

Fuel Recovery History

**Mandan,
North Dakota**



North Dakota Department of Health

1950

- Approximate start-up date of the Burlington Northern rail yard fueling activities, downtown Mandan

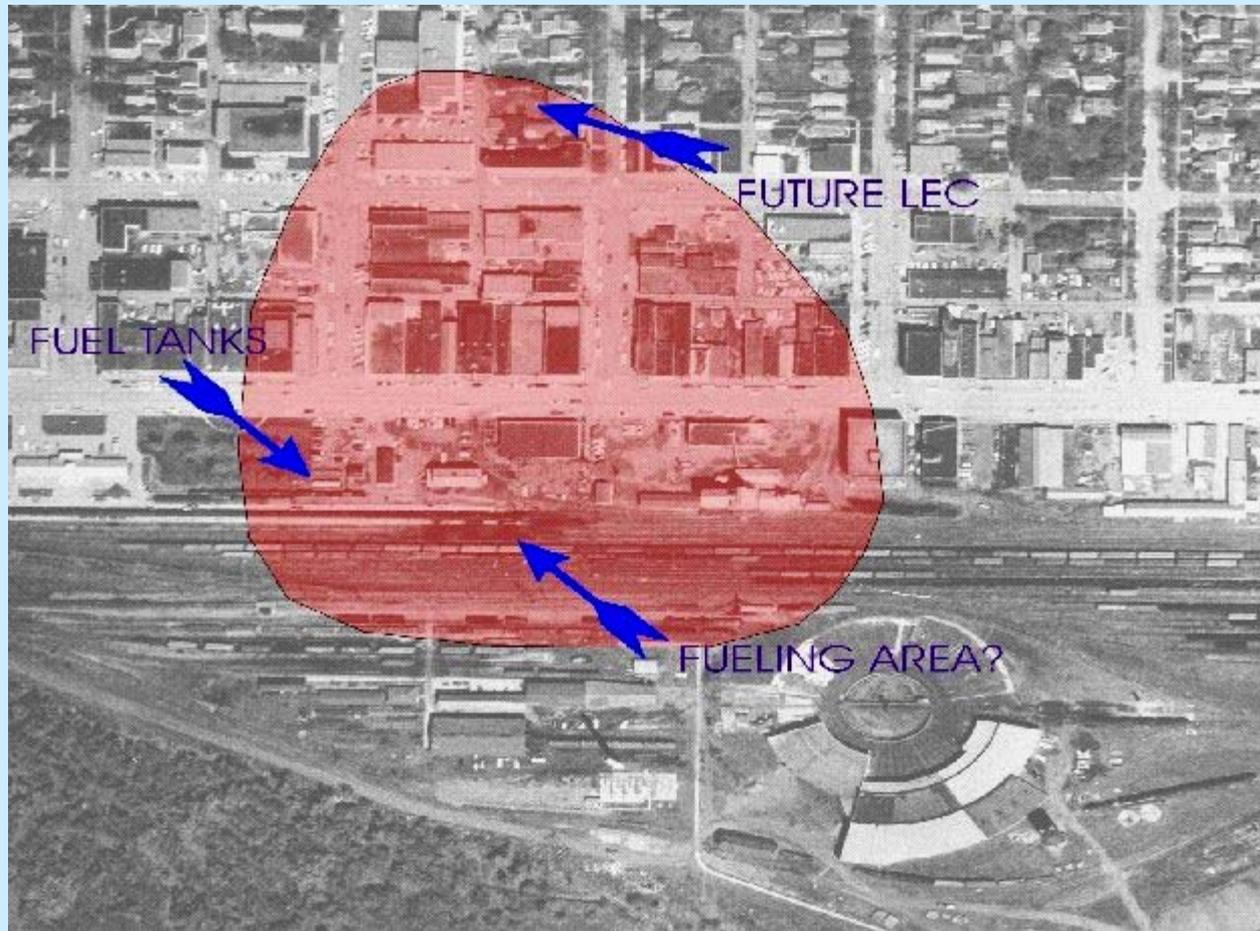
1984

- Geotechnical Soil Testing Service discovers fuel at the site of the proposed Law Enforcement Center (LEC)
- North Dakota Department of Health begins investigation of the fuel plume extent

1985

- North Dakota Department of Health issues administrative order to BN to delineate and recover the fuel plume
- Burlington Northern Railroad begins recovering fuel from a location south of Main St. and First St. N.W. ~ About 4,000 gallons of fuel are recovered

Downtown Mandan Fuel Plume as Originally Delineated ~ 1985



1985 (cont.)

