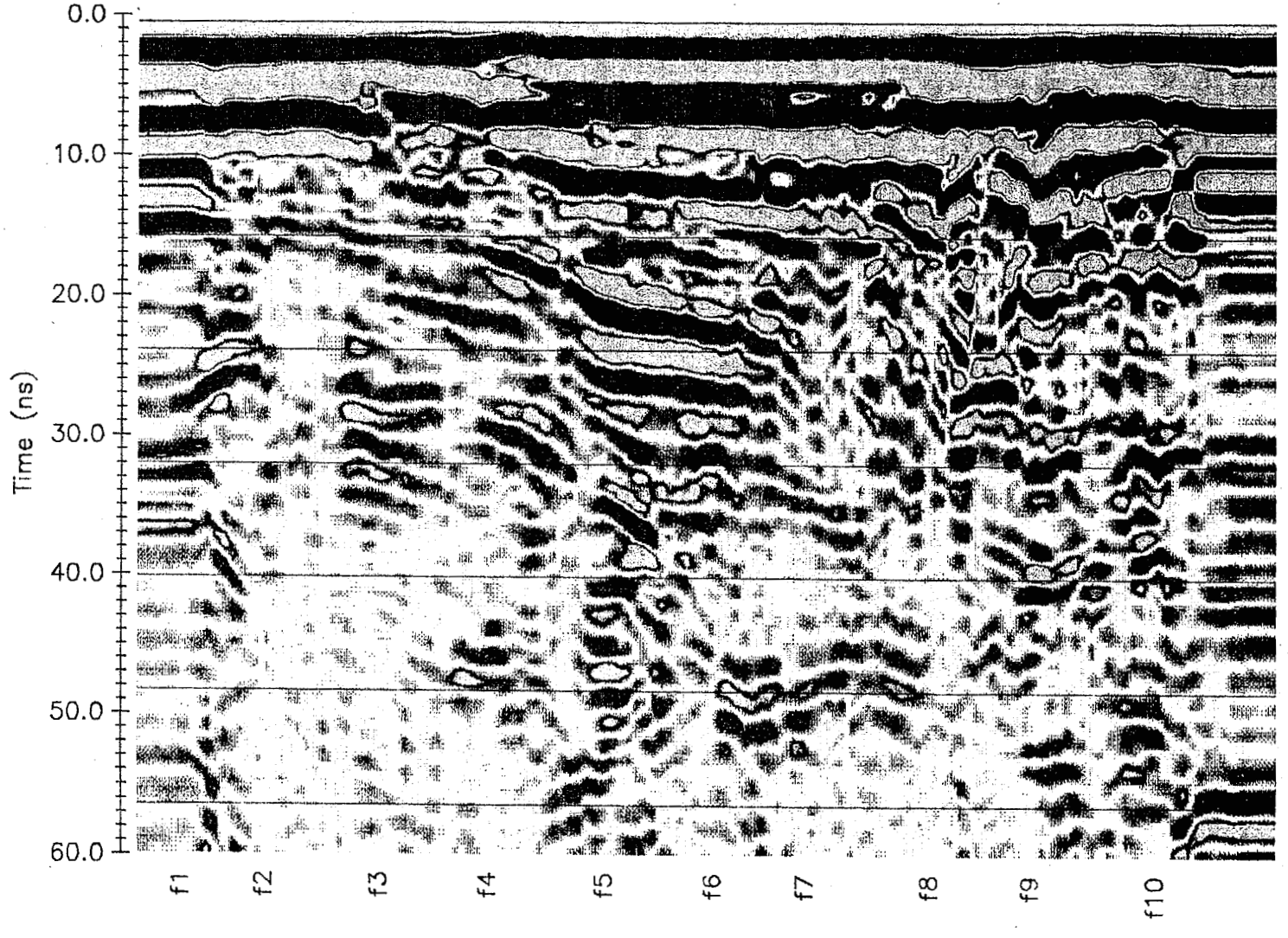
Scan EN22 Taken along LINE 22 w/ 450 mHz Transducer.
DC Shifted, Low Pass Filtered @ 70% of Nyquist Frequency
and High Pass Filtered @ 20 % of Nyquist Frequency.
Highly reflective areas appear in color.



