



# Evaluating Your Emissions Using the NEI Input Format (NIF)

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# Gulfwide Summary

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- Common Emission Unit Types:
  - Amine units (AMI)
  - Boilers (BOI)
  - Diesel engines (DIE)
  - Drilling rigs (DRI)
  - Combustion flares (FLA)
  - Fugitive components (FUG)
  - Glycol dehydrators (GLY)
  - Loading (LOA)
  - Losses from Flashing (LOS)
  - Mud degassing (MUD)
  - Natural Gas Engines (NGE)
  - Natural Gas Turbines (NGT)
  - Pneumatic Pumps (PNE)
  - Pressure/Level Controllers (PRE)
  - Storage Tanks (STO)
  - Cold Vents (VEN)



# Emission Source-Pollutant Matrix

	CO	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	NO <sub>x</sub>	PM <sub>10</sub> /PM <sub>2.5</sub>	SO <sub>2</sub>	VOC
AMI			X				X	X
BOI	X	X	X	X	X	X	X	X
DIE	X	X	X		X	X	X	X
DRI	X	X			X	X	X	X
FLA	X	X	X	X	X	X	X	X
FUG			X					X
GLY			X					X
LOA								X
LOS		X	X					X
MUD		X	X					X
NGE	X	X	X		X	X	X	X
NGT	X	X	X	X	X	X	X	X
PNE		X	X					X
PRE		X	X					X
STO								X
VEN		X	X					X



# NIF Structure

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- Emissions from state/local/tribal agencies are submitted to EPA using the National Emissions Inventory (NEI) Input Format (NIF).
- The NIF is a relational database format
  - Contains eight data tables.
  - Format is prescribed, not flexible in field type or length.
- Full guidance located at:

<http://www.epa.gov/ttn/chief/nif/index.html>



# NIF Structure

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- Data tables are:
  - Emissions Table (EM) – contains pollutant emissions information at the process/stack level
  - Site Table (SI) – contains descriptive information about the site (street address, facility codes, etc).
  - Emission Unit Table (EU) – contains descriptive information about the emitting unit (boiler, dehydrator, storage tank, etc)
  - Emission Process Table (EP) – contains descriptive information about the process (fuel type, floating roof, etc.)
  - Emission Release Point Table (ER) – contains descriptive information on stack and fugitive parameters (height, temperature, velocity, etc), as well as location coordinates.

