

Energy

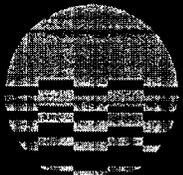
Indian Point Energy Center

Groundwater Investigation

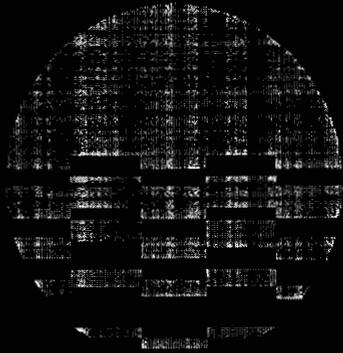
March 28, 2006

Agenda

- Introduction Fred Dacimo, Entergy
- Overview of Investigation Don Mayer, Entergy
- Indian Point Site Hydrology Matt Barvenik, GZA
- Monitoring Program Don Mayer, Entergy
- Next Steps Don Mayer, Entergy



Entergy



Amtegy

Groundwater Investigation

Don Mayer

Director, Special Projects

Indian Point Looking South Along the Hudson River



5th Street Well

Quarry

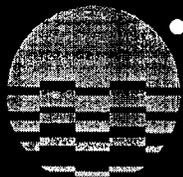
Gypsum Plant

Algonquin Outfall

Groundwater Investigation Overview

Identification of Leak from IP2 Spent Fuel Pool

- Hairline settlement cracks identified in Fuel Storage Building wall during excavation for new gantry crane
 - Moisture in crack tested for radioactivity
 - Radionuclides characteristic of spent fuel pool identified in sample
 - Leakage collected, sampled, and trended
 - Permanent leak collection box designed and installed
 - Leakage from crack has stopped
- Tested existing wells on site for radioactivity
- Tested off-site wells and water supplies for radioactivity—none detected



Entergy



Monitoring Well Investigation

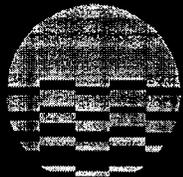
Phase 1 Investigation

Installed 9 new wells to determine groundwater characteristics around IP2
All wells drilled and sampled

Phase 2 Investigation

Will install approximately 14 wells in phase 2 to characterize ground water flow on site
12 of 14 wells completed
2 in progress

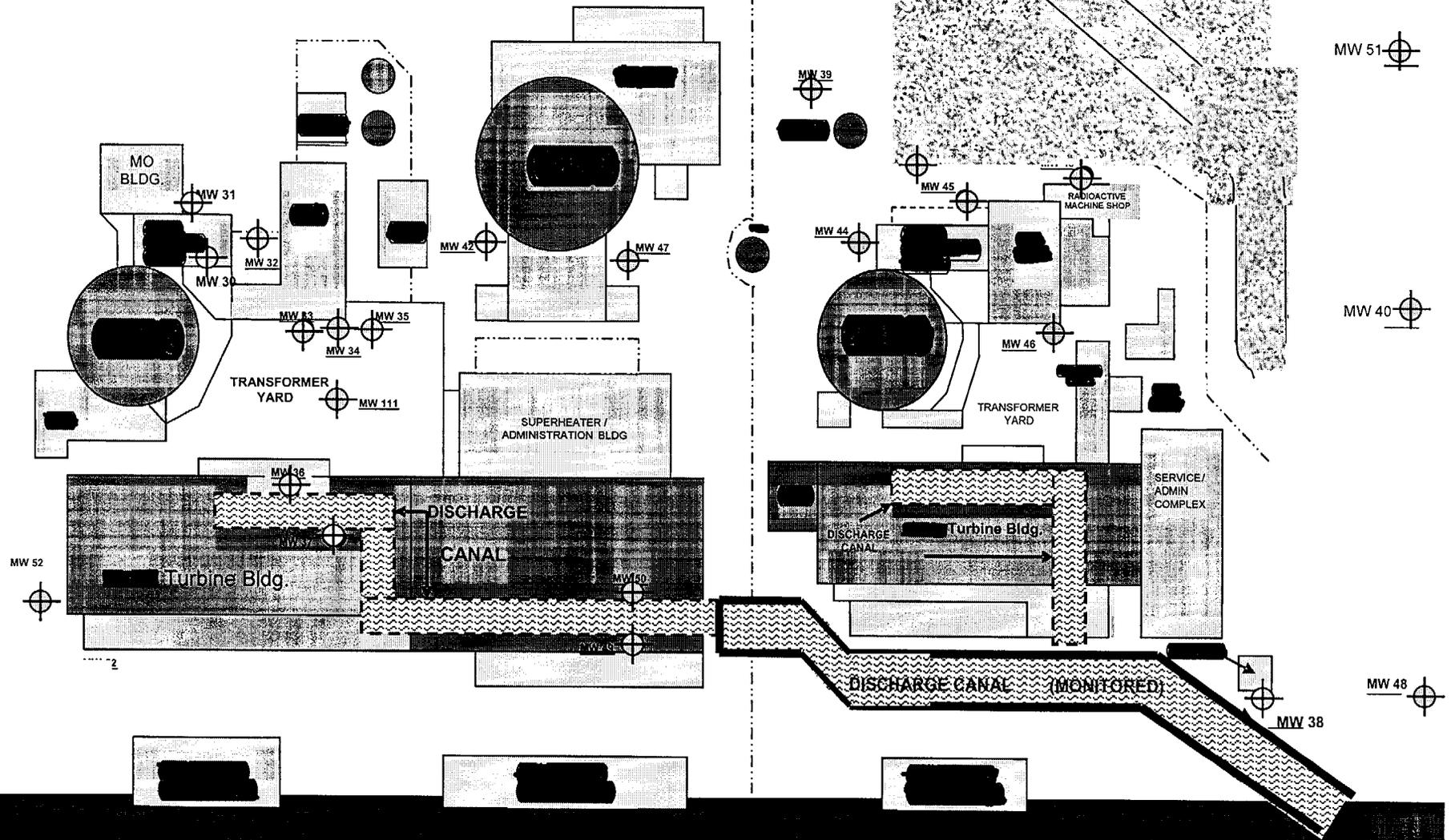
Expanded sampling program to include storm drains
Conducting split sample program with NRC and DEC



