Washington State Auto Body ERP Pilot: Key Lessons Learned

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Goal of Presentation

- Present methodology, results, and evaluation
- Focus on Washington-unique aspects

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Washington's Auto Body Pilot Project

- Combined elements from:
  - ERP Model
  - EnviroStars business certification program
  - Local Source Control Partnership
- Main goals:
  - Assess ERP model when combined with voluntary leadership program
  - Increase compliance and adoption of BMPs
  - Move businesses to voluntarily self-certify
  - Increase the number of EnviroStars businesses

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Why This Approach?

- State Hazardous Waste ("Beyond Waste") Plan – create a Voluntary Leadership Program with a sustainability focus
- 2008 EPA State Innovations Grant – combine the ERP model with a new Voluntary Leadership Program

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Who Was Involved?

- Local Source Control Partnership
  - State and local government employees from 13 entities
  - Goal to prevent polluted runoff to Puget Sound and the Spokane River Basin
- EnviroStars Co-op
  - Business certification program run by local government in five counties
  - Goal to promote proper management and reduction of hazardous waste and materials

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Pilot Project Area

- Nine counties surrounding Puget Sound (west side of state)
- Spokane County on extreme east side of state
- Includes approximately 65% of state's total population

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Nature of Pilot Project

- Multimedia approach: air quality, water quality, and hazardous waste
- Compliance and "beyond compliance" BMPs
- 117 question checklist (shortened for verification visits)
- Incentives for self-certification
  - Opportunity to meet EPA's NESHAPs Notice of Compliance
  - Self-certify to become a certified EnviroStar business

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Universe Identification

- List from Department of Labor and Industries
  - Worker's Comp classification included non-related but similar businesses (e.g., spray-on bedliner)
  - Excluded auto repair, auto engine repair, and related businesses
  - Auto body classification higher cost; therefore presumed more restrictive
- Local air authorities' permitees
- Harris InfoSource "Selectory" database for NAICS code 811121

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Data "Cleaning" – Round 1

- Three lists combined for 1725 facilities
- First step: eliminate duplicates
- Second step: eliminate facilities outside target jurisdictions (e.g., not in applicable counties)
- Third step: eliminate facilities clearly not in autobody industry (e.g., attorney's office)
- Revised list 947 facilities

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Data "Cleaning" – Round 2

- Other use of "Selectory" database returned about 75% incorrect entries (e.g., out of business)
- Fourth step: compare each entry to state business licensing databases for tax registration, business registration, and corporation registration
  - If tax or license registration closed, removed entry
  - If tax and license registration active, left alone
- Somehow inadvertently dropped 62 facilities

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Final Universe List

- Revised list 831 potential participants
- 11 jurisdictions (plus sites in 12th jurisdiction)
  - 8 counties (plus sites in additional county)
  - 3 cities, all located in participating counties
  - Jurisdictions checked for proper allocation between participating cities versus counties (based on physical location of business; ignored mailing address) – discovered even more errors
- Developed custom list for each jurisdiction based on final list of 779 facilities

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Sample Size Calculation

- Used EPA "ERP Sample Planner"
- Used formula for two-sample test:

$$n = \frac{(Z_\alpha)^2[P_1(1-P_1)+P_2(1-P_2)]}{\delta^2}$$

- Planner makes continuity adjustment due to finite population:

$$n_\Delta = \frac{n}{1+\frac{n}{P}}$$

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Site Visits

- Due to resource limitations, management set target of 150 site visits
- Using Sample Planner for two-sample test with adjustment, achieved target by using 90% confidence level and margin of error of ±8.5%
- Sample size 151 site visits for each round
- 19.4% of total facilities to receive visit (151 visits/779 total sites)

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Additional Sites

- Participating county requested list for neighboring (non-participating) county
- Added to calculations, changing totals to:
  - 787 total eligible facilities
  - 12 total jurisdictions
  - 152 site visits needed (minimum)
  - 19.3% of total sites to receive site visit

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Stratification

- Multiplied each jurisdiction's total number of sites by 19.3% to give estimate of number of visits required
  - Always rounded up to the next whole integer; e.g., result of 10.025 equals 11 site visits
  - Rounding resulted in increase in number of site visits to 156
- Changing from 19.4% to 19.3% of sites affected one jurisdiction, reducing its count by one visit; all others remained the same