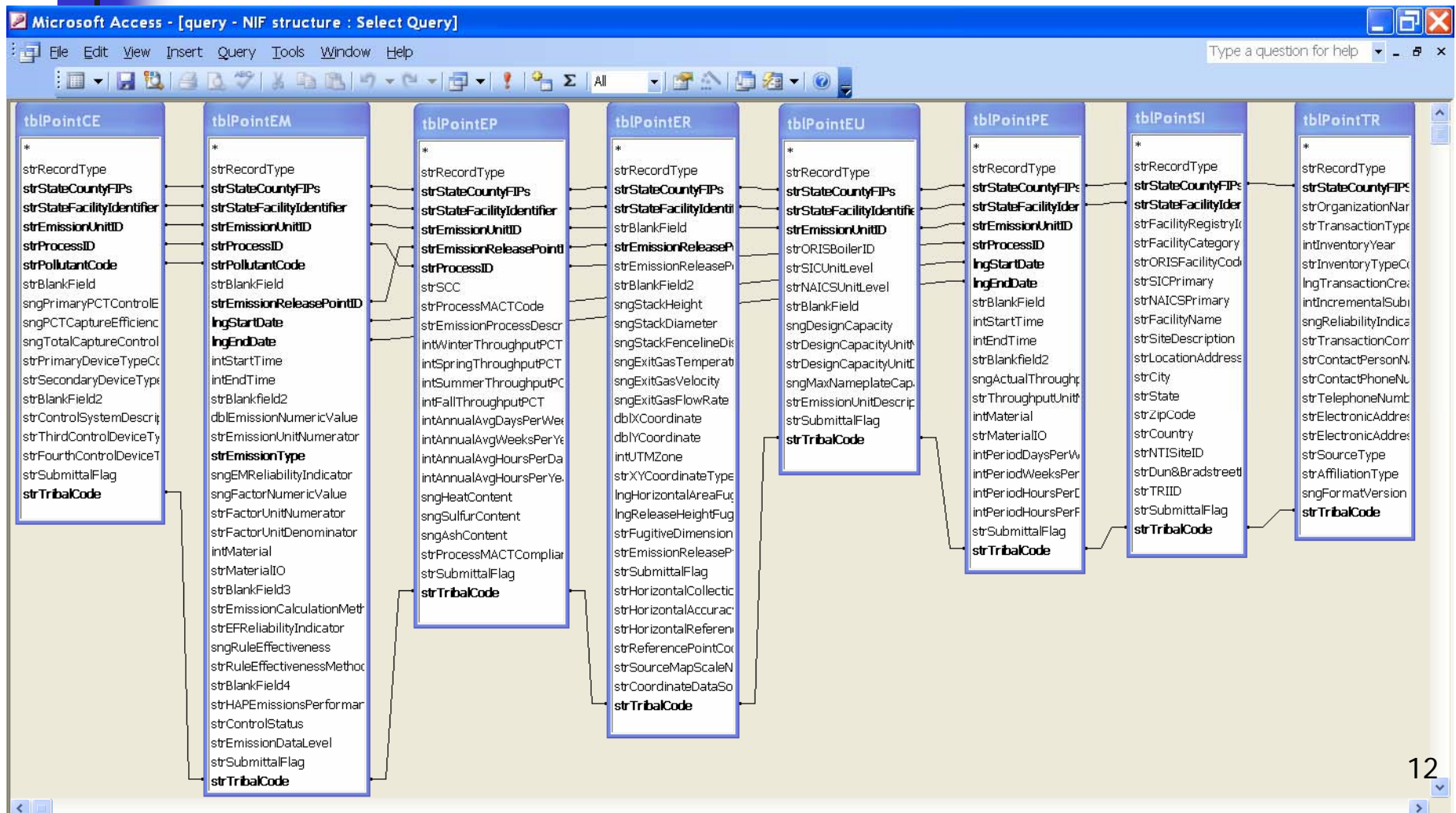


# NIF Structure

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- Data tables are:
  - Emission Period Table (PE) – contains activity data related to the emission process (amount of fuel consumed, amount of oil transported, etc.).
  - Control Equipment Table (CE) – contains descriptive information about any control devices that may be in place (device type, control efficiency, etc.).
  - Transmittal Table (TR) – contains descriptive information the person and organization submitting the NIF files.

# NIF Structure





# Example Data Set

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- ERG Oil, Inc.
  - Operates 10 platforms in the Gulf Of Mexico
  - MMS Company ID = 00999
  - Each platform contains the typical emission units
- Need to determine:
  - Emissions by platform
  - Emissions by unit type (boilers, engines, etc.)
  - Emissions by unit





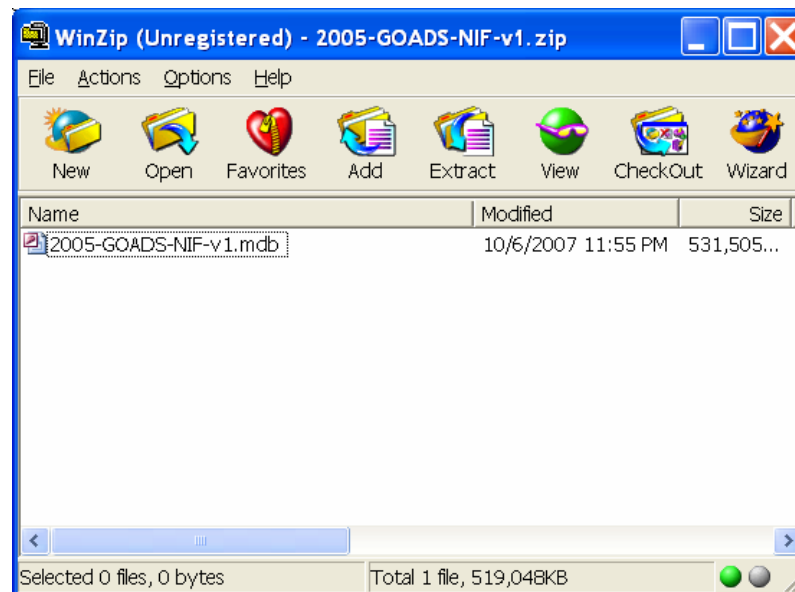
# Example Data Set

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- Approach
  - Step 1 – Retrieve the GOADS 2005 NIF
  - Step 2 – Unzip the file
  - Step 3 – Identify your platforms
    - MMS Complex Number
    - MMS Structure Number
  - Step 4 – From each of the 8 tables, create your own records
  - Step 5 – Create a “flattened” data table for analysis
  - Step 6 – Develop analysis queries

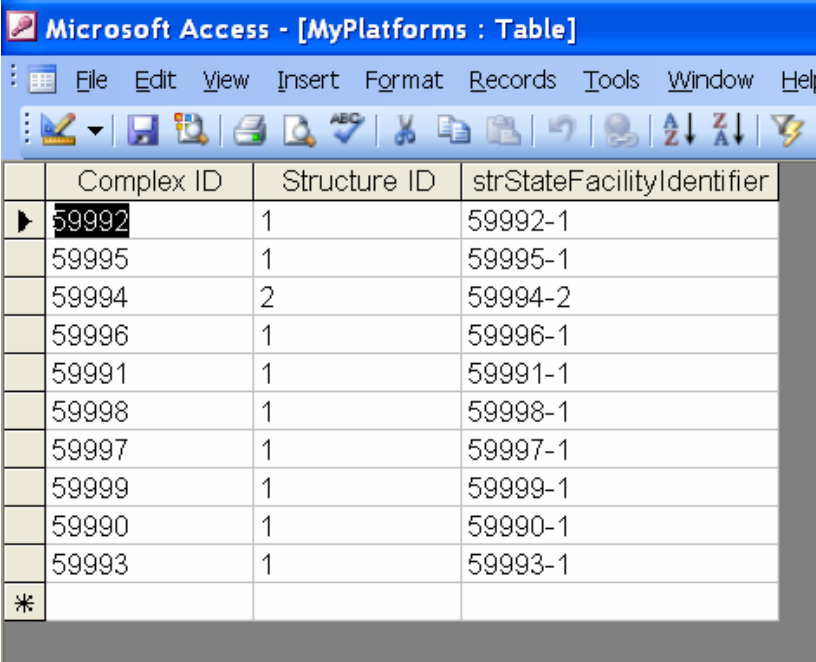
# Example Data Set

- Step 1 – Retrieve the GOADS 2005 NIF
  - File available on the MMS website in November
- Step 2 – Unzip the File



