Ambient monitoring of surface-water and groundwater quality on the Fort Berthold Indian Reservation, North Dakota, 2013 through 2016

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• In 2010, the USGS evaluated existing data to establish baseline or background concentrations in the surface water and groundwater of the Fort Berthold Indian Reservation.

• Report identified several data gaps that need to be addressed to analyze for potential long-term changes in water-quality
PROBLEM

• Williston Basin is an intensive area of energy development

• On Fort Berthold Indian Reservation there are currently 348 active oil wells with hydraulic fracturing occurring at most wells

• Oil wells on the Reservation are projected to increase by 1,700 in the foreseeable future
PROBLEM, cont.

• Agricultural land use on the Reservation has potential to introduce fertilizers, pesticides, sewage effluent, and livestock waste into streams, groundwater, and Lake Sakakawea.

• TAT Environmental Department has identified understanding the potential effects of land use on surface-water and groundwater quality as the primary concern of their environmental program.
PLANNED PROGRAM

• Beginning in 2013, implement a reservation-wide ambient water-quality monitoring program of the streams, groundwater, and springs on the Fort Berthold Indian Reservation

• Compilation of existing and historical data collected from Lake Sakakawea by TAT, the NDDH and the USACE
OBJECTIVES

• determine the effects of land use on stream and groundwater quality on the Fort Berthold Indian Reservation

• monitor long-term changes in water-quality over time that may result from the cumulative long-term effects of land use can be detected
OBJECTIVES, cont.

• influence of energy development on water quality also may be assessed by supplementing the ambient monitoring with analysis of the organic compounds and various isotopes
APPROACH

• Streams
• Groundwater
• Springs
• Lake Sakakawea
SURFACE WATER SAMPLING

• Water-quality samples collected from the three existing USGS stations at Bear Den Creek (USGS station 06332515), East Fork Shell Creek (USGS station 06332523), and Deepwater Creek (USGS station 06332770)

• Three discontinued USGS stations at Shell Creek, Moccasin Creek, and Squaw Creek
Existing USGS gaging stations

Discontinued USGS gaging stations

EXPLANATION

- Selected drainage basin
- Boundary between contributing and noncontributing area of drainage basin
- Fort Berthold Indian Reservation boundary

- Continuous-record gaging station or miscellaneous discharge-measurement site—Number indicates U.S. Geological Survey identification
SURFACE WATER SAMPLING, cont.

• Samples collected at all 6 stream sites for the analysis of field measurements, major ions, trace elements, and nutrients in January, April (2 samples), May, June, August, and October

• Streamflow also will be measured in each stream every time a water-quality sample is collected
GROUNDWATER SAMPLING

• The TAT Environmental Department will continue to collect water-quality samples from the 20 domestic groundwater wells.

• All domestic groundwater wells will be sampled twice each year, once in April and once in August, and analyzed for the same constituents as surface-water.
Eleven groundwater wells previously sampled by the NDSWC will also be sampled, including water-level measurements each time a water-quality sample is collected.

All groundwater wells sampled twice each year, once in April and once in August, and analyzed for the same constituents as surface-water.
Fort Berthold Reservation O & G

Legend:
- X: Selected Sample Locations
- Potential Sample Locations
- Confidential Wells Events
- Active Wells Events
- Drilling Rigs
- State Land
- Trust Surface
SPRINGS SAMPLING

- Five springs sampled twice each year, once in April and once in August at the same time the streams and groundwater wells are sampled.

- The purpose of sampling springs is to determine the influence of spring discharge on stream water-quality, and because they may function as “early warning indicators” of energy development effects.
LAKE SAKAKEWE SAMPLING

• The TAT Environmental Department sampled Lake Sakakawea at the 6 withdrawal intakes for the rural water program for about the previous 10 years.

• Water-quality data has been and continues to be collected from Lake Sakakawea by the NDDH and USACE, TAT Environmental Department would be redundant and is no longer needed.
FUTURE REPORT

• In 2016, a USGS Report will be published that includes an interpretation of the data collected in the ambient monitoring program.

• If possible, will include data collected by the NDDH and the USACE from Lake Sakakawea, previous data collected by the TAT Environmental Department from the 20 domestic groundwater wells and Lake Sakakawea.
Questions