

This presentation was made on June 13 2007  
at the third public meeting of the Community LOOW Project.

This slide show represents initial findings and should be considered a draft, subject to revision if additional information becomes available.

# Radioactivity on the LOOW Site

Contamination on Vicinity Properties and the  
Central Drainage Ditch

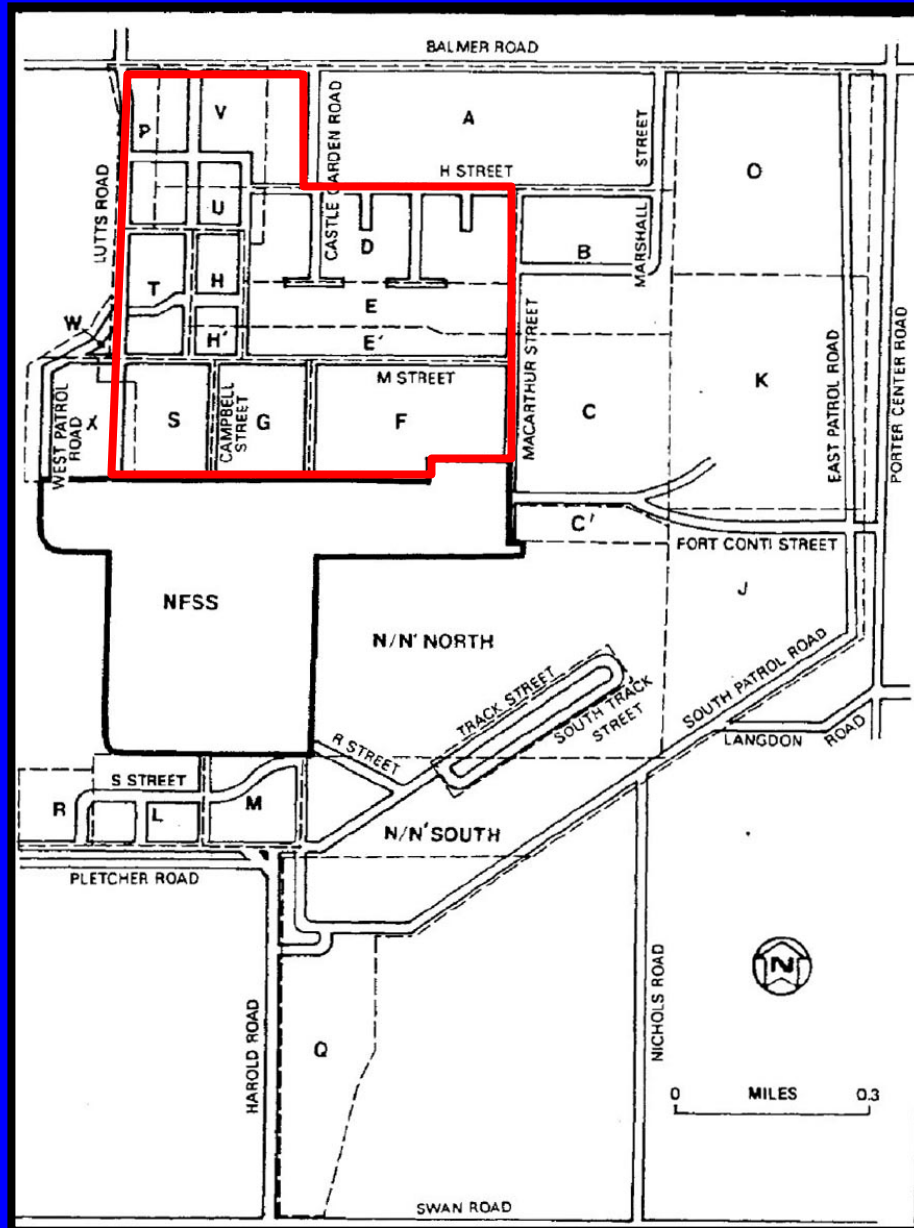
By

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RWMA

# NFSS Site and Vicinity Properties

— Vicinity properties analyzed



# Timeline of Remediation

<b>Clean-up Year</b>	<b>Remediation Company</b>
1955	Hooker Chemical
1972	Atomic Energy Commission
1983-1984	Bechtel National Inc.
1985	Bechtel National Inc.
1986	Bechtel National Inc.
1987	Bechtel National Inc.
1988-1989	Bechtel National Inc

