



A Study on Environmental Equity in Washington State



Washington State Department of Ecology
Hazardous Waste and Toxics Reduction Program
Hazardous Substance Information Office

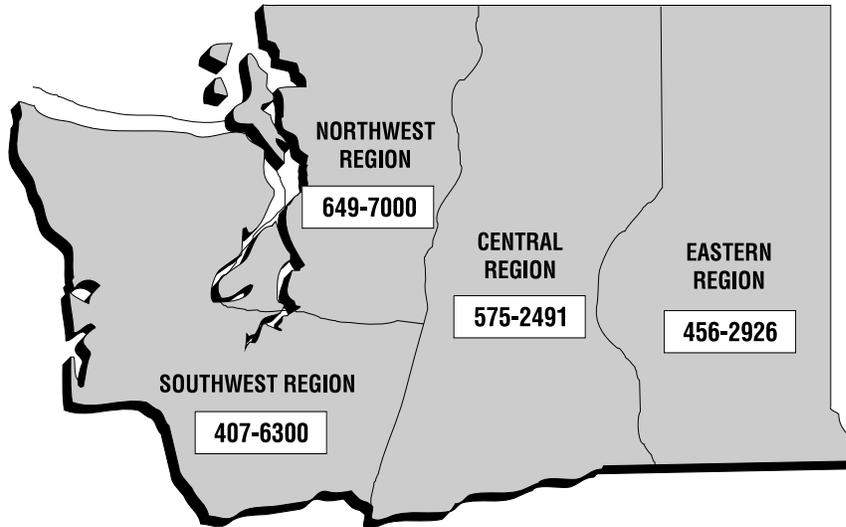
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Department of Ecology

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Table of Contents

Section	Title	Page
	Acknowledgements	4
	Maps and Tables	6
	Executive Summary	7
I	Study Background	9
	A. Why The Study Was Done	9
	B. What The Study Addressed	9
	C. What The Study Did Not Address	10
II	Environmental Equity Issues	11
	A. What Is Environmental Equity?	11
	B. Examples of Environmental Equity Issues and Actions	11
III	Methodology	13
	A. Design & Implementation	13
	B. Facility Data	14
	C. Demographic Data	16
	D. Tables	18
IV	Results	21
	A. Distribution of Environmental Facilities Relative to Demographic	21
	B. Distribution of Reported Toxic Releases Relative to Demographics	22
	C. Is There Environmental Equity In Washington?	22
V	Recommendations	24
	A. Follow-up	24
	B. Legislative Support and Funding	26
	Endnotes	27
	Appendices	29
	A. Detail of Study Methodology	31
	B. Further Considerations and Options	38
	C. Facility Descriptions and Maps	41
	D. Demographic Definitions	50
	E. Tables	52
	F. Related Environmental Equity Activities In Washington	66

Maps

No.	Title	Page
1.	Washington Facility Distribution	15
2.	Washington's Block Groups	15
3.	Cowlitz County	16
<i>(In Appendices)</i>		
4.	State Map	43
5.	Contaminated Sites	44
6.	Hazardous Waste Treatment Storage & Disposal Facilities	45
7.	Major (high-volume) Waste Water Releasers	46
8.	Major (high-volume) Air Releasers	47
9.	Solid Waste Landfills & Incinerators	48
10.	Toxic Release Inventory Reporters for 1993	49

Tables

No.	Title	Page
1.	Relationship of Facilities and Toxic Releases to Block Group Demographics - Washington State Totals	19
2.	Summary of State's Facility / Block Group Analysis	20
3.	Summary of State's Toxic Release / Block Group Analysis	20
<i>(In Appendices)</i>		
4.	Facility Distribution Compared to Block Group Distribution - by County	54
5.	Facility Distribution - Top 8 Counties (by block group count)	58
6.	Facility Distribution - Top 8 Counties (by facility count)	59
7.	Toxic Release Inventory Distribution (1993) Compared to Block Group Distribution - by County	60
8.	Toxic Release Inventory (TRI) Distribution - Top 8 Counties (1993) (by block group count)	64
9.	Toxic Release Inventory (TRI) Distribution - Top 8 Counties (1993) (by pounds released)	65

Environmental Equity Study

Executive Summary

During the 1994 session, the Washington state Legislature appropriated \$29,000 to conduct an environmental equity study to include information on the distribution of environmental facilities and toxic chemical releases in relation to low-income and minority communities. The study took place between July 1994 and June 1995. This report describes the study, its results and presents recommendations for follow-up action.

The study looked at the proportional distribution of nearly 900 facilities and contaminated sites around the state in relation to communities of color and low-income. Demographic information from the 1990 Census was used to evaluate block groups (communities). A block group is an area which contains approximately 400 households. Department of Ecology used several databases to evaluate the locations of the “environmental facilities” relative to the block groups. Definitions for these and other terms are located both within the report’s text and the appendices.

The study results indicate that on a statewide basis, there is a disproportionately greater number of facilities located in low-income and minority block groups, and a smaller number of facilities in the non minority / non low-income block groups. When comparing data between low-income and minority block groups, low-income block groups have a higher disproportion of facilities than do minority block groups. Toxic chemical release data, as reported by the 1993 Toxic Release Inventory, also indicate some disproportionate distribution, although it is not as consistent or conclusive as the facility data. There is an even greater level of disproportionate distribution on a county-by-county perspective. This supports one of the study observations that environmental equity issues are more pronounced at local levels than statewide.

There are many factors that may contribute to the disparities identified above. These factors include the history of residential and

industrial growth in the same areas, zoning ordinances, environmental regulations, property values, and proximity to freeways and other major transportation routes. However, the study did not try to determine reasons or causes for facility distribution relative to demographics.

The study did not attempt to measure potential risks in relation to the facilities or the communities in which they reside. The study did not attempt to compare the risk associated with any one type of facility in relation to another. These are important issues, and they naturally follow the subject of the study, but they were beyond the study’s scope and budget.

Recommendations call for follow-up analysis, limited case studies at the local level, data enhancements, and general coordination within, and between, state agencies, the Legislature, local governments, local environmental / citizen groups, and the federal Environmental Protection Agency. These recommendations are submitted to the Legislature for consideration.

In addition to the report, the study also produced a *Supplemental Atlas* Publication Number 95-414, which contains more detailed state maps, and maps and data of the state’s 39 counties. The maps show locations of the facilities and block group demographics. Tables provide comparative data on the types and locations of the facilities, and quantities of reported chemical released within the different block group categories during 1993.

I Study Background

A. Why the Study Was Done

In the Fall of 1993, state Senator Rosa Franklin, from the Tacoma/Pierce county area, proposed that Washington conduct an environmental equity study. Since environmental equity is an issue in other parts of the country, Senator Franklin questioned if it was an issue in Washington. She proposed that a study be done to better assess the distribution of environmental facilities and toxic chemical releases in relation to low-income and minority populations within the state. The proposal was submitted as Senate Bill 6401 during the 1994 legislative session.¹ At the conclusion of the session, the Legislature appropriated \$29,000 from the Worker and Community Right-to-Know Fund for fiscal year 1995, "...solely for conducting an environmental equity study to include information on the distribution of environmental facilities and toxic chemical releases in relation to low-income and minority communities."² The Department of Ecology (Ecology) was to work with the Washington Department of Health to complete the study. Ecology's Pollution Prevention and Community Right-to-Know Unit received the funds.

B. What The Study Addressed

The study looked at the distribution of environmental facilities in relation to communities of low-income and/or communities of color.* Specific locations for the facilities were identified, plotted, and mapped, showing in which type of community they reside. Tabular data about facility and community distributions were also generated and analyzed. Basic statistical evaluations and comparisons were made based upon state and county averages reflected in the tables.

The "environmental facilities" were comprised of nearly 900 facilities and contaminated sites around the state. The demographic (or community) information came from the 1990 Census, (U.S. Department of Commerce). The study evaluated facility locations in terms of where they exist relative to communities classified as "minority," and/or "low-income," as well as relative to areas classified as non-minority/non low-income. The census-defined "block group" was used to represent a community. A block group is an area containing approximately 400 households. General definitions for the quoted terms above, and other terms, can be found within **Section III**; more detailed definitions are in the **Appendices**.

Given this initial analysis, the follow-up question arose: Is there a disproportionate distribution of environmental facilities relative to the distribution of minority and/or low-income communities in Washington State? Although this question was not part of the Legislature's appropriation language for the study, and though it cannot be fully answered, some comparative analysis has been done to address it.

* A small but important distinction in semantics is warranted regarding the terms 'community of color' and 'minority community.' Although 'minority' is the term referenced by the Legislature, and it is used at times in the report's text and tables, it is not always accurate. In the context of a study which attempts to better address a local population (block group in this case), the *majority* of a local population may be of a non-white origin; thus, 'minority' would not be correct. Also, 'minority' populations are derived from Census surveys, which ask people to identify themselves as White, Black, Native American, Asian, and Other. These are terms which refer to color more than the numerical relationships of majority / minority. For these reasons, 'community of color' is a more accurate term. Further, it has been observed that most local groups, which are active in the environmental justice / environmental equity arena, use the term 'community of color' rather than 'minority.' In this report, the two terms are used interchangeably.

One goal of the study was to consider a broader, comprehensive spectrum of “environmental facilities” in order to gain a more complete understanding of the situation within Washington. This study appears to be the first in the country to consider a broader view of environmental facility. Most of the other studies have focused on one or two types of facilities, such as Superfund sites³, permitted hazardous waste “Treatment, Storage and Disposal” facilities⁴, or Toxic Release Inventory facilities⁵. Although each of these facility types were part of Washington’s evaluation, this study also included: approximately 450 confirmed contaminated sites; high-volume releasers of hazardous waste into the air and water; and solid waste landfills and incinerators.

C. What The Study Did Not Address

The study did not try to determine reasons or causes for facility distribution relative to the various block group classifications. Neither did the study attempt to assess potential health risks in relation to the facilities or block groups in which they are located. There was no attempt to compare the risk associated with any one type of facility. These are important issues, which naturally follow the subject of the study, but they were beyond the study’s scope and budget. **Section V — Recommendations, and Appendix B — Further Considerations and Options** address these issues, in terms of what could be considered or accomplished in the future. Also, the study did not conduct a comprehensive statistical analysis of the data generated, which is one of the study recommendations. A more comprehensive statistical analysis should draw additional information from the substantial data assembled for the study.

Block group ranking was not done. The Legislature’s proposed environmental equity bill included a request to have the study rank the fifty block groups with the highest total releases during the most recent five years, based upon the Toxic Release Inventory (TRI) data. However, this was not possible for two main reasons. First, a comparative analysis of Washington’s 4,620 block groups required data which did not exist. Second, the TRI data were not entirely compatible for the previous five years, because of regulatory and other changes.⁶

II Environmental Equity Issues

A. What is Environmental Equity?

Around the country, the terms Environmental Justice, Environmental Equity, and Environmental Racism, have been used to convey the same general concept. Each has its own connotations, but definitions and distinctions between them have not yet evolved into generally agreed upon language. There are a number of definitions for these terms, yet there does not appear to be a consensus on which one best defines the issue. In general, all of these terms apply to the interrelationships between local populations (particularly communities of color and low-income) and the factors which have, or potentially could, influence their local environment (i.e., the quality of their air, water, and land). These interrelationships and factors are complex, extremely varied, and far from being fully understood. Without an agreed upon definition, the efforts and actions listed below provide examples of how the concept of environmental equity is evolving.

Typically, the areas generating the greatest amount of concern about environmental inequities are at the local-community level, where the greatest potential for disproportionate impact is more likely to exist. However, due to resource limitations, Washington's analysis focused on state and county data. By beginning to address the issues at the state and county level, Washington will be better prepared to address past and present inequities, and help to avoid future environmental inequities that may exist at a community level. This study is a first step to identify and address these issues.

The 1994 Washington State Legislature's inquiry into the issue used the term "Environmental Equity." For the sake of consistency, and based upon the connotation that the word 'equity' better relates to something being measured, as opposed to 'justice,' Washington's study and this report retained the Legislature's term. A team of Ecology employees (the League for Environmental

Equity and Diversity — LEED Team) has also addressed environmental equity issues. They defined environmental equity as: "the proportionate and equitable distribution of environmental benefits and risks among diverse economic and cultural communities. It ensures that policies, activities, and the responses of government entities do not differentially impact diverse social and economic groups. Environmental equity promotes a safe and healthy environment for all people."⁷

B. Examples of Environmental Equity Issues and Actions

Federal. President Clinton's Executive Order 12898, issued February 11, 1994, required certain federal agencies to make environmental justice part of their mission by identifying and addressing disproportionately high and adverse human health or environmental effects on minority and low income populations. These agencies had to develop and implement an Environmental Justice plan by 1995. As part of this Order, the Environmental Protection Agency (EPA) was directed to convene an Interagency Federal Working Group on Environmental Justice.

State. On October 8, 1993, Louisiana's Department of Environmental Quality was informed that EPA's Office of Civil Rights was investigating Louisiana for one of its hazardous waste permitting processes for potential violations of Title VI of the federal Civil Rights Act. This was triggered by a claim submitted by a local parish Police Juror (equivalent of a county commissioner). Other claims of Title VI violations are under EPA's investigation in Texas, Florida, New York, Georgia, and Mississippi.⁸

Oregon State established the Environmental Equity Citizen Advisory Committee, which generated a number of recommendations for their state's various agencies regarding environmental equity issues. These are published in the *Oregon Environmental Equity*

Citizen Advisory Committee Report — On Ensuring Environmental Equity in Oregon, 1994. The lead agencies in support of this report were Oregon's Department of Environmental Quality, and the Oregon Health Division.

Local. On March 6, 1995, the Puyallup Tribe formally recommended that: "EPA designate the Commencement Bay Superfund Site and the 1873 Survey Area of the Puyallup Reservation as an Environmental Justice Site for all Agency programs and actions. The purpose of this designation would be to apply environmental justice review on a multi-media basis to Agency actions affecting members of the Puyallup Tribe who rely upon Commencement Bay's living resources."⁹ Also, Seattle's Mayor, Norm Rice established an Environmental Justice Task Force in 1995 to develop a city wide plan to address the city's management of environmental justice issues.

These are some examples of current efforts to define and address the basic issues which intertwine our social, ethical, environmental, and economic values, on a historic, present day, and future policy perspective. Citizens and government are paying more attention, and becoming more sensitive to, environmental equity issues. There is more information about Washington's environmental equity issues in **Appendix F — Related Environmental Equity Activities in Washington.**

III Methodology

A few key points about the study methodology are given in this section. A comprehensive description of the study methodology is provided in **Appendix A**.

A. Design, and Implementation.

The study design was based on the following sequential steps (with a brief description of each step following):

1. Collect and consolidate various databases at Ecology that contained locational references to facilities and contaminated sites;
2. Identify low-income and minority communities using U.S. Census data;
3. Combine the two databases into one, allowing for comparative analysis and the generation of tables;
4. Map each county, or subsections of high population counties, to show facility locations relative to the demographics;
5. Apply basic statistical analysis to determine the proportional distribution of the facilities and toxic releases, relative to the demographics;
6. Using the study results and other resources within Ecology and the Department of Health, develop appropriate recommendations for the Legislature and the two agencies.

Regarding implementation, the study formally began in July 1994 and ended in June 1995. However, study preparation was well underway during the Spring of 1994, while much of the report's writing, review, and production continued beyond July 1995.

1. It was noted early that Ecology kept at least six distinct databases that tracked seven types of facilities. Since each of the databases contained facility latitude and longitude coordinates (needed for mapping and spatial analysis), it seemed appropriate to use them all. The consolidated databases generated a group of 889 individual facilities, of which all were known to, or likely to, release contaminants. A general list of facility types is given below in subsection **B. Facility Data**; a more detailed description of the facilities, and maps of their general location, are in **Appendix C — Facility Descriptions and Maps**.
2. Simultaneous to step 1, the 1990 U.S. Census data for Washington were obtained to identify low-income and minority communities. The "block group" was the unit of area used to reflect a local community. Block groups represent areas containing approximately 400 households. There are 4,620 block groups in Washington. A general discussion of demographic data used in this study is provided in subsection **C. Demographic Data**. Additional discussion of demographic terms can be found in **Appendix D — Demographic Definitions**.

3-4. The next two steps involved consolidating the facility and demographic databases into one, and mapping the results. The information was conveyed through two different methods: a tabular form using tables; and a graphical form, using maps. Together, these two methods would show the types and locations of the facilities in relation to five categories of block groups. To plot the maps, a computerized Geographic Information System (GIS) was used (ARC/INFO¹⁰). Some examples of the maps appear within the report for illustrative purposes. Most of the study maps and their supporting data are in the *Supplemental Atlas*, an 11" x 17" publication of the study maps and tables.

5. Once consolidated, the data were evaluated noting facility distribution relative to five categories of block groups: 1) Minority; 2) Low-Income; 3) Low-Income and Minority; 4) Non Minority/Non Low-Income, and; 5) Totals. The tables allowed for comparison of county and statewide demographics. General descriptions of the tables are in subsection **D. Tables**. Detailed descriptions of the tables and are in **Appendix E — Tables**. Tables for each of the counties, along with maps for each of the counties are provided in the report's *Supplemental Atlas*.

6. Ecology, the Department of Health, the EPA, and the state Office of Financial Management reviewed products of the study. This review generated questions, considerations, follow-up options, and recommendations. Finally, an extensive internal review process took place before the report was published.

