



NEI Input Format (NIF) Training Session



Emissions Inventory Conference
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USEPA

Instructor

- Ms. Lee Tooly
 - Emission Factors & Inventory Group (EFIG)
 - Office of Air Quality Planning and Standards
 - Research Triangle Park, NC
 - 919-541-5292
 - tooly.lee@epa.gov

Session Logistics

- Schedule
- Facilities
- Course materials

Session Objectives

- Define the NEI
- Review relational database concepts
- Review emission inventory source types and data relationships
- Provide NIF orientation
 - Format structure, rules of use, data examples
 - NIF user materials
 - Influence of EPA data standards
 - Review changes from NIFV2.0 to V3.0
- Discuss transfer of data files to EPA



Defining the NEI

What is the NEI?

EPA's National Air Emissions Inventory

- National Emission Inventory of criteria pollutants (and precursors) and HAPS
- Published annually by EPA's Office of Air Quality Standards and Planning
 - (<http://www.epa.gov/ttn/chief>) -- see NEI / NEI data
- Consists of data from state/local/tribal agencies, EPA, and other government sources
- Documented data incorporation procedures
 - (http://www.epa.gov/ttn/chief/net/nei_plan_feb2001.pdf)
- EPA's NEI Data System is comprised of two Oracle databases (NET & NTI)

Uses of the NEI

- Regional and Local Scale Air Quality & Human Exposure Modeling
- Control Strategy Analysis
- Regulatory Impact Analysis
- Risk Assessment Studies
- Emission Trends - Public Reports
- International Reporting

What's in the NEI?

Geographic Coverage

- Entire U.S.
- County Level Inventory for Area and Mobile Sources
- Process Level Inventory for Point Sources

What's in the NEI ?

Pollutant Coverage

- Ozone Precursors
 - VOC, NO_x, CO (NET)
- Direct PM Emissions
 - PM₁₀ and PM_{2.5} (NET)
- PM Precursors
 - SO₂, NH₃ (NET)
- Air Toxics
 - 188 HAPs (NTI)

What's in the NEI?

Temporal Coverage

- Data for 1985 through 2000 (NET)
 - Highest Quality Data 1996 and forward
- Data for 1990, 1993, 1996, 1999 (NTI)
- Annual Emissions (NET and NTI)
- Average Summer Day Emissions (NET)
- Operating Schedule & Temporal Factors to Create Emissions for Other Time Periods

NEI Data Access



AIRSDATA WWW Site
Plant Level Summaries
SIC Summaries
County Level Summaries
Tier 2 Summaries
MACT Code Summaries

