Community Based Environmental Protection
Galveston/Harris Counties

Montgomery County

Liberty County

Waller County

Harris County

Chambers County

Fort Bend County

Galveston Bay

Brazoria County

Galveston County

Gulf of Mexico

Legend:
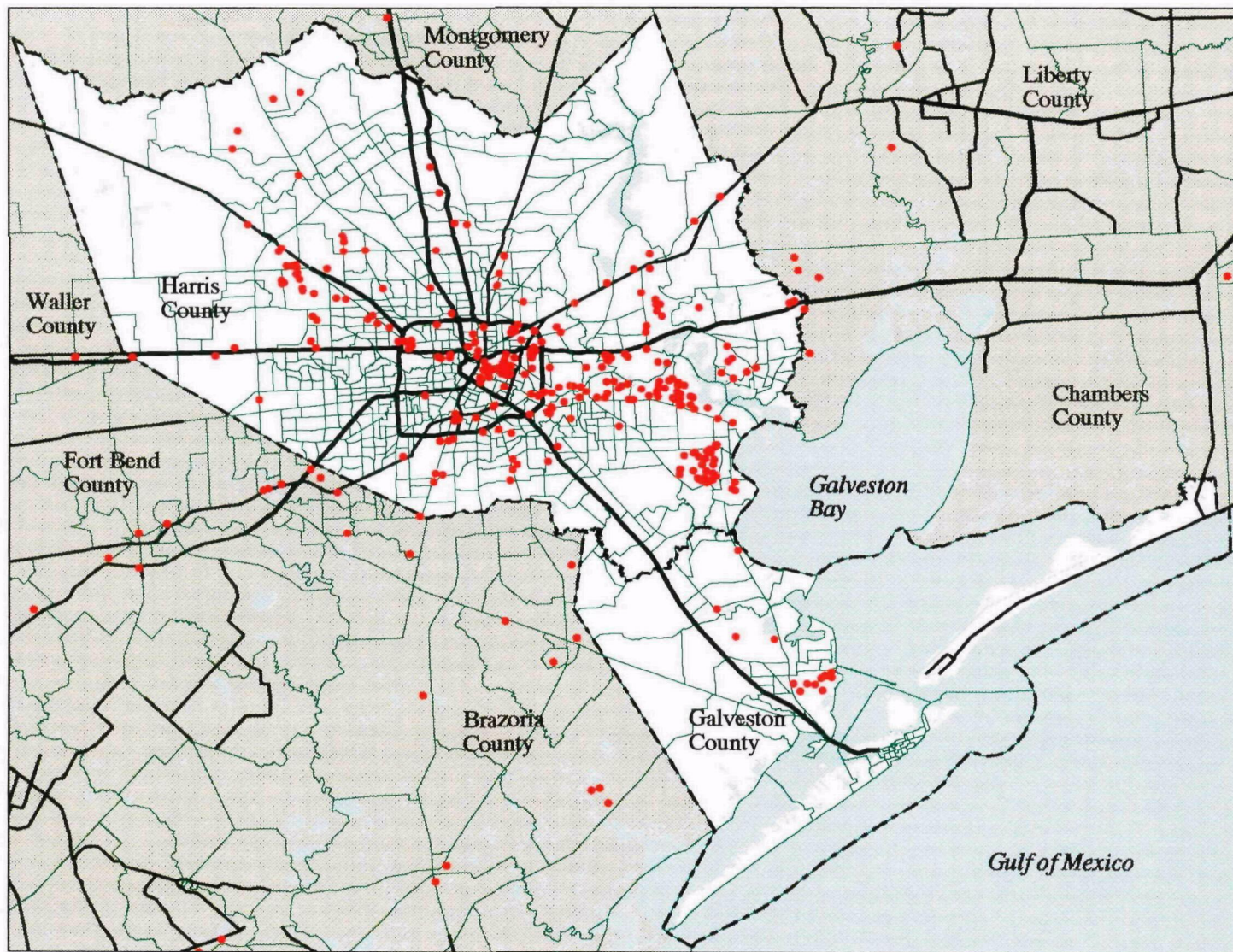
● Toxic Release Inventory Site
(Facility Submitted a Report to TRI in 1993)

Census Tract

Major Road

County Boundary

Water Body

0   5   10   15   20
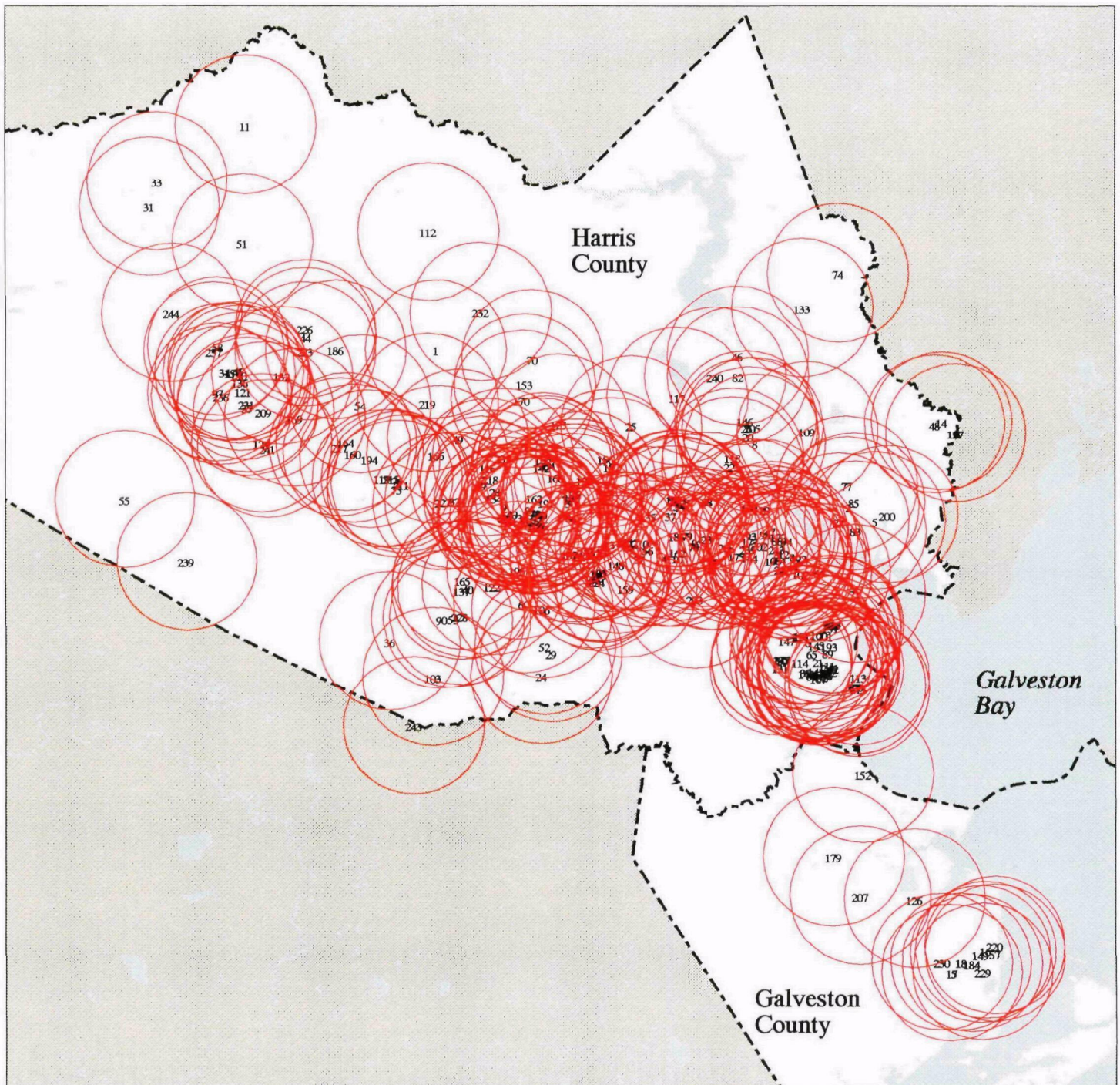Miles

COMMUNITY BASED ENVIRONMENTAL PROTECTION

Harris
County

Galveston
Bay

Galveston
County

CUMULATIVE RISK INDEX
CENSUS TRACTS ANALYSIS

36831
1   Census Tract ID
    Number of TRI Sites

Cumulative HRI Values

—   Census Tract Boundary

- - -   County Boundary

▨   Water Body

☐   Bordering County

☐   0
☐   > 0 and <= 10
☐   > 10 and <= 20
☐   > 20 and <= 40
☐   > 40 and <= 60
☐   > 60

COUNTY CODE	CENSUS TRACT	NUMBER OF FACILITES	CUMULATIVE HRI	AVERAGE* HRI	MAXIMUM HRI VALUE	MINIMUM HRI VALUE	CUMULATIVE EJ INDEX	AVERAGE* EJ INDEX	MAXIMUM EJ INDEX	MINIMUM EJ INDEX
157	701.15	1	2.9	2.9	2.9	2.9	15	15	15	15
071	1101.02	1	4.9	4.9	4.9	4.9	2	2	2	2
167	1207.00	1	1.9	1.9	1.9	1.9	2	2	2	2
167	1213.00	1	2.5	2.5	2.5	2.5	2	2	2	2
167	1216.10	2	5.3	2.6	2.6	2.6	6	3	4	2
167	1230.00	10	89.5	9.0	24.2	1.2	61	6.1	12	4
201	201.02	1	5.7	5.7	5.7	5.7	45	45	45	45
201	202.10	2	15.4	7.7	7.7	7.7	120	60	60	60
201	202.20	4	30.8	7.7	7.7	7.7	240	60	60	60
201	207.04	1	7.7	7.7	7.7	7.7	60	60	60	60
201	208.03	3	23.1	7.7	7.7	7.7	180	60	60	60
201	209.00	2	32.8	16.4	19.7	13.1	90	45	45	45
201	210.01	5	33.6	6.5	6.9	6.6	225	45	45	45
201	211.00	4	40.2	10.3	22.8	5.7	72	18	24	12
201	213.02	1	11.4	11.4	11.4	11.4	18	18	18	18
201	214.01	1	7.7	7.7	7.7	7.7	60	60	60	60
201	214.02	1	5.7	5.7	5.7	5.7	24	24	24	24
201	215.02	1	6.6	6.6	6.6	6.6	45	45	45	45
201	224.01	2	12.3	6.2	6.6	5.7	69	35	45	24
201	225.03	1	6.6	6.6	6.6	6.6	45	45	45	45
201	228.01	1	3.9	3.9	3.9	3.9	9	9	9	9
201	230.02	2	5.9	3.0	3.0	2.9	6	3	3	3
201	232.00	2	9.6	4.8	5.7	3.9	18	9	12	6
201	233.00	10	41.1	4.1	7.8	2.0	46	4.6	6	2
201	235.00	6	25.1	4.2	10.4	1.9	12	2	2	2
201	237.00	1	2.5	2.5	2.5	2.5	4	4	4	4
201	240.03	1	5.1	5.1	5.1	5.1	18	18	18	18
201	252.00	2	4.2	2.1	2.6	1.6	3	1.5	2	1
201	254.00	2	7.0	3.5	6.0	1.0	3	1.5	2	1
201	259.01	1	3.2	3.2	3.2	3.2	2	2	2	2
201	260.00	2	11.8	5.9	9.9	1.9	4	2	2	2
201	264.00	3	34.0	11.3	20.4	0.0	13	4.3	6	3
201	265.00	3	23.6	7.9	10.2	3.2	14	4.7	6	2
201	266.00	1	5.1	5.1	5.1	5.1	3	3	3	3
201	300.22	4	25.8	6.5	6.9	5.7	180	45	45	45
201	301.01	1	7.7	7.7	7.7	7.7	60	60	60	60
201	301.02	6	47.8	8.0	8.1	7.7	360	60	60	60
201	309.02	1	7.7	7.7	7.7	7.7	60	60	60	60
201	314.02	1	6.6	6.6	6.6	6.6	45	45	45	45
201	317.02	3	11.3	3.8	3.9	3.7	54	18	18	18
201	317.04	1	4.8	4.8	4.8	4.8	36	36	36	36
201	318.02	1	6.6	6.6	6.6	6.6	45	45	45	45
201	321.02	2	12.6	6.3	6.9	5.7	69	35	45	24
201	321.03	3	29.7	9.9	18.0	5.7	72	24	24	24
201	322.01	1	22.8	22.8	22.8	22.8	18	18	18	18
201	322.02	6	64.5	10.8	18.0	5.7	138	23	24	18
201	325.02	1	6.6	6.6	6.6	6.6	45	45	45	45
201	329.01	2	7.4	3.7	3.7	3.7	48	24	24	24
201	332.00	1	3.7	3.7	3.7	3.7	18	18	18	18
201	339.01	1	3.0	3.0	3.0	3.0	15	15	15	15

* Average values have been rounded to the nearest t nth.

