

# Operable Unit 3 Offsite Areas

Rocky Flats Stewardship  
Council Board Meeting

February 4, 2013



Scott Surovchak

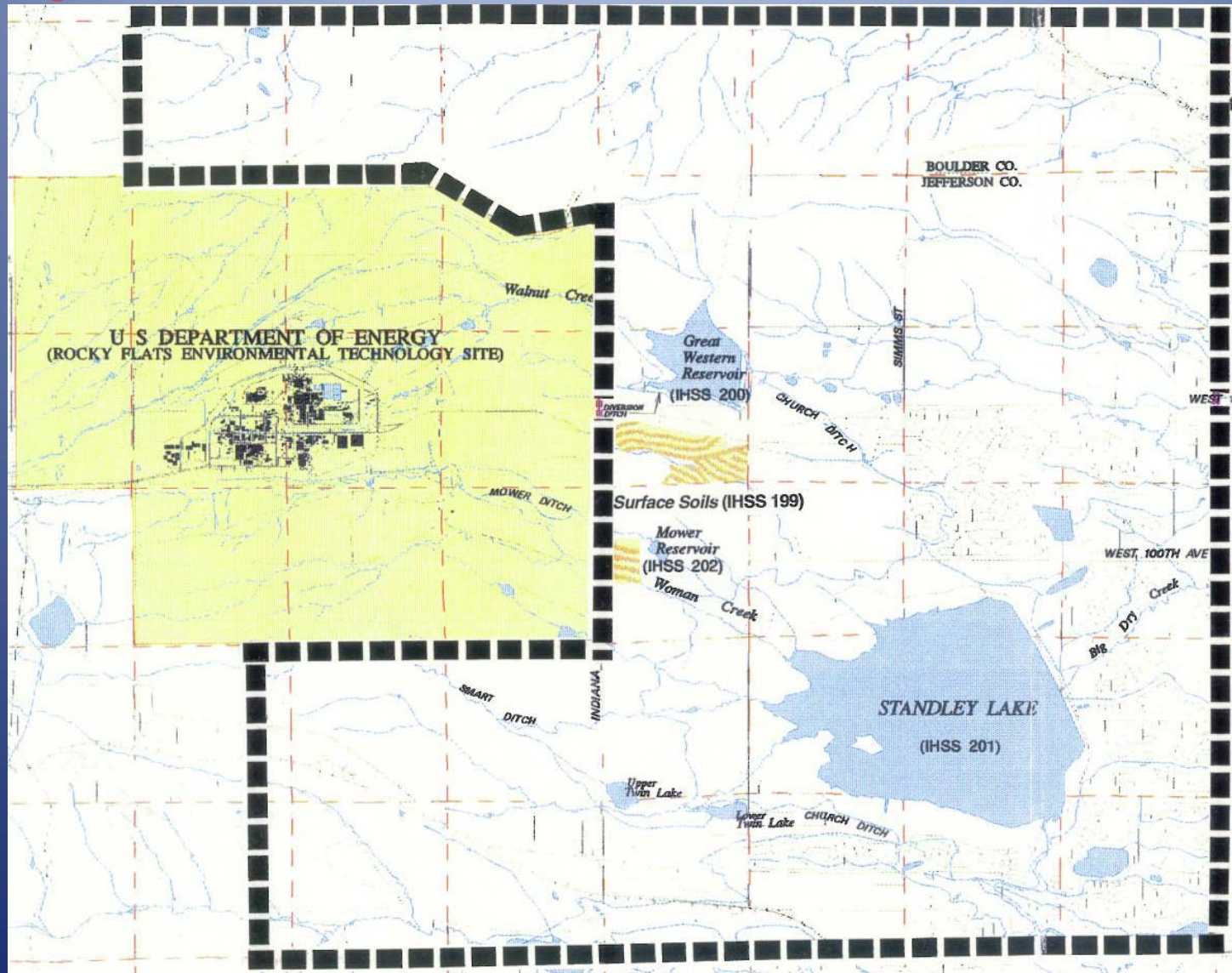


Carl Spreng

# Operable Unit 3 – Offsite Areas

- ~ 20, 480 acres (32 square miles)
- 1 of 16 Operable units designated in IAG (1991) and RFCA (1996)
- 4 Individual Hazardous Substance Sites (IHSSs):
  - 1) Surface Soils (IHSS 199)
  - 2) Great Western Reservoir (IHSS 200)
  - 3) Standley Lake (IHSS 201)
  - 4) Mower Reservoir (IHSS 202)

# Operable Unit 3 – Offsite Areas



# OU 3 Corrective Action Decision / Record of Decision (CAD/ROD)

- Proposed Plan
  - Public comment period: Aug. 7 – Oct. 11, 1996
  - Public hearing: September 18, 1996
- Selected Remedy = “no action”  
(all IHSSs already in a state protective of human health and the environment)
- Offsite areas available for all uses w/o restriction
- Signed by DOE, EPA, CDPHE (June 1997)
- Did not consider potential future releases
- Decision based on RFI/RI Report