www.epa.gov/airsdata/sources.htm

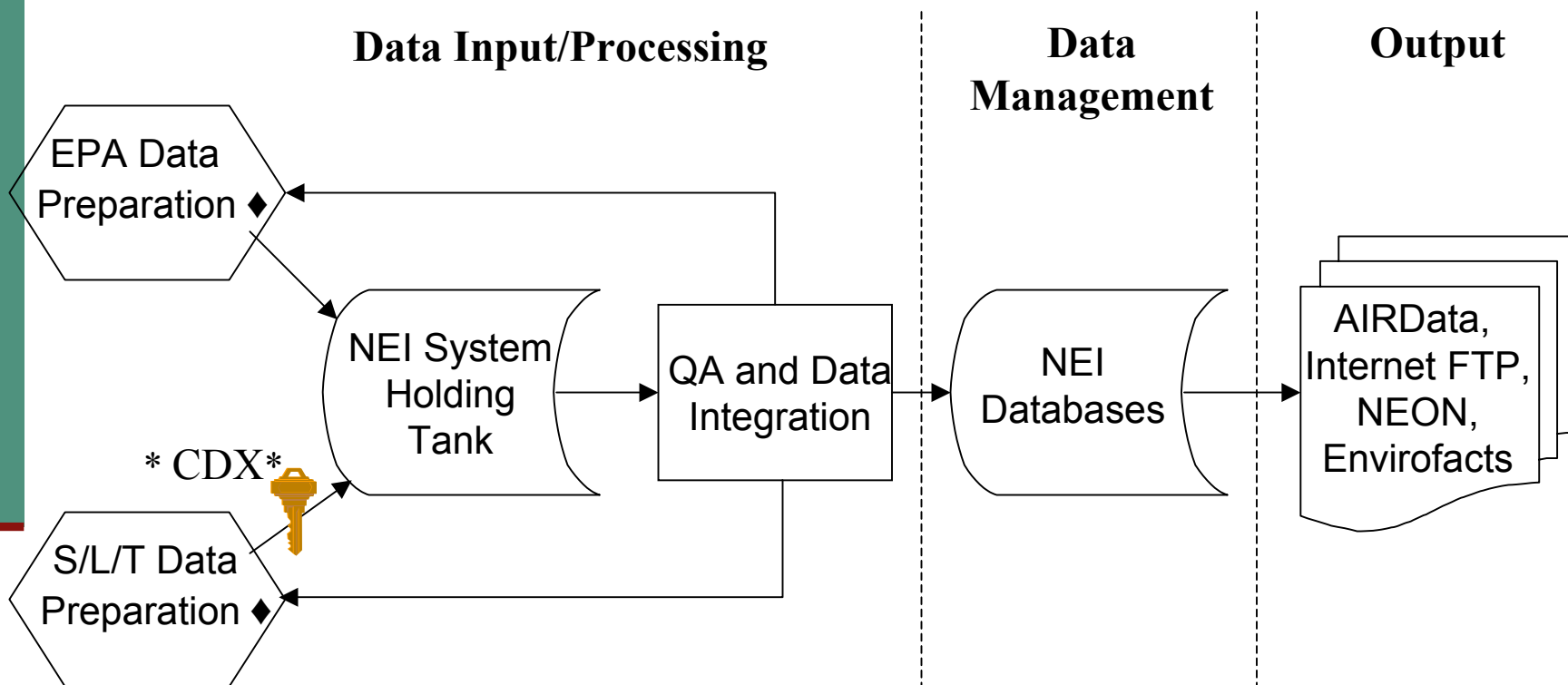
NEON
Intranet Query Tool
Available to EPA
Design Your Own Queries
and Data Extracts
Emission Process Detail
Summaries (SCC, SIC, Tier)

EPA FTP Site
FTP Site Where Entire 1996 and
1999 NET and NTI Inventories
Can Be Downloaded
Process/SCC Level for Points
County/SCC Level for
Area/Mobile

[ftp.epa.gov/pub/EmisInventory/](ftp://ftp.epa.gov/pub/EmisInventory/)



Transferring Data – To and From the NEI



◆ Standard Formats: NIF or XML

* CDX = EPA's Central Data Exchange



Review Relational Database Concepts

Relational Database Concepts¹

- Data table attributes
 - Records
 - Data fields, data type, definition
- Table relationships
 - One-to-one
 - One-to-many
 - Many-to-many

