ATSDR's Current Health Study at Marine Corps Base Camp Lejeune, NC: Use of Water-Modeling Methods

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The findings and conclusions in this presentation are those of the author and do not necessarily represent the views of the Agency for Toxic Substances and Disease Registry

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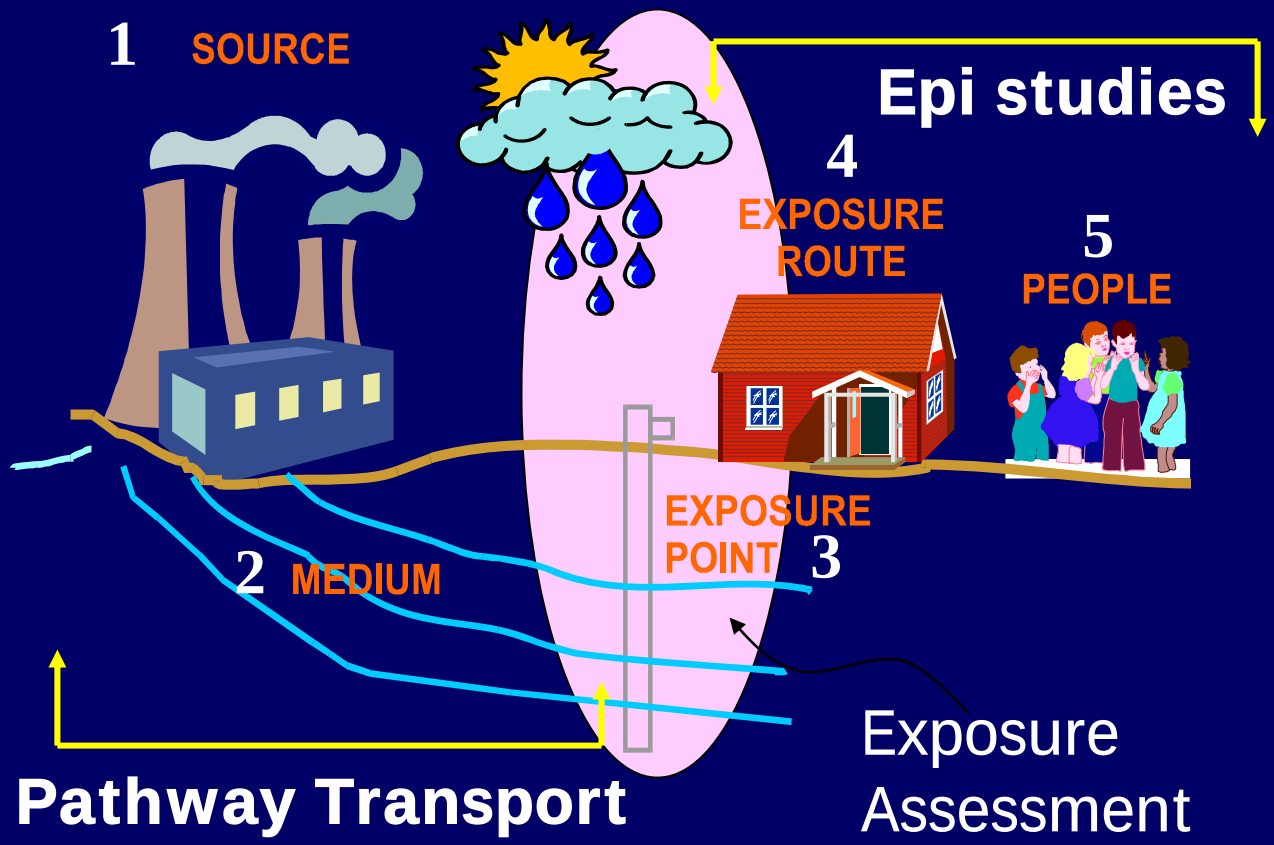
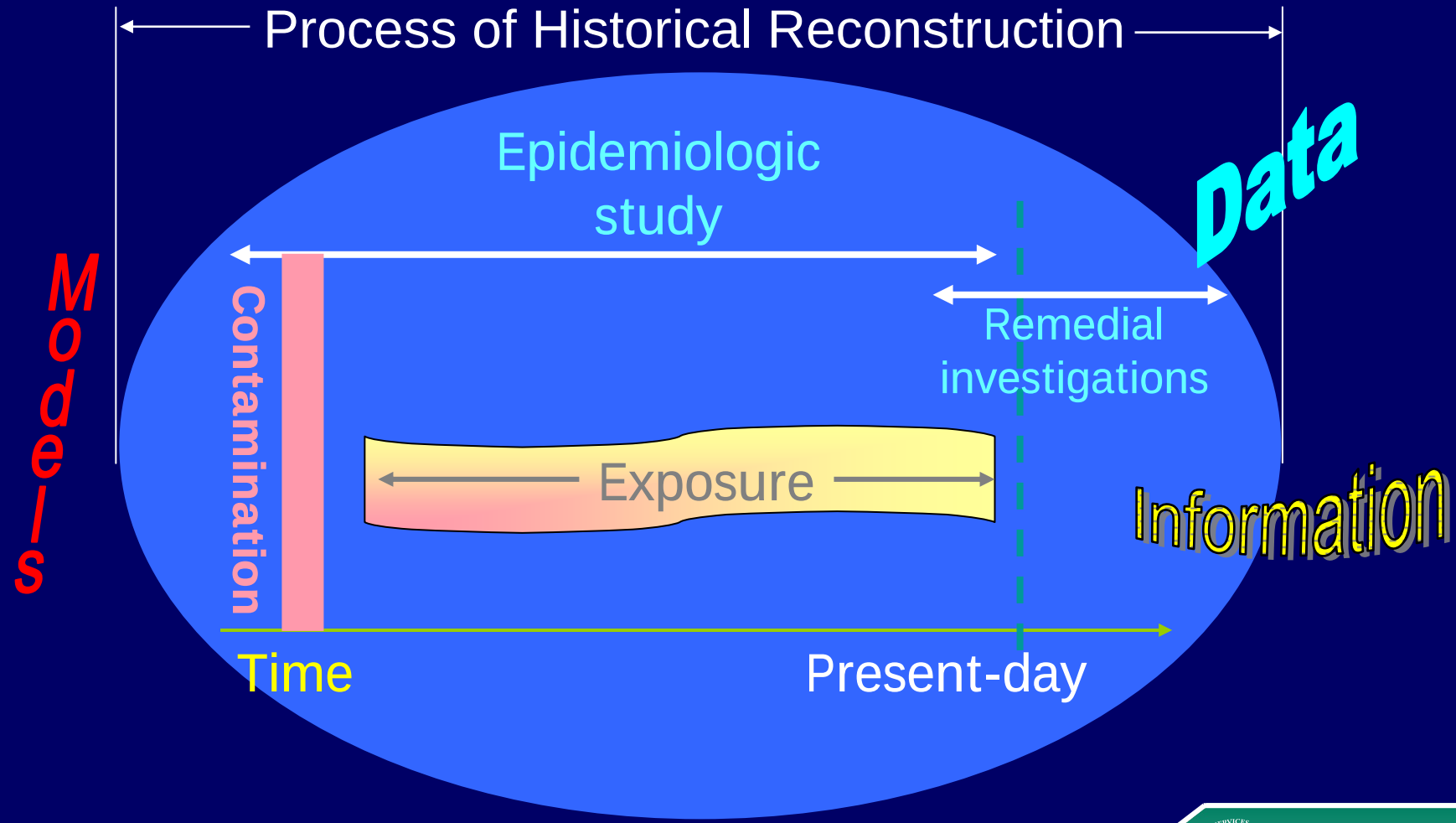
- Former Marines and Families

