



# **A Comparison of Safety-and-Health Training of Painters In Alaska, Oregon, and Washington**

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**January 1997**

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This study was conducted under a cooperative agreement between the Center to Protect Workers' Rights (CPWR) and the National Institute for Occupational Safety and Health (NIOSH) and funded under NIOSH grants U02/CCU310982-02 and U02/CCU312014. The contents are solely the responsibility of the authors and do not necessarily represent the official views of NIOSH.

CPWR — the research and development arm of the Building and Construction Trades Department, — is uniquely situated to serve workers, contractors, and the scientific community. A major CPWR activity is to improve worker safety and health in the construction industry in the United States. This report is part of that effort.

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sent to more than 1,100 painters in Oregon and more than 2,400 in Washington. The two state agencies handled the mailings to assure confidentiality of records. (The states billed Paint-Safe for postage.)

Painters who received announcements could call a toll-free number to enroll in scheduled classes. Class times and locations were flexible to accommodate recruits. Training was offered at reduced cost in Alaska and at no cost in Oregon and Washington.

## **Participant groups**

Study participants were categorized in four groups, three for painters and one for employers. One group comprised non-union and union painters participating in mandatory certification training in Alaska between August 1994 and March 1995. This mandatory training group consisted of 128 painters applying for initial certification, eligible for renewal, or returning for renewal, plus nine painters in Oregon and Washington who were Alaska-certified and who worked sometimes in Alaska.

A second group, the voluntary training group, consisted of non-union and union painters who participated in a voluntary training program offered between August 1994 and March 1995 as part of the study in Oregon and Washington. The 231 volunteers were recruited from among workers who

## The training

The program approved by the state of Alaska was used to train 368 painters in the three states: 128 in Alaska, 102 in Oregon, and 138 in Washington. The program focused on using respirators and fans to reduce exposures while painting. Topics included the selection and use of personal protective equipment, such as respirators and gloves; the health hazards of painting, with an emphasis on recognizing and avoiding neurotoxic signs and symptoms of exposure; how to obtain and use a material safety data sheet (MSDS); and selection and use of fans for temporary ventilation. A 7-minute video produced for the training demonstrated correct ventilation using one or two portable fans; numbers on the screen showed exposure levels and how they changed during the demonstration. Training time was split between classroom and hands-on sessions.

## Surveys used

Six survey instruments were used in this study, all during the study's second and third years. (Copies of the year 3 questionnaires are in annex A.)

### Survey instrument Year 2

Painter questionnaire

### Description

Cross-sectional survey in Alaska, Oregon, and Washington; questions include type of work, application methods, contractor size, types of training (if any), years in the trade, union status, protective practices (respirators, fans, gloves, long-sleeve shirts, and so on).

Contractor questionnaire

Used with 206 contractors in Alaska, Oregon, and Washington; questions include company size, type of work, application methods, state worked in the most, training and protective-practice policies, spending for safety-and-health and production equipment, and attitudes, beliefs, and knowledge.

### Year 3

Painter demographic/behavioral questionnaire

Pre-training; selection of questions from the year 2 painter survey questionnaire.

Painter reading-level test

Pre-training; SelectABLE, standardized reading test (Harcourt Brace Jovanovich), which groups trainees into three levels.

Knowledge test

Pre- and post-training; questions from the Alaska certification exam on health hazards of painting, reading and understanding material safety data sheets, and respirator and fan use.

Painter follow-up telephone survey

Given 44 to 340 days after training (an average of 180 days after); selected questions from the demographic/behavioral questionnaire (see above, this chart), used as baseline for nontrainees and as follow-up for trainees.

In year 2 of the study, researchers at the University of Washington compared surreptitious observations of painter work practices with self-reporting by the same painters on mailed questionnaires two to three weeks later. The comparison showed that the observations and the self-reports were in substantial agreement, beyond what would be expected by chance. The results indicated that painters' self-reports could be relied upon in the study. Questions from the validated questionnaire continued to be used in all subsequent painter questionnaires for years 2 and 3 (Keiffer and others 1996).