Relational Database Concepts²

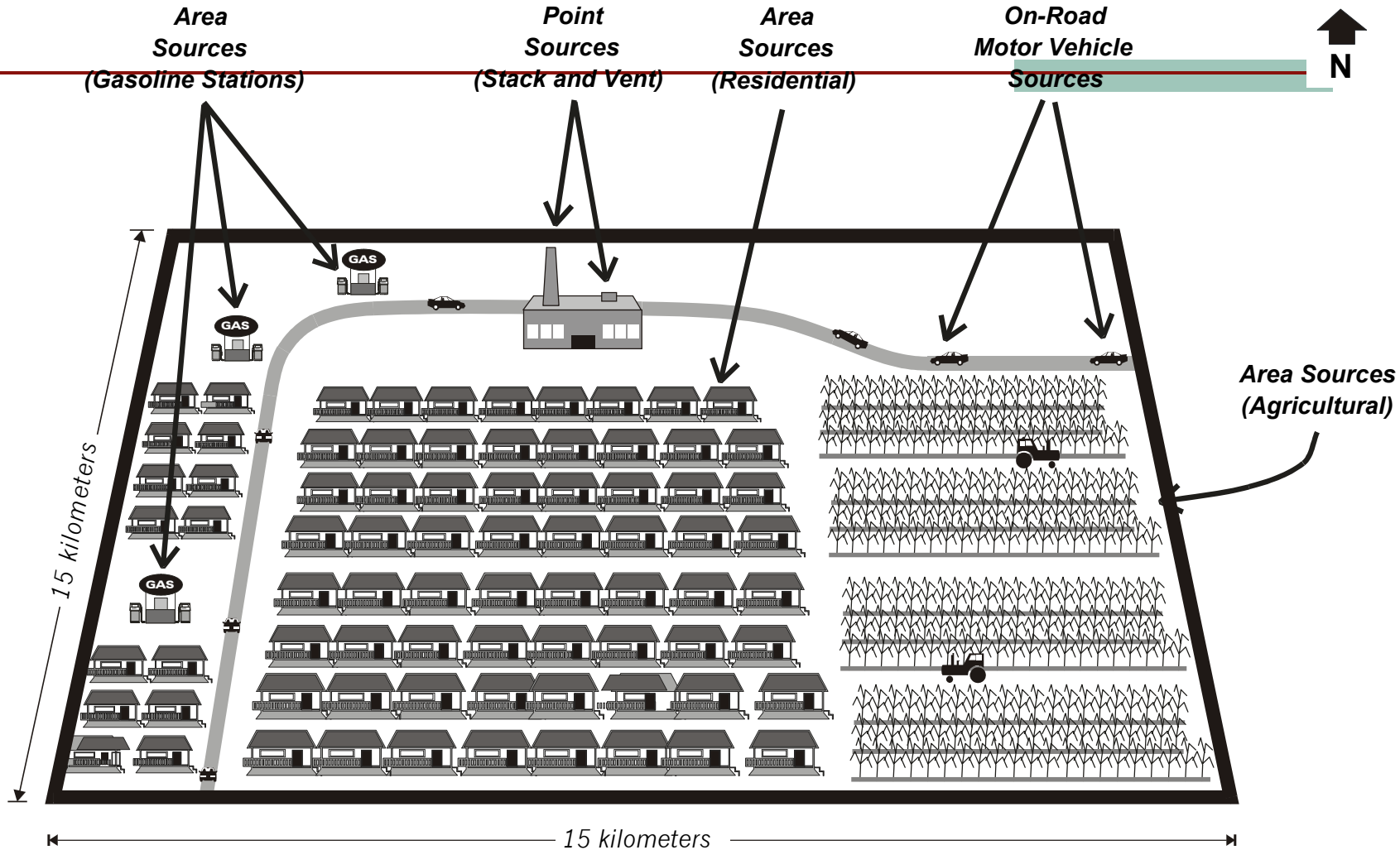
- Associating tables
 - Common key values (fields)
 - Parent / child table relationships
- Examples



Review E1 Source Types and Data Relationships

What is an emissions inventory?

A comprehensive characterization of sources emitting air pollutants in a geographic area during a specific time period.



Emission Inventory Source Types and Data Relationships¹

■ Point Source

What characterizes a point source of emissions?

- Specific location and release(s) to the air
- Specific process(es) that produce the emissions
- Timing of process operations
- Control devices that may affect emissions

Data Needs for Air Quality Modeling of Point Source Emissions

- Required Data Elements
 - Process Level Emissions
 - Geographic Coordinates
 - Stack Parameters
 - Operating Schedule
- Nice to Have Data (Growth & Control)
 - SIC
 - Activity throughput
 - Emission Factors

Data Needs Point Sources Facility Level Data Elements

- Identification
 - Site ID, name
- Location
 - State, County, address
- Industrial classification
 - NAICS
- Emissions

Data Needs Point Sources

Process Level Data Elements¹

- Identification
 - Process ID
- Location
 - State, County, Site
- Process Characteristics
 - SCC, NAICS, Design Capacity, Fuel Heat Content, Fuel Throughput, Fuel Sulfur/Ash Content
- Operating Schedule / Temporal Variation
 - Seasonal Percentages, Weekly, Daily

Data Needs Point Sources

Process Level Data Elements²

- Emission Release Point
 - Location, Rel Pt ID, Height, Diameter, Exhaust Temperature, Flow Rate, Exhaust Velocity, Release Type
- Control Information (by Pollutant)
 - Device Type, Control Efficiencies
- Emission Information (by Pollutant)
 - Emission Rates, Emissions

How Are Point Sources Typically Categorized?

