

ATTACHMENT

FOR ACE 3-31-14 LETTER TO NRC CHAIRMAN ALLISON MACFARLANE

**LIMERICK NUCLEAR PLANT MUST CLOSE!
IT CAN'T BE MADE SAFE!**

**LIMERICK'S REACTORS AND FUEL POOLS
ARE BUILT ON TOP OF AN
EARTHQUAKE FAULT ZONE
THERE IS NO WAY TO FIX THIS!**



CONTENTS

OF THIS PACKET

Evidence That Shows That Limerick Nuclear Plant's Reactors and Spent Fuel Pools Were Built Directly On Top of Earthquake Fault Fractures.

ATTACHED PHOTOGRAPHS AND DIAGRAMS ARE FROM:

The 1974 report for Limerick Nuclear Plant titled: "Report on Treatment of Fracture Zones for PECO by Bechtel Power Company", Showing That Fault Fractures Under Limerick Were So Big They Decided To Fill Them In With Cement In Order To Construct Limerick Buildings On Top Of The Fractures

Bechtel's September 3, 1974 Report Reveals That Limerick Nuclear Plant's Buildings Were Built Directly ON TOP Of Earthquake Fault Fractures:

- (1) Reactors [Plus Spent Fuel Pools]
- (2) Control Room
- (3) Turbine Building
- (4) Rad-Waste Building

Photographs And Diagrams From The 1974 Report:

1. Copy of Bechtel's 1974 Report Cover
2. Photograph - A fault zone fracture filled with cement that supports a column for Limerick Unit 2 reactor
3. Photograph - A fault zone fracture after it was filled in with cement (called dental concrete) in 1973, BEFORE Limerick's Geological Survey was completed in 1974
4. Photograph - A fault zone fracture being filled with cement directly under the support wall between the control room and turbine building
5. Photograph - A fault zone fracture directly under Limerick Unit 1 reactor
6. Diagram - The location of Limerick Nuclear Plant buildings and their position over the fault zone fractures
7. Diagram - The location of fault fractures and their position under Limerick Nuclear Plant buildings
8. Diagram - Showing fracture fingers extending from the horizontal surface fractures into the earth; no one knows how far down they go

NOTE: Spent fuel pools are not shown in the diagram, since Limerick is a GE Mark II BWR design, with its fuel pools built on top of its reactors.

REPORT

ON



TREATMENT OF FRACTURE ZONES

AT

LIMERICK GENERATING STATION

FOR

PHILADELPHIA ELECTRIC COMPANY

BY

BECHTEL POWER CORPORATION

Reports File

JOB 8031

September 3, 1974

9548

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**A Fault Zone Fracture Was Being
Filled With Cement In 1973
Before Limerick's Geological Survey
Was Completed In 1974**