Environmental pathways, exposure assessment, and modeling concepts

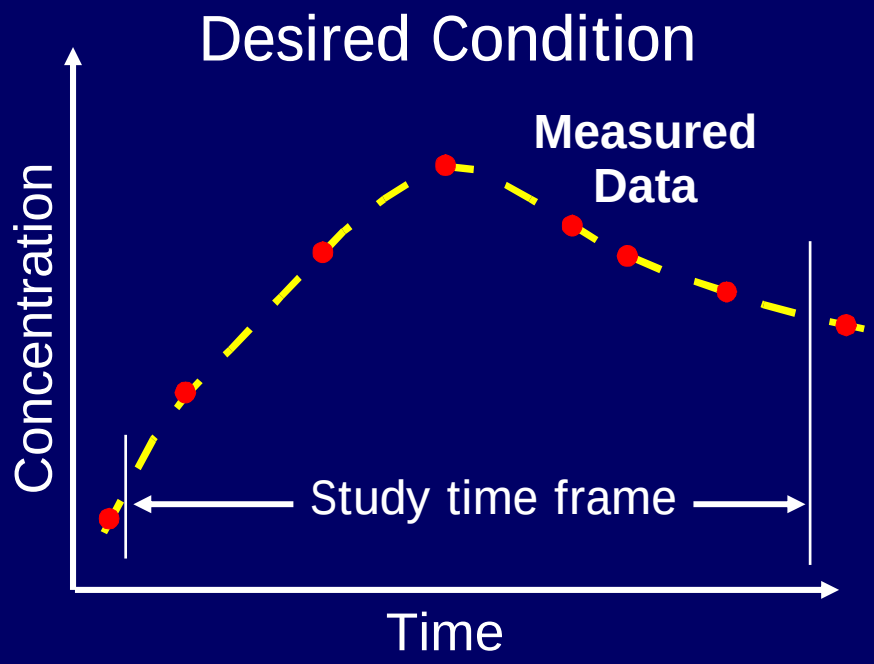
Environmental health process

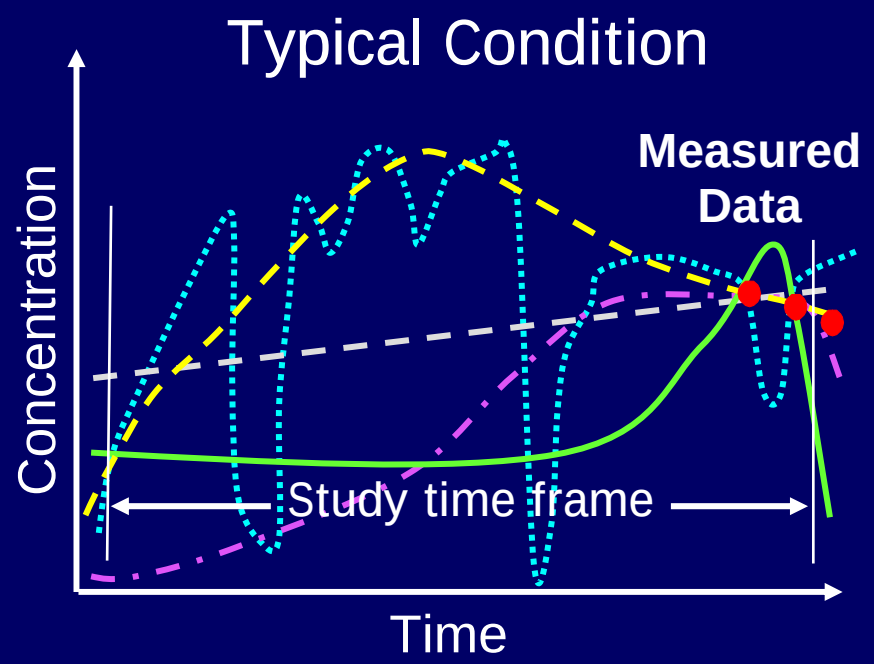


Historical reconstruction



Why use models to estimate exposure scenarios?