- LEC building contractors attempt to dewater/defuel the LEC construction site ~ About 13,550 gallons of fuel are recovered
- BN estimates that the plume below downtown Mandan contains 600,000 to 900,000 gallons of fuel ~ Estimated recovery time is three to five years

1986

- Additional delineation of the fuel plume
- LEC construction completed;
fuel odors and infiltration continue to plague elevator shafts
- BN expands recovery activities by installing two additional fuel/water recovery wells

1987

- Additional fuel/water recovery wells begin operation
- Fuel recovery reaches 102,459 gallons

1989

- Study of the recovery system efficiency and the extent of the fuel plume is initiated
- BN is requested to expand the study to include all other fueling locations and pipelines

1990

- Study identifies four new areas of fuel contamination and a major leak in a fuel transmission pipeline
- One recovery well taken out of service due to lack of fuel production in northern portion of the downtown plume

Midtown Fuel Plumes as Delineated ~ 1991



East Fueling Area Plume as Delineated ~ 1991



West Fueling Plume as Delineated ~ 1991



1991 to 1992

- Further delineation of newly identified fuel plumes
- Fueling operation problems are identified and addressed by Department of Health and BN
- Recovery systems are installed in three fueling areas and the pipeline break plume

1993

- Fuel recovery begins in December 1992 at the old roundhouse and pipeline break area
- Fuel recovery begins in early 1993 at the east and west fueling areas

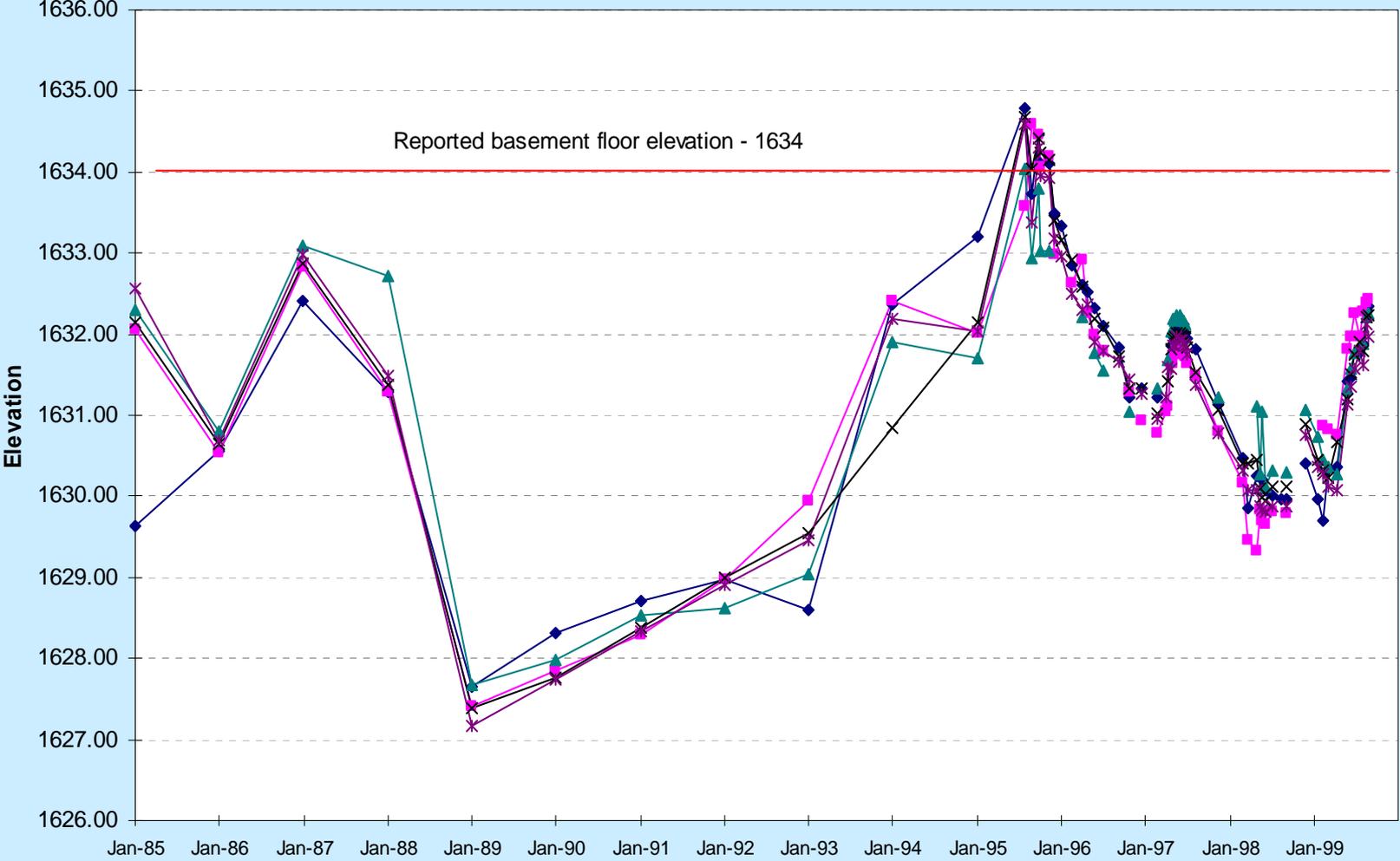
1994

- Roundhouse fuel recovery operations change from recovery well to belt skimmer from Monitoring Well RH-1

1995

- Ground water elevations reach an all-time high level
- Fuel and fuel odor are reported in LEC
- BN responds with cleanup of LEC basement and air-handling equipment installations in elevator shafts
- Department of Health and Morton County Commissioners discuss long-term solutions to fuel contamination in the LEC