# EPA & NRC Guidelines for Radionuclides

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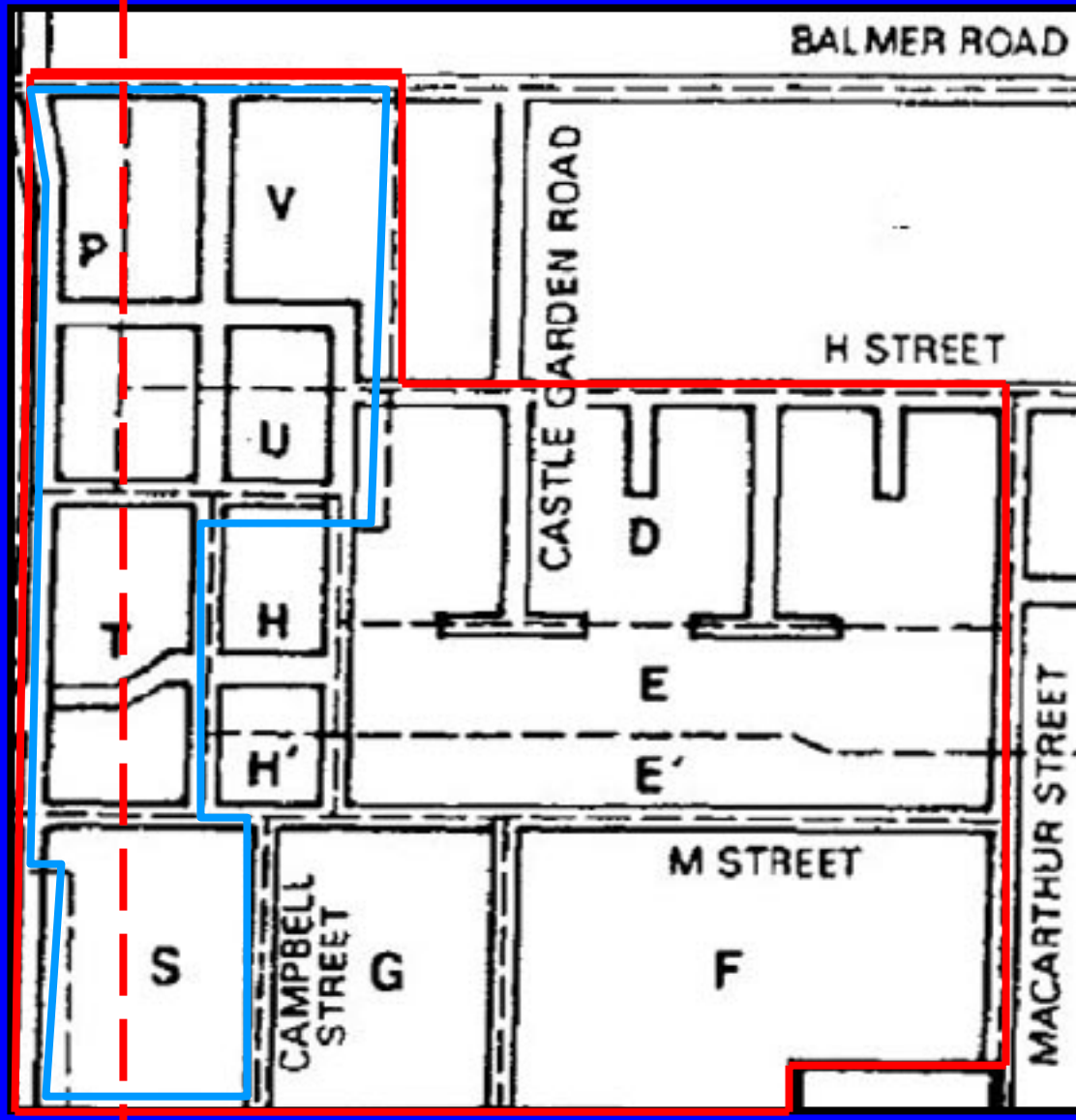
- **Drinking Water:** Ra 226+228 → 5 pCi/L  
U → 30 µg/L; gross alpha → 15 pCi/L
- **Decommissioned facilities:** 25 mrem/yr TEDE
- **Uranium mill tailings:** Ra 226+228 → 5/15 pCi/g (surface/subsurface); Rn-222 → 20 pCi/m<sup>2</sup>-sec (outdoors); Rn-220/222 → 0.02 working levels (indoors); U 234/238 → 30 pCi/L
- **Operating nuclear facilities:** 100 mrem/yr