B. Facility Data

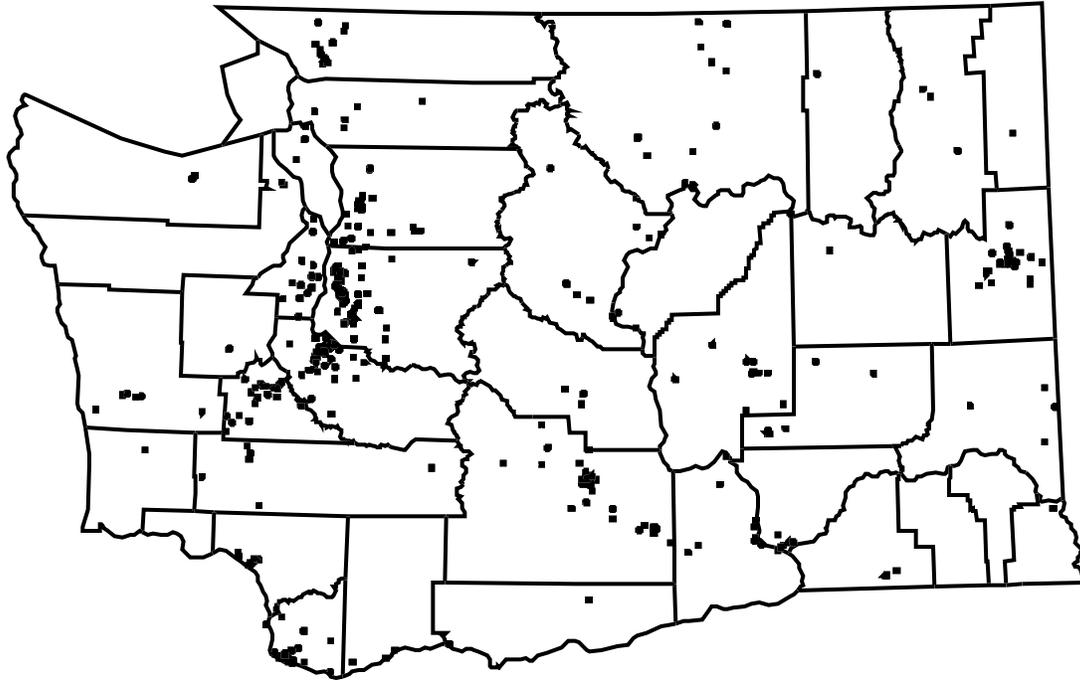
The following types of facilities were considered in this study:

- 1) *Contaminated Sites*
- 2) *Hazardous Waste Treatment, Storage, and Disposal Facilities*
- 3) *Major (high-volume) Waste Water Releasers*
- 4) *Major (high-volume) Air Releasers*
- 5) *Solid Waste Landfills*
- 6) *Solid Waste Incinerators*
- 7) *Toxic Release Inventory Reporters*

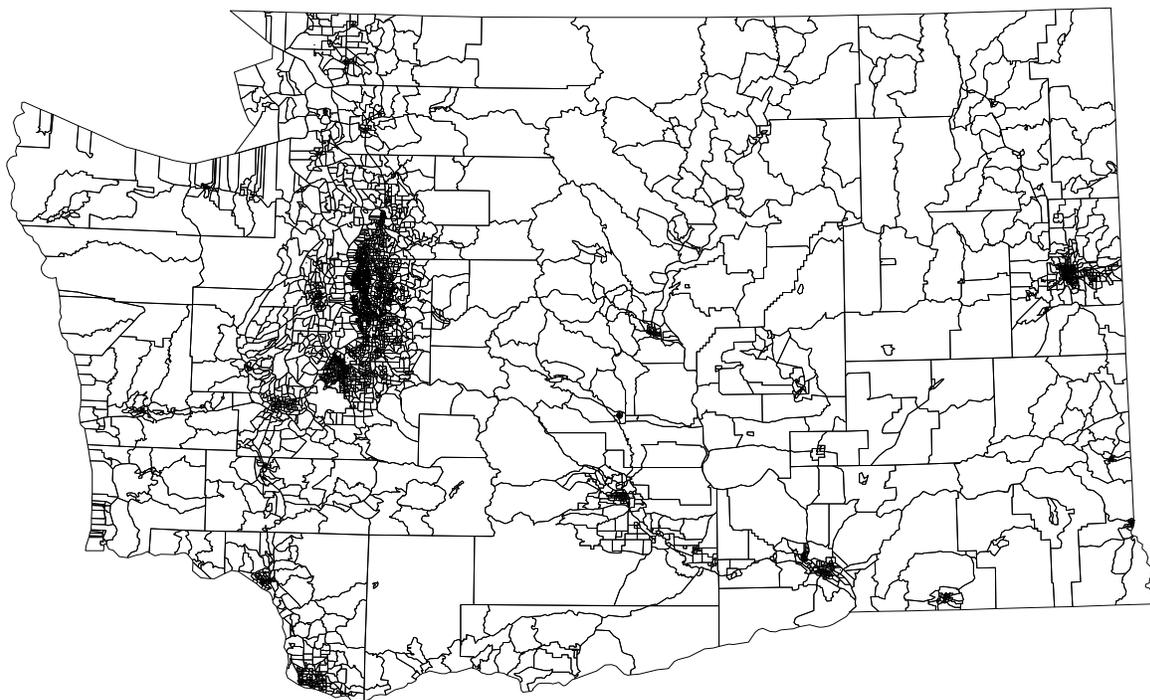
For the purposes of this study, "environmental facilities" (facilities) were: contaminated sites; businesses or public entities that generated regulated hazardous wastes, or; solid waste landfills and incinerators. The contaminated sites and business were confirmed locations where hazardous wastes were reported to be released into the environment¹¹, or where the facilities were permitted to treat, store or dispose of hazardous wastes on site. In the case of solid waste landfills, the extent of contamination from hazardous waste was less clear. Typically in the past, household hazardous wastes and some business-generated hazardous wastes have been disposed into solid waste landfills.

The facilities addressed in this study did not reflect all locations where a release of hazardous contaminants could pose a human health or environmental threat. Rather, they were one of many categories of potential environmental risks a community should consider.

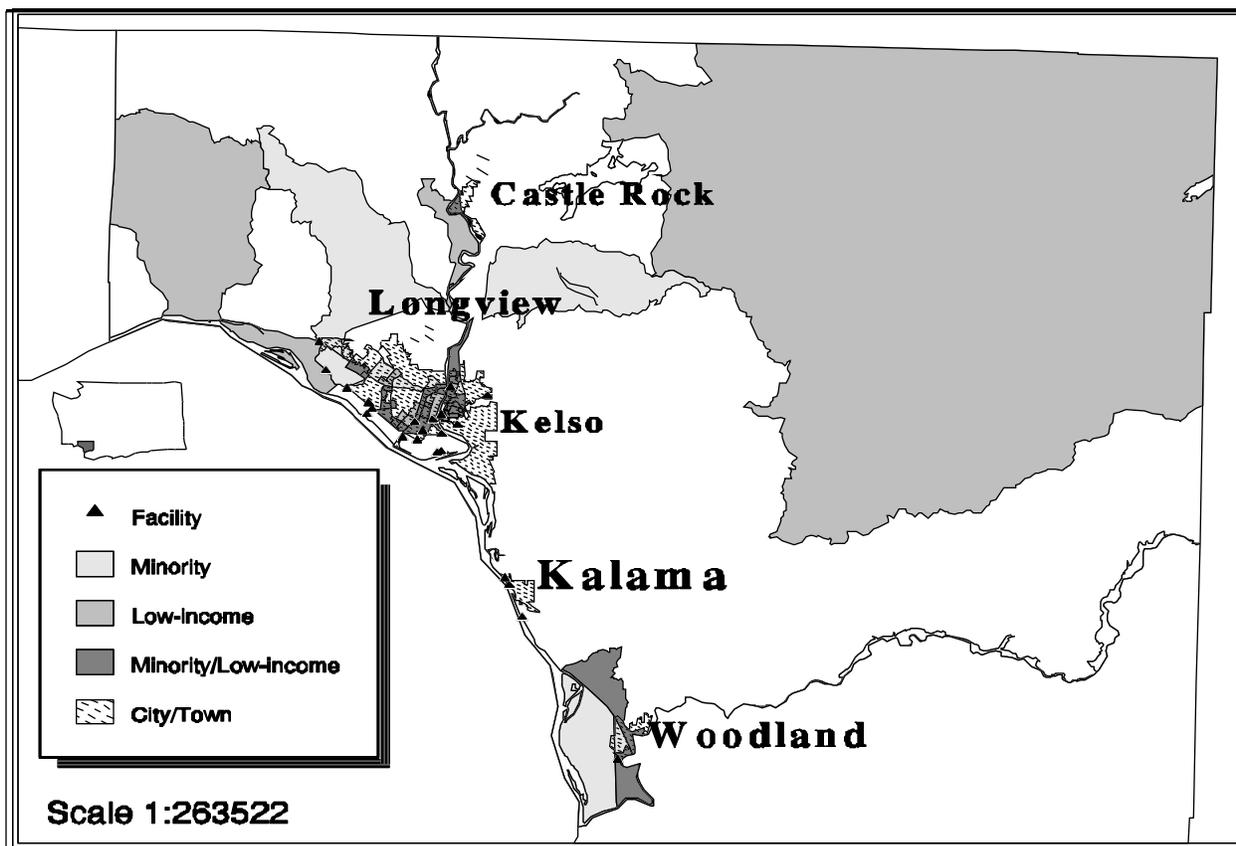
Regarding facility data preparation, extensive work was applied to verifying the correct locations for mapping and quality analysis purposes. In terms of the facility data quality, there are many limitations to the study data, which should be observed. These are discussed in detail in **Appendix C. Map 1 — Washington Facility Distribution**, on the following page, shows the locations of all the facilities considered in the study. Other maps in **Appendix C** show the distribution of the facilities broken out by facility type.



Map 1. Washington Facility Distribution



Map 2. Washington's Block Group



Map 3. Cowlitz County Demographics with Facilities

C. Demographic Data

This study used the census-defined “Block Group” to characterize a community. A block group represents an area of approximately 400 households. As can be seen in **Map 2. — Washington’s Block Groups**, the state’s 4,620 block groups are extremely varied in size. In some low population areas, a block group can cover many dozens of square miles (e.g., along the Pacific coastline and the Cascade mountains) to represent 400 households. In the heavily populated areas of the state, a block group will be smaller than a dozen city blocks. **Map 3. — Cowlitz County**, provides an example of the combination of the facility and demographic information used in the study.

The census data had a number of limitations when used to characterize some of the study’s fundamental factors. Since the census data were the only practicable resource avail-

able, particular attention was paid to becoming familiar with their limitations. This was especially so in determining what constituted a community.

Ecology and the Department of Health continue to be interested in options and methodologies which could improve this kind of study of the factors related to environmental equity. There are no agreed upon units to define a community in the context of this type of study. There are also no agreed upon methods to characterize such communities regarding color and income. Ecology and the Department of Health are looking for ways to improve the applied methods. Data sources, time periods evaluated, and statistical applications are examples of where there is ample room for further evaluation and possible improvement.

When taking the next step of identifying a community of color, low-income, both, or neither, the variables became even more complex. Low-income and minority demographic values for areas do not match commonly cited census population values. The reason is a block group applies to an area, while the commonly used census data apply to individual head counts. These, and other demographic details are provided in **Appendix D — Demographic Definitions**.

Minority status for block groups was determined using the following methodology:

1. The percentage of each block group's minority population was calculated, relative to the total population of the block group, using the 1990 Census' minority counts for each block group.
2. The minority population percentage for each of the 39 counties was also calculated.
3. Each block group's minority percentage was then compared to the minority percentage of its respective county. If a given block group's minority percentage was greater than its county's minority percentage, that block group was designated as a minority block group.

Low-Income status for block groups was determined using the same basic methodology as for minority status:

1. The study defined persons of low-income as those who earned less than or equal to the federal 1989 poverty threshold¹². Each block group was evaluated for the number of people within it who fell below the poverty threshold. From this, a 'low-income' percentage was calculated for each block group, relative to the total population of the block group.
2. In the same manner, a low-income percentage was calculated for each of the 39 counties.

3. Each block group's low-income percentage was then compared to the low-income percentage of its respective county. If a given block group's low-income percentage was greater than its county's low-income percentage, that block group was designated as a low-income block group.

Low-Income/Minority status means a block group met both of the criteria noted above. This also means that any block group or facility in this category, by definition, will also be counted in one of the previous two categories.

Non Low-Income/Non Minority status means a block group did not meet either the minority or low-income status, as defined above (or in **Appendix D**). In other words, this category is the balance of block groups in the state.

It is important to note that the categories of 'low-income' and 'minority' are not mutually exclusive. Distinct criteria identify these two different demographic characteristics. Therefore, a block group could be identified as minority, low-income, or both. Only the 'non minority/non low-income' category of block groups is exclusive to itself as it does not meet either the minority or the low-income criteria.

Block groups will usually have diverse populations within them. These demographic classifications do not mean that all residents, or households, within a given block group meet the classification criteria for the block group designation. These designations do not imply that the majority of the block group's residents meet such criteria. Though in some instances, this is the case. The designations do mean that the block group's percentage of residents meeting the designation criteria exceeds the county percentage of residents that meet the same criteria.

D. Tables

One of the fundamental tools developed in the study for analysis was a table comparing the locations of various facility types, and toxic chemical releases, relative to communities of color and/or low-income. This was done at the state level and for each of Washington's 39 counties. **Table 1 — Relationship of Facilities to Block Group Demographics — State Totals**, shows in which type of block group the various facilities and toxic releases are located. Data for each county are provided in a similar format in the *Supplemental Atlas*. **Tables 2 and 3** further summarize Table 1, reflecting facility totals, and Toxic Release Inventory totals respectively. Other tables with county specific data are located in **Appendix E**.

As noted previously, only the non minority/non low-income category of block groups is exclusive unto itself. In terms of the tables, again, this is important. It means that the block group percentages reflected within the tables are not additive by their categories (columns).

Each of the county tables are provided with accompanying maps in the report's *Supplemental Atlas*. Definitions of terms used in the tables are provided in **Appendix E — Tables**.

Table 1

Relationship of Facilities and Toxic Releases to Block Group Demographics
Washington State Totals

Block Group Category	Minority	Low Income	Minority / Low-Inc.	Non Minority / Non Low-Inc.	State Total *
Block Group Distribution	1,521	1,791	969	2,277	4,620
Percent of State's Total	33%	39%	21%	49%	100%
Distribution of Facility Types					
Contaminated Sites	171	226	114	173	456
Treatment-Storage-Disposal Facilities	17	24	10	19	50
Major Water Releasers	29	32	14	38	85
Major Air Releasers	36	42	21	31	88
Landfills & Incinerators	5	8	3	19	29
Toxic Release Inventory (TRI) Facilities	107	140	73	133	307
Facility Totals **	322	414	210	363	889
Percent of State's Total Facilities	36%	47%	24%	41%	100%
1993 TRI Releases - in Pounds	6,016,468	8,660,199	2,755,926	12,665,513	24,586,254
Percent of State's Total TRI Releases	24%	35%	11%	52%	100%

* Columns are non-additive; only data in the **Non Minority / Non Low-Income** column are exclusive.

** Although some individual facilities fall into more than one category type, the values in this row are non-duplicative.

Table 2

Summary of State's Facility / Block Group Analysis

	State Total	State %	Minority	Low-Inc.	Min. / L.I.	Non Min. / Non L.I.
Number of Facilities in State	889		322	414	210	363
No. of Block Groups in State	4,620		1,521	1,791	969	2,277
Percent of State's Facilities		100%	36%	47%	24%	41%
Percent of State's Block Groups		100%	33%	39%	21%	49%

Shaded boxes here indicate the block group categories with the highest margin of facility / block group disproportionality.

Table 3

Summary of State's Toxic Release / Block Group Analysis

	State Total	State %	Minority	Low-Inc.	Min. / L.I.	Non Min. / Non L.I.
State TRI Releases in '93 (lbs.)	24,586,254		6,016,468	8,660,199	2,755,926	12,665,513
No. of Block Groups in State	4,620		1,521	1,791	969	2,277
Percent of State's Releases		100%	24%	35%	11%	52%
Percent of State's Block Groups		100%	33%	39%	21%	49%

Shaded boxes here indicate the block group categories with the higher margins of TRI release / block group disproportionality.

IV Results

It is important to understand that due to the study's limited scope, data limitations, and lack of established or agreed upon measurement standards, caution must be used in drawing conclusions based upon this study and its results.

In General...

There are at least two basic components in measuring environmental equity: 1) analysis of the geographic relationships of environmental facilities relative to various local populations, and 2) evaluation of the potential or actual impact of those relationships. This study began to address the first component. The second part, typically referred to as a 'risk assessment' or a 'health assessment' fell outside the scope of this study.

There are many ways to approach the challenge of measuring environmental equity, but there is no standard for such measurement. Washington's approach was guided by available data, a \$29,000 budget and a relatively simple, first-step attempt to better understand facility distribution relative to demographics. Staff made a conscious effort to approach and carry out the study with as little bias as possible. This is one of the reasons the study looked at such a broad range of facilities, rather than only Superfund sites and/or permitted hazardous waste Treatment-Storage-Disposal facilities.

Environmental equity is a local issue, as much or more than a county or statewide issue. It is usually addressed by comparing different parts of a city or county. Thus, the utility of relying upon statewide or county data and analysis is limited. Given this reality, the study results are also limited because they are derived from state and county data, which do not reflect more localized circumstances in detail. Statewide data tend to average out the local anomalies, masking them and their need of further attention.

