New Approaches to PM Inventory Evaluation and Improvement

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Inventory Needs For RPO's

- Chemical Transport Modeling Key
- Demands exceed those of SIP grade inventory
  - Locations/Coordinates
  - Temporal(Hour specific by day of week and month)
  - Chemical Speciation
  - Projection to multiple future years.

Degrees of Separation

- State Converts to NIFv2.0 and Sends to EPA
- EPA Reviews, Sends to Contractor
- Contractor processes, fixes, and puts in new data
- Loads into EPA's Oracle Database
- EPA Extracts data back into NIFv2.0
- RPO Modelers Download data from Web into emissions model(might convert format)
- Emissions model fix critical problems and fill in defaults where necessary.

Regional Inventory Issues

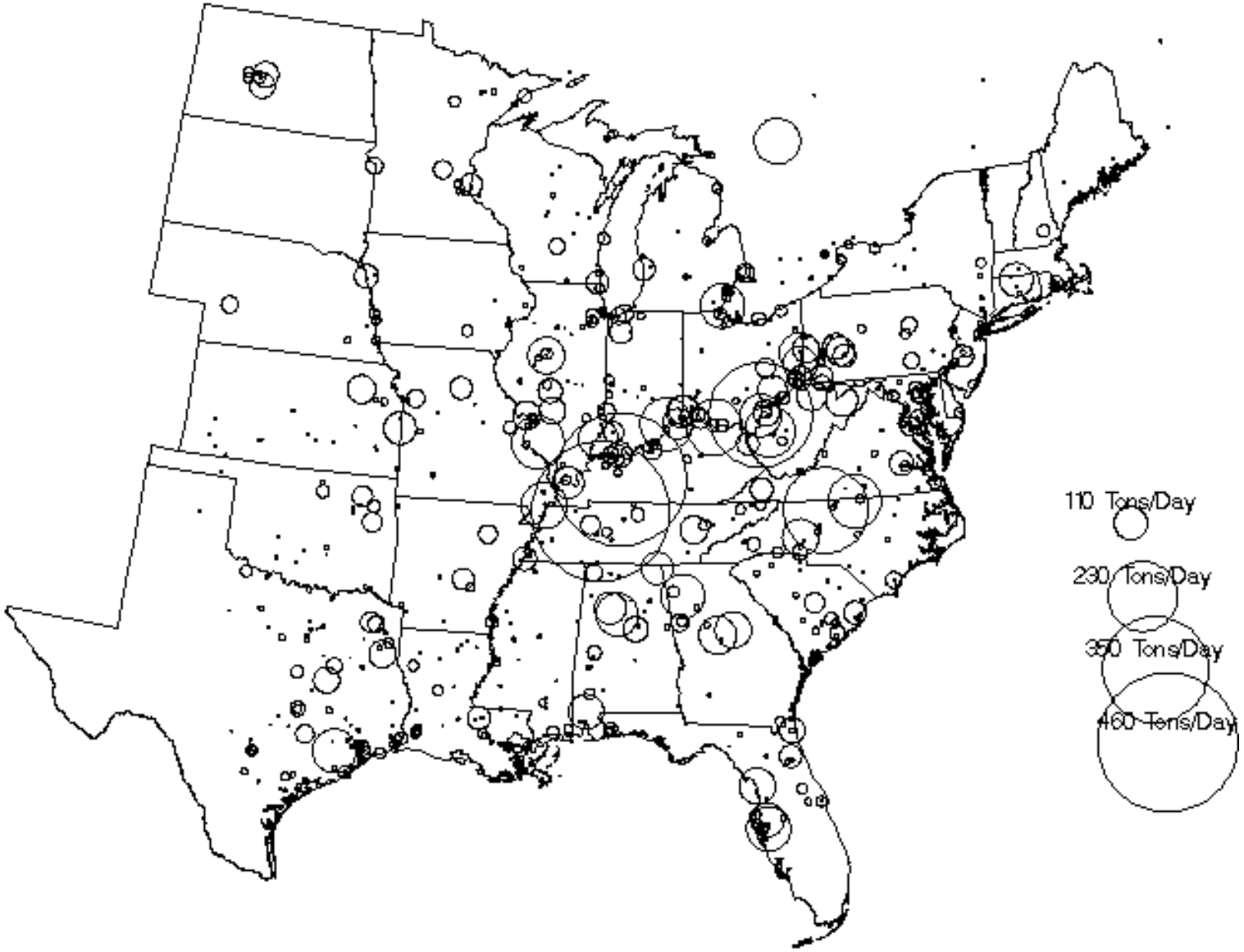
- Developers Distant from Inventory Users
- Paper Documentation Useless
- Commonly Misinterpret Inventory
  - Double Counting
  - Temporal Allocation
- Inventories are not Transparent