# Vicinity Properties of Concern

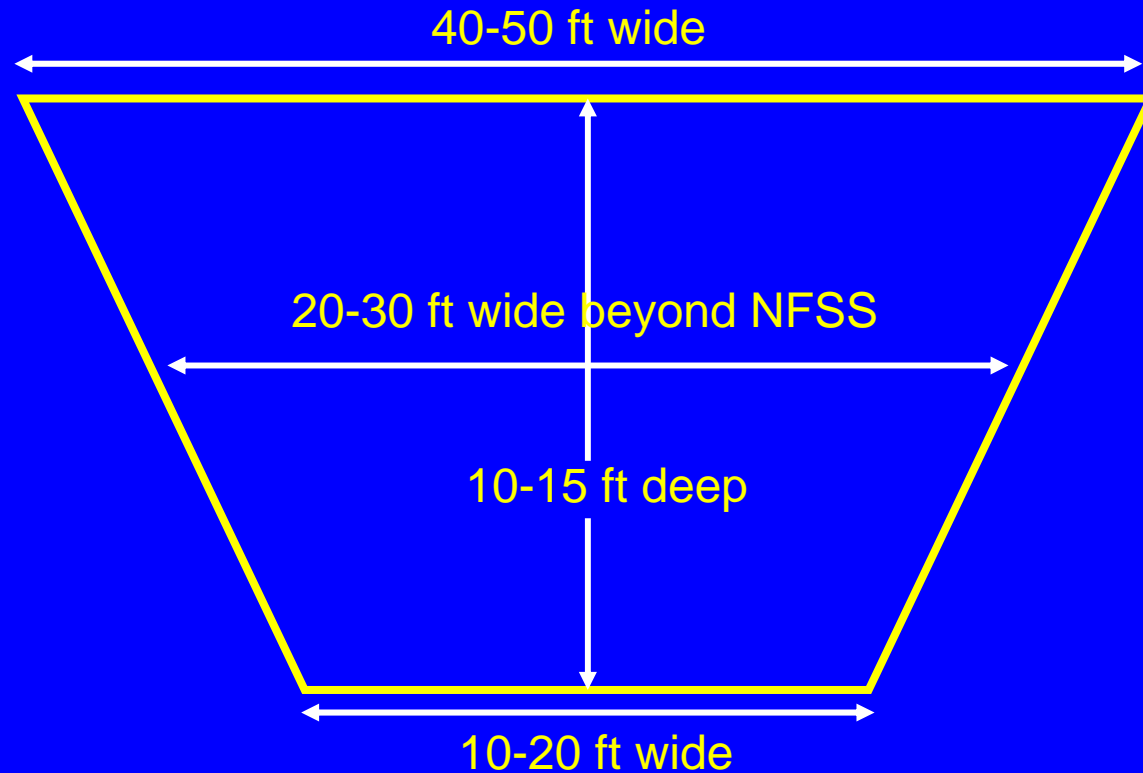
— Vicinity properties analyzed

— Central Drainage Ditch

— Vicinity properties adjacent to the Central Drainage Ditch

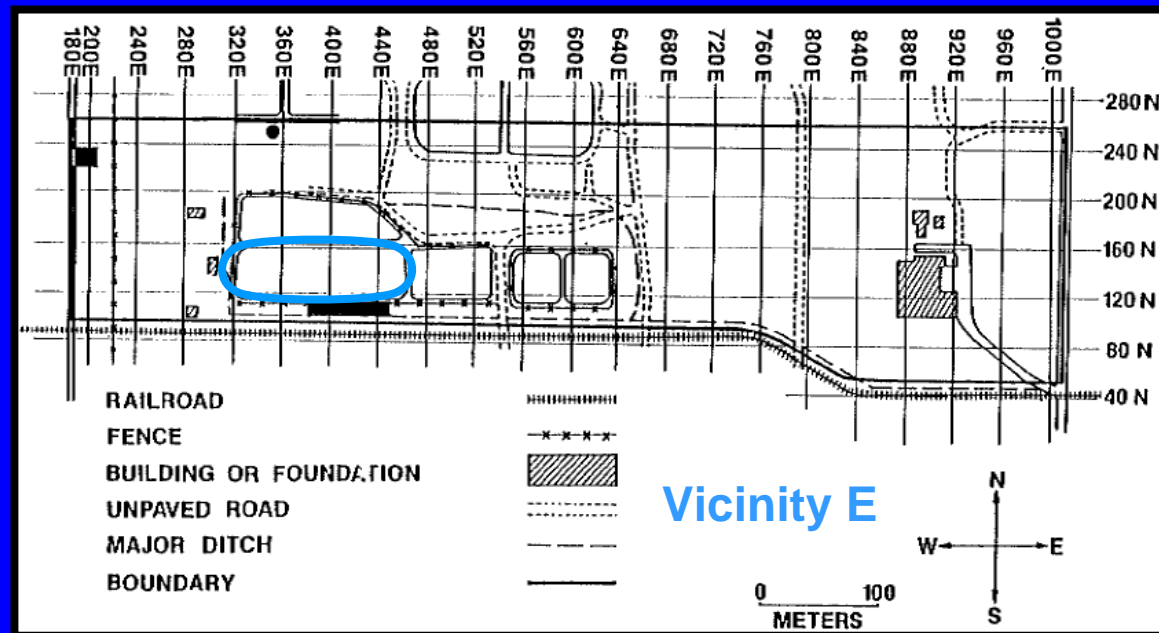


# Cross Section of the Central Drainage Ditch



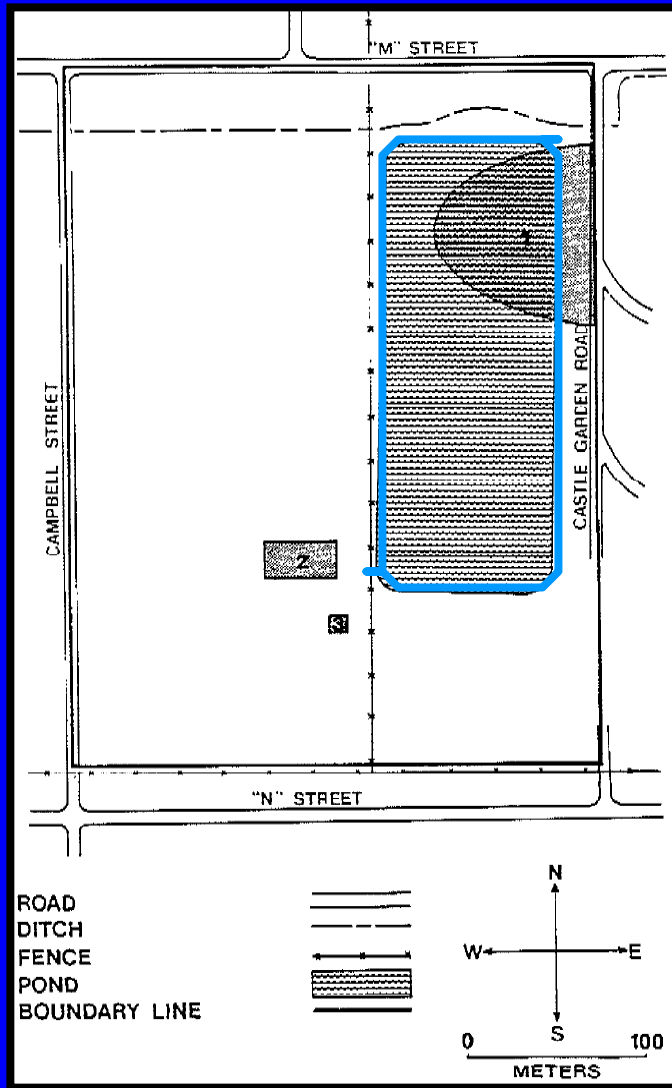
# Possible Areas of Contamination in Vicinity Properties

- There is at least one area on each of the vicinity properties we analyzed that has a high probability of being above EPA/NRC guidelines of soil or water contaminated with radioactive material.
- Vicinity E is one example