ATSDR's current health study at U.S. Marine Corps Base Camp Lejeune, North Carolina

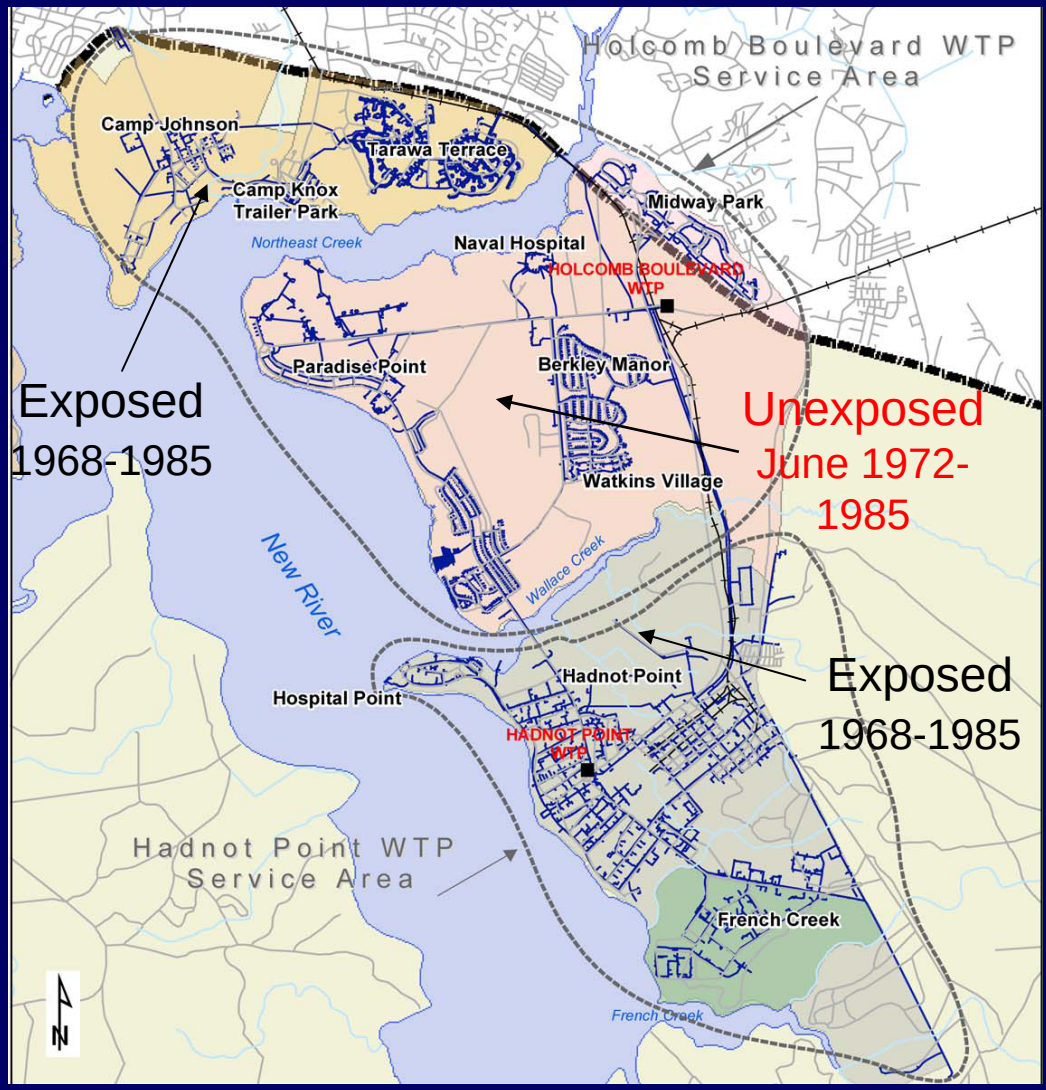
Exposure to volatile organic compounds in drinking water and specific birth defects and childhood cancers (case-control study)