County Codes:
  071 - Chambers County
  157 - Fort Bend County
  167 - Galveston County
  201 - Harris County

EPA ID[1]	NAME[2]	Potential[3] Health Risk Index	Potential[4] Env. Justice Index	POP[5]	PE[6]	DI[7]	DV[8]	EF[9]	DVMAV[10]	DVECO[11]	MAVE[12]	EAVE[13]
COUNTY: 157 CENSUS TRACT: 701.15												
TXD065078826	WITCO OLEO/SURFACTANTS OR	2.9	15	57041	0.95	1	1.0	3	5	1	85.6	18.7
TRACT TOTAL	(1 FACILITY):	2.9	15									
COUNTY: 071 CENSUS TRACT: 1101.02												
•TXD008096281	J. M. HUBER CORP. BAYTOWN	4.9	2	11908	0.95	2	1.3	2	1	1	13.9	12.1
TRACT TOTAL	(1 FACILITY):	4.9	2									
COUNTY: 167 CENSUS TRACT: 1207.00												
TXD988040085	MAUDLIN & SON MFG. CO. IN	1.9	2	30908	0.95	1	1.0	2	1	1	12.6	13.1
TRACT TOTAL	(1 FACILITY):	1.9	2									
COUNTY: 167 CENSUS TRACT: 1213.00												
TXD000013912	PENNZOIL PRODS. CO. DICKI	2.5	2	24930	0.95	1	1.3	2	1	1	26.7	19.5
TRACT TOTAL	(1 FACILITY):	2.5	2									
COUNTY: 167 CENSUS TRACT: 1216.10												
TXD044452324	ISP TECH.	2.6	4	27946	1.00	1	1.3	2	2	1	42.3	26.7
TXD000804302	SEA LION TECH.	2.6	2	24850	1.00	1	1.3	2	1	1	39.0	24.0
TRACT TOTAL	(2 FACILITIES):	5.	6									
COUNTY: 167 CENSUS TRACT: 1230.00												
TXD000461533	•UNION CARBIDE CORP. TEXAS	24.2	12	54633	.95	5	1.7	3	2	2	43.4	28.9
TXD005942438	.AMOCO CHEMICAL CO. TEXAS C	10.2	12	50217	1.00	2	1.7	3	2	2	43.2	29.2
TXD008080533	.AMOCO OIL CO. TEXAS CITY R	10.2	8	49026	1.00	3	1.7	2	2	2	41.0	28.9
• TXD000792937	.PHIBRO ENERGY USA INC.	10.2	4	44193	1.00	3	1.7	2	1	2	38.4	28.5
TXD008079527	,STERLING CHEMICALS INC.	10.2	4	32620	1.00	3	1.7	2	1	2	37.0	28.8
TXD008079501	.MARATHON OIL CO.	6.8	4	39589	1.00	2	1.7	2	1	2	36.6	28.5
TXD980626782	,UNION CARBIDE CHEMICALS &	6.5	4	37477	.95	2	1.7	2	1	2	35.7	28.5
•TX000829358	.AMOCO CHEMICAL CO. TEXAS C	4.8	12	50217	.95	1	1.7	3	2	2	43.2	29.2
TXD000829341	.AMOCO CHEMICAL CO. TEXAS C	3.2	4	36725	.95	1	1.7	2	1	2	36.5	28.8
	DALLAS GROUP OF AMERICA I	3.2	4	33152	0.95	1	1.7	2	1	2	36.8	28.8
TRACT TOTAL	(10 FACILITIES):	89.5	68									

• Average values have been rounded to the nearest tenth.

County Codes:
    071 - Chambers County
    157 - Fort Bend County
    167 - Galveston County
    201 - Harris County

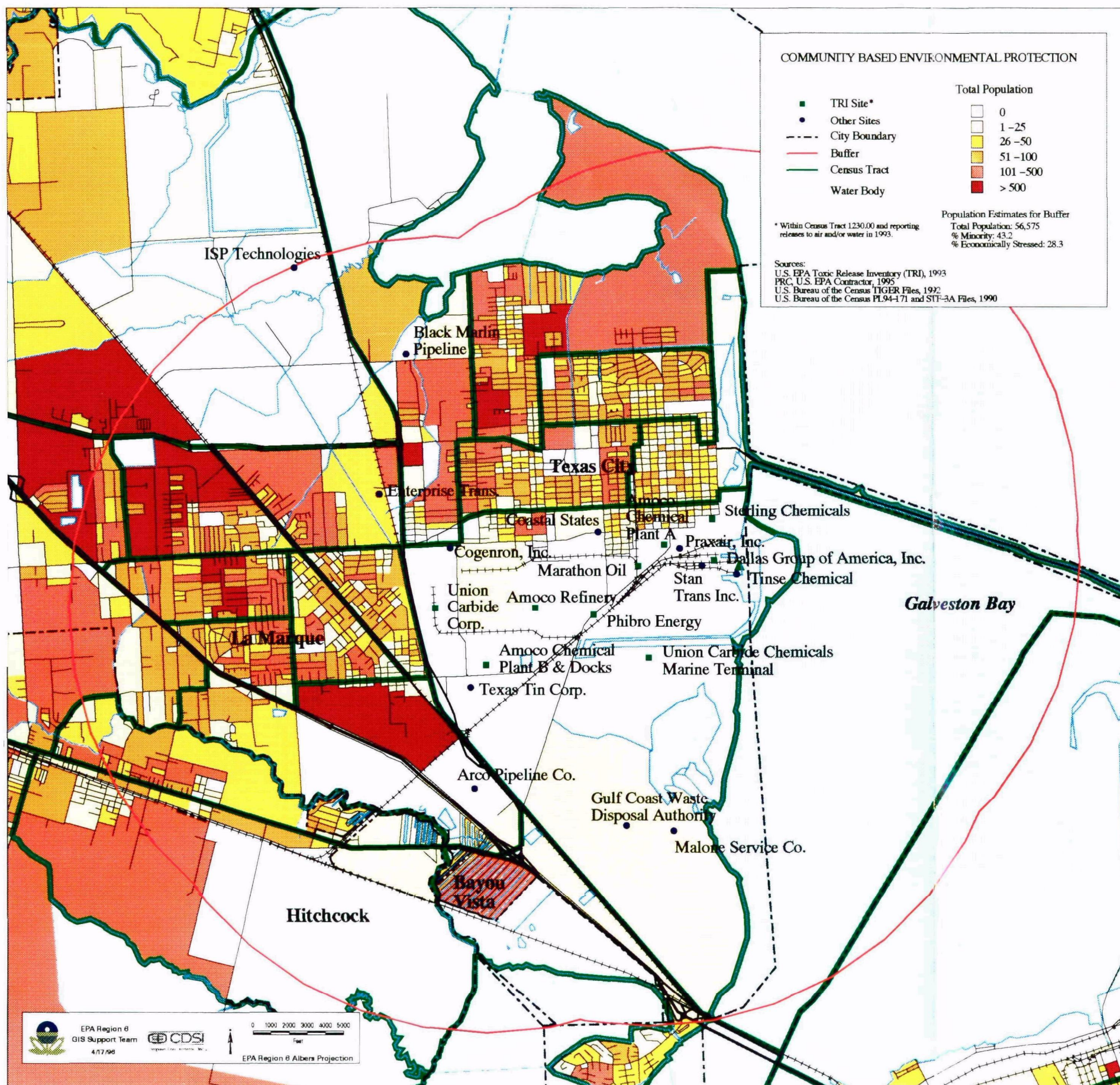| EPA ID[1]	NAME[2]		Potential[3] Health Risk Index	Potential[4] Env. Justice Index	POP[5]	PE[6]	DI[7]	DV[8]	Ef[9]	DVMAV[10]	DVECO[11]	MAVE[12]	EAVE[13]

COUNTIES: 201 = HARRIS
167 = GALVESTON
157 = FORT BEND
071 = CHAMBERS

* - asterisk denotes TRI Sites that have not been verified by the Region 6 GIS Team. 42 out of the 246 sites listed above have **not** been verified.

[1] **EPA ID** — EPA ID from the 1993 Toxic Release Inventory Database. The EPA ID for Kewrian & Bost Chemical is from the RCRA Generators database.

[2] **NAME** — Facility Name from the 1993 Toxic Release Inventory Database.

[3] **POTENTIAL HEALTH RISK INDEX (HRI)** — A ranking from 0 - 100 derived from the Region 6 Enforcement Targeting Methodology. The HRI evaluates TRI chemical releases (1993), population, natality, age, and economic status for a four mile radius around each facility. $HRI = PE * Ef * DI * DV$ (Enforcement Targeting 1995 Methodology).

[4] **POTENTIAL ENVIRONMENTAL JUSTICE INDEX (EJI)** — A ranking from 0 - 100 derived from the Region 6 Environmental Justice analysis methodology. $PEJI = Ef * DVMAV * DVECO$ (Environmental Justice Version 4.2 Methodology, 5-30-94).

[5] **POPULATION** — Number of people in a four mile radius (50 square miles) around facilities. 1990 Census Data (PL94-171 database)

[6] **PE** — Population Exposed - (when a facility releases to air only then PE = .95; when a facility releases to water only then PE = .05; when there are releases to both air and water then PE = 1).

[7] **DI** — Potential Degree of Impact is the chemical impact (ranked 1 - 5) of the HRI evaluation. TRI chemical release data (1993) are evaluated for each facility.

[8] **DV** — Degree of Vulnerability evaluates census data (the mean of the rankings of 1 - 5) for natality, economic status, and age in the study area for each facility.

[9] **Ef** — Exposure Factor is a numerical ranking from 0 - 4 of the population for each study area. Evaluated on a 1 square mile basis. Used for HRI and EJI.

[10] **DVMAV** — Degree of Vulnerability for Minority Status is a 1 - 5 ranking based on the percent minority population in the study area.

[11] **DVECO** — Degree of Vulnerability for Economic Status is a 1 - 5 ranking based on the percent of households in a study area where income is less than $15,000.

[12] **MAVE** — Minority Percentage - the percent minority population in a given study area.

[13] **EAVE** — Economic Percentage - the percent households in a given study area with income less than $15,000.
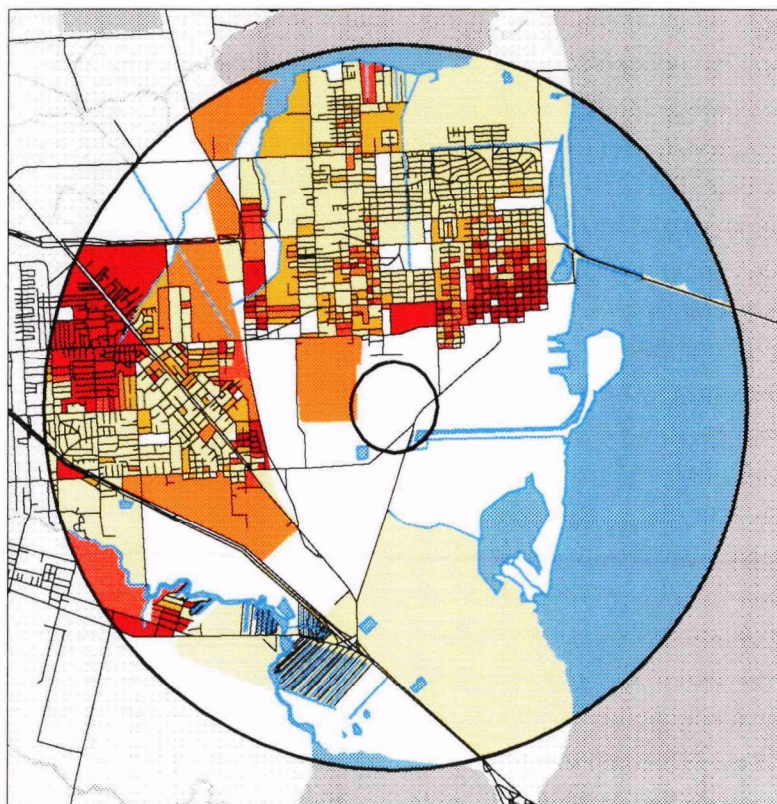
STATE COMPARATIVE CRITERIA:

	AR	LA	NM	OK	TX
Minority Percentage	17.8	34.2	49.6	19.0	39.4
Economically Stressed Percentage	36.0	36.3	31.0	32.0	27.6

COMMUNITY BASED ENVIRONMENTAL PROTECTION

Legend:
- TRI Site*
- Other Sites
- City Boundary
- Buffer
- Census Tract
- Water Body

Total Population
- 0
- 1 – 25
- 26 – 50
- 51 – 100
- 101 – 500
- > 500

* Within Census Tract 1230.00 and reporting releases to air and/or water in 1993.