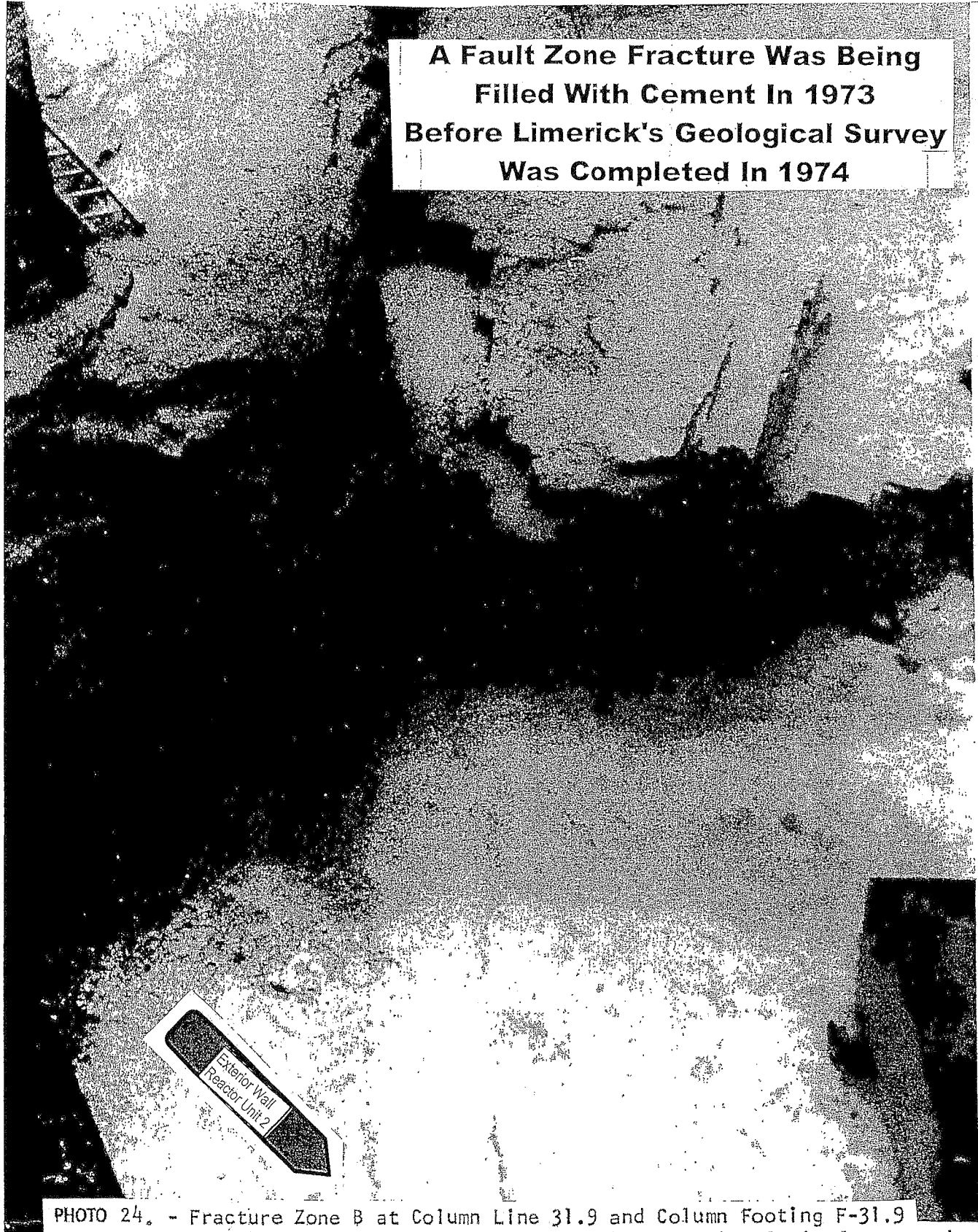
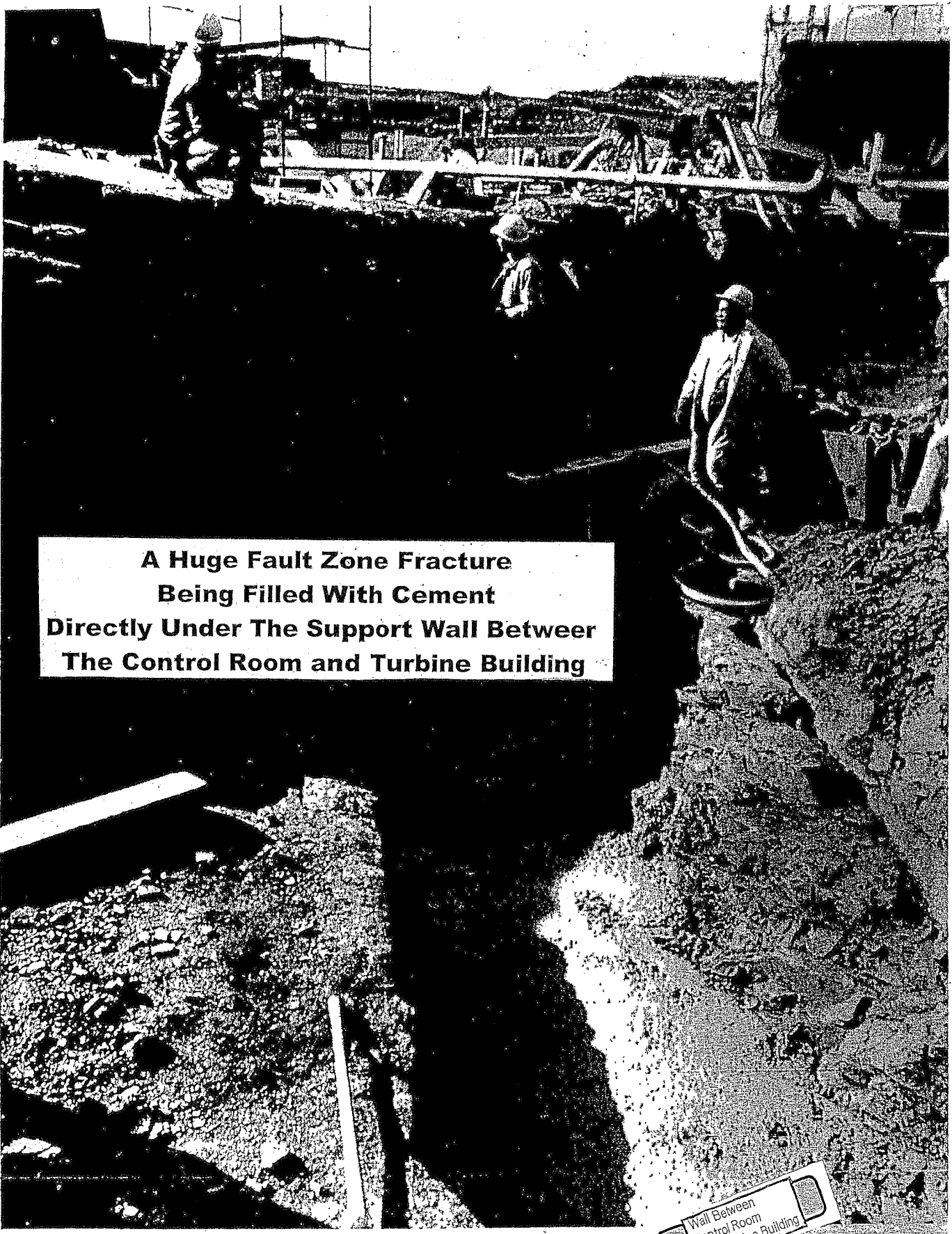


PHOTO 24. - Fracture Zone B at Column Line 31.9 and Column Footing F-31.9. Looking SW along strike of Zone B. Column footing is in foreground. Paint marks column line 31.9. Shows the zone after being filled with dental concrete.

Dental concrete was placed in the treated zone on August 10, 1973.

Photo 24 shows the zone after being filled with concrete.



**A Huge Fault Zone Fracture
Being Filled With Cement
Directly Under The Support Wall Between
The Control Room and Turbine Building**

Wall Between
Control Room
And Turbine Building

PHOTO 12.- Fracture Zone A at "Mh" and "N" Lines
Looking SW along strike as dental concrete is being placed in the zone.

This Is A Fault Zone Fracture Filled With Cement That Support A Column For Limerick Unit 2 Reactor

