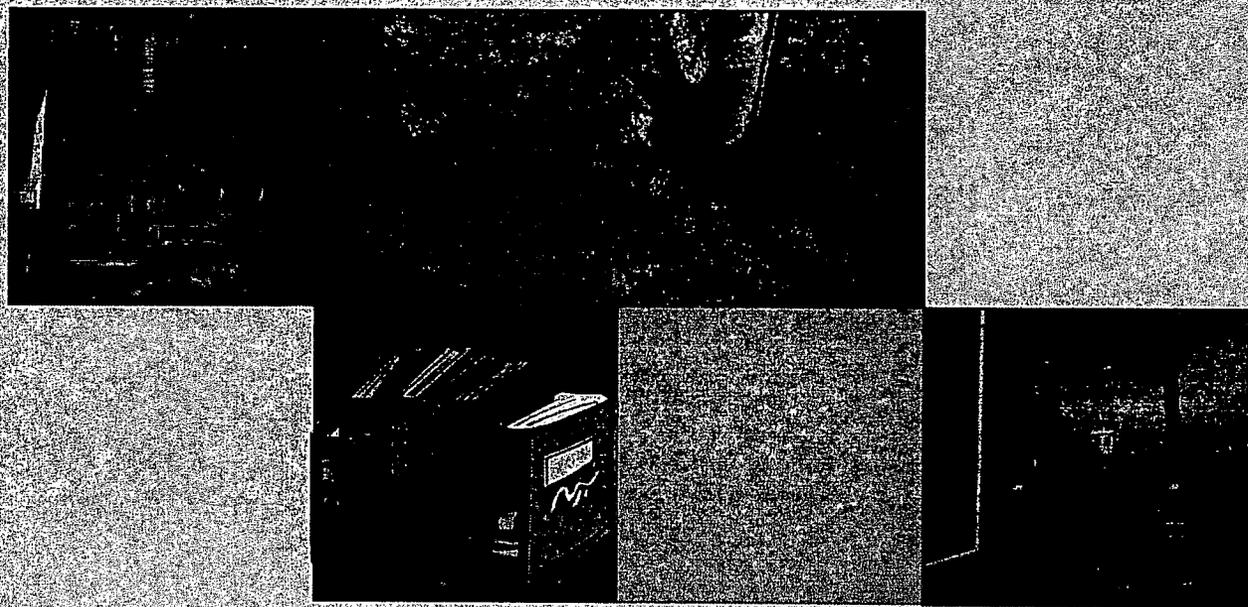


# Stakeholder Briefing



**Indian Point Energy Center**  
**November 15, 2007**

# Agenda

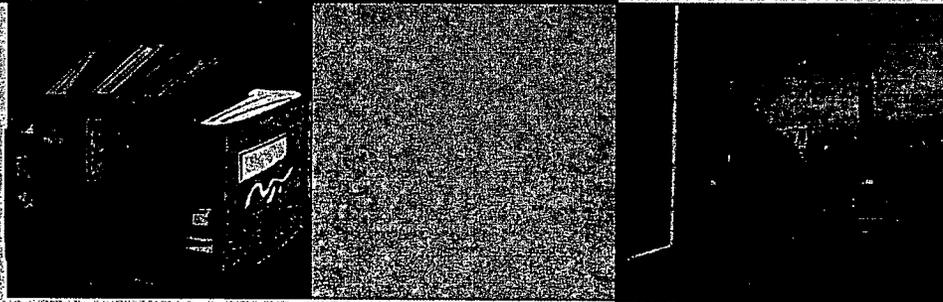
1. Welcome

2. Groundwater Investigation

3. Dry Fuel Storage

4. License Renewal

# Ground Water Investigation



Don Mayer

Director Unit 1 Projects



# Ground Water Investigation Overview

- Identify Source(s) of Contamination
- Assess Impact of Leaks
- Develop Hydrological Model of Site
- Calculate Potential Dose to Public
- Develop Remediation Strategy
- Conclusions



# Indian Point Looking South Along the Hudson River



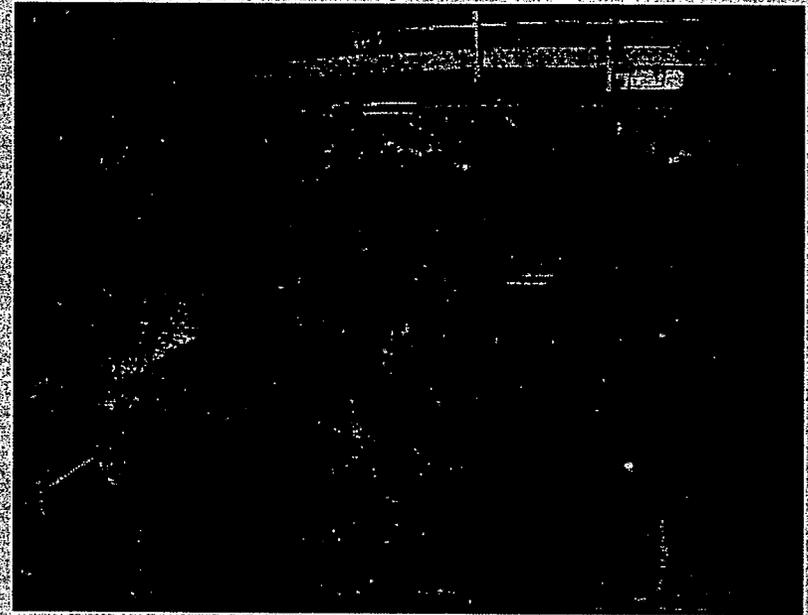
Gypsum  
Plant

Waste  
Water  
Treatment  
Plant

# Identify Sources of Contamination

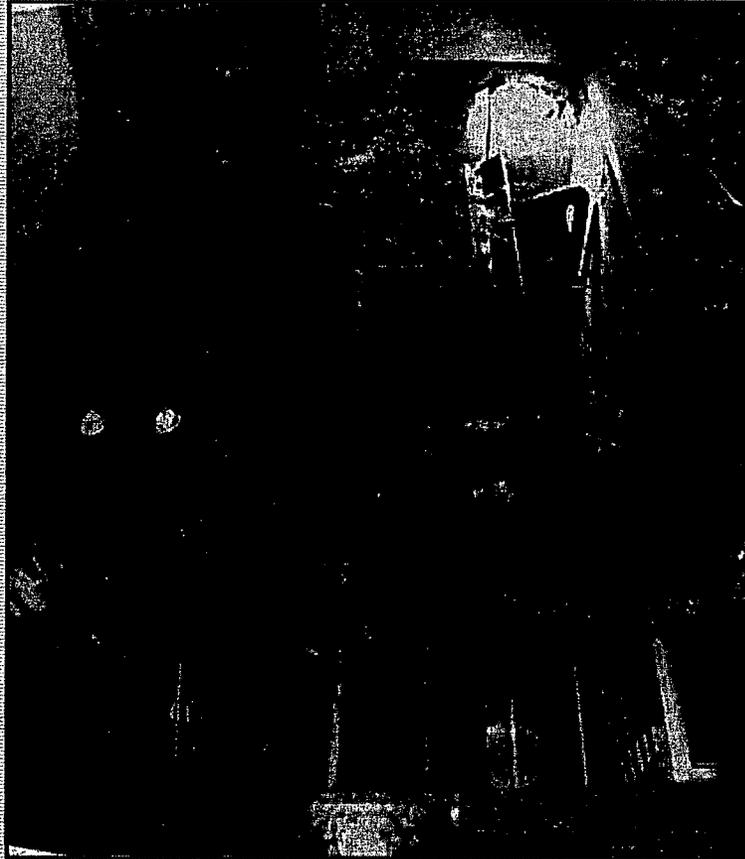
## *IP2 Spent Fuel Pool*

- Hairline concrete shrinkage cracks identified in Fuel Storage Building wall during 2005 excavation for new gantry crane
- Tested existing wells on site for radioactivity- Tritium detected in the IP2 transformer yard
- Tested off-site wells and water supplies for radioactivity—none detected
- Accessible pool wall areas inspected
- After extensive testing a pinhole defect has been identified (Sept 07) in the pool transfer canal



