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Aquatic Mercury Assessment of the Savannah River Site

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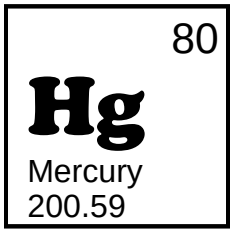
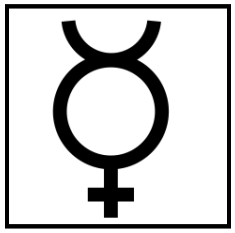
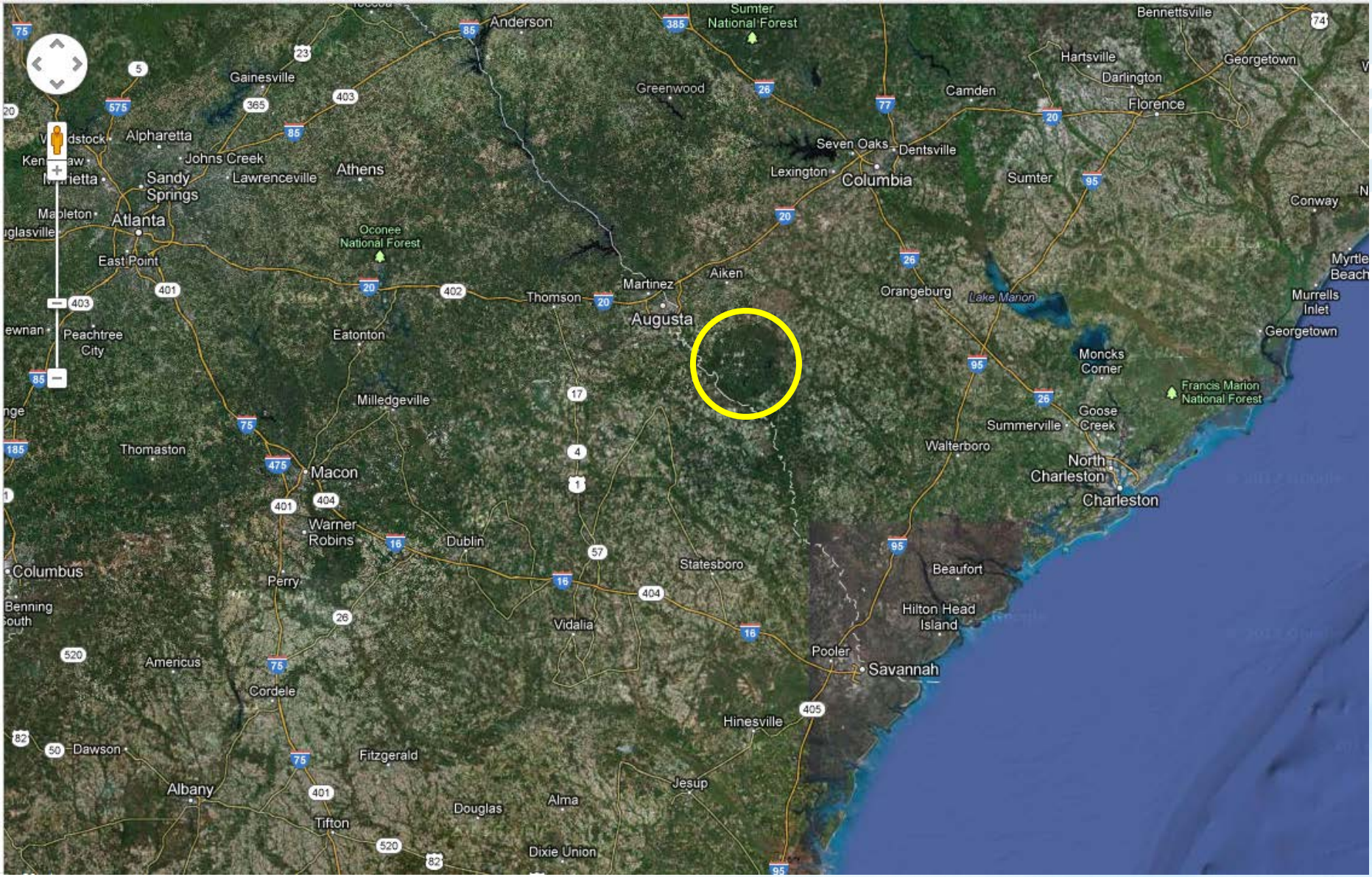
Savannah River National Laboratory