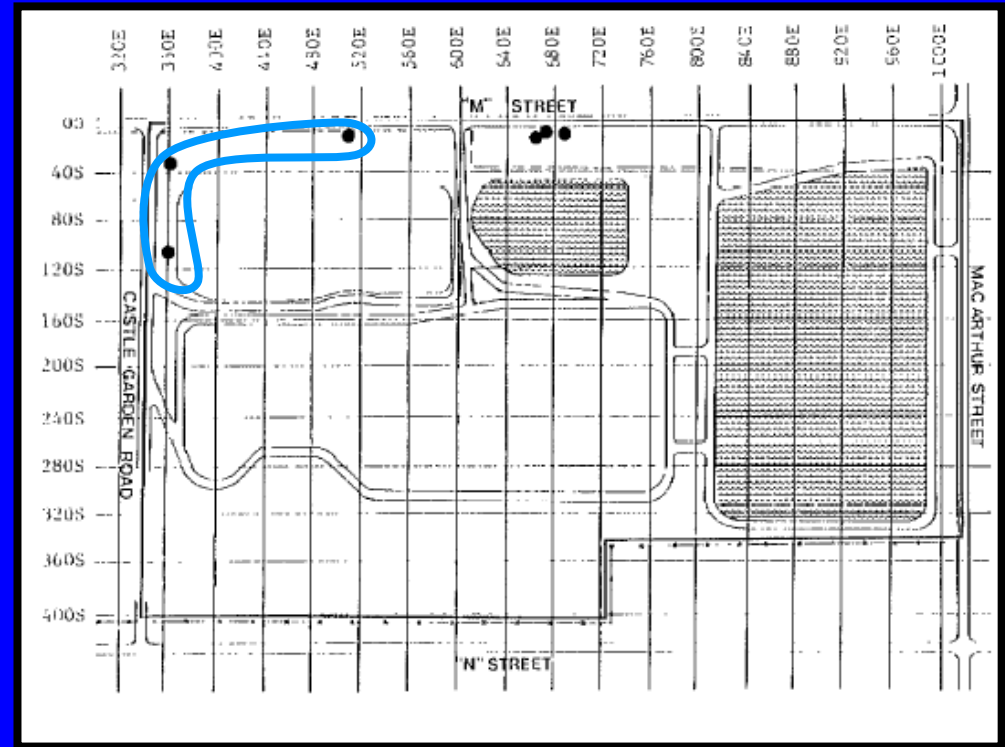




# Contaminated Vicinity Properties

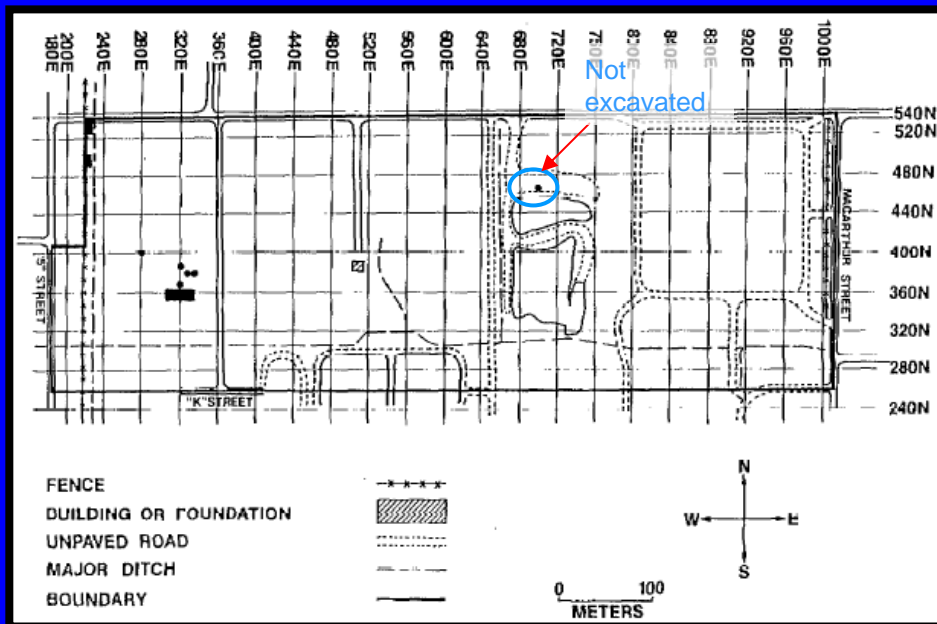


Vicinity G

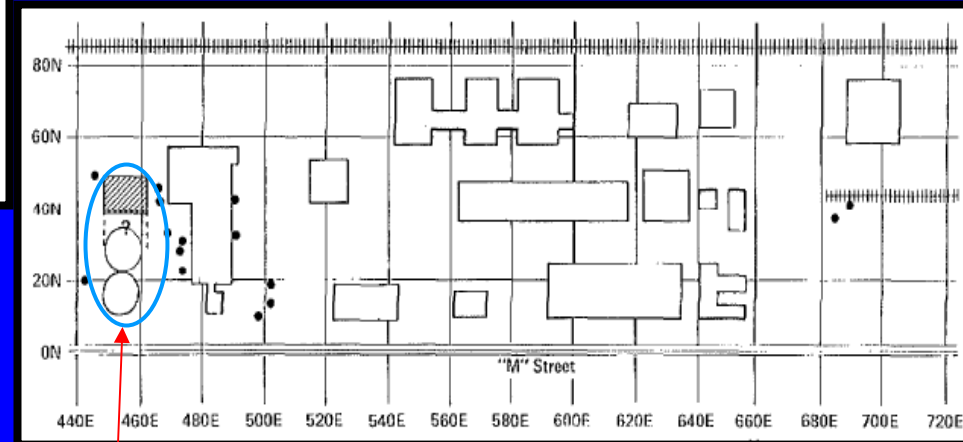