# Example Data Set

- Step 3 – Identify Your Platforms
  - Create a database table listing your platform(s)  
strStateFacilityIdentifier = Complex ID and Structure ID



The screenshot shows a Microsoft Access window titled "Microsoft Access - [MyPlatforms : Table]". The window displays a table with three columns: "Complex ID", "Structure ID", and "strStateFacilityIdentifier". The table contains 11 rows of data, with the first row highlighted. The first row has a black triangle icon in the first column, followed by the values "59992", "1", and "59992-1". The subsequent rows follow a similar pattern with varying Complex IDs and Structure IDs.

	Complex ID	Structure ID	strStateFacilityIdentifier
▶	59992	1	59992-1
	59995	1	59995-1
	59994	2	59994-2
	59996	1	59996-1
	59991	1	59991-1
	59998	1	59998-1
	59997	1	59997-1
	59999	1	59999-1
	59990	1	59990-1
	59993	1	59993-1
*			

# Example Data Set

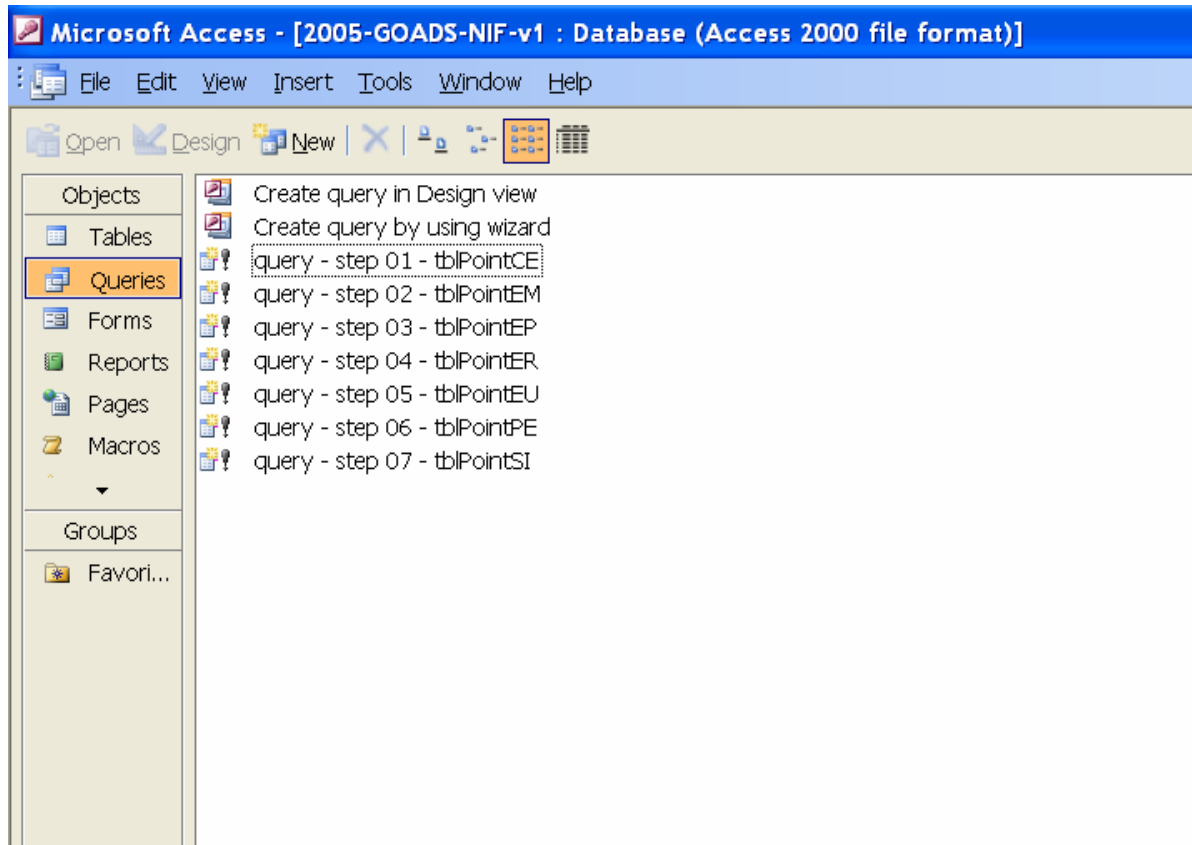
- Step 4 – From each of the 8 tables, create your own records

The screenshot shows the Microsoft Access interface during the 'Make Table' process. The 'Make Table' dialog box is open, with 'Make New Table' selected. The 'Table Name' is 'tblPointCE' and the 'File Name' is 'C:\work\mms\2008\ERGOil.mdb'. The background shows a list of fields for 'tblPointCE' and a table structure view at the bottom.