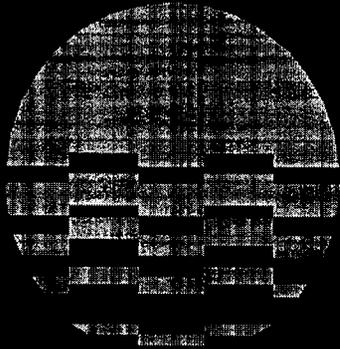
Entergy



Monitoring Well Locations



HUDSON RIVER



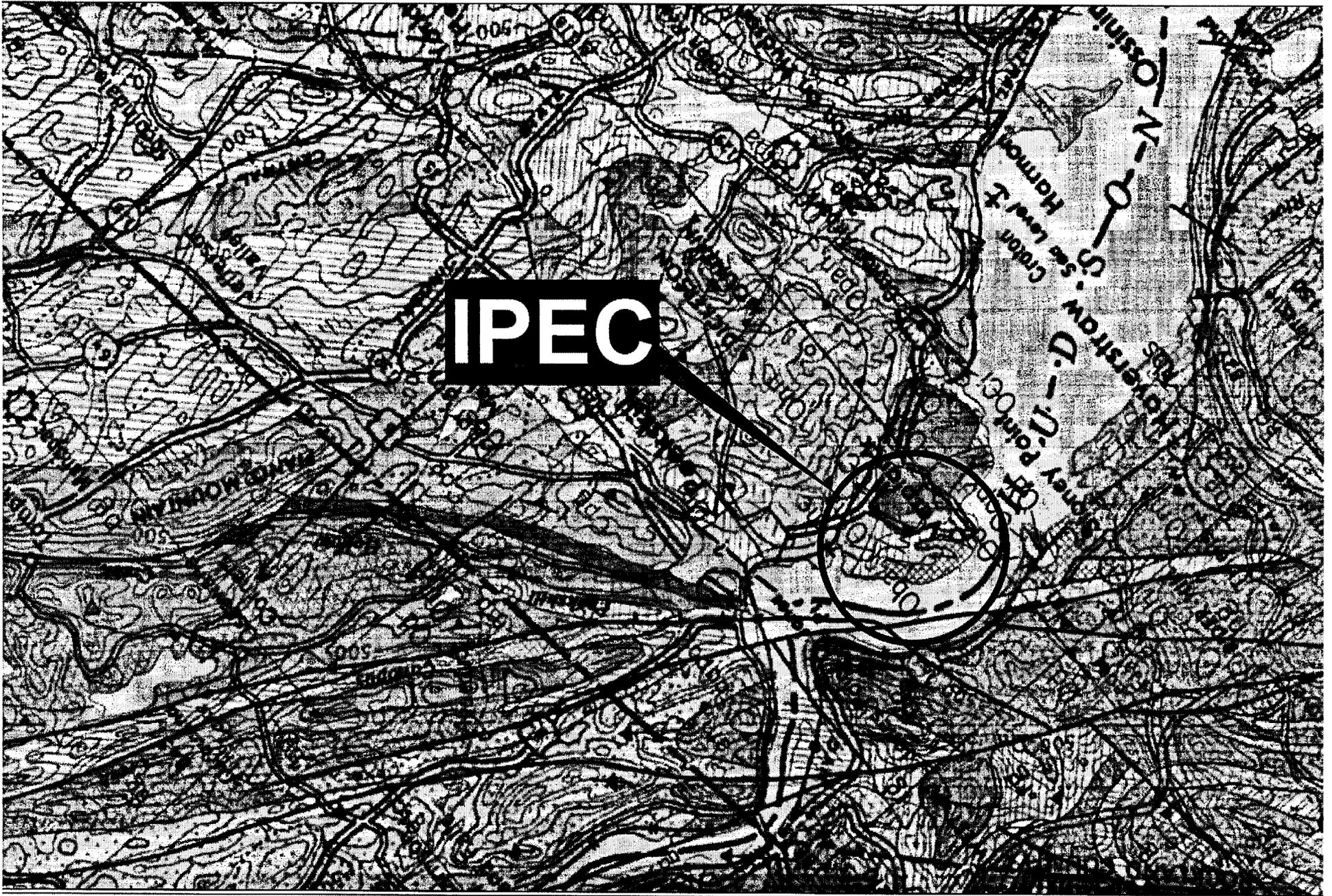
Antergy

Ground Water Hydrology

Matt Barvenik

Senior Vice President

GZA



IPEC



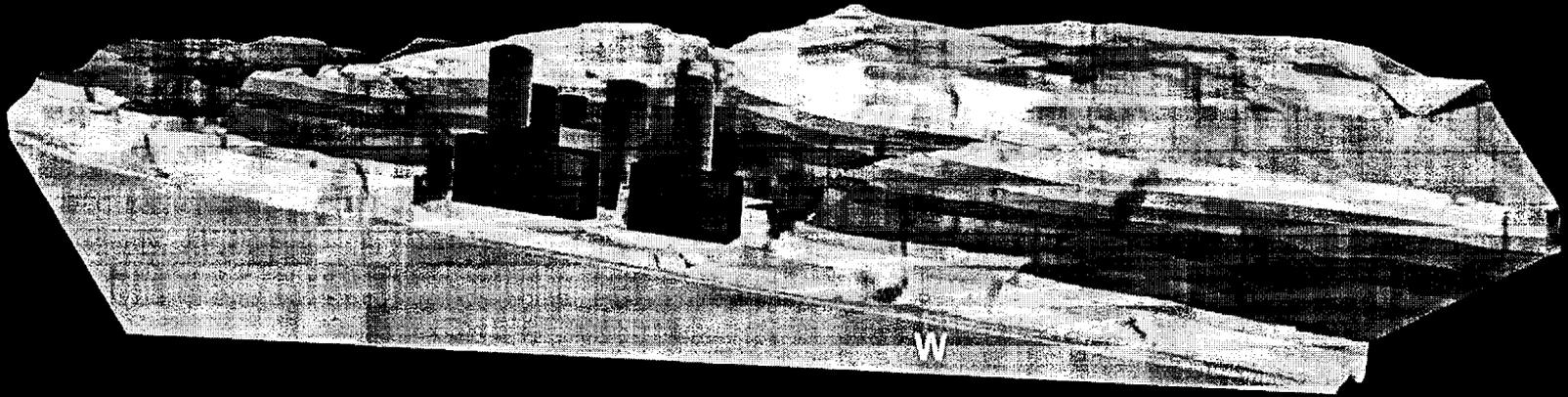
GEOLOGIC MAP OF NEW YORK, LOWER HUDSON SHEET,
REPRINTED 1995, NEW YORK STATE MUSEUM AND
SCIENCE SERVICE, MAP AND CHART SERIES NO. 15.



USGS BEDROCK GEOLOGY

INDIAN POINT ENERGY CENTER, BUCHANON, NEW YORK

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CAMP FIELD RESERVOIR
LOCATED 3 MILES NORTHEAST
OF SITE AT ELEVATION 370'

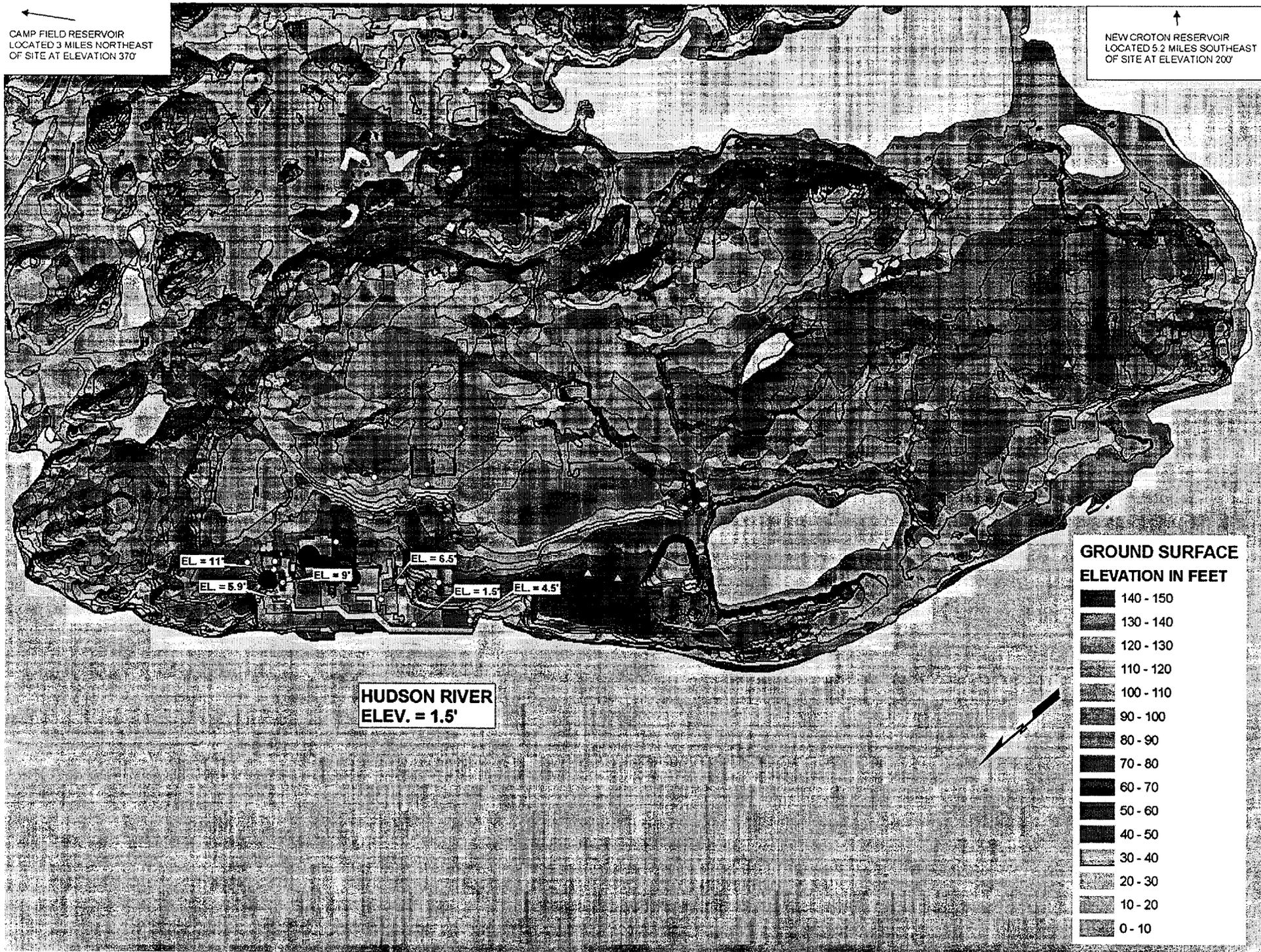
NEW CROTON RESERVOIR
LOCATED 5.2 MILES SOUTHEAST
OF SITE AT ELEVATION 200'



HUDSON RIVER
ELEV. = 1.5'