Vicinity F

# Contaminated Vicinity Properties cont'd



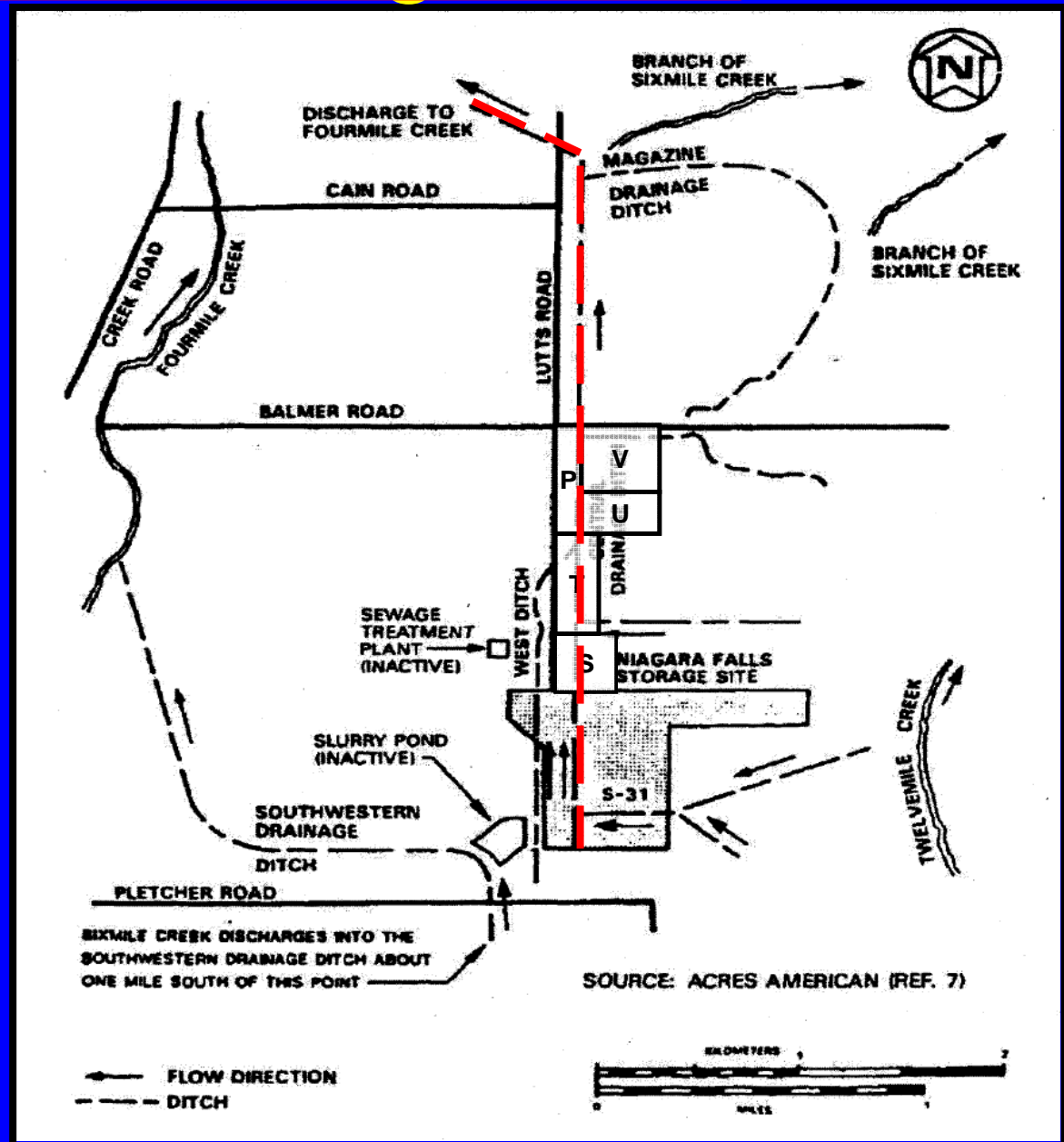
Vicinity D

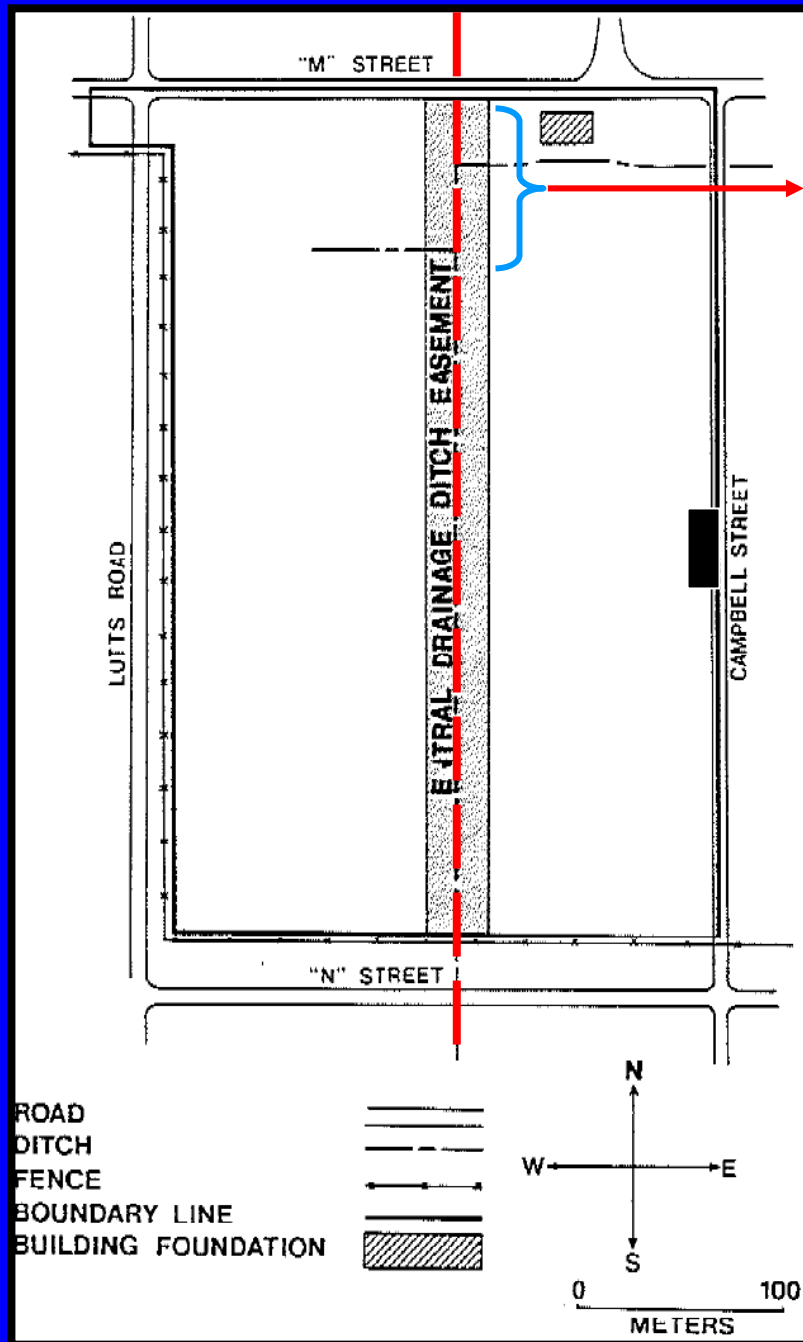


Vicinity E'