Field:	tblRecordType	tblStateCountyFIPs	tblStateFacilityIdentif	tblEmissionUnitID	tblProcessID	tblPollutantCode	tblBlankField	tblPrimaryPCTContr	tblPCTCaptureEffic	tblPoi
Table:	tblPointCE	tblPointCE	tblPointCE	tblPointCE	tblPointCE	tblPointCE	tblPointCE	tblPointCE	tblPointCE	tblPoi
Sort:										
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Criteria:										
or:										

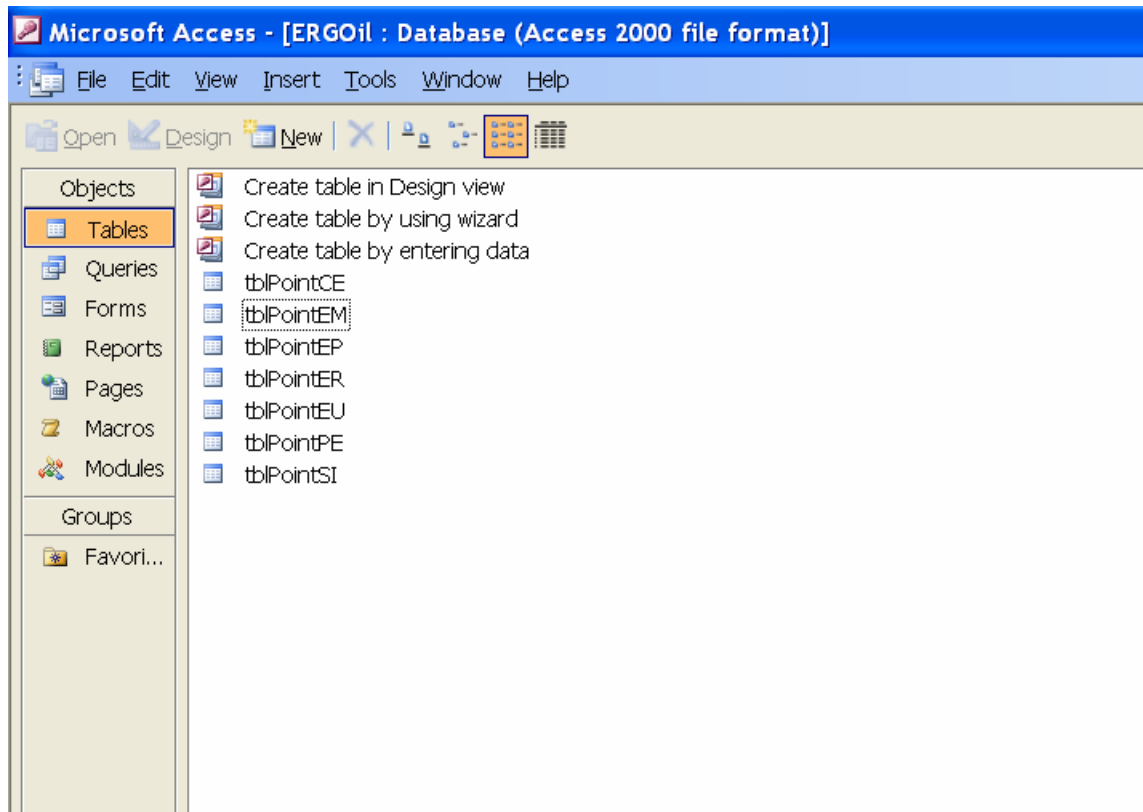
# Example Data Set

- Step 4 (cont.) – Create the remaining tables



# Example Data Set

- Step 4 (cont) – ERG Oil file is now created



# Example Data Set

- Step 5 – Create a “flattened” data table for analysis

Microsoft Access - [query - flattened : Make Table Query]

Field:	strStateCountyFIPs	strStateFacilityIdentif	strFacilityRegistryIde	strFacilityName	strSiteDescription	strEmissionUnitID	strEmissionUnitDescr	strProcessID	strS
Table:	tblPointSI	tblPointSI	tblPointSI	tblPointSI	tblPointSI	tblPointEU	tblPointEU	tblPointEP	tblP
Total:	Group By	Group By	Group By	Group By	Group By	Group By	Group By	Group By	Grout
Sort:	Ascending	Ascending	Group By	Group By	Group By	Ascending	Group By	Ascending	
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Criteria:									
or:									

Ready



# Example Data Set

## Recommended Fields

strStateCountyFIPs	strEmissionReleasePointType	intMaterial
strStateFacilityIdentifier	sngStackHeight	intPeriodHoursPerDay
strFacilityRegistryIdentifier	sngStackDiameter	intPeriodHoursPerPeriod
strFacilityName	sngExitGasTemperature	strPollutantCode
strSiteDescription	sngExitGasVelocity	dblEmissionNumericValue
strEmissionUnitID	dblXCoordinate	strEmissionUnitNumerator
strEmissionUnitDescription	dblYCoordinate	sngFactorNumericValue
strSCC	strXYCoordinateType	strFactorUnitNumerator
strEmissionProcessDescription	lngStartDate	strFactorUnitDenominator
strEmissionReleasePointID	lngEndDate	strControlStatus
sngHeatContent	sngActualThroughput	strPrimaryDeviceTypeCode
sngSulfurContent	strThroughputUnitNumerator	sngPrimaryPCTControlEfficiency
strEmissionReleasePointID		16





# Example Data Set

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- NIF Notes:
  - strStateCountyFIPs
    - GA078 = Galveston Area, Block = 78
  - strStateFacilityIdentifier
    - 59992-1; Complex ID = 59992; Structure ID = 1
  - strFacilityRegistryNumber
    - G99992 = MMS Lease Number
  - strFacilityName
    - Platform A of ERG Oil (MMS ID = 00999)