- Fuel Combustion
- Waste disposal
- Food and agriculture industry
- Metallurgical industry
- Petroleum-related industries
- MACT/Residual Risk categories
- Mineral products industry
- Chemical process industry
- Wood products industry
- Storage tanks

Emission Inventory Source Types and Data Relationships²

■ Non-Point Source

What characterizes a non-point source of emissions?

- Non-specific location and release(s) to the air
- Specific process that produces the emissions
- Timing of process operations
- Control devices (maybe)

Data Needs for Air Quality Modeling of Non-Point Source Emissions

- Required Data Elements
 - Process Level Emissions
 - Operating Schedule
- Nice to Have Data (Growth & Control)
 - Activity
 - Emission Factors

Data Needs Non-Point Sources

Process Level Data Elements

- Identification
 - SCC
- Location
 - State, County
- Process Characteristics
 - NAICS, MACT Code
- Operating Schedule / Temporal Variation
 - Seasonal Percentages, Weekly, Daily
- Emissions (by pollutant)

How Are Nonpoint Sources Typically Categorized?

- Fuel Combustion
- Chemical and allied products manufacturing
- Metal processing
- Petroleum and related industries
- Other industrial processes
- Solvent utilization
- Storage and transport
- Waste disposal and transport
- Miscellaneous sources (e.g. unpaved road dusts)
- Material storage/distribution
- Cooling towers
- Fires - prescribed burning, forest fires, structural fires, ag burning
- Hospital sterilizers
- Gasoline service stations
- Dry cleaners
- Natural sources (i.e., wind erosion, vegetation)
- On road mobile sources
- Off road mobile sources



NIF Orientation

NEI Input Format (NIF)

- Separate file structure for point, area/nonroad, and mobile data
- “Mini” relational fixed-position database files
- Current Version 2.0, released Nov. 2000, reissued Apr 2001
- Version 3.0 release Spring 2003
- Published in MS Excel, MS Access
- www.epa.gov/ttn/chief/nif/index.html

NIF Source Files and Records

- Point Source File
 - (8) Record Types (TR, SI, EU, EP, PE, ER, CE, EM)
- Area/ Nonroad Mobile Source File
 - (5) Record Types (TR, EP, CE, PE, EM)
- On-Road Mobile Source File
 - (3) Record Types (TR, PE, EM)
- Biogenic Source File
 - (2) Record Types (TR, EM)

NIF Record Types¹

■ Transmittal

- Description of the organization submitting the data to EFIG, point of contact, data yr, source type

■ Site

- Description of plant location and ID

■ Emission Unit

- Description of unit or device generating emissions (point)

■ Emission Release Point

- Description of mechanism releasing emissions to the atmosphere, including geo coordinate location

NIF Record Types²

■ **Emission Process**

- Description and operational status of the process generating the emissions

■ **Emission Period**

- Material volume and timing of emission process

■ **Control Equipment**

- Description of control equipment and impact on emissions (applied CE%)