# Identify Sources of Contamination

## *Leak Collection Device – Unit 2*



- Leak collection device installed to capture water seeping from wall crack
- Volume of water has decreased to essentially zero

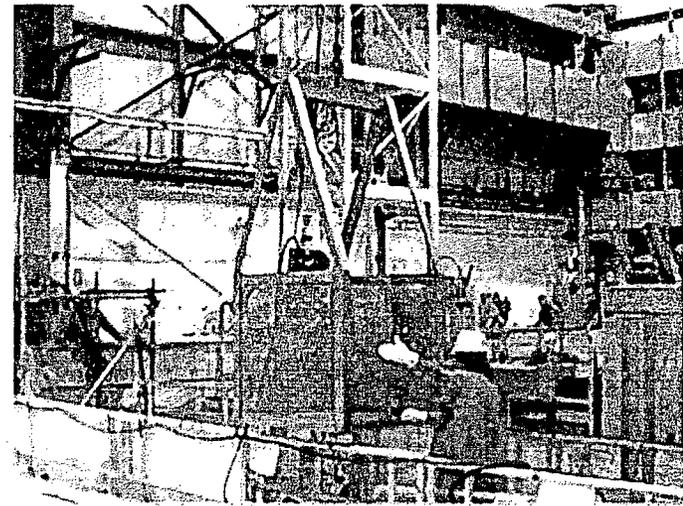
Leak collection  
box



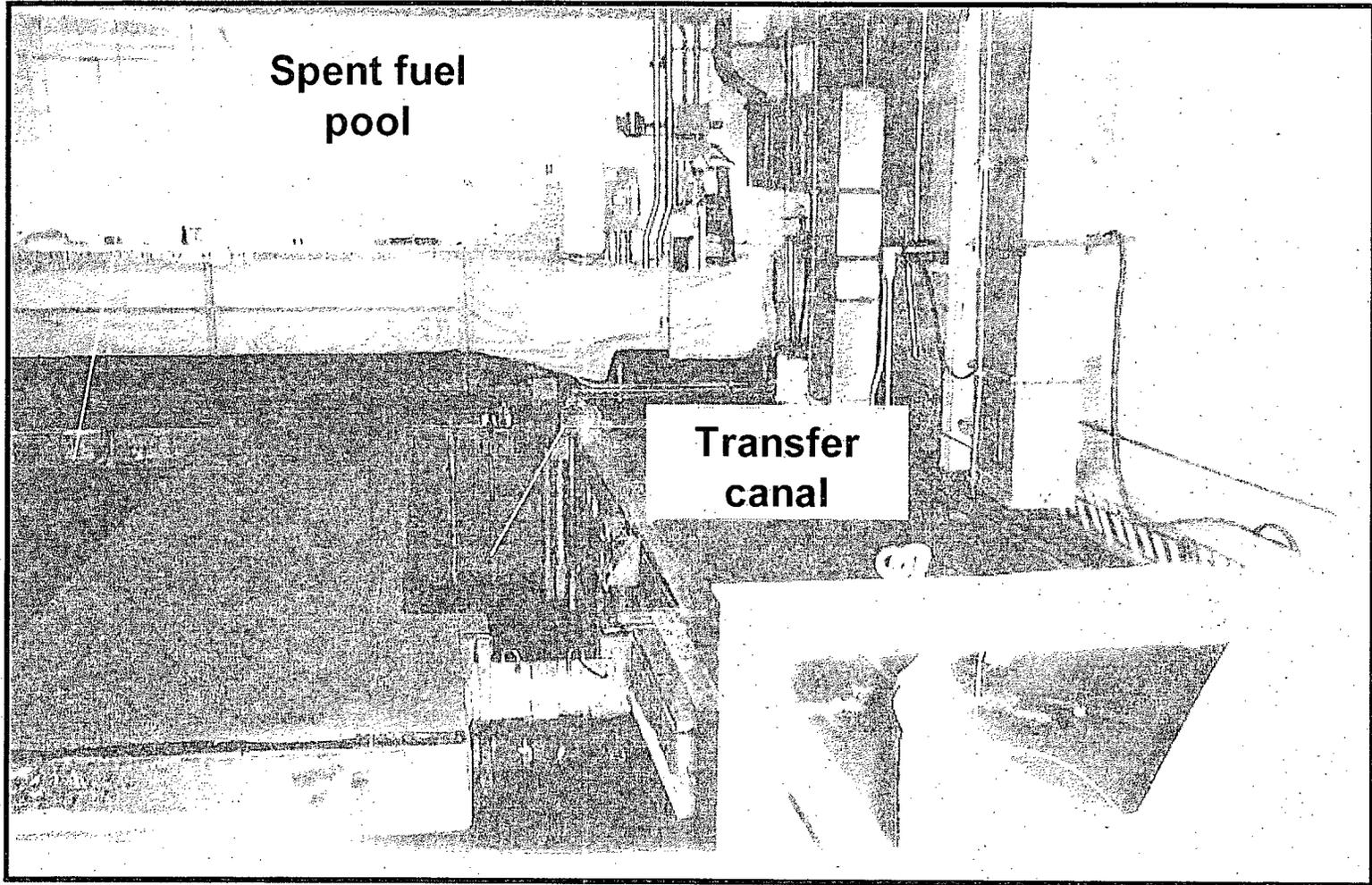
# IP2 Spent Fuel Pool Liner Inspection

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- Inspected accessible portions of liner with divers and remote video camera (2005-2006)
- No leaks detected using visual and vacuum box testing techniques
- Decision made to conduct extensive transfer canal inspections as extension of pool liner
  - Ability to drain and inspect allows even more extensive evaluation for potential degradation mechanisms



# IP2 Transfer Canal



# IP2 Transfer Canal Inspection

## Transfer Canal Inspections

- Evaporation Test
- Microbiologically Influenced Corrosion (MIC) test
- Drained and inspected for bleed back
- Non destructive evaluations
  - Visual
  - Vacuum box
  - Ultrasonic testing
- Identified 1 through-wall “pinhole” leak
  - Preparing repair plan for this defect
- *Did not identify any degradation mechanisms for pool or transfer canal liner (Key finding)*