# Example Data Set

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- NIF Notes:
  - strSiteDescription
    - Area=GA; Block=078; Name=A
  - strEmissionUnitID
    - DIE-01
  - strEmissionUnitDescription
    - Diesel Engine; GOADS Equip ID = CRN-1
  - strProcessID
    - D<600d = diesel engine less than 600 horsepower



# Example Data Set

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- NIF Notes (cont)\*:
  - strSCC
    - 20200102 = internal combustion diesel engine, industrial turbine
  - strEmissionReleasePointType
    - 01 = fugitive; 02 = stack
  - intMaterial
    - 57 = diesel oil
  - strPrimaryDeviceType
    - 047 = Vapor Recovery System

\* full NIF description is located at: <http://www.epa.gov/ttn/chief/nif/index.html>

# Example Data Set

- Top NO<sub>x</sub>-Emitting Platforms - Query

Microsoft Access - [query - Top NOX Emitting Platforms : Select Query]

File Edit View Insert Query Tools Window Help

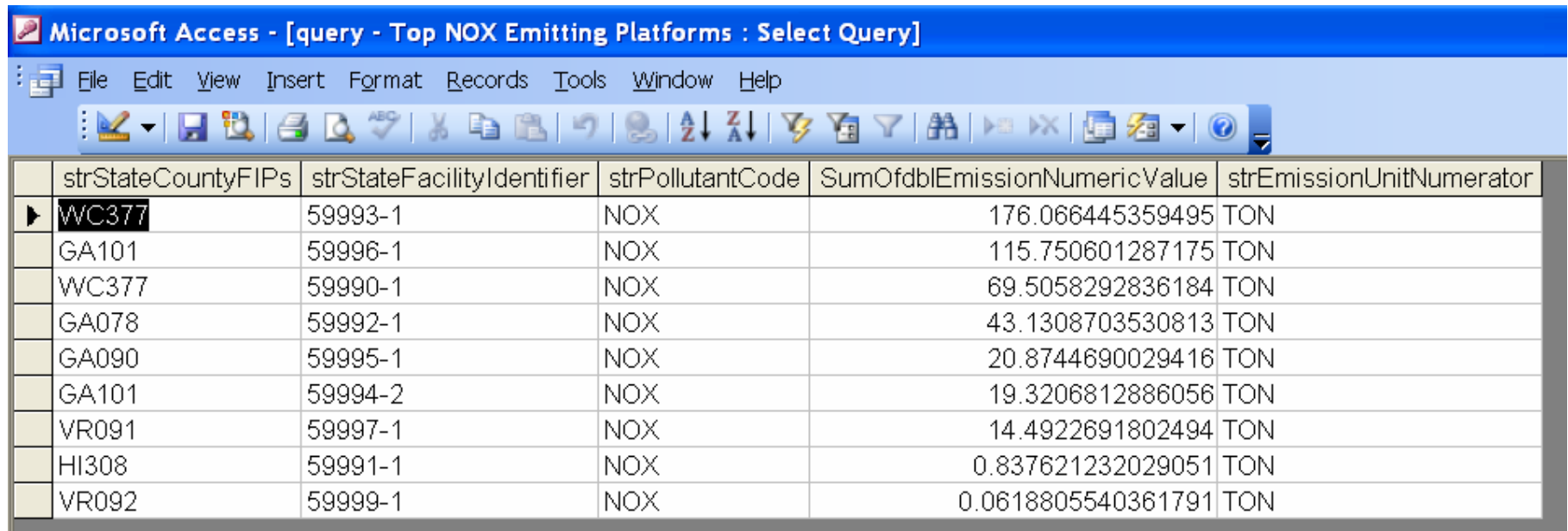
Flattened Emissions

- intPeriodHoursPerPeriod
- strPollutantCode
- dblEmissionNumericValue
- strEmissionUnitNumerator
- sngFactorNumericValue

Field:	strStateCountyFIPs	strStateFacilityIdentif	strPollutantCode	dblEmissionNumeric\	strEmissionUnitNume	
Table:	Flattened Emissions	Flattened Emissions	Flattened Emissions	Flattened Emissions	Flattened Emissions	
Total:	Group By	Group By	Group By	Sum	Group By	
Sort:				Descending		
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Criteria:			"nox"			
or:						

# Example Data Set

- Top NO<sub>x</sub>-Emitting Platforms - Result



The screenshot shows the Microsoft Access interface with a query named 'Top NOx Emitting Platforms : Select Query'. The table displays the following data:

strStateCountyFIPs	strStateFacilityIdentifier	strPollutantCode	SumOfdblEmissionNumericValue	strEmissionUnitNumerator
WC377	59993-1	NOX	176.066445359495	TON
GA101	59996-1	NOX	115.750601287175	TON
WC377	59990-1	NOX	69.5058292836184	TON
GA078	59992-1	NOX	43.1308703530813	TON
GA090	59995-1	NOX	20.8744690029416	TON
GA101	59994-2	NOX	19.3206812886056	TON
VR091	59997-1	NOX	14.4922691802494	TON
HI308	59991-1	NOX	0.837621232029051	TON
VR092	59999-1	NOX	0.0618805540361791	TON

# Example Data Set

- Top VOC Emission Unit Types - Query

Microsoft Access - [query - Top VOC Emitting Emission Types : Select Query]