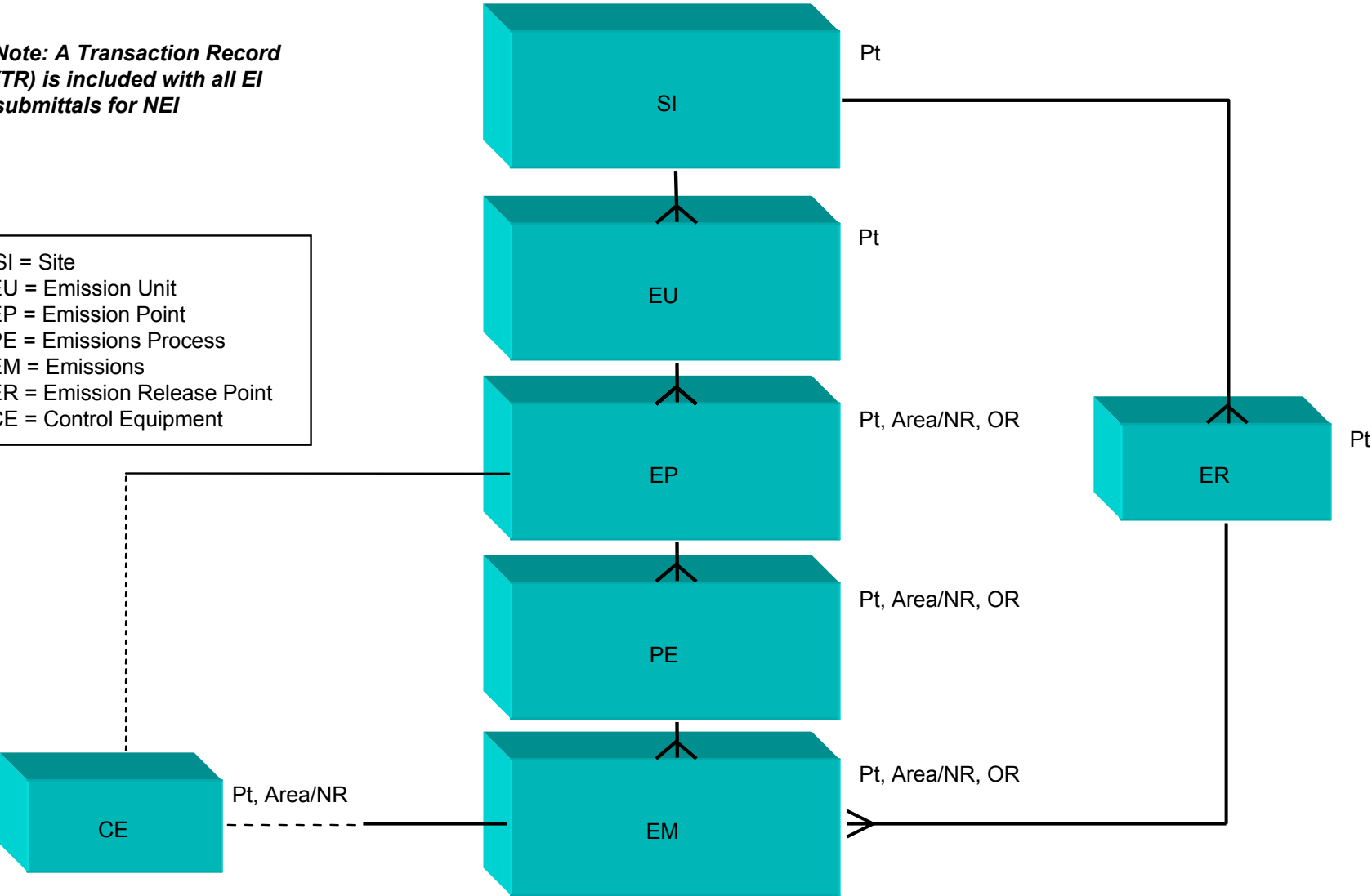
■ **Emissions**

- Amount of emissions resulting from activity and emission rate

EI Data Relationships in NIF

Note: A Transaction Record (TR) is included with all EI submittals for NEI

SI = Site
 EU = Emission Unit
 EP = Emission Point
 PE = Emissions Process
 EM = Emissions
 ER = Emission Release Point
 CE = Control Equipment



One to Many Relationship
 One to One Relationship
 Mandatory to Optional

Review of NIFV2.0 Specifications²

■ Primary Key Fields - Point Source File

- TR: State, County
- SI: State, County, Site ID
- EU: State, County, Site ID, Unit ID
- EP: State, County, Site ID, Unit ID, Process ID
- ER: State, County, Site ID, EmissRelPt ID
- CE: State, County, Site ID, Unit ID, Process ID, Pollutant
- PE: State, County, Site ID, Unit ID, Process ID, Start and End Dates
- EM: State, County, Site ID, Unit ID, Process ID, Pollutant, EmissRelPtID, Start and End Dates