Solution One: Reporting

- Reports that are visual and focused not long tabular and broad

Circle Plot of NOX Sources

CASE: unified12k.960719

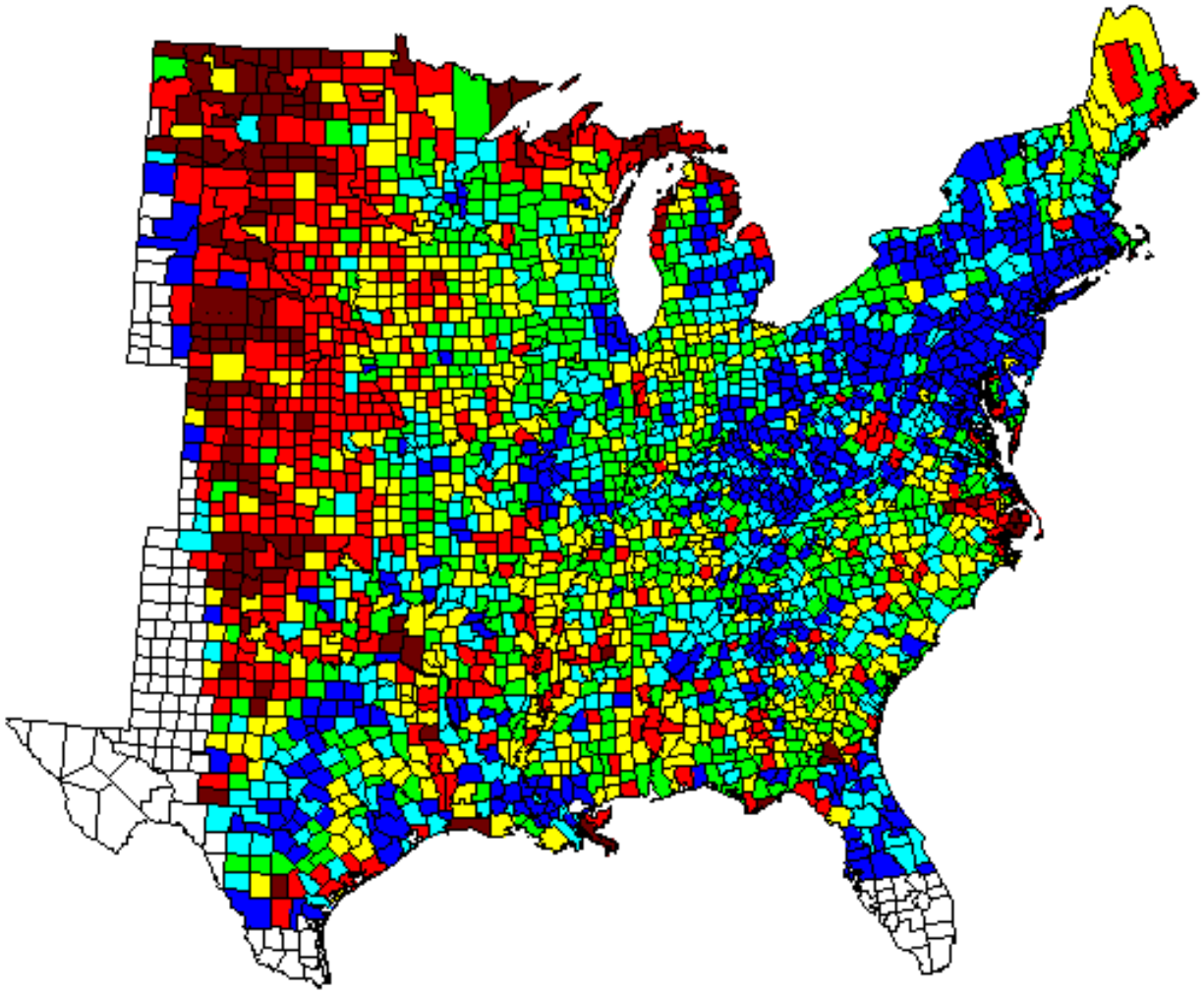


Created with EMS-2001 on February 4,2002

Area Source County Population Density Emissions : ROG

File Used For Emissions Summary: ems_run.areaemis

Population from 1990 United States Census.