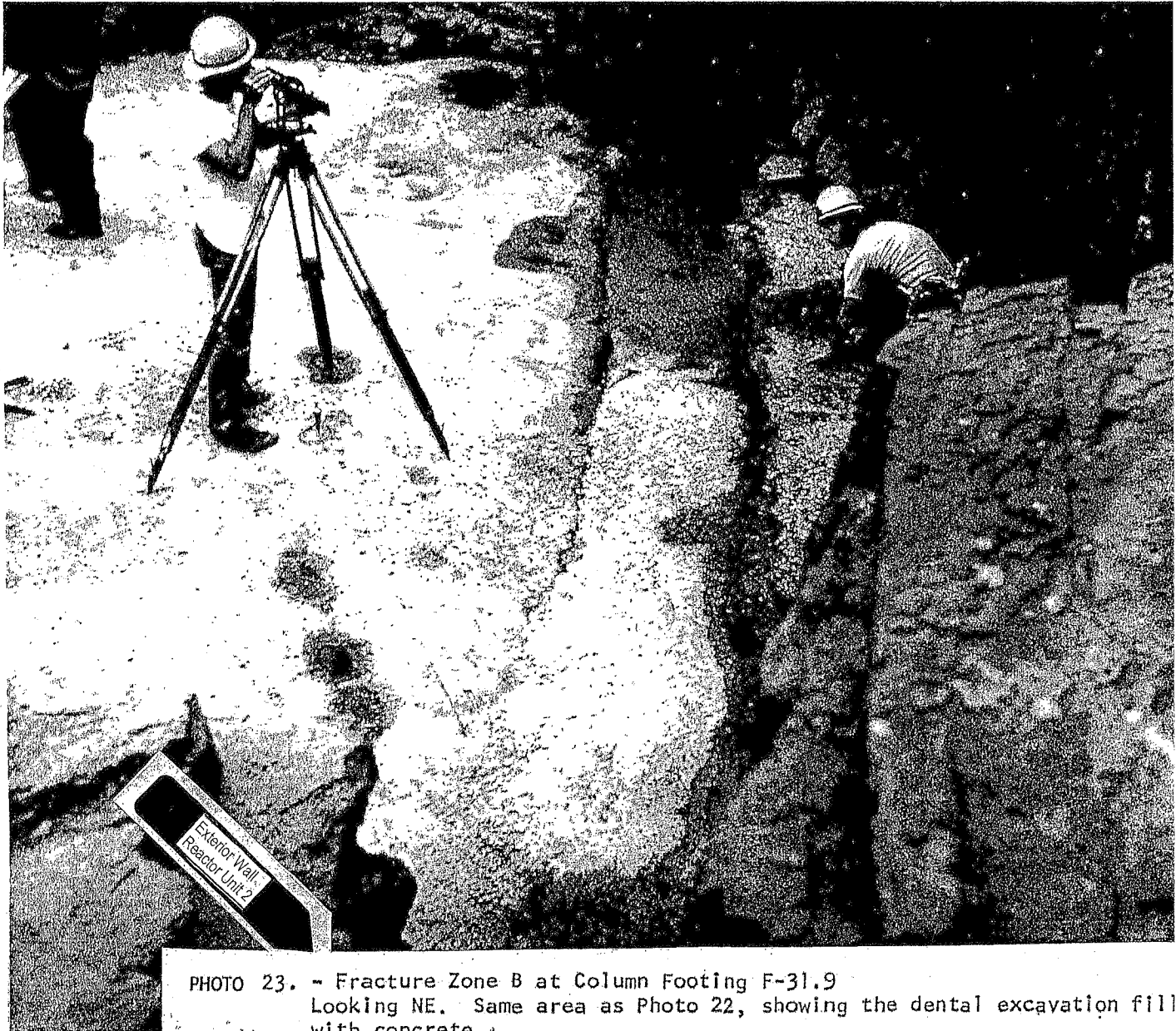


PHOTO 23. - Fracture Zone B at Column Footing F-31.9 Looking NE. Same area as Photo 22, showing the dental excavation fill with concrete.