Using the NIF – Documentation and User Materials

- Find on: www.epa.gov/ttn/chief/nif/
- Format specification
 - Structure of NIF
- Appendix A (User's Guide)
 - How to ...
- Code Tables
 - Valid Values for Codes
- File organization guide
 - How to Organize Files for Submission
- Steps for Electronic Submission
 - How to Get to CDX

Review of NIFV2.0 Specifications¹

- Documented in MS Excel
- Format notes
 - Prescribed data types, lengths, and positions
 - Data types – character, numeric, date
 - Key fields – indicated by bold italics
 - Mandatory Fields – mandatory for inventory
 - Necessary Fields – needed to complete dataset used in air quality modeling
 - Data Definitions – description of expected data for field
 - User Convention Notes – information on where to find valid code values and how to implement and express values of fields (reference to App A and Code tables)
 - Units – some are prescribed, some are not

NIFV2.0 as MS Access File

- Review MS Access 'shell'
 - Table design view contains NIF record specs
 - Includes import mask for each record/ table
 - Do's and Don't's
- Review example NIFV2.0 dataset in MS Access
- Addtl example NIFV2.0 datasets as .mdb files
 - EPA's NEI data published on [ftp.epa.gov/pub/EmisInventory/](ftp://ftp.epa.gov/pub/EmisInventory/)

NIF Use Conventions

- Reporting toxic (HAP) emissions for the level of data available
- Reporting emissions for specific time periods
- Reporting units of measure
- Setting Submittal Flag for making data corrections
- *See Appendix A (User's Guide) for specific explanation on each of above*

Update to NIFV3.0

- To be released in Spring 2003
- Implements/complies with EPA data standards in Environmental Data Registry
 - [http://oaspub.epa.gov/edr/epastd\\$.startup](http://oaspub.epa.gov/edr/epastd$.startup)
- User guide to be reformatted and expanded to address implementation of new fields, to provide more prescriptive instruction
- Review applicable standards
- Review changes from NIFV2.0
 - <http://www.epa.gov/ttn/chief/nif/index.html#drft3>

Update to NIFV3.0

Why EPA Data Standards?

- Data standards
 - *Agreements on representation, formats, and definitions for common data*
- Data common to whom?
- EPA's role

Update to NIFV3.0

Data Standards That Influence NEI

- Facility Identification
- Latitude/Longitude
- Chemical Identification
- Date
- NAICS
- Contact
- Tribal Identifier

Update to NIFV3.0

Type of Changes from NIFV2.0

- For specific NIF Records
 - Revise existing data element name or length
 - Add new data elements
 - Delete existing data element(s) and replace with standard element
- Review some examples
 - Site record revisions for Facility Identifier
 - Emission Release Point record for Lat / Lon

Examples of Changes From NIFV2.0 to V3.0

- Facility ID standard – Ex's. of SI record changes

| NIFV2.0 Field | NIFV3.0 Field | Type of Change |
|---------------------------------------|-------------------------------------|--|
| COUNTY FIPS (A,3) STATE FIPS (A,2) | COUNTY AND STATE FIPS CODE (A,5) | Combine two fields w existing lengths |
| SITE ID (A,15) | STATE FACILITY IDENTIFIER (A,15) | New name |
| FACILITY NAME (A,50) | FACILITY NAME (A,80) | Increase length |
| STREET LINE 1, 2, 3 | LOCATION ADDRESS (A,50) | Replace 3 fields w one |
| ADDRESS TYPE CODE | | Delete, address=physical |
| CITY(A,30) | CITY(A,60) | Increase length |