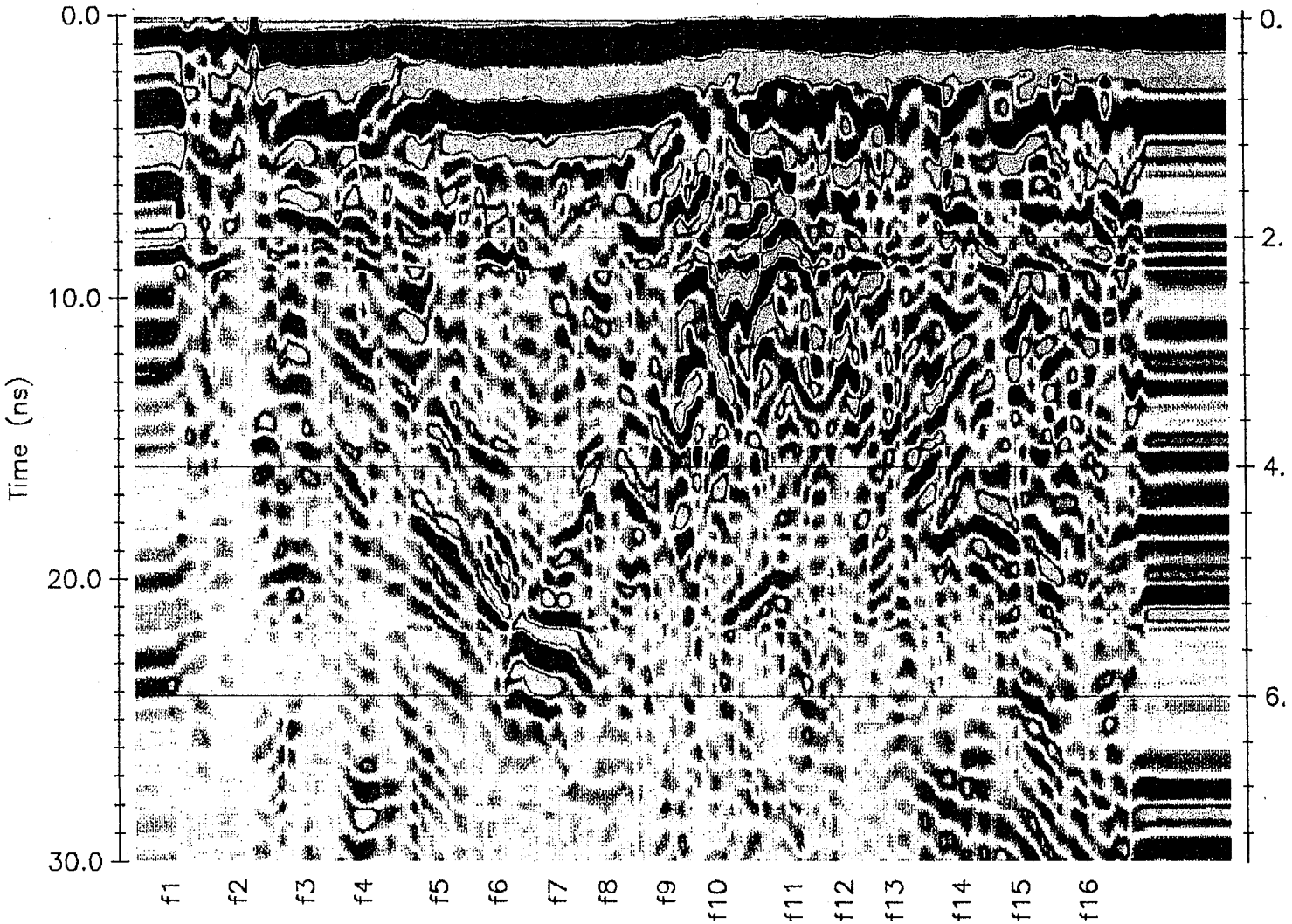
Scan EN24 Taken along LINE 24 w/ 450 mHz Transducer.
DC Shifted, Low Pass Filtered @ 70% of Nyquist Frequency
and High Pass Filtered @ 20 % of Nyquist Frequency.
Highly reflective areas appear in color.