CAMP FIELD RESERVOIR
LOCATED 3 MILES NORTHEAST
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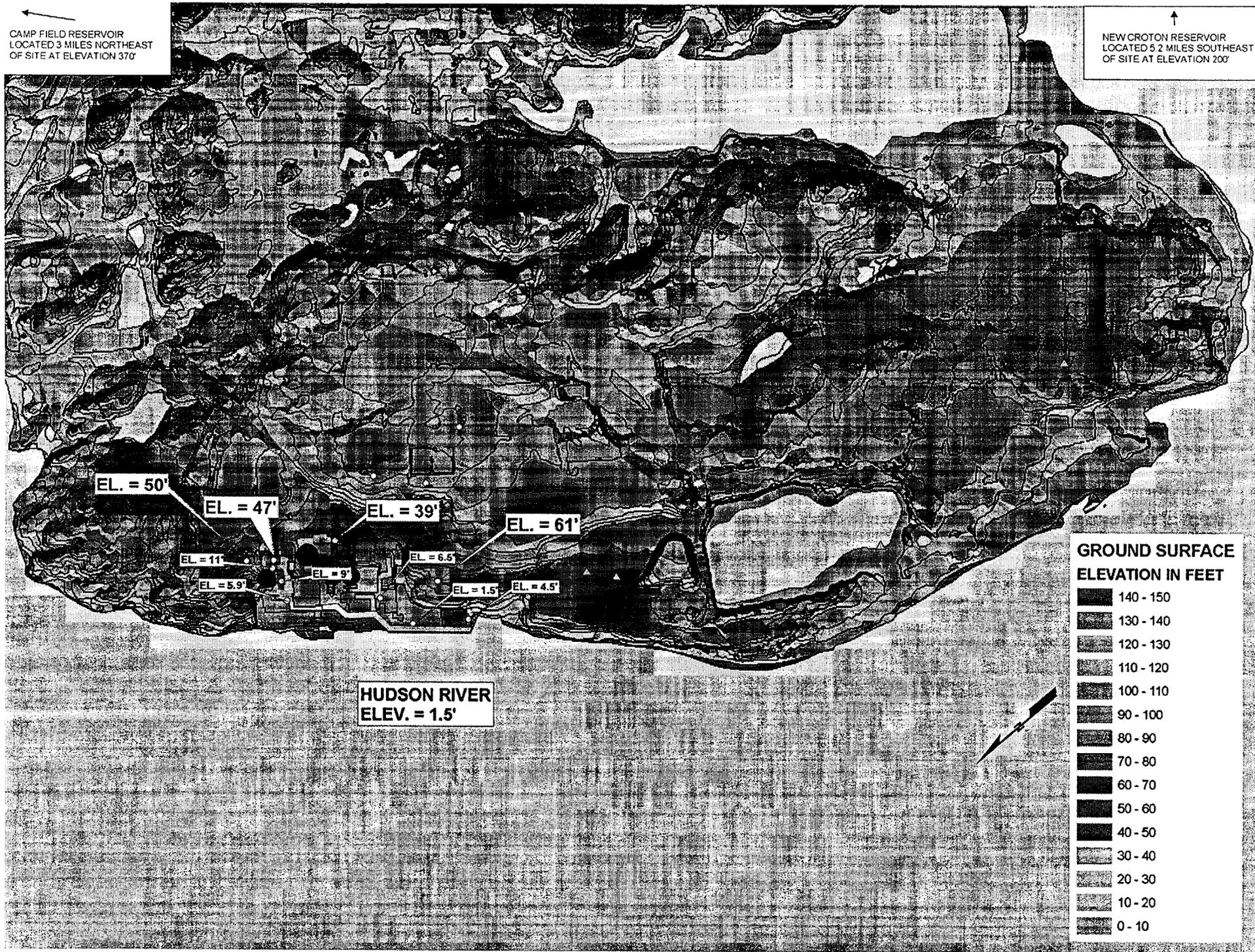
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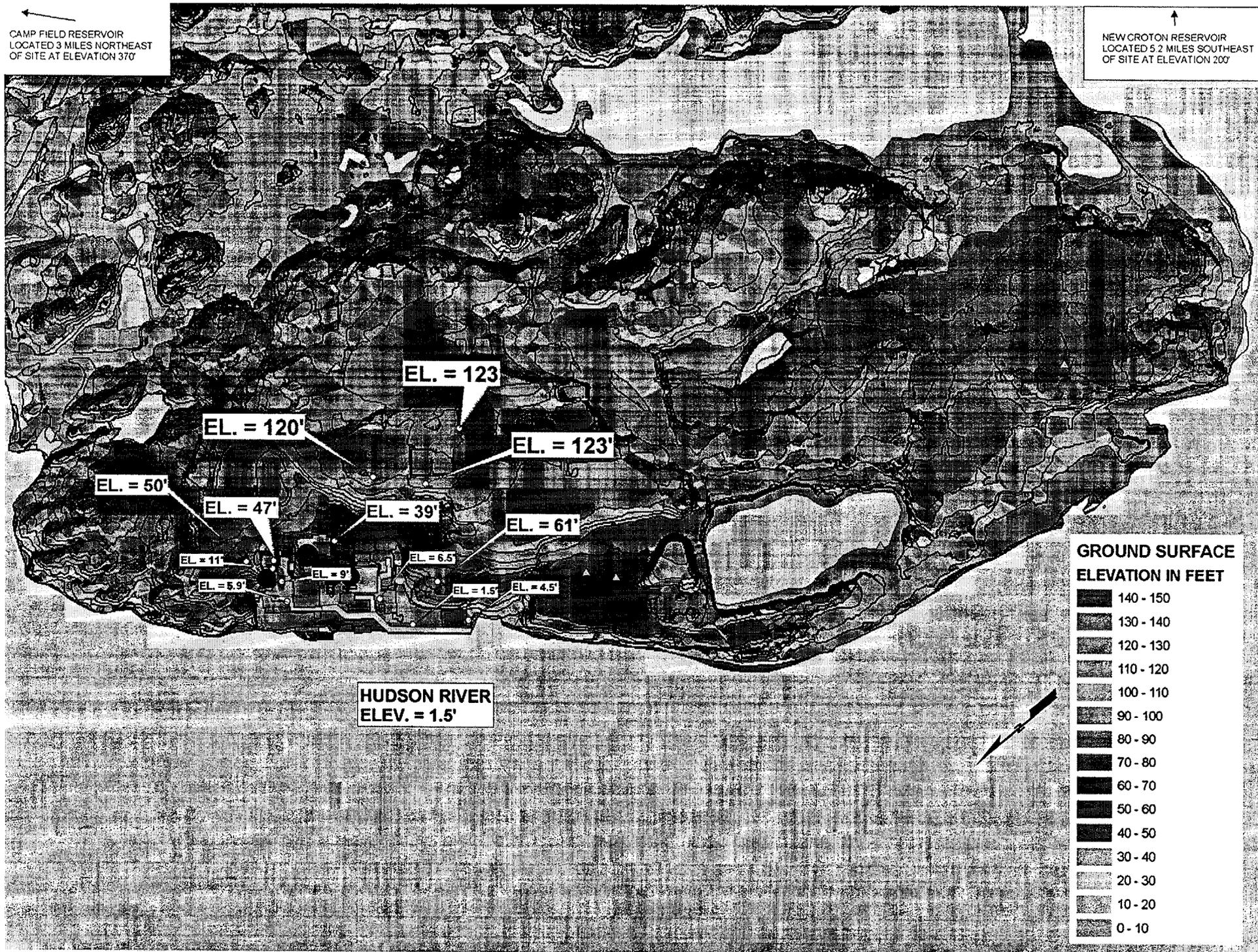