Examples of Changes From NIFV2.0 to V3.0 (cont)²

- Latitude/ Longitude standard –
Ex's. of Emission Release Point record changes

| NIFV2.0 Field | NIFV3.0 Field | Type of Change |
|----------------------|---|-----------------------|
| | HORIZONTAL COLLECTION METHOD CODE (A,3) | Add field |
| | HORIZONTAL ACCURACY MEASURE (A,6) | Add field |
| | HORIZONTAL REFERENCE DATUM CODE (A, 3) | Add field |
| | REFERENCE POINT CODE (A,3) | Add field |
| | SOURCE MAP SCALE NUMBER (A,10) | Add field |
| | COORDINATE DATA SOURCE CODE (A,3) | Add field |

More on Latitude / Longitude Standard Definitions & NIFV3.0 Implementation

- X, Y coordinates
 - Latitude Measure (decimal degrees)
 - Longitude Measure (decimal degrees)
- Measurement accuracy determination (MAD)
 - Horizontal Collection Method Code
 - Horizontal Accuracy Measure
 - Horizontal Reference Datum Code
 - Reference Point Code
 - Source Map Scale Number
 - Coordinate Data Source Code
- Review NIF implementation & available guidance

Preparing Data in the NIF

- See end of session notes on converting your local data format to NIF
- Acceptable file types
 - ASCII text .txt
 - MS Access .mdb

NIF QC Software Tool

- Checks for correct formatting
- Presently works on data in NIFV2.0
- Desktop Tool
- Developed in MS Access
- Works on data in a MS Access file
- Works on criteria, toxics, and combined files
- www.epa.gov/ttn/chief/nif/index.html#qa

Organizing Your NIF Files

- Implementation rules

Described in NIF *File Organization Guide*

(located on Website with rest of user materials)

- File type(s)

- Save as .txt or send the .mdb file

- File naming convention

- Source file / record organization



Transferring Data Files to EPA

Steps For Submitting Your Data Electronically to EPA

- Put your data in NEI Input Format
 - Save in acceptable file type
- Follow prescribed file naming convention
- Register on EPA's Central Data Exchange (CDX) site
- Go on-line to CDX, complete submittal information, and send your files.

Described in *Steps for Submitting Data Electronically*
(located on Website with rest of user materials)

Submitting NEI Data to EPA's Central Data Exchange (CDX)

- Administered by EPA OEI
- Provide single secure point of entry to EPA
 - Move data to EPA programs
- Support variety of formats
 - Program-defined formats
 - Extensible Markup Language (XML)
 - Web Forms
- Automate and secure data transfer with all trading partners over exchange network

CDX Submission Procedures

- State/Local /Tribal air program prepares emissions data in NEI Input Format (NIF) or XML
- Access EPA CDX Secure Web Site
- Complete (on-line) NEI Submittal Form
- Upload NIF file
- Data files accessed by EPA's Emission Factors & Inventory Group for QC and processing



End Notes

Converting Your Local Data Format to NEI Input Format¹

- 'Map' your data elements to NIF data elements
- Determine where cross reference tables are needed
- Determine other 'prior to conversion' routines needed
- Choose a software tool to do the mapping
- Develop the conversion routines, run&test, test&run

Converting Your Local Data Format to NEI Input Format²

- Mapping to the NIF data elements
 - Help resources
 - NIF specification with data definitions
 - NIF Appendix A for use conventions
 - NIF Codes tables
 - 'Old' SCC_map file to derive NIF activity units for specific SCCs

Converting Your Local Data Format to NEI Input Format³

- 'Prior to Conversion' routines
 - Prepare and/or update cross reference tables to match coded values, unit fields, etc.
 - Transform data into prescribed NIF field formats, units
Examples: Date -YYYYMMDD, lat/lon in decimal degrees, etc.
 - Check for invalid code values

Keys to Successful Use of the NIF

- Do not change the MS Access shell
- Do not change the MS Access shell
- Enforce the NIF record relationships
- Pay attention to *valid* code values
 - Ex. units, pollutant codes
- Correctly designate annual and average day emissions
 - E.g., Start Date, End Date, Emission Type
- Correct use of Submittal Flag to designate data correction / replacement
- Foster strong partnership of IT staff and data developers