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Aerial Radiation Survey and Soil Sampling at the WNYNSC and Cattaraugus Creek

November 16, 2016

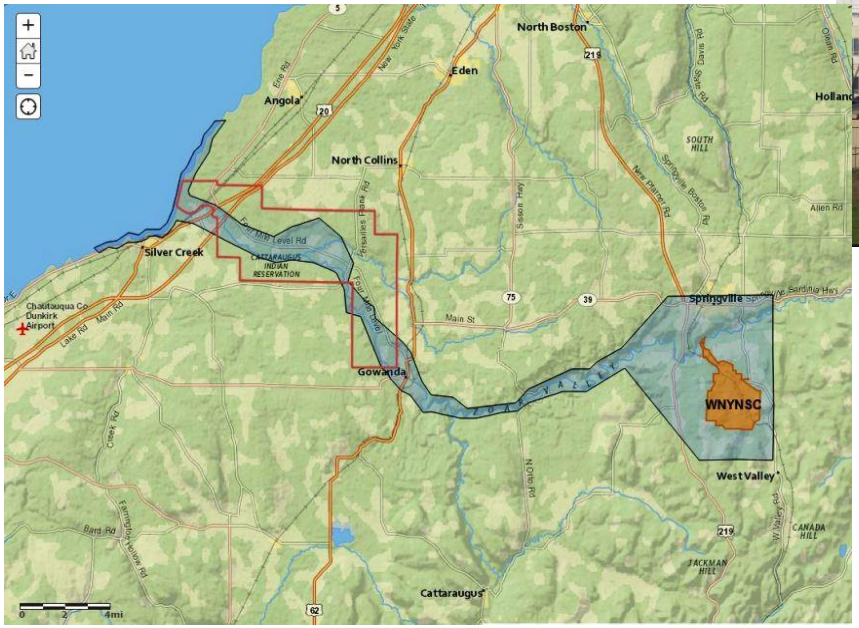
Aerial Survey to Measure Radiation

- In 2014, the U.S. Department of Energy (DOE) and the New York State Energy Research and Development Authority (NYSERDA) jointly conducted an aerial radiation survey of the Western New York Nuclear Service Center (Center) and Cattaraugus Creek from the Center to Lake Erie.
- The purpose of the survey was to provide an updated picture of radiation conditions at and near the Center in relation to previous aerial surveys that have been conducted.
- The agencies also included Cattaraugus Creek from the Center to Lake Erie in the aerial radiation survey.

Aerial Survey to Measure Radiation

The aerial radiation survey included:

- Cattaraugus Creek from Springville to Lake Erie.
- A portion of the Cattaraugus Territory of the Seneca Nation of Indians (SNI).
- A total of 90 square miles was surveyed (including the entire 5.2 square miles of the Center).



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Aerial Survey to Measure Radiation

Survey approach:

- Conducted using sensitive detection equipment mounted to a helicopter.
- GPS antenna to record the location as data is collected.
- Ground speed of about 80 mph.
- Altitude of 150 feet above ground level.
- Spacing of 300 feet between the survey flight lines.