A. Distribution of Environmental Facilities Relative to Demographics.

As can be seen in **Table 2**, the minority block groups represent 33% of the state's total, while containing 36% of the facilities — a fairly close match. Low-income block groups represent 39% of the state's total block groups, while they have 47% of the facilities — a disproportionately high percentage of facilities, with a variation of 8 percentage points. The block groups which meet both low-income and minority criteria represent 21% of the state's total, while hosting 24% of the state's facilities, again a fairly close match. The remaining 49% non minority/non low-income block groups contain 41% of the facilities — a disproportionately low percentage of facilities, with a variation of 8 percentage points. These data show that, statewide, the largest disproportion of facility distribution are in the low-income block groups, and in the non minority/non low-income block groups. The low-income block groups have a disproportionately higher percentage of facilities, while the non minority/non low-income block groups have a disproportionately lower percentage of facilities. When looking at facility distribution data at the county level, the variations are much larger, as can be seen in **Table 4**, in **Appendix E**.

When looking at the top eight counties in the state (by number of block groups), six of the top eight (King, Pierce, Spokane, Clark, Yakima, and Thurston) show that their low-income block groups have a disproportionately higher percentage of facilities. Similar results appear when looking at the top eight counties ranked by number of facilities. These data are shown in greater detail within **Tables 5 and 6**, located in **Appendix E**.

B. Distribution of Reported Toxic Releases Relative to Demographics

Statewide, the Toxic Release Inventory (TRI) data are less conclusive. When looking at reported releases for calendar year 1993, on **Table 3**, the TRI data give different results compared to facility distribution. The minority block groups (representing 33% of the state's block groups) received 24% of the releases. Low-income block groups (39% of the state's block groups) received 35% of the releases. Block groups meeting both low-income and minority criteria (21% statewide) received 11% of the releases. And, the non minority/non low-income block groups (49% statewide) received 52% of the releases. Again, at the county level, the range and variation of TRI releases relative to demographics is much greater in magnitude. County-specific TRI data are provided in **Table 7** in **Appendix E**.

At the county level, the TRI data is very similar to the facility data. The low-income block groups in the same six of the top eight counties (King, Pierce, Spokane, Clark, Yakima, and Thurston), received a disproportionately higher percentage of TRI releases, compared to the other three categories of block groups in those counties. When looking at the top eight counties ranked by pounds of chemicals released, disproportionately high values are nearly equal between the low-income block groups and the non minority/non low-income block groups. County by county TRI data are displayed in **Table 7**, with a focus on the top eight counties (by block group and by pounds released) in **Tables 8 and 9**, located in **Appendix E**.

C. Is There Environmental Equity in Washington?

At this point, the question cannot be fully answered. However, the data do suggest that the distribution of facilities and toxic releases around the state are not proportional to Washington's demographics.

Statewide, a greater proportion of facilities exist in low-income block groups, and a proportionately smaller number of facilities are in the non minority/non low-income block groups (**Tables 1 and 2**). The TRI data also indicate disproportionate distributions, but not in the same manner. Statewide, the TRI data show the greatest disproportions between minority block groups and block groups meeting both low-income and minority status. However, it is interesting to note that the TRI data show disproportionately low levels of releases in these two categories (**Tables 1 and 3**).

Locally, there is much more fluctuation when making the same comparisons. Examples include Pierce, Spokane, Clark, and Thurston county facility distributions (compared to block groups), each with at least a 15 percentage-point disproportionately high value within the low-income block groups (**Table 5**). Regarding TRI releases, the local variations are even greater: Pierce, Spokane, Clark, and Yakima counties each have at least a 30 percentage-point disproportionately high value within their low-income block groups. When looking at TRI releases in Snohomish and Yakima counties, the minority block groups have over a 45 percentage-point disproportionately high value (**Table 8**). It comes as little surprise that within these same noted counties, there is a nearly equal degree of disproportionately low distribution values, when looking at the non minority/non-low income block group category.

King county, the state's largest county by number of block groups (31%), and number facilities (24%), and the second largest by TRI releases (14%), follows the same pattern noted above. Its degree of variation between the non minority/non low-income category and the other categories, is relatively smaller in magnitude, similar to the state's averages. This would be expected since it represents such a relatively large portion of the state.

Comparing environmental equity in Washington to that of other states would be difficult because there are no relative measures by which to gauge such a comparison. A comparison to other states would also be difficult because Washington's study considered a broader range of facility types than typically considered in environmental equity/justice studies conducted in other states or regions. It would be possible to selectively compare like-facilities, such as Superfund sites or hazardous waste Treatment-Storage-Disposal facilities, as other states have done, but one might ask the purpose in such a comparison.

V Recommendations

A. Follow-up

The following recommendations are for the Legislature's consideration. Most apply to the Department of Ecology and the Department of Health, in general. They are intended to be a guide for consideration and follow up action by the two agencies in a jointly coordinated and supported manner. In addition, the Legislature, other state institutions, local and federal governmental counterparts, local communities and organizations, and local facilities, should show an interest and take an appropriately active role in the follow-through of these recommendations and related efforts. However, without legislative support with these various groups and organizations, follow-through on most of the recommendations will be difficult.

1. Further Analysis

Given the multitude of data, factors, approaches, and undefined issues, the potential for more analysis on environmental equity and related risk assessments appears to be endless. Resources for such research clearly are limited. From this premise, the following recommendations for further analysis are made (see **Appendix B** for related discussion).

a. Enhancements to the Study *Statistical Analysis*. Investigate the potential for additional statistical analysis. This could come from the state's colleges or universities, possibly within sociology, economics, or environmental study departments or programs. The data have not been analyzed to their full potential; additional expert attention to the data could prove to be both valuable and useful.

Identify Local Areas of Potential Concern. Since there is a greater degree of disproportionate facility distribution relative to demographics at the local level, and given that the data and maps are now available

from the study, it would be appropriate to use those resources in a cost effective and timely manner. It is therefore recommended that the Departments of Health and Ecology identify local areas that have relatively high concentrations or clusters of facilities. This would be the logical next step to assist the Department of Health in targeting areas for local health assessment studies. GIS mapping would make this a relatively easy task. The more challenging task would be deciding the criteria for defining which areas to analyze in greater detail. Selection of locations for a health assessment case study would most likely require additional analysis of facility distribution and demographic information. The inclusion of more of Ecology's environmental indicators could possibly support this type of analysis¹³. See discussion in **Appendix B**, question 1, item A.

b. Case Studies of Local Areas

Part One — Conduct a Localized Distance Analysis. This would be a case study on facility/demographic relationships based upon uniform distances from a facility or cluster of facilities. One or more case studies of selected local area(s) should be done. Such areas would be identified based upon the preceding recommendation. This type of case study would provide a much better understanding of the potential, or actual, causal relationships between facility locations and local populations, based upon actual distances, as opposed to semi-arbitrary block group borders and demographic classifications (minority, low-income, etc.). This could be done by Ecology, the Department of Health, academic institutions, or others. See **Appendix B**, question 1, item B.

Part Two — Conduct a Limited Health Assessment for the Same Local Area(s). In sequence to the above, this second part would begin to truly assess the potential or actual health risks associated with living in the local area(s) addressed in part one. The Department of Health would take the lead in conducting such a health assessment. See **Appendix B**, question 1, item C

2. General Coordination

a. GIS and Data Support

Verify Latitude/Longitude Coordinates.

Although a major effort was made to use accurate latitude/longitude coordinates, it was not possible to verify their accuracy due to resource limitations at the time of the study. This is crucial for any confidence in geographic (GIS) related data analysis. Ecology should manage information about facilities within an agency-wide database. This database should include both spatial GIS and tabular components. The precision and accuracy of the facility locations should be appropriate for future potential environmental equity analysis at the local level. This would require that facilities be represented as polygon features within GIS, with local accuracy better than ± 250 feet.

At the time of this report release, Ecology is embarking upon a major agency-wide initiative to coordinate and enhance its facility databases and data management procedures. This effort will include the enhancement of Ecology's GIS resources.

However, it will be important that resources at the Department of Health, as well as those of other relevant entities (such as county, city, and academic organizations), are used. Local resources often have more information about their local conditions. The Department of Natural Resources could be another possible resource for locational data.

b. Coordination

Support Environmental Equity Related Coordination. Continue to build and support intra- and inter-agency (local to federal) coordination regarding environmental equity. This would include items noted within **Appendix B**, question 5. and:

- ❖ sharing of related data;
- ❖ clarifying of terms and measurement methods;
- ❖ identifying, meeting, and coordinating with local areas or groups dealing with, or likely impacted by this issue;
- ❖ working with locally impacted or active groups addressing environmental equity.

Further, tie present and future study results to Ecology's efforts to track and use environmental indicators. And, continue to coordinate with Ecology's Community Right-to-Know data management system and community outreach efforts.

Convey the Study Results. Convey the study results to staff at Ecology, the Department of Health, the Legislature, and other state agencies (e.g., departments of: Community Trade and Economic Development; Social and Health Services; Natural Resources). Likewise, county government and other interested parties are likely to be curious about, and interested in the data, maps, and issues addressed in the study. The Department of Health and Ecology could offer this simultaneously within their respective agencies, and share the load of getting the information out to others.

B. Legislative Support and Funding

Carrying out most of the future analysis elements of the above recommendations requires legislative support and funding. The Legislature had the foresight to demonstrate its interest in the subject of environmental equity before the subject was forced upon the state by litigation or other forms of serious contention. Other states have not been as lucky. At the least, it would be prudent for the Legislature to take the results of this study and its recommendations under serious consideration. Beyond consideration, the Legislature would have to provide appropriate funding and authority to carry out whichever recommendations it chooses. Presently, there are no funds allocated for follow up to this study. The EPA has begun to make grant

funding available for environmental justice work, and Ecology has been indirectly involved with these efforts already. However, at this time, EPA has targeted their funds for local group involvement only. The funds are not intended for governmental agencies. Further, federal funds for environmental justice work is presently in question due to proposed budget cuts by Congress. If so directed, Ecology, the Department of Health, or other appropriate state agencies could do what was possible to supplement legislative funding by soliciting other sources of funding for environmental equity related efforts.

End Notes

1. Senate Bill (SB) 6401 passed out of the Senate but it did not come up for a vote within the House of Representatives before the session was completed. Also, proposed Resolution 1994-8692 within the Senate addressed the same topic; it also did not pass.

2. Engrossed Substitute Senate Bill 6244, Chapter 6, Laws of 1994, paragraph (18), pg 85, effective April 6, 1994. This was the source of the study's funding.

3. The following studies used the location of Superfund contaminated sites as a basis for the measurement of environmental equity:

A. Marianne Lavelle, Marcia Coyle and Others, "Unequal Protection," *National Law Journal*, Special Report, September 10, (Washington D.C., 1992);

B. United Church of Christ Commission For Racial Justice, *Toxic Wastes and Race in the United States*, (New York, 1987);

C. Hind, J. "Environmental Policy and Equity: The Case of Superfund," *Journal of Policy Analysis and Management*, 12 (2) (1993);

D. Zimmerman, R., "Social Equity and Environmental Risk," *Risk Analysis*, 13 (6) (1993);

E. United States General Accounting Office, *Siting of Hazardous Waste Landfills and Their Correlation with Racial and Economic Status of Surrounding Communities* (Washington D.C., Government Printing Office, 1983).

4. The following studies used the location of federally defined (Resource Conservation and Recovery Act - RCRA) Treatment-Storage-Disposal Facilities for the measurement of environmental equity:

A. Danika M. Holm, *Environmental Inequities in South Carolina: The Distribution of Hazardous Waste Facilities*, University of South Carolina, (Columbia, SC 1994);

B. United Church of Christ Commission For Racial Justice, *Toxic Wastes and Race in the United States*, (New York, 1987);

C. Mohai, P. and Bryant, *Race and the Incidence of Environmental Hazards*, (Boulder, CO, Westview Press, 1992);

D. Benjamin A. Goldman and Laura Fitton, *Toxic Wastes and Race Revisited: An Update of the 1987 Report on the Racial and Socioeconomic Characteristics of Communities with Hazardous Waste Sites*, Center for Policy Alternatives (Washington D.C., 1994).

5. The following studies used the location of federally regulated Toxic Release Inventory facilities for the measurement of environmental equity:

A. Lauretta M. Burke, *Environmental Equity in Los Angeles*, Technical Report 93-6, National Center for Geographic Information and Analysis (Santa Barbara, CA, 1993);

B. J. Stockwell and Others, "The U.S. EPA Geographic Information System for Mapping Environmental Releases of Toxic Chemical Release Inventory (TRI) Chemicals," *Risk Analysis*, 13 (2) (1993).

6. To rank block groups by the past five year's TRI releases, would have meant including facilities which were not necessarily included in the 1993 reporting year (because of changes in operation, chemicals used, regulatory changes, etc.). This would have complicated the databases by having to include past reported releases for some facilities, while not having such data for others, thereby corrupting the data's consistency, and leading to an incomplete comparative analysis. When conducting such a ranking, many other factors need to be considered in order to more appropriately be able to compare one block group with another. Such a ranking falls under the general guise of a 'health' or 'risk' assessment, which was beyond the scope of this study.

7. At Ecology, the League for Environmental Equity and Diversity (LEED Team) was established within the Department's Waste Division to enhance workforce diversity and to ensure equitable environmental decision making. Their report (June 1995) included the referenced Environmental Equity definition.

8. Mike Mattheisen, U.S. EPA, Office of Civil Rights, Washington, D.C., presentation to National Governor's Association workshop on Environmental Justice, New Orleans, Louisiana, February 23, 1995.

9. Letter to Ms. Piper Peterson, Region 10, U.S. EPA, from Mr. William C. Sullivan, representing the Puyallup Indian Tribe, March 6, 1995. The Puyallup Tribe is located in Pierce County, east of Tacoma, Washington.

10. ARC/INFO is a Geographic Information System (GIS) developed by Environmental Systems Research Institute (ESRI).

11. Not all facilities had releases on site. In the case of facilities which reported under the Toxic Release Inventory (TRI), some or all of their generated wastes could have been shipped off site for treatment or disposal elsewhere. Also, due to TRI reporting requirements, it is possible that a TRI reporting facility did not have any releases during the year. A number of facilities reported zero pounds released during 1993.

12. "Poverty" is built upon the federal government's assumption that a person needs a minimum nutritional intake to sustain basic health. The least costly way to meet an 'economy' food plan was calculated by the government. Further, "it was determined from the Agriculture Department's 1955 survey of food consumption that families of three or more persons spend approximately one-third of their income on food; hence the poverty level for these families was set at three times the cost of the economy food plan." The costs of meeting this food plan is routinely updated to reflect current costs. In 1989, the poverty level for a family of four was set at \$12,674. Source: *1990 Census of Population and Housing, Summary Tape File 3*, Appendix B., pg B-28.

13. As discussed in *Washington's Environmental Health 1995*, (Publication Number 95-700), A Summary of Environmental Indicators (Washington Department of Ecology), there are a number of measurable indicators which could support an effort to better identify and assess local environmental health, and local communities where further analysis would be appropriate.

Appendix

Table of Contents

Section	Title	Page
A.	Detail of Study Methodology	31
B.	Further Considerations and Options	38
C.	Facility Descriptions and Maps	41
D.	Demographic Definitions	50
E.	Tables	52
F.	Related Environmental Equity Activities In Washington	66

Maps

No.	Title	Page
4.	State Map	42
5.	Contaminated Sites	43
6.	Hazardous Waste Treatment Storage & Disposal Facilities	45
7.	Major (high-volume) Waste Water Releasers	46
8.	Major (high-volume) Air Releasers	47
9.	Solid Waste Landfills & Incinerators	48
10.	Toxic Release Inventory Reporters for 1993	49

Tables

No.	Title	Page
4.	Facility Distribution Compared to Block Group Distribution - by County	54
5.	Facility Distribution - Top 8 Counties (by block group count)	58
6.	Facility Distribution - Top 8 Counties (by facility count)	59
7.	Toxic Release Inventory (TRI) Distribution (1993) Compared to Block Group Distribution - by County	60
8.	Toxic Release Inventory (TRI) Distribution - Top 8 Counties (1993) (by block group count)	64
9.	Toxic Release Inventory (TRI) Distribution - Top 8 Counties (1993) (by pounds released)	65

Ecology has produced a companion document to this report. The *Environmental Equity Study Supplemental Atlas, Publication Number 95-414*, is printed in an 11"x 17" format to accommodate detailed maps for all of Washington's counties. The maps identify locations for facilities and block group characteristics. Tables with detailed data for each county are also provided.

Appendix A. Detail of Study Methodology

The study design followed specific sequential steps. Section III of the report provides a brief description and discussion of each step. The study steps were:

1. Collect and consolidate various databases at the Department of Ecology (Ecology) that contained locational references to facilities and contaminated sites;
2. Identify minority and low-income communities using U.S. Census data;
3. Combine the two databases into one, allowing for comparative analysis and the generation of tables;
4. Map each county, or subsections of high population counties, to show facility locations relative to the demographics;
5. Apply basic statistical analysis to determine the proportional distribution of the facilities and toxic releases, relative to the demographics;
6. Develop appropriate recommendations for the Legislature and the two agencies using the study results and other resources within Ecology and the Department of Health.

1. Facility/Site Selection

The first step involved checking for complete facility/site locations. Since Ecology kept at least six different databases that tracked seven different types of facilities or sites known to, or likely to, release contaminants, it seemed appropriate to use them all. A general listing of the facility types follows, with more complete definitions appearing in **Appendix C - Facility Descriptions and Maps**.

The following facility types were considered in the study:

- 1) Contaminated Sites
- 2) Hazardous Waste Treatment, Storage, and Disposal Facilities

- 3) Major (high-volume) Waste Water Releasers
- 4) Major (high-volume) Air Releasers
- 5) Solid Waste Landfills
- 6) Solid Waste Incinerators
- 7) Toxic Release Inventory Reporters

The latitude and longitude coordinates for each facility linked each of these databases, but the accuracy of the coordinates was not known. The effort to confirm latitude/longitude coordinates for the 889 individual facilities was tedious and time consuming, lasting from July 1994 through March 1995.