# Central Drainage Ditch

- ~ 10-15 feet deep
- ~ 10-20 feet wide at the bottom of the channel
- ~ 40-50 feet wide at the top of the banks
- Beyond the northern boundary of the NFSS the width of the CDD varies between 20 and 30 feet





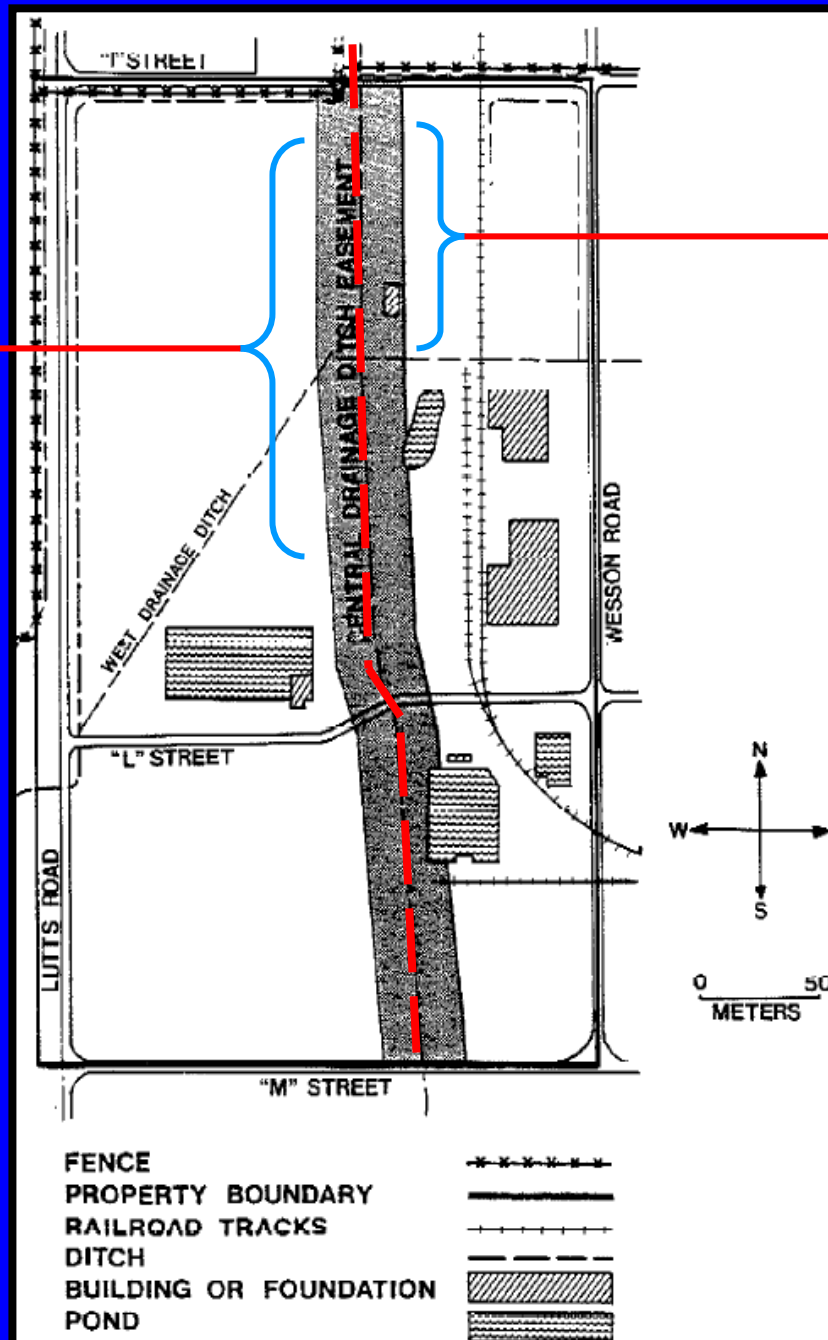
Gamma levels in this area still high after 1972 decontamination

Vicinity S

Areas in the NW and WC sections did not meet the 20  $\mu$ R/h guidelines after 1972 cleanup operations

- Guidelines after 1978 were 20  $\mu$ R/h above background levels (40CFR192.12)

- A guideline of 25 mrem/yr was also established for persons inhabiting the property. (40CFR191.14)