# OU 3 RFI/RI Report

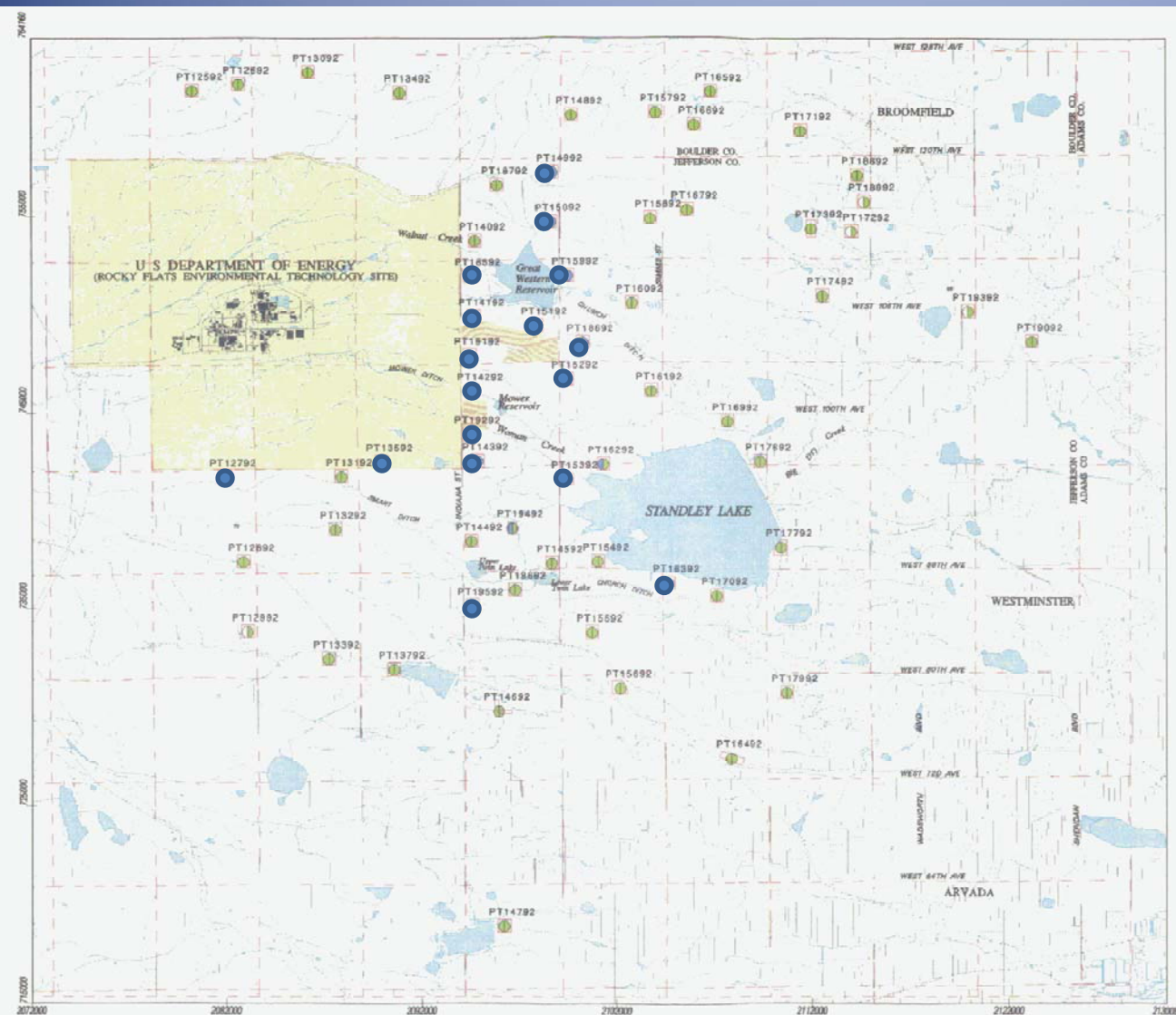
## (RCRA Facility Investigation/Remedial Investigation)

- Investigated surface soils, subsurface soils, sediments, surface water, ground water and air
- Contaminants of Concern:
  - 1) Americium (surface soil)
  - 2) Plutonium (surface soil; surface sediment)
- Human Health Risk Assessment
  - Residential reasonable maximum exposure (RME) =  $3 \times 10^{-6}$
  - Recreational Use reasonable maximum exposure =  $1 \times 10^{-8}$
- Ecological Risk Assessment  
[Hazard Quotient  $< 1$  = “no adverse ecological effects”]
- “Conditions in OU 3 pose no unacceptable or significant risks to human health or the environment”



# Radionuclides in OU 3 Surface Soil

Am and Pu levels compared to background



● Pu  $\leq$  background (44)