This Is Part Of The Fault Zone Fracture Zone Under Limerick Unit 1 Reactor

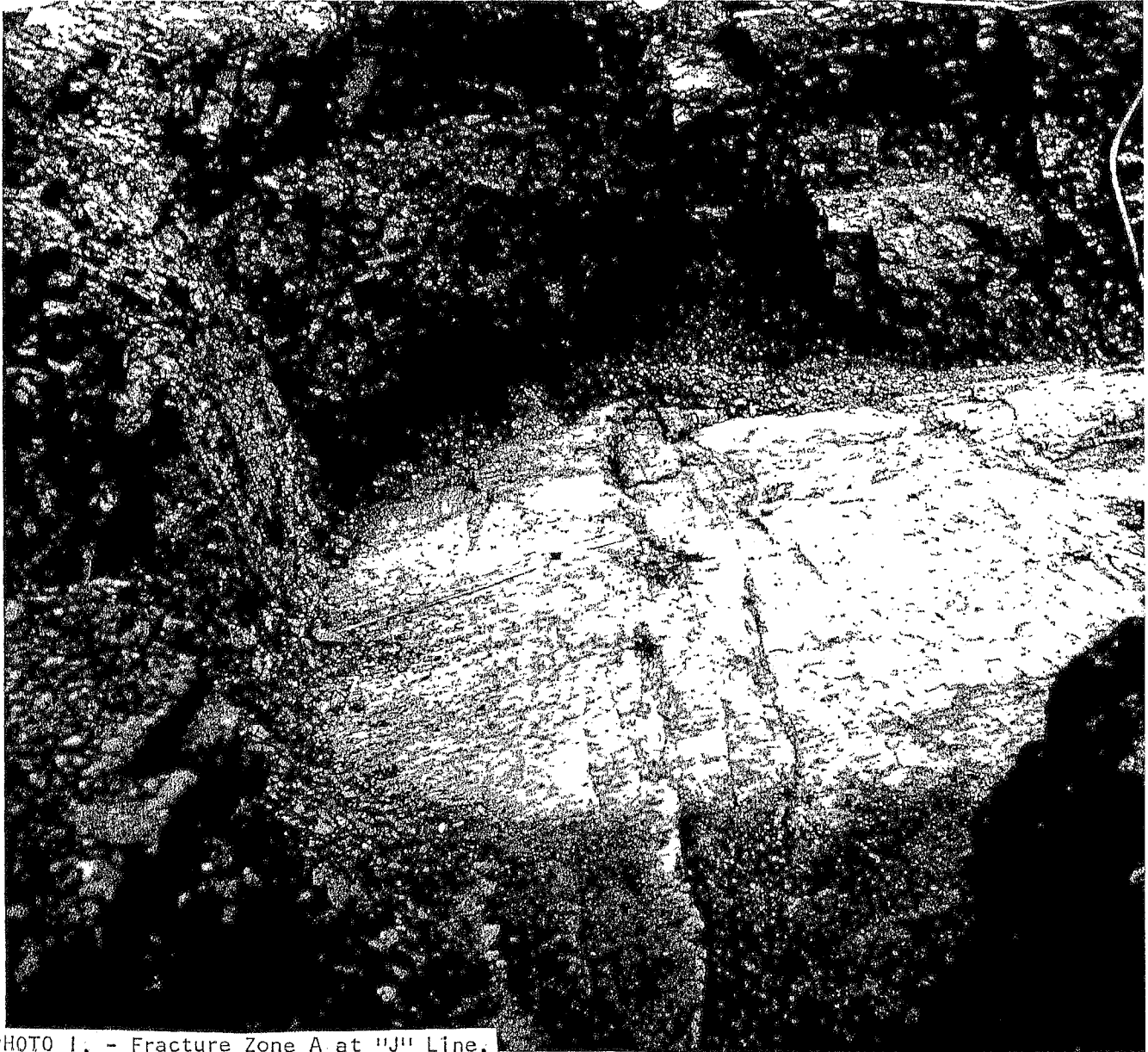
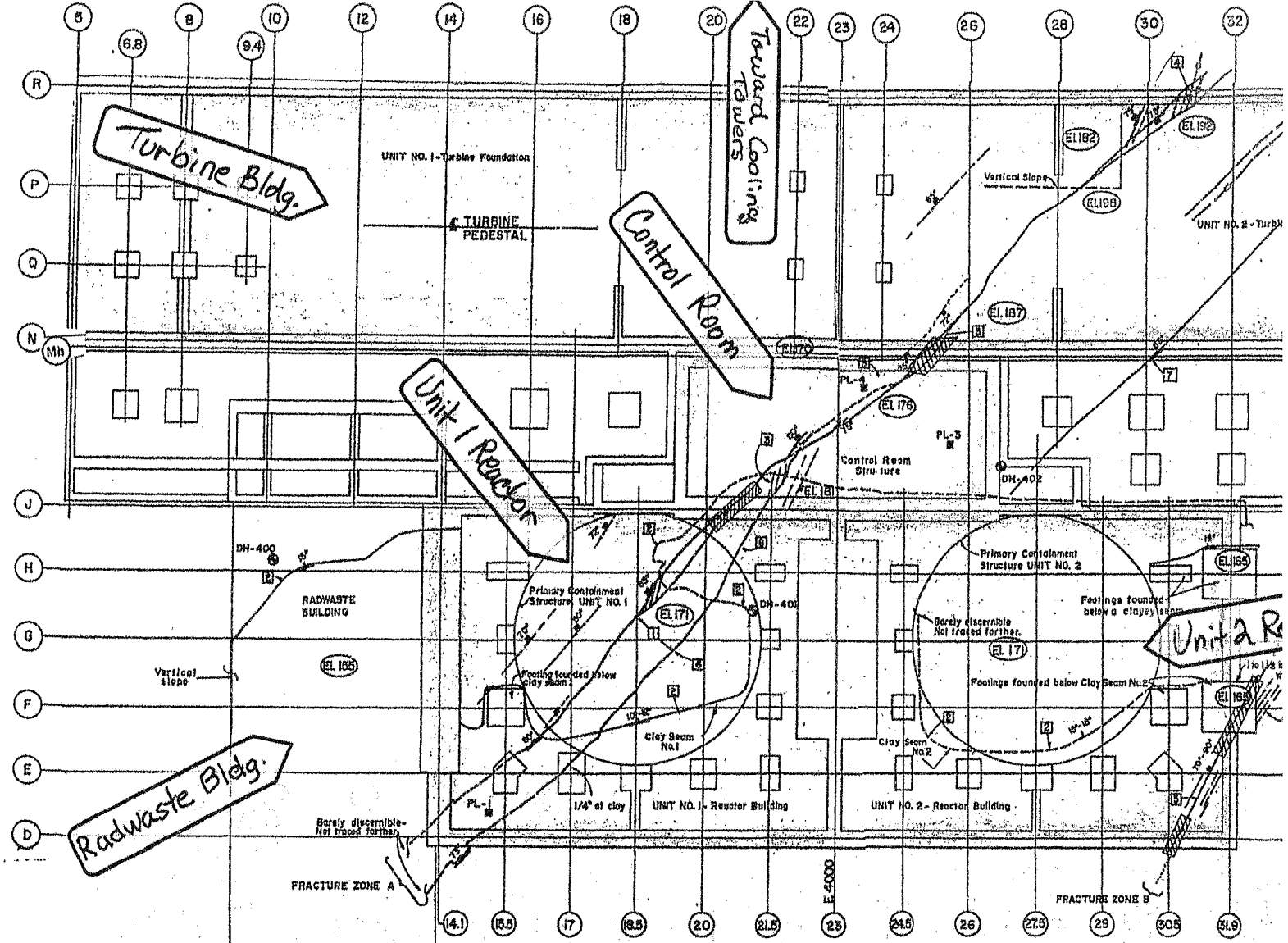


PHOTO 1. - Fracture Zone A at "J" Line. Looking NE along strike of the zone. "J" line is near the center of the photo. Note that the bedding plane which has been cleaned off (center of the photo) is not displaced across the zone. Clay seam 1 occurs along this bedding plane.