- Multi-step process
  - **Review scientific literature to identify specific birth defects and childhood cancers associated with drinking water contaminated with chlorinated solvents**
  - **Conduct telephone survey to ascertain potential cases**
  - **Obtain medical records to verify diagnoses of reported cases**
  - **Conduct a case-control study**
    - interview parents
    - **obtain estimates of exposure from the water modeling component**

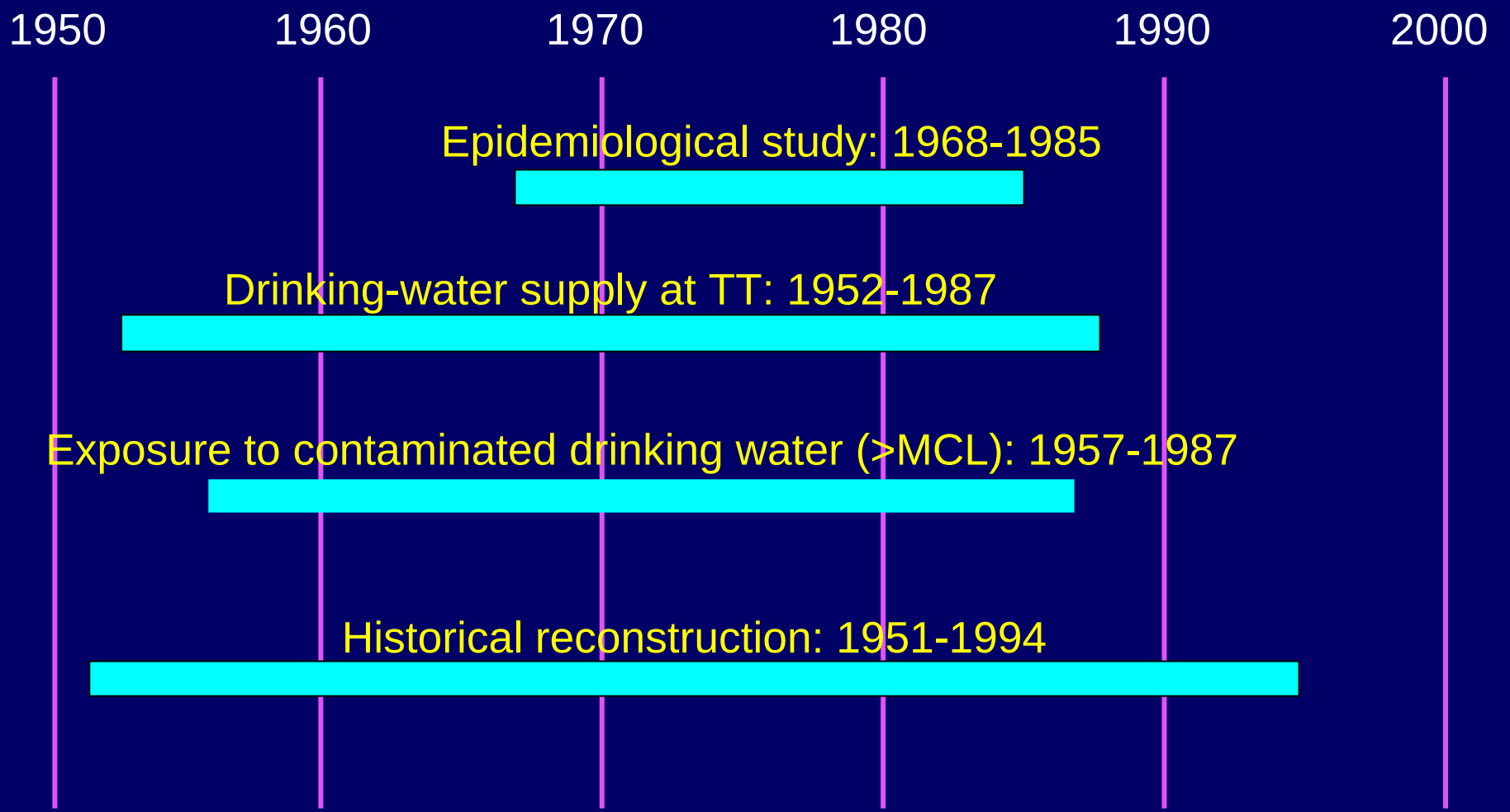
Goals and objectives of water-modeling activities supporting current health study