Population Estimates for Buffer
Total Population: 56,575
% Minority: 43.2
% Economically Stressed: 28.3

Sources:
U.S. EPA Toxic Release Inventory (TRI), 1993
PRC, U.S. EPA Contractor, 1995
U.S. Bureau of the Census TIGER Files, 1992
U.S. Bureau of the Census PL94-171 and STF-3A Files, 1990

Map labels:
ISP Technologies
Black Marlin Pipeline
Texas City
Enterprise Trans.
Coastal States
Sterling Chemicals
Amoco Chemical Plant A
Praxair, Inc.
Cogenron, Inc.
Dallas Group of America, Inc.
Marathon Oil
Stan Trans Inc.
Tinse Chemical
Union Carbide Corp.
Amoco Refinery
Phibro Energy
Galveston Bay
La Marque
Amoco Chemical Plant B & Docks
Union Carbide Chemicals Marine Terminal
Texas Tin Corp.
Arco Pipeline Co.
Gulf Coast Waste Disposal Authority
Malone Service Co.
Bayou Vista
Hitchcock

EPA Region 6
GIS Support Team
4/17/96

CDSI

0 1000 2000 3000 4000 5000
Feet

EPA Region 6 Albers Projection

CENSUS TRACT 1230, TEXAS CITY, TX
Minority Status - Degree of Vulnerability (DVMAV)
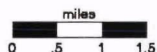
Percent Minority by Census Block
State Percentage = 39.4

- <= the State Percentage
- > the State Percentage, <= 1.33 times the State Percentage
- > 1.33 times the State Percentage, <= 1.66 times the State Percentage
- > 1.66 times the State Percentage, <= 2 times the State Percentage
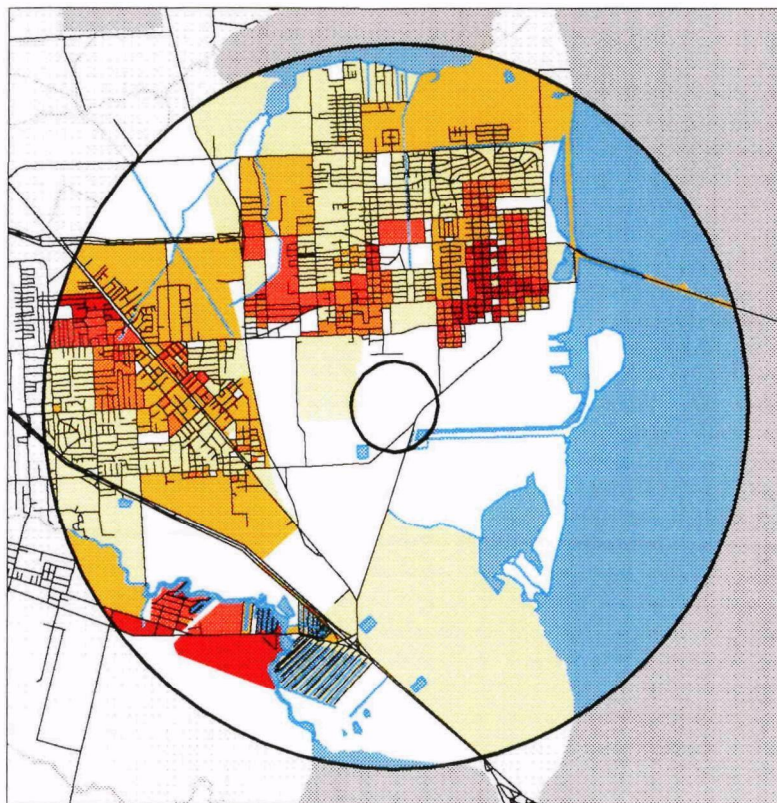- > 2 times the State Percentage

Potential Environmental Justice Index for Two Study Areas	1 Sq. Mile	50 Sq. Mile
Total Population	1	47152
Population Ranking (PF)	1	2
Percent Minority	100%	39.9%
Minority Status (DVMAV)	5	2
Percent Economically Stressed	0%	28.8%
Economic Status (DVECO)	1	2
Environmental Justice Index	5	8

Longitude: -94 55 22 Latitude: 29 22 02

miles
0   .5   1   1.5

CENSUS TRACT 1230, TEXAS CITY, TX

Economic Status - Degree of Vulnerability (DVECO)
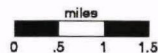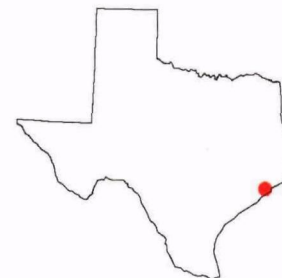
Percent Economically Stressed by Census Block Group
State Percentage = 27.6

- <= the State Percentage
- \> the State Percentage, <= 1.33 times the State Percentage
- \> 1.33 times the State Percentage, <= 1.66 times the State Percentage
- \> 1.66 times the State Percentage, <= 2 times the State Percentage
- \> 2 times the State Percentage

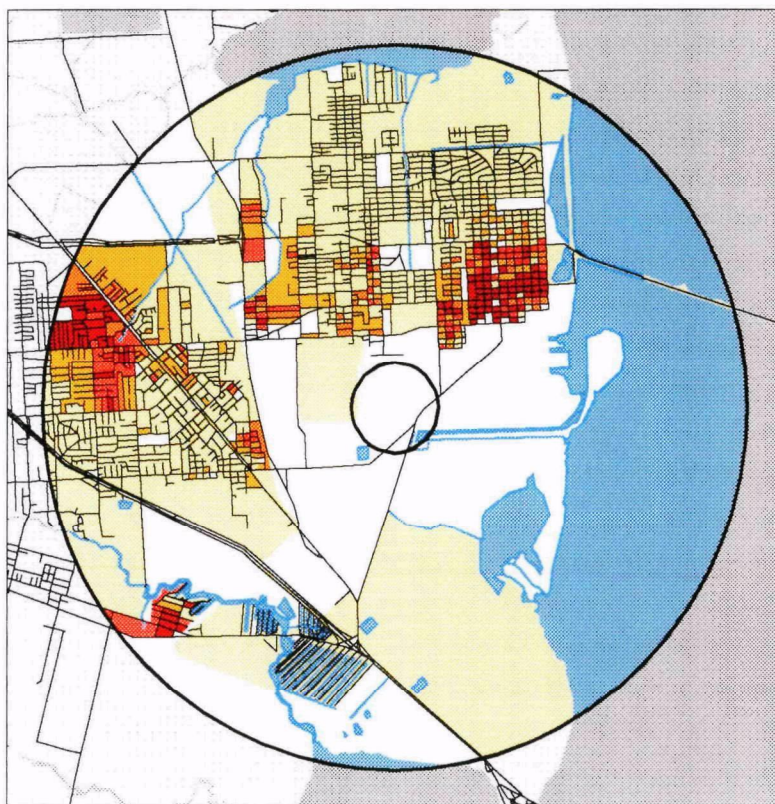### Potential Environmental Justice Index for Two Study Areas

	1 Sq. Mile	50 Sq. Mile
Total Population	1	47152
Population Ranking (PF)	1	2
Percent Minority	100%	39.9%
Minority Status (DVMAV)	5	2
Percent Economically Stressed	0%	28.8%
Economic Status (DVECO)	1	2
Environmental Justice Index	5	8

Longitude: -94 55 22 Latitude: 29 22 02

miles
0   .5   1   1.5

CENSUS TRACT 1230, TEXAS CITY, TX

Potential Environmental Justice Index (EJ)
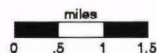
Criteria Ranked by Census Block
(DVMAV * DVECO * PF)

	1 to 12
	13 to 25
	26 to 37
	38 to 50
	51 to 100

Longitude: -94 55 22 Latitude: 29 22 02

miles
0   .5   1   1.5

Potential Environmental Justice Index for Two Study Areas	1 Sq. Mile	50 Sq. Mile
Total Population	1	47152
Population Ranking (PF)	1	2
Percent Minority	100%	39.9%
Minority Status (DVMAV)	5	2
Percent Economically Stressed	0%	28.8%
Economic Status (DVECO)	1	2
Environmental Justice Index	5	8

POTENTIAL ENVIRONMENTAL JUSTICE (EJ) INDEX PILOT

```
                    Date : 17 Apr 96 16:14:30 Wednesda,
               Requestor : GERALD CARNEY 6EN
          Site Id Number : TXDCT1230
               Site Name : CENSUS TRACT 1230
                  County : GALVESTON
    State/County FIPS Code : 48167
                Location : -94 55 22    29 22 2
  Quality Assurance Resource : 1
```

```
=================================================================================
```

CENSUS TRACT 1230
50 square mile study area

```
Minority Ranking Value (DVMAV)  : 2     Percent Minority               = 39.9
Economic Ranking Value (DVECO)  : 2     Percent Economically Stressed  = 28.8
Population Ranking Value (PP)    : 2     Total Population               = 47152
```

Potential Environmental Justice Index (DVMAV * DVECO * PP) = 8

```
=================================================================================
```

CENSUS TRACT 1230
1 square mile study area

```
Minority Ranking Value (DVMAV)  : 5     Percent Minority               = 100
Economic Ranking Value (DVECO)  : 1     Percent Economical] Stressed   = 0
Population Ranking Value (PP)    : 1     Total Population               = 1
```

Potential Environmental Justice Index (DVMAV * DVECO * PP) = 5

```
=================================================================================
```

POTENTIAL ENVIRONMENTAL JUSTICE (EJ) INDEX PILOT

The Potential Environmental Justice Index, or the independent subfactors comprising

the index, should be used as a DEMOGRAPHIC CORRELATION VARIABLE for studies conducted

by the PROGRAMS. These studies may be used to measure Agency policies or procedures

regarding sociological equity for enforcement or permitting activities. The information

given in this report does not represent the final analysis of a site in regard to

Environmental Justice or RISK. The indices and raw data reported are indicators of

Vulnerability for subgroups of people to other stressors.

SEE METHODOLOGY CRITERIA

POTENTIAL ENVIRONMENTAL JUSTICE (EJ) INDEX PILOT

METHODOLOGY CRITERIA

Environmental Justice Indexes are indicators of potential EJ concern.
1990 Census data for a Study Area is evaluated and ranked in relationship to
state percentages. Ranking variables are multiplied to produce an index for
prioritizing applications. The ranking variables are:
  - Minority Status, Degree of Vulnerability (DVMAV),
  - Economic Status, Degree of Vulnerability (DVECO),
  -    and Total Population, Population Factor (PF).

-MINORITY STATUS (DVMAV) - For TX the percent minority is 39.4%.

-ECONOMIC STATUS (DVECO) - Economically Stressed is defined as Households making
  less than $15,000 a year. For TX the percent economically stressed is 27.6%.