EXPLANATION

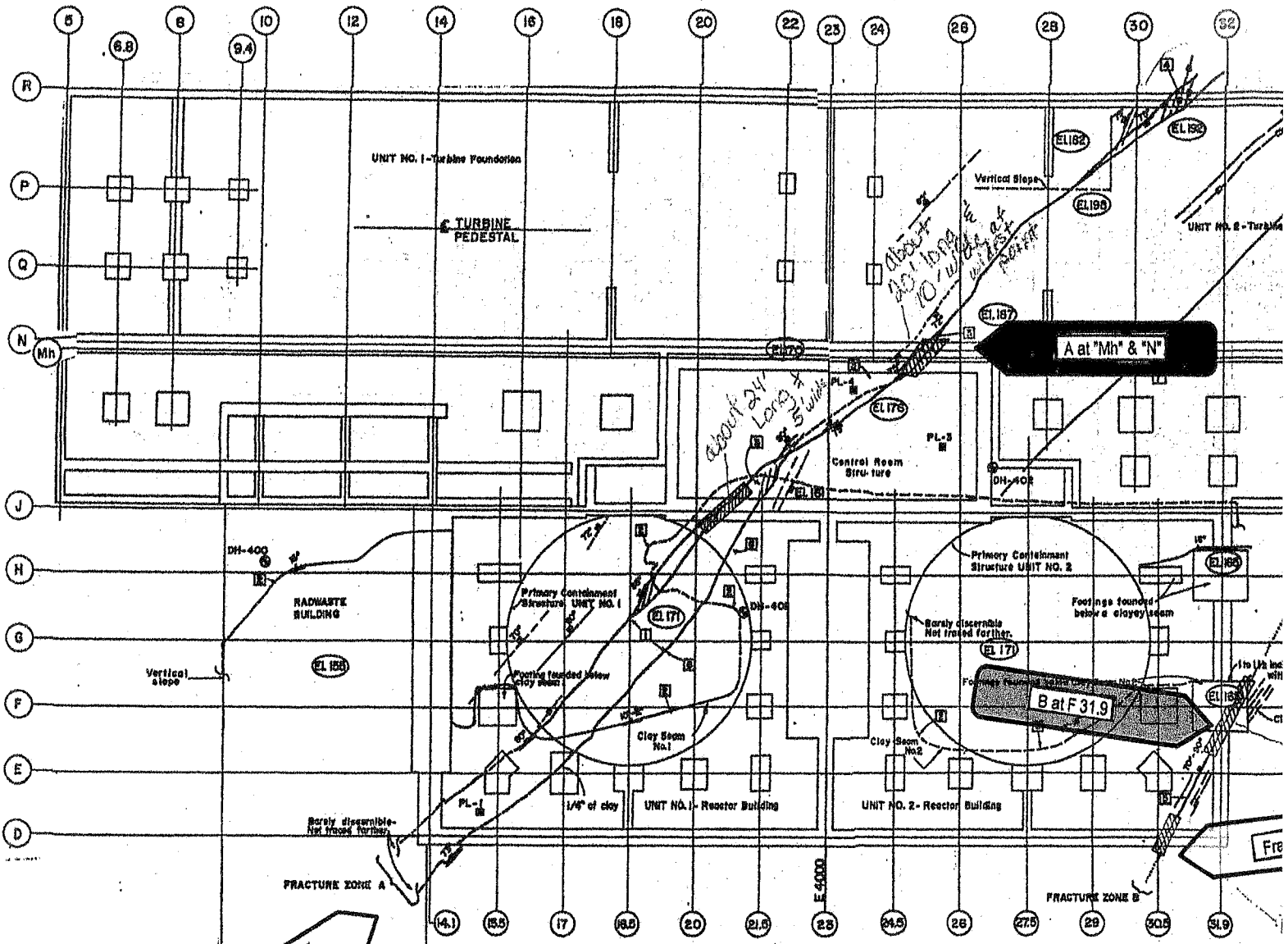
- DH-400 Drill hole to investigate clay seam
- Trace of fracture zones on excavated rock surface showing dip. Dashed where fractures are light and indistinct. Dotted where concealed.
- Trace of clay seam on excavated rock surface showing dip. Dashed where exposed in excavated slope.
- Area where fracture zones were treated. See report for description and photographs.
- See notes for further descriptions
- Elevation of excavated surface
- Joint showing attitude
- Plate load test showing location and number.
- Fracture zone
- Less bed
- Fracture zone
- Well Clay
- Fracture zone with 10 ft
- Strike
- Fracture zone with 10 ft
- Fracture zone with 10 ft

PHILADELPHIA ELECTRIC COMPANY
 LIMERICK GENERATING STATION
 UNITS 1 AND 2
 PRELIMINARY SAFETY ANALYSIS REPORTS

**GEOLOGIC MAP
 LOCATION OF FRACTURE ZONES**

FIGURE 1

**ACE Clarification:
 Positions of Limerick Buildings
 Over Fault Fractures**



PHILADELPHIA ELECTRIC COMPANY
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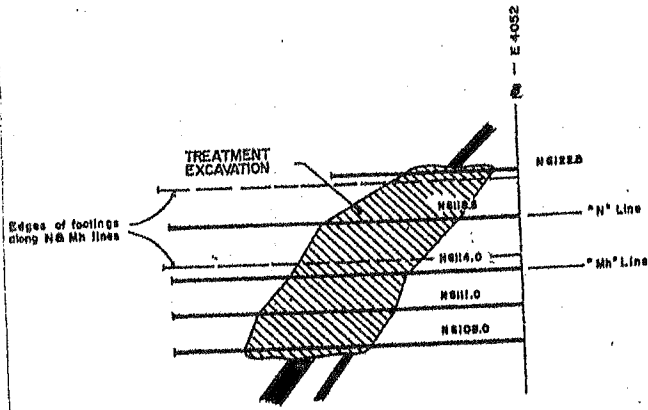
**GEOLOGIC MAP
 LOCATION OF FRACTURE ZONES**