# Identify Sources of Contamination

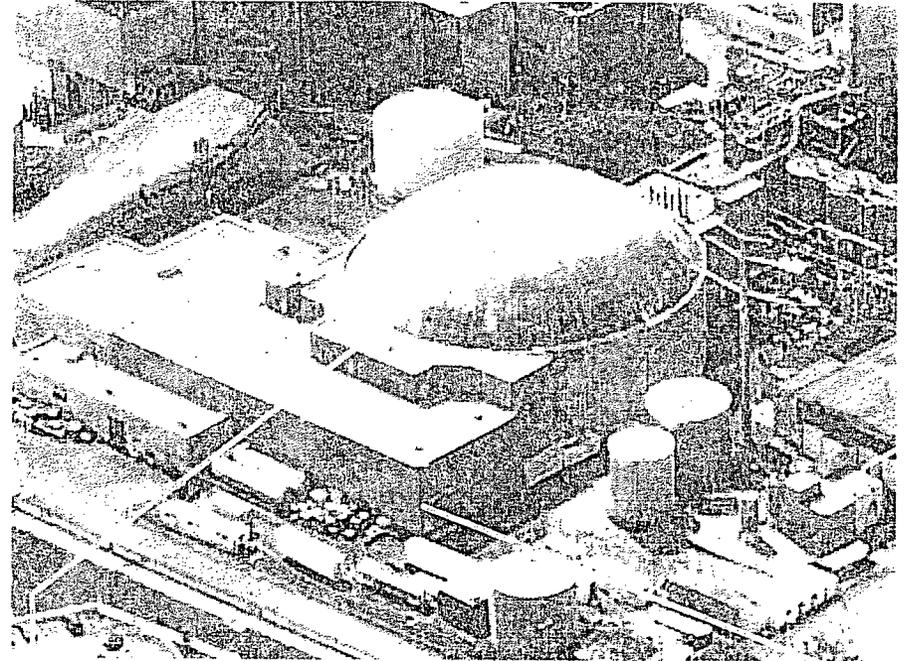
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## *IP1 Spent Fuel Pool*

Leak of IP1 spent fuel pool identified in the 1990's

Footing drains re-routed to allow for collection and monitoring

Investigation finds ( Spring 2006) some contaminants have bypassed footing drains and are present in GW



IP1 containment  
dome

IP1  
spent fuel  
pools

# Major Conclusions of the Study

## *Public Health and Safety*

After two years of testing and investigation, we have concluded that there is no impact to public health and safety or the environment.

- No evidence of offsite contaminants attributable to Indian Point have been observed in surrounding environmental media. This has been confirmed by the independent split sampling and analysis by USNRC and NYDEC.
- The principal exposure pathway to man is Hudson River fish ingestion.
  - No radionuclides have been detected above background in HR fish samples, most recently via a split sampling program by Entergy the NRC and DEC (Hudson River fish study).



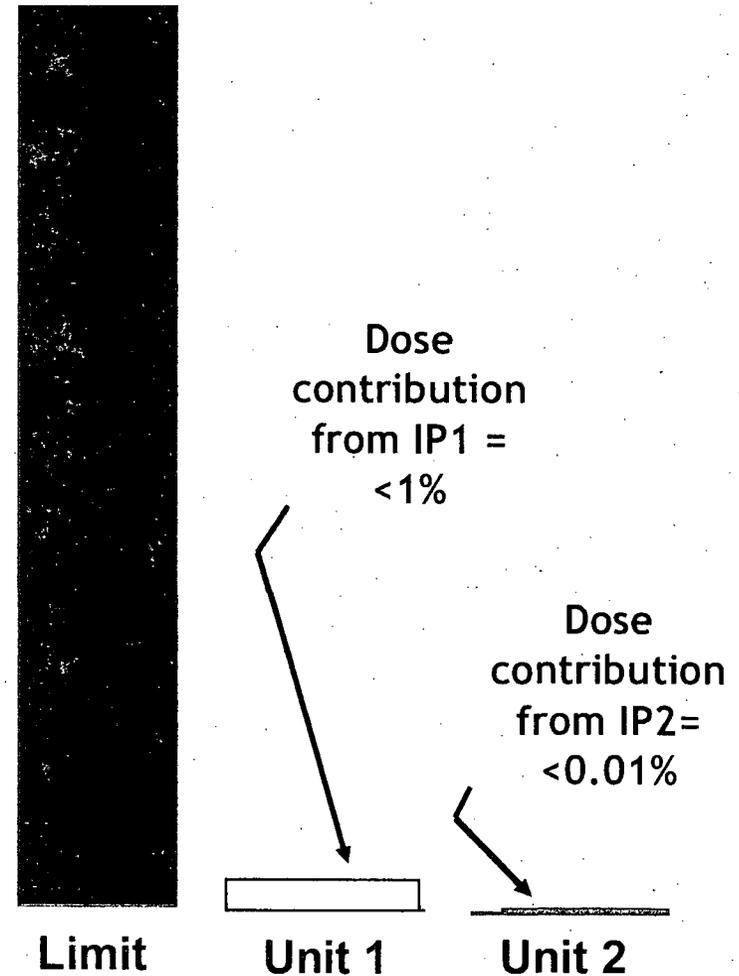
# Calculated Potential Dose Impacts Remain Low

No radioactivity above background found in any off-site drinking water supply or monitoring well

No radioactivity above background in HR fish near plant

Concentrations of radionuclides on site are decreasing

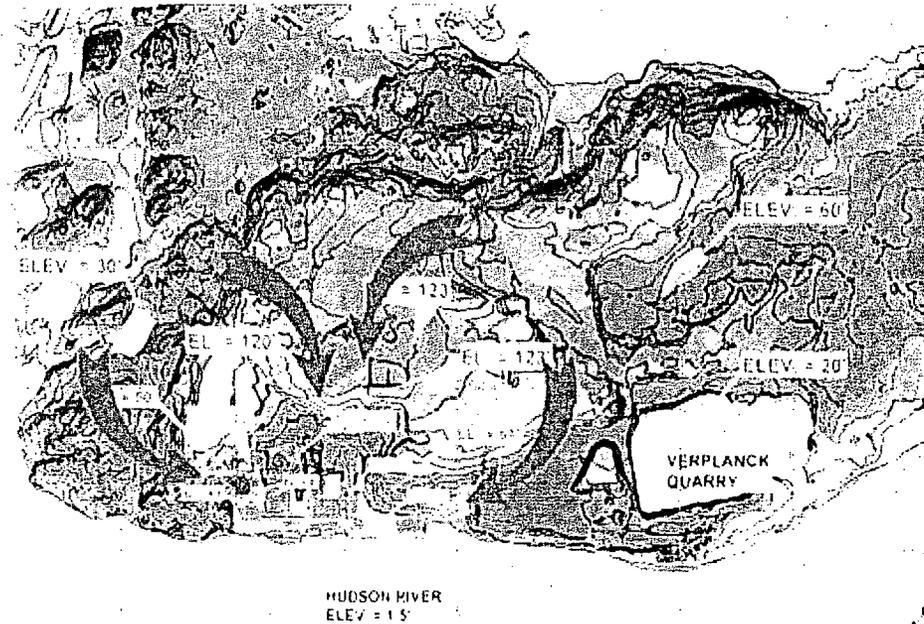
Calculated dose is  $\ll 1\%$  of federal limits



# Major Conclusions of the Study

## *Hydrology*

Geo-hydrological modeling and well testing, both onsite and offsite, show that groundwater is not migrating to offsite properties



# Major Conclusions of the Study

## *Source of the leaks*

### Unit 2 Spent Fuel Pool

1990-1992 leak in liner, which while repaired, resulted in residual local tritium under the pool that contributes to observed ground water concentrations

a pinhole defect in the transfer canal which will be repaired prior to refilling the canal