File Edit View Insert Query Tools Window Help

Type a qu

Flattened Emissions

strFacilityName  
strSiteDescription  
strEmissionUnitID  
strEmissionUnitDescription  
strProcessID

Field:	strStateCountyFIPS	strStateFacilityIdentif	Emission Unit Type: Left([Flattened Emissions]![strEmissionUnitID],3)	strPollutantCode	dblEmissionNumeric\	strEmissionUnitNume
Table:	Flattened Emissions	Flattened Emissions		Flattened Emissions	Flattened Emissions	Flattened Emissions
Total:	Group By	Group By	Group By	Group By	Sum	Group By
Sort:					Descending	
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:				"voc"		
or:						

Emission Unit Type: Left([Flattened Emissions]![strEmissionUnitID],3)

# Example Data Set

- Top VOC Emission Unit Types - Result

Microsoft Access - [query - Top VOC Emitting Emission Types : Select Query]

File Edit View Insert Format Records Tools Window Help

strStateCountyFIPs	strStateFacilityIdentifier	Emission Unit T	strPollutantCode	SumOfdblEmissionNumericValue	strEmissionUnitNumerator
WC377	59993-1	VEN	VOC	309.076053798199	TON
WC377	59993-1	FUG	VOC	40.641622501862	TON
WC377	59993-1	STO	VOC	30.6002527475357	TON
GA101	59996-1	FUG	VOC	30.0407147181977	TON
VR092	59999-1	VEN	VOC	26.1321231126785	TON
VR091	59997-1	VEN	VOC	20.9162630438805	TON
WC377	59990-1	FUG	VOC	19.5964999198623	TON
GA078	59992-1	FUG	VOC	19.4586536184652	TON
GA078	59992-1	VEN	VOC	19.3437407016754	TON
VR092	59999-1	FUG	VOC	16.5556825068197	TON
WC377	59990-1	PNE	VOC	15.4173227896099	TON
GA078	59992-1	GLY	VOC	13.5552369356155	TON
GA101	59994-2	GLY	VOC	12.6974642276764	TON
VR091	59997-1	FUG	VOC	11.2782631421287	TON
GA101	59994-2	FUG	VOC	10.0293674618006	TON
WC377	59990-1	VEN	VOC	8.50033795833588	TON
GA101	59996-1	PNE	VOC	7.62490999698639	TON
GA090	59995-1	FUG	VOC	6.65198952431092	TON

# Example Data Set

- Top CO Emission Units - Query

Microsoft Access - [query - Top VOC Emitting Emission Types : Select Query]

File Edit View Insert Query Tools Window Help

Flattened Emissions

- strFacilityName
- strSiteDescription
- strEmissionUnitID
- strEmissionUnitDescription
- strProcessID

Field:	strStateCountyFIPs	strStateFacilityIdentif	strEmissionUnitID	strEmissionUnitDescr	strPollutantCode	dblEmissionNumeric\	strEmissionUnitNume
Table:	Flattened Emissions	Flattened Emissions	Flattened Emissions	Flattened Emissions	Flattened Emissions	Flattened Emissions	Flattened Emissions
Total:	Group By	Group By	Group By	Group By	Group By	Sum	Group By
Sort:						Descending	
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:					"co"		
or:							



# Example Data Set

- Top CO Emission Units - Result

Microsoft Access - [query - Top VOC Emitting Emission Types : Select Query]

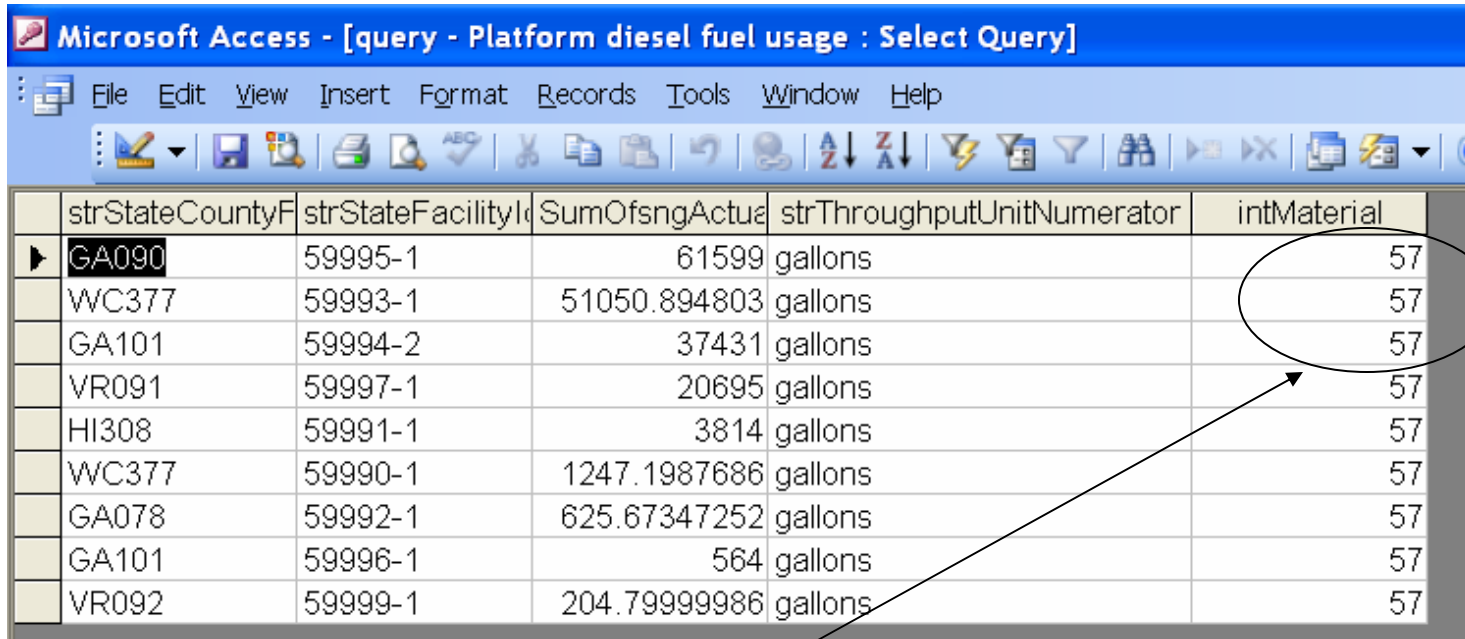
File Edit View Insert Format Records Tools Window Help