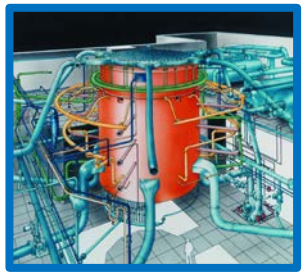


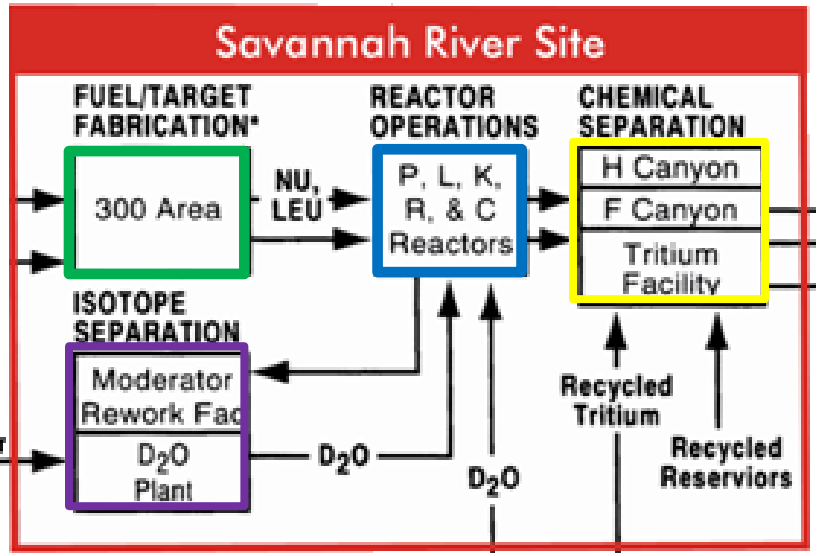
Presented at 2012 NADP Annual Meeting & Symposium. October 2-4, 2012. Portland, Maine.

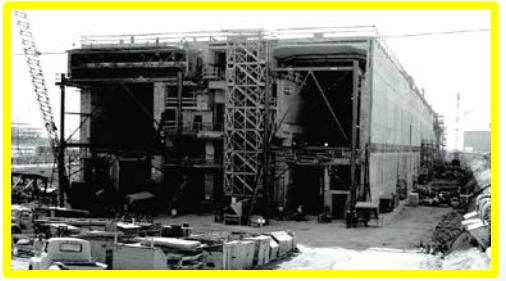
Savannah River Site: An Emerald on the Coastal Plain…



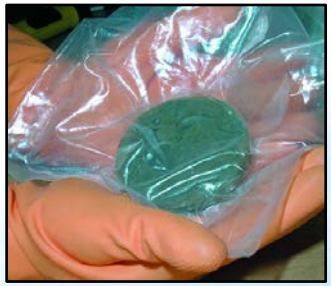
The Savannah River Site: Production of Nuclear Materials