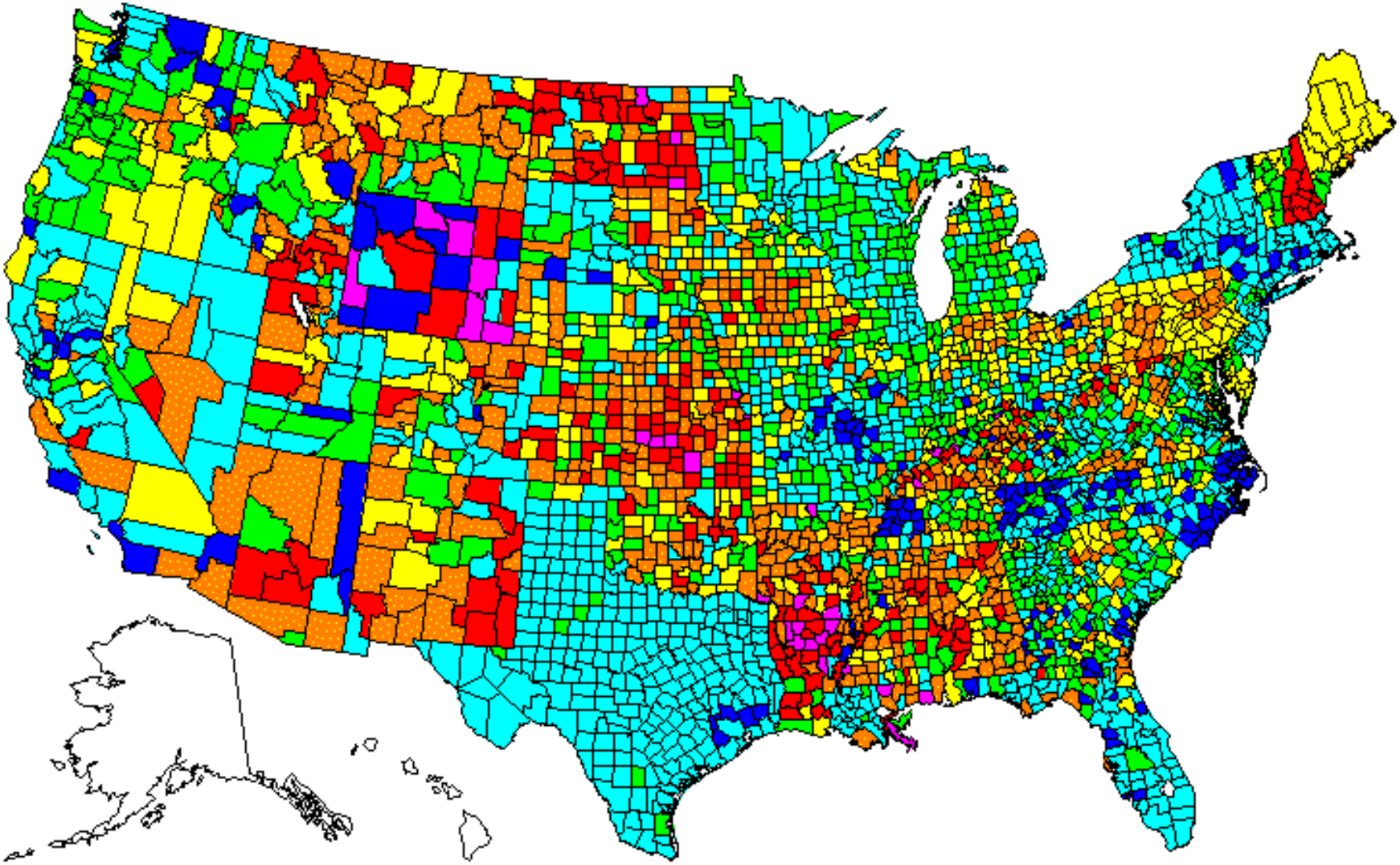
Tons per Day(*1000)/Population		
	0—0.1197	0.11971—0.1582
	0.15821—0.2064	0.20641—0.3075
	0.30751—0.6852	Over 0.6852

County emissions on edge of domain reflect only the area within OTAG. Population for whole county used in all cases.

Canada and offshore emissions are not shown.

NOX Emissions Per Capita for Area Catagory:

NUMASCT= 2100000000 DESC= Stationary_Source_Fuel_Combustion|



Solution Two: Improved Identification

- Status Quo: Volumes of Errors
- Every possible error identified
- History: EPA sends Photocopier boxes filled with errors
- States built workarounds
  - Drop Small sources
  - Put in default answers that became “reality”

Solution: Tiered Reporting

- Done within Emissions Models(EMS-2001)
- Separate Critical Errors from Minor Nuisances
- Larger(Emissions Mass) sources listed first

Tier 1 : Severe Problems

- Problems Likely to cause emissions mass or sources to be lost
- Examples:
  - No SCC Codes
  - No State or County Codes

Tier 2: Important Problems

- Problems Likely to Alter Emissions Significantly, Default Will be applied
- Examples
  - Coordinates Missing
  - No Default Stack Parameters
  - Missing Source ID's(Facility, Stack, Device)
  - Missing Temporal Data