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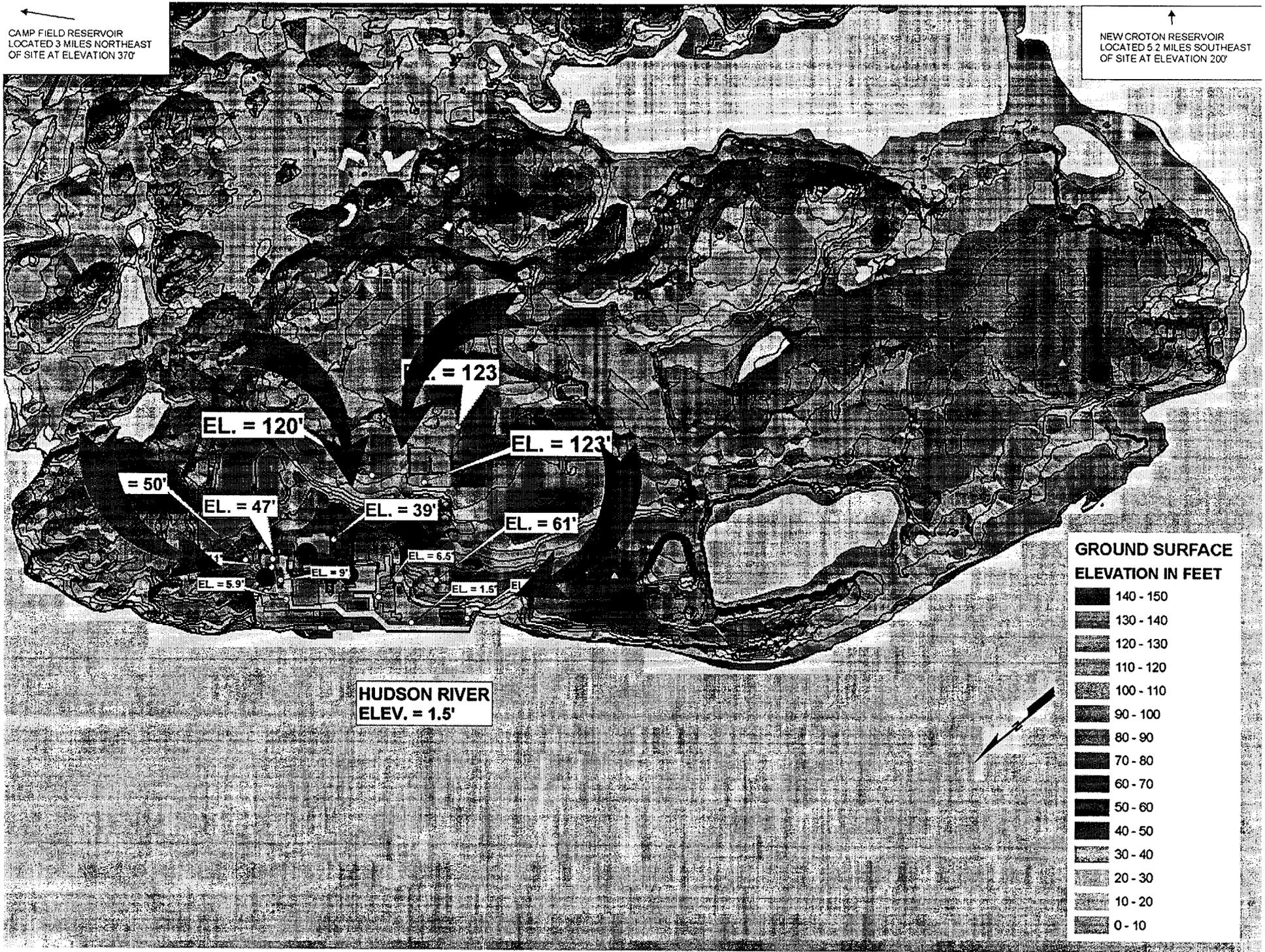
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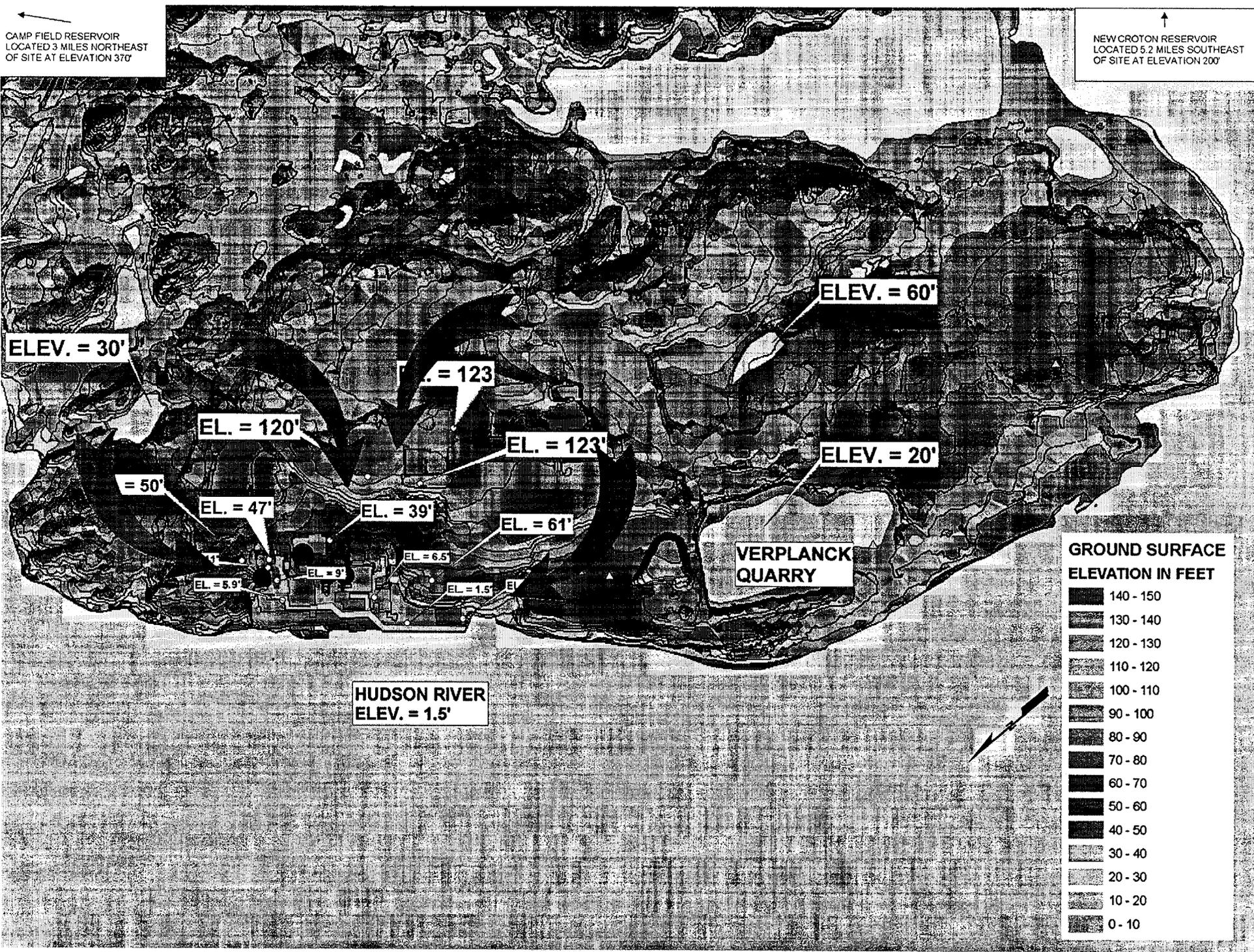
HUDSON RIVER
ELEV. = 1.5'