- Arrival of contaminants at public water-supply wells
- Distribution of contaminants by housing location
- Reliability of and confidence in water-modeling results

Epidemiological study areas

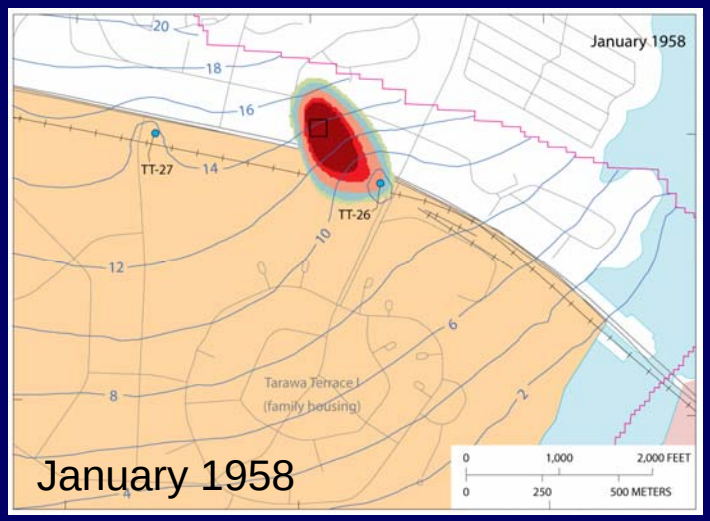


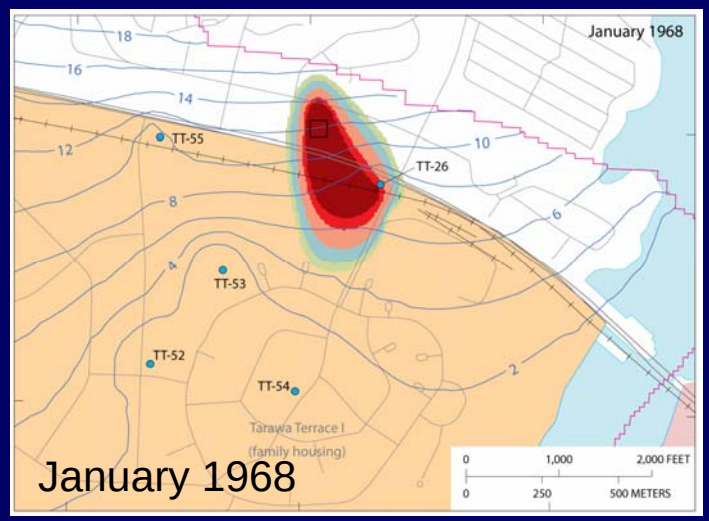
Study and analysis time frames for Tarawa Terrace

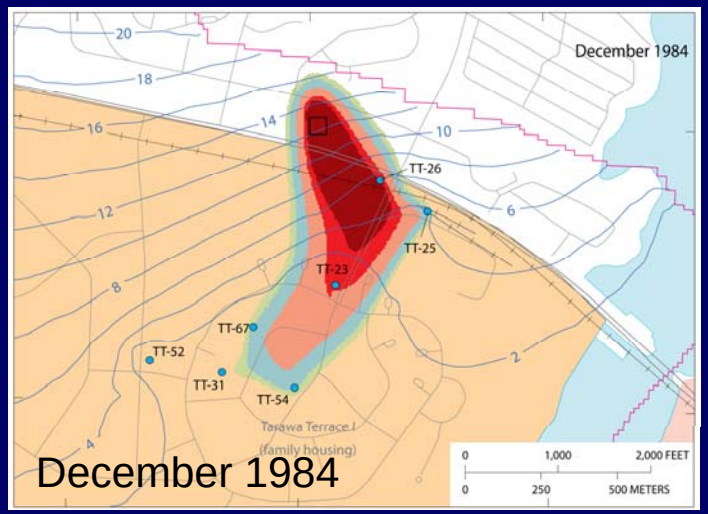


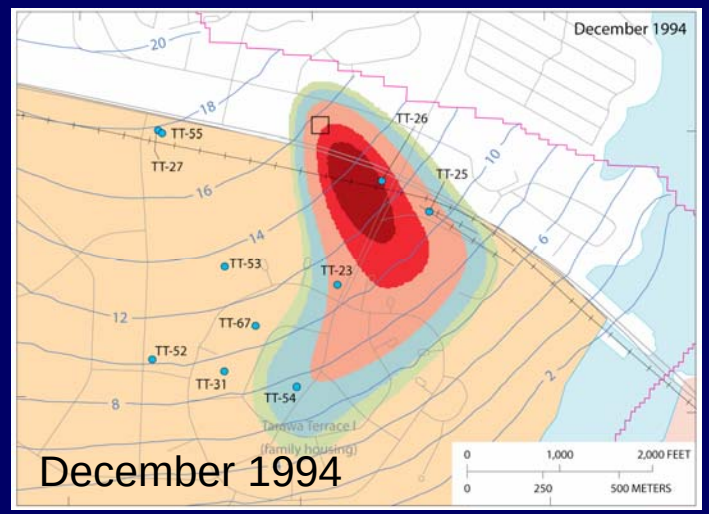
Final Results for Tarawa Terrace and Vicinity