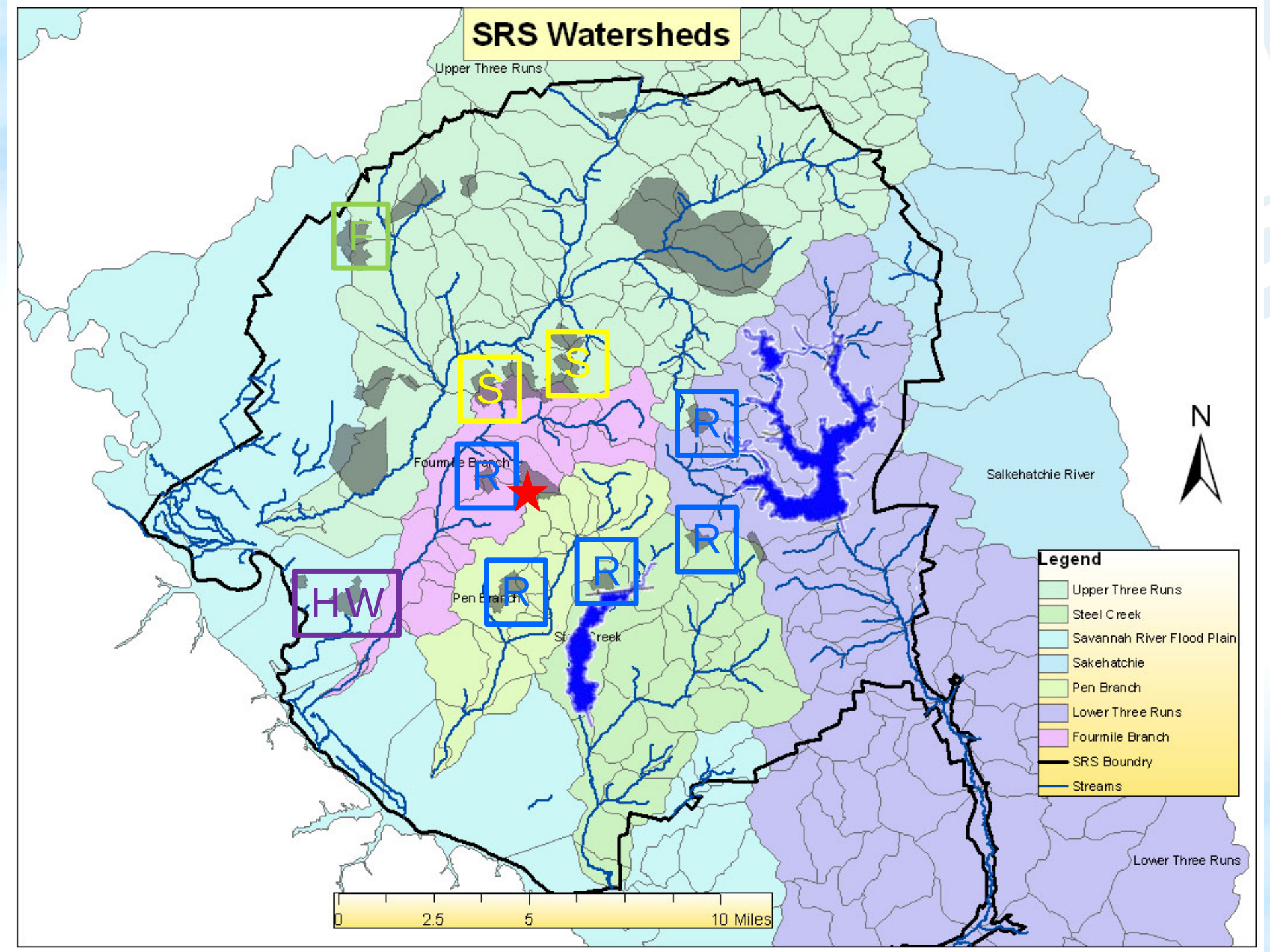




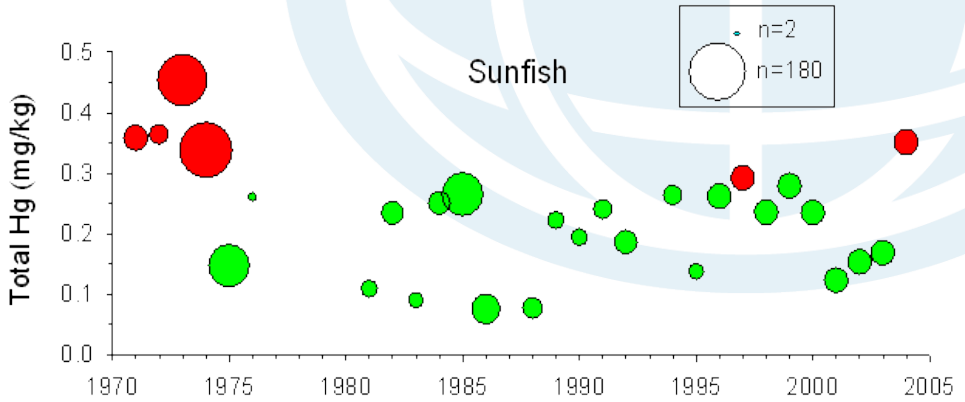
thulium-170
europium-152
californium-252
polonium-210
special programs
plutonium-242
curium-244