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Small Strata Methodology

- Of 12 total jurisdictions, five have 15 or more sites – OK for statistical analysis
- Remaining seven jurisdictions have fewer than 15 sites – covers 118 facilities (14.99% of total)
- Concerned about variance calculations
- Divided into three strata:
  - More than 15 sites and 15 visits
  - More than 15 sites but fewer than 15 visits
  - Fewer than 15 sites

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Small Strata Adjustments

- Stratum 1: Jurisdictions with 15 or more sites and visits – no adjustment
- Stratum 2: Jurisdictions with 15 or more sites but fewer than 15 visits – oversample by 5% (or 24.3% of total facilities instead of 19.3%), resulting in 1 additional visits each
- Stratum 3: Jurisdictions with fewer than 15 total sites – census of all facilities
- Data from strata 2 and 3 weighted accordingly

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Final Inspection Numbers

Jurisdiction	Total Sites	Total Visits	Difference from Proportional Share
City of Bellevue	23	6	1 more (oversample stratum)
City of Bellingham	13	13	10 more (census stratum)
City of Issaquah	8	8	6 more (census stratum)
King County	241	47	
Kitsap County	77	15	
Mason County	9	9	7 more (census stratum)
Pierce County	124	25	
San Juan County	4	4	3 more (census stratum)
Skagit County	32	8	1 more (oversample stratum)
Snohomish County	128	25	
Spokane County	99	20	
Whatcom County	29	7	1 more (oversample stratum)

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Sample Selection and List Generation

- Prepared each jurisdiction's list in Excel, listing facilities in that jurisdiction in alphabetical order
- Random number generator for each sequence at www.random.org
- Total list randomized to allow for errors in universe identification (e.g., if 50 facilities in jurisdiction, selected random sequence of 1-50 and prioritized list based on Excel row number)

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Final Numbers

- Final universe actually totaled 507 facilities
- Total visits performed:
  - 154 baseline visits
  - 142 verification visits
- Final margin of error ±8.1% at 90% confidence level
- 95 total self-certifications received

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Data Management

- Data storage – created database in Access to handle responses
- Data cleaning – had to review each entry for illogical, incorrect, and missing answers
- Data analysis – imported data into SPSS statistics software and
  - Transform data as needed (e.g., times converted to 24-hour scale, 1:30 pm became 13:30)
  - Assigned level of measurement, labels, etc.
  - Created new variable for "good" or "bad" answers

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New Variables

- Determined whether answers were good (= 1) or bad (= 0), and ran calculations on those responses
- Made roll-up score easy to calculate – add up all good answers and divide by total number of questions
- Also allowed for question-specific coding (e.g., "good" answer might be "Yes" or "N/A")

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Statistical Analysis

- Normality: data not really normally distributed
  - Slightly negatively skewed (-1.085 to -1.243, depending on question)
  - Slight leptokurtosis (1.579 to 1.870, depending on question)
  - Given large sample size of 391, determined no adjustments necessary
- No outliers possible for most questions, due to nominal data

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Statistical Significance

- Used Pearson Chi-Square calculation to determine statistical significance
  - Compared baseline results to verification results
  - Ignored self-certification in significance calculation
  - $\chi^2 < 0.100$ to be statistically significant
- Only relied on responses that were both significantly significant AND outside the margin of error

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Significant Results – Hazardous Waste

Question	Baseline	Verification	Change
Are all hazardous waste containers properly labeled?	56%	70%	+15%
Are all hazardous waste containers properly labeled with the risk hazard?	62%	74%	+11%
Is mercury-containing equipment handled as hazardous waste or recycled as universal waste?	74%	85%	+11%
Does facility teach employees proper hazardous waste management procedures?	69%	79%	+10%
Are waste containers closed except when materials are being added or removed?	69%	79%	+10%
Does hazardous waste accumulation area have secondary containment?	57%	67%	+10%

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Significant Results – Air Quality

Question	Baseline	Verification	Change
Is inspection log kept?	35%	68%	+32%
Does spray booth have 98% capture of overspray?	51%	72%	+21%
Does facility document HTEP training?	59%	74%	+16%
Does facility document coatings used containing chromium, lead, cadmium , nickel, and manganese?	32%	46%	+14%
Does facility use dustless vacuum equipment?	22%	33%	+11%