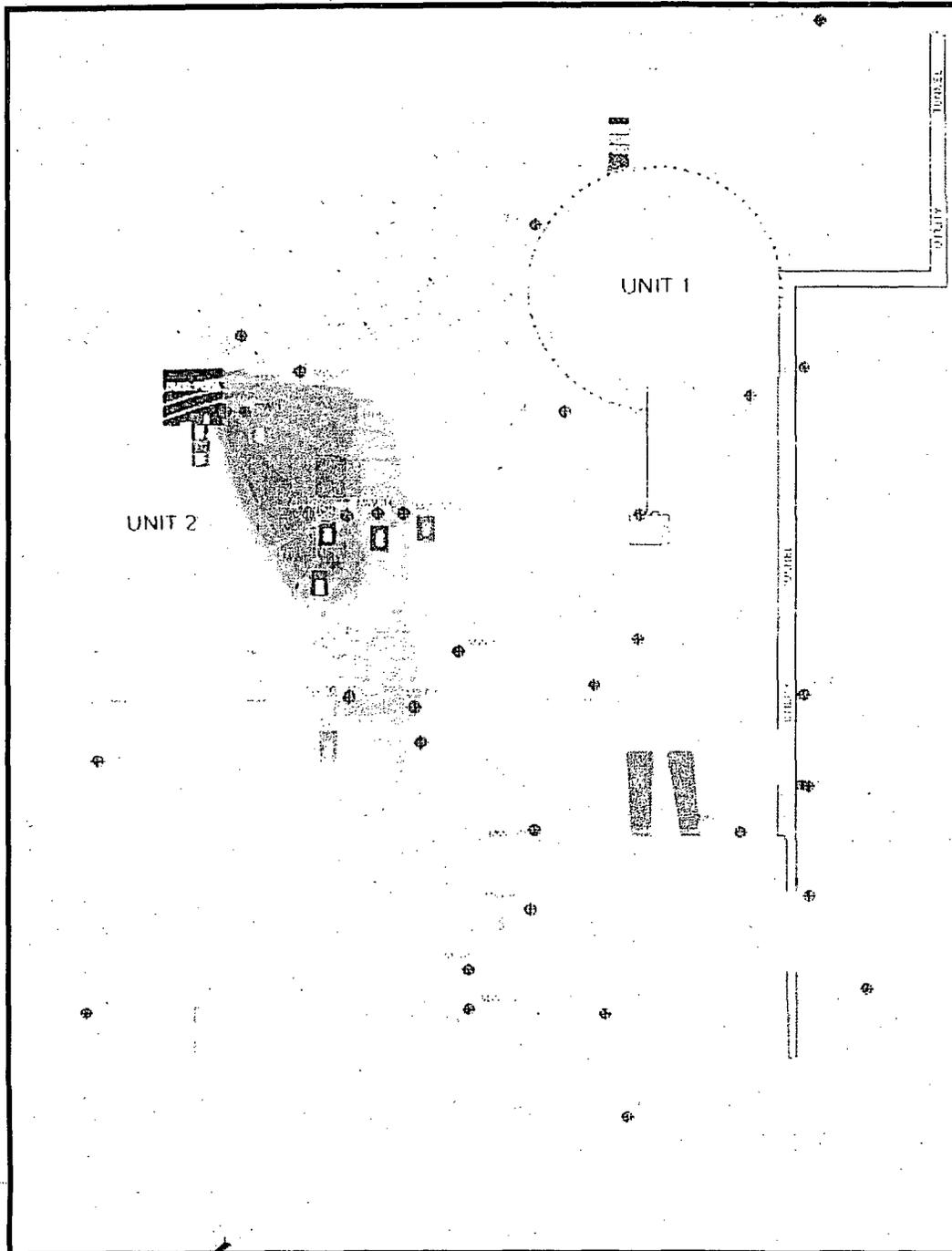
### Unit 1 Spent Fuel Pool

Legacy leak which is presently being mitigated with demineralization/filtration technology. This is the source of Sr-90 observed in monitoring wells

Leak affected areas are fully characterized by monitoring wells and the site hydrological model.



# Tritium Map



## BOUNDING TRITIUM (H3) ACTIVITY ISOPLETHS

Unit, Strategical, and Proprietary

### LEGEND

#### Probable Legacy Release Locations

- /// - Terminated Connection to Storm Drain
- Cooling Drain Exhauster
- ..... Water Structure South West Mar
- Containment Sump Sump Pipe Trail
- Unit 1 West Fuel Pool
- Unit 2 Fuel Pools

- Monitoring Well Designation
- ⊕ Monitoring Wells Location

#### Depth-Specific Data

■ Average Data for entire facility - 1000 to 100000 pCi/L

■ Multiple screened intervals at depth

■ Average Data for entire facility - 1000 to 100000 pCi/L

■ Average Data for entire facility - 1000 to 100000 pCi/L

#### Activity Data<sup>1</sup>

Bar Graphs: Bounding H3, pCi/L      Isopleths, Bounding H3, pCi/L

No Depth Specific Samples      5,000 - 10,000

Not Detected (ND)      10,000 - 50,000

ND - 1,000      50,000 - 100,000

1,000 - 3,000      100,000 - 250,000

5,000 - 10,000      250,000

10,000 - 50,000

50,000 - 100,000

100,000 - 250,000

250,000

#### Groundwater Elevation Contours

○ And 4M "Water Table" Contours  
@ 12,000 - 10 Interval

○ Contours Other Than 10 Interval

○ Vadose Zone Contaminant Transport

# Sr-90 Map

BOUNDING STRONTIUM (Sr-90) ACTIVITY ISOPLETHS

Draft, Privileged, and Proprietary

## LEGEND

### Probable Legacy Release Locations

- /// - Terminated Connection To Storm Drain
- Footing Drain Exfiltration
- ..... Inter-Structure Joint / Mud Mat
- Containment Spray Sump Pipe Trench

 Unit 1 West Fuel Pool

 Unit 2 Fuel Pool

- Monitoring Well(s) Designation
- ⊕ Monitoring Well(s) Location

### Depth-Specific Data

- ▲ Activity of Sr-90 (pCi/L) for each screened interval
- Multiple Screened Intervals w/ Depth
- Screened in Soil
- Screened in Bedrock

Average Total Response for each screened interval measured between 10:06 and 11:20 (05)  
 Groundwater elevation at time of low river tide for each screened interval: 591-1237