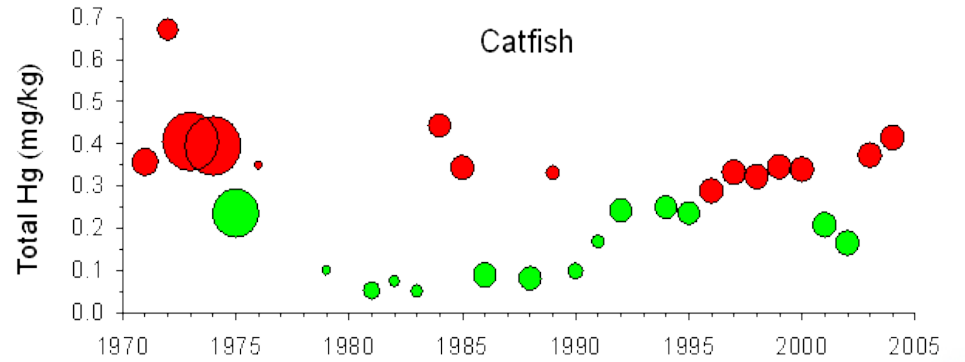


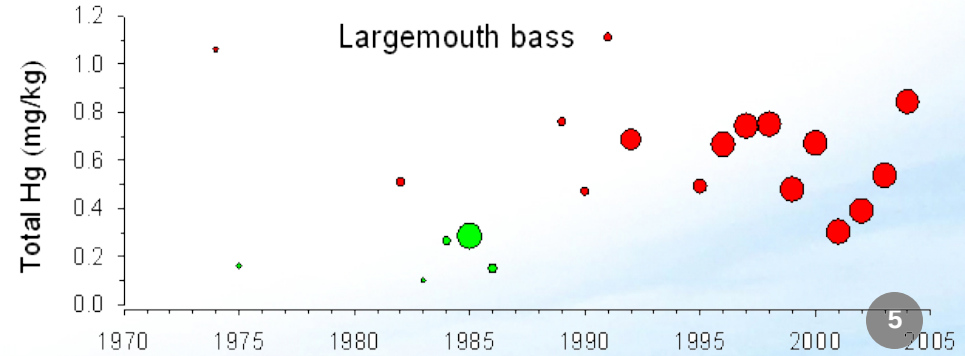
americium-243
plutonium-238
plutonium-240
cobalt-60
uranium-233
tritium
plutonium-239


SRS Watersheds
Upper Three Runs
F
S
S
R
R
R
R
R
HW
Fourmile Branch
Pen Branch
Steel Creek
Salkehatchie River
Lower Three Runs
N
Legend
Upper Three Runs
Steel Creek
Savannah River Flood Plain
Sakehatchie
Pen Branch
Lower Three Runs
Fourmile Branch
SRS Boundry
Streams
0
2.5
5
10 Miles

Mercury in the Middle & Lower Savannah River Watersheds

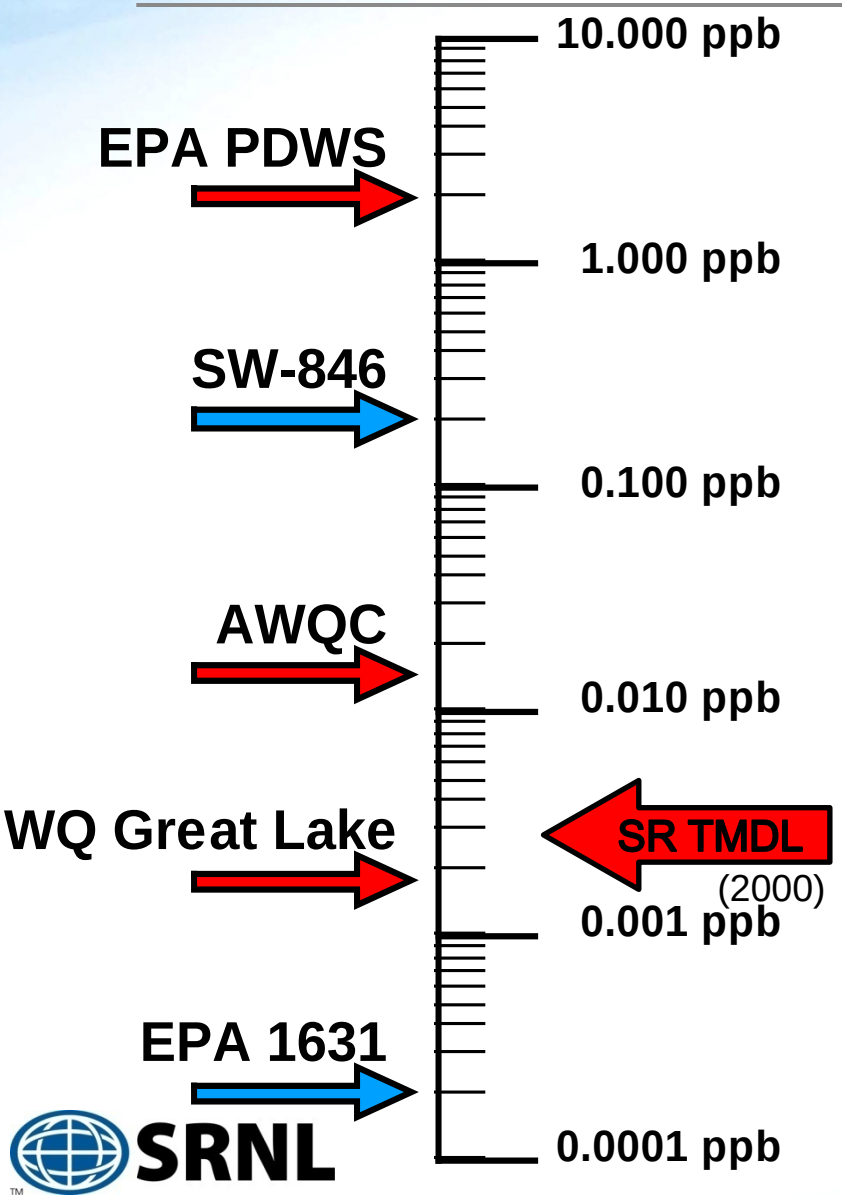






(SRS Environmental Reports 1970 – 2005)