Groundwater fate and transport of PCE









EXPLANATION

Historical water-supply area
- Tarawa Terrace
- Holcomb Boulevard

Model boundary

Frenchmans Creek

4 — Simulated potentiometric contour—Shows simulated potentiometric surface during January 1958. Contour interval 2 feet. Datum is National Geodetic Vertical Datum of 1929

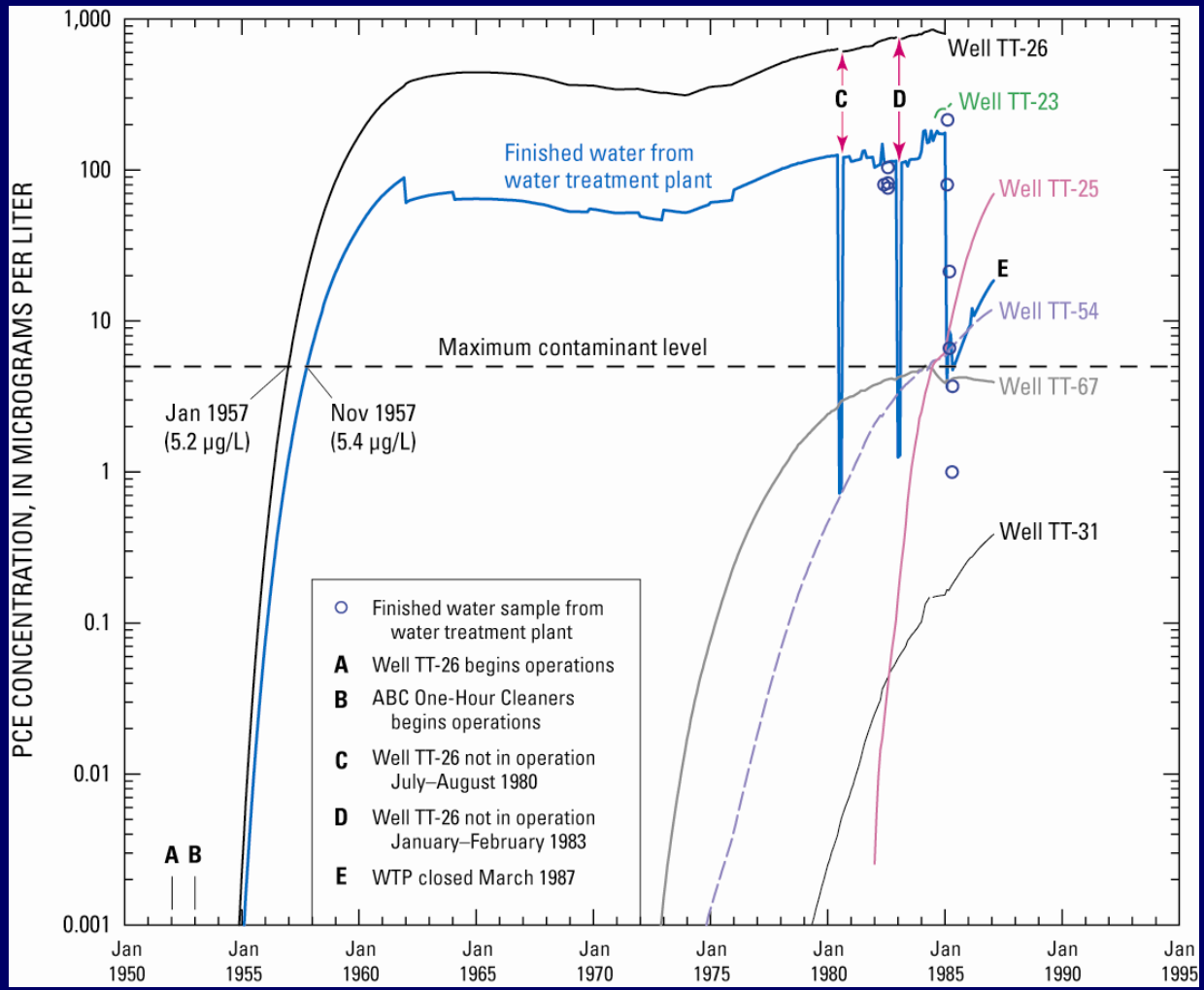
Simulated direction of groundwater flow, January 1958

ABC One-Hour Cleaners

TT-26 Pumping water-supply well and identification

PCE concentration, in micrograms per liter
- 1 to 5
- Greater than 5 to 50
- Greater than 50 to 500
- Greater than 500 to 1,500
- Greater than 1,500