The facilities addressed in this study did not reflect all locations where a release of hazardous contaminants could pose a human health or environmental threat. Rather, the facilities represented one of many categories of potential environmental risks a community should consider. Many locations in Washington generate or store hazardous materials or wastes, but do not typically release them. Transportation routes, commercial warehouses, retail outlets, and small repair or machine shops are examples. Although these businesses certainly could pose a potential (if not actual) risk to a community, the study chose not to include them because they were not known to have released contaminants to their local environment. There was no attempt in designing the study to imply that these other facility types were any less of a potential threat, or any less related to environmental equity issues. In addition, the inclusion of well over 10,000 such locations statewide could have skewed the data away from the facilities known to have released pollutants and contaminants. Further, including these types of businesses would have increased the study's complexity because of the data's diversity, due to different reporting requirements and different types of businesses reporting. Finally, most of these facilities were not tracked in a database with geographical locations. The ability to evaluate these additional types and numbers of facilities in an equal manner would have been beyond the study resources.

How Facility Data Was Prepared

Data Validation

By necessity, Ecology chose each of the databases in part because they contained site specific locational information, usually in the form of latitude/longitude coordinates. Facilities often appeared simultaneously in two or more databases, showing different coordinates. Likewise, facility names were tracked in different ways (spellings, titles, etc.). Verifying this information required time to ensure there was a complete listing of the facilities, without duplication.

Many facility latitude/longitude coordinates needed correction or entry for the first time. This was accomplished through a combination of resources. Study staff called the facilities, cross referenced databases, and used the "Matchmaker" software program to complete the locational portion of the databases. When given a physical address, Matchmaker usually provided a latitude/longitude coordinate. This software used established, preprogrammed, physical markers for a local area, such as roads, intersections, water boundaries, and confirmed addresses, to generate a latitude/longitude coordinate. The approximate margin of error for the generated coordinates was not less than 200 square feet; although the error margin could have been much higher. The Matchmaker software used data from the U.S. Bureau of the Census.

Data Consolidation

Ecology created the six databases independent of one another, because they were based upon different environmental laws. Each database typically used different naming, locating, and other tracking conventions. In spite of this, coordinated support from the various program's staff made it possible to create a prototype master database that showed the locational information for 889 individual facilities in a uniform format. A number of the facilities were tracked in more

than one database because they were regulated under multiple environmental laws. This is why the combined number of facilities within the six databases totaled 1,015. Data analyses were based upon the non-duplicated list of 889 facilities.

Facility Data Limitations

The data provided a reasonable first-step approach to evaluate the locational relationship between demographics and facilities. More complicated analyses on facility data remains an option for the future.

Few Coordinates Were Verified.

It was not possible to verify the exact locations of all the facilities with 100% accuracy. Although a notable effort was applied to this task, it will be some time before all such data elements can be verified¹. The location information used by this study varied significantly. Some businesses had reported their street address, which was not necessarily where the waste was discharged. Other businesses gave the exact location of a smoke stack or discharge pipe.

Coordinates Are Not Areas.

Typically, an area (or polygon) becomes contaminated, not a single point. A latitude/longitude coordinate provides only a point. For a discharge location, an exact point is preferred, but it is of minimal value for a contaminated area. Using a single set of coordinates limited the identification of a contaminated area, yet this was all that was available.

¹ The Department of Ecology has recently initiated an Information Intergration Project (IIP), which is designed to link most of Ecology's facility related databases across the Agency. These include the databases used in this study. Another key component of the IIP is to enhance the Agency's Geographic Information System (GIS) through better collection and use of facility/site locational data.

Released Wastes Typically Move Away From Source.

Most pollutant discharges from facilities do not stay at the initial point of discharge; once released, air and water discharges tend to drift away. Likewise, though typically slower, ground or groundwater based contaminants move away from their initial spill or disposal site. A limitation of this study was that only the point of discharge was used in the analysis.

Facility Locations Are Not Given Relative to Population Densities Within a Block Group.

Simply identifying a facility's location within a given block group does not identify the facility's position relative to the high and low density areas of the block groups. For that matter, a facility located in a low population area of its host block group could lie close to a heavily populated area in a neighboring block group. The tabular data would not reflect this. A block group showing no facilities within its border could in fact be very close to one or more facilities in an adjacent block group(s). The tabular data alone would not reflect this either. This is one reason why mapping the facilities relative to population densities (or other references to populations) became a critical tool for the study analysis.

On a larger scale, the analysis of Washington's facilities did not consider bordering polluting facilities in Oregon, Idaho, or British Columbia, Canada. Effluents from these areas reach, and potentially impact, the human and environmental health of Washington. Similarly, some of Washington's contaminants will go outside its borders and potentially affect tribal lands, neighboring states, and other sovereign regions.

Time Sensitivity

The study considered facilities and sites confirmed as releasers of wastes, or as contaminated during the most current year, from

each of Ecology's various databases (1993 - 1994). It was not practicable to compare prior year's databases with the current databases due to incompatible data formats. Thus, the study could not consider a broader historical perspective. Several thousand suspected contaminated sites were not considered in the study because they lacked documented confirmation of contamination. Additional facilities and contaminated sites were not evaluated in the study because many of them legally generated or released smaller quantities of hazardous waste during the 1993, placing them below regulatory thresholds for reporting. Another reason for unknown releases was because they were illegal and/or unreported.

History of when facilities were originally sited, or when the initial contamination took place was not always available. Intuition suggests an inter-relationship between when facilities were sited (or when contamination took place), neighboring property values, and when an area became residentialized. These factors were not addressed in the study.

The Toxic Release Inventory (TRI) data were another example of time sensitivity as a limitation. The Legislature's environmental equity proposal looked for an analysis on the amount of toxic chemicals released during the most recent five years, based upon the TRI data. But, the most recent five years of TRI data did not include the same facilities for each year. Over the past five years, some facilities stopped reporting, while others began. This was usually due to changes in the federal reporting requirements, or a changes in the facility's production or chemical use values². In an effort to address this limitation, the study evaluated TRI releases for the 1993 calendar year (the most current available).

² See endnote 11 regarding other conditions of the Toxic Release Inventory data.

Toxic Chemical Releases - The Data Are Limited.

The study's reference and use of the TRI data was limited in a number of ways. Releases were often based upon calculations or estimates, not necessarily direct measurement. The TRI data did not give the chemical concentrations for the releases. The TRI data by no means represented all of the toxic chemicals or wastes released into the state's environment; some estimations at the national level suggest that TRI releases represent as little as 5% of all actual toxic releases. Only larger manufacturers reported TRI releases, so there were many other unreported releases. And, although the TRI data reflected a reporting facility's total reported releases for calendar year 1993, the data did not show if those releases were uniform during the entire year, or if they took place over a relatively short period. Finally, there was very little review or enforcement regarding the quality of reported TRI data. Few Environmental Protection Agency resources exist for TRI review or enforcement in Washington. They mostly focused on the identification of facilities that failed to report under the TRI laws, rather than on the validity of the data submitted by those facilities that did report.

Types of releases tracked in Ecology's five other databases differed from the TRI releases. Air and water discharges were often tracked in relation to amounts that could not be exceeded by permit as opposed to the actual quantities released. For example, a business may have had a permit to release 10,000 pounds of a certain waste during a particular year, but they may not have released that entire amount. Also, the types of chemicals or compounds tracked differed. An example was the priority air pollutant data, which tracked particulates and compounds, such as carbon monoxide or sulfur dioxide. These compounds were not tracked in TRI, yet both are known to pose potential health risks. Since these other data formats did not provide chemical release information in a comparable format to the TRI data, they were not included in this study.

2. Demographics

In the study's second step, Ecology gathered Washington's 1990 U.S. Census data reflecting local communities of color and low-income status. The U.S. Census data were the only reasonably accessible source of demographic information. Although formatted for different needs and parameters, the same basic census database has been used by legislative commissions for voter re-districting purposes, and by the state's Office of Financial Management (OFM) for other demographic needs.

The "block group" was determined to be the unit of demographic area used to reflect communities. A block group represents, on average, an area containing approximately 400 households. There are 4,620 block groups in Washington. A more detailed discussion of demographic terms appears in **Appendix D - Demographic Definitions**.

How The Census Data Were Prepared

The U.S. Census data did not require much preparation. Commonly referred to as the TIGER Files (Topological Integrated Geographical Encoding and Referencing), these data originated from the federal Department of Commerce's Bureau of the Census. Ecology obtained census data from the Washington State Library. Ecology staff subsequently formatted the census data to reflect minority and low-income status, based in part upon advisement from the Bureau of the Census and OFM. The manner of how minority and/or low-income status was established for the study is in **Section III - Methodology**.

Data Limitations

One of the most notable limitations with the census data was based upon the somewhat abstract boundaries (block groups) relative to the study's environmental facilities. This is not meant to imply the data were not useful. But, when considering the location of a facility relative to a given block group, the wastes released from that site typically move, at least in part, outside the block groups' borders, especially if they are air borne releases.

This issue of distance could be addressed more adequately by evaluating population groups relative to uniform distances from facilities, rather than by looking at the block groups in which facilities are located. This is a component of one of the study recommendations (see **Section V - Recommendations, item A. 1. b. - Case Studies of Local Areas**). Regarding the measurement of local environmental equity relative to facility distribution, the analysis of all populations within a one mile radius, for example, relative to a given site, would be more uniform and perhaps more realistic. This is sometimes referred to as centroid analysis. However, it would be difficult to measure smaller internal populations (such as communities of color or low-income) based upon the existing political boundaries. Uniform distances from a given point will frequently cross block group boundaries, making the census demographics nearly impossible to use. This kind of demographic analysis would require sophisticated computer programs. It is likely that detailed on-location population surveys would be needed to generate data and to validate the computer's data modeling. See the related discussion in **Appendix B - Question 1**.

There are other limitations to the census data. The census data came from the 1990 census, and the poverty levels were based upon 1989 standards - both somewhat out of date. Similar to the facility databases, little or no information existed on the demographic history for a given area, showing the construction of residences relative to neighboring facilities. In terms of causal relationships, the history of an area's facility and residential development likely plays a significant role.

Finally, the demographic classifications do not mean that all residents or households within an given block group met the classification criteria for which the block group was designated. Block groups very likely have many classifications of residents within their borders.

3. Data Consolidation & Tables

The third step of the study consolidated the six facility databases into one. Once merged, the data were evaluated noting facility distribution relative to five categories of block groups: 1) Minority; 2) Low-Income; 3) Minority and Low-Income; 4) Non Minority/Non Low-Income, and; 5) Totals. **Section IV** contains the tables reflecting the consolidated data, while **Appendix E - Tables** presents county-specific data.

Tables comparing the locations of various facility types and toxic chemical releases relative to communities of color and/or low-income, furnished a fundamental tool for the study and analysis. Tables were generated both at the state level and for each of Washington's 39 counties.

Table 1, in Section III - Methodology, shows the placement of the various facilities and toxic releases across the state relative to block group type. Data for each county appear in a similar format in the *Supplemental Atlas*. **Tables 2 and 3** summarize Table 1 for facility totals, and Toxic Release Inventory totals respectively. **Tables 4-9, in Appendix E**, reflect county-specific data and county rank analysis, based upon percentage comparisons, rather than direct numerical counts.

Limitations With The Table's Data.

Looking at Cowlitz county's data in the *Supplemental Atlas*, as an example, facility distribution can not be equal. The tabular data identify 54 block groups classified as Non Minority/Non Low-Income. There are 15 facilities within these 54 block groups. The data cannot show if all 15 facilities are in one particular block group or if they are equally distributed among the 54. Since 15 facilities can not be equally divided into 54 block groups (in whole numbers), this example shows that "equity" would not be possible in Cowlitz county, in terms of equal distribution of facilities among the 54 block groups. In reality, some block groups will have facilities

and others will not. This is a clear example of some limitations in using statistics to measure environmental equity.

Data representing many of the counties with lower populations reflect numbers which are so low as to be quite limited for statistical value. In some cases, the data from low population counties become inappropriate for comparison to counties with 10 or 100 times more block groups or facilities. Columbia, Garfield, San Juan, and Wahkiakum counties had no facilities (as defined) in the databases. Another four counties, Asotin, Ferry, Lincoln, and Pacific, had only one or two facilities each. On the other hand, King County had 200 facilities and Pierce County had 107 facilities. Regarding block groups, Garfield County had only four block groups, while King County had 1,408 block groups. At the county level, statistical analysis and statistical significance can become questionable when there are low quantities of data with which to work (**Table 4**).

4. Mapping

Step four involved mapping the data using Ecology's Geographic Information Systems (GIS). One of the study goals was to convey its results as clearly as possible to a broad range of readers. Ecology staff decided early on to include maps in the study and report because the maps make it much easier to understand the relative distribution of the facilities compared to tabular data relationships. Use of the maps also significantly reduced the time necessary to assess and analyze block group and the facility distributions.

The study produced 45 maps showing statewide, county, and in some cases, more localized data. Due to size limitations, the maps shown in this report provide less detail and data as compared with the maps provided in the study report's *Supplemental Atlas*. For visual clarity, block groups are distinguished in the maps by different gradations of grey,

without their respective internal borders shown when they are contiguous. This removes many lines (see **Map 2 - Washington's Block Groups**), that would clutter the map's other items such as facility locations, city names, and city boundaries. When observing the block group distinctions on the maps, keep in mind that one uniform area (by shading gradation) could represent one or many contiguous block groups, since their internal border lines are not displayed (see **Map 3 - Cowlitz County**).

Some low population counties were consolidated onto one map. This was done because there were few (or no) facilities in some of these counties, and they had relatively few block groups. For high population counties, larger scale sub-county maps were generated by GIS staff to better distinguish the many facilities and block groups within those counties.

5. Data Analysis

Data analysis comprised step five of the study. The application of proportionality, based upon county and state percentages for the various categories considered, provided the foundation of the data analysis. **Section IV - Results**, describes how the data were evaluated. **Tables 4-9 in Appendix E**, show the proportional relationships used to assess the data.

In some counties, such as Clark, Pierce, Spokane, and Yakima, there is a proportionately higher number of facilities within the low-income block group category. The majority of the facilities in these counties are also located in the low-income block groups. In other counties, such as Benton, Cowlitz, Kitsap, and Whatcom for example, the non minority, non low-income category of block groups hosts a greater number and proportion of facilities (**Tables 4-6**). In Snohomish and Yakima counties, there is a notably high proportion of toxic chemical releases within the minority category of block groups (**Tables**

7-9). The key word here is “proportional.” The proportions or disproportions were determined by comparing the percentages for each individual block group’s categories, to the same-category percentages for that block group’s county. State percentages are based upon state totals in the same way by comparing facility and toxic chemical distributions against block group distributions.

As noted earlier in the report, standard methodology for environmental equity data analysis has not been established. Because of this, staff decided early on to make all of the study’s facility data available to encourage other forms of analysis. Ecology and the Department of Health continue to be interested in options and methodologies to improve this kind of study and better evaluate the factors related to environmental equity. Data sources, time periods evaluated, and statistical applications are examples of where there is ample room for further evaluation and possible improvement.

6. Recommendations

The sixth step was the review of the study analysis and results by Ecology and the Department of Health. This review produced follow-up options and recommendations that are discussed in detail in **Appendix B - Further Considerations and Options**.

The recommendations take into account that no funding has been allocated for related activities in follow-up to this study. Therefore, the departments of Ecology and Health developed recommendations for 1) legislative consideration and action, and 2) internal opportunities, which could use existing general resources. Should the Legislature choose to carry out recommendations presented in the report, additional funding for such action(s) would likely be necessary.

Finally, an extensive review process took place before the report was published. Review of the report included representation by over thirty Ecology staff, as well as staff from the Department of Health, the Office of Financial Management, and the U.S. Environmental Protection Agency.

Appendix B. Further Considerations and Options

The following questions and issues assisted Ecology with understanding the study results and the many factors and limitations which contributed to them. This appendix acts as the template for many of the recommendations in **Section V**.

1. What are the relationships between these facilities and their local communities regarding public health?

This is not clearly understood, although it could be addressed by additional analysis. Study options for this are nearly limitless, yet resources are not. Three basic levels of analysis, when done in sequential order, could go a long way toward identifying locally impacted areas and evaluating the facility/public health dynamics within them:

- A. Identify Local Areas of Potential Concern;
- B. Conduct a Localized Distance Analysis;
- C. Conduct a Limited Health Risk Assessment.

Each level goes into a greater degree of analysis and complexity, with the first being the least resource intensive. The results of each level's efforts would be expected to peel away more layers of confusion regarding the many factors to be considered. A detailed discussion of each follows.

A. Identify Local Areas of Potential Concern. Use GIS and a set of criteria to select which local areas would most likely benefit from expanded analysis. The identification of local facilities, local populations, and local environmental areas of interest (environmental indicators³) could then be evaluated as an interrelated system. Once identified, a combination of local, state, and federal agencies, and those who lived or worked in the identified areas, could better position resources to jointly decide whether or not health assessments, other analysis, or other possible avenues for action would be warranted. This item is recommended in **Section V - Further Analysis, Enhancements to the Study**.

B. Conduct a Localized Distance Analysis. A question directly related to the above is,

How to best address the block groups, which were shown as not having one or more facilities within their borders, yet were likely exposed to the waste and or environmental influence of facilities in neighboring block groups?

To address this question, a more complete method by which to study local environmental equity may be to evaluate the population diversity in an area of uniform distance around a facility or cluster of facilities — as part of a case study. For example, rather than counting the number of facilities or sites within a block group, Ecology/Department of Health could identify several environmental facilities, or clusters of facilities, to study, and then identify the populations living within a given radius (0.5, 1, or 2 miles, for example) of the site. This would provide a clearer picture of potential or actual population impact relative to these facilities by eliminating the majority of the potential errors introduced by use of the census data. This time consuming method would likely require more sophisticated GIS resources to relate the facility locations and the populations located within a given radius⁴. This research would provide only localized analysis; it would not generate a statewide environmental equity measure.