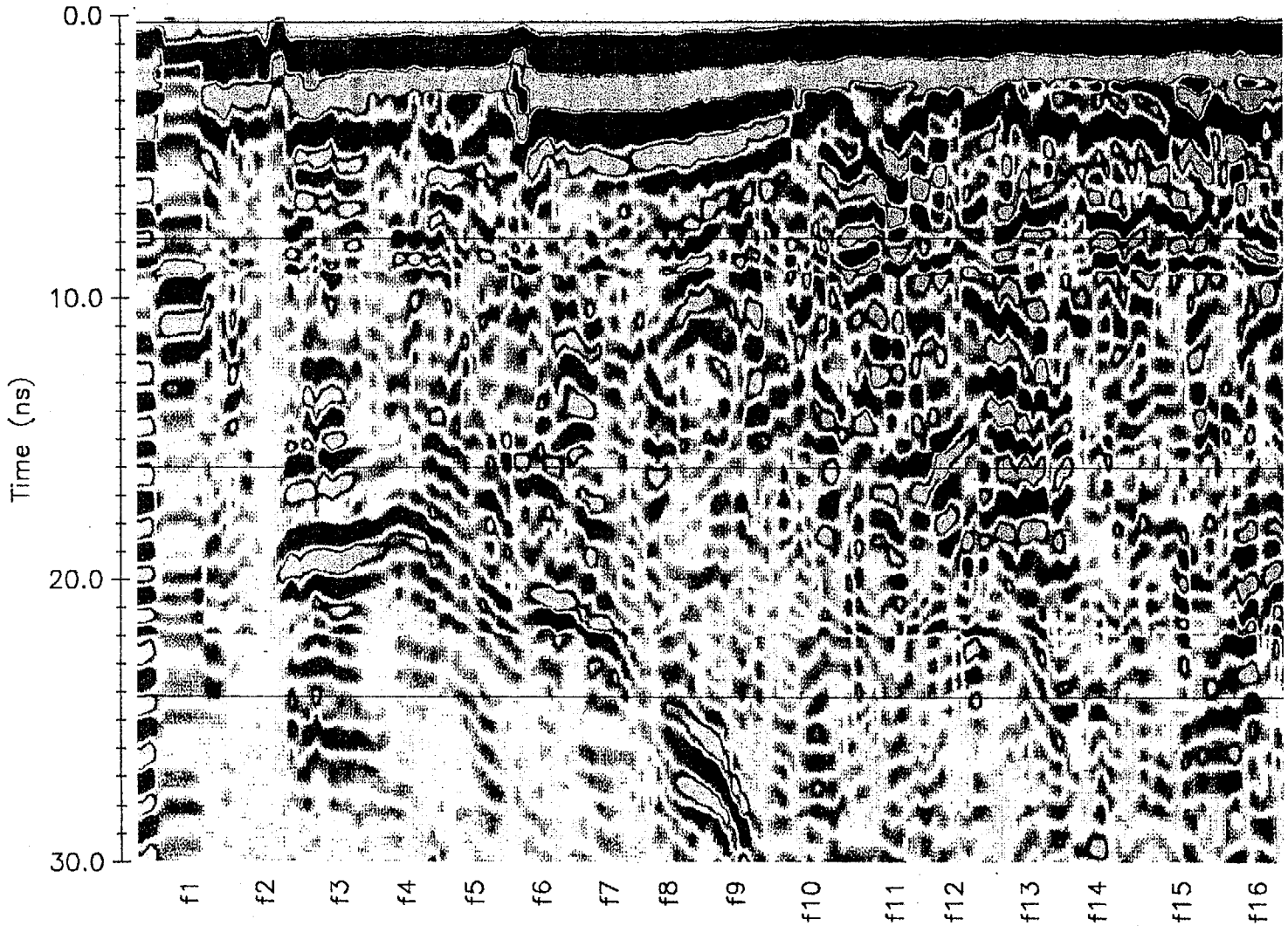
Scan EN25 Taken along LINE 25 w/ 250 mHz Transducer.
DC Shifted, Low Pass Filtered @ 70% of Nyquist Frequency
and High Pass Filtered @ 20 % of Nyquist Frequency.
Highly reflective areas appear in color.