**ACE Clarification:
 Arrows Show Fractures
 Documented in Photographs**

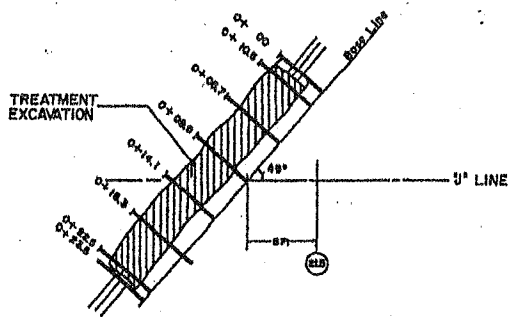
EXPLANATION

- DH-400
 Drill hole to investigate clay seam
- Trace of fracture zones on excavated rock surface showing dip. Dashed where fractures are tight and indistinct. Dotted where concealed.
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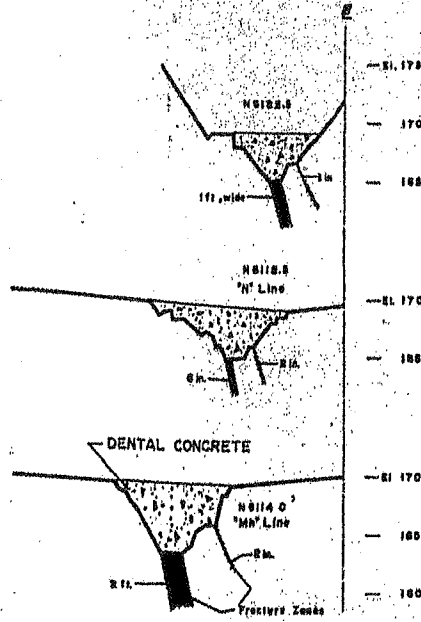
- NOT**
- Fracture from 1
 - Last 1
 - Fracture
 - Well 4
 - Clay 4
 - Fracture with 10 feet
 - Strain
 - Fracture inches rock
 - Fracture



PLAN
TREATMENT OF ZONE A
AT "N" & "Mh" LINES

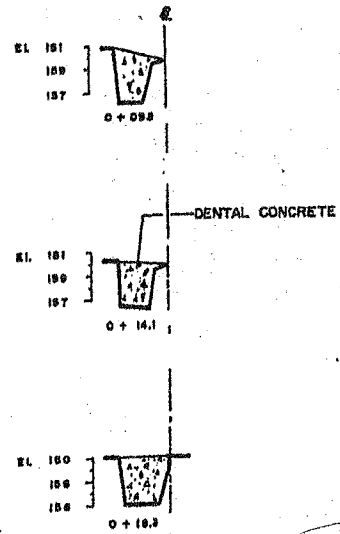


PLAN
TREATMENT OF ZONE A
AT "J" LINE



SECTIONS

TREATMENT OF ZONE A
AT "N" & "Mh" LINES



SECTIONS

TREATMENT OF ZONE A
AT "J" LINE

ACE Clarification:
Fracture Fingers
Extend Down From
Horizontal Fractures

**AEC SHOULD HAVE CHOSEN
AN ALTERNATIVE SITE
FOR LIMERICK NUCLEAR PLANT**

**HOWEVER
AEC'S DRAFT ENVIRONMENTAL STATEMENT
SHOWS THAT COST CONSIDERATIONS
PRE-EMPTED PUBLIC SAFETY CONCERNS**

- The Atomic Energy Commission's 1972 DRAFT ENVIRONMENTAL STATEMENT shows that AEC knew in 1972 that the site chosen for Limerick Nuclear Plant was in an area that had experienced earthquakes.
- AEC considered alternative sites, however chose the Limerick site due to economic considerations, downplaying the earthquake risks.
 - **AEC did not choose an alternative site, due to what Philadelphia Electric considered:**
 - ✓ **Irrecoverable Costs**
 - ✓ **New Site Capitol Costs**
 - ✓ **Purchase Power Costs Due To Construction Delay**
 - **Costs Were Based On Philadelphia Electric (PE) Estimates
See Attached Table 12.4**
 - ✓ **PE Saved An Estimated \$201 to \$236 Million In Projected Losses**
 - ✓ **That decision costs PE/PECO ratepayers the lions' share of \$6.8 Billion Reported In 1997**

**AEC's 1972 Environmental Statement
Downplays Possible Earthquake Hazard By
Failing to Mention the Sanatoga Fault Under the Limerick site.**

The real reason that an alternative site was not chosen for Limerick Nuclear Plant

DRAFT ENVIRONMENTAL STATEMENT
Issued: December 1972
by the
DIRECTORATE OF LICENSING
UNITED STATES ATOMIC ENERGY COMMISSION
related to the
LIMERICK GENERATING STATION
UNITS 1 AND 2
PHILADELPHIA ELECTRIC COMPANY
Docket Nos. 50-352 and 50-353

A nuclear plant on fault fractures Limerick Nuclear Plant should have never been built!

12.3.3 Alternative Site

Abandonment of the Limerick site in favor of one of the alternative sites would entail a two year (minimum) delay and numerous additional monetary and environmental costs. The monetary penalty of an alternate site would be composed mainly of three factors: a) irrecoverable costs of site preparation activities at the Limerick site, b) new site capital costs greater than original Limerick site capital costs, and c) purchase of power during the delay period necessitated by starting with another site. The applicant's estimate of these economic penalties are given in Table 12.4.

The environmental impact of station construction at an alternative site selected now would be greater than at the Limerick site since it would be in addition to site preparation activities which have already occurred at the Limerick site.