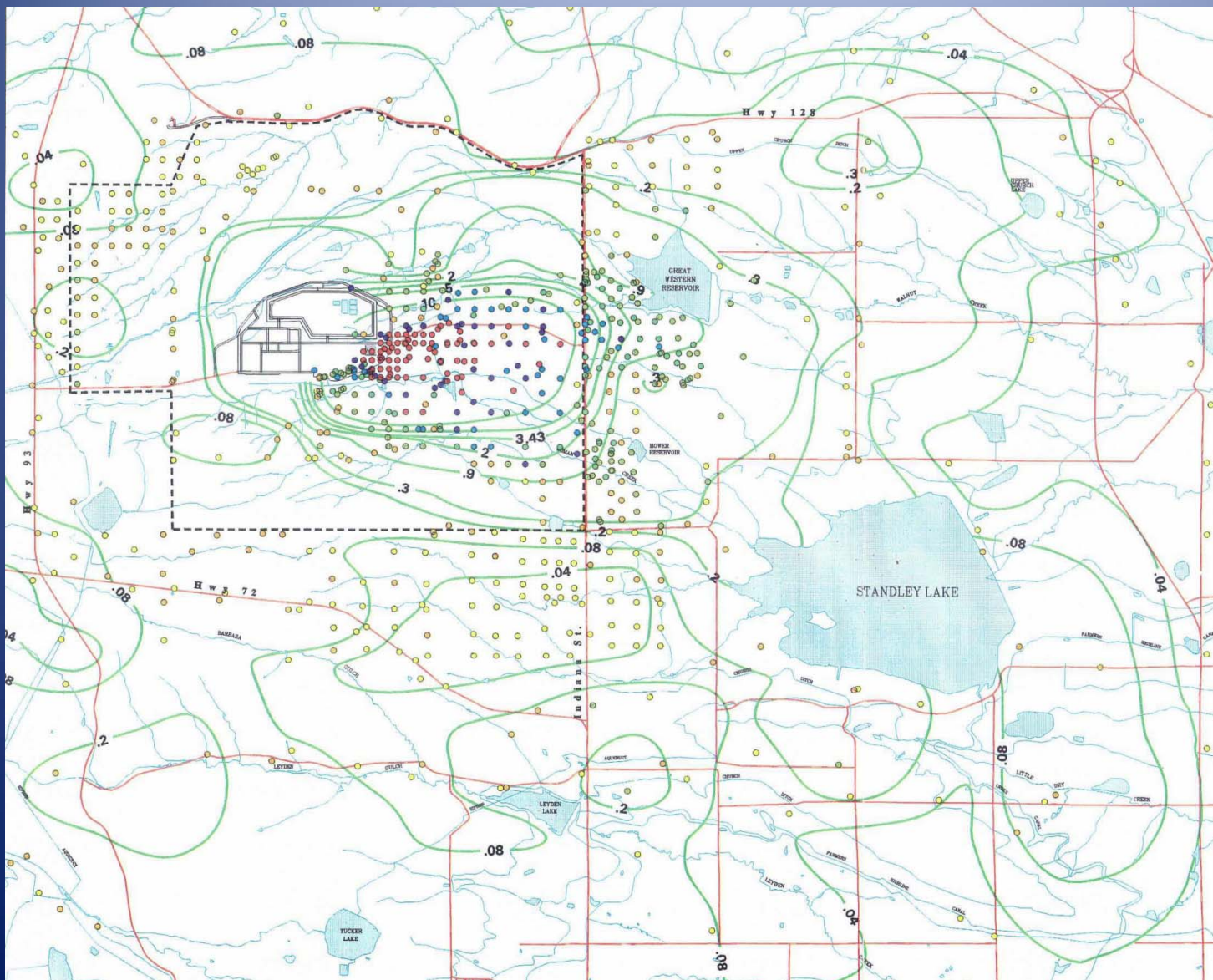
● Pu  $>$  background (17)

RFI/RI Report Data sets:

- 144 samples from 61 ten-acre plots
- 47 Remedy Lands samples
- Average Pu = 0.158 pCi/g