Painters were grouped for statistical comparisons, based on information obtained from the demographic, knowledge-test, and contractor surveys. Self-reported protective practices related to respirator and fan use — reported by painters on the questionnaire — were the primary dependent

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<sup>2</sup>Other results of the study not presented here include pre- and post-training comparisons of knowledge and protective practices among the study trainees and evaluations of training features, the validity and reliability of the Alaska Certification Examination, and the relationship between a contractor's size and policy and painters' protective practices.

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respirators and use fans, contractors in Alaska spent less per painter on safety-and-health equipment and training than did contractors in Oregon and Washington.

## **Conclusions**

This study has demonstrated the following:

- Safety-and-health training improves painters’ self-protective behaviors, such as respirator and fan use. Trained workers appear to better protect themselves from exposures to toxic substances, thus reducing the risks to themselves and their offspring of serious and costly long-term work-related health effects.
- Mandatory training is more effective than voluntary training in improving self-protective behaviors overall and in reaching a wide range of painters, regardless of previous training, union status, or company size. Voluntary training tends to draw mainly “true believers” — workers with previous training, better protective practices, and lower exposure risks.
- A mandatory system costs less for recruitment and produces much higher participation rates.
- C Under Alaska’s mandatory training system, employers appear to spend less per worker on safety-and-health supplies and training. This issue warrants further investigation.

Although this study covers only a six-year period, the authors believe the findings about worker self-protective practices will continue to apply for the longer term.

The findings have clear implications for efforts to provide training or improve safety and health for painters and other construction workers. The key lesson is that the construction industry, employees, and society can benefit substantially — in terms of costs and worker quality of life — from a well-designed government-mandated safety-and-health certification training program.

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This report is the first of a planned series based on the three-year study.

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## Annex B. Selected Tables

### B-1. PRE-TRAINING RESPIRATOR USE FOR WORK WITH OIL-BASED PAINTS AND COATINGS BY PREVIOUS TRAINING - CROSSTABS YR03 TRAINEES [PRE-TRNG] AND YR03 NON-TRAINED AND YR02 SURVEY RESPONDENTS

| PREVIOUS TRAINING (YES/NO)                    | PRE-TRAINING RESPIRATOR USE (YES/NO) |                         |                      | N= YES/NO |
|---|--------------------------------------|-------------------------|----------------------|-----------|
|   | ODDS RATIO                           | 95% CONFIDENCE INTERVAL | CHI-SQUARE PEAR / LR |           |
| AK CERT TRNG (1)<br>AK CERT=YES<br>NO TRNG=NO | 2.72683                              | 1.95028- 3.81257        | .00000*/.00000*      | 323/ 415  |
| OTHER TRNG (2)<br>OTHR TR=YES<br>NO TRNG=NO   |                                      |                         |                      |           |
| RESPIR SELECT                                 | 1.37085                              | 1.02612- 1.83139        | .03259*/.03240*      | 385/ 412  |
| VENTILATION TR                                | 1.51026                              | 1.09239- 2.08798        | .01239*/.01196*      | 272/ 412  |
| HEALTH HZD PTG                                | 1.39091                              | 1.01873- 1.89906        | .03754*/.03698*      | 300/ 412  |
| ASBESTOS ABATE                                | 1.47612                              | 0.92975- 2.34356        | .09749 / .09400      | 102/ 412  |
| LEAD ABATEMENT                                | 1.47417                              | 1.03528- 2.09912        | .03096*/.02987*      | 207/ 412  |
| HAZ COM TRNG                                  | 1.50461                              | 1.07355- 2.10876        | .01740*/.01674*      | 239/ 412  |
| MSDS TRAINING                                 | 1.32800                              | 0.99198- 1.77784        | .05642 / .05614      | 371/ 412  |
| EMP INITIAL TR                                | 1.59287                              | 1.14397- 2.21792        | .00571*/.00564*      | 307/ 307  |
| ANY H&S TRG                                   | 1.39074                              | 1.06080- 1.82330        | .01683*/.01690*      | 496/ 415  |
| RSP+VNT+HZDS                                  | 1.33138                              | 1.01258- 1.75057        | .04020*/.03994*      | 421/ 477  |
| VOC TRG Y/N (3)                               | 0.94849                              | 0.68481- 1.31371        | .75034 / .75033      | 314/ 298  |
| APPR TRG Y/N(3)                               | 1.45285                              | 1.03449- 2.04041        | .03079*/.03020*      | 249/ 352  |