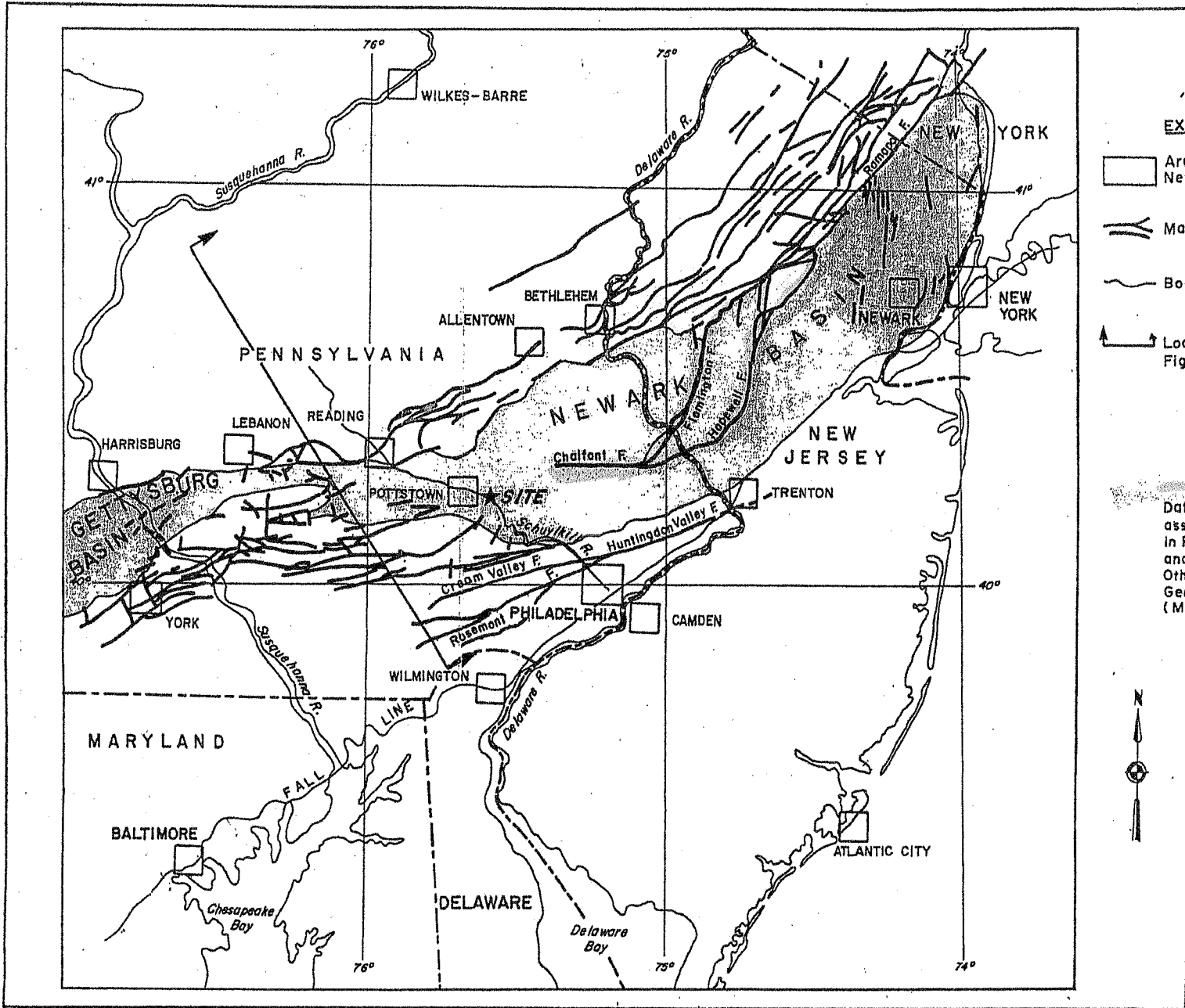
An assessment of the environmental impact of station operation at an alternative site would require a more thorough analysis of the ecological community at a specific site. Operation of the station at the Limerick site is acceptable ecologically.

The staff concludes that on balance the additional monetary and ecological costs associated with relocating the station at an alternative site are greater than any benefits to be gained by this action.

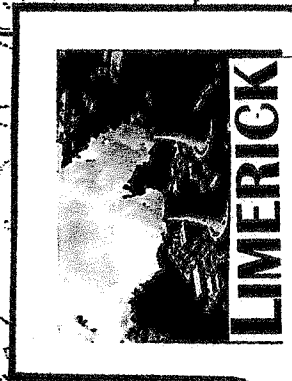
Table 12.4 Economic penalty for alternative site

	Penalty compared with Limerick (millions of dollars)
Irrecoverable costs	60
Additional capital costs	45-80
1976 and 1977 energy	96
Total penalty	201-236

**This Is The Deceptive Map, Sent By Mr. Rosebrook, NRC
To A Resident Who Wanted To Know The Closest Fault To Limerick
OMITTING THE SANATOGA FAULT UNDER LIMERICK**