Type a question for help

strStateCountyFIPs	strStateFacilityIdentifier	strEmissionUnitID	strEmissionUnitDescription	strPollutantCode	SumOfdblEmissionNumericValue	strEmission
WC377	59993-1	NGE-01	Natural Gas Engine; GOADS Equip ID = COMP1	CO	164.631285667419	TON
WC377	59990-1	NGE-01	Natural Gas Engine; GOADS Equip ID = CE-01	CO	102.365750551224	TON
GA101	59996-1	NGE-02	Natural Gas Engine; GOADS Equip ID = CBA-940	CO	90.5461006164551	TON
GA101	59996-1	NGE-01	Natural Gas Engine; GOADS Equip ID = CBA-900	CO	80.471049785614	TON
▶ WC377	59993-1	NGE-02	Natural Gas Engine; GOADS Equip ID = GE-02	CO	36.168657541275	TON
WC377	59993-1	NGE-03	Natural Gas Engine; GOADS Equip ID = GE-03	CO	35.4440587759018	TON
VR091	59997-1	NGE-01	Natural Gas Engine; GOADS Equip ID = NG001	CO	12.739987321198	TON
GA101	59994-2	NGE-01	Natural Gas Engine; GOADS Equip ID = GEN-1	CO	11.5475314855576	TON
GA078	59992-1	NGT-01	Natural Gas Turbine; GOADS Equip ID = GEN1	CO	8.34309642016888	TON
GA090	59995-1	NGE-01	Natural Gas Engine; GOADS Equip ID = GE-02	CO	4.32677698135376	TON
WC377	59993-1	BOI-01	Boiler; GOADS Equip ID = HT-01	CO	4.15623600035906	TON
GA090	59995-1	DIE-02	Diesel Engine; GOADS Equip ID = GE-03	CO	3.57073114812374	TON
WC377	59993-1	DIE-02	Diesel Engine; GOADS Equip ID = GE-01	CO	3.25288578867912	TON
GA078	59992-1	NGT-02	Natural Gas Turbine; GOADS Equip ID = GEN-2	CO	2.66074604168534	TON
WC377	59990-1	NGE-02	Natural Gas Engine; GOADS Equip ID = GE-02	CO	2.42422360298224	TON
GA101	59994-2	DIE-02	Diesel Engine; GOADS Equip ID = GEN-2	CO	2.41526681510732	TON
WC377	59993-1	NGE-04	Natural Gas Engine; GOADS Equip ID = PE-04	CO	2.24893633276224	TON
WC377	59993-1	NGE-05	Natural Gas Engine; GOADS Equip ID = PE-05	CO	2.24893633276224	TON

# Additional Analysis

- How much diesel oil was used throughout the year?