³ See endnote 13 regarding Ecology's Environmental Health Indicators as presented in *Washington's Environmental Health 1995*. (Publication number 95-700).

⁴ With air, even this approach does not account for true effects and transport of emissions. For example, while ozone precursors are generated in the Seattle area, it takes time for the chemical reactions to form ozone. High ozone values are seen in the rural areas at the Western base of the Cascade mountain range, where local air currents take them far away from their source. In terms of air contaminants, point source modeling is typically conducted for a 50 kilometer (30 mile) radius, also indicating limited value in analyzing environmental impacts based upon a relatively small radius.

This approach has been applied in other environmental equity studies⁵. It would be a logical follow-up to this study, at least for a select number of local areas. This approach clarifies a number of proximity issues. In terms of demographics, identifying various population groups within an area of a given distance from each facility would require additional work since census data do not provide this kind of detail. This is recommended under **Section V - Further Analysis, Case Study of Local Areas - Part One**.

C. Conduct a Limited Risk Assessment.

While item B above may give a clearer picture of local demographics relative to facility locations, it still will not identify the adverse health effects those populations living near the facilities may be experiencing, regardless of minority or income status. Only a case study risk assessment would identify such health impacts. This type of a health analysis evaluates the potential adverse health effects experienced by those people living near environmental facilities. The assessment would need to link existing adverse health outcome databases, such as cancer registries, the birth defects registry, and hospital discharge information (CHARS) to the locations of certain facilities. Several variations of these studies would be possible given adequate resources and time. This is recommended under **Section V - Further Analysis, Case Study of Local Areas - Part Two**.

⁵ To date, Washington is aware of only two environmental equity studies for which this type of radius-based analysis was done. One took place in Detroit, Michigan in the early 1990's: Mohai, P. and Bryant, *Race and the Incidence of Environmental Hazardous*, (Boulder, CO, Westview Press, 1992). The other was done for targeted regions in South Carolina: Danika M. Holm, *Environmental Inequities in South Carolina: The Distribution of Hazardous Waste Facilities*, University of South Carolina (Columbia, SC, 1994)

Even by addressing all three of the levels of this issue, it is not clear that the public would necessarily benefit from such analysis. On the other hand, not enough is known to suggest that public benefits would not be gained by pursuing any one of the above options.

2. Why is it that income appears to be more of a factor than minority status?

This is not confirmed, nor is the relationship between low-income block groups and facility distribution completely understood. Factors which could contribute to this observation include:

- ❖ The criteria used to designate minority and low-income block groups;
- ❖ The potential problems associated with under-counting in low-income and minority areas during the 1990 census. However, the significance of possible under-counting in Washington is not known;
- ❖ The housing costs and property values relative to facility sites;
- ❖ The relationship between household income and availability/choice of living locations.

Conducting an expanded study by socio-economic experts, would offer a reasonable option to address this relationship. State colleges or universities could pursue this level of analysis. However, since this issue focuses more on historical and causal relationships, its enhanced study may provide fewer direct benefits to the public. For this reason, it is not one of the study recommendations.

3. Is there a feasible way to determine relative risks between the various types of facilities evaluated?

This would be very complicated and difficult, if not impossible. Each facility is unique because of its particular waste stream (chemicals and compounds involved, concentration, and frequency of releases), and the

local conditions that influence contaminant migration. Further, a historical perspective of a site's activities and releases would be helpful, if known (often unavailable for contaminated sites), as would ground contamination levels and rates of migration from the point(s) of release. If surface or groundwater is, or has been, subject to contamination, this too would have to be addressed relative to local exposure and use of that water.

On a very localized basis, such analysis could be conducted on a limited scale by the Department of Health. This could give additional information to better understand relative risk between specific facilities or sites. Additionally, environmental epidemiologists within the Department of Health could evaluate some of these related issues and then make further recommendations. This option is not to be confused with question 1, item C. above. This issue addresses risk comparisons relative to facility type. It is not a localized public health risk analysis. Based upon the complexity of this question, further analysis is not recommended at this time.

4. Is there a feasible way to determine relative risk or environmental equity between the 4,620 block groups within the state, in relation to the facilities evaluated in this study?

This would be very difficult and even more complicated for the same and similar reasons discussed in the preceding comment. Such demographic considerations would have to include the combined potential or known effects from multiple facilities within and between all block groups. Due to complexity and the need for extensive resources, it is not recommended for further research.

5. What steps can Ecology, the Department of Health, and other groups or institutions (community groups, local government, facilities, the Legislature, EPA, etc.) take to acknowledge and address "inequities" as observed in this study or elsewhere?

Distribution of this environmental equity report is a good first step. Within Ecology and the Department of Health, staff and management would likely benefit from a brief description and overview of how these issues may touch upon their respective roles. Examples may include:

- ❖ Adopting standard definitions of Environmental Equity;
- ❖ Designating a person or group to become a key resource on environmental equity issues;
- ❖ Providing for quality, multilingual translations and interpretations when needed, including the translation of this report into Spanish;
- ❖ Reviewing and revising program policies in relation to environmental equity issues;
- ❖ Training staff on environmental equity factors which other states have already had to address (e.g., permitting, facility siting, clean-up enforcement);
- ❖ Adopting success measures for tracking the results of various related efforts.

Note in **Appendix F - Related Environmental Equity Activities in Washington**, that these and/or similar efforts are already being carried out by EPA and the City of Seattle (as well as by the state of Oregon⁶).

These items are recommended in **Section V, under General Coordination, Convey the Study's Results.**

⁶ Oregon State established the Environmental Equity Citizen Advisory Committee, which generated a number of recommendations for their state's various agencies regarding environmental equity issues. These are published in the Oregon Environmental Equity Citizen Advisory Committee Report — On Ensuring Environmental Equity in Oregon, 1994. The lead agencies in support of this report were Oregon's Department of Environmental Quality, and the Oregon Health Division.

Appendix C. Facility Descriptions and Maps

For the purposes of this study, “environmental facilities” (facilities) were considered to be businesses, contaminated sites, and/or solid waste landfills or incinerators. Businesses and contaminated sites included confirmed locations where hazardous wastes were reported to be released into the environment, or where the facilities were permitted to treat, store or dispose of hazardous wastes on site. Solid waste landfills and incinerators were included because typically household hazardous wastes have been part of solid wastes, ending up in landfills or at incinerators. The study did not include all the known solid waste landfills which had been closed prior to 1988. However, nearly 100 of the contaminated sites included in the study were closed landfills. Thus many landfills were included as “contaminated sites” instead.

Not included in the study were many hundreds of sites where owners or operators reported a release of hazardous substances to the environment. These sites are either in the process of, or have completed, an independent cleanup. The majority of these contaminations resulted from leaking underground storage tanks. Ecology does not typically verify the extent or nature of a reported release or the efficacy of the cleanups conducted at independent sites. Information on these independent cleanups is maintained in paper files located at Ecology’s regional offices.

Other types of facilities and sites were not included as well. See **Appendix A, 1.- Facility/Site Selection** for further discussion.

The facility types included in the study were:

1) Contaminate Sites. Approximately 450 sites were included from Ecology’s “Hazardous Sites List,” as of August 1994. These were sites with confirmed contamination and subject to cleanup under the Model Toxics Control Act (Chapter 70.105D, Revised Code of Washington). Sites included landfills (of which approximately 100 are now closed),

abandoned contaminated property, and contaminated property associated with operating businesses. These facilities are tracked by Ecology’s Toxics Cleanup Program.

2) Treatment, Storage, & Disposal Facilities (TSD’s). These 50 facilities were tracked under the federal Resource Conservation and Recovery Act, as businesses specifically permitted to broker and treat, store and/or dispose of hazardous wastes. Several thousand hazardous waste generators were not included in the analysis because they were permitted to maintain smaller quantities of wastes on site on a temporary basis. TSD’s were considered a relatively higher potential risk to their respective communities because of the more stringent regulations regarding their higher quantities of managed hazardous wastes. Some of the methods used by TSD’s for waste treatment involved routine air emissions. Ecology’s Hazardous Waste and Toxics Reduction Program tracks the TSD’s in Washington.

3) Major Waste Water Discharges. Ecology’s Water Quality Program tracks approximately 2,000 facilities permitted to discharge waste water directly into a surface water or to the ground. These facilities have either a National Pollutant Discharge Elimination System (NPDES) permit under the federal Clean Water Act, or a state waste water discharge permit. The study looked at 85 ‘Major’ NPDES permits. Major NPDES permits were defined as permits issued to facilities discharging more than 1,000,000 gallons of waste water per day to surface water. They mostly included municipal waste water treatment plants and industrial facilities. Only the Majors were used for this study.

4) Major Air Releasers. There are approximately 500 facilities tracked by Ecology’s Air Quality Program, of which about 90 ‘Major’ sources were included. The Majors were defined as businesses permitted to discharge 100 tons or more of wastes to the air on an annual basis (1994). This subset of 90

facilities was contained within Ecology's Operating Permit List. These facilities were permitted according to their potential to emit a specified amount of criteria pollutants.

5) Solid Waste Landfills. These were municipal solid waste disposal sites. Although these locations are not regulated as disposal sites for businesses generating hazardous wastes, most, if not all of these facilities are used as disposal sites for household hazardous wastes. Ecology's Local Government Solid Waste Program (formally the Solid Waste Services Program) works with local municipalities in tracking 23 active municipal solid waste landfills.

6) Solid Waste Incinerators. As of the end of 1994, there were six solid waste incinerators operating in Washington (two privately owned, three publicly owned), which were included in the study. These facilities are tracked by Ecology's Local Government Solid Waste Program.

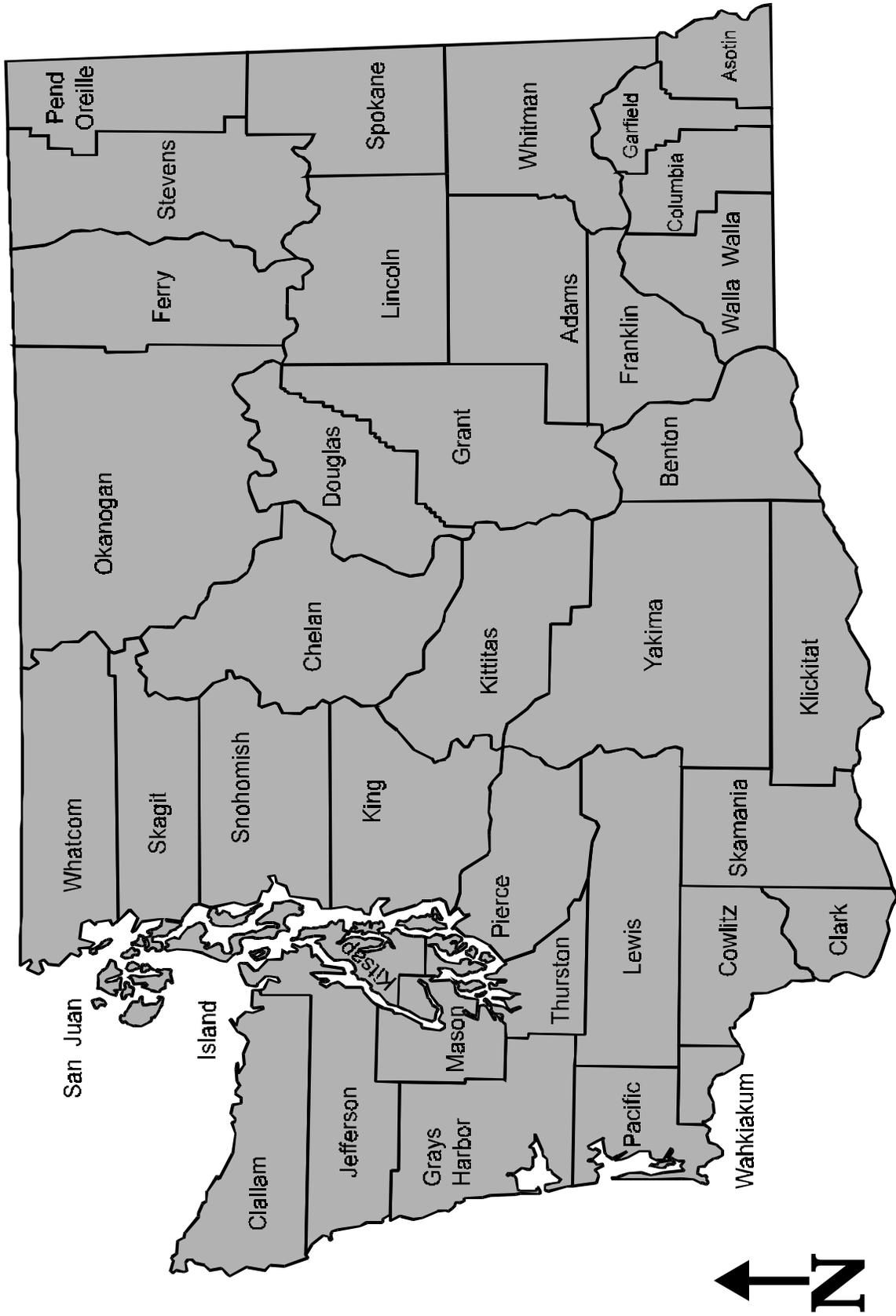
7) Toxic Release Inventories (TRI). These were businesses reporting under the federal Community Right-to-Know law⁷ for the 1993 calendar year. By definition these manufacturers had 10 or more full-time employees (annual average), and handled specifically listed toxic chemicals of concern to the Environmental Protection Agency. These facilities had to report their annual totals of toxic releases, if they manufactured, produced, or otherwise used any one of approximately 320 listed chemicals and some compounds, at quantities above listed thresholds (in pounds), during 1993.

Although most TRI reporting facilities do in fact have releases, some do not. A facility may be required to report due to quantities of chemicals manufactured, produced, or otherwise used, but this does not necessarily mean that the facility released the chemicals. All TRI facilities were included in the study, whether or not they reported releases. A small number of TRI facilities reported zero releases for the 1993 year.

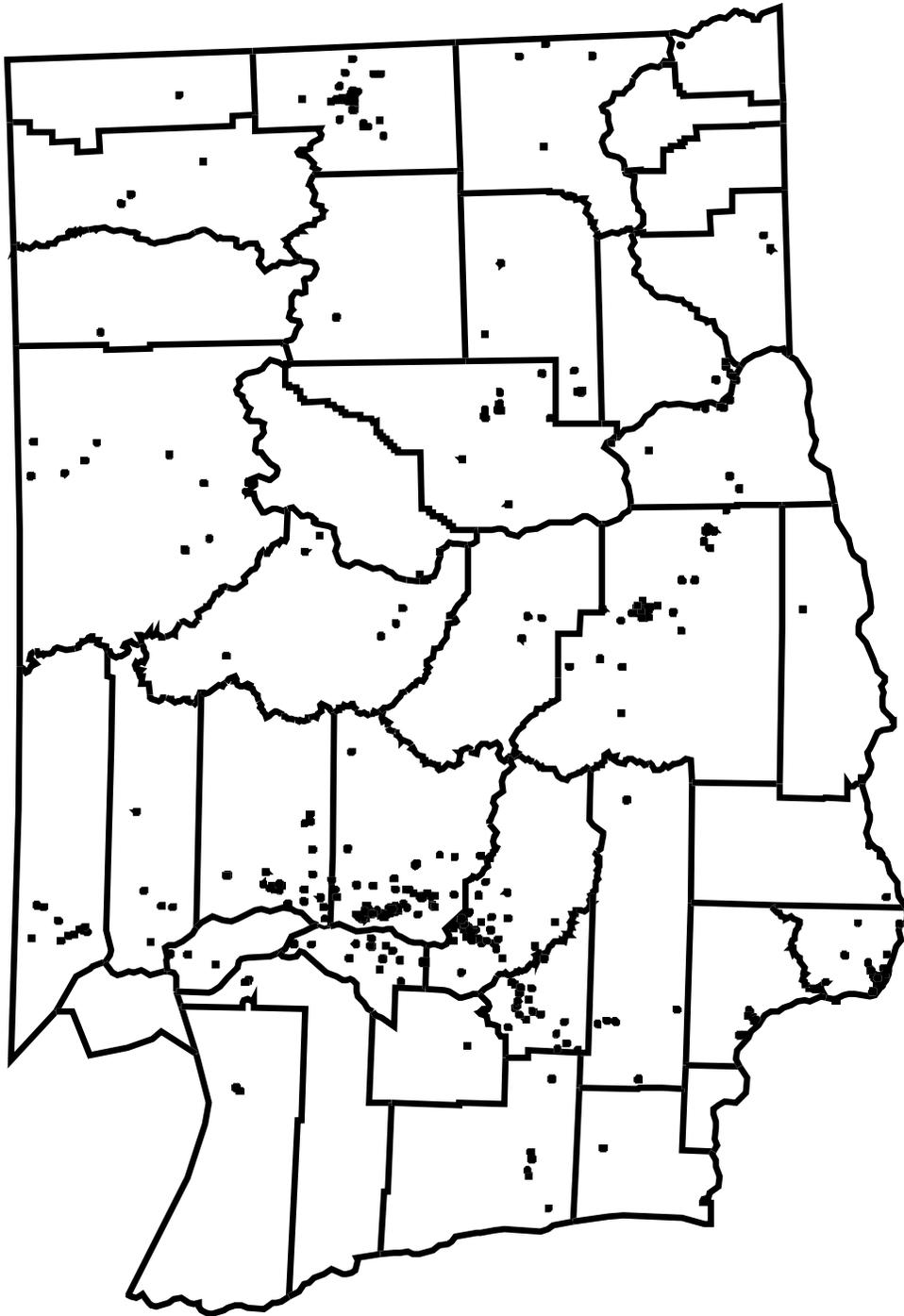
The TRI data are relatively well known and organized for public interest. It was the Legislature's suggestion to include the TRI data, in large part, because of their utility and ease of access. Ecology's Hazardous Substance Information Office, part of the Hazardous Waste and Toxics Reduction program, tracks approximately 300 TRI reporting facilities in Washington.