**GROUND SURFACE
ELEVATION IN FEET**

- 140 - 150
- 130 - 140
- 120 - 130
- 110 - 120
- 100 - 110
- 90 - 100
- 80 - 90
- 70 - 80
- 60 - 70
- 50 - 60
- 40 - 50
- 30 - 40
- 20 - 30
- 10 - 20
- 0 - 10

CAMP FIELD RESERVOIR
LOCATED 3 MILES NORTHEAST
OF SITE AT ELEVATION 370'

NEW CROTON RESERVOIR
LOCATED 5.2 MILES SOUTHEAST
OF SITE AT ELEVATION 200'



ELEV. = 30'

ELEV. = 60'

EL. = 120'

ELEV. = 123'

EL. = 123'

ELEV. = 20'

ELEV. = 50'

EL. = 47'

EL. = 39'

EL. = 61'

EL. = 5.9'

EL. = 9'

EL. = 6.5'

EL. = 1.5'

VERPLANCK
QUARRY

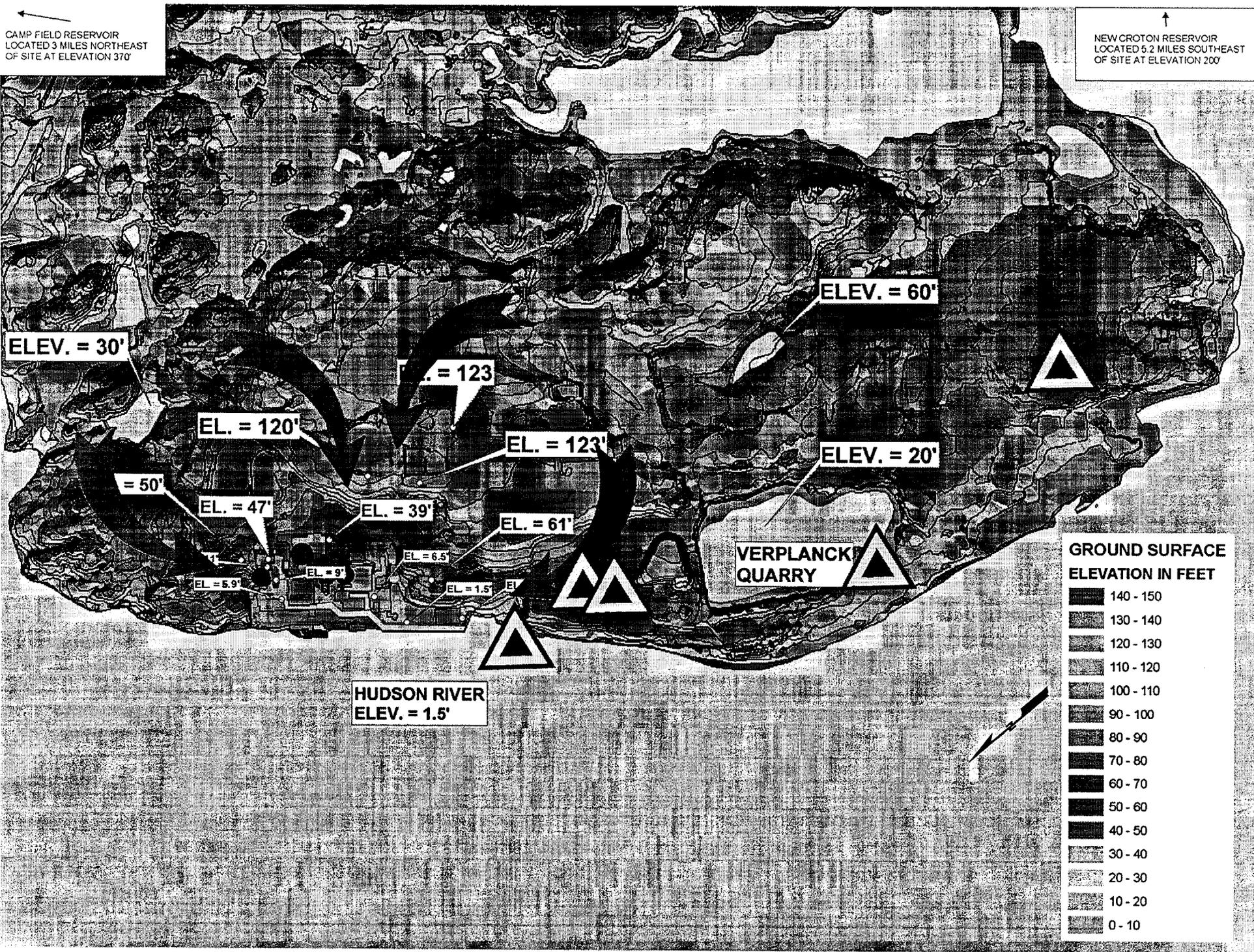
HUDSON RIVER
ELEV. = 1.5'

**GROUND SURFACE
ELEVATION IN FEET**

[Dark Grey Swatch]	140 - 150
[Medium-Dark Grey Swatch]	130 - 140
[Medium Grey Swatch]	120 - 130
[Light-Medium Grey Swatch]	110 - 120
[Light Grey Swatch]	100 - 110
[Very Light Grey Swatch]	90 - 100
[Dark Swatch]	80 - 90
[Medium-Dark Swatch]	70 - 80
[Medium Swatch]	60 - 70
[Light-Medium Swatch]	50 - 60
[Light Swatch]	40 - 50
[Very Light Swatch]	30 - 40
[Darkest Swatch]	20 - 30
[Lightest Swatch]	10 - 20
[White Swatch]	0 - 10

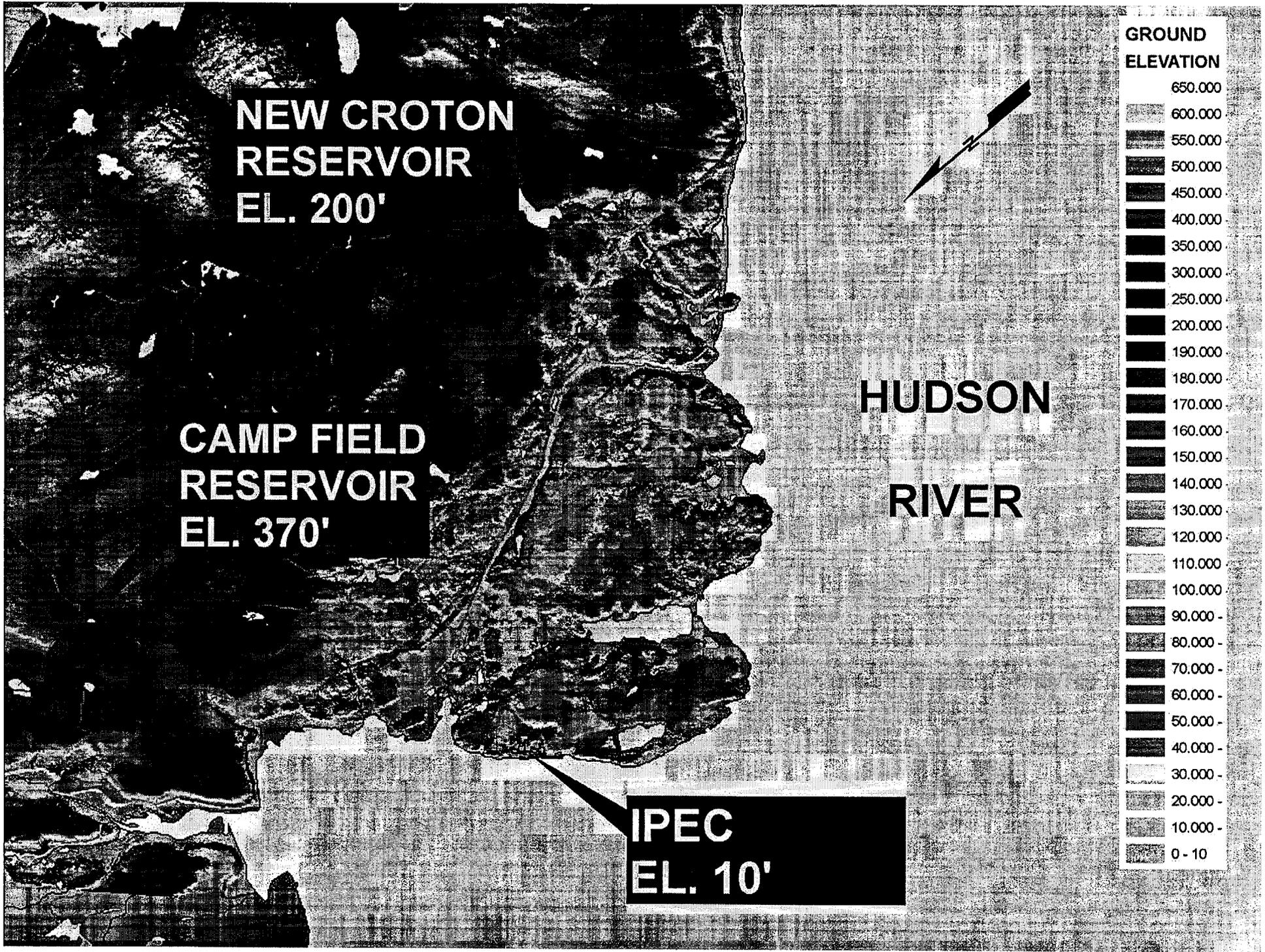
CAMP FIELD RESERVOIR
LOCATED 3 MILES NORTHEAST
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NEW CROTON RESERVOIR
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**GROUND SURFACE
ELEVATION IN FEET**

- 140 - 150
- 130 - 140
- 120 - 130
- 110 - 120
- 100 - 110
- 90 - 100
- 80 - 90
- 70 - 80
- 60 - 70
- 50 - 60
- 40 - 50
- 30 - 40
- 20 - 30
- 10 - 20
- 0 - 10



**NEW CROTON
RESERVOIR
EL. 200'**

**CAMP FIELD
RESERVOIR
EL. 370'**

**IPEC
EL. 10'**

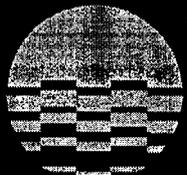
**HUDSON
RIVER**

GROUND ELEVATION	
[Lightest Gray]	650.000
[Light Gray]	600.000
[Medium-Light Gray]	550.000
[Medium Gray]	500.000
[Medium-Dark Gray]	450.000
[Dark Gray]	400.000
[Very Dark Gray]	350.000
[Black]	300.000
[Black]	250.000
[Black]	200.000
[Black]	190.000
[Black]	180.000
[Black]	170.000
[Black]	160.000
[Black]	150.000
[Black]	140.000
[Black]	130.000
[Black]	120.000
[Black]	110.000
[Black]	100.000
[Black]	90.000 -
[Black]	80.000 -
[Black]	70.000 -
[Black]	60.000 -
[Black]	50.000 -
[Black]	40.000 -
[Black]	30.000 -
[Black]	20.000 -
[Black]	10.000 -
[Black]	0 - 10