# Plutonium levels in OU 3 surface soil

## RFI/RI Report

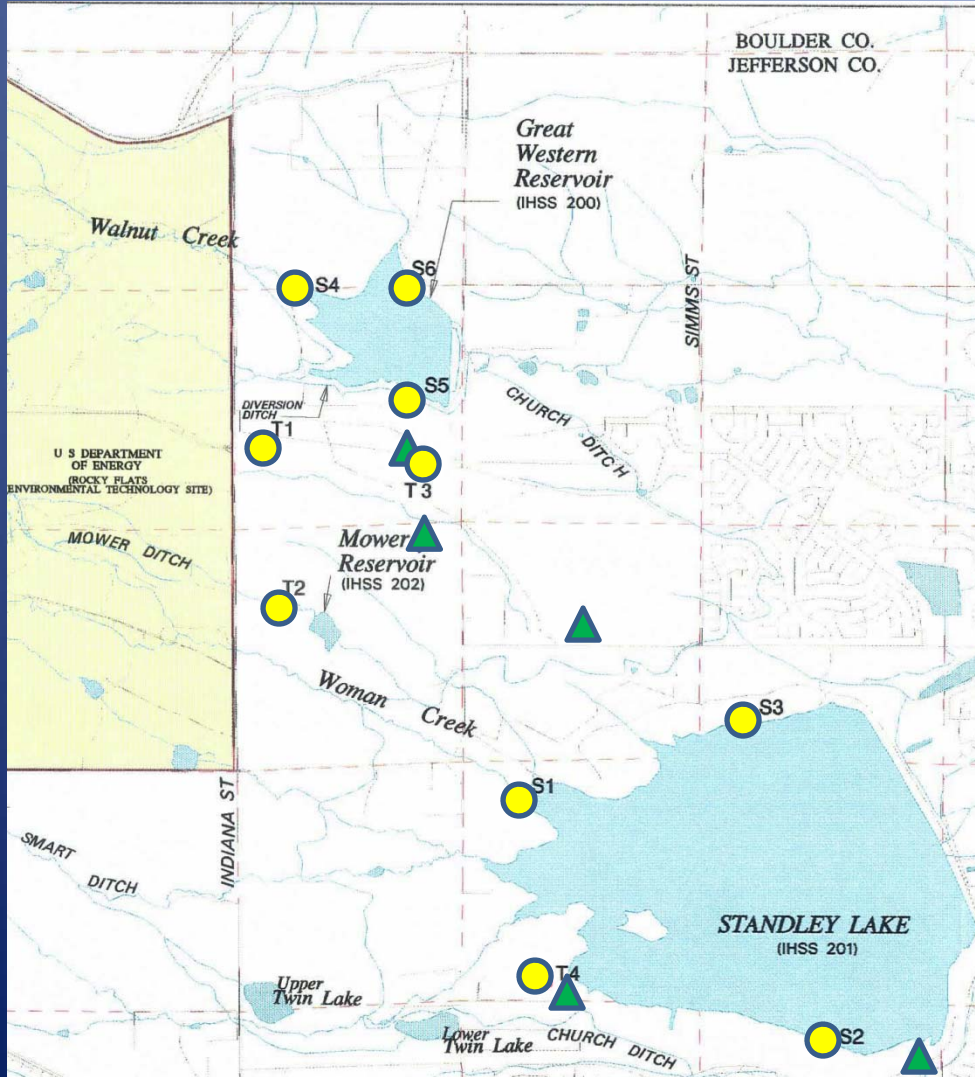


Pu isopleths  
(pCi/g)

Plotted from about  
750 sample points



# OU 3 Air Sampling Test Sites



## RFI/RI Report

 Wind Tunnel location

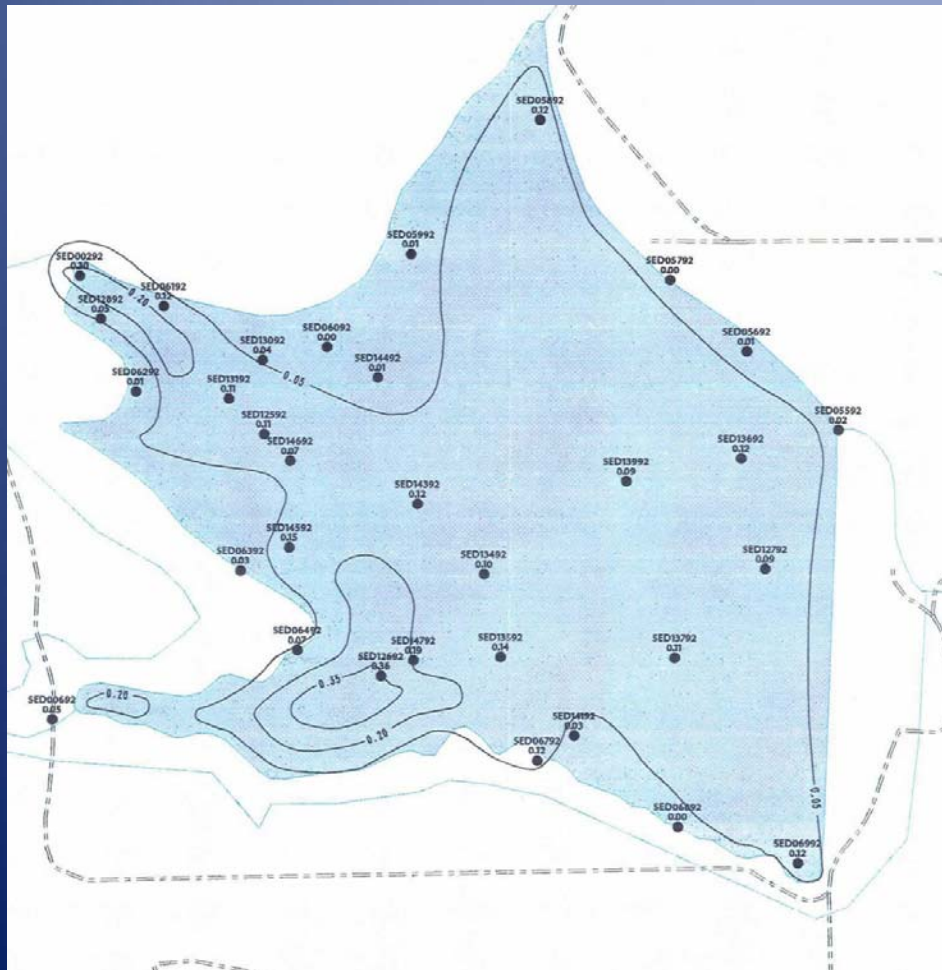
 Air monitoring location



# OU 3 Sediment Samples

## IHSS 200: GREAT WESTERN RESERVOIR

Pu contours (pCi/g)