The Methodology for ranking values associated with Degrees of Vulnerability is

Ranking	Criteria
1	<= the State Percentage
2	> the State Percentage but <= 1.33 times the State Percentage
3	> 1.33 times the State Percentage but <= 1.66 times the State Percentage
4	> 1.66 times the State Percentage but <= 1.99 times the State Percentage
5	>= 2 times the State Percentage

-POPULATION RANKING FACTOR   Total Population is ranked using the following criteria.

Ranking	Criteria (evaluated on a 1 square mile basis)
0	Total Population = 0
1	Total Population > 0 and < 200
2	Total Population > 200 and < 1000
3	Total Population > 1000 and < 5000
4	Total Population > 5000

Reference for Quality Assurance Resources

1	Personal Verification	7	AIRS
2	Reconciliation with Quad maps	8	PCS
3	Reported from archived files	9	GIS Verified
4	TRIS	10	Professional Judgement
5	RCRIS	11	Federal Facility Tracking System
6	CERCLIS	12	Dun & Bradstreet

EPA ID	NAME	DI						
		'987	1988	1989	1990	1991	1992	1993
TXD987997657	DALLAS GROUP OF AMERICA I	NR	NR	45.600	978.500	1909.500	2384.500	20064.000
TXD008080533	AMOCO OIL CO. TEXAS CITY	2102839.500	1818050.125	1945956.000	2135752.750	1810238.500	1658204.250	1569626.875
TXD008079501	MARATHON OIL CO.	600973.312	462945.719	686627.500	434036.688	491116.562	362107.906	968232.188
TXD005942438	AMOCO CHEMICAL CO. TEXAS	1257990.000	1213024.625	1006355.875	689022.250	669113.375	590079.125	529367.188
TXD981912587	AMOCO CHEMICAL CO. TEXAS	27151.949	18908.801	18844.199	27532.900	32276.250	21652.400	19847.400
TXD981912132	AMOCO CHEMICAL CO. TEXAS	359413.500	298904.188	283176.000	233567.000	169557.906	140577.203	137706.297
TXD980626782	UNION CARBIDE CHEMICALS &	440037.156	438994.062	490605.656	629223.938	587181.188	540315.500	411916.188
TXD000461533	UNION CARBIDE CORP. TEXAS	16241996.000	9139268.000	14617228.000	12346858.000	8360273.500	7003365.000	6351197.500
TXD988081048	PRAXAIR INC.	NR	NR	NR	NR	NR	NR	NR
TXD008079527	STERLING CHEMICALS INC.	32746'0 000	?923462.500	3015306.000	2385919.750	2016065.250	1745074.750	1825611.000
TXD000792937	PHIBRO ENERGY USA INC.	2114 1.141	101873.500	121654.750	726907.375	668134.000	905586.625	1079566.625
TXD062113329	TEX TIN CORP.	30765.000	NR	NR	33477.000	NR	NR	NR

NR - No Releases to Air or Water reported to TRI.

EPA ID EPA ID from the Toxic Release Inventory Database.
NAME   Facility Name from the Toxic Release Inventory Database.
DI   Potential Degree of Impact is the chemical impact of the HRI Evaluation. TRI chemical release data are evaluated for each facility.

CENSUS TRACT 1230.00 - TEXAS CITY, TEXAS

EPA ID	NAME	HRI						
		1987	1988	1989	1990	1991	1992	1993
TXD987997657	DALLAS GROUP OF AMERICA I	NR	NR	3.2	3.2	3.2	3.2	3.2
TXD008080533	AMOCO OIL CO. TEXAS CITY	13.6	10.2	10.2	13.6	10.2	10.2	10.2
TXD008079501	MARATHON OIL CO.	6.8	6.8	6.8	6.8	6.8	6.8	6.8
TXD005942438	AMOCO CHEMICAL CO. TEXAS	14.5	14.5	14.5	10.2	10.2	10.2	10.2
TXD981912587	AMOCO CHEMICAL CO. TEXAS	3.2	3.2	3.2	3.2	3.2	3.2	3.2
TXD981912132	AMOCO CHEMICAL CO. TEXAS	9.7	4.8	4.8	4.8	4.8	4.8	4.8
TXD980626782	UNION CARBIDE CHEMICALS &	6.5	6.5	6.5	6.5	6.8	6.8	6.5
TXD000461533	UNION CARBIDE CORP. TEXAS	24.2	24.2	24.2	24.2	24.2	24.2	24.2
TXD988081048	PRAXAIR INC.	NR	NR	NR	NR	NR	NR	NR
TXD008079527	STERLING CHEMICALS INC.	13.6	13.6	13.6	13.6	13.6	10.2	10.2
TXD000792937	PHIBRO ENERGY USA INC.	3.4	3.4	3.4	6.8	6.8	6.8	10.2
TXD062113329	TEX TIN CORP.	3.4	NR	NR	3.4	NR	NR	NR

NR - No Releases to Air or Water reported to TRI.

EPA ID EPA ID from the Toxic Release Inventory Database.
NAME   Facility Name from the Toxic Release Inventory Database.
HRI   Potential Health Risk Index. A ranking from 0 - 100 derived from the Region 6 Enforcement Targeting Methodology. The HRI evaluates TRI chemical releases (1987-1993), population, natality, age, and economic status for a four mile radius around each facility.
        HRI = PE * Ef * DI * DV (Enforcement Targeting 1995 Methodology).

CENSUS TRACT 1230.00 - TEXAS CITY, TEXAS

EPA ID[1]	NAME[2]	PE[3]	Ef[4]	DV[5]	DI[6]	HRI[7]
1993						
TXD987997657	DALLAS GROUP OF AMERICA I	0.95	2	1.7	1	3.2
TXD008080533	AMOCO OIL CO. TEXAS CITY	1.00	2	1.7	3	10.2
TXD008079501	MARATHON OIL CO.	1.00	2	1.7	2	6.8
TXD005942438	AMOCO CHEMICAL CO. TEXAS	1.00	3	1.7	2	10.2
TXD981912587	AMOCO CHEMICAL CO. TEXAS	0.95	2	1.7	1	3.2
TXD981912132	AMOCO CHEMICAL CO. TEXAS	0.95	3	1.7	1	4.8
TXD980626782	UNION CARBIDE CHEMICALS &	0.95	2	1.7	2	6.5
TXD000461533	UNION CARBIDE CORP. TEXAS	0.95	3	1.7	5	24.2
TXD988081048	PRAXAIR INC.	NR	2	1.7	NR	NR
TXD008079527	STERLING CHEMICALS INC.	1.00	2	1.7	3	10.2
TXD000792937	PHIBRO ENERGY USA INC.	1.00	2	1.7	3	10.2
TXD062113329	TEX TIN CORP.	NR	2	1.7	NR	NR
1992						
TXD987997657	DALLAS GROUP OF AMERICA I	0.95		1.7	1	3.4
TXD008080533	AMOCO OIL CO. TEXAS CITY	1.00		1.7	3	10.2
TXD008079501	MARATHON OIL CO.	1.00		1.7	2	6.8
TXD005942438	AMOCO CHEMICAL CO. TEXAS	1.00		1.7	2	10.2
TXD981912587	AMOCO CHEMICAL CO. TEXAS	0.95		1.7	1	3.2
TXD981912132	AMOCO CHEMICAL CO. TEXAS	0.95		1.7	1	4.8
TXD980626782	UNION CARBIDE CHEMICALS &	1.00	2	1.7	2	6.8
TXD000461533	UNION CARBIDE CORP. TEXAS	0.95	3	1.7	5	24.2
TXD988081048	PRAXAIR INC.	NR	2	1.7	NR	NR
TXD008079527	STERLING CHEMICALS INC.	1.00	2	1.7	3	10.2
TXD000792937	PHIBRO ENERGY USA INC.	1.00	2	1.7	2	6.8
TXD062113329	TEX TIN CORP.	NR	2	1.7	NR	NR
1991						
TXD987997657	DALLAS GROUP OF AMERICA I	0.95	2	1.7	1	3.2
TXD008080533	AMOCO OIL CO. TEXAS CITY	1.00	2	1.7	3	10.2
TXD008079501	MARATHON OIL CO.	1.00	2	1.7	2	6.8
TXD005942438	AMOCO CHEMICAL CO. TEXAS	1.00	3	1.7	2	10.2
TXD981912587	AMOCO CHEMICAL CO. TEXAS	0.95	2	1.7	1	3.2
TXD981912132	AMOCO CHEMICAL CO. TEXAS	0.95	3	1.7	1	4.8
TXD980626782	UNION CARBIDE CHEMICALS &	1.00	2	1.7	2	6.6
TXD000461533	UNION CARBIDE CORP. TEXAS	0.95	3	1.7	5	24.2
TXD988081048	PRAXAIR INC.	NR	2	1.7	NR	NR
TXD008079527	STERLING CHEMICALS INC.	1.00	2	1.7	4	13.6
TXD000792937	PHIBRO ENERGY USA INC.	1.00	2	1.7	2	6.8
TXD062113329	TEX TIN CORP.	NR	2	1.7	NR	NR
1990						
TXD987997657	DALLAS GROUP OF AMERICA I	0.95	2	1.7	1	3.2
TXD008080533	AMOCO OIL CO. TEXAS CITY	1.00	2	1.7	4	13.6
TXD008079501	MARATHON OIL CO.	1.00	2	1.7	2	6.8
TXD005942438	AMOCO CHEMICAL CO. TEXAS	1.00	3	1.7	2	10.2
TXD981912587	AMOCO CHEMICAL CO. TEXAS	0.95	2	1.7	1	3.2
TXD981912132	AMOCO CHEMICAL CO. TEXAS	0.95	3	1.7	1	4.8
TXD980626782	UNION CARBIDE CHEMICALS &	0.95	2	1.7	2	6.5
TXD000461533	UNION CARBIDE CORP. TEXAS	0.95	3	1.7	5	24.2
TXD988081048	PRAXAIR INC.	NR	2	1.7	NR	NR
TXD008079527	STERLING CHEMICALS INC.	1.00	2	1.7	4	13.6
TXD000792937	PHIBRO ENERGY USA INC.	1.00	2	1.7	2	6.8
TXD062113329	TEX TIN CORP.	1.00	2	1.7	1	3.4

EPA ID[1]	NAME[2]	PE[3]	Ef[4]	DV[5]	DI[6]	HRI[7]
1989						
TXD987997657	DALLAS GROUP OF AMERICA I	0.95	2	1.7	1	3.2
TXD008080533	AMOCO OIL CO. TEXAS CITY	1.00	2	1.7	3	10.2
TXD008079501	MARATHON OIL CO.	1.00	2	1.7	2	6.8
TXD005942438	AMOCO CHEMICAL CO. TEXAS	0.95	3	1.7	3	14.5
TXD981912587	AMOCO CHEMICAL CO. TEXAS	0.95	2	1.7	1	3.2
TXD981912132	AMOCO CHEMICAL CO. TEXAS	0.95	3	1.7	1	4.8
TXD980626782	UNION CARBIDE CHEMICALS &	0.95	2	1.7	2	6.5
TXD000461533	UNION CARBIDE CORP. TEXAS	0.95	3	1.7	5	24.2
TXD988081048	PRAXAIR INC.	NR	2	1.7	NR	NR
TXD008079527	STERLING CHEMICALS INC.	1.00	2	1.7	4	13.6
TXD000792937	PHIBRO ENERGY USA INC.	1.00	2	1.7	1	3.4
TXD062113329	TEX TIN CORP.	NR	2	1.7	NR	NR
1988						
TXD987997657	DALLAS GROUP OF AMERICA I	NR	2	1.7	NR	NR
TXD008080533	AMOCO OIL CO. TEXAS CITY	1.00	2	1.7	3	10.2
TXD008079501	MARATHON OIL CO.	1.00	2	1.7	2	6.8
TXD005942438	AMOCO CHEMICAL CO. TEXAS	0.95		1.7	3	14.5
TXD981912587	AMOCO CHEMICAL CO. TEXAS	0.95		1.7	1	3.2
TXD981912132	AMOCO CHEMICAL CO. TEXAS	0.95		1.7	1	4.8
TXD980626782	UNION CARBIDE CHEMICALS &	0.95		1.7	2	6.5
TXD000461533	UNION CARBIDE CORP. TEXAS	0.95		1.7	5	24.2
TXD988081048	PRAXAIR INC.	NR	2	1.7	NR	NR
TXD008079527	STERLING CHEMICALS INC.	1.00	2	1.7	4	13.6
TXD000792937	PHIBRO ENERGY USA INC.	1.00	2	1.7	1	3.4
TXD062113329	TEX TIN CORP.	NR	2	1.7	NR	NR
1987						
TXD987997657	DALLAS GROUP OF AMERICA I	NR	2	1.7	NR	NR
TXD008080533	AMOCO OIL CO. TEXAS CITY	1.00	2	1.7	4	13.6
TXD008079501	MARATHON OIL CO.	1.00	2	1.7	2	6.
TXD005942438	AMOCO CHEMICAL CO. TEXAS	0.95	3	1.7	3	14.5
TXD981912587	AMOCO CHEMICAL CO. TEXAS	0.95	2	1.7	1	3.2
TXD981912132	AMOCO CHEMICAL CO. TEXAS	0.95	3	1.7	2	9.7
TXD980626782	UNION CARBIDE CHEMICALS &	0.95	2	1.7	2	6.5
TXD000461533	UNION CARBIDE CORP. TEXAS	0.95	3	1.7	5	24.2
TXD988081048	PRAXAIR INC.	NR	2	1.7	NR	NR
TXD008079527	STERLING CHEMICALS INC.	1.00	2	1.7	4	13.6
TYD000792937	PHIBRO ENERGY USA INC.	1.00	2	1.7	1	3.4
TXD062113329	TEX TIN CORP.	1.00	2	1.7	1	3.4

NR - No Releases to Air or Water reported to TRI.