### Activity Data<sup>1</sup>

Bar Graphs: Bounding Sr-90, pCi/L

Isopleths: Bounding Sr-90, pCi/L

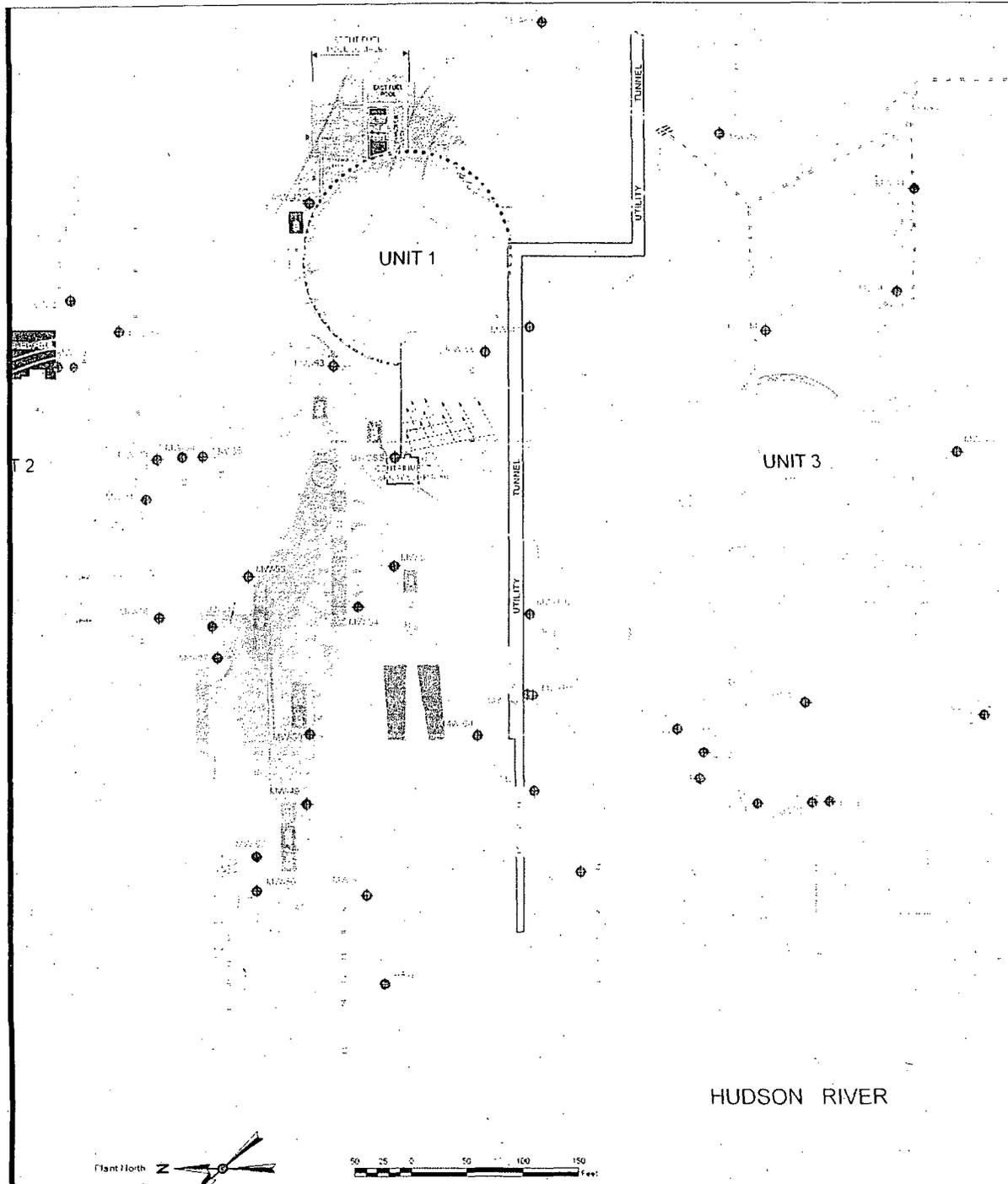
|                           |         |
|---------------------------|---------|
| No Depth-Specific Samples | 2 - 4   |
| ND - Not Detected (ND)    | 4 - 8   |
| ND - 1.0                  | 8 - 25  |
| 1.0 - 2.0                 | 25 - 75 |
| 2.0 - 4.0                 | > 75    |
| 4.0 - 8.0                 |         |
| 8.0 - 25                  |         |
| 25 - 75                   |         |
| > 75                      |         |

### Groundwater Elevation Contours

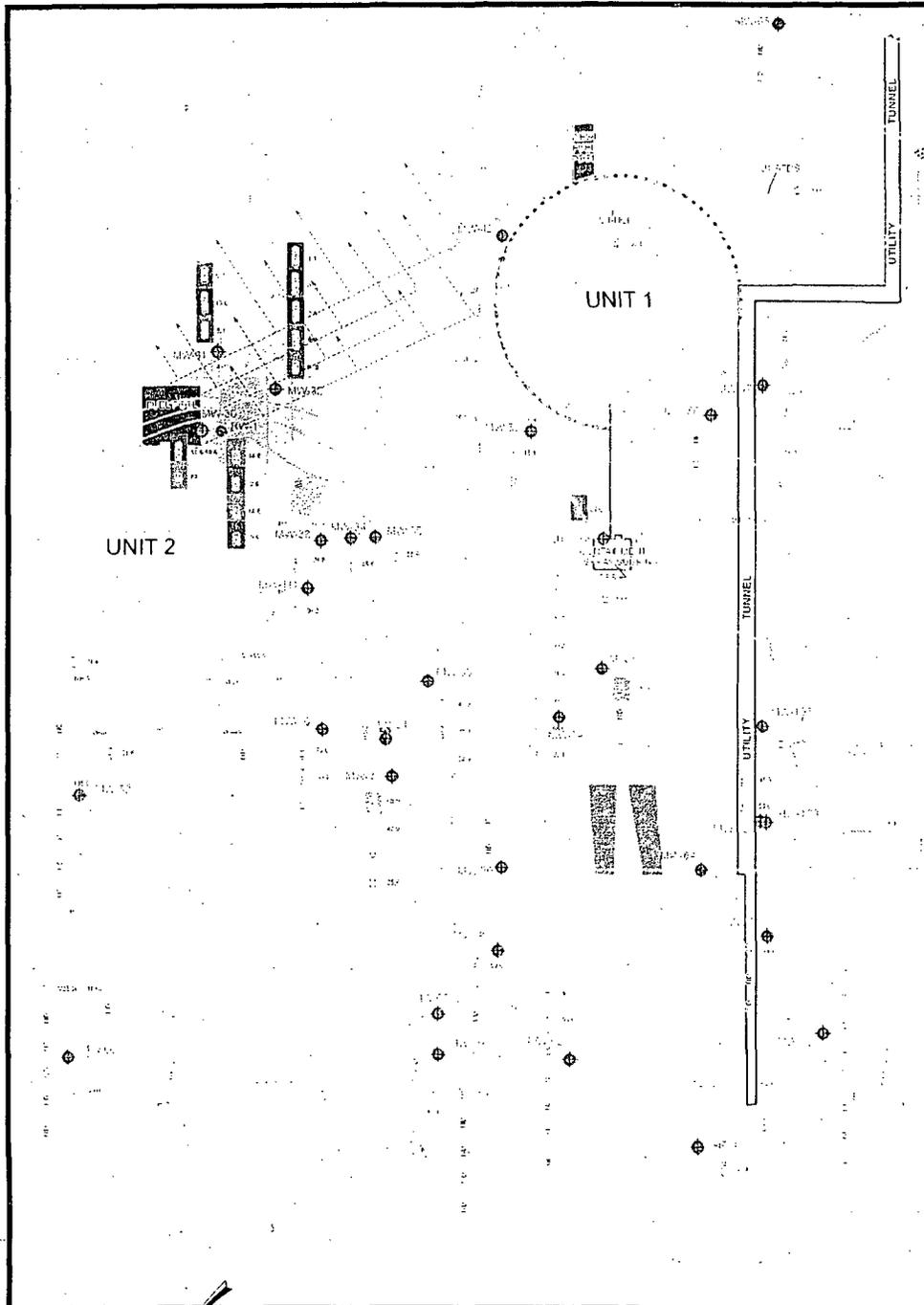
Ambient "Waterable" Contours  
 6/1/2007 (10' Interval)