The following state maps show the general locations for the facilities by type. The first map shows the state's counties by name.

⁷ These reports are required under section 313, Title III, of the Superfund Amendments Reauthorization Act, commonly referred to as SARA Title III. SARA Title III is also known as the Emergency Planning and Community Right-to-Know Act, or EPCRA.



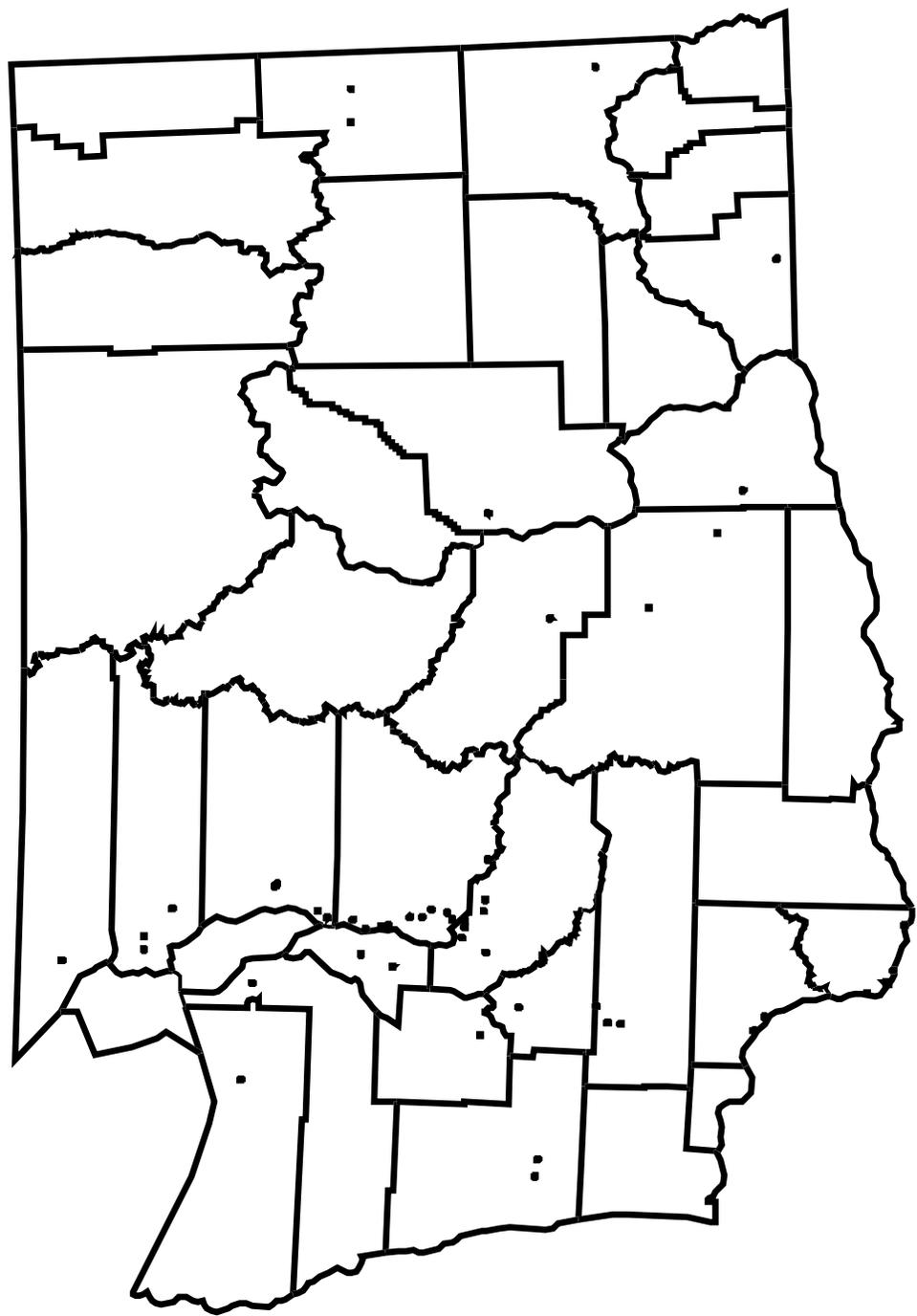
Map 4. State Map with Counties



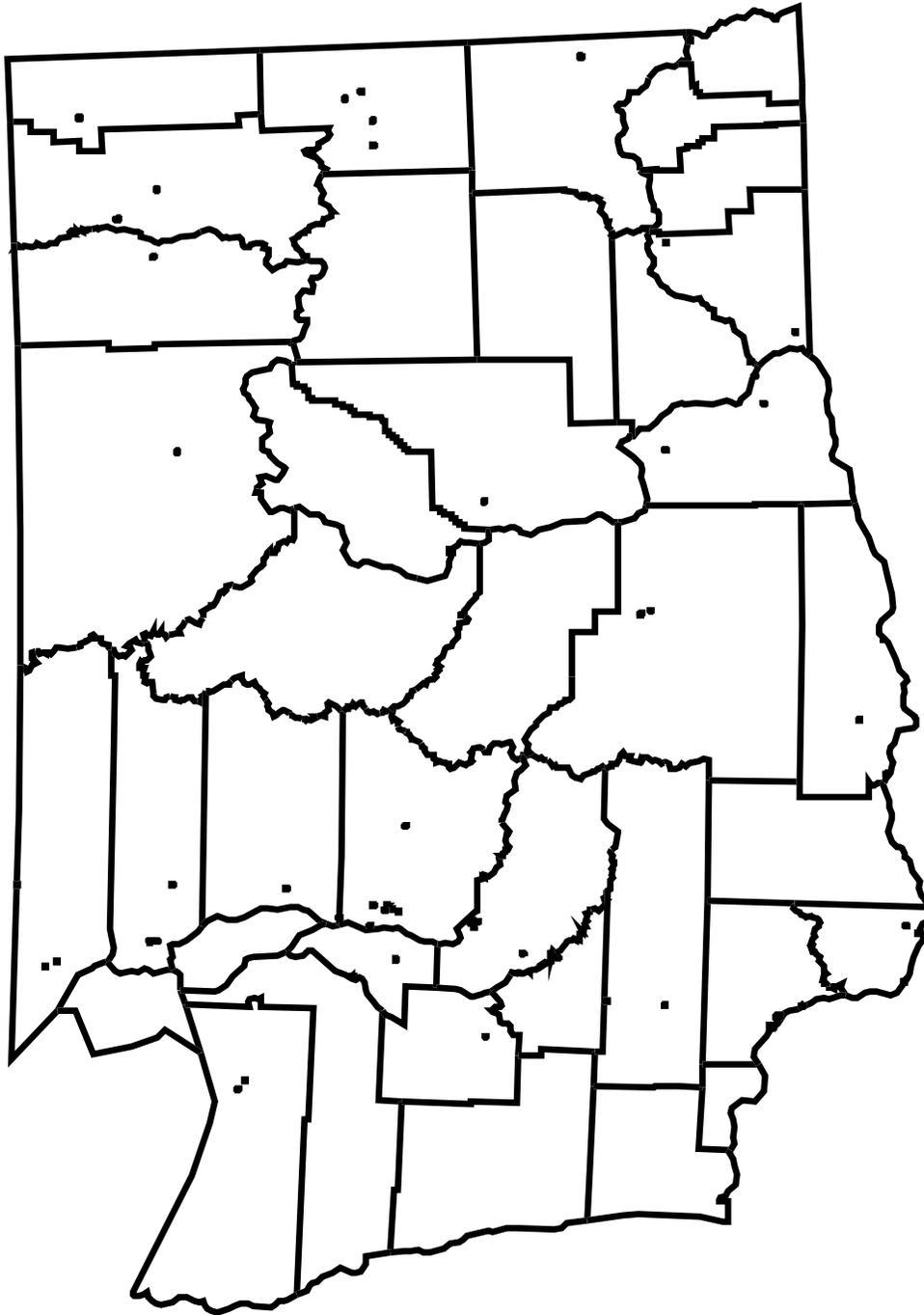
Map 5. Contaminated Sites



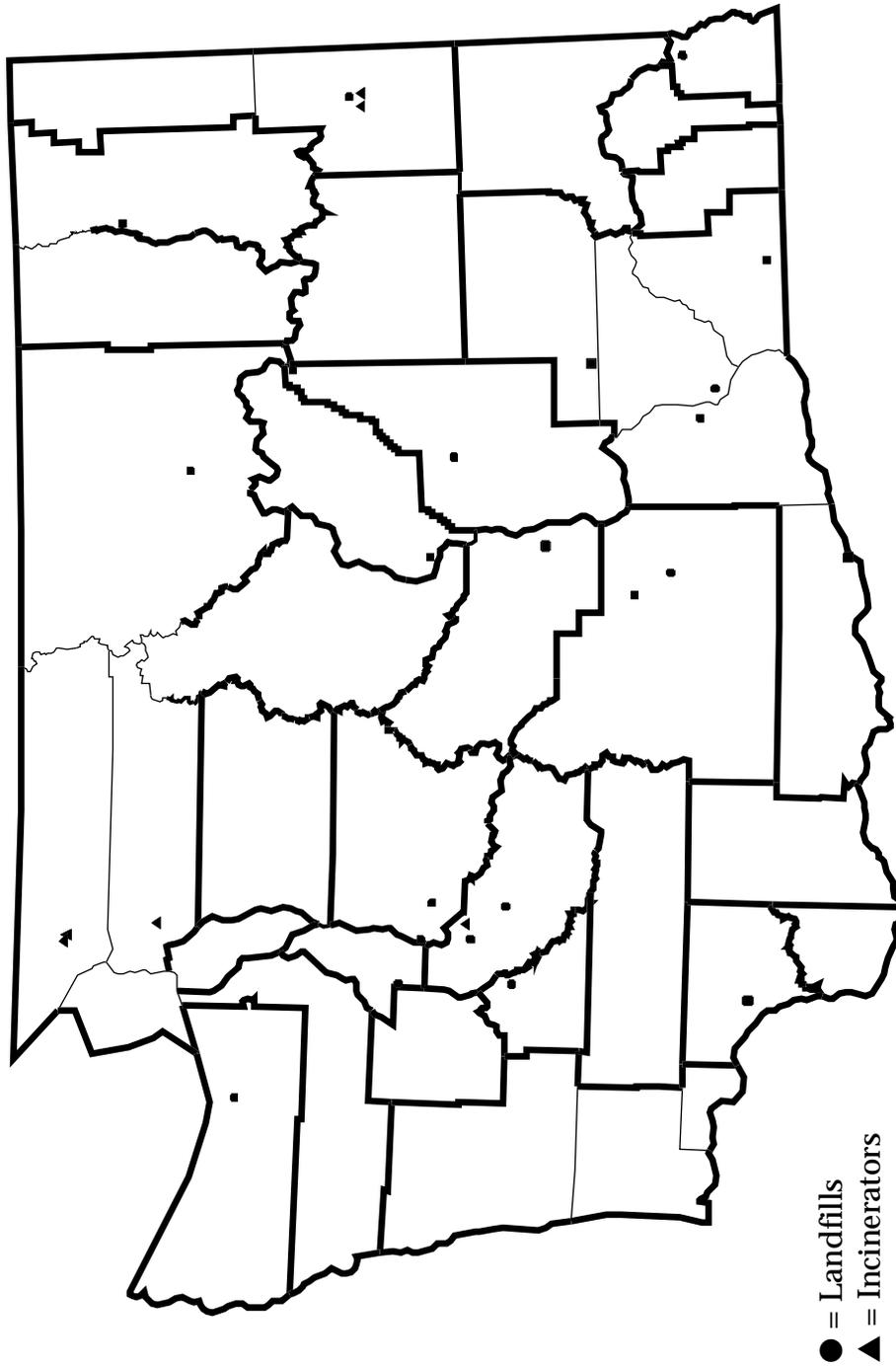
Map 6. Hazardous Waste Storage Treatment Storage and Disposal Facilities



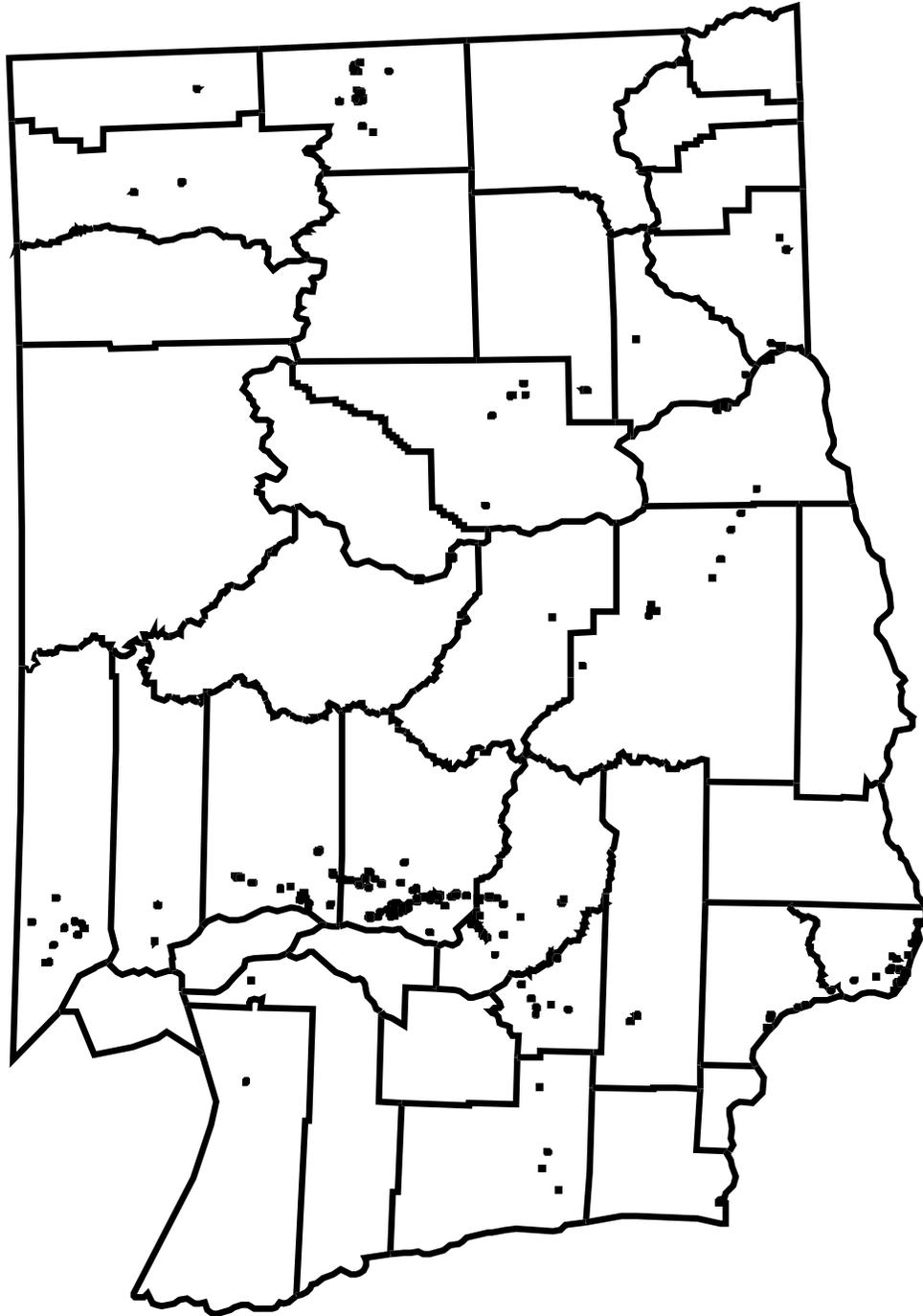
Map 7. Major (high-volume) Waste Water Releasers



Map 8. Major (high-volume) Air Releasers



Map 9. Solid Waste Landfills and Incinerators



Map 10. Toxic Release Inventory Reporters for 1993

Appendix D. Demographic Definitions

This study used information generated from the 1990 U.S. Census⁸ for the purpose of determining the population and location of communities of color and low-income. These data were used because no others were known to be available that could meet the demographic needs for this study, and because they have been generally accepted for most governmental and other environmental justice/equity analyses. Although formatted for different needs and parameters, the same basic database has been used for voter re-districting purposes, and by the state's Office of Financial Management (OFM) for their demographic needs.

1) Census Blocks, Block Groups, and Tracts. There are three types of demographic subdivisions within the census data. From large to small, they are: Tracts, Block Groups, and Blocks.

Tracts are subdivisions into which counties are divided on a larger scale in metropolitan areas. For non-metropolitan areas, areas of the same size are called Block Number Areas (BNA's). Though tract populations may range between 2,500 and 8,000 persons, the ideal total is around 4,000 persons. Tracts are designed to be homogeneous with respect to population characteristics, economic status, and living conditions. Block Number Areas follow a similar division process.

A **Block Group** is a cluster of blocks within a census tract or Block Number Area. Block groups may cross county subdivisions. Block groups generally contain between 250

and 550 housing units, with an ideal size of 400 housing units. Counting housing units rather than individual persons corresponds with the defining criteria for "low-income" status. Low income status is based in large part upon 'household' income, rather than the income of a specific individual. The 1990 census identified 4,620 Block Groups in Washington.