Concentration of finished water delivered from Tarawa Terrace WTP

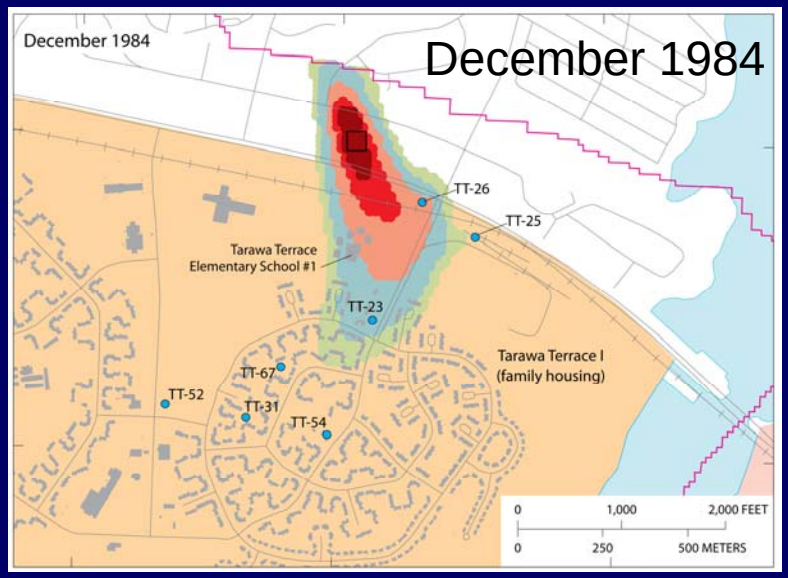


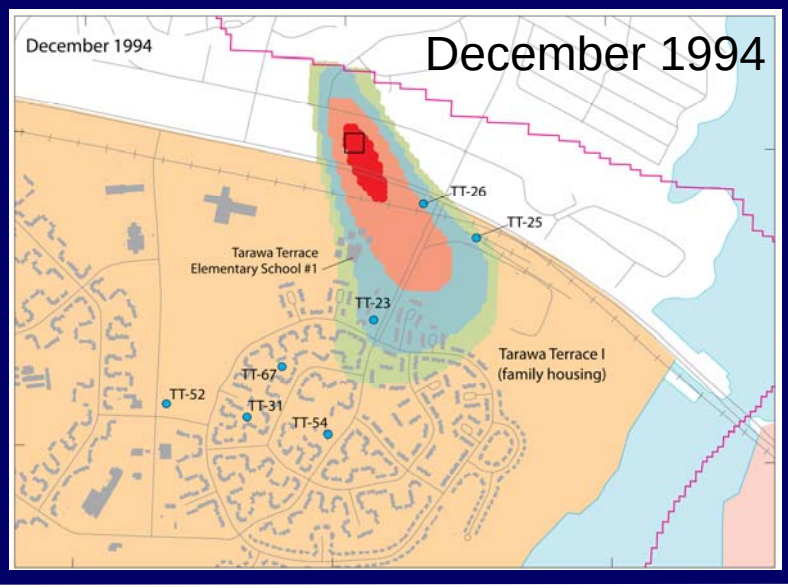
Summary of simulation results

Water supply	Date and duration, in months, MCL exceeded	Maximum PCE concentration, in μg/L	Average PCE concentration, in μg/L*
TT-23	Aug 1984–Apr 1985: 8 months	274	252
TT-25	Jul 1984-Feb 1985: 32 months	69	27
TT-26	Jan 1957-Jan 1985: 333 months	851	414
WTP	Nov 1957-Feb 1987: 346 months	183	70

*Exceeding MCL for PCE of 5 μg/L

PCE in soil gas (depth of 10 ft)





EXPLANATION

Historical water-supply area

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PCE vapor-phase concentration, in micrograms per liter of air

- 1 to 5
- Greater than 5 to 50
- Greater than 50 to 500
- Greater than 500 to 1,500
- Greater than 1,500

Summary of Findings

- PCE concentration exceeded the current MCL of 5 μg/L in finished water at the Tarawa Terrace WTP for 346 months
  - November 1957-February 1987
  - Maximum modeled value:183 μg/L
  - Maximum measured value: 215 μg/L (Feb 1985)