Contours Other Than 10' Interval

 Vadose Zone Contaminant Transport



# Tracer Test



## BOUNDING TRACER (FLUORESCIN) CONCENTRATION ISOPLETHS

Draft - Privileged and Proprietary

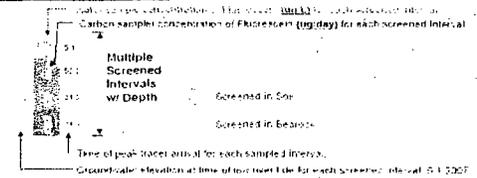
### LEGEND

#### Probable Legacy Release Locations

- /// - Terminated Connection To Storm Drain
- Footing Drain Extriltration
- Inter-Structure Joint / Mud Mat
- Containment Spray Sump Pipe Trench
- [Stippled Area] Unit 1 West Fuel Pool
- [Cross-hatched Area] Unit 2 Fuel Pool

- Monitoring Well(s) Designation
- ⊕ Monitoring Well(s) Location

#### Depth-Specific Data



#### Concentration Data<sup>1</sup>

##### Bar Graphs: Bounding Fluorescein, ug/L

- Not Measured
- Not Detected (ND)
- ND - < 1
- 1 - 5
- 5 - 25
- 25 - 50
- 50 - 500
- 500 - 5,000
- 5,000 - 50,000

##### Bar Graphs: Bounding Fluorescein, ug/day

- Not Measured
- Not Detected (ND)
- ND - < 1
- 1 - 5
- 5 - 10
- 10 - 15
- 15 - 25

##### Isopleths; Fluorescein Peak, ug/L

- 5 - 50
- 50 - 500
- 500 - 5,000
- 5,000 - 50,000
- > 50,000

#### Groundwater Elevation Contours

Ambient "Watertable" Contours  
6/1/2007 (10' Interval)

Contours Other Than 10' Interval

Vadose Zone Contaminant Transport

# Remediation Strategy Unit 1

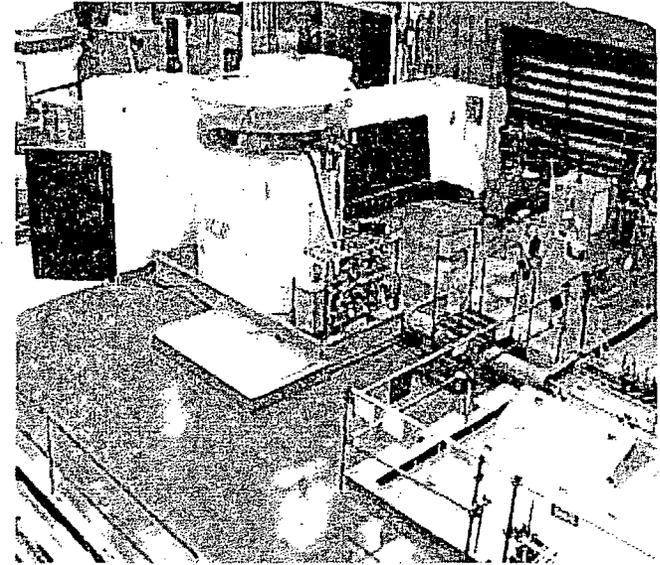
1

Reduce concentration of contaminants in spent fuel pool

Installed enhanced demineralization which has reduced Sr-90 and other nuclides by ~98%

This control method significantly reduces total radioactivity released to GW

MW-42, located near IP1, has seen marked decreases in radionuclide concentrations



# Remediation Strategy Unit 1



## Stop Pool Leakage

Leak source elimination by removal of IP1 spent fuel from pool, scheduled for Summer 2008

Drain IP1 pools after fuel removal

Over time, groundwater concentrations are expected to decrease

Groundwater attenuation trends will be assessed through long term monitoring



# Remediation Strategy Unit 2

- 1992 leak was repaired and repair verified as sound in 2006
- 2005 shrinkage crack area has been contained
- Repair identified through wall defect to stop subsequent leakage from this location.
- Continue to monitor impact of 1992 residual tritium and pinhole defect to assess results.
  - the current trend shows a decrease in concentration
- Additional remedial actions are not warranted
  - e.g. pumping groundwater will draw contaminants from Unit 1 and offer no advantage
  - calculated dose impacts remain extremely low

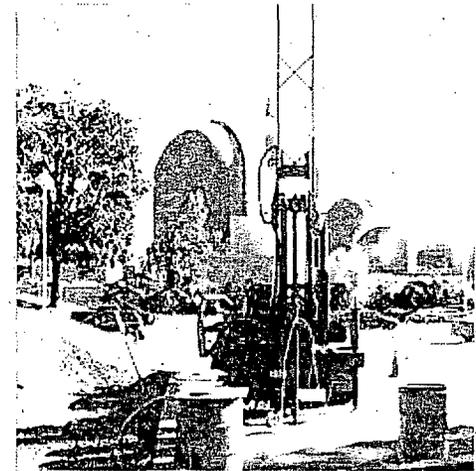


# Long-term Ground Water Monitoring

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## Purpose

- Monitor status of current plumes
- Collect data to calculate potential doses due to GW
- Provide timely identification of potential new leaks
- Monitor effectiveness of any remediation / intervention actions



# Long-term Ground Water Monitoring

## Program Elements – Monitoring Wells

Boundary and Riverfront wells

Selected wells along affected areas of the site

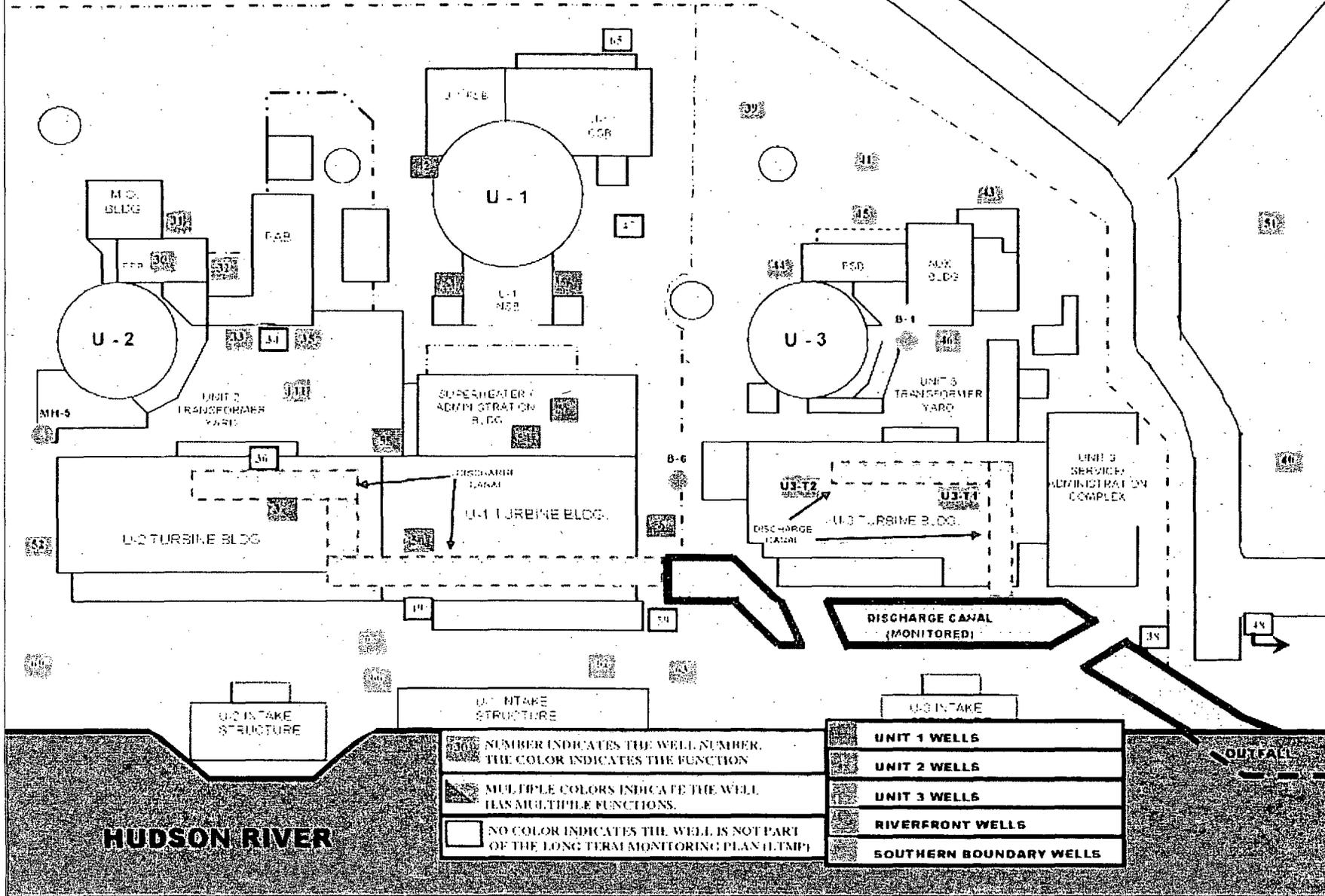
Frequencies established for long-term monitoring