Tier 3. Moderate Problem

- Problems not likely to result in Emission mass change but might impact modeling results
- Examples:
  - Stack Parameter Problems(Supersonic)
  - Minor Coordinate Problems

Tier 4. Minor Problems

- Not likely to effect emissions estimates and probably will not effect modeling, Might make it difficult to understand modeling results
- Examples:
  - Bad SIC Code
  - Out of Range Stack Parameters

How use

- LADCO Fixes All Tier 1 Problems
- Attempts to fix most Tier2
- Fix obvious Tier3
- Read Tier4

Advanced Stack Diagnostics(ASD)

- Heuristic Tool used to identify point source problems.
- Not Right/Wrong Distinction
- Average 20-30 records per report per state
  - Limit state efforts
- Focused/Ordered on Large Sources
- Balance Comprehensive with Concise
- State Specific Report
- For NET 1996 V4 at
- www.ladco.org/emis/asd2/index.html

Report 1 and 2. Big Sources

- List State's 10 Largest NOX and ROG sources
- States use to verify that their large sources are include and that small sources are not over stated.
- More often identifies overstated Small sources
- 50% of statewide point source mass might be at 10 sources

Report 1:EMS-2000 Adv. Stack Diagnostics, Top 20 Largest NOX sources in the State of Wisconsin
Verify that these totals are correct, and that none are missing
State total emissions are 452 Tons/Day NOX and 181 Tons/Day ROG
A complete list of all sources summarized by this report are in wisconsin_long.lst
State = wisconsin State FIPS = 55

OBS	STID	CYID	FCID	NAME	NOX TONS/DAY	ROG TONS/DAY
1	55	59	0062	PLEASANT PRAIRIE	73.871	0.4700
2	55	21	0030	COLUMBIA	52.570	0.4002
3	55	117	0330	EDGEWATER	40.470	0.3000
4	55	79	0076	SOUTH OAK CREEK	25.094	0.1902
5	55	73	0090	WESTON	18.770	0.1428
6	55	9	0328	FORT JAMES CORPORATION (FT. HO	15.050	0.4959
7	55	9	0319	PULLIAM	13.970	0.0901
8	55	43	0145	NELSON DEWEY	11.880	0.0802
9	55	123	0209	GENOA	10.965	0.0801
10	55	105	0037	ROCK RIVER	10.413	0.0636
11	55	39	0397	A F K CORP	8.920	0.3200
12	55	79	0078	VALLEY	7.820	0.0400
13	55	141	0106	NEKOOSA PAPERS INC NEKOOSA MI	7.193	1.8470
14	55	11	0341	ALMA	7.160	0.0200
15	55	87	0317	HILLSHIRE FARM & KAHN'S	7.041	0.0336
16	55	69	0080	TENNECO PACKAGING INC.	6.981	7.2673
17	55	141	0094	CONSOL PAPERS INC BIRON DIV	6.950	0.1070
18	55	141	0101	CONSOLIDATED PAPERS INC-KRAFT	6.431	5.0830
19	55	87	0311	THILMANY PULP & PAPER COMPANY	5.940	0.9833
20	55	93	0230	PIERCE COUNTY HIGHWAY DEPT	5.750	0.0101
					========	========
					343.240	18.0245

Report 3. Stack Repair Utility

- Automated repair utility eliminates supersonic stack velocities at small sources.
- Fixes all small sources where
  - Stack height is less than 33 Meters
  - Effective plume height is greater than 100 Meters
  - Less than 1 TPD NOX + ROG
  - Fail 2 or more tests.

Repair Tests

- Emissions/Flow greater than 20g/SCFM
- Emissions/Flow Less than .5 Grams/SCFM
- Calculated Flow Rate 20% different from reported Flow Rate
- Velocity > 100 Feet/Second
- Flow rate greater than 1 Million SCFM
- Plume Height greater than 3 times stack height.
- Georgia fixed sources = .05 TPD

Report 4. Low Plume Heights

- Shows Large emissions sources with low effective plume heights
- In general most permitting processes should not allow large emitters to have low effective plume heights
- Good at detecting bad stack parameters
- Better at detecting bad emissions estimates

Report 4:EMS-2000 Adv. Stack Diagnostics, Large sources with low effective plume heights. (all >1 TPD) 37

Problems might include bad emissions estimates or stack parameters State = wisconsin State FIPS = 55