## SEDIMENT SAMPLES FROM 3 RESERVOIRS

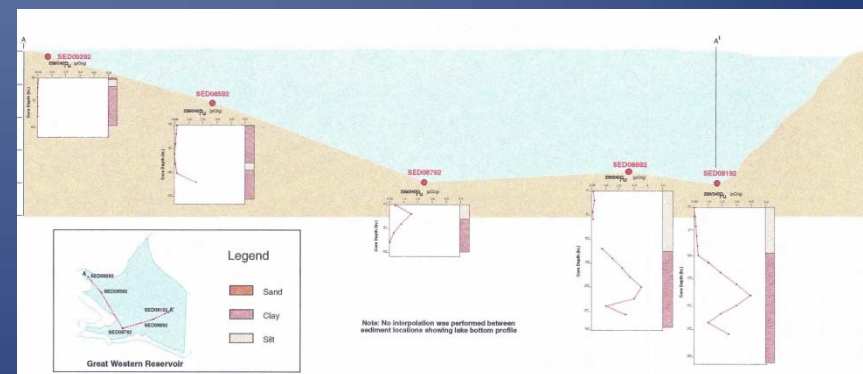
120 surface sediment samples

155 subsurface sediment samples

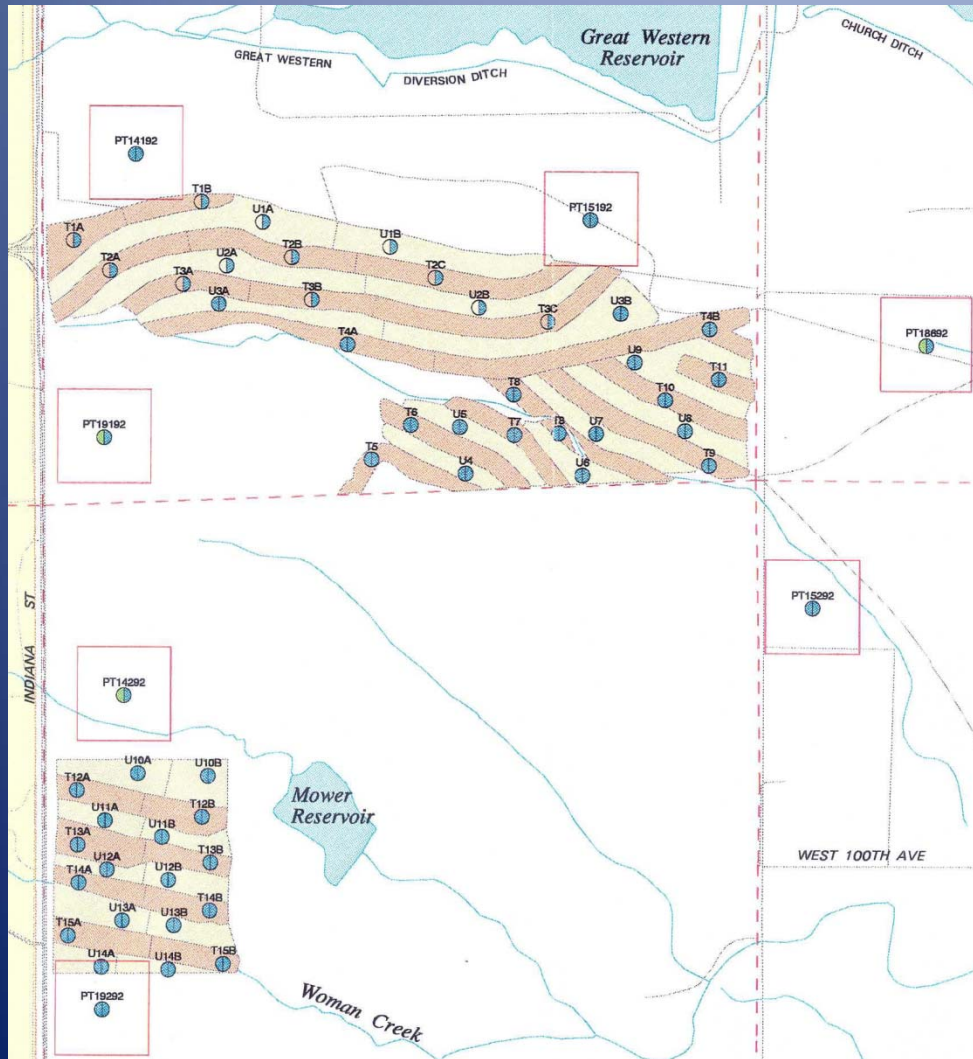
114 Standley Lake samples (1983-84)