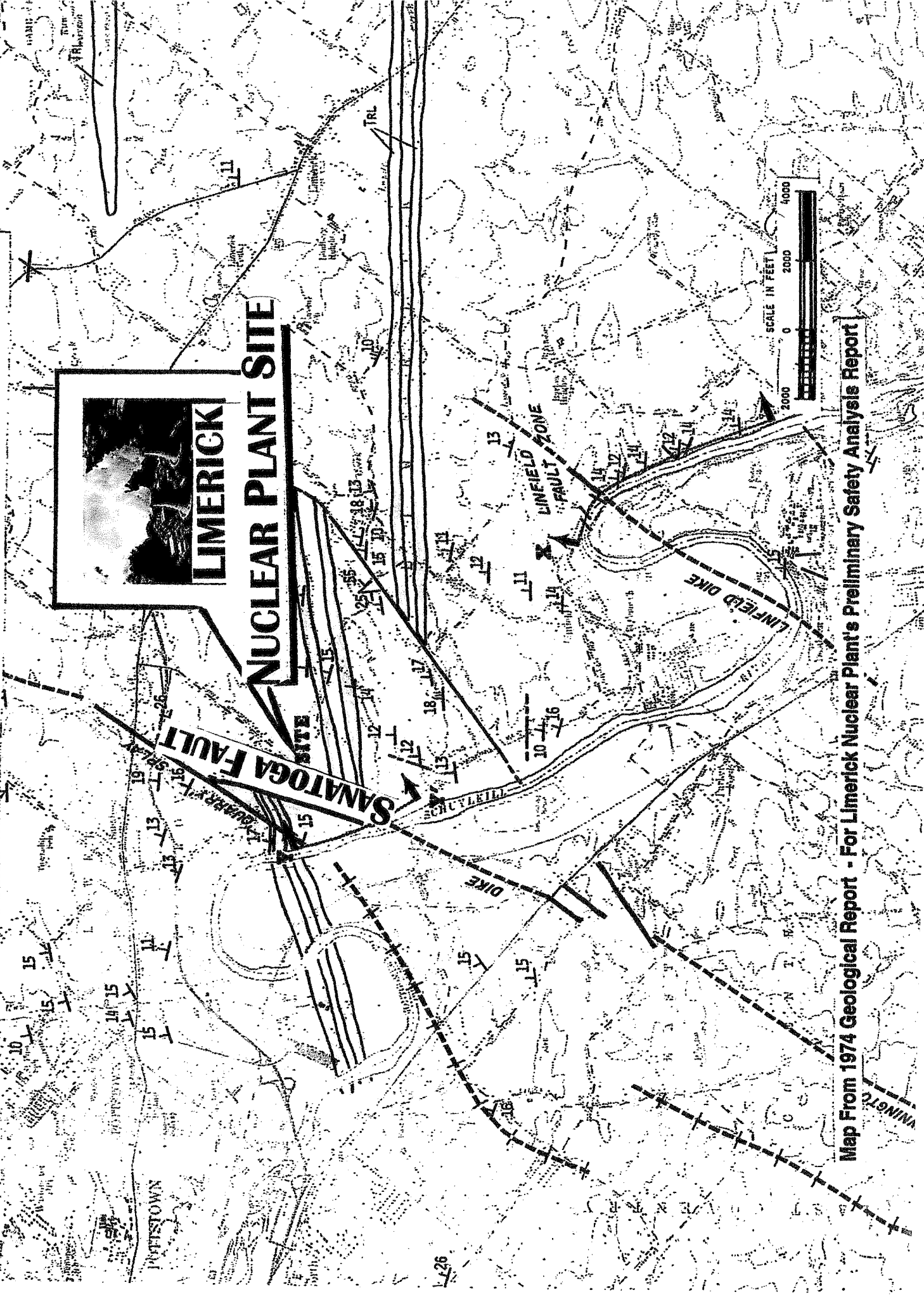


NUCLEAR PLANT SITS ON SANATOGA FAULT



LIMERICK

NUCLEAR PLANT SITE



Map From 1974 Geological Report - For Limerick Nuclear Plant's Preliminary Safety Analysis Report

OPINION

PottsmMerc.com

FACEBOOK: Pottstown Mercury
TWITTER: @MercuryX

Awarded the Pulitzer Prize for spot news photography in 1979 and editorial writing in 1990.

ANOTHER VIEW

Limerick nuke plant should be shut down

Exelon is considering closing some of its nuclear plants early. Limerick should be near the top of the list for nuclear plants to be closed.

Last month, we found Bechtel's 1974 report on the "Treatment of Fracture Zones" at Limerick. A diagram shows Sanatoga Fault zone fractures running directly under a Limerick reactor. Photos show portions of the fault being filled with cement to level the surface so the plant could be built on top.

Limerick's risks aren't just limited to the fact that Limerick is third on the nation's earthquake risk list and has the second-most populated evacuation zone in the nation. Yet, NRC has refused requests to update Limerick's outdated earthquake analysis, clinging to its 1983 stance based on 40-year-old information from a time when earthquake risks were less understood, less frequent and less severe.

Guest Columnist

In 2011, NRC lied by omission when it provided a resident with a map which showed only off-site faults and that failed to include the fault under Limerick.

It wasn't until 2012, after residents showed NRC officials Limerick's 1974 Geologic Survey map illustrating the Sanatoga Fault running under the Limerick site, that NRC officials finally acknowledged its existence. Then NRC claimed the fault had been factored into its 1983 earthquake analysis. If so, why did NRC omit the fault under Limerick from the map it sent to the resident?

A Penn State Geo-expert who reviewed the 1974 Geologic Survey map saw indications that the fault under Limerick could be pretty big. She suggested that a more accurate picture of what's going on down there is possible using new equipment, but it wouldn't be free (Mercury May 20, 2012). To date, it hasn't been done.

Limerick's overloaded fuel pools, storing high-level radioactive wastes, sitting on top of Limerick's reactors, which sit on top of fault fractures, present an enormous potential for catastrophe.

Of major concern, Limerick's seismic monitors were inoperable when the Aug. 23, 2011 Virginia earthquake shook Limerick Nuclear Plant. For a year and four months before the quake, Exelon had been promising to fix the seismic moni-

toring system, but never did. Inoperable on Aug. 23, 2011, Limerick's seismic monitors could not confirm the quake. Exelon had to call the USGS to confirm the quake. NRC cited Exelon with a violation.

Incredibly, Exelon created a contradictory report claiming that Limerick's seismic monitors worked as soon as vibrations were felt in the control room.

Additionally, GE Hitachi repeatedly warned Limerick to test its GE Mark II Boiling Water Reactors because they may fail to shut down safely if running at low power when a quake hits. Fortunately, Limerick Units 1 and 2 were operating at 100 percent power when the Virginia quake hit Limerick.

Our risks are multiplied by NRC's refusal to inspect any Limerick underground infrastructure. NRC is relying on Limerick's gauges and monitors to reveal problems in the miles of nearly 30-year-old inaccessible buried pipes and cables under the Limerick site.

An AP report reveals that underground leaks can go undetected at nuclear plants for years before discovery. Worse, NRC Safety Reports show that, in addition to Limerick's inoperable seismic monitors, many violations at Limerick have stemmed from other monitors and systems also inoperable for years before they were discovered.

In short, hollow assurances from Exelon and NRC have not, and cannot, fix Limerick's increasing threats to public safety. Even fracking in Pennsylvania and its adjoining states adds to Limerick's earthquake risk.

One reason Exelon cites for early nuclear plant closure is political support. (Cooper report July 17, 2013 and Mercury July 19, 2013.) Our politicians should speak up now to close Limerick Nuclear Plant early to protect the safety and economic future of the Greater Philadelphia Region.

For more information see www.acereport.org: Section 11 "Earthquake Risks." For political contact information, see "Recent Posts" - Video Blog, "Elected Officials Must Take Action." Contact elected officials today.

BETTY and CHARLIE SHANK
Pottstown