EMP INITIAL TRG, VOC TRG, and APPR TRG include year 03 non-trained follow up group.

- (1) Compares respirator wear between all AK-certified painters and all painters with no previous training in the three states.
- (2) Compares respirator wear between all painters with each type of other training and all painters with no previous training in the three states.
- (3) Compares respirator wear between all painters with apprentice or vocational training and all painters without in the three states.

**B-2. PRE-TRAINING FAN USE FOR WORK WITH OIL-BASED PAINTS AND COATINGS BY PREVIOUS TRAINING -  
CROSSTABS YR03 TRAINEES [PRE-TRNG] AND YR03**

**B-3. PREVIOUS TRAINING BY STATE - CROSSTABS YR03 TRAINEES [PRE-TRAINING] AND YR02 SURVEY RESPONDENTS**

| PREVIOUS TRG<br>(YES/NO) | PARTICIPANT STATE<br>(ALASKA VS WASHINGTON-OREGON) |                            |                         |                |
|--------------------------|--|----------------------------|-------------------------|----------------|
|                          | ODDS<br>RATIO                                      | 95% CONFIDENCE<br>INTERVAL | CHI-SQUARE<br>PEAR / LR | N=<br>AK/WA-OR |
| RESP SELECT TR           | 6.17889  | 4.68627- 8.14691           | .00000*/.00000*         | 420/958        |
| VENTILATION TR           | 6.48003  | 5.01414- 8.37448           | .00000*/.00000*         | 420/958        |
| HLTH HZDS PTG            | 6.66549  | 5.13098- 8.65891           | .00000*/.00000*         | 420/958        |
| HAZ COM TRG              | 3.47119  | 2.72720- 4.41815           | .00000*/.00000*         | 420/958        |
| MSDS TRAINING            | 5.14313  | 3.94991- 6.69681           | .00000*/.00000*         | 420/958        |
| EMP INITIAL TR           | 1.37142  | 1.07902- 1.74305           | .00972*/.01001*         | 392/933        |
| ASBESTOS AB TR           | 1.94785  | 1.41011- 2.69063           | .00004*/.00007*         | 420/958        |
| LEAD ABTMNT TR           | 1.04897  | 0.79736- 1.37999           | .73528 / .73302         | 420/958        |
| ANY H&S TRG              | 5.34615  | 3.94481- 7.24529           | .00000*/.00000*         | 421/992        |
| RSP+VNT+HZDS             | 6.89969  | 5.12917- 9.28137           | .00000*/.00000*         | 420/958        |
| VOC TRG Y/N              | 0.85189  | 0.66814- 1.08617           | .19575 / .19410         | 425/996        |
| APPR TRG Y/N             | 1.13605  | 0.88015- 1.46634           | .32714 / .32903         | 425/996        |

EMP INITIAL TR, VOC TRG, APPR TRG include year 03 non-trained follow up group.

**B-4. PREVIOUS TRAINING BY PARTICIPANT GROUP STATUS - GROUP T-TESTS YR03 TRAINEES [PRE-TRAINING] VERSUS YR02 SURVEY RESPONDENTS**