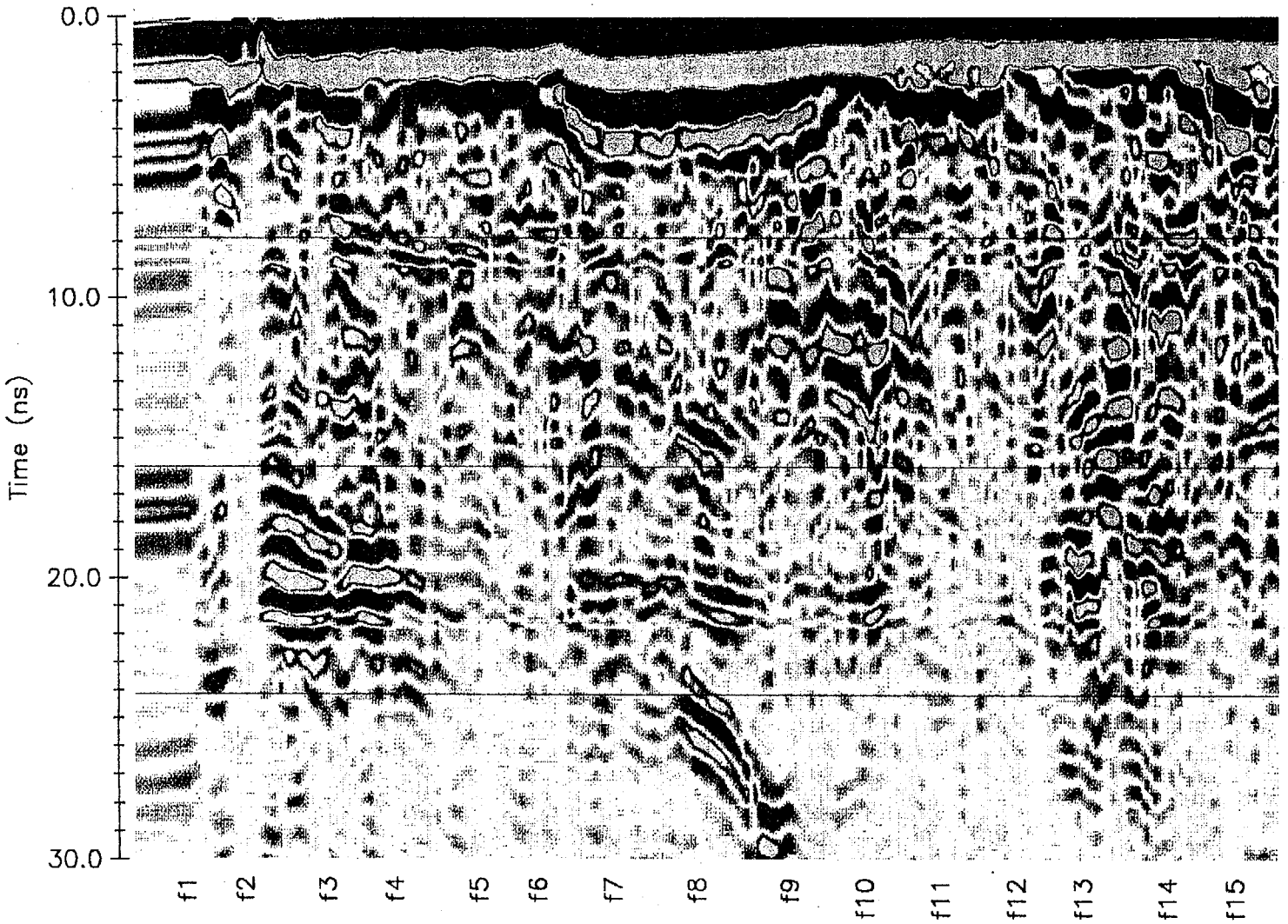
Scan EN27 Taken along LINE 27 w/ 450 mHz Transducer.
DC Shifted, Low Pass Filtered @ 70% of Nyquist Frequency
and High Pass Filtered @ 20 % of Nyquist Frequency.
Highly reflective areas appear in color.