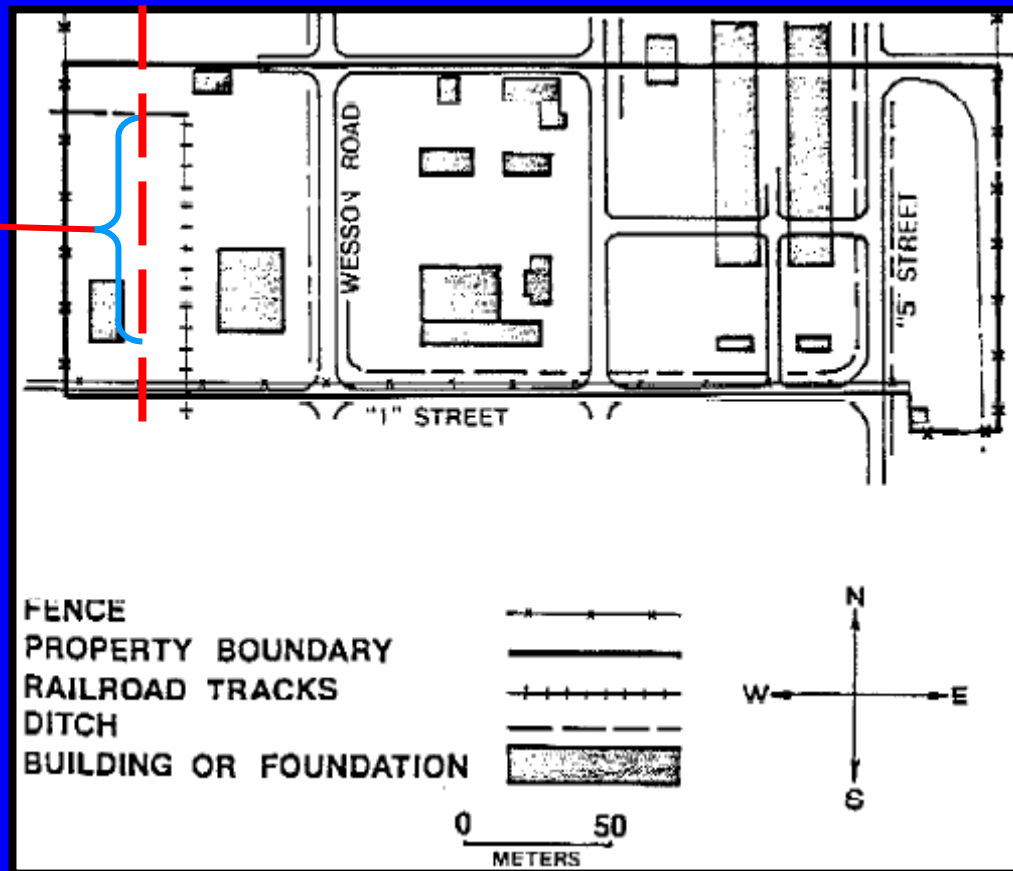


Areas in the NE sections did not meet the 20  $\mu$ R/h guidelines after 1972 cleanup operations

- 20  $\mu$ R/h, on a yearly basis would be over seven times 25 rem/yr
- No one can build and live on the property now but after 100 years, the EPA assumes no active controls.

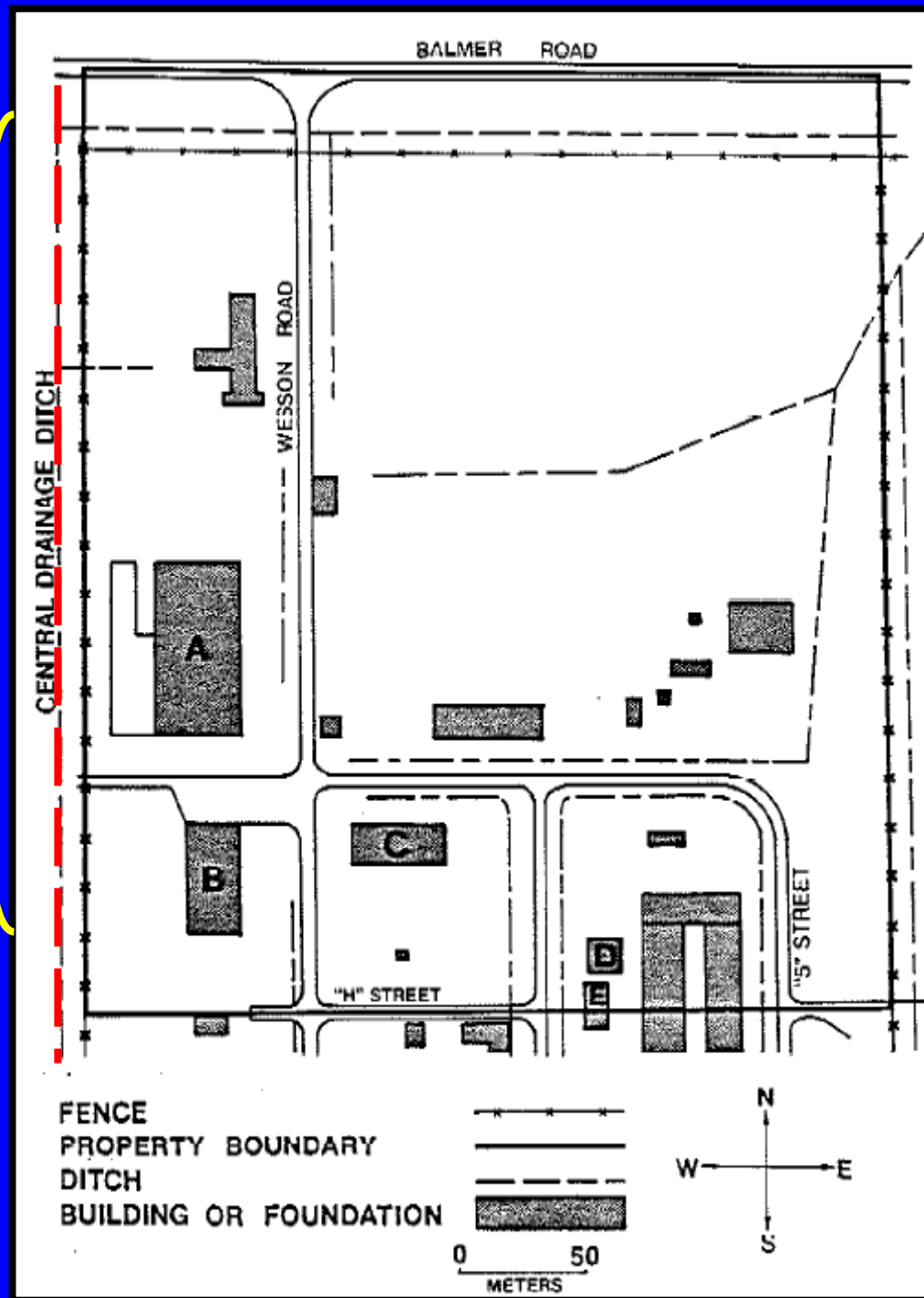
Vicinity T

Remained contaminated with gamma activity of 45  $\mu\text{R/h}$  after 1972



Vicinity U

This part of the CDD had gamma activity as high as 60  $\mu\text{R}/\text{h}$  post the 1972 cleanup