Groundwater Investigation

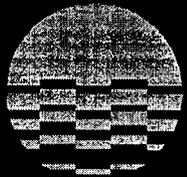
Spent Fuel Pool Liner Inspection

- Unit 2 SFP constructed of 4-6 feet of steel re-enforced concrete with a ¼” Stainless Steel Liner
- Divers and remote video cameras employed to inspect accessible areas of pool (cask loading area and above the fuel racks)
- Preliminary scoping inspection (video) of spent fuel pool floor
- Evaluating capabilities of vendors to inspect inaccessible walls and floor
- Inspection found 6 indications
- All 6 areas leak tested and repaired with coating



Unit 1 Investigation

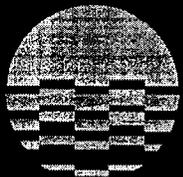
- Leak of IP1 spent fuel pool identified in the 1990's
- Leakage is collected, monitored and released in accordance with our state and federal permits
- As part of the on-going investigation, we are installing wells near IP1
- Monitoring wells will be used to help validate our understanding of the hydrology near IP1.
- Entergy has had an on-going program to move IP1 fuel from the pool to dry cask storage and drain the pool



Groundwater Investigation

Results to date- Radiological

- Tritium levels are highest near IP2 spent fuel pool and IP2 transformer yard
- Lower levels of tritium found in other locations including low levels in some storm drainage systems
- Sr-90 found at elevated levels in a well adjacent to discharge canal



Groundwater Investigation

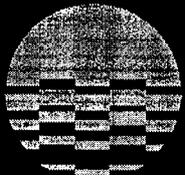
Results to date - Groundwater Movement

Water movement on site has been influenced by construction activities

Groundwater movement on site is generally toward the plants; not away from the plants

Groundwater flow is generally from north to west and south toward Hudson River

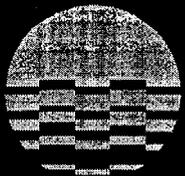
Some contaminants are migrating around or under the discharge canal



Groundwater Investigation

Radiological Impacts

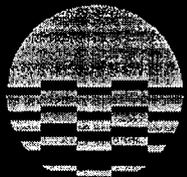
- No impact from groundwater pathway
 - No groundwater drinking water supplies
 - All samples off-site negative for radioactivity
 - Supported by hydrology
- River pathway - well below limits
 - Bounding calculation for river release pathway
 - < 0.1% of regulatory limits
 - Small fraction of natural background



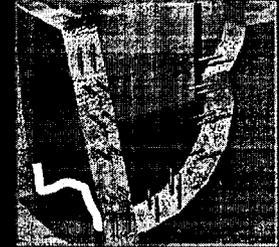
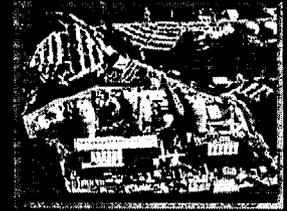
Groundwater Investigation

Next Steps

- Finish development of phase 2 wells to refine conceptual model of groundwater flow
- Conduct tracer tests
- Continue sampling program
- Evaluate mitigation/remediation strategy



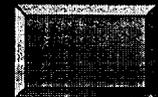
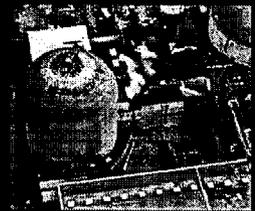
Plant Diagrams Pictures

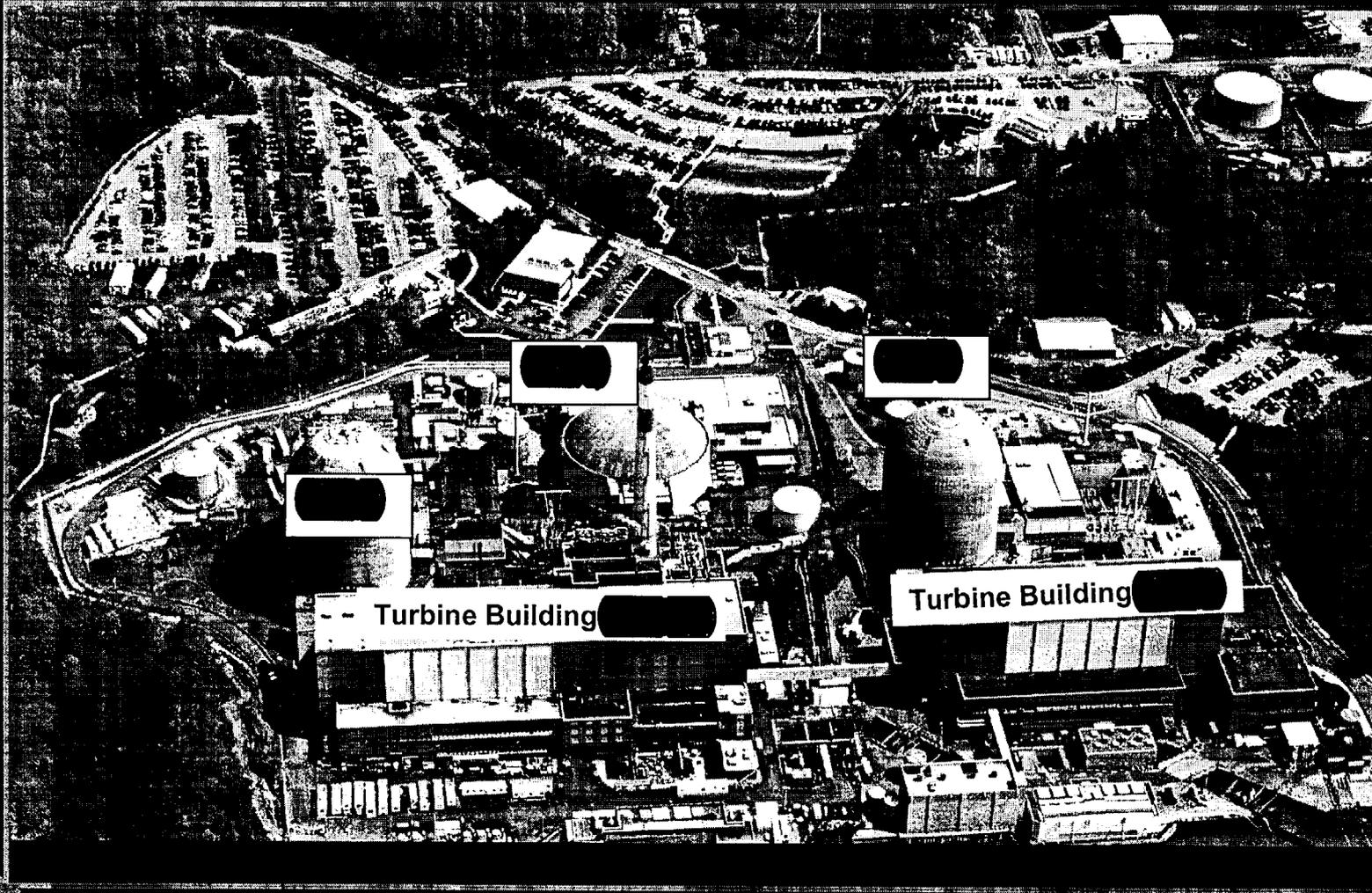
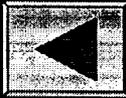


Phase 1

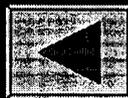
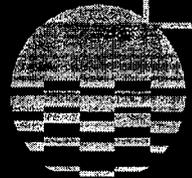