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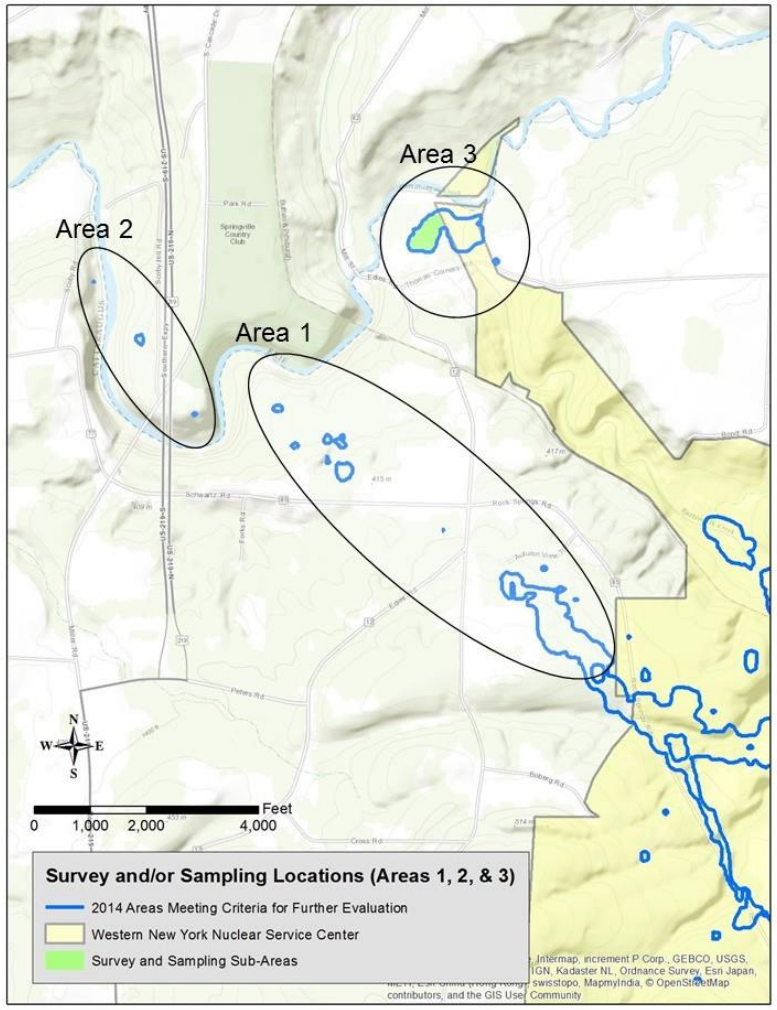
Aerial Survey Results

- The survey found that some areas outside the Center have radiation levels slightly above “background radiation” levels.
- What is background radiation?
  - Background radiation includes naturally occurring radiation from natural radioactive elements in rock, soil, air, water and outer space.
  - Background radiation also includes some manmade contributions, including radiation from historic atomic testing.

Aerial Survey Results

- Three areas above background are adjacent to the Center.
- Two areas are on the Cattaraugus Territory of the Seneca Nation of Indians. These areas had levels that are “very small compared to background,” and the levels were “just above the sensitive detection thresholds inherent in these measurement and analysis methods.”

Aerial Survey Results



Sampling Locations 1, 2 and 3

Above background locations near the Western New York Nuclear Service Center.

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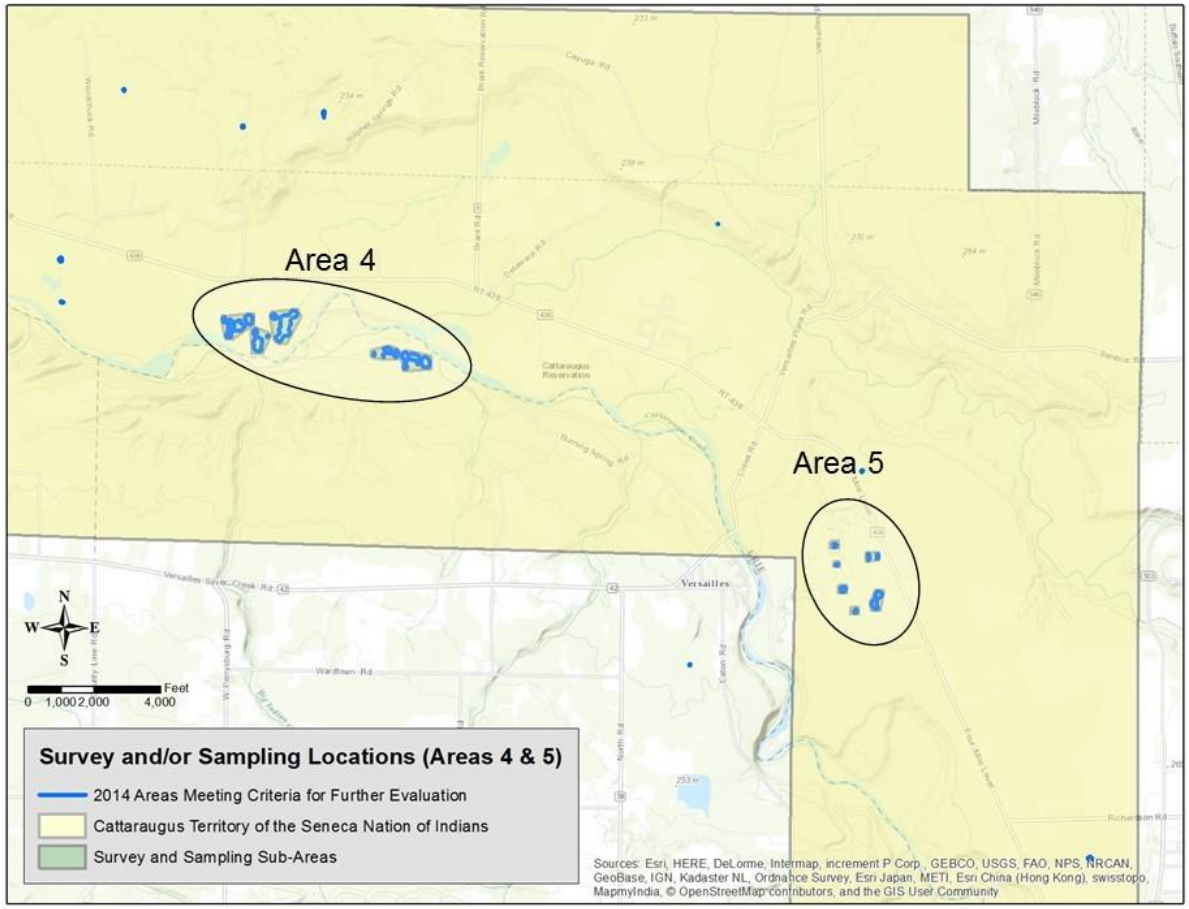
Aerial Survey Results