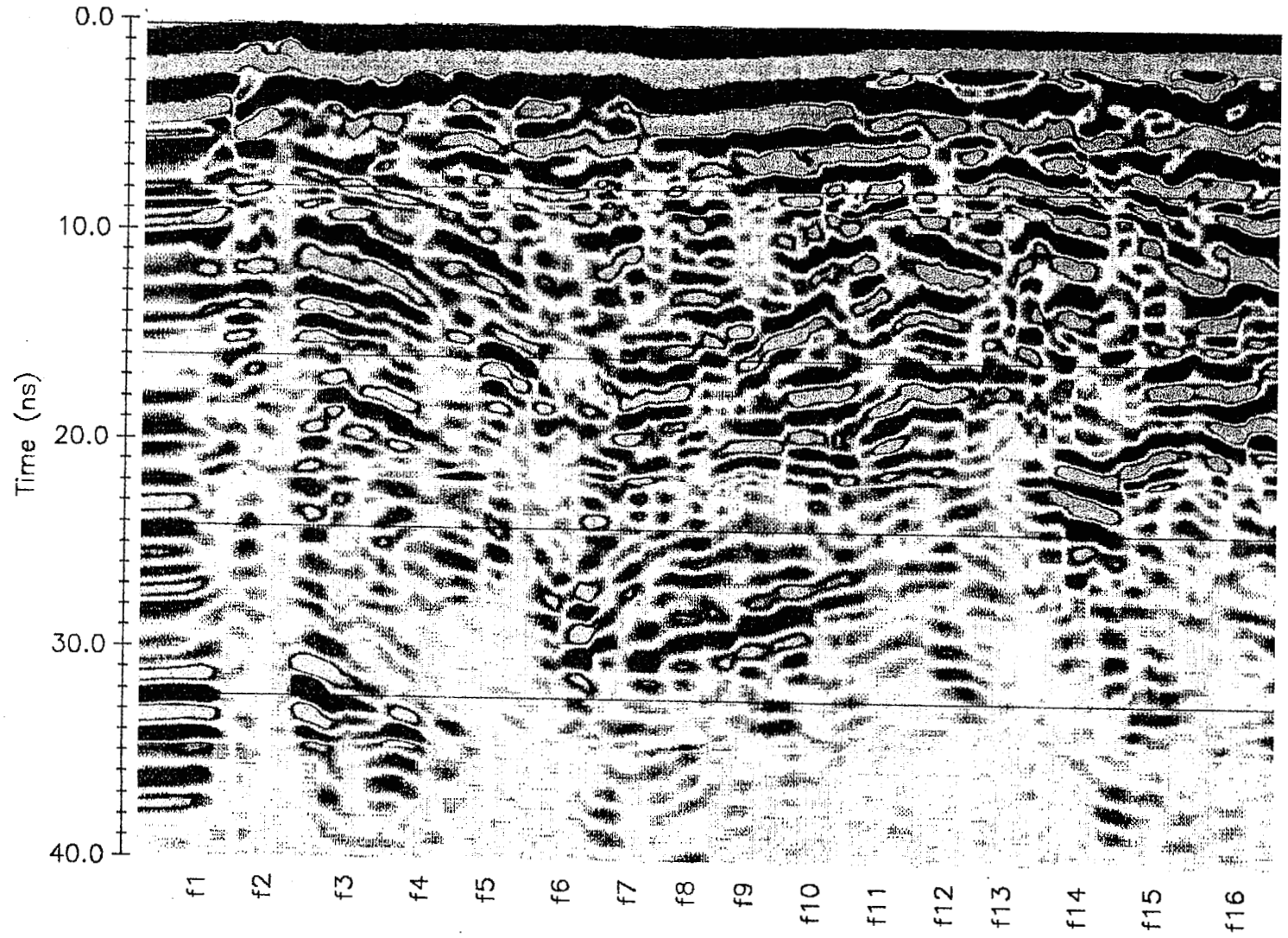
Scan EN29 Taken along LINE 15 w/ 450 mHz Transducer.
DC Shifted, Low Pass Filtered @ 70% of Nyquist Frequency
and High Pass Filtered @ 20 % of Nyquist Frequency.
Highly reflective areas appear in color.