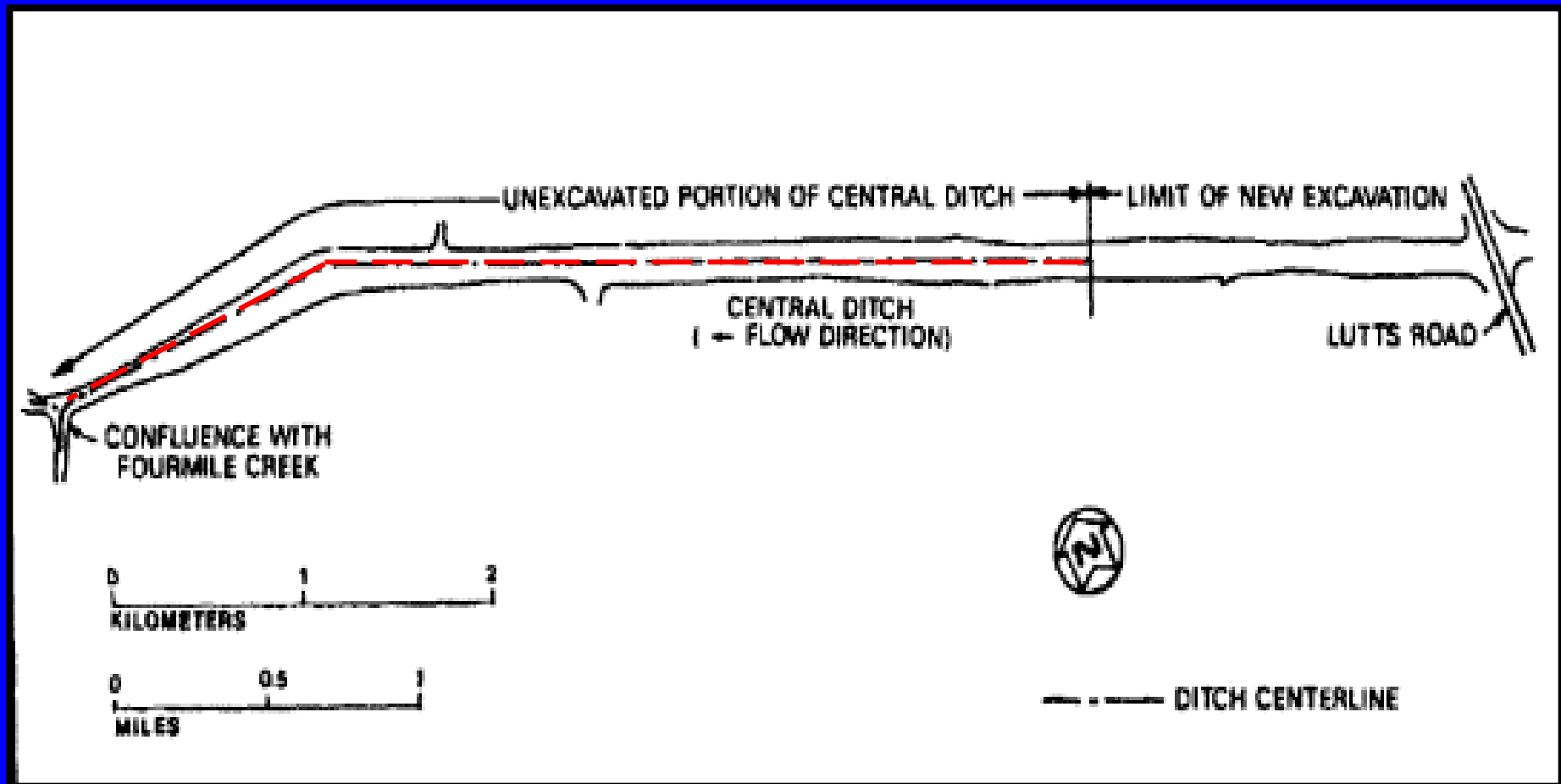
Vicinity V

# Central Drainage Ditch after 1983-1984 Remediation

- The December 1986 remedial action report states that the CDD was decontaminated from the northern boundary of the NFSS property to a location 1500 feet west of Lutts Road
- Of the 1750 sediment samples collected within the ditch, 101 of them exceeded 5 pCi/g above the background levels
- The report mentions that after averaging concentrations over 100m<sup>2</sup> of contiguous areas seven areas were identified where the average Ra-226 concentration still exceeded the 5 pCi/g guideline but was less than 15 pCi/g.
- It is important to mention that if the land is disturbed so that the soil below 15 cm is brought to the surface, the 5 pCi/g guideline should apply.



# Unexcavated Portion of Central Drainage Ditch



Undated document states it does not need to be excavated

# Dose from Unexcavated portion of the Central Drainage Ditch

Radionuclides	Sv m <sup>3</sup> /Bq s	Mrem/y
Ra 226	1.65E-19	1.88E-01
Th 230	6.39E-21	7.28E-03
Pb 210	1.31E-20	1.49E-02
Pb 214	6.70E-18	7.63E+00
Bi 210	1.86E-20	2.12E-02
Bi 214	4.36E-17	4.97E+01
Po 210	2.45E-22	2.79E-04
Po 214	2.40E-21	2.73E-03
	<b>Total =</b>	<b>5.76E+01</b>

# Conclusions

- The vicinity properties we analyzed still have contaminated areas
  - Radionuclide concentrations in the soil and water exceed EPA and/or NRC guidelines
- The Central Drainage Ditch and adjacent vicinity properties are also contaminated
- The unexcavated portion of the CDD should be decontaminated since our calculated dose of 57.6 mrem/yr exceeds the 25 mrem/y guideline for a decommissioned site, not including other pathways.
- All sections of the previously excavated section of the CDD, from 1500 feet past Lutts Road down to the NFSS property line, where the Ra-226 concentrations exceed 5 pCi/g should be decontaminated.

# References

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- *Berger, J.D., Comprehensive Radiological Survey : Off-Site Property E, U.S. Department of Energy, Lewiston, NY, March 1984.*
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- *Berger, J.D. Comprehensive Radiological Survey: Off-Site Property E', Lewiston, NY, September 1983*
- *Memo from J Berger to C Yarbrow, ORAU, July 26, 1982.*
- *Berger, J.D. Excerpts from Verification of 1985 and 1986 Remedial Actions: Niagara Falls Storage Site Vicinity Properties, Lewiston, New York, Final Report July 1990.*
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- *Shneider, Tom, Carl Spreng, Robin Anderson, and Stuart Walker (2007, June 5) Radiation Site Cleanup: CERLA Requirements and Guidance. Presented in online ITRC Training Lecture.*