## IHSS 200: GREAT WESTERN RESERVOIR

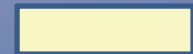
Pu depth profiles



# Remedy Lands



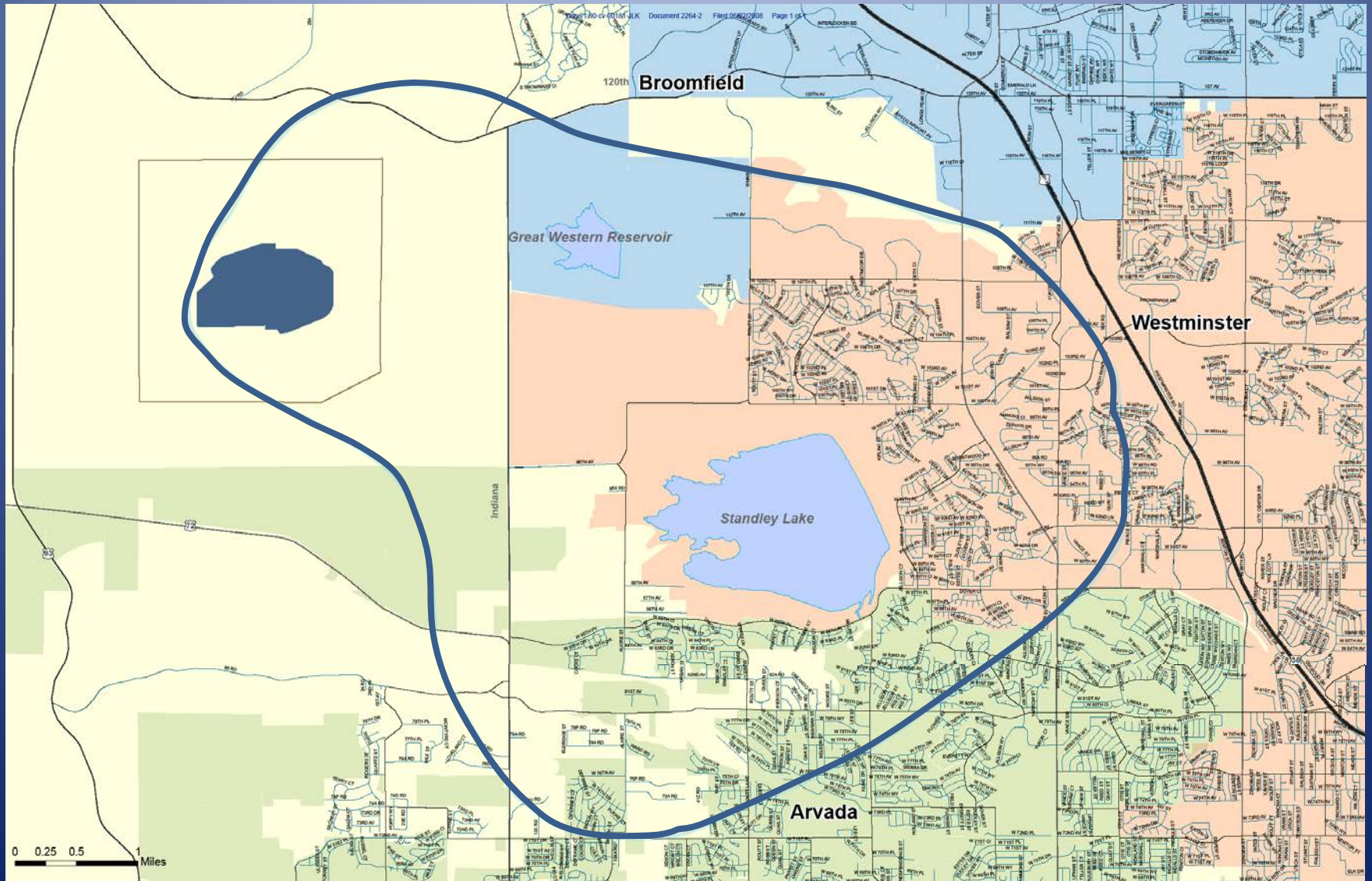
tilled



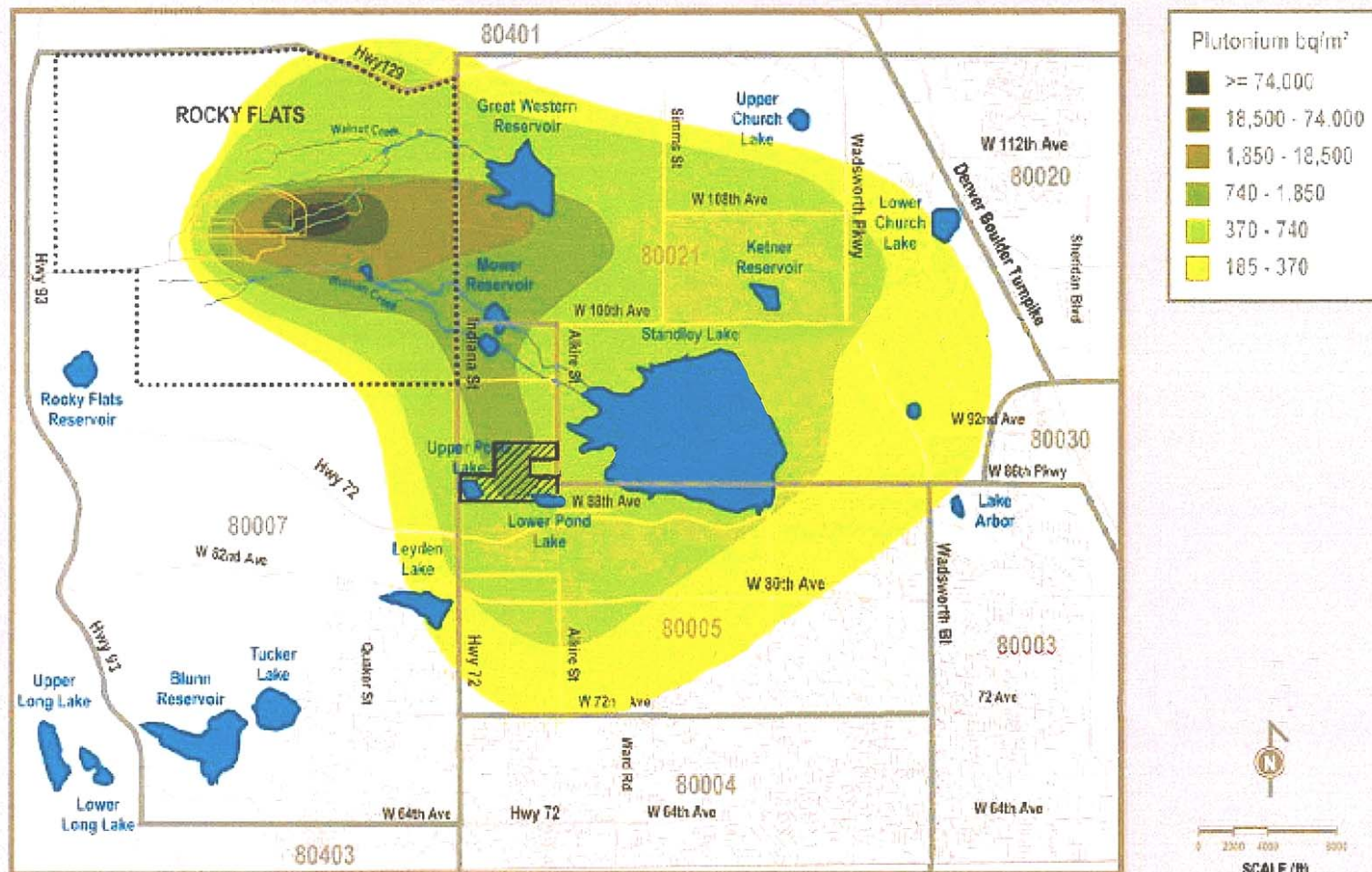
untilled



# Cook Case



# Earlier Studies



pCi/g
>200
50 - 200
5 - 50
2 - 5
1 - 2
0.5 - 1

- Data do not meet EPA useability criteria.
- Data included multiple analyses by various labs.

Source: JeffCo Map (10/25/04) and Krey Hardy Map (8/1/70)



# Other Off-site Environmental Studies

## DOE:

- 1970. Krey, P.W. and Hardy, E.P. *Plutonium in soil around the Rocky Flats Plant.*
- 1970. Dickson, C.R. and Start, G.E. *Plutonium releases to the environment at Rocky Flats*
- 1971. Seed, J.R. et al. *Committee evaluation of Plutonium levels in soils within and surrounding USAEC Installation at Rocky Flats, CO.*
- 1971-2006. EG&G, et al. *Rocky Flats Monthly Environmental Monitoring Report.*
- 1972. Loser, R.W. and Tibbals, R.L. *Soil sampling east of Indiana Avenue.*
- 1976. Krey, P. W. *Remote plutonium contamination and total inventories from Rocky Flats.*
- 1977. Illsley, C.T. *Results of special soil samples collected adjacent to the Rocky Flats Plant Site.*
- 1979. Illsley, C.T. and Hume, M.W. *Plutonium concentrations in soil on lands adjacent to the Rocky Flats Plant.*
- 1979. Hurley, J.D. Great Western Reservoir spillway sediment sampling program, phase I report.
- 1980. Hardy, et al. *Time pattern of off-site plutonium deposition from Rocky Flats Plant by lake sediment analyses.*