- Quarterly, Semi-annual and Annual

Investigative criteria and actions defined



# MONITORING WELL LOCATIONS AND FUNCTIONS



NUMBER INDICATES THE WELL NUMBER. THE COLOR INDICATES THE FUNCTION.  
 MULTIPLE COLORS INDICATE THE WELL HAS MULTIPLE FUNCTIONS.  
 NO COLOR INDICATES THE WELL IS NOT PART OF THE LONG TERM MONITORING PLAN (LTMP)

- UNIT 1 WELLS
- UNIT 2 WELLS
- UNIT 3 WELLS
- RIVERFRONT WELLS
- SOUTHERN BOUNDARY WELLS

**HUDSON RIVER**

OUTFALL

# **Major Conclusions of the Study**

**No impact to public health and safety from ground water contamination at Indian Point**

**No contamination observed in off-site wells or reservoirs**

**No detectable amounts of contaminants (above background) have been found in marine organisms in Hudson River**

**Source of leaks have been identified**



# Major Conclusions of the Study

## Remediation Strategy

- **Source Control/Elimination combined with Monitored Natural Attenuation**

### Unit 1

- Continued source control via in-pool demineralization system
- Source elimination via complete fuel removal (Mid 2008)

### Unit 2

- Unit 2 transfer canal liner pinhole repair (leak cessation)
- Continued utilization of existing wall collection box (control)

Long-term program to monitor plume reduction and early leak identification for new potential leaks.