Phase 2

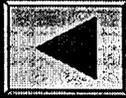




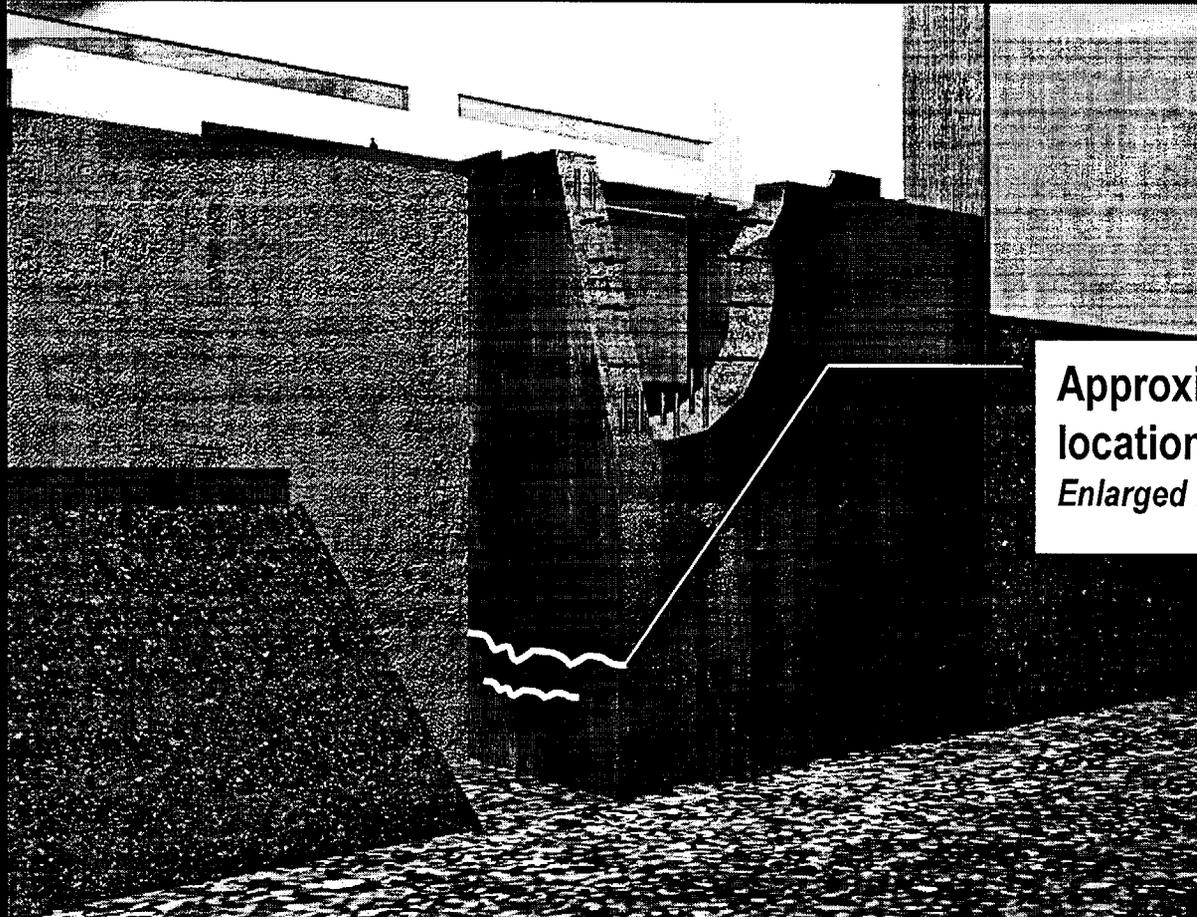
Indian Point Energy Center



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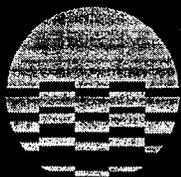
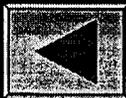


IP2 Loading Bay During Excavation



Artist
depiction
of spent
fuel pool
wall

Approximate
location of cracks.
Enlarged for illustration

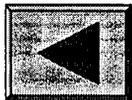
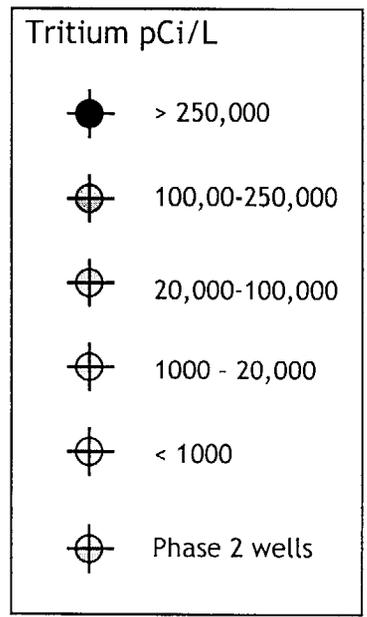
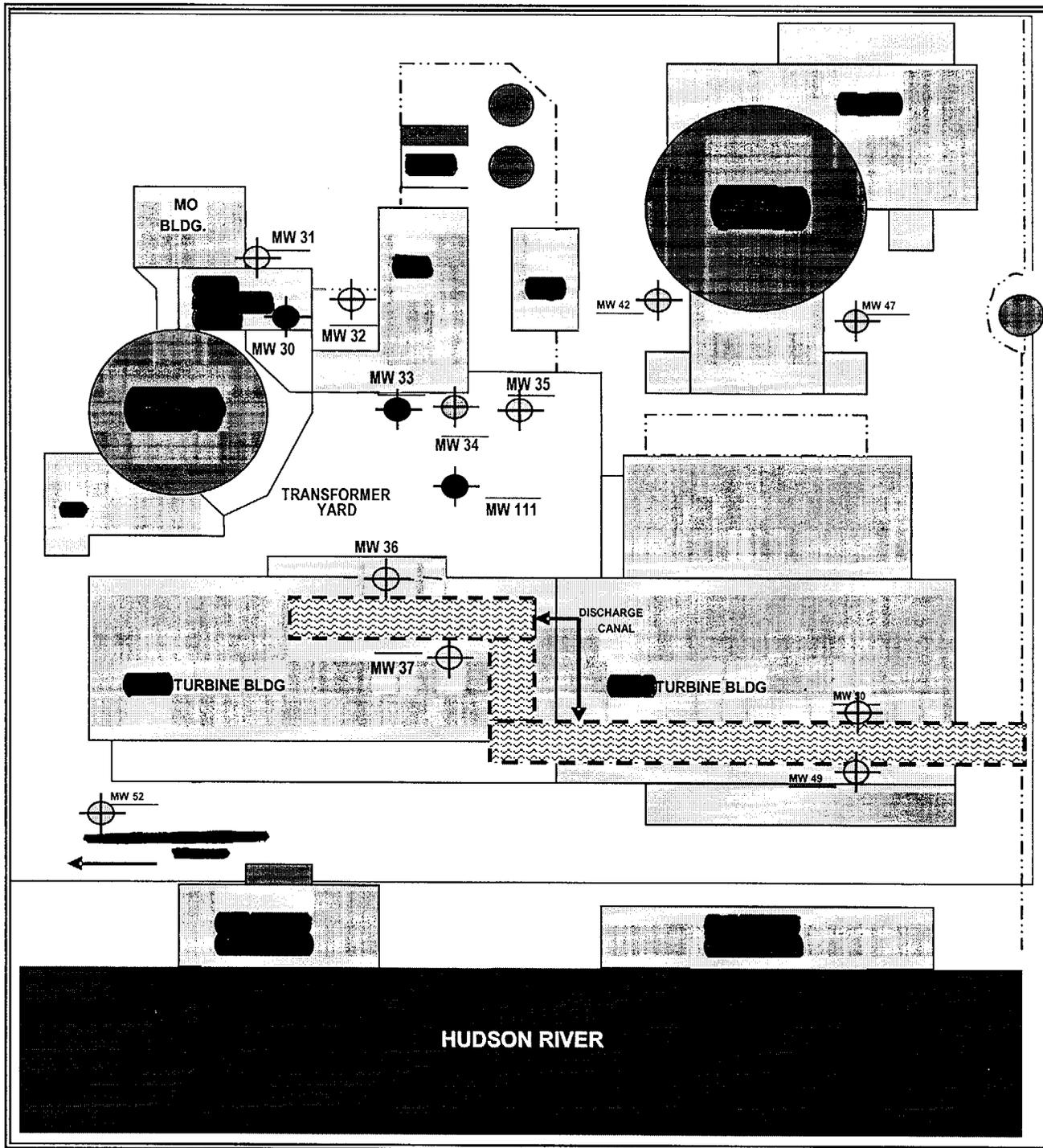