Sampling Locations 4 and 5

Above background locations on the Cattaraugus Territory of the Seneca Nation of Indians.

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Soil Sampling

- NYSERDA developed a soil sampling program to provide a more complete picture of each of the five areas identified in the aerial survey in greater detail.
- The objective was to confirm the results of the aerial survey, and to provide information needed to compare the results to regulatory requirements for public health and safety.

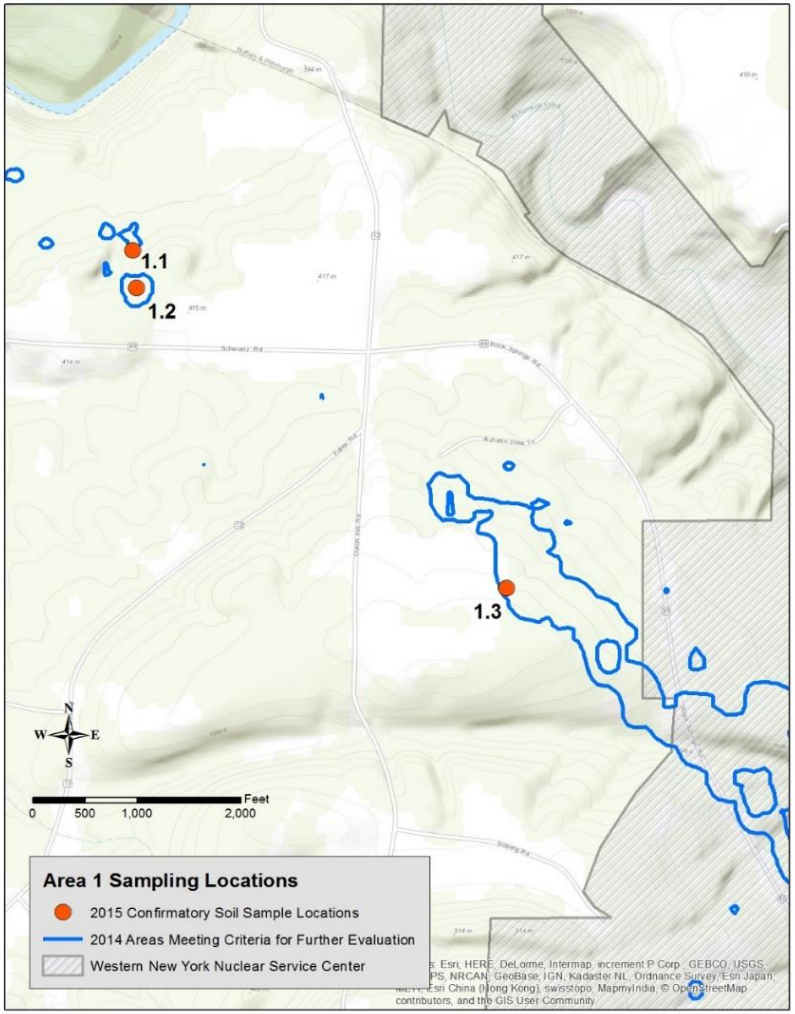
Field Survey and Sampling Approach

The process used for each area included the following:

- Conduct gamma walkover field surveys of each area to determine whether elevated locations were identified (except for Area 1).
- Conduct dose rate surveys for each area.
- Collect soils at all sample locations. (The plan identified the number of samples and depth at each location.)
- Collect a number of “background” samples and dose rates.
- Collect current land use information. This information is used to develop the exposure scenarios used in the dose models.