OBS	CYID	FCID	NAME	STKID	NOX TONS/DAY	ROG TONS/DAY	DIAM (FEET)	HEIGHT (FEET)	TEMP F	FLOW CALCULATED ACFM	VELOC FEET/SEC	FLOW REPORTED ACFM	Estimated Plume Heit (Meters)
1	105	0037	ROCK RIVER	001	10.02	0.00	11.99	250	295	4750	0.70116	4750	94.8784
2	39	0397	A F K CORP	011	8.92	0.00	0.25	30	70	10	3.53795	10	9.1519
3	73	0090	WESTON	001	8.19	0.00	12.51	242	337	5931	0.80420	5931	97.8130
4	87	0317	HILLSHIRE FARM & KAHN'S	001	6.97	0.00	2.00	50	150	113	0.60151	113	15.8633
5	69	0080	TENNECO PACKAGING INC.	015	6.42	0.00	10.60	199	383	4778	0.90234	4778	82.7273
6	105	0028	GM- NAO JANESVILLE- TRUCK PLAT	010	0.00	6.18	1.00	1	32	0	0.00042	0	0.3054
7	141	0106	NEKOOSA PAPERS INC NEKOOSA MI	010	6.18	0.00	14.00	194	350	8337	0.90268	8337	90.9026
8	93	0230	PIERCE COUNTY HIGHWAY DEPT	011	5.75	0.00	2.30	20	160	243	0.97668	243	7.2857
9	85	0081	WAUSAU-MOSINEE PAPER CO.-RHINE	009	5.20	0.00	7.00	207	339	1659	0.71851	1659	72.3877
10	141	0094	CONSOL PAPERS INC BIRON DIV	011	4.59	0.00	5.30	230	327	1122	0.84785	1122	76.8839
11	69	0080	TENNECO PACKAGING INC.	011	0.00	4.06	7.00	154	421	1190	0.51551	1190	55.1486
12	33	0498	CARDINAL FG	001	3.75	0.00	8.00	200	300	1267	0.42017	1267	67.9797
13	105	0028	GM- NAO JANESVILLE- TRUCK PLAT	001	0.00	3.06	0.25	1	50	0	0.03395	0	0.3060
14	73	0090	WESTON	002	3.02	0.00	12.51	242	338	4999	0.67787	4999	94.9613
15	25	0044	BLOUNT STREET	003	2.88	0.00	8.52	250	290	4000	1.16935	4000	92.4310
16	71	0359	MANITOWOC PUBLIC UTILITIES	010	2.20	0.00	12.00	250	350	3335	0.49151	3335	92.1924
17	75	0393	CONSOLIDATED PAPERS, INC. NIAG	011	1.96	0.00	9.00	127	380	3168	0.83001	3168	54.8612
18	87	0309	INTER LAKE PAPERS (REPAP WISCO	010	1.84	0.00	12.00	225	330	1301	0.19167	1301	76.1957
19	141	0101	CONSOLIDATED PAPERS INC-KRAFT	010	1.78	0.00	9.00	213	418	3235	0.84751	3235	82.2193
20	141	0101	CONSOLIDATED PAPERS INC-KRAFT	011	1.76	0.00	9.00	213	404	2706	0.70901	2706	79.7772
21	87	0312	APPLETON PAPERS INC LOCKS MILL	015	1.56	0.00	11.00	250	260	2168	0.38017	2168	85.6866
22	85	0081	WAUSAU-MOSINEE PAPER CO.-RHINE	013	0.00	1.54	3.00	42	300	250	0.58985	250	14.8831
23	73	0095	MOSINEE PAPER CORP	010	1.46	0.00	8.50	213	349	2718	0.79834	2718	78.6179
24	97	0087	CONSOL PAPERS INC WISCONSIN RI	012	1.45	0.00	6.00	150	330	1311	0.77301	1311	53.3828
25	21	0088	AMERICAN PACKAGING CORPORATION	001	0.00	1.44	12.00	50	300	834	0.12283	834	20.3687
26	25	0083	WIS DOA / UW MADISON--CHARTER	010	1.39	0.00	11.00	250	275	2501	0.43867	2501	87.2006
27	17	0427	NORTHERN STATES POWER CO WHEAT	012	1.34	0.00	22.60	38	1000	16560	0.68801	16560	95.2063
28	135	0337	WAUPACA FOUNDRY INC-PLANT NO 1	000	0.00	1.33	3.93	49	169	649	0.89152	649	17.5654
29	141	0105	NEKOOSA PAPERS INC PORT EDWAR	010	1.32	0.00	13.00	202	400	3418	0.42917	3418	79.1667
30	87	0392	SIMMONS JUVENILE PRODUCTS CO	011	0.00	1.25	2.00	25	72	334	1.76934	334	7.7889
					89.95	18.86							