Need for an Aquatic Assessment for Mercury



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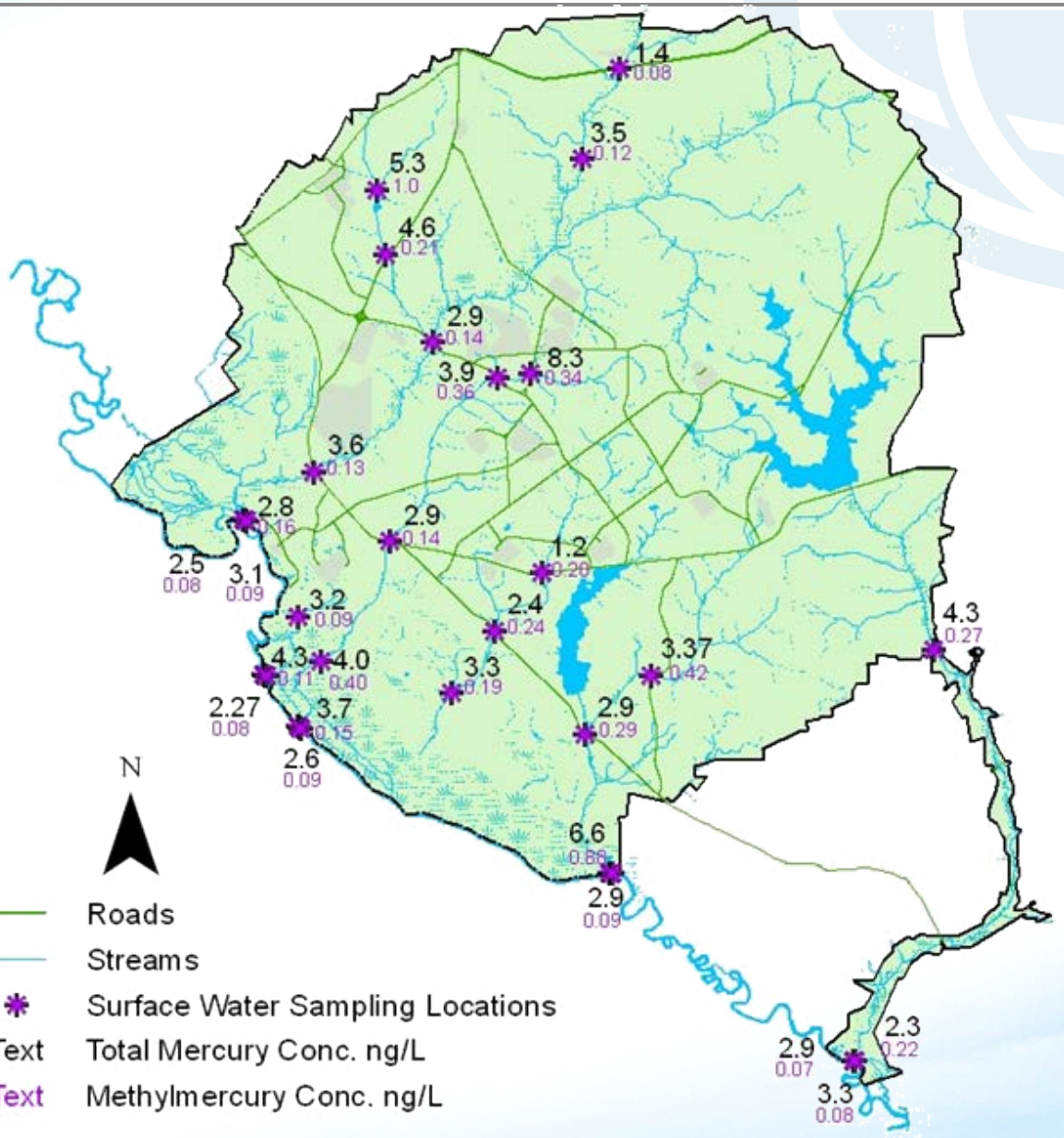
Total & Methyl Mercury in Surface Streams:



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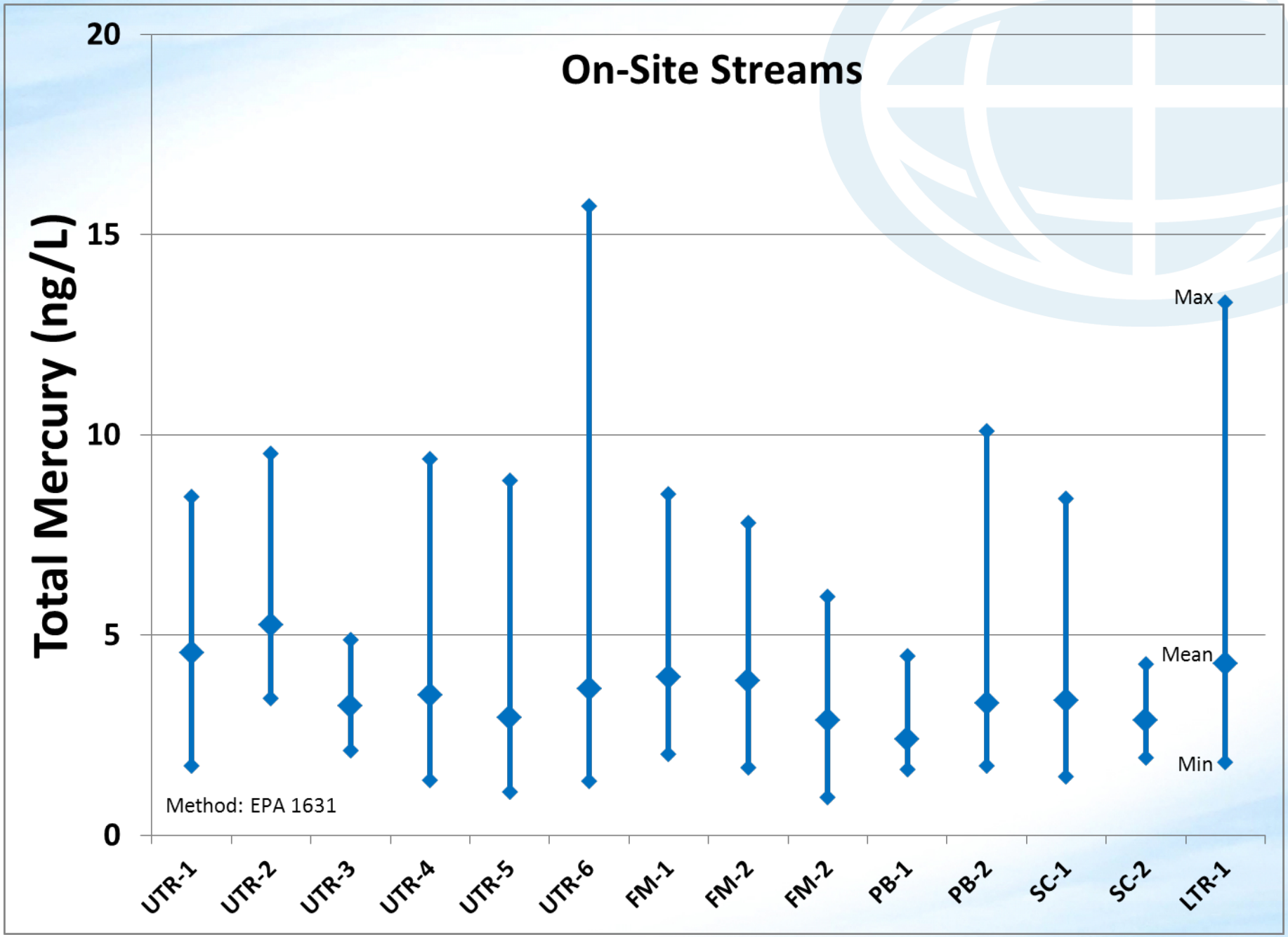