Area 1 - Summary

- Area 1 is adjacent to the Center and is known as the “Cesium Prong.”
- The Cesium Prong is the result of unintentional airborne releases by NFS in 1968.
- Area was previously identified and sampled.
- All areas met the standards for public health and safety.
- Results in 2015 were modeled using a year-round resident and range from 0-8.0 mrem/year, which continues to meet public health and safety standards.



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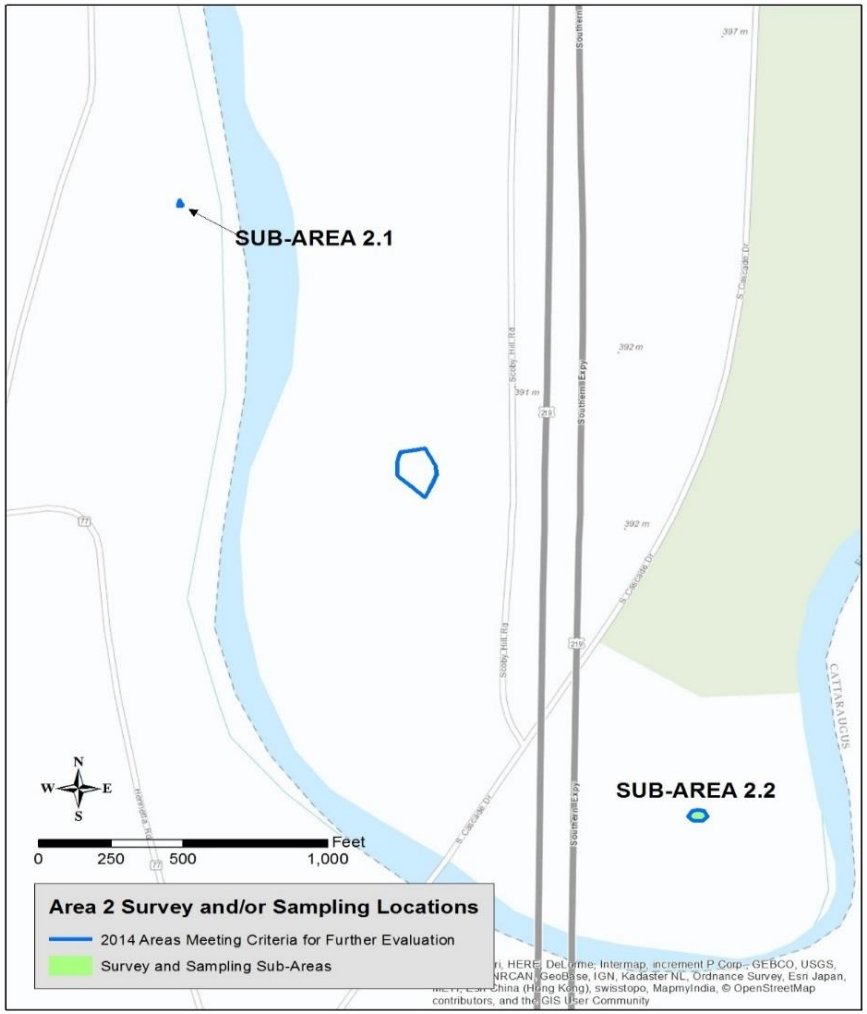
Area 2 - Summary

- Area 2 believed to be a continuation of the Cesium Prong.
- Surveys and sampling were conducted in Sub-Areas 2.1 and 2.2.
- Both areas are sloped and tree covered.
- Area 2.1 extremely treacherous due to steep slope and difficult terrain.
- Results were modeled using a Recreational Hiker/hunter scenario (uses the property 100 hours/year and consumes the animals) and range from 0 to 0.4 mrem/year.