Report 5. Too Close to County Centroid

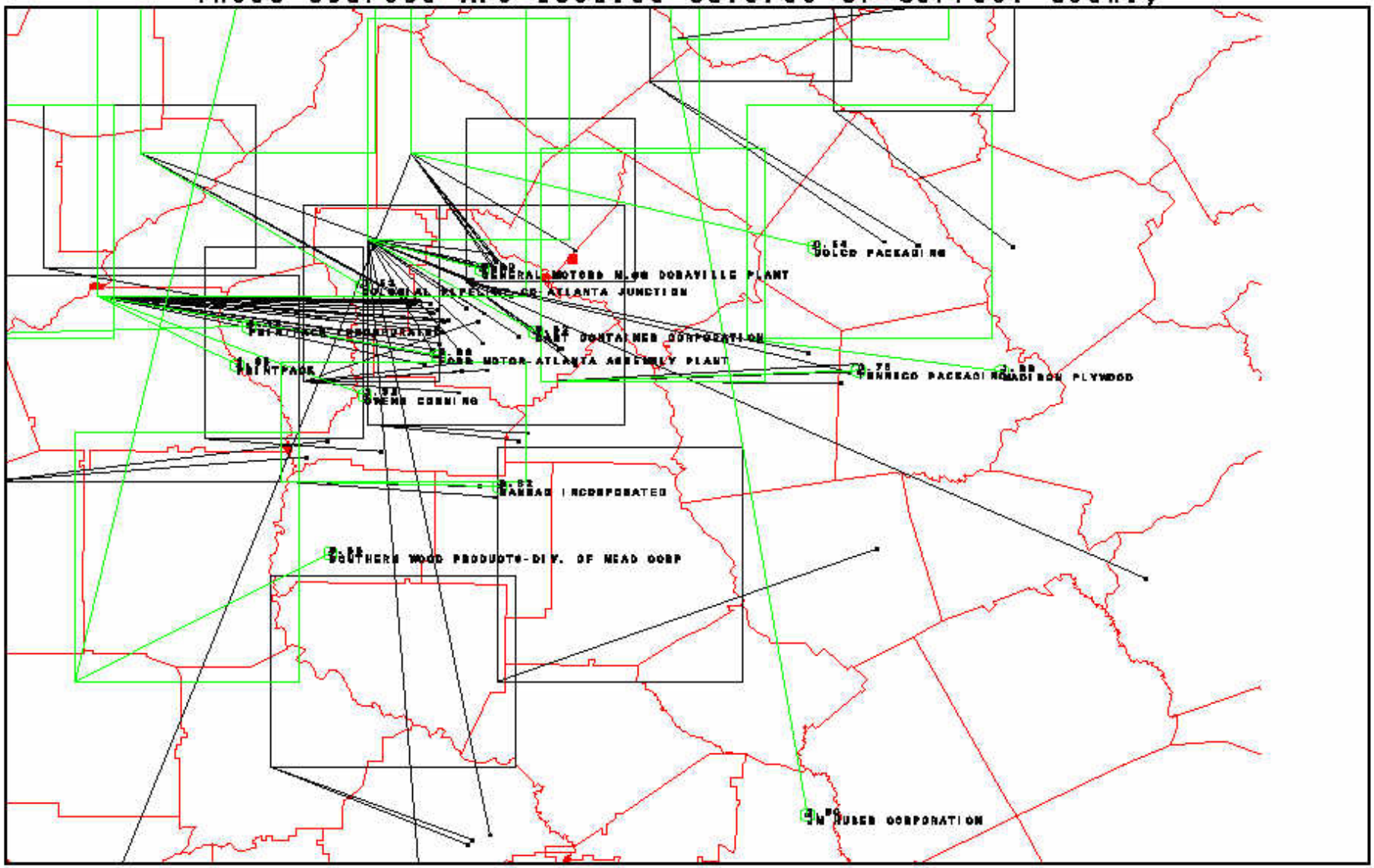
- Looks at the historical practice of locating sources with bad stack coordinates at county centroid
- Identifies source for repair.
- 500 Meter buffer

Report 6. Not in County

- Stack/Facility Coordinates not located within the county of the FIPS
- Give a 500 Meter buffer
- Mapping in ARC/INFO Optional
- Sometimes identified mobile asphalt plants