Water Elevation Beneath Law Enforcement Center



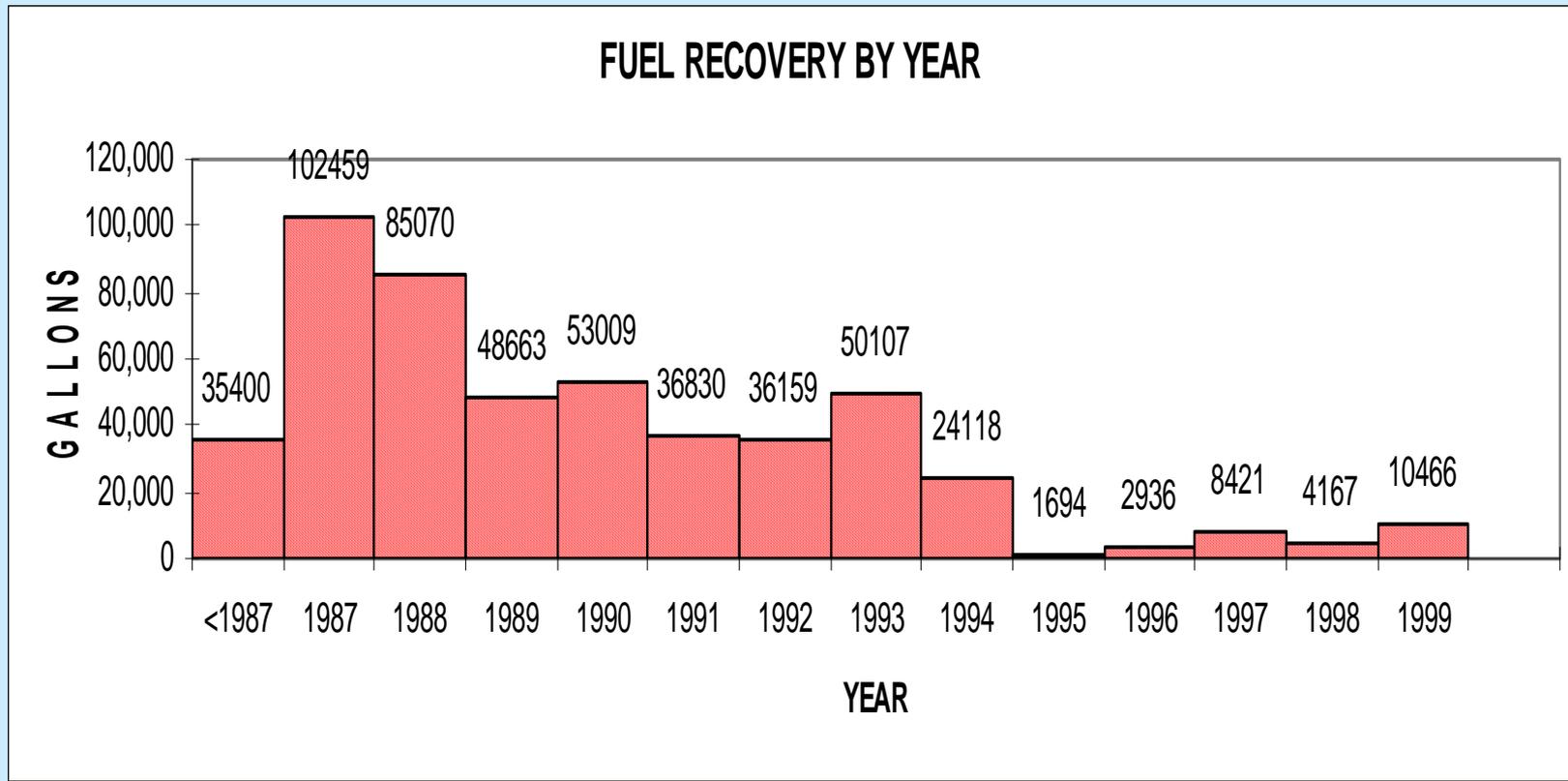
Monitoring Wells

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1996

- Fuel recovery at roundhouse, east and west fueling areas are taken off-line due to poor fuel recovery
- Other recovery operations suffer similar problems ~ Solutions are sought

Total Plume Fuel Recovery



1997

- Department of Health begins intensive project review aimed at developing a more focused, aggressive recovery effort
- Ground water chemistry monitoring program is required

1998

- BN is directed to explore an aggressive, multi-phase recovery program to address not only the free-product plumes, but also the dissolved and smear-zone fractions
- Department of Health again investigates fuel odors reported in the LEC

1998 (cont.)

- Chemical monitoring of ground water is implemented
- BN agrees to more aggressive approach and timetable
- Expanded subsurface assessment is applied to downtown plume, with focus on new recovery and cleanup techniques

1999

- Concerned citizens express interest in cleanup progress and directions
- Vacuum recovery system pilot tests are run by BN ~ Results do not meet recovery expectations
- Alternative recovery methods are required under aggressive time schedule

Midtown Plumes as Delineated ~ 1999



East Fueling Area Plume as Delineated ~ 1999



West Fueling Plume as Delineated ~ 1999