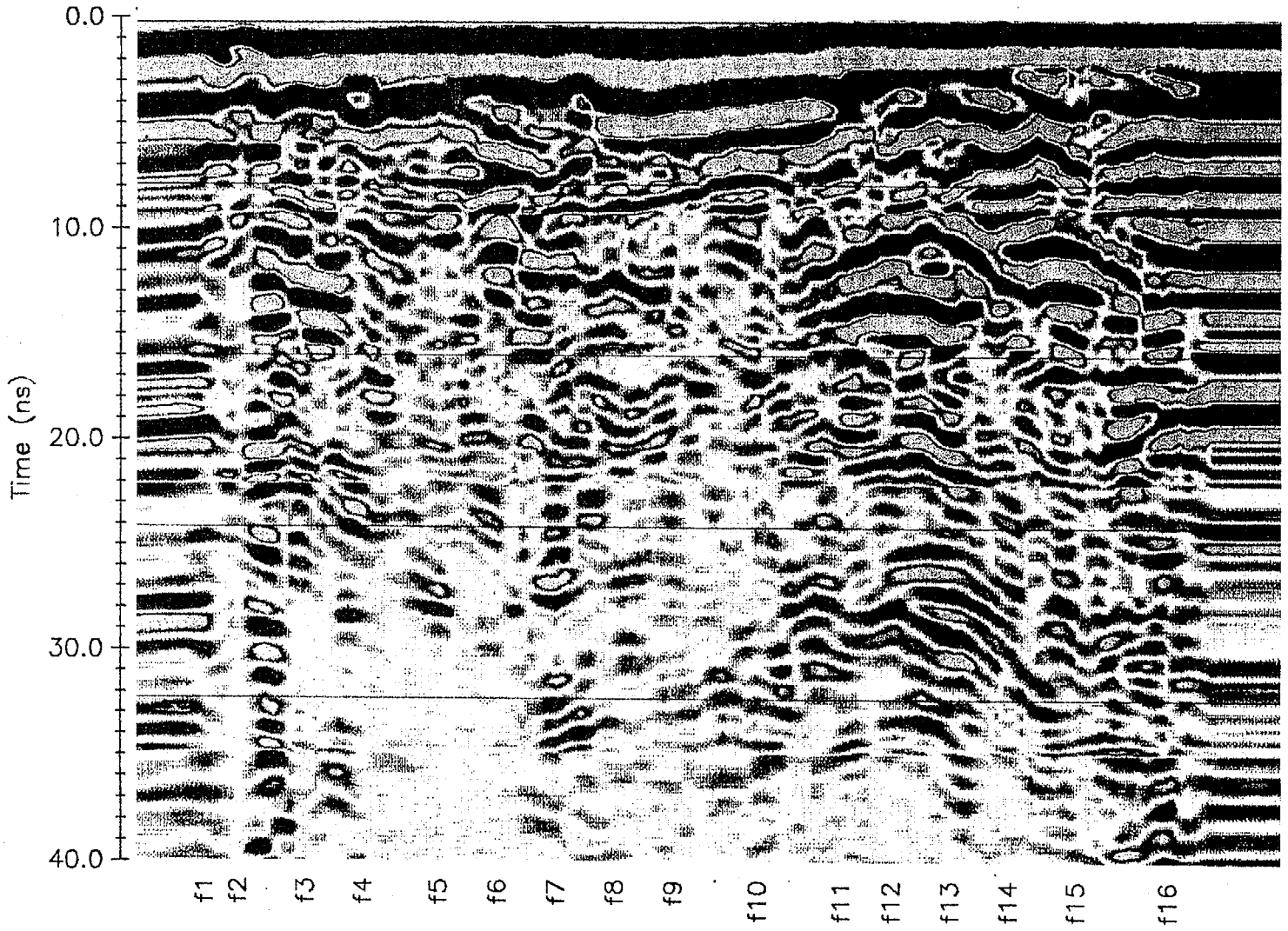
Scan EN31 Taken along LINE 31 w/ 450 mHz Transducer.
DC Shifted, Low Pass Filtered @ 70% of Nyquist Frequency
and High Pass Filtered @ 20 % of Nyquist Frequency.
ighly reflective areas appear in color.