- 1980. Hurley, J.D. Great Western Reservoir spillway sediment sampling program, phase II report.
- 1985. Rockwell International. *Disclosure to the City of Broomfield.*
- 1985. Illsley, C.T. *Soil sample collection and analysis for plutonium on lands adjacent to Great Western Reservoir for the City of Broomfield.*
- 1985. Campbell, G.W. *Great Western Reservoir Sediment Cores.*
- 1987. Illsley, C.T. *Remedial action program on Jefferson County Open Space land in Section 7, T2S, R69W, south of Great Western Reservoir.*
- 1987. Rockwell International. *Remedial action program on Jefferson County Open Space land status report for period January 15, 1987 to October 15, 1987.*
- 1988. Rockwell International. *Status of remedial action program on Jefferson County Open Space land, November 1987 to November 1988.*
- 1991. DOE. *Past Remedy Report, Operable Unit 3 – IHSS 199.*
- 1994. Litaor, M. I., et al. *Plutonium-239+240 and Americium-241 in soils east of Rocky Flats.*
- 1995. Litaor, M. I. *Spatial analysis of plutonium-239+240 and americium-241 in soils around Rocky Flats.*
- 1995. Litaor, M.I., et al. *Comprehensive appraisal of <sup>239+240</sup>Pu in soils around Rocky Flats.*
- 1995. Litaor, M.I., et al. *A comprehensive appraisal of plutonium-239+240 in soils of Colorado.*
- 1996. Litaor, M.I. and Allen, L. *A comprehensive appraisal of <sup>241</sup>Am in soils around Rocky Flats.*
- 2001. DOE, CDPHE, and EPA. *Radionuclide Soil Action Levels.*
- 2002. DOE. *First Five-Year Review Report*