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Significant Results – Water Quality

Question	Baseline	Verification	Change
Is all outside waste under cover and not in direct contact with soil?	39%	76%	+37%

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Significant Results – Management

Question	Baseline	Verification	Change
Is there any indication of spills in or near the shop?	9%	18%	-9%
Does the facility work with vendors to find less hazardous products?	86%	73%	-13%

Note that these two questions both indicate a reduction in environmental performance. Ecology does not have a good explanation as to why fewer facilities reported exploring environmentally preferred products or why more sites showed indications of spills. These responses may actually be due to our less reliable 90% confidence level.

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All Questions – Not Just Significant Results

- Graded businesses A (giving "good" responses to at least 90% of questions) through F (giving "good" responses to fewer than 60% of questions)
- Number of Grade A businesses increased more than 60% from baseline to verification
- Number of Grade D and F businesses fell by half from baseline to verification

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Business Grades

Grade	Percent at Baseline	Percent at Verification
A (≥90% good answers)	16%	26%
B (80-89% good answers)	32%	38%
C (70-79% good answers)	27%	23%
D (60-69% good answers)	14%	9%
F (<60% good answers)	11%	5%

Note: Verification total numbers exceed 100% due to rounding

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A & B Facilities by Environmental Area

Environmental Area	Percentage of Facilities Scoring Grade A or B – Baseline	Percentage of Facilities Scoring Grade A or B – Verification
Hazardous Waste	55%	63%
Air Quality	59%	74%
Water Quality	29%	41%
Overall	48%	64%

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Project Evaluation

- Contracted with Cascadia Consulting Group
- Conducted phone interviews with 47 businesses
- Web-based survey of 34 project team members

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Survey and Interview Topics

- Satisfaction with the project
- Challenges and barriers to participation
- Motivations and incentives for participation
- Effectiveness of program elements
- Opportunities for improvement

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Satisfaction with Project

- Among active participants, more than half satisfied with site visits, self-certification process, and technical assistance materials
- Project team members reported lower levels of satisfaction, particularly self-certification, for reasons ranging from dislike of concept to implementation challenges
- Both businesses and project team members preferred multimedia program

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Challenges and Barriers

- Checklist was too long; took too much time
- Managing the multi-agency effort
- Technical assistance limited
- Public agency lists more useful than private data, but also contained inaccuracies
- Local Source Control Program new
- Staffing changes
- Timing: harsh winter of 2008-09 and recession

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Motivations and Incentives

- Self-certified participants motivated by:
  - Ability to meet NESHAPs reporting requirement
    - 56% of those interviewed reported as incentive
    - 82% of self-certified participants completed the forms
  - Ability to earn EnviroStars certification
    - 44% of those interviewed reported as incentive
    - 28% submitted new applications, but only seven became EnviroStars participants (25 shops in the pilot group already EnviroStars certified)

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Effectiveness of Program Elements

- About 1 in 5 of businesses (19%) completed self-certification process
- Over half (53%) participated through site visit and/or self-certification
- Remainder only received materials via mail
- Highest satisfaction levels for technical assistance materials, particularly manual

http://www.ecy.wa.gov/pubs/0804017.pdf

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Opportunities for Improvement

- Shorter checklist and ability for electronic data entry
- Multiple ways to access technical information
- Clear and timely information to businesses
- More effective partnerships with industry associations, vendors, and leading businesses
- Early and ongoing communication and coordination with local partners

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Conclusions

- Participants increased compliance
- Self-certification participation fell short of goal
- Limited success moving beyond compliance
- Mandatory program may increase self-certification and environmental results
- Financial assistance, public recognition, and fewer inspections may increase participation
- Ecology not planning another ERP project but may incorporate some aspects in future work

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Additional Information Available

- Cascadia Consulting Evaluation Report: http://www.ecy.wa.gov/pubs/1104018.pdf
- Self-certification checklist: http://www.ecy.wa.gov/pubs/ecy070346.pdf
- EnviroStars self-certification checklist: http://www.ecy.wa.gov/pubs/0804017n.pdf

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