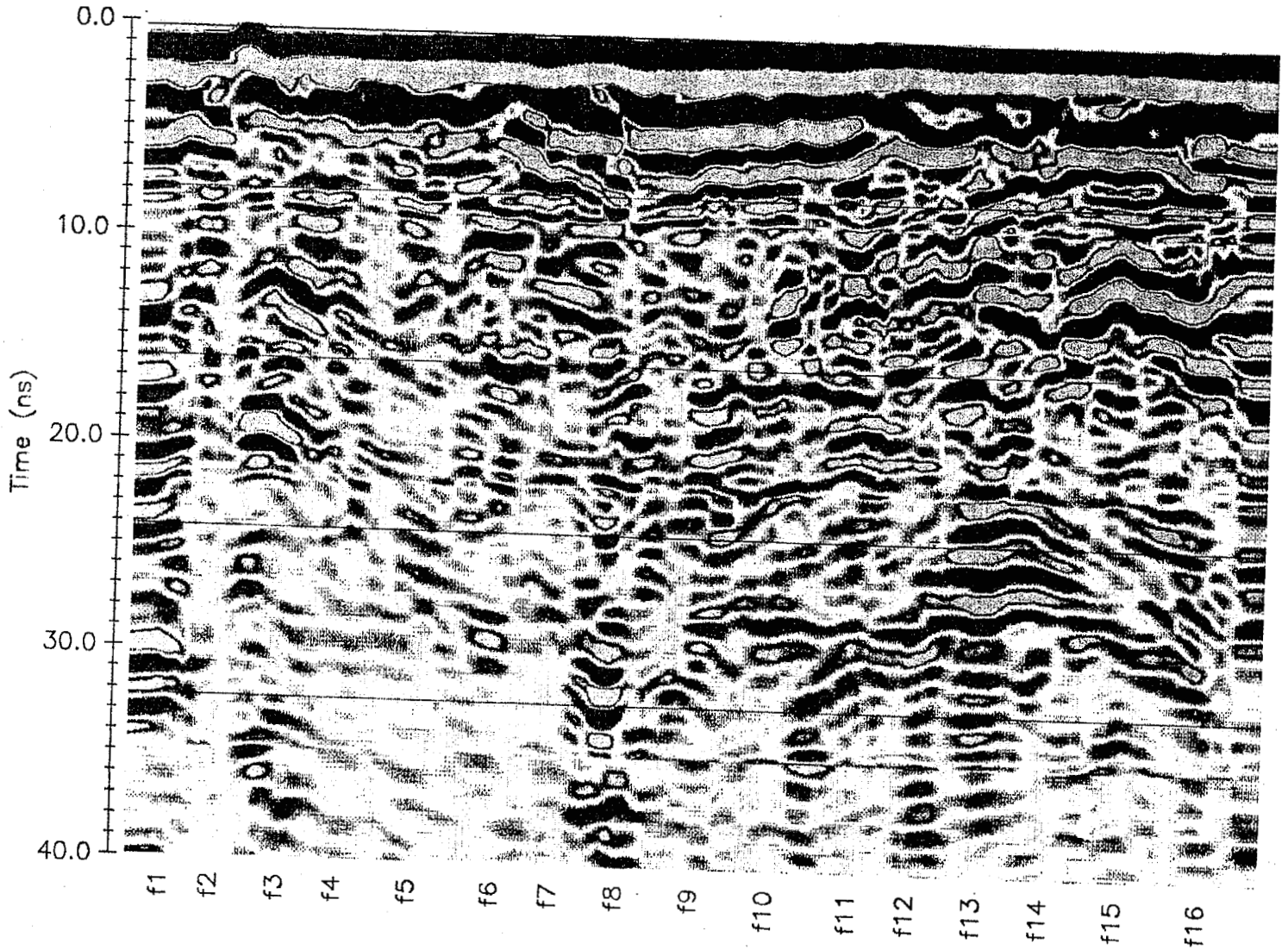
Scan EN32 Taken along LINE 32 w/ 450 mHz Transducer.
Highly reflective areas appear in color.