Summary of Findings--continued

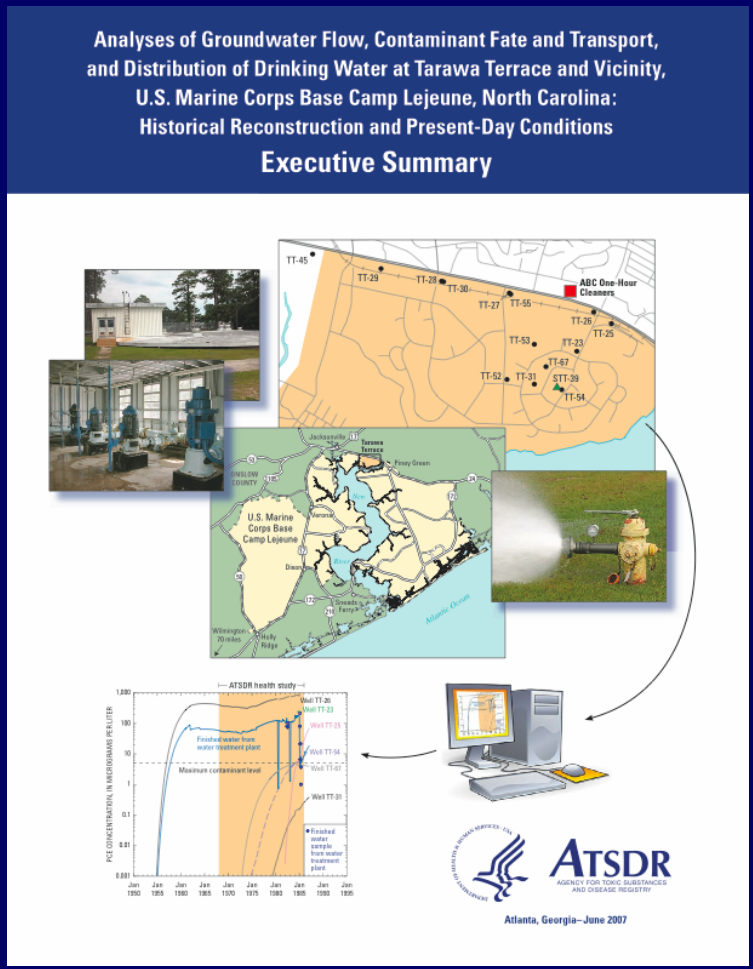
- PCE degradation by-products TCE and 1,2-tDCE in finished water at the Tarawa Terrace WTP:
  - Modeled concentrations: 2-15 μg/L
  - Measured concentration (TCE): 8 μg/L (Feb 11, 1985)
  - Measured concentration (1,2-tDCE): 12 μg/L (Feb 11, 1985)

Summary of Findings--continued

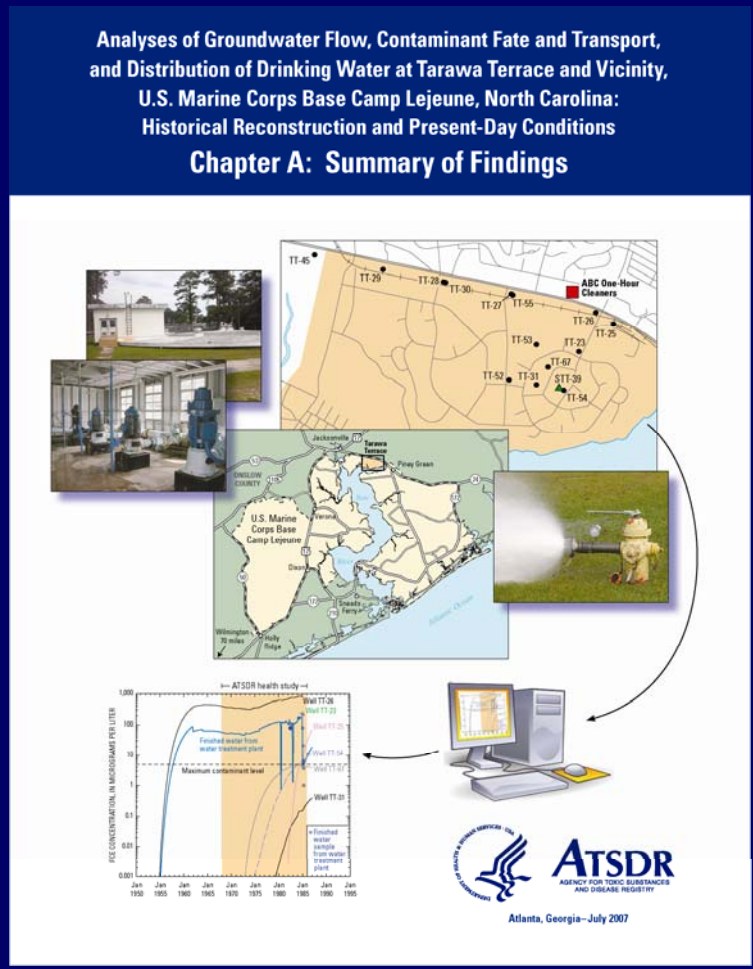
- Exposure to PCE and PCE degradation by-product contaminated drinking water ceased after February 1987
- Potential for exposure from PCE and PCE degradation by-product vapor in soil (soil gas) at elementary school and in Tarawa Terrace I family housing area simulated through December 1994.

Tarawa Terrace reports

Executive Summary



Summary of Findings



Information and results available to public

- ATSDR Camp Lejeune web site
  - http://www.atsdr.cdc.gov/sites/lejeune/watermodeling.html
- Web application
  - Table listing simulated concentrations of PCE, TCE, 1,2-*t*DCE, and VC by month and year
  - Graph of simulated concentrations
- PDF files for down load
  - Peer Review Panel on Water Modeling report
  - Executive Summary report
  - Table of simulated concentrations vs. time
  - Graph of simulated concentrations vs. time
  - Chapter A – Summary of Findings

Thank you for the opportunity to present information on ATSDR's current health study and water- modeling results at Marine Corps Base Camp Lejeune, NC

For questions or additional information,
you can contact:

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