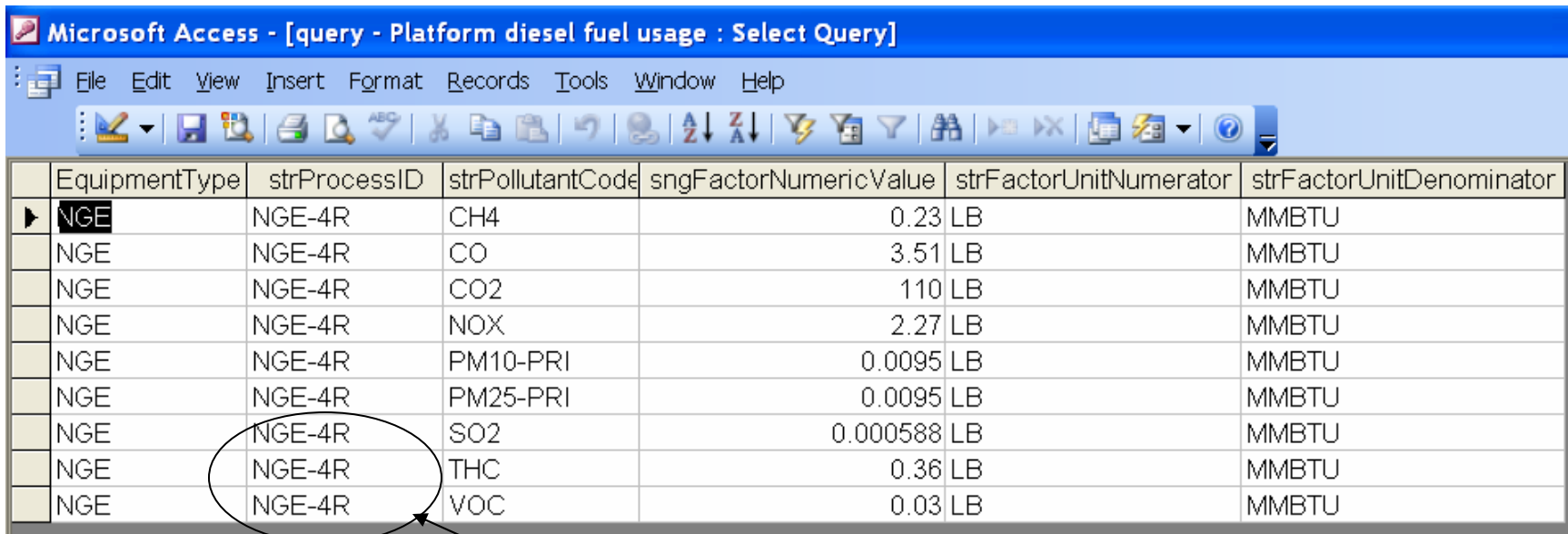


strStateCountyF	strStateFacilityId	SumOfsngActua	strThroughputUnitNumerator	intMaterial
GA090	59995-1	61599	gallons	57
WC377	59993-1	51050.894803	gallons	57
GA101	59994-2	37431	gallons	57
VR091	59997-1	20695	gallons	57
HI308	59991-1	3814	gallons	57
WC377	59990-1	1247.1987686	gallons	57
GA078	59992-1	625.67347252	gallons	57
GA101	59996-1	564	gallons	57
VR092	59999-1	204.79999986	gallons	57

intMaterial = 57 = diesel oil

# Additional Analysis

- What emission factors used to calculate 4-stroke, reciprocating natural gas engines?



Microsoft Access - [query - Platform diesel fuel usage : Select Query]

File Edit View Insert Format Records Tools Window Help

EquipmentType	strProcessID	strPollutantCode	sngFactorNumericValue	strFactorUnitNumerator	strFactorUnitDenominator
NGE	NGE-4R	CH4	0.23	LB	MMBTU
NGE	NGE-4R	CO	3.51	LB	MMBTU
NGE	NGE-4R	CO2	110	LB	MMBTU
NGE	NGE-4R	NOX	2.27	LB	MMBTU
NGE	NGE-4R	PM10-PRI	0.0095	LB	MMBTU
NGE	NGE-4R	PM25-PRI	0.0095	LB	MMBTU
NGE	NGE-4R	SO2	0.000588	LB	MMBTU
NGE	NGE-4R	THC	0.36	LB	MMBTU
NGE	NGE-4R	VOC	0.03	LB	MMBTU

NGE-4R = Natural gas engine, 4-stroke, reciprocating

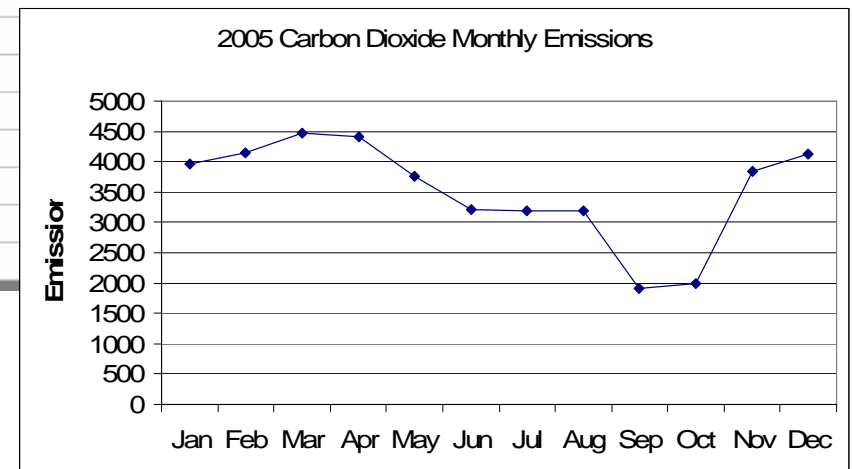
# Additional Analysis

- As a company, how did CO<sub>2</sub> emissions vary by month?

Microsoft Access - [query - monthly CO2 emissions : Select Query]

File Edit View Insert Format Records Tools Window Help

	lngStartDate	lngEndDate	strPollutantCode	SumOfdblEmiss	strEmissionU
▶	20050101	20050131	CO2	3960.318639	TON
	20050201	20050228	CO2	4150.9106766	TON
	20050301	20050331	CO2	4473.2052907	TON
	20050401	20050430	CO2	4408.541226	TON
	20050501	20050531	CO2	3758.8456962	TON
	20050601	20050630	CO2	3219.5687326	TON
	20050701	20050731	CO2	3185.4767286	TON
	20050801	20050831	CO2	3194.2686913	TON
	20050901	20050930	CO2	1917.3995413	TON
	20051001	20051031	CO2	1997.1513049	TON
	20051101	20051130	CO2	3838.6642521	TON
	20051201	20051231	CO2	4119.0795452	TON





# Wrap-Up

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Any questions?

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