Entergy

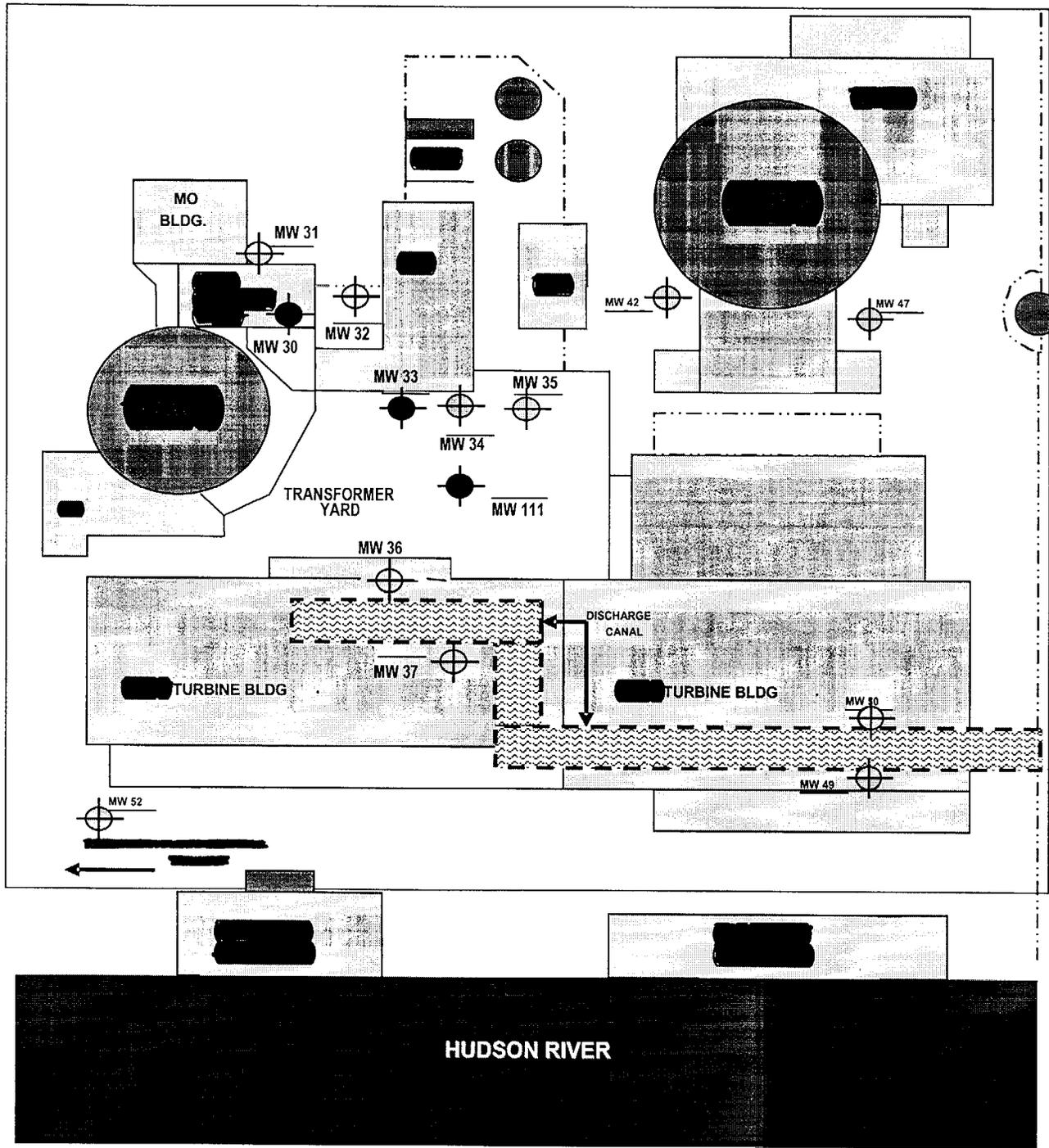
For illustration only



Phase 1 Monitoring Wells

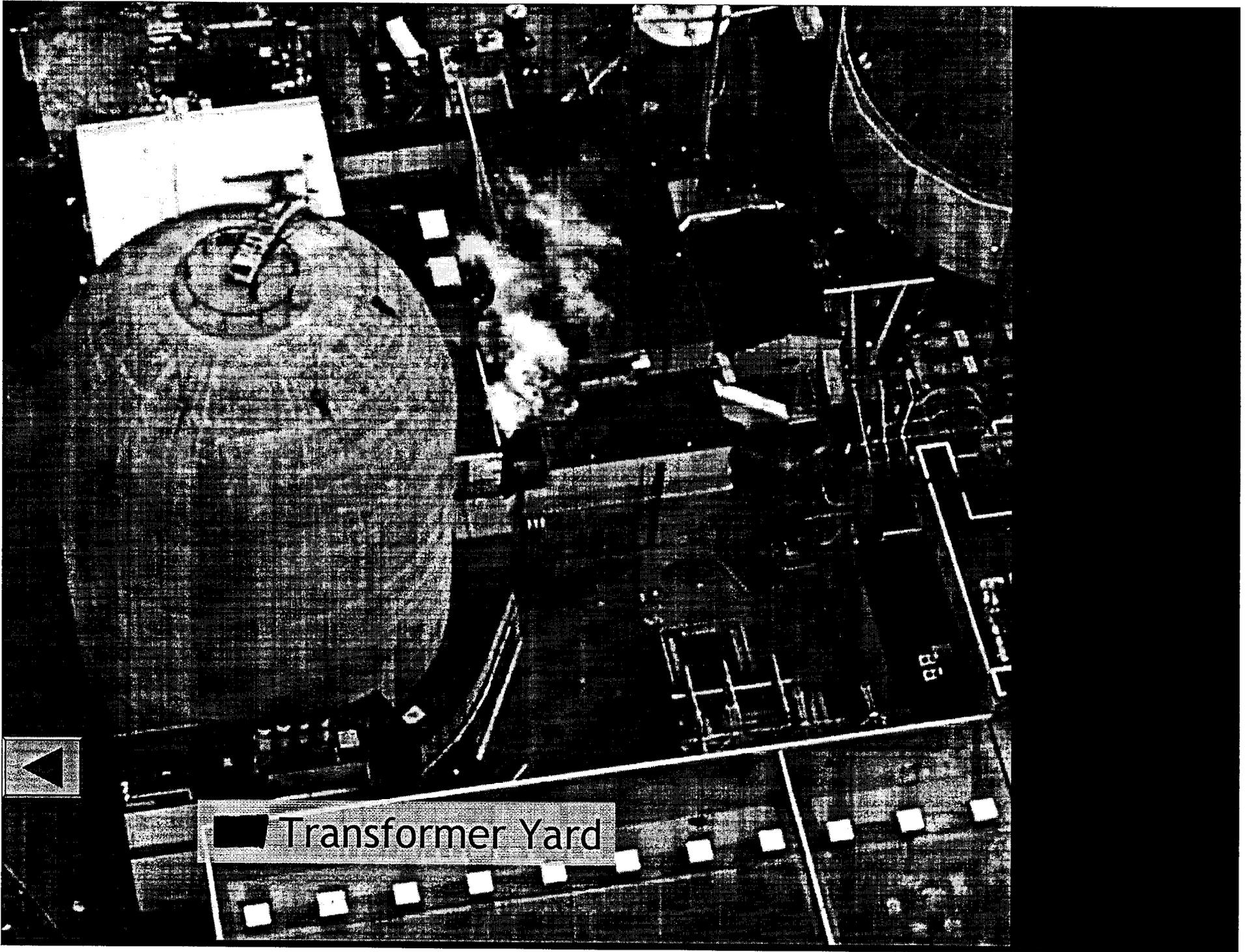


Phase 1 Monitoring Wells



Tritium pCi/L

●	> 250,000
⊕	100,00-250,000
⊕	20,000-100,000
⊕	1000 - 20,000
⊕	< 1000
⊕	Phase 2 wells



Transformer Yard

ID	Date	Location	Sample Results Tritium (pCi/L)	
Monitoring Wells on Site				
MW-111	3/3/06	Transformer Yard	236,000	
MW-30	2/7/06	SFB	511,000	
MW-31	2/7/06	Adjacent to SFB	33,100	
MW-32	2/7/06	SFB Alley Way	17,700	
MW-33	3/3/06	Transformer Yard	253,000	
MW-34	3/3/06	Transformer Yard	230,000	
MW-35	3/3/06	Transformer Yard	119,000	
MW-36	2/27/06	IP2 Turbine building	45,800 @ 41'	
MW-37	2/25/06	IP2 Turbine Building	30,500 @ 32'	
MW-38		South perimeter near IP3		
	3/3/06	Entergy (Teledyne)	2630	ND-Sr
	12/8/05	New York State	701	
	12/8/05	Entergy	985	
MW-48		South perimeter		
	2/10/06	Entergy	ND-HTO	ND-Sr
	2/8/06	New York State	250-HTO	
Off Site Locations (Entergy data)				
	2/8/06	Algonquin/Gypsum	ND-HTO	ND-Sr
	2/8/06	Trap Rock Quarry/Hudson River	ND-HTO	ND-Sr
MW-111 Samples Analyzed for Sr-90				
	9/29/05	Entergy Sr-90	ND	
	10/21/05	New York State - Sr-90	3	