[1] EPA ID   EPA ID from the Toxic Release Inventory Database.

[2] NAME   Facility Name from the Toxic Release Inventory Database.

[3] PE   Population Exposed - (when a facility releases to air only, then PE = .95; when a facility releases to water only, then PE = .05; when there are releases to both air and water, then PE = 1).

[4] Ef   Exposure Factor is a numerical ranking from 0 - 4 of the population for each study area. Evaluated on a 1 square mile basis. Used for HRI and EJI.

[5] DV   Degree of Vulnerability evaluates census data (the mean of the rankings of 5) for natality, economic status, and age in the study area for each facility.

[6] DI   Potential Degree of Impact is the chemical impact (ranked 1 - 5) of the HRI evaluation. TRI chemical releas data are evaluated for each facility.

[7] HRI   Potential Health Risk Index. A ranking from 0 - 100 derived from the Region Enforcement Targeting Methodology. The HRI evaluates TRI chemical releases (1993), population, natality, age, and economic status for a four mi. radius around each facility. HRI = PE * Ef * DI * DV (Enforcement Targeting 1995 Methodology).

Comparative Risk Analysis
Human Health Risk Index (HRI) Methodology
EPA, Region 6

The Region 6 Human Health Risk Index (HRI) enables users to
select specific HRI subfactors (i.e., age, income, natality,
ethnicity) and perform special regulatory, health, and social-
economic analyses. These special applications include
environmental justice studies, enforcement targeting analyses,
environmental impact studies, and assessments of pollution
prevention projects.

Enforcement targeting is a procedure which ranks industrial
facilities as to the potential risk each facility may pose to
human health and ecology. The Region's Multi-Media Enforcement
Committee (CRIMES) identified possible high risk facilities from
NEIC compliance data. Facilities were selected for risk
screening if noncompliant in two or more media programs
(air,water,land). The Region's Management Division scientists
estimated the relative risk posed by each facility using a
modification of the Region 6 Human Health Risk Index (HRI). The
methodology ranked each site using Toxic Release Inventory (TRI)
data, 1990 Census data and chemical toxicity data from the TRI
Relative Risk-Based Environmental Indicators Model (TRI
Environmental Indicators data managed by EPA's Office of
Pollution Prevention and Toxics - OPPT). The enforcement
targeting methodology is mathematically and toxicologically
    nsistent with the Region's Potential Environmental Justice
evaluation methodology.

All HRI subfactors are mathematically related. All special
application studies contribute to an ever larger risk analysis.
Use of the HRI formula assures the investigator that risk data is
evaluated by documented, consistent, peer reviewed ranking
criteria.

A.   Enforcement Targeting Analysis

For the enforcement targeting study, comparative risk assumptions
are a means of applying a consistent criteria to TRI releases and
demographic data. They are not to be confused with risk
assessment assumptions. Comparative risk assumptions should not
be perceived as actual exposures or actual causes of adverse
effects. Comparative risk studies only rank risks (compare one
risk to another). They can not quantify risks.

Region 6 industrial facilities were screened for enforcement
targeting by revi͡ͅng EPA compliance data (RCRA, NPDES, AIRS.)

Those facilities with violations in these three regulatory
programs were considered for further targeting.

The 1997 Enforcement Targeting study ranks industrial facilities
in Region 6 by mathematically relating TRI chemical release data,
TRI Environmental Indicators chemical toxicity information, and
Census demographic data. The area of study is a four mile radius
around each facility (50 sq.mi.). The tables attached list the
facilities and the estimated population around each (1990
Census.)

The Human Health Risk Index formula ranks on a scale from 0 to
100. The higher scores indicate a higher potential risk from the
TRI emissions and therefore, a more suitable enforcement target.
Factors examined for each industrial-50 sq.mi. area are total
population, specific annual TRI chemical releases in pounds to
air, land, and surface water, percent of population estimated to
be exposed, household income, age, chemical toxicity through air
and water pathways, ecological toxicity and bioaccumulation
potential via water releases.

1.   Comparative Risk Index - Enforcement Targeting Formula

The Enforcement Targeting Formula is similar to the base HRI
(Human Health Risk Index) and the Region's Environmental
Justice formula. Similar data sets and mathematical
relationships are used in each. Therefore, the Risk Index
and the special applications indices can be integrated. The
following are the general components of the enforcement
targeting formula where:

Human Health Risk Index (HRI` =   Exposure   ·   Hazard

Enforcement Targeting Ranking =   (PE/PC · Pf) ·   (DI · DV)

PE   =   Population Exposed
PC   =   Population in Community
Pf   =   Population Factors (Actual Population)
DI   =   Degree of Impact
DV   =   Degree of Vulnerability

"Community" is defined as a 4 mile radius around an
industrial facility. The radius is measured from the
estimated center of the site (TRI data, EPA facility maps,
and personal communications with facility personnel were
used to locate these centers). The radius did not account
for the size of the facility (fence line). The study area
is approximately 50 square miles (calculated: $3.14 \times 4^2 =$
50.2). PE is assumed to be
the population potentially exposed to a given TRI chemical
release from the facility.

Note that PE is divided by PC. This represents a ratio of

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the potential exposed population to the total population in the study area. This ratio then becomes the population fraction exposed in a given area (4 mile radius). For the 1997 Enforcement Targeting initiative, the assumed exposed population is 100%.

PE (Population Exposed) / PC (Total Population) = 1

2. Comparative Risk Index - Enforcement Targeting Ranking Criteria

Data for Pf, DI and DV are evaluated in specific ranges and assigned scaling scores. Pf represents the actual population for a 4 mile radius area and is scaled from 0 to 4. Degree of Impact (DI) and Degree of Vulnerability (DV) subfactors are ranked from 1 to 5. Degree of Impact subfactors include the pounds of TRI chemical releases, air and water toxicity, and bioaccumulation in fish. Degree of Vulnerability subfactors are age, economically stressed, and natality. The enforcement targeting Pf and DI scoring criteria differ significantly from the HRI method description (see Chapter IV, Scoring Criteria[1]). The Degree of Vulnerability criteria are similar to the HRI.

B. Exposure

For the Enforcement Targeting application:

1. PE/PC

o   The community is defined as a 4 mile radius around the center of the facility.

o   PE is 1 (or 100% of the study area population.)

o   PC is 1 (or 100% of the community.)

o   **The PE/PC value is a ratio of the number of people potentially exposed to the releases of a facility.**

2. Population Factor

The **Population Factor (Pf)** used in the Enforcement Targeting formula is scored from the actual population for each study area. The actual population ranking is determined from 1990

Census block totals for population per one square mile by the scaling criteria following. The criteria scores range from 0 to 4.

POPULATION FACTOR Population Ranking	
Population per Sq. Mile	Scaling Score
0	0
0 and ≤ 200	1
> 200 and ≤ 1,000	2
> 1,000 and ≤ 5,000	3
> 5,000	4

C. Hazard

1. Degree of Impact

The **Degree of Impact (DI)** is a chemical specific factor. In the Region 6 Comparative Risk HRI calculation, DI includes cancer and non-cancer potency factors, assessment of mutagenicity, environmental fate, and pharmacokinetics. Risk to human health can be estimated with the enforcement targeting formula by defining scoring criteria for population exposed (PE), vulnerability of exposed populations (DV), and the chemical hazard (DI) criteria. **For this application, potential health and ecological impacts of a specific TRI reported chemical or group of chemicals was estimated using TRI Environmental Indicators data. DI is calculated for each TRI release and the values are summed. Summing these values for each facility serves to address the potential additive impact of multiple chemical releases.**

Degree of Impact (DI) is one of two factors defining the Hazard portion of the enforcement targeting application of the HRI methodology. Selected facilities in the 1995 Toxic Release Inventory (TRI-Community Right-to-Know database) are screened and ranked as to the potential risk each may pose to the human health and ecology for a four mile radius around each site. The two primary sources of information used to determine DI are TRI chemical release data and Environmental Indicators toxicity information.

Reported 1995 TRI releases to air and water are determined for each facility. Stack and fugitive air releases are added to represent total air releases. Water releases are those to surface water. If a facility reports an air release and a water release of zero pounds, the DI is calculated from the air release only. The same is true if

only a water release is reported (DI is calculated from
water.) If a facility reports the zero release of chemicals
to air and water media and these are the only releases
reported or the facility is not found in the TRI database,
then the facility is ranked with the default value of 1.
Chemical specific information from TRI Environmental
Indicators data was used to give a relative estimate of the
potential impact of each TRI chemical release from each
facility.

Toxicity ranking, for each chemical reported in 1995 TRI for
the targeted facilities, was developed to address air
toxicity and water toxicity. Environmental Indicator data
was used as reference data for evaluating the chemicals.
These toxicity values were used to calculate toxicity points
for Degree of Impact ranking.

Each chemical's TRI release to air (pounds) was multiplied
by the chemical's "INHALE_TOX" Environmental Indicators
factor. Each chemical's TRI release to surface water
(pounds) was multiplied by the chemical specific
"ORAL_TOX_W" factor plus the bioaccumulation "BCF" factor.
Each of the weighted TRI release values are summed.

For all air releases 95% (0.95) of the total study area's
population was assumed to be exposed. For all TRI releases
to water 5% (0.05) of the total area population was assumed
to be exposed. These fractions were agreed upon by Region 6
staff scientists in the Air, Hazardous Waste, Superfund, and
Water programs. The rationale for assuming that 95% of the
residents are possibly exposed to air releases and that 5%
of the residents to water releases were: (1) it is possible
for chemicals released to air to travel anywhere in the four
mile radius, all residents can travel throughout the area,
the lungs are very efficient absorbers of airborne
chemicals, (2) chemical releases to surface water are
estimated to come in contact with 5 percent of the study
area population, primarily from eating contaminated fish.

The summed values round for air and water are multiplied by
0.95 and 0.05 respectively. The new value is ranked to
become the facility's Degree of Impact (DI) value.

Application of the toxicity of a chemical to its release is
handled through the methodology following.

> 1) A facility's specific chemical release of pounds
>   to air is multiplied by the chemical's estimated
>   TRI Indicators "INHALE_TOX" value.

> 2) A facility's specific chemical release of pounds
>   to water is multiplied by the sum of the values of

the estimated "ORA1_TOX-W" and "BCF" values.

3) The sum of the facility's chemicals for air toxicity is multiplied by 0.95. The sum of the facility's chemicals for water is multiplied by 0.05.