Atlanta Area Point Sources in NEI V4

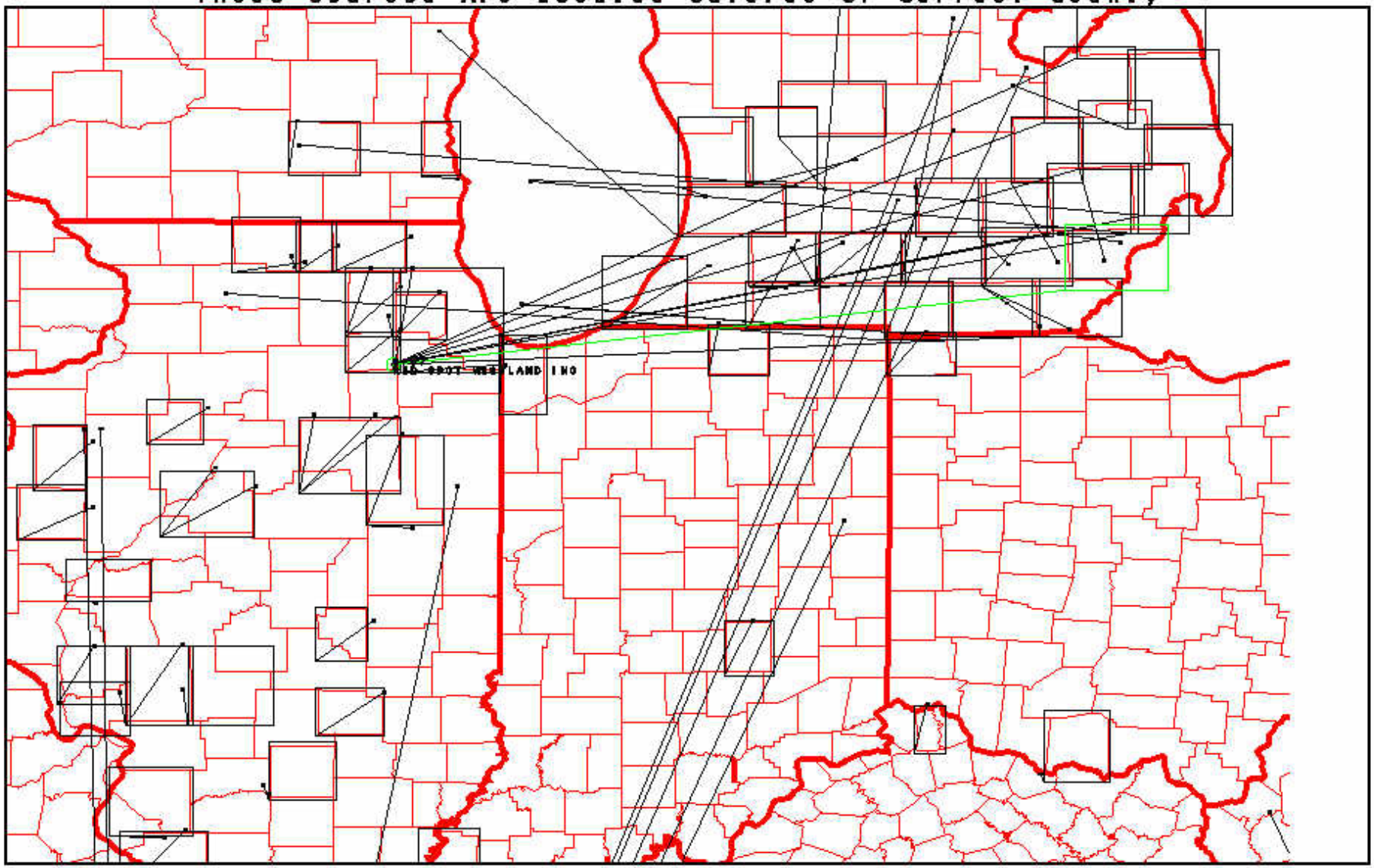
These Sources Are Located Outside Of Correct County