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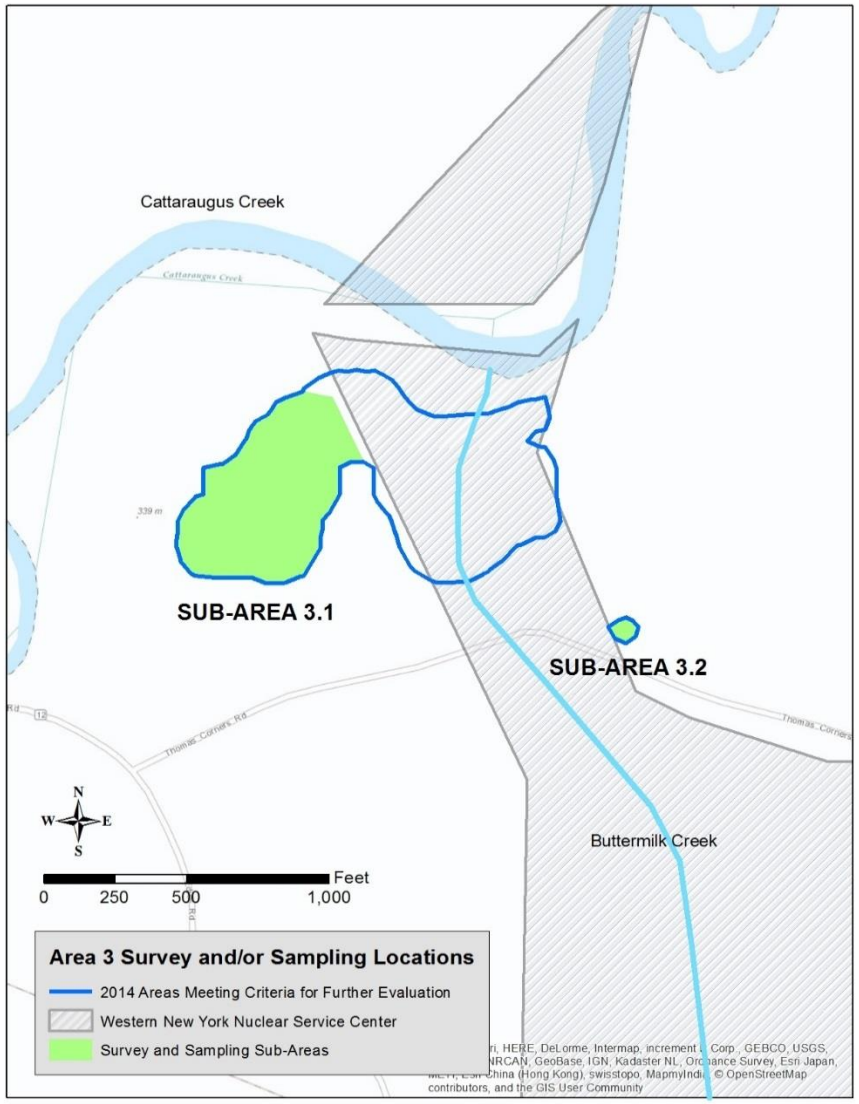
Area 3 - Summary

- Area 3 is located in the floodplain of Cattaraugus Creek near the confluence of Buttermilk Creek.
- Identified in previous aerial radiation surveys. Elevated activity from permitted discharges from the site.
- Surveys and samples were conducted in Sub-Areas 3.1 and 3.2.
- Results were modeled using a Resident Farmer (uses the property 2,100 hours/year and consumes the animals that eat the crop) and range from 0 to 7.2 mrem/year.