# Other Off-site Environmental Studies

## CDPHE:

- 1977. Colorado Department of Health. *Amendment to rules and regulations pertaining to radiation control.*
- 1977. Colorado Department of Health. *Radioactive soil contamination (Ce-137 and Pu) in the environment near the Rocky Flats Nuclear Weapons Plant.*
- 1990. Colorado Department of Health. *Rocky Flats surface soil survey, 1970-1989.*
- 1991. Terry, R. *Contamination of surface soil in Colorado by plutonium, 1970-1989: summary and comparison of Pu concentration in soil in the Rocky Flats plant vicinity and eastern Colorado.*
- 1993. CDPHE. *Groundwater sampling in private wells near Rocky Flats.*
- 1993. ChemRisk. *Exposure pathway emissions and transport modeling, Project Task 6, Health Studies on Rocky Flats.*
- 1993. Radiological Assessments Corp. *Evaluation of historical environmental data, Project Task 4, Health Studies on Rocky Flats.*
- 1994. ChemRisk. *Reconstruction of Historical Rocky Flats operations & identification of release points, Project Tasks 3 & 4, Health Studies on Rocky Flats.*
- 1994. ChemRisk. *Estimating Historical Emissions from Rocky Flats, Project Task 5, Health Studies on Rocky Flats.*
- 1994. Love, J. *Rocky Flats soil plutonium survey from 1970 to 1991, technical status report.*
- 1996. Jones, R.H., and Zhang, Y. *Spatial and Temporal Analysis of the Rocky Flats Soil Plutonium Data.*
- 1996. CDPHE - Citizens' Environmental Sampling Committee. *Soil and sediment study of off-site areas surrounding the Rocky Flats Nuclear Weapons Plant, Golden, Colorado.*
- 1996. CDPHE. *Ground Water Plutonium<sup>239,240</sup> Data in Walnut Creek Alluvium East of Terminal Ponds.*
- 2002. Lavelle, J.M., et al. *A comparative study of <sup>239,240</sup>Pu in soil near the former Rocky Flats Nuclear Weapons Facility, Golden, Colorado*

# Other Off-site Environmental Studies

## Other sources:

- 1970, Colorado Committee for Environmental Information Subcommittee on Rocky Flats. *Report on the Dow Rocky Flats fire: Implications of plutonium releases to the public health and safety.*
- 1971. USEPA. *Radioactivity levels in the environs of the Rocky Flats plutonium plant.*
- 1971. Volchok, H.L. (for AEC). *Resuspension of Plutonium-239 in the vicinity of Rocky Flats.*
- 1972. Poet, S.E. and Martell, E. A. *Plutonium-239 and Americium-241 contamination in the Denver area.*
- 1973. USEPA. *Radioactivity levels in the environs of the Rocky Flats plutonium plan – Part II.*
- 1974. Gunning, R.R. *Strontium-90 Reanalysis and recount of silt samples, Great Western Reservoir and Standley Lake.*
- 1977. Johnson, C.J. *Offsite distribution of plutonium in the respirable dust on the surface of soil in the vicinity of the Rocky Flats Plant.*
- 1977. Sehmel, G.A. *An overview of plutonium resuspension research at Rocky Flats conducted by Battelle Northwest.*
- 1981. Thomas, C.W., and Robertson, R.E. *Radionuclide concentrations in reservoirs, streams and domestic waters near the Rocky Flats installation.*
- 1991. Western Technologies. *Plutonium-238 and 239/240 testing of the surface soil on the Conda, Spicer, and McKay gravel lease properties, Rocky Flats west buffer zone.*
- 1994. Webb, et al. *The spatial distribution of plutonium in soil near the Rocky Flats Plant.*
- 1995. Clow, D.W., and Johncox, D.A. (USGS). *Characterization of selected radionuclides in sediment and surface water in Standley Lake, Great Western Reservoir, and Mower Reservoir, Jefferson County, Colorado, 1992.*
- 1995. Thomas, R.S. and Ibrahim, S.A. *Plutonium concentrations in lichens of Rocky Flats environs.*
- **1997. ATSDR. *Health consultation – RFETS Operable Unit 3.***
- 1997. Ibrahim, S.A., Webb, S.B. and Whicker, F.W. *Contributions of Rocky Flats releases to the total plutonium in regional soils.*
- 2010. Moore, L. *Citizens find plutonium in breathable form at two locations near the Rocky Flats Site.*
- 2011. Moore, L. *Citizen sampling near Rocky Flats.*

# Delisting OU 3

- 30-day public comment period (beginning March 13, 2007)
- Notice of Partial Delisting from National Priorities List (May 17, 2007)
- “OU 3 poses no significant threat to public health or the environment and, therefore, no further remedial measures pursuant to CERCLA are appropriate.”