# Dry Fuel Storage

Mike Rutkoske  
Project Manager



# Project Overview

IPEC Cask storage capacity  
- 75 casks

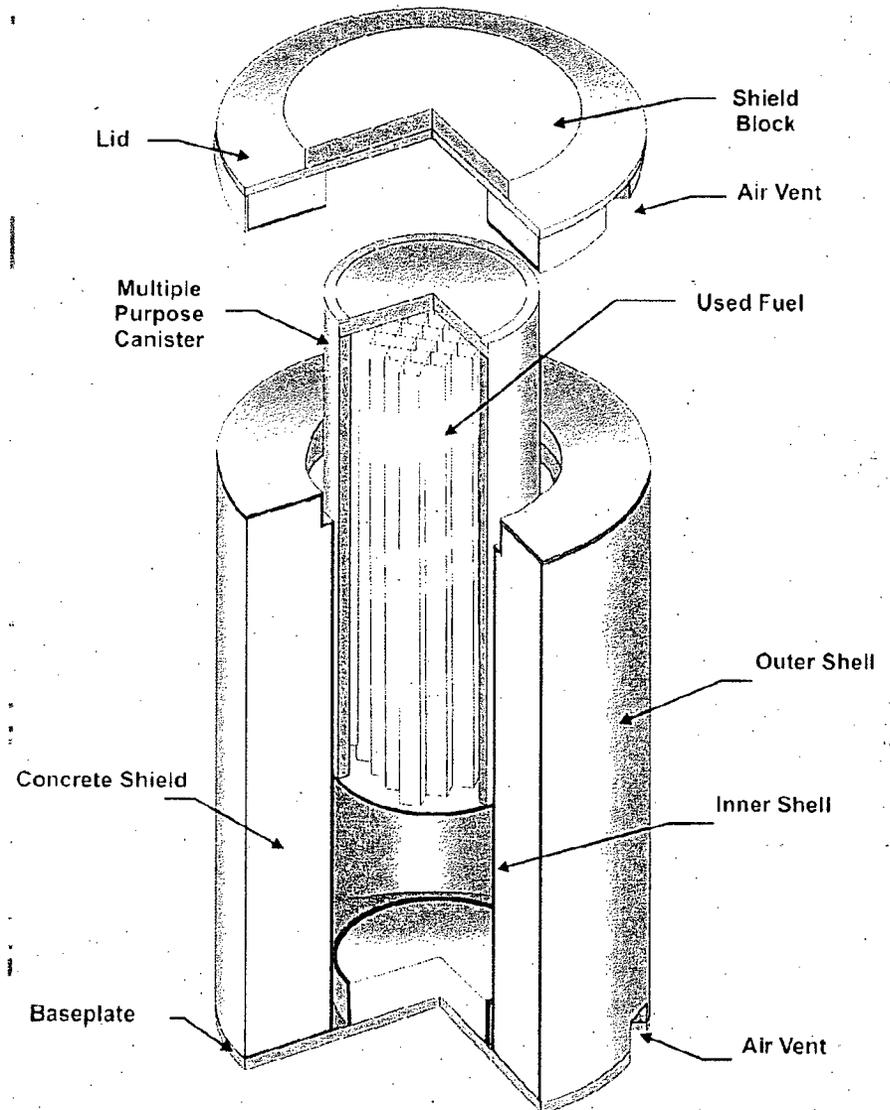
IP1 – 5 Casks

IP2 – 40 Casks

IP3 – 30 Casks

IP1 and IP2 installation  
activities in progress

IP3 Scoping in progress

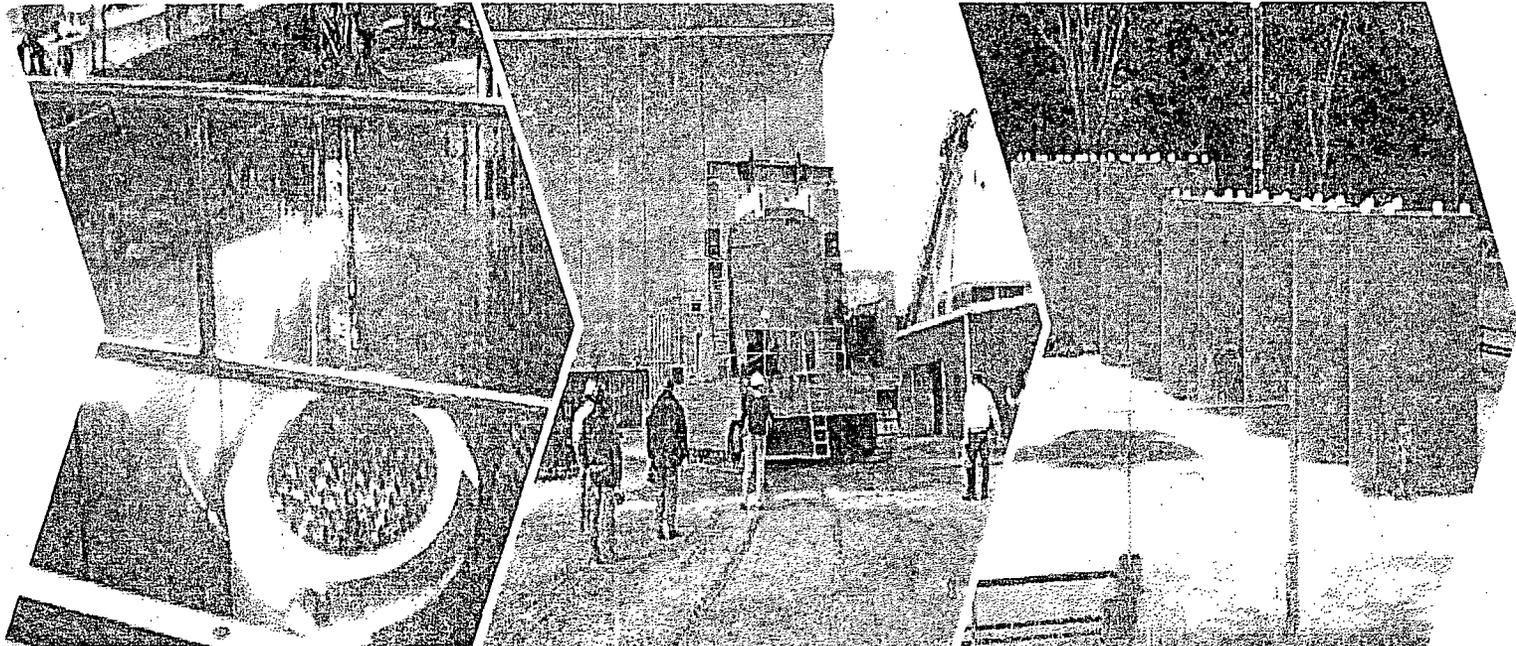


# Dry Fuel Storage

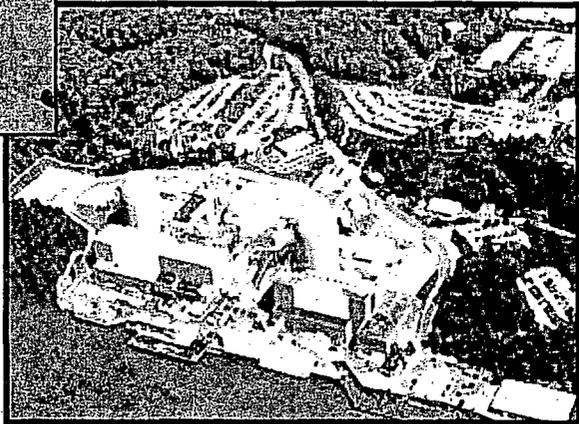
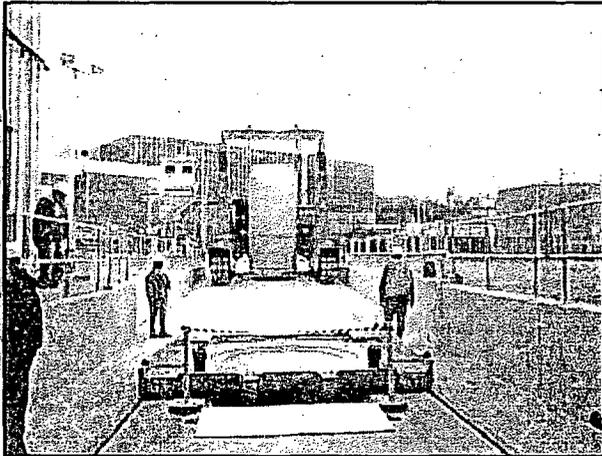
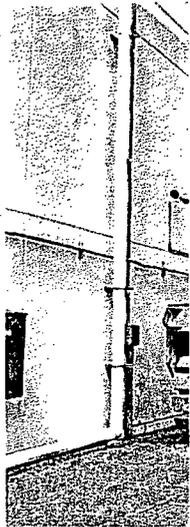
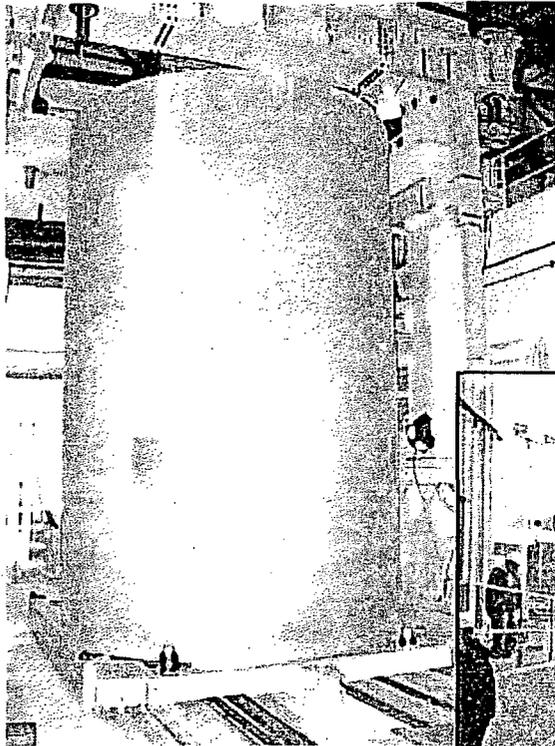
Fuel Load

Fuel Move

Fuel Storage



# Dry Fuel Storage



# Indian Point Unit 2

|                               |           |
|-------------------------------|-----------|
| Plant modifications complete  | Complete  |
| Gantry Crane install complete | Complete  |
| Team Training Completion      | Nov. 2007 |
| Complete NRC Dry Runs         | Dec. 2007 |
| Start Cask Loading            | Dec. 2007 |



# Indian Point Unit 1

|                              |                        |
|------------------------------|------------------------|
| Complete Plant Modifications | 2 <sup>nd</sup> Q 2008 |
| Dry Run Preparation          | 2 <sup>nd</sup> Q 2008 |
| Licensing Items Complete     | 2 <sup>nd</sup> Q 2008 |
| Perform NRC Dry Run          | 3 <sup>rd</sup> Q 2008 |
| Start Cask Loading           | 3 <sup>rd</sup> Q 2008 |
| Drain the Unit 1 Fuel Pools  | 4 <sup>th</sup> Q 2008 |



# Indian Point Unit 3

Scoping of required plant modifications is currently in progress

Fuel from IP3 will be transferred prior to the 2011 refueling outage