"**Blocks** are small areas bounded on all sides by visible features such as streets, roads...and by invisible boundaries such as city, town, township, and county limits..." A typical city or urban residential block is an example. However in rural areas, blocks vary greatly in size, in part due to such a broad range of population densities in these areas. There is not a average number of people used to define a block.

This study used the **Block Group** to assess the characteristics of minority and income demographics in local communities. Block level data were not available to the study due to privacy rights. Tract level data would have encompassed too large an area to assess true community characteristics closest to the facilities in question. This left the block group level as the only appropriate choice. It is of interest to note the range in block group sizes, especially between the urban and rural portions of the state. **See Map 2 - Washington's Block Groups.**

2) Minority. "The concept of race as used by the Bureau of the Census reflects self-identification; it does not denote any clear-cut scientific definition of biological stock. The data for race represent self-classification by people according to the race with which the surveyed people most identify." The Census Bureau divides race into five main categories: White; Black; American Indian, Eskimo or Aleut; Asian; and Other race. The fifth category "Other race" exists for those individuals who feel they are not represented among the other four categories. "Persons reporting in the "Other race" category and providing write-in entries such as multiracial,

⁸ Language, quotations, and terms used within these Census definitions were taken from: *CENSUS '90, 1990 Census of Population and Housing, Population and Housing Characteristics for Census Tracts and Block Numbering Areas, U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census, publication number 1990 CPH-3-250, Appendices A and B.*

multiethnic, mixed, interracial, Wesort, or a Spanish/Hispanic origin group (such as Mexican, Cuban, or Puerto Rican) are included here.” See **Section III - Methodology** for the discussion on how minority block groups were identified.

Although persons of Hispanic origin are considered an ethnic, not racial, category by the U.S. Bureau of the Census, this study included Hispanics as part of the minority data. An example would be someone who checked “white Hispanic” would not necessarily be counted as a minority in some census derived analyses; in this study, such a person was counted as a minority. There are no established rules for this determination, one way or the other.

3) Low-Income. To project the relative poverty status of a community from the 1990 census, 1989 poverty threshold levels were established using the reported income for 1989. Poverty thresholds are, “not adjusted for regional, State or local variations in the cost of living.” The poverty thresholds vary depending upon three criteria: size of family, number of children, and age of the family householder or unrelated individual for one and two-persons households. The poverty threshold for a family of four, in 1989, was based upon an annual income of \$12,674. The percentage of a community that falls below the poverty level is available at both the tract and block group level, but not at the block level. Poverty status was not determined for “institutionalized persons, persons in military group quarters and in college dormitories, and unrelated individuals under 15 years old.” See **Section III - Methodology** for the discussion on how low-income block groups were identified.

4) Minority/Low-Income. These are block groups which met the criteria for both minority and low-income status, based upon the preceding definitions. Keep in mind that block groups, facilities, and toxic chemical releases in this category, by definition, will also be counted in one of the two individual catego-

ries. This is why many of the tables make the noted reference that the totals presented in the far right columns are not additive. This category of block groups is not a combination of the previous two because these two characteristics are based upon (relatively) unrelated measures: household income for one, race designation for the other. Rather, this third classification is a distinct category of block groups, which met the criteria for both minority and low-income definitions. The purpose for including this classification was to evaluate those areas where both minority and income factors were of potential consequence in the same area, so that a comparison between the three combinations (minority, low-income, or both) could be made.

5) Non Minority/Non Low-Income. This classification includes all areas that do not meet either the minority or low-income criteria. In essence, this category covers all other block groups (areas) of the state. Not all people or households in areas with this classification meet minority or low-income status. Rather, their percentage within their respective block group is lower than the minority or low-income percentage for their respective county, thus the block group would not be classified as either minority or low-income.

Appendix E. Tables & Descriptions

Table Definitions:

Two basic types of tables were generated by the study - consolidated statewide tables, located in the report (Tables 1-3) and this Appendix (Tables 4-9), and county specific tables, located in the *Supplemental Atlas*. Some of the statewide tables also appear in the *Supplemental Atlas*. Tables 5, 6, 8, and 9, were generated to look at the top eight counties as measured by block groups, number of facilities, and pounds of toxic chemical releases.

The foundation of the study results are based upon comparative analyses using percentages. These percentage comparisons can be seen in Tables 2 - 9. The *Supplemental Atlas* gives details on the data used to derive the percentages within the individual county tables.

Many of the column and row headings stay the same for both state and county tables. For the county tables, a few rows have slightly different headings, to note the application of a different statistical tool. Also in the county tables, the percentage comparisons reflect county totals in addition to some of the state totals.

The percentage values within the tables do not address the distribution of facilities within individual block groups. Rather, they represent the number of facilities within the combined total of block groups in each of the county's five demographic categories.

Top Margin - Block Group Category columns, Total

The block group column headings, referring to demographics, are defined the same throughout the report (see **Section III and Appendix D**).

Total: This column reflects the total for block groups, facilities, and toxic chemical releases, in a non-duplicative manner. As noted on the tables, the Total column is not the addition of the four columns to its left. Only the data in the Non Minority/Non Low-Income column are exclusive. Data in the Total column reflect county and/or state totals for the given row, without double counting those block groups, facilities, or releases located in more than one demographic category.

Left Margin: Block Group Numbers; Facilities; TRI Releases; Comparisons.

The thicker black lines distinguish each of these sub-headings. Note that the county tables (in the *Supplemental Atlas*) are slightly different; rows unique to county tables are identified in the following descriptions by noting "(county tables)" after the heading.

Block Group Distribution, or Number of Block Groups: These rows show the total number of block groups in each of the five categories.

County's Block Group Distribution (county tables): This row shows the number block groups within each of the five categories within the county.

Percent of State's/County's Total: These rows show the percentage relationship of each block group category to the state's, or county's, total number of block groups. Thus, Table 1 shows that the 1,521 block groups in the minority column represent 33% of state's 4,620 total block groups (top two values, left column).

County's Percent of State's Block Groups (county tables): This row shows the percentage of the county's block groups within each of the categories, relative to the state's total number of block groups (in the same category), one row above. Note that the value in this row's far right column, under "Total," is not the row's total, but rather, it is the percentage of the county's total number of

block groups compared to the state's total number of block groups. Thus, when viewing King county's table in the *Supplemental Atlas*, the 30.5% value is derived from King county's 1,408 block groups divided by the state's 4,620 block groups; i.e., King county's block groups represent 30.5% of the state's block groups.

Distribution of Facilities Types: Each of the facility types are described **Appendix C**. Within the county tables, values shown for the various facility types reflect the respective county's facilities, while in the state table (Table 1), the values are for the entire state. The row of facilities titled "Landfills & Incinerators," is a combined list of these two different facility types.

Facility Totals/County's Facility Subtotals: These rows show the total number of individual facilities within the given block groups. Although some facilities are listed in more than one facility type, the values in this row are non-duplicative. Thus, there were 363 individual facilities within the Non Minority/Non Low-Income column of Table 1. Because some of the facilities are classified as more than one type, the combined total in this column would be 413, due to double counting of some facilities. For statistical analysis, this row of non-duplicative facility totals was used.

Percent of State's Total Facilities: This row shows the percentage of individual facilities within their respective demographic type, in relation to the 889 facilities evaluated. Thus, for Table 1, the 47% value within the "Low-Income" column is derived by dividing the 414 facilities (immediately above that value) by the state's 889 facilities.

Percent of County's Total Facilities (county tables): This row shows the percentage distribution of the county's facilities within each of the county's block group categories, compared to all of the facilities within the respective county.

1993 TRI Releases - in Pounds/County's 1993 TRI Releases (Pounds): These rows show the total pounds of Toxic Release Inventory (TRI) listed chemical wastes released during calendar year 1993 into each of the five categories of block groups, by state and county totals respectively.

Percent of State's/County's Total TRI Releases: These rows show the percentage of 1993's TRI reported releases within each of the four block group categories, compared to the state's or county's total TRI releases, respectively.

Table 4

Facility Distribution Compared to Block Group Distribution - by County							
County Name		No. in Cnty	State %	Minority % in Cnty	Low-Inc. % in Cnty	Min. / L.I. % in Cnty	Non Min. / Non L.I. % in Cnty
(Rank is noted for top 8 counties in parentheses, by facility & by block group)							
1 Adams	Facilities	11	1.2%	45%	36%	27%	45%
	Block Groups	18	0.4%	28%	33%	22%	61%
2 Asotin	Facilities	2	0.2%	0%	0%	0%	100%
	Block Groups	22	0.5%	50%	45%	41%	45%
3 Benton	Facilities	27	3.0%	33%	30%	30%	67%
	Block Groups	122	2.6%	30%	40%	20%	51%
4 Chelan	Facilities	15	1.7%	33%	47%	27%	47%
	Block Groups	67	1.5%	40%	42%	25%	43%
5 Clallam	Facilities	10	1.1%	0%	20%	0%	80%
	Block Groups	66	1.4%	23%	44%	17%	50%
6 Clark (5)	Facilities	57	6.4%	40%	67%	33%	26%
	(5) Block Groups	182	3.9%	42%	43%	23%	38%
7 Columbia	Facilities	0	0.0%	0%	0%	0%	0%
	Block Groups	5	0.1%	40%	60%	40%	40%
8 Cowlitz	Facilities	22	2.5%	23%	23%	14%	68%
	Block Groups	101	2.2%	36%	36%	25%	53%
9 Douglas	Facilities	4	0.4%	0%	0%	0%	100%
	Block Groups	32	0.7%	25%	31%	19%	63%
10 Ferry	Facilities	2	0.2%	50%	50%	50%	50%
	Block Groups	9	0.2%	22%	44%	22%	56%
11 Franklin	Facilities	10	1.1%	60%	20%	20%	40%
	Block Groups	39	0.8%	44%	36%	31%	51%

Table 4

Facility Distribution Compared to Block Group Distribution - by County							
County Name		No. in Cnty	State %	Minority % in Cnty	Low-Inc. % in Cnty	Min. / L.I. % in Cnty	Non Min. / Non L.I. % in Cnty
(Rank is noted for top 8 counties in parentheses, by facility & by block group)							
12 Garfield	Facilities	0	0.0%	0%	0%	0%	0%
	Block Groups	4	0.1%	50%	25%	25%	50%
13 Grant	Facilities	22	2.5%	36%	45%	36%	55%
	Block Groups	49	1.1%	33%	49%	27%	45%
14 Grays Harbor	Facilities	12	1.3%	50%	50%	17%	17%
	Block Groups	71	1.5%	31%	46%	24%	46%
15 Island	Facilities	3	0.3%	33%	67%	33%	33%
	Block Groups	59	1.3%	27%	44%	14%	42%
16 Jefferson	Facilities	4	0.4%	0%	100%	0%	0%
	Block Groups	29	0.6%	24%	45%	17%	48%
17 King (1)	Facilities	200	22.4%	35%	46%	28%	47%
	(1) Block Groups	1,408	30.5%	29%	35%	19%	55%
18 Kitsap	Facilities	22	2.5%	27%	36%	23%	59%
	(8) Block Groups	137	3.0%	36%	36%	22%	50%
19 Kittitas	Facilities	6	0.7%	50%	17%	17%	50%
	Block Groups	35	0.8%	34%	43%	29%	51%
20 Klickitat	Facilities	6	0.7%	67%	17%	17%	33%
	Block Groups	22	0.5%	45%	32%	18%	41%
21 Lewis	Facilities	15	1.7%	53%	67%	33%	13%
	Block Groups	66	1.4%	41%	53%	23%	29%
22 Lincoln	Facilities	1	0.1%	0%	0%	0%	100%
	Block Groups	11	0.2%	55%	45%	36%	36%

Table 4

Facility Distribution Compared to Block Group Distribution - by County							Non Min. / Non L.I.
County Name		No. in Cnty	State %	Minority % in Cnty	Low-Inc. % in Cnty	Min. / L.I. % in Cnty	% in Cnty
(Rank is noted for top 8 counties in parentheses, by facility & by block group)							
23 Mason	Facilities	3	0.3%	67%	67%	67%	33%
	Block Groups	50	1.1%	18%	36%	10%	56%
24 Okanogan	Facilities	18	2.0%	39%	33%	11%	39%
	Block Groups	48	1.0%	27%	38%	19%	54%
25 Pacific	Facilities	1	0.1%	100%	100%	100%	0%
	Block Groups	37	0.8%	27%	49%	16%	41%
26 Pend Oreille	Facilities	3	0.3%	67%	33%	0%	0%
	Block Groups	14	0.3%	36%	57%	21%	29%
27 Pierce (2)	Facilities	107	12.0%	24%	59%	13%	30%
	(2) Block Groups	516	11.2%	36%	39%	24%	49%
28 San Juan	Facilities	0	0.0%	0%	0%	0%	0%
	Block Groups	17	0.4%	29%	41%	6%	35%
29 Skagit	Facilities	15	1.7%	60%	33%	20%	27%
	Block Groups	81	1.8%	35%	41%	20%	44%
30 Skamania	Facilities	3	0.3%	67%	67%	33%	0%
	Block Groups	11	0.2%	45%	36%	27%	45%
31 Snohomish (6)	Facilities	52	5.8%	37%	35%	17%	46%
	(4) Block Groups	361	7.8%	37%	41%	18%	40%
32 Spokane (4)	Facilities	69	7.7%	39%	59%	29%	30%
	(3) Block Groups	369	8.0%	37%	44%	28%	46%
33 Stevens	Facilities	9	1.0%	0%	56%	0%	44%
	Block Groups	43	0.9%	7%	44%	7%	56%

Table 4

Facility Distribution Compared to Block Group Distribution - by County							Non Min. / Non L.I. % in Cnty
County Name		No. in Cnty	State %	Minority % in Cnty	Low-Inc. % in Cnty	Min. / L.I. % in Cnty	
(Rank is noted for top 8 counties in parentheses, by facility & by block group)							
34 Thurston (7)	Facilities	34	3.8%	32%	50%	6%	24%
	(7) Block Groups	149	3.2%	30%	35%	10%	46%
35 Wahkiakum	Facilities	0	0.0%	0%	0%	0%	0%
	Block Groups	7	0.2%	43%	29%	14%	43%
36 Walla Walla	Facilities	12	1.3%	58%	50%	50%	42%
	Block Groups	48	1.0%	29%	38%	23%	56%
37 Whatcom (8)	Facilities	30	3.4%	30%	23%	13%	60%
	Block Groups	96	2.1%	27%	32%	16%	56%
38 Whitman	Facilities	7	0.8%	43%	29%	29%	57%
	Block Groups	41	0.9%	32%	27%	22%	63%
39 Yakima (3)	Facilities	75	8.4%	49%	51%	35%	35%
	(6) Block Groups	178	3.9%	40%	44%	33%	48%
<div style="background-color: #cccccc; width: 20px; height: 10px; display: inline-block; margin-right: 5px;"></div> Shaded boxes above indicate the county has no facilities.							
Summary of Facility / Block Group Analysis							
		State Total	State %	Minority	Low-Inc.	Min. / L.I.	Non Min. / Non L.I.
Number of Facilities in State		889		322	414	210	363
No. of Block Groups in State		4,620		1,521	1,791	969	2,277
% of State's Facilities			100%	36%	47%	24%	41%
% of State's Block Groups			100%	33%	39%	21%	49%
<div style="background-color: #cccccc; width: 20px; height: 10px; display: inline-block; margin-right: 5px;"></div> Shaded boxes here indicate the block group categories with the highest margin of facility / block group disproportionality.							

Table 5

**Facility Distribution - Top 8 Counties
(by block group count)**

County Name		No. in Cnty	State %	Minority % in Cnty	Low-Inc. % in Cnty	Min. / L.I. % in Cnty	Non Min. / Non L.I. % in Cnty
1 King	Facilities	200	22.4%	35%	46%	28%	47%
	Block Groups	1,408	30.5%	29%	35%	19%	55%
2 Pierce	Facilities	107	12.0%	24%	59%	13%	30%
	Block Groups	516	11.2%	36%	39%	24%	49%
3 Spokane	Facilities	69	7.7%	39%	59%	29%	30%
	Block Groups	369	8.0%	37%	44%	28%	46%
4 Snohomish	Facilities	52	5.8%	37%	35%	17%	46%
	Block Groups	361	7.8%	37%	41%	18%	40%
5 Clark	Facilities	57	6.4%	40%	67%	33%	26%
	Block Groups	182	3.9%	42%	43%	23%	38%
6 Yakima	Facilities	75	8.4%	49%	51%	35%	35%
	Block Groups	178	3.9%	40%	44%	33%	48%
7 Thurston	Facilities	34	3.8%	32%	50%	6%	24%
	Block Groups	149	3.2%	30%	35%	10%	46%
8 Kitsap	Facilities	22	2.5%	27%	36%	23%	59%
	Block Groups	137	3.0%	36%	36%	22%	50%

Number of Facilities	616	69.3%
No. of Block Groups	3,300	71.4%

Shaded boxes indicate those categories where there is a higher percentage of facilities than block groups (i.e., there is a disproportionately higher percentage of facilities).