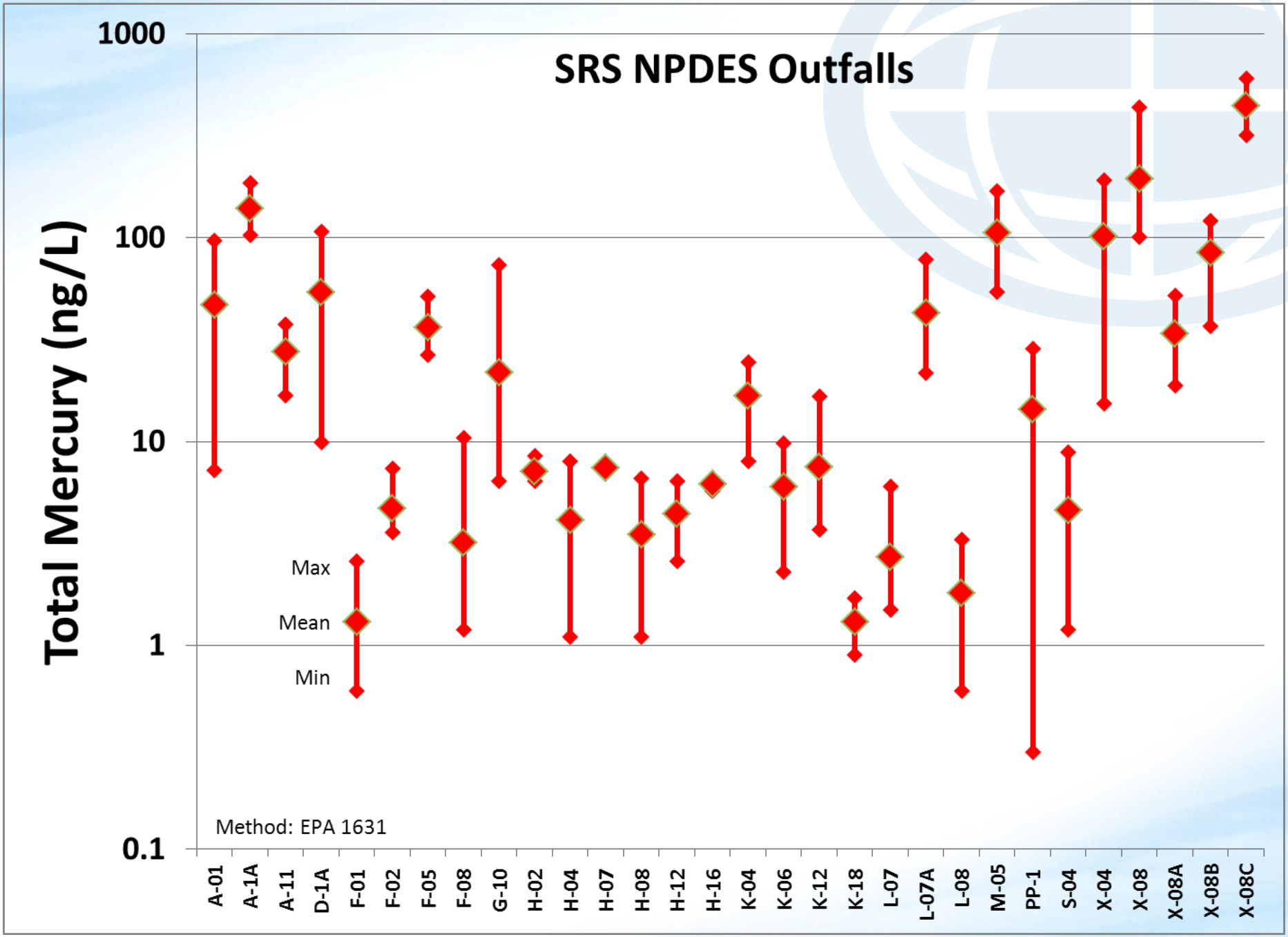
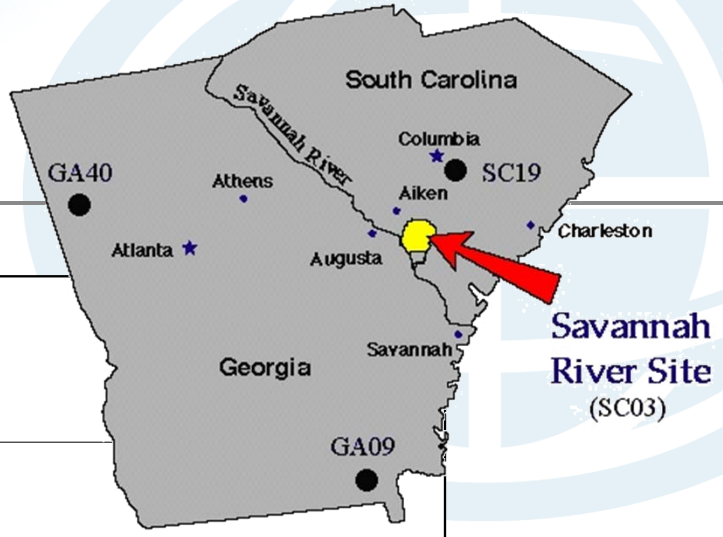