4) The sum of the facility's chemical toxicity calculated under the criteria in 1), 2) and 3) above are scaled according to the figure following:

HRI Degree of Impact Scaling Criteria		
Release calculation <=	300000	1
Release calculation > <=	300000 and 1000ᴜᴜ0	2
Release calculation > <=	1000000 and 2000000	3
Release calculation > <=	2000000 and 5000000	4
Release calculation >	5000000	5

2.   Degree of Vulnerability

The **Degree of Vulnerability** (DV) of the HRI includes demcgraphic data for ethnicity, economic status, age, pregnancy, life-style factors, and pre-existing disease. Of these subfactors, natality, age and economically stressed, are used in the enforcement targeting formula. Each DV subfactor has a scaling range from 1 to 5. **The mean of the subfactor rankings is the facility Degree of Vulnerability.** The maximum value for Degree of Vulnerability in the HRI formula is 5.

The Degree of Vulnerability factor for this example is derived from a comparison of the 4 mile radius area's percent of population under the criteria subfactor and the state percent of population under the criteria subfactor.

The scaling criteria for the subfactors is evaluated through the Comparative Risk Index (HRI) Degree of Vulnerability Ranking Methodology. An area is evaluated specific to the state criteria in which it resides (see Chapter IV).

Census 1990 data is used for the Degree of Vulnerability factor. For the Economically Stressed subfactor <u>the risk group is assumed to be households with an income of less than $15,000 a year.</u>

```
HRI Degree of Vulnerability Ranking Methodology
     Study Area Subfactor                    Score

  Number of residents in the risk group
  less than or equal to the state percentage 1

  Number of residents in the risk
  group greater than the state percentage
  but less than or equal to 1.33 times       2
  the state percentage

  Number of residents in the risk
  group greater than 1.33 times
  the state percentage but less than or       3
  equal to 1.66 times the state percentage

  Number of residents in the risk
  group greater than 1.66 times
  the state percentage but less than or       4
  equal to 2 times the state percentage

  Number of residents in the risk
  group greater than 2 times the state        5
  percentage.
```

DV   Degree of Vulnerability - The Health Risk Index (HRI) defines the vulnerability of a population by setting criteria for Natality, Age, and Economically Stressed, Life-Style, Ethnicity, and Pre-existing Disease. Natality, Age and Economically Stressed subfactors are used to characterize the vulnerability within 4 miles of each site.

$$(DV_{nat} + DV_{age} + DV_{eco}) / 3$$

DV_{nat} "Natality" data is taken from the 1990 Census and is defined as the number of children less than one year of age. The assumption is that within the past year, both mother and fetus could be exposed to chemical releases.

DV_{age} "Age" vulnerability data is taken from the 1990 Census and is defined as individuals from infant to 13 years old and those over 55 are assumed to be more at risk than the general population.

DV_{eco} "Economic Status" data is taken from the 1990 Census and is defined as households with incomes of less than $15,000 per year.

D. Enforcement Targeting Assumptions:

Through clear recognition of assumptions we can accurately interpret and realistically use the study results.

1. The data for the industry study area and each TRI chemical release is evaluated for potential human health risk. This data is used to calculate specific enforcement targeting formula risk factors. The exposure and hazard scores are mathematically related to produce an enforcement targeting risk index value. **The higher risk index number, the more potential human health and ecological risk to the 4 mile radius around a facility.** The risk index scores can range from 0 to 100. If the highest risk index score is 30 and the lowest score is 1, the quantitative assumption is that there is a 30 fold difference in potential risk posed by the two facilities.

2. Values for study area population are derived from 4 mile radius GIS "clippings" around each industrial facility. The data is from 1990 block level Census data. The data does not indicate the population dispersion within the 50 sq. mile study area. **Therefore, it is assumed that the population is evenly distributed throughout the 4 mile radius.** This, of course, is never true.

3. Meteorological and topographical factors are not taken into consideration in the calculations of this comparative risk study. The assumptions for the study are that the wind blows equally in all directions and facility chemical runoff from spills and lagoons travels equally in all directions. This, of course, is never true.

4. A single point is used to represent the facility boundary, as if all releases emanate from that one cartographic point. The facility may in fact represent 1-3 square miles of the areas shown on each map. There may be more employees exposed to chemical releases than residents. **The facility employees are not considered in the Census data used.**

5. Ecological concerns are not adequately addressed. For example, several locations have large areas of wetlands which included bays, marshlands, rivers, streams

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lakes, and estuaries. The lack of human population is mathematically noted but the resulting potential for exposure of large ecologically sensitive areas is not.

6. EPA's Office of Pollution Prevention and Toxics (OPPT) "TRI Environmental Indicators" data used in the Degree of Impact (DI) analyses of facility releases are scaled from 1-5. Adjustments are not made for fugitive versus stack emitted pollutants or pollutants released to fresh, salt, or brackish waters. **The scaling factors used are not document quotes but interpretations of the "Indicators" values.**

7. The Population Exposed (PE) factor assumes 100 % of a given study area's population can be exposed to a TRI release. A basic assumption for PE is that if a facility releases a chemical then the whole study population is exposed.

8. Degree of Impact is calculated by multiplying a facility's specific chemical releases in pounds to air times the chemical's toxicity scaling value. The sum of the facility's air release toxicity (INHALE_TOX) is multiplied by 0.95. For TRI release data to water the sum of bioaccumulation (BCF) and water toxicity (ORAL_TOX_W) values is multiplied times the chemical's release to water in pounds. A water release is assumed to expose 5% of the population due to eating contaminated fish. The sum of a facility's water release toxicity is multiplied by 0.05. All the chemical specific release products are added for each facility. **The calculation assumes the facility's potential health and ecological impacts from TRI releases are additive.**

9. The enforcement targeting method first screens Region 6 industries through review of compliance history data from NEIC. Those with evidence of non-compliance in RCRA, NPDES, and AIRS databases are selected for comparative risk evaluation. **Therefore, facilities with records of non-compliance are assumed to be better candidates for enforcement targeting.**

10. A review of TRI data and discussions with Air, Water, Superfund and Hazardous Waste scientists in the region resulted in a decision that TRI reported releases to land did not pose significantly risks to the human population. Judgements were also made that 95% of the human population in a 4 mile radius could be exposed to air emissions and 5% of the area's population can be exposed to a surface water discharge.

11. It is assumed that the human and ecological impacts of chemical releases from facilities are equal throughout a 50 sq. mi. study area.

E. Geographic Information Systems and Other Computer Resources

Comparative Risk results are used in Risk Management decision making processes. Geographic Information Systems (GIS) can assure locational accuracy for industrial facilities in Region 6. The Potential Environmental Justice and Multi-Media Enforcement Targeting applications use Census 1990 data to provide demographic information.

° The community evaluated is the 4 mile radius area from the center of a facility. ·

° Population Factors and Degree of Vulnerability use GIS spatially extracted data. Through quality assurance techniques and AML application, accurate population information can be made available to any system supporting the methodology. This data is essential for human population and vulnerability analysis.

A format of 1995 TRI data is available to Region 6 GIS staff. Through the use of GIS facilities, point specific images can be laid on top of compatible landmark images to verify location of the study area.

The Degree of Vulnerability and Potential Environmental Justice Index demographic system was used to extract data from the Region 6 GIS Library to calculate the Degree of Vulnerability and the Potential Environmental Justice Index. The data sets used were:

TIGER/Line Census Files, 1990 prepared by the Bureau of the Census. Washington: The Bureau, 1991.

Census of Population and Housing, 1990: Public Law (P.L.) 94-171 Data (AR, LA, NM, OK, and TX) prepared by the bureau of the Census. --Washington: The Bureau, 1991.

Census of Population and Housing, 1990: Summary Tape File 3 on CD-ROM (AR, LA, NM, OK, and TX) prepared by the Bureau of the Census. --Washington: The Bureau, 1992.

F. QUALITY ASSURANCE

TRI data lat/long points are sometimes reported at locations other than the true geographical point coordinate, therefore, verification of the facility location is essential. Information related to the Region 6 TRI 1990 Spatial Database was checked for accuracy by GIS Support Staff. Data was reviewed from RCRA files containing site maps, permit information, and other relevant source documentation on site specific issues. Addresses from these files were matched against TRI address information.

Quality assurance for facility location was achieved when TRI facility point locations from GIS databases were matched against TIGER line files. Using RCRA program information, the point was checked for vicinity. If RCRA program information was inconclusive, verification was attempted by phone using TRI supplied telephone contacts. Location of the facility was determined relative to intersection or major highway, rivers, railroad, other landmarks including other TRI sites in close proximity. If uncertainty existed after all verification attempts were exhausted, the TRI lat/long point became the default coordinate.

The buffers created from the verified points were then used as clip coverages for extracting population totals for community definition in the HRI formula. These buffers were used to clip total population from PL94171 and STF3A (Census 1990) and Degree of Vulnerability percentages for subfactors NATALITY, AGE and ECONOMICALLY STRESSED rankings.

Potential Environmental Justice Index Processing
EPA, Region 6

A. History

Environmental Justice refers to the pledge or assurance that no
population subset will endure a disproportionate share of the
country's pollution. There is evidence that minority and low
income communities are exposed to more environmental pollutants
than the general population (Environmental Justice, Reducing Risk
for all Communities, U.S. EPA, OPPE, February, 1992). The
Comparative Health Risk Index (HRI) formula is used to define and
prioritize specific sites as to their potential for pollution
impacts. The Potential Environmental Justice methodology also
sets criteria, applies basic principles of science, and enables
environmental managers to determine which communities may have
environmental justice concerns and why.

The Comparative Health Risk Index enables users to select
specific HRI subfactors and perform special regulatory, health,
and social-economic analyses. These special applications include
environmental justice studies, enforcement targeting analyses,
environmental impact studies, and assessments of pollution
prevention projects.

The Environmental Justice analysis uses Geographic Information
System (GIS) maps, census demographic data, and the general HRI
method for mathematically ranking each site. Potential
Environmental Justice information is demonstrated using HRI
criteria and rankings alone. The method described is automated
through The Degree of Vulnerability and Potential Environmental
Justice demographic analysis system.

B. Methodology

Sites are evaluated using the Potential Environmental Justice
formula and ranked on a scale of 0 to 100 as to their potential
for environmental demographic concerns. The higher score
indicate greater potential for justice concern. Factors examined
for each site are population density, percent minority population
and percent economically stressed population data. Data is
compared to individual state percentages.

1. Potential Environmental Justice Formula

The Potential Environmental Justice Formula is similar to the base HRI (Human Health Risk Index) formula where:

$$HRI = Exposure \cdot Hazard$$

$$EJI = (PE/PC \cdot Pf) \cdot (DI \cdot DV)$$

PE   =   Population Exposed
PC   =   Population in Community
Pf   =   Population Density
DI   =   Degree of Impact
DV   =   Degree of Vulnerability
DVMAV = Minority Status Score
DVECO = Economic Status Score
MAVE = Minority Percentage
EAVE = Economic Percentage

Like HRI, the community of the Potential Environmental Justice application is defined as a 50 sq. mi. study area (a 4 mile radius from the point of interest) or subsets of this base study area.

Potential Environmental Justice rankings can be calculated for an individual census block, a census block group, a census tract, or the area of any polygon or circle surrounding a site of interest.

2. Potential Environmental Justice Ranking Criteria

PE is assumed to be the total population in the community evaluated (i.e., 50 sq. mi. or smaller area). Therefore, the PE/PC value is 1. If the characteristics of the community or a specific pollutant allows the researcher to identify particular portions of the community as the only areas being significantly exposed, then the PE would be a smaller value than PC, and PE/PC would be less than 1. For the Potential Environmental Justice methodology PE is equal to PC. Therefore, the analysis addresses the total 50 square mile study area.

Data for Pf and DV are evaluated in specific ranges and assigned a scaling score from 0 to 4 for Pf, and 1 to 5 for each of the DV subfactors, percent minority population and economically stressed population.

The **Population Factor (Pf)** used in the justice formula is the population density score for the study area. The population density ranking is determined by evaluating the <u>total population per square mile</u> for the area by the scaling criteria following. The criteria scores range from 0 to 4.