Table 6

**Facility Distribution - Top 8 Counties
(by facility count)**

County Name	No. in Cnty	State %	Minority % in Cnty	Low-Inc. % in Cnty	Min. / L.I. % in Cnty	Non Min. / Non L.I. % in Cnty	
1 King	Facilities	200	22.4%	35%	46%	28%	47%
	Block Groups	1,408	30.5%	29%	35%	19%	55%
2 Pierce	Facilities	107	12.0%	24%	59%	13%	30%
	Block Groups	516	11.2%	36%	39%	24%	49%
3 Yakima	Facilities	75	8.4%	49%	51%	35%	35%
	Block Groups	178	3.9%	40%	44%	33%	48%
4 Spokane	Facilities	69	7.7%	39%	59%	29%	30%
	Block Groups	369	8.0%	37%	44%	28%	46%
5 Clark	Facilities	57	6.4%	40%	67%	33%	26%
	Block Groups	182	3.9%	42%	43%	23%	38%
6 Snohomish	Facilities	52	5.8%	37%	35%	17%	46%
	Block Groups	361	7.8%	37%	41%	18%	40%
7 Thurston	Facilities	34	3.8%	32%	50%	6%	24%
	Block Groups	149	3.2%	30%	35%	10%	46%
8 Whatcom	Facilities	30	3.4%	30%	23%	13%	60%
	Block Groups	96	2.1%	27%	32%	16%	56%

Number of Facilities	624	70.2%
No. of Block Groups	3,259	70.5%

Shaded boxes indicate those categories where there is a higher percentage of facilities than block groups (i.e., there is a disproportionately higher percentage of facilities).

Table 7

Toxic Release Inventory (TRI) Distribution (1993)
Compared to Block Group Distribution - by County

County Name		Pounds / # in Cnty	State %	Minority % in Cnty	Low-Inc. % in Cnty	Min. / L.I. % in Cnty	Non Min. / Non L.I. % in Cnty
(Rank is noted for top 8 counties in parentheses, by TRI releases & by block group)							
1 Adams	Pounds	23,780	0.1%	0%	0%	0%	100%
	Block Groups	18	0.4%	28%	33%	22%	61%
2 Asotin	Pounds	0	0%	0%	0%	0%	0%
	Block Groups	22	0.5%	50%	45%	41%	45%
3 Benton	Pounds	879,144	3.6%	0%	0%	0%	100%
	(8) Block Groups	122	2.6%	30%	40%	20%	51%
4 Chelan	Pounds	150,351	0.6%	0%	0%	0%	100%
	Block Groups	67	1.5%	40%	42%	25%	43%
5 Clallam (1)	Pounds	3,739,731	15.2%	0%	0%	0%	100%
	Block Groups	66	1.4%	23%	44%	17%	50%
6 Clark	Pounds	1,244,579	5.1%	37%	87%	37%	13%
	(5) Block Groups	182	3.9%	42%	43%	23%	38%
7 Columbia	Pounds	0	0%	0%	0%	0%	0%
	Block Groups	5	0.1%	40%	60%	40%	40%
8 Cowlitz (3)	Pounds	3,012,978	12.3%	0%	0.01%	0%	99.99%
	Block Groups	101	2.2%	36%	36%	25%	53%
9 Douglas	Pounds	0	0%	0%	0%	0%	0%
	Block Groups	32	0.7%	25%	31%	19%	63%
10 Ferry	Pounds	0	0%	0%	0%	0%	0%
	Block Groups	9	0.2%	22%	44%	22%	56%
11 Franklin	Pounds	169,755	0.7%	100%	94%	94%	0%
	Block Groups	39	0.8%	44%	36%	31%	51%

Table 7

Toxic Release Inventory (TRI) Distribution (1993)
Compared to Block Group Distribution - by County

County Name		Pounds / # in Cnty	State %	Minority % in Cnty	Low-Inc. % in Cnty	Min. / L.I. % in Cnty	Non Min. / Non L.I. % in Cnty
(Rank is noted for top 8 counties in parentheses, by TRI releases & by block group)							
12 Garfield	Pounds	0	0%	0%	0%	0%	0%
	Block Groups	4	0.1%	50%	25%	25%	50%
13 Grant	Pounds	23,095	0.1%	89%	89%	89%	11%
	Block Groups	49	1.1%	33%	49%	27%	45%
14 Grays Harbor	Pounds	907,895	3.7%	100%	0.4%	0.4%	0%
	Block Groups	71	1.5%	31%	46%	24%	46%
15 Island	Pounds	0	0%	0%	0%	0%	0%
	Block Groups	59	1.3%	27%	44%	14%	42%
16 Jefferson	Pounds	544,120	2.2%	0%	100%	0%	0%
	Block Groups	29	0.6%	24%	45%	17%	48%
17 King (2)	Pounds	3,369,350	13.7%	17%	51%	15%	47%
	(1) Block Groups	1,408	30.5%	29%	35%	19%	55%
18 Kitsap	Pounds	0	0%	0%	0%	0%	0%
	Block Groups	137	3.0%	36%	36%	22%	50%
19 Kittitas	Pounds	0	0%	0%	0%	0%	0%
	Block Groups	35	0.8%	34%	43%	29%	51%
20 Klickitat	Pounds	20,330	0.1%	100%	0%	0%	0%
	Block Groups	22	0.5%	45%	32%	18%	41%
21 Lewis	Pounds	758	0.003%	100%	100%	100%	0%
	Block Groups	66	1.4%	41%	53%	23%	29%
22 Lincoln	Pounds	0	0%	0%	0%	0%	0%
	Block Groups	11	0.2%	55%	45%	36%	36%

Table 7

Toxic Release Inventory (TRI) Distribution (1993)
Compared to Block Group Distribution - by County

County Name	Pounds / # in Cnty	State %	Minority % in Cnty	Low-Inc. % in Cnty	Min. / L.I. % in Cnty	Non Min. / Non L.I. % in Cnty
(Rank is noted for top 8 counties in parentheses, by TRI releases & by block group)						
23 Mason	Pounds	0	0%	0%	0%	0%
	Block Groups	50	1.1%	18%	36%	10%
24 Okanogan	Pounds	0	0%	0%	0%	0%
	Block Groups	48	1.0%	27%	38%	19%
25 Pacific	Pounds	0	0%	0%	0%	0%
	Block Groups	37	0.8%	27%	49%	16%
26 Pend Oreille	Pounds	202	0.001%	100%	0%	0%
	Block Groups	14	0.3%	36%	57%	21%
27 Pierce (6)	Pounds	1,717,820	7.0%	8%	86%	7%
	(2) Block Groups	516	11.2%	36%	39%	24%
28 San Juan	Pounds	0	0%	0%	0%	0%
	Block Groups	17	0.4%	29%	41%	6%
29 Skagit	Pounds	591,442	2.4%	100%	0%	0%
	Block Groups	81	1.8%	35%	41%	20%
30 Skamania	Pounds	0	0%	0%	0%	0%
	Block Groups	11	0.2%	45%	36%	27%
31 Snohomish (4)	Pounds	2,067,520	8.4%	85%	29%	28%
	(4) Block Groups	361	7.8%	37%	41%	18%
32 Spokane (5)	Pounds	1,738,286	7.1%	1%	74%	1%
	(3) Block Groups	369	8.0%	37%	44%	28%
33 Stevens	Pounds	227,827	0.9%	0%	100%	0%
	Block Groups	43	0.9%	7%	44%	7%

Table 7

Toxic Release Inventory (TRI) Distribution (1993)
Compared to Block Group Distribution - by County

County Name	Pounds / # in Cnty	State %	Minority % in Cnty	Low-Inc. % in Cnty	Min. / L.I. % in Cnty	Non Min. / Non L.I. % in Cnty	
(Rank is noted for top 8 counties in parentheses, by TRI releases & by block group)							
34 Thurston	Pounds	1,047,077	4.3%	42%	58%	0%	0.05%
	(7) Block Groups	149	3.2%	30%	35%	10%	46%
35 Wahkiakum	Pounds	0	0%	0%	0%	0%	0%
	Block Groups	7	0.2%	43%	29%	14%	43%
36 Walla Walla (8)	Pounds	1,449,256	5.9%	12%	12%	12%	88%
	Block Groups	48	1.0%	29%	38%	23%	56%
37 Whatcom (7)	Pounds	1,465,384	6.0%	40%	38%	38%	60%
	Block Groups	96	2.1%	27%	32%	16%	56%
38 Whitman	Pounds	0	0%	0%	0%	0%	0%
	Block Groups	41	0.9%	32%	27%	22%	63%
39 Yakima	Pounds	195,574	0.8%	87%	91%	87%	9%
	(6) Block Groups	178	3.9%	40%	44%	33%	48%

Shaded boxes above indicate the county had no reported TRI releases in 1993.

Summary of Toxic Release / Block Group Analysis

	State Total	State %	Minority	Low-Inc.	Min. / L.I.	Non Min. / Non L.I.
State TRI Releases in '93 (lbs.)	24,586,254		6,016,468	8,660,199	2,755,926	12,665,513
No. of Block Groups in State	4,620		1,521	1,791	969	2,277
% of State's Releases		100%	24%	35%	11%	52%
% of State's Block Groups		100%	33%	39%	21%	49%

Shaded boxes here indicate the block group categories with the higher margins of TRI release / block group disproportionality.

Table 8

Toxic Release Inventory (TRI) Distribution - Top 8 Counties (1993)
(by block group count)

County Name		Pounds / # in Cnty	State %	Minority % in Cnty	Low-Inc. % in Cnty	Min. / L.I. % in Cnty	Non Min. / Non L.I. % in Cnty
1 King	Pounds	3,369,350	13.7%	17%	51%	15%	47%
	Block Groups	1,408	30.5%	29%	35%	19%	55%
2 Pierce	Pounds	1,717,820	7.0%	8%	86%	7%	13%
	Block Groups	516	11.2%	36%	39%	24%	49%
3 Spokane	Pounds	1,738,286	7.1%	1%	74%	1%	26%
	Block Groups	369	8.0%	37%	44%	28%	46%
4 Snohomish	Pounds	2,067,520	8.4%	85%	29%	28%	13%
	Block Groups	361	7.8%	37%	41%	18%	40%
5 Clark	Pounds	1,244,579	5.1%	37%	87%	37%	13%
	Block Groups	182	3.9%	42%	43%	23%	38%
6 Yakima	Pounds	195,574	0.8%	87%	91%	87%	9%
	Block Groups	178	3.9%	40%	44%	33%	48%
7 Thurston	Pounds	1,047,077	4.3%	42%	58%	0%	0.05%
	Block Groups	149	3.2%	30%	35%	10%	46%
8 Benton	Pounds	879,144	3.6%	0%	0%	0%	100%
	Block Groups	122	2.6%	30%	40%	20%	51%

Pounds Released	12,259,350	49.9%
No. of Block Groups	3,285	71.1%

Shaded boxes indicate those categories where there is a higher percentage of TRI releases than block groups (i.e., there is a disproportionately higher percentage of releases).

Table 9

Toxic Release Inventory (TRI) Distribution - Top 8 Counties (1993)
(by pounds released)

County Name	Pounds / # in Cnty	State %	Minority % in Cnty	Low-Inc. % in Cnty	Min. / L.I. % in Cnty	Non Min. / Non L.I. % in Cnty	
1 Clallam	Pounds	3,739,731	15.2%	0%	0%	0%	100%
	Block Groups	66	1.4%	23%	44%	17%	50%
2 King	Pounds	3,369,350	13.7%	17%	51%	15%	47%
	Block Groups	1,408	30.5%	29%	35%	19%	55%
3 Cowlitz	Pounds	3,012,978	12.3%	0%	0.01%	0%	99.99%
	Block Groups	101	2.2%	36%	36%	25%	53%
4 Snohomish	Pounds	2,067,520	8.4%	85%	29%	28%	13%
	Block Groups	361	7.8%	37%	41%	18%	40%
5 Spokane	Pounds	1,738,286	7.1%	1%	74%	1%	26%
	Block Groups	369	8.0%	37%	44%	28%	46%
6 Pierce	Pounds	1,717,820	7.0%	8%	86%	7%	13%
	Block Groups	516	11.2%	36%	39%	24%	49%
7 Whatcom	Pounds	1,465,384	6.0%	40%	38%	38%	60%
	Block Groups	96	2.1%	27%	32%	16%	56%
8 Walla Walla	Pounds	1,449,256	5.9%	12%	12%	12%	88%
	Block Groups	48	1.0%	29%	38%	23%	56%
Pounds Released		18,560,325	75.5%				
No. of Block Groups		2,965	64.2%				

Shaded boxes indicate those categories where there is a higher percentage of TRI releases than block groups (i.e., there is a disproportionately higher percentage of releases).

Appendix F. Related Environmental Equity Activities In Washington

The U.S. Environmental Protection Agency (EPA)

(Joyce Kelly, Region 10, Environmental Justice Coordinator)

Environmental Justice is one of the seven principles that are the core of both the Agency's and the Region's Strategic Plans. These principles apply to all EPA programs and activities and will be guiding planning, resource allocation, and decision-making processes over the next five years.

Environmental Justice for EPA Region 10 [Washington, Oregon, Idaho, & Alaska] ensures inclusion of affected parties in regional environmental actions. It oversees the analysis, implementation and enforcement of environmental regulations, initiatives, and grant programs to ensure that all ethnic groups, communities, and people of color, regardless of age, gender, or socioeconomic levels, receive fair and just environmental protection.

EPA Region 10 will continue to develop a work force, through training and recruitment, that truly reflects the diversity of the public they serve. They want to ensure that decision-making reflects the broadest range of experience and understanding.

The regional Environmental Justice Operating Principles focus on: community and stakeholder involvement and empowerment; implementing and enforcing regulations; and training and diversifying the work force to better reflect the diverse population.

Region 10 also identified short-term and long-term actions to move the Region forward on Environmental Justice. Actions include, but are not limited to: providing Environmental Justice and diversity training to Regional employees and other agencies; initiating or conducting necessary research and analysis to identify potentially high risk populations; incorporating Environmental Justice into

policy initiatives (e.g., geographic and place-based initiatives, pollution prevention, sustainable development); migrant farm workers issues; and tribal and Alaska Native Villages environmental initiatives.

The Community Coalition for Environmental Justice (Yalonda Allen, Coalition member)

The Community Coalition for Environmental Justice (CCEJ) was founded in 1992 by a group of concerned citizens who came together to examine urban environmental issues. In February of 1994, CCEJ, with People for Puget Sound as its fiscal agent, hosted a very successful Environmental Justice conference. The funds for the conference were donated by the Bullitt Foundation. The all day conference, in Seattle, attracted more than 250 participants. The purpose of the conference was to educate and organize citizens around environmental justice issues. After the conference, CCEJ received numerous requests for more information about environmental justice. CCEJ formed an Air & Land Committee, Water Committee, Multiple Chemical Sensitivity Committee, and a Speakers Bureau Committee. CCEJ is guided by a ten member volunteer Board of Directors. CCEJ has responded to requests for information about environmental justice issues by participating in numerous workshops and conferences, and producing a bi-monthly newsletter to improve communication and coordination among existing community based grassroots organizations.

Seattle's Environmental Justice Task Force (Monica Power, Task Force Facilitator)

The City of Seattle's Environmental Justice Task Force is currently composed of staff from ten City departments and from varying levels in the organization. An effort was made early on to ensure diversity on the Task Force to provide for greater cultural exchange in the decision-making process. The goal of the Task Force is to provide City employees with information in three key areas: 1) what Environmental Justice means;

2) how a greater awareness of Environmental Justice can enhance current business practices; and 3) what it means to build Environmental Justice into performance and accountability measures. To that end, the Task Force is working on ways to interject Environmental Justice into existing operations, particularly as they pertain to decision-making and community outreach. The Task Force hopes to make recommendations to the Mayor's Office the end of this [1995] year.

The Yakima Railroad Area (Antonio Valero, Ecology's Central Regional Office, Yakima)

The Yakima Valley, rich in diversity of economy ranging from agricultural to industrial, is equally rich in the diversity of the people that reside within. The Valley is comprised of a 64% minority population; with Hispanics comprising the major part of this population.

Within the Southeastern part of the City of Yakima, lies an area where soil and drinking water remain contaminated with the solvent Perchloroethylene or "PCE." Identified potentially liable parties include a hazardous waste disposal facility, dry-cleaners, machine/auto service shops and photographic processors. This compound is a probable carcinogen. The contaminated area is known as the "Yakima Railroad Area" (YRRA), and is home to a population comprised of 50% Hispanic. Additionally, 50% of the total population within the YRRA is at or below the poverty level. At one time, over 1,000 homes were receiving free bottled water due to Ecology efforts. Ecology appropriated a \$6.1 million grant for the cities of Yakima and Union Gap to connect these home to the city water system.

Ecology continues its relentless efforts with respect to remedial activities including source control, site investigation, cleanup and extensive public outreach to keep the impacted public informed.

Eco-Sound Video (Dan Josue, Ecology Headquarters)

Department of Ecology employees recently assisted the efforts of a multi-cultural youth group, known as Eco-Sound, to examine and understand environmental justice-related issues. Sponsored by the office of King County Councilman Ron Sims and the City of Seattle Office of Education, the group seeks to promote awareness of important cultural and environmental issues to the state's diverse communities, and particularly to minority youth.

One of Eco-Sound's educational goals was to express its beliefs, values and the overall environmental "message" in a documentary and musical video, using the performing arts as a point of entry and an avenue of communication to impact environmental issues. Consisting of 20 to 25 urban youth members, particularly youth of color, the group's 1994 summer project involved an examination of environmental justice - specifically, the impacts of environmental degradation upon minority and low income populations. In doing this, Eco-Sound focused upon urban, rural, and tribal communities.

Ecology personnel assisted Eco-Sound by planning and sponsoring their tour of the Hanford nuclear reservation, including meetings with U.S. Department of Energy, and Yakama, Umatilla and Nez Perce tribal representatives. The group witnessed first hand, the impacts of Hanford's nuclear production operations and hazardous/nuclear wastes upon sites considered sacred or culturally important for Native Americans. Representatives of Ecology's Central Regional Office (in Yakima) assisted Eco-Sound's examination of the impacts of pesticide use by agricultural growers upon Hispanic and other farm workers.

Participating Ecology personnel were pleased to support Eco-Sound's activities. They were very impressed by the quality, the sincerity, dedication and the extensive talent displayed by Eco-Sound's members in their publicly released videotape "Let's Talk About the People" which will be viewed by communities and youth across the state.