Sources in green have > .5 Tons/Day NOX or HC

LADCO States Point Sources in NEI V4

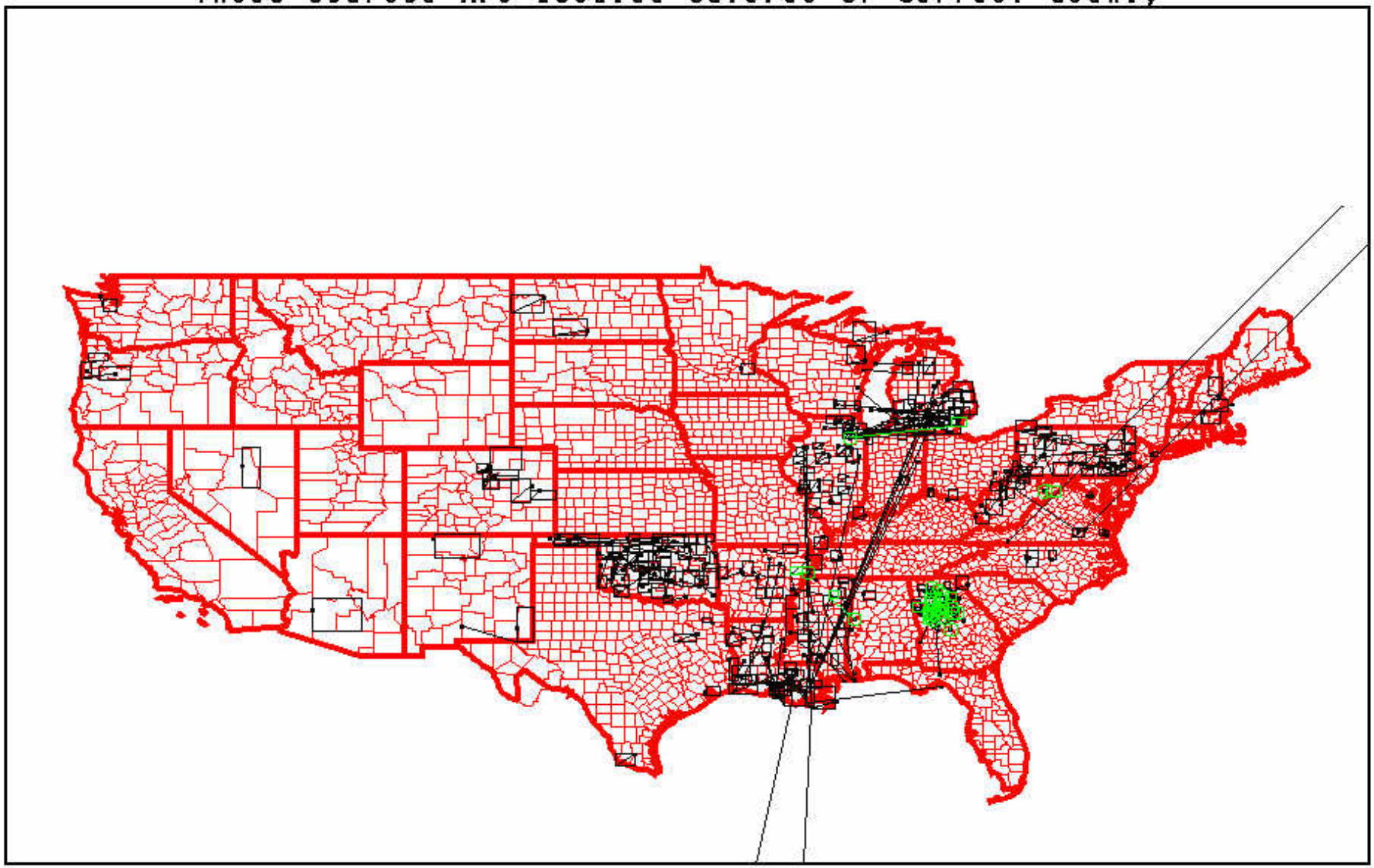
These Sources Are Located Outside Of Correct County



Sources in green have > .5 Tons/Day NOX or HC

Point Sources in NEI V4

These Sources Are Located Outside Of Correct County



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Report 7. Bad SCC

- Significant portions of emissions modeling needs SCC: Temporal, Speciation
- Invented SCC's not in cross references
- Reporting problems
- Fix it by changing National Databases

Future: Improving Transparency

- RPO's should promote states include background data
- Include information making it easy to understand what source are included
- Help understand how calculations were made
- Who made them for future reference.

Future LADCO Direction: Inventory Scoring

- Goal is to improve transparency in state inventories
- Use Mild Social Pressure = Grades
- Give points to states that include more information about methods
- Weight by emissions so large sources mean more than small sources; focus attention

Future LADCO Direction: Inventory Scoring

- Report Score by sector (POINT, AREA, MV)and “How best to improve” reports.
- Example Area Sources

Modeling Inputs 33%

- SCC Code Correct 10%
- All Emissions Categories Included 10%
- Temporal Data Included (13%)
  - Days/Week
  - Hours/Day
  - Monthly Profiles

Methods/Contact Data 33%

- Document including page number for Estimation method and EF. 10%
- Email address for Inventory Developer 13%
  - Not Supervisor
- Emissions Calculation Equation. 10%

Raw Data 34%

- Emission factor 10%
- Emission factor units 8%
  - (example: LB/Person/Year)
- Surrogate Data 8%(Population)
- Surrogate Units 8%(HP Hours/Year)
- Other Background data?
  - (HP Hours/Vehicle /year)

Rankings

- Excellent, Good, Average, Poor
- Based on RPO/State/Tribe consultation.
- Automated Recommendations on where to improve inventory

Example Recommendation

- Include Emissions factor and Surrogate data for Commercial/Consumer Solvent (SCC=2402001000) would improve the score for it by 23% and your overall score by 2%
- Including Temporal Data and Email Contact information for Marine Vessels, Pleasure Craft (scc=2282002010) would improve your score for this category by 26% and your overall score by 4%.

What It Will Enable Us To Do?

- Check common Emission factors and surrogates
- If anomalies exist, find source documents
- If cannot be explained easily, Contact the State/RPO/EPA inventory developer.

- ***“A foolish consistency is the hobgoblin of small minds.”***

  –Mark Twain

Conclusions:

- Improve transparency
- Focus QA on large sources
- Smarter Reporting
- Don’t enforce consistency and deter innovation