POPULATION FACTOR Population Ranking	
Population per Sq. Mile	Scaling Score
0	0
0 and ≤ 200	1
> 200 and ≤ 1,000	2
> 1,000 and ≤ 5,000	3
> 5,000	4

The **Degree of Impact (DI)** is a chemical specific factor. In the
HRI calculation, DI includes cancer and non-cancer potency
factors, assessment of mutagenicity, environmental fate, and
pharmacokinetics. Potential risk to human health can be assessed
with the formula by defining scoring criteria for population
exposed (PE) and the chemical hazard (DI) criteria. **For this
application, the potential health impact of a specific chemical
or group of chemicals is not determined in this application.
Environmental Justice Indexes are not potential risk indexes.
Therefore, DI is given the HRI default value of 1.**

Degree of Vulnerability (DV) for the HRI is the mean of the
ranking values of demographic data including ethnicity, economic
status, age, pregnancy   '-style factors, and pre-existing
disease.

Of the subfactors above, ethnicity and economically stressed, are
used in the justice formula. Each DV subfactor, ethnicity
(DVMAV) and economically stressed (DVECO), has a scaling range
from 1 to 5. **The Potential Environmental Justice vulnerability
scaling scores are multiplied.** Therefore, the maximum value for
Degree of Vulnerability in the EJ formula is 25.

The Ethnicity subfactor is derived from a comparison of the
area's percent of minority population to the calculated state
percent minority population. The actual percentages for percent
minority (MAVE) and percent economically stressed (EAVE) are
presented in the attached tables. Region 6 chose to include the
Hispanic population in the definition of minority, even though
this group may have reported themselves as white in the 1990
Census. The minority population of a Region 6 community is
defined as the Census 1990 total of the non-white population plus
the white Hispanic-Origin population.

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Risk assessors of other Regions will have to make similar census based decisions to properly identify their Region's ethnic/minority population.

The scaling criteria for the Degree of Vulnerability subfactors, Percent Minority and Percent Economically Stressed, is found through the HRI Degree of Vulnerability Ranking Methodology. An area is compared to the state in which it resides.

HRI Degree of Vulnerability Ranking Methodology	
Study Area Subfactor	Score
Number of residents in the risk group less than or equal to the state percentage	1
Number of residents in the risk group greater than the state percentage but less than or equal to 1.33 times the state percentage	2
Number of residents in the risk group greater than 1.33 times the state percentage but less than or equal to 1.66 times the state percentage	3
Number of residents in the risk group greater than 1.66 times the state percentage but less than or equal to 2 times the state percentage	4
Number of residents in the risk group greater than 2 times the state percentage.	5

For the Economically Stressed subfactor the risk group is assumed to be households that make less than $15,000 a year.

The Potential Environmental Justice formula:

$$EJ = \frac{(PE/PC)}{(1)} \cdot \frac{(Pf)}{(Pop.\ Den.\ Rank)} \cdot \frac{(DI)}{(1)} \cdot \frac{(DV)}{(DVMAV \cdot DVECO)}$$

PE/PC   =   1
Pf   =   Population Density Scaling Scores (0 - 4)
DI   =   1
DV   =   DVMAV · DVEC

DVMAV   = Minority Status (1 - 5)
DVECO   = Economic Status (1 - 5)   Household Income < $15000

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DV$_{mv}$ The minority population of a Region 6 community is defined as the
Census 1990 total of the non-white population plus the white
Hispanic-Origin population.

DV$_{eoo}$ "Economically Stressed" data is taken from the 1990 Census and is
defined as households with incomes of less than $15,000 per year.

The Degree of Vulnerability and Potential Environmental Justice Index
demographic system was used to extract data from the Region 6 GIS
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on CD-ROM (AR, LA, NM, OK, and TX) prepared by the Bureau of
the Census. --Washington: The Bureau, 1992.

STATE COMPARATIVE CRITERIA:

	AR	LA	NM	OK	TX
MINORITY PERCENTAGE	17.7	34.2	49.0	19.0	39.4
ECONOMICALLY STRESSED PERCENTAGE	36.0	36.3	31.0	32.0	27.6

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CAS	CHEMICAL	ARTX[1]	ECTX[2]	BCF[3]
000630206	1,1,1,2-Tetrachloroethane	3	3	1
000071556	1,1,1-Trichloroethane	1	1	2
000079345	1,1,2,2-Tetrachloroethane	3	3	2
000079005	1,1,2-Trichloroethane	3	3	2
000812044	1,1-Dichloro-1,2,2-trifluoroethane (HCFC-123b)	1	1	1
001717006	1,1-Dichloro-1-fluoroethane	1	1	1
000057147	1,1-Dimethyl Hydrazine	4	4	1
000095501	1,2 Dichlorobenzene	2	2	3
000095636	1,2,4 Trimethylbenzene	3	3	3
000120821	1,2,4-Trichlorobenzene	3	3	4
000106887	1,2-Butylene oxide	3	3	1
000096128	1,2-Dibromo-3-chloropropane (DBCP)	4	4	2
000106934	1,2-Dibromoethane	4	5	2
000354234	1,2-Dichloro-1,1,2-trifluoroethane	1	1	1
000107062	1,2-Dichloroethane	3	3	2
000540590	1,2-Dichloroethylene	3	3	2
000078875	1,2-Dichloropropane	3	3	2
000122667	1,2-Diphenylhydrazine	4	4	2
000106990	1,3-Butadiene	4	4	2
000541731	1,3-Dichlorobenzene	2	3	3
000542756	1,3-Dichloropropylene	3	4	2
000764410	1,4-Dichloro-2-butene	2	2	1
000106467	1,4-Dichlorobenzene	2	3	3
000123911	1,4-Dioxane	3	3	1
000082280	1 Amino-2-methyl-anthraquinone	1	1	4
000354256	1 Chloro-1,1,2,2-tetrafluoroethane	1	1	1
000075683	1-Chloro-1,1-difluoroethane	1	1	1
000306832	2,2-Dichloro-1,1,1-trifluoroethane	1	1	1
000078886	2,3-Dichloropropene	1	1	2
000095954	2,4,5-Trichlorophenol	2	2	4
000088062	2,4,6-Trichlorophenol	3	3	3
000094757	2,4-D (Acetic Acid (2,4 dichlorophe	3	3	2
000615054	2,4-Diaminoanisole	1	1	1
039156417	2,4-Diaminoanisole sulfate	1	1	1
000095807	2,4-Diaminotoluene	4	4	2
000120832	2,4-Dichlorophenol	3	3	2
000105679	2,4-Dimethylphenol	3	3	3
000051285	2,4-Dinitrophenol	3	3	2
000121142	2,4-Dinitrotoluene*	4	4	2
000606202	2,6-Dinitrotoluene	4	4	2
000087627	2,6-Xylidine	1	1	2
000053963	2-Acetylaminofluorene	1	1	3
000117793	2-Aminoanthraquinone	1	1	4

CAS	CHEMICAL	ARTX[1]	ECTX[2]	BCF[3]
002837890	2-Chloro-1,1,1,2-tetrafluoroethane	1	1	1
000532274	2-Chloroacetophenone	5	5	2
000110805	2-Ethoxyethanol	2	2	1
000109864	2-Methoxyethanol	3	3	1
000109068	2-Methylpyridine	1	1	1
000088755	2-Nitrophenol	1	1	2
000079469	2-Nitropropane	5	5	2
000090437	2-Phenylphenol	1	1	2
000091941	3,3'-Dichlorobenzidine	3	3	3
000119904	3,3'-Dimethoxybenzidine	3	3	2
000119937	3,3'-Dimethylbenzidine	5	5	2
000101804	4,4'-Diaminodiphenylether	3	3	2
000080057	4,4'-Isopropylidenediphenol	2	2	2
000101144	4,4'-Methylenebis(2-chloroaniline)	3	3	3
000101611	4,4'-Methylenebis(N,N,dimethyl)benz	3	3	4
000101779	4,4'-Methylenedianiline	1	1	2
000139651	4,4'-Thiodianiline	1	1	2
000534521	4,6-Dinitro-o-cresol	4	4	2
000060093	4-Aminoazobenzene	1	1	2
000092671	4-Aminodiphenyl	1	1	2
000060117	4-Dimethylaminoazobenzene	1	1	4
000092933	4-Nitrobiphenyl	1	1	3
000100027	4-Nitrophenol	3	3	2
000099592	5-Nitro-o-anisidine	1	1	2
000075070	Acetaldehyde	3	3	1
000060355	Acetamide	1	1	1
000067641	Acetone	2	2	1
000075058	Acetonitrile	3	3	1
000098862	Acetophenone	2	2	1
000107028	Acrolein	5	3	3
000079061	Acrylamide	4	4	1
000079107	Acrylic acid	4	2	1
000107131	Acrylonitrile	3	4	2
000309002	Aldrin	5	5	4
000107186	Allyl alcohol	3	3	1
000107051	Allyl chloride	4	4	2
007429905	Aluminum (fume or dust)	5	1	1
001344281	Aluminum oxide (fibrous forms)	1	1	1
000061825	Amitrole	1	1	1
007664417	Ammonia	2	1	1
006484522	Ammonium nitrate (solution)	1	1	1
007783202	Ammonium sulfate (solution)	5	5	1

CAS	CHEMICAL	ARTX[1]	ECTX[2]	BCF[3]
000062533	Aniline	4	3	2
000120127	Anthracene	2	2	3
007440360	Antimony	4	4	1
N010	Antimony compounds	4	4	1
007440382	Arsenic	5	4	2
N020	Arsenic compounds	5	4	2
001332214	Asbestos (friable)	3	1	1
000492808	Auramine	1	1	3
007440393	Barium	4	2	1
N040	Barium compounds	4	2	1
000098873	Benzal chloride	1	1	2
000055210	Benzamide	1	1	2
000071432	Benzene	3	3	2
000092875	Benzidine	5	5	3
000098077	Benzotrichloride	5	5	2
000094360	Benzoyl Peroxide	1	1	1
000098884	Benzoyl chloride	1	1	1
000100447	Benzyl chloride	3	3	2
007440417	Beryllium	5	4	1
N050	Beryllium compounds	5	4	1
000092524	Biphenyl	2	2	3
000108601	Bis(2-chloro-1-methethyl)ether	1	1	2
000111911	Bis(2-chloroethoxy)methane	1	1	1
000111444	Bis(2-chloroethyl)ether	4	4	2
000103231	Bis(2-ethylhexyl)adipate	1	1	4
000542881	Bis(chloromethyl)ether	5	5	1
000353593	Bromochlorodifluorome*hane (Halon 1	1	1	2
000075252	Bromoform (Tribromomethane)	2	3	2
000074839	Bromomethane (Methyl Bromide)	3	3	2
000075638	Bromotrifluoromethane (Halon 1301)	1	1	2
000141322	Butyl acrylate	2	4	2
000085687	Butyl benzyl phthalate	2	2	3
000123728	Butyraldehyde	1	1	2
004680788	C.I. Acid Green 3	1	1	1
000569642	C.I. Basic Green 4	1	1	1
000989388	C.I. Basic Red 1	1	1	1
001937377	C.I. Direct Black 38	5	5	1
002602462	C.I. Direct Blue 6	5	5	1
016071866	C.I. Direct Brown 95	5	5	1
002832408	C.I. Disperse Yellow 3	1	1	1
000081889	C.I. Food Red 15	1	1	1
003761533	C.I. Food Red 5	1	1	1

CAS	CHEMICAL	ARTX[1]	ECTX[2]	BCF[3]
003118976	C.I. Solv Orange 7	1	1	5
000842079	C.I. Sol t Yellow 14	1	1	4
000097563	C.I. Solv..it Yellow 3	1	1	3
000128665	C.I. Vat Yellow 4	1	1	4
000076142	CFC 114	1	1	2
000076153	CFC 115	1	1	2
000075694	CFC-11	2	2	2
000075718	CFC-12	2	2	2
007440439	Cadmium	5	3	4
N078	Cadmium compounds	5	3	4
000156627	Calcium cyanamide	3	3	1
000133062	Captan	2	2	2
000063252	Carbaryl	2	2	2
000075150	Carbon disulfide	3	2	2
000056235	Carbon tetrachloride	3	3	2
000463581	Carbon ulfide	3	3	2
000120809	Catecho	3	3	2
000133904	Chlorar :n	3	3	2
000057749	Chlorda :	4	4	5
007782505	Chlorine	2	2	1
010049044	Chlorine dioxide	4	4	1
000079118	Chloroacetic acid		3	1
000108907	Chlorobenzene	J	3	3
000510156	Chlorobenzilate	3	3	3
000074456	Chlorodifluoromethane (HCFC-22)	1	1	1
000075003	Chloroethane (Ethyl chloride)	1	1	2
000067663	Chloroform	3	3	2
000074873	Chloromethane	2	2	2
000107302	Chloromethyl methyl ether	5	5	1
N084	Chlorophenols	1	1	1
000126998	Chloroprene	3	3	2
063938103	Chlorotetrafluoroethane	1	1	1
001897456	Chlorothalonil	3	3	3
007440473	Chromium	5	3	4
N090	Chromium compounds	5	3	4
007440484	Cobalt	5	5	4
N096	Cobalt compounds	5	5	4
007440508	Copper	3	3	5
N100	Copper compounds	3	3	5
008001589	Creosote	1	1	1
001319773	Cresol (mixed isomers)	2	2	1
000098828	Cumene	3	3	2