On-Site Streams
Total Mercury (ng/L)
20
15
10
5
0
Max
Mean
Min
Method: EPA 1631
UTR-1
UTR-2
UTR-3
UTR-4
UTR-5
UTR-6
FM-1
FM-2
FM-2
PB-1
PB-2
SC-1
SC-2
LTR-1


SRS NPDES Outfalls
Total Mercury (ng/L)
1000
100
10
1
0.1
Max
Mean
Min
Method: EPA 1631
A-01
A-1A
A-11
D-1A
F-01
F-02
F-05
F-08
G-10
H-02
H-04
H-07
H-08
H-12
H-16
K-04
K-06
K-12
K-18
L-07
L-07A
L-08
M-05
PP-1
S-04
X-04
X-08
X-08A
X-08B
X-08C

Southeast Total Hg Wet Deposition:



GA09: n=276 between 8/97 - 12/02
GA40: n=177 between 6/00 - 12/02
SC03: n= 94 between 2/01 - 12/02
SC19: n=312 between 1/96 - 12/02

ng/m^2 per week

3000
2500
2000
1500
1000
500
0

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

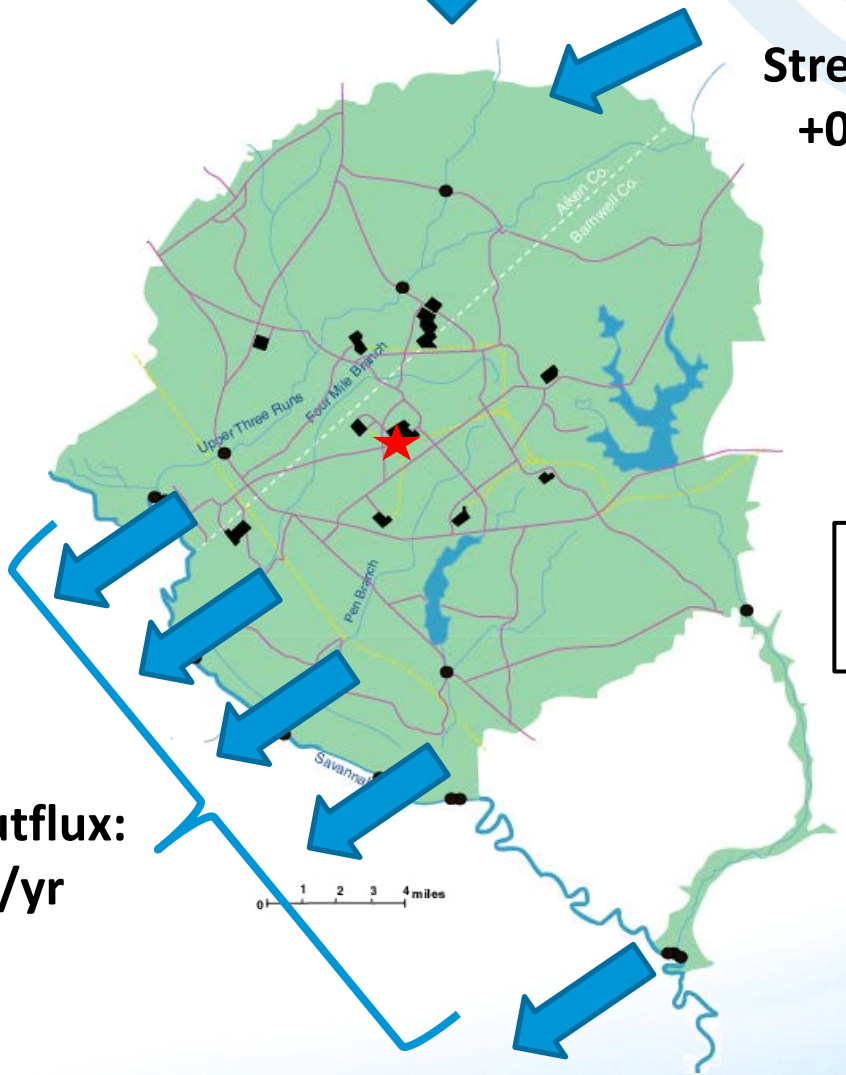
Data: National Atmospheric Deposition Program - Mercury Deposition Network.

Summary of Mass Balance:

Atmospheric Deposition: 10 kg/yr Wet + 7 kg/yr Estimated Dry

Outfalls: +0.2 kg/yr

Stream Influx:
+0.09 kg/yr



Unaccounted Mass:
+16.2 kg/yr

Stream Outflux:
-1.1 kg/yr

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Summary of Mercury in the SRS Aquatic System

Fish tissue from off-site (Savannah River) and On-Site exceeds FDA consumption guidelines.

Between 1999 and 2002 NPDES releases to aquatic systems were on the order of 0.2 kg/yr.

SRS experiences a significant load from Atmospheric Deposition (Observed Wet 10 kg/yr).

Load from Atmospheric Deposition consistent with surrounding ecosystems.

Mass Balance suggests that a significant fraction is retained or transformed in the ecosystem.

Questions…

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Historical References and Data Resources

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