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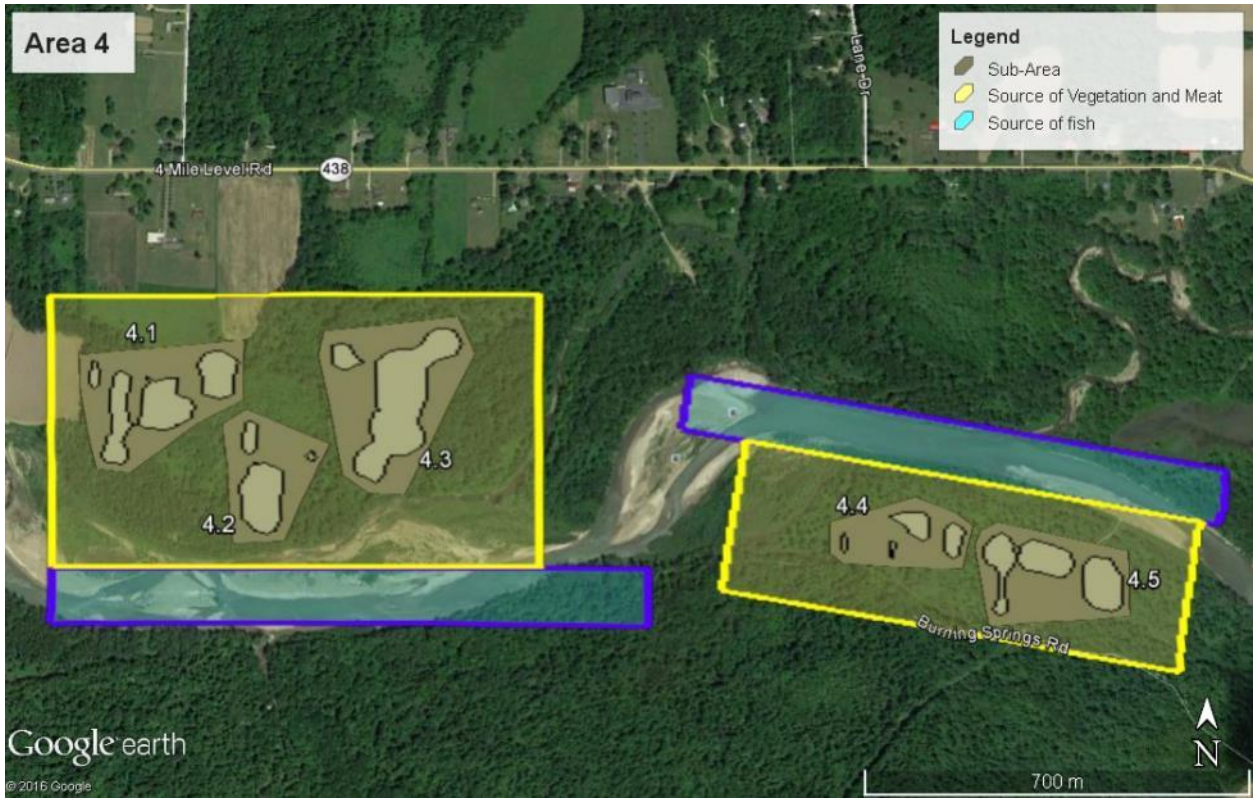
Culturally Specific Land Use Survey

NYSERDA worked with the Seneca Nation to develop land use scenarios for each of the areas.

- The Collector gathers medicinal herbs and other wild vegetation from these areas.
- The Hunter/Fisher is hunting these areas and wild game and fish are from these areas.
- For the additionally requested sample locations, a Homeowner land use was included, along with the Collector and Hunter/Fisher scenarios.

Area 4 - Soil Sampling

- Area 4 is located on the Cattaraugus Territory of the Seneca Nation of Indians.
- This area is located within the floodplain of Cattaraugus Creek.
- Surveys and sampling were conducted in all five areas shown.



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Area 4 Summary of Results

1. Dose from 2014 Aerial Radiation Survey -
   - Area 4.1 – Collector = 1.5 mrem/year, Hunter/Fisher = 3.7 mrem/year
   - Areas 4.2 – 4.5 all at or below background levels
2. Dose from Field Survey Data -
   - Area 4.1 – Collector = 0.8 mrem/year, Hunter/Fisher = 1.9 mrem/year
   - Areas 4.2 – 4.5 all at or below background levels
3. Dose from Maximum Field Survey Data Point -
   - Area 4.1 – Collector = 5.8 mrem/year, Hunter/Fisher = 8.0 mrem/year
   - Area 4.2 – Collector = 8.6 mrem/year, Hunter/Fisher = 11.9 mrem/year
   - Area 4.3 – Collector = 8.6 mrem/year, Hunter/Fisher = 11.9 mrem/year
   - Area 4.4 – Collector = 5.2 mrem/year, Hunter/Fisher = 7.8 mrem/year
   - Area 4.5 – Collector = 5.2 mrem/year, Hunter/Fisher = 7.8 mrem/year
4. Dose from Soil Sampling Data –
   - Collector ranges from 0.1 to 0.4 mrem/year (Areas 4.4 and 4.5, respectively)
   - Hunter/Fisher ranges from 0.2 to 0.6 mrem/year (Areas 4.4 and 4.2, respectively)

Area 5 - Summary

- Area 5 is located on the Cattaraugus Territory of the Seneca Nation of Indians.
- Area is **not** within the floodplain of Cattaraugus Creek.
- Surveys and sampling were conducted in six areas shown.