CAS	CHEMICAL	ARTX[1]	ECTX[2]	BCF[3]
000080159	Cumene droperoxide	3	3	2
000135206	Cupfer	3	3	1
N106	Cyanide compounds	3	3	1
000110827	Cyclohexane	1	1	3
001163195	Decabromodiphenyl oxide	3	3	1
000117817	Di(2-ethylhexyl) phthalate	3	3	3
002303164	Diallate	3	3	3
025376458	Diaminotoluene (mixed isomers)	5	5	1
000334883	Diazomethane	1	1	1
000132649	Dibenzofuran	1	1	4
000124732	Dibromotetrafluoromethane (Halon 24	1	1	3
000084742	Dibutyl phthalate	2	2	2
090454185	Dichloro-1,1,2-trifluoroethane	1	1	1
025321226	Dichlorobenzene (mixed isomers)	2	3	1
000075274	Dichlorobromomethane	3	3	2
000075092	Dichloromethane	2	3	2
034077877	Dichlorotrifluoroethane	1	1	1
000062737	Dichlorvos	3	3	2
000115322	Dicofol	1	1	5
001464535	Diepoxybutane	1	1	1
000111422	Diethanolamine	3	3	1
000084662	Diethyl phthalate	1	1	3
000064675	Diethyl sulfate	4	4	2
000094586	Dihydrosafrole	1	1	1
000131113	Dimethyl phthalate	1	1	2
000077781	Dimethyl sulfate	5	5	2
000079447	Dimethylcarbamyl chloride	1	1	1
025321146	Dinitrotoluene (mixed isomers)	1	1	1
000106898	Epichlorohydrin	4	3	2
000140885	Ethyl acrylate	3	3	2
000541413	Ethyl chloroformate	1	1	1
000100414	Ethylbenzene	2	2	2
000074851	Ethylene	1	1	2
000107211	Ethylene glycol	1	1	2
000075218	Ethylene oxide	3	4	1
000096457	Ethylene thiourea	4	4	2
None1	Ethylenebisdithiocarbamic acid, salts and esters	1	1	1
000151564	Ethyleneimine (Aziridine)	1	1	1
000075343	Ethylidene dichloride	2	2	1
002164172	Fluometuron	3	3	2
000050000	Formaldehyde	3	3	1
000064186	Formic acid	1	1	1

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CAS	CHEMICAL	ARTX[1]	ECTX[2]	BCF[3]
000076131	Freon 113	1	1	3
N230	Glycol Ethers	3	3	1
000076448	Heptachlor	4	4	4
000087683	Hexachloro-1,3-butadiene	3	4	5
000118741	Hexachlorobenzene	4	4	5
000077474	Hexachlorocyclopentadiene	5	3	3
000067721	Hexachloroethane	2	3	3
001335871	Hexachloronaphthalene	1	1	5
000070304	Hexachlorophene	4	4	1
000680319	Hexamethylphosphoramide	1	1	1
000302012	Hydrazine	5	4	1
010034932	Hydrazine sulfate	5	4	1
007647010	Hydrochloric acid	3	3	1
000074908	Hydrogen cyanide	3	3	1
007664393	Hydrogen fluoride	1	1	1
007783064	Hydrogen sulfide	3	3	1
000123319	Hydroquinone	3	3	2
000078842	Isobutyraldehyde	5	5	2
000067630	Isopropyl alcohol	1	1	1
000120581	Isosafrole	1	1	2
007439921	Lead	5	5	4
N420	Lead compounds	5	5	4
000058899	Lindane	4	4	4
000108316	Maleic anhydride	2	2	1
000109773	Malononitrile	5	5	1
012427382	Maneb	3	3	1
007439965	Manganese	5	3	1
N450	Manganese compounds	5	3	1
007439976	Mercury	4	4	5
N458	Mercury compounds	4	4	5
000126987	Methacryonitrile	4	4	1
000067561	Methanol	1	1	2
000072435	Methoxychlor	3	3	4
000096333	Methyl acrylate		3	2
000079221	Methyl chlorocarbonate	1	1	1
000078933	Methyl ethyl ketone	2	1	1
000060344	Methyl hydrazine	4	4	1
000074884	Methyl iodide	3	3	2
000108101	Methyl isobutyl ketone	3	2	2
000624839	Methyl isocyanate	5	5	1
000074931	Methyl mercaptan	1	1	1
000080626	Methyl methacrylate	2	2	2

CAS	CHEMICAL	ARTX[1]	ECTX[2]	BCF[3]
001634044	Methyl te butyl ether	1	1	2
000074953	Methyle· romide	3	3	2
000101688	Methylenois(phenylisocyanate)	5	5	1
000090948	Michlers Ketone	3	3	2
001313275	Molybdenum trioxide	4	3	1
000505602	Mustard gas	1	1	2
000121697	N,N-Dimethylaniline	3	3	2
000759739	N-Nitroso-N-ethylurea	5	5	1
000684935	N-Nitroso-N-methylurea	1	1	1
000924163	N-Nitrosodi-n-butylamine	5	5	2
000621647	N-Nitrosodi-n-propylamine	5	5	2
000055185	N-Nitrosodiethylamine	5	5	1
000062759	N-Nitrosodimethylamine	5	5	1
000086306	N-Nitrosodiphenylamine	2	2	3
004549400	N-Nitrosomethylvinylamine ·	1	1	1
000059892	N-Nitrosomorpholine	1	1	1
016543558	N-Nitrosonornicotine	1	1	1
000100754	N-Nitrosopiperidine	1	1	2
000091203	Naphthalene	1	1	3
007440020	Nickel	4	3	3
N495	Nickel compounds	4	3	3
007697372	Nitric acid	3	3	1
000139139	Nitrilotriacetic acid	3	3	2
000099558	Nitro-o-toluidine	3	3	1
000098953	Nitrobenzene	3	3	2
001836755	Nitrofen	1	1	4
000051752	Nitrogen mustard	1	1	2
000055630	Nitroglycerin	4	4	2
002234131	Octachloronaphtahlene	1	1	5
020816120	Osmium tetroxide	1	1	1
000123677	Paraldehyde	1	1	1
000056382	Parathion	3	3	3
000076017	Pentachloroethane	1	1	1
000087865	Pentachlorophenol	3	3	3
000079210	Peracetic acid	3	3	1
000108952	Phenol	1	1	2
000075445	Phosgene	1	1	1
007664382	Phosphoric acid	1	1	1
007723140	Phosphorus (yellow or white)	5	5	1
000085449	Phthalic anhydride	3	1	1
000088891	Picric acid	4	4	1
N575	Polybrominated Biphenyls (PBBs)	5	5	5

CAS	CHEMICAL	ARTX[1]	ECTX[2]	BCF[3]
001336363	Polychlorinated biphenyls	5	5	1
023950585	Pronamide	2	2	1
001120714	Propane sultone	1	1	1
000123386	Propionaldehyde	1	1	2
000114261	Propoxur	3	3	2
000115071	Propylene (Propene)	1	1	2
000075569	Propylene oxide	3	3	1
000075558	Propyleneimine	5	5	1
000110861	Pyridine	3	3	2
000091225	Quinoline	4	4	2
000106514	Quinone	1	1	1
000082688	Quintozene	3	3	3
000081072	Saccharin (manufacturing)	1	1	2
000094597	Safrole	1	1	2
007782492	Selenium	3	3	4
N725	Selenium compounds	3	3	4
007440224	Silver	3	3	1
N740	Silver compounds	3	3	1
000100425	Styrene	2	2	2
000096093	Styrene oxide	1	1	2
007664939	Sulfuric acid	5	3	1
000127184	Tetrachloroethylene (Perchlorethyle	3	3	2
000961115	Tetrachlorvinphos	3	3	3
007440280	Thallium	4	4	2
N760	Thallium comounds	4	4	2
000062555	Thioacetamide	1	1	1
000062566	Thiourea	4	4	1
000137268	Thiram	3	3	1
001314201	Thorium dioxide	4	5	1
007550450	Titanium tetrachloride	5	5	1
000108883	Toluene	2	2	2
000584849	Toluene-2,4-diisocyanate	5	3	1
000091087	Toluene-2,6-Diisocyanate	5	3	1
026471625	Toluenediisocyanate	-	3	1
008001352	Toxaphene	.	4	4
000068768	Triaziquone	1	1	1
000052686	Trichlorfon	1	1	1
000079016	Trichloroethylene	3	3	2
001582098	Trifluralin	3	3	4
000126727	Tris(2,3-dibromopropyl)phosphate	1	1	2
000072571	Trypan blue	1	1	1
000051796	Urethane (Ethyl Carbamate)	1	1	1

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CAS	CHEMICAL	ARTX[1]	ECTX[2]	BCF[3]
007440622	Vanadium (fume or dust)	3	3	1
000108054	Vinyl acetate	2	1	2
000593602	Vinyl bromide	3	3	2
000075014	Vinyl chloride	3	4	2
000075354	Vinylidene chloride	3	3	2
None2	Warfarin and salts	1	1	1
001330207	Xylene (mixed isomers)	1	1	1
007440666	Zinc (fume or dust)	2	2	5
N982	Zinc Compounds	2	2	5
012122677	Zineb	2	2	3
000134327	alpha-Naphthylamine	1	1	2
000091598	beta-Naphthylamine	1	1	2
000057578	beta-Propiolactone	1	1	1
000108394	m-Cresol	2	2	2
000099650	m-Dinitrobenzene	4	4	1
000108383	m-Xylene	1	1	2
000071363	n-Butyl alcohol	2	2	2
000090040	o-Anisidine	4	3	2
000134292	o-Anisidine hydrochloride	1	1	1
000095487	o-Cresol	2	2	2
000528290	o-Dinitrobenzene	4	4	1
000095534	o-Toluidine	3	3	2
000636215	o-Toluidine hydrochloride	1	1	1
000095476	o-Xylene	1	1	2
000104949	p-Anisidine	1	1	2
000120718	p-Cresidine	3	3	2
000106445	p-Cresol	3	3	2
000100254	p-Dinitrobenzene	4	4	1
000156105	p-Nitrosodiphenylamine	1	1	3
000106503	p-Phenylenediamine	2	2	1
000106423	p-Xylene	1	1	2
000078922	sec-Butyl alcohol	2	2	2
000075650	tert-Butyl Alcohol	2	2	2

[1] Toxicity factor applied to air releases. Equivalent to the field "INHALE_TOX" in the new Chemical Data Matrix.
Ratings were assigned using the following scale: 0-1 = 1; 10 = 2; 100-1000 = 3; 10,000 = 4; 100,000-1,000,000 = 5

[2] Ecotoxicity factor applied to water releases. Equivalent to the field "ORAL_TOX_W" in the new Chemical Data Matrix.
Ratings were assigned using the following scale: 0-1 = 1; 10 = 2; 100-1000 = 3; 10,000 = 4; 100,000-1,000,000 = 5

[3] Bioaccumulation factor. Equivalent to the field "BCF" in the new Chemical Data Matrix.
Ratings were assigned using the following scale: ≤ 1 = 1; > 1 and ≤ 100 = 2; > 100 and ≤ 1000 = 3; > 1000 and ≤ 10,000 = 4; > 10,000 = 5.