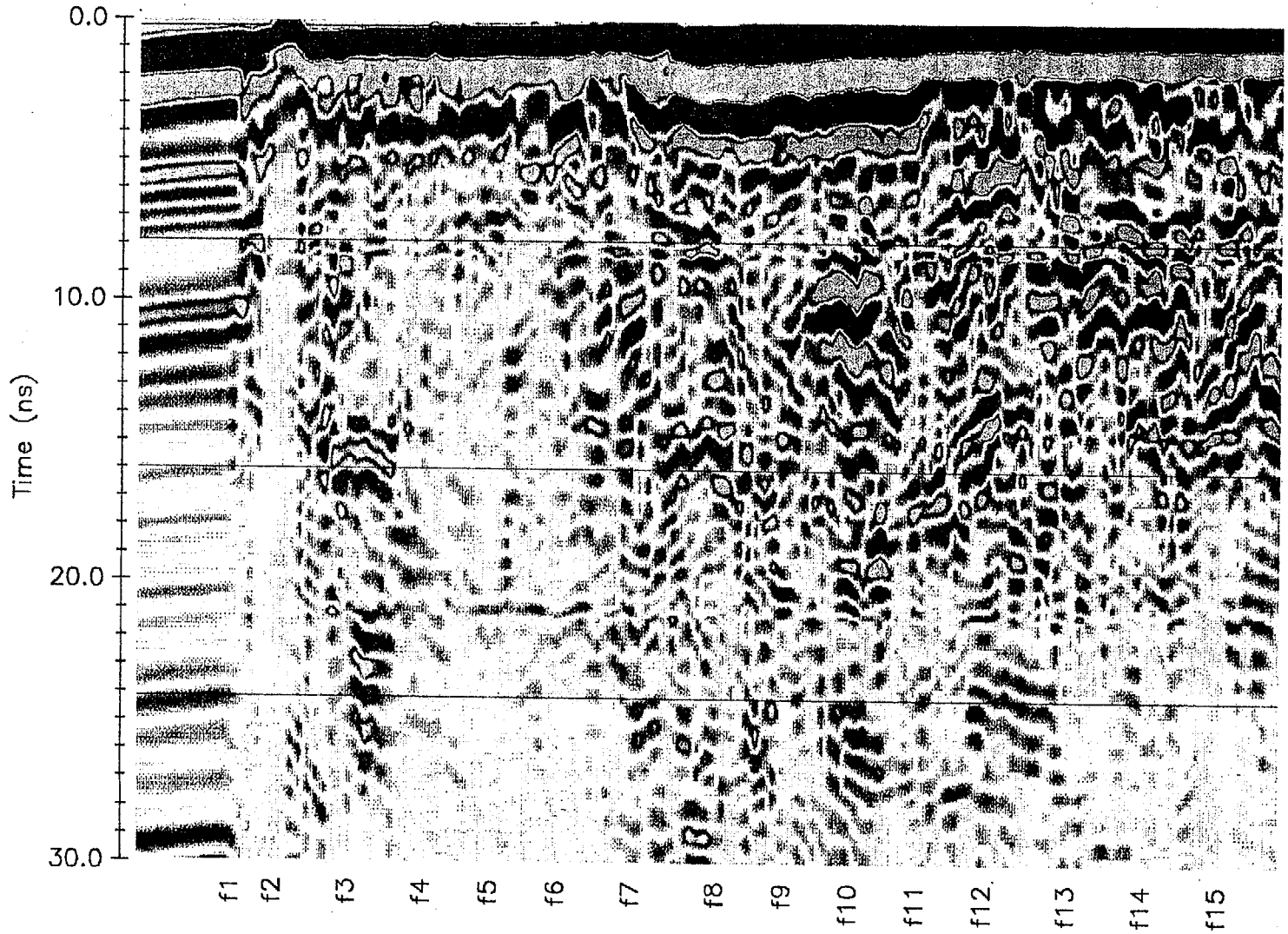
Scan EN33 Taken along LINE 33 w/ 450 mHz Transducer.
Highly reflective areas appear in color.



Scan EN34 Taken along LINE 34 w/ 450 mHz Transducer.
Highly reflective areas appear in color.



Scan EN35 Taken along LINE 35 w/ 450 mHz Transducer.
DC Shifted, Low Pass Filtered @ 70% of Nyquist Frequency
and High Pass Filtered @ 20 % of Nyquist Frequency.
Highly reflective areas appear in color.



Scan EN36 Taken along LINE 36 w/ 450 mHz Transducer.
DC Shifted, Low Pass Filtered @ 70% of Nyquist Frequen
and High Pass Filtered @ 20 % of Nyquist Frequency.
Highly reflective areas appear in color.