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Area 5 Summary of Results

1. Dose from 2014 Aerial Radiation Survey -
   - Area 5.1 - 5.6 - Collector = 0.6 mrem/year, Hunter/Fisher = 1.3 mrem/year.
2. Dose from Field Survey Data -
   - Area 5.1 Highest Results - Collector = 2.0 mrem/year, Hunter = 4.6 mrem/year.
   - Areas 5.2, 5.3 and 5.6 all at or below background levels.
3. Dose from Maximum Field Survey Data Point -
   - Collector ranges from 1.5 to 6.4 mrem/year (Areas 5.3 and 5.1 and 5.5, respectively).
   - Hunter ranges from 2.0 to 8.5 mrem/year (Areas 5.3 and 5.1 and 5.5, respectively).
4. Dose from Soil Sampling Data –
   - All of Area 5 Collector dose below 0.1 mrem/year.
   - All of Area 5 Hunter dose at or below 0.1 mrem/year.

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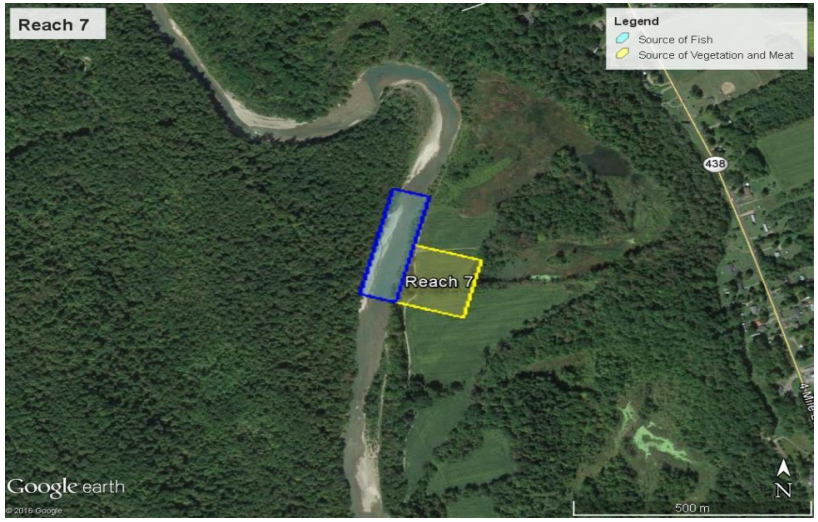
SNI - Additionally Requested Sample Locations

Residence Locations at Snow's Beach

Creek Location No. 21



Creek Location No. 7

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Results Summary of Additionally Requested Samples

1. Dose from Field Survey Data -
   - Homeowner Locations 3, 4 and 5 are at or below background levels.
   - Reach (Creek) Location 7 is at or below background levels.
   - Reach (Creek) Location 21 – Collector – 7.1 mrem/year and Hunter/Fisher = 10.0 mrem/year.

2. Dose from Soil Sampling Data –
   - Homeowner 3 = 0.2 mrem/year.
   - Homeowner 4 = 0.3 mrem/year.
   - Homeowner 5 = 1.1 mrem/year.
   - Reach (Creek) 7 – Collector = 0.1 mrem/year, Hunter/Fisher = 0.2 mrem/year
   - Reach (Creek) 21 – Collector = 1.0 mrem/year, Hunter/Fisher = 1.0 mrem/year

Areas 1, 2 and 3 Summary

- The assessed doses in Areas 1, 2, and 3 used multiple approaches and covered current and conservative potential use scenarios. All doses were calculated to be significantly less than the 25 mrem per year NRC regulatory release requirement (10 CFR § 20.1402).
- Areas 1, 2 and 3 meet NRC's unrestricted release criteria and can be used for any purpose.

Seneca Nation of Indians Summary

- For Areas 4 and 5, Homeowner locations 3-5, and Creek Segments 7 and 21, culturally-specific land use scenarios were developed.
- Areas were used for hunting, collecting medicinal herbs and vegetation, fishing and hiking.
- Due to the varied land uses, detailed radionuclide specific analyses were completed in order to provide conservative/bounding dose estimates.
- All doses were calculated to be significantly less than the 25 mrem per year NRC regulatory release requirement (10 CFR § 20.1402).
- The report has been updated and will be provided to the Seneca Nation.