| PREVIOUS TRAINING<br>BY STATE  | PARTICIPANT GROUP<br>(YR03 TRNS/YR02 SRVY) |           | SIG.  | N=<br>TRN/SUR |
|--------------------------------|--|-----------|-------|---------------|
|                                | YR03 TRNS                                  | YR02 SRVY |       |               |
| AK ALASKA CERT TRG Y/N (Mean)  | .39  | .94       | .000* | 104/ 284      |
| WA ALASKA CERT TRG Y/N (Mean)  | .02  | .02       | .845  | 99/ 383       |
| OR ALASKA CERT TRG Y/N (Mean)  | .04  | .03       | .521  | 72/ 294       |
| AK RESP SELECT TRG Y/N (Mean)  | .78  | .83       | .264  | 104/ 284      |
| WA RESP SELECT TRG Y/N (Mean)  | .78  | .31       | .000* | 99/ 383       |
| OR RESP SELECT TRG Y/N (Mean)  | .82  | .39       | .000* | 72/ 294       |
| AK VENTILATION TRNG Y/N (Mean) | .65  | .75       | .064  | 104/ 284      |
| WA VENTILATION TRNG Y/N (Mean) | .67  | .19       | .000* | 99/ 383       |
| OR VENTILATION TRNG Y/N (Mean) | .69  | .24       | .000* | 72/ 294       |

72/ 294 |

**B-5. PREVIOUS TRAINING BY UNION STATUS - CROSSTABS FOR WORK WITH OIL-BASED PAINTS AND COATINGS YR03  
TRAINEES [PRE-TRAINING] AND YR02 SURVEY RESPONDENTS**

|  |  | UNION STATUS<br>(NO/YES) |  |  |
|--|--|--------------------------|--|--|
|--|--|--------------------------|--|--|

**B-8. RELATIVE RISKS - COMPANY SIZE BY ANY H&S TRAINING FOR WORK WITH OIL-BASED PAINTS AND COATINGS  
YR03 TRAINING PRTCPNTS [PRE-TRAINING] AND YR02 SURVEY RESPONDENTS**

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**B-9. RELATIVE RISKS - COMPANY SIZE BY SPRAY OIL FOR WORK WITH OIL-BASED PAINTS AND COATINGS YR03 TRAINEES [PRE-TRAINING] AND YR02 SURVEY RESPONDENTS**

|               | SPRAY OIL-BASED PAINT<br>(YES/NO) |                         |                      |           |
|---------------|-----------------------------------|-------------------------|----------------------|-----------|
|               | ODDS RATIO                        | 95% CONFIDENCE INTERVAL | CHI-SQUARE PEAR / LR | N= YES/NO |
| COMPANY SIZE: |                                   |                         |                      |           |
| SM 1-4 PTRS   | 1.45945                           | 1.00716- 2.11486        | .04511*/.04281*      | 460/216   |
| MD 5-9 PTRS   | 1.29621                           | 0.87787- 1.91390        | .19125 / .18739      | 460/216   |
| LG 10+ PTRS   | 0.61538                           | 0.44437- 0.85221        | .00336*/.00336*      | 460/216   |

**B-10. RELATIVE RISKS - COMPANY SIZE BY PARTICIPANT GROUP STATUS YR03 TRAINEES [PRE-TRAINING] AND YR02 SURVEY RESPONDENTS**

| COMPANY SIZE<br>SM=1-4 PTRS<br>MD=5-9 PTRS<br>LG=10+ PTRS | PARTICIPANT GROUP STATUS<br>(YR03 TRNG PARTICIPANTS/YR02 SURVEY RSPNDS) |  |                         |            |
|---|---|--|-------------------------|------------|
|   | ODDS RATIO  | 95% CONFIDENCE INTERVAL                        | CHI-SQUARE PEAR / LR    | N= TRN/SUR |
| AK SMALL CNTR   | 1.84149   | 1.09591- 3.09432                               | .02056*/.02021*         | 126/118    |
| WA SMALL CNTR   | 0.23843   | 0.12946- 0.43912                               | .00000*/.00000*         | 124/167    |
| OR SMALL CNTR   | 0.59919   | 0.28488- 1.26026                               | .17381 / .16577         | 93/164     |
| AK MEDIUM CNTR  | 0.75392   | 0.4433NTR72S71r00336*                          | 46me5277 6me50 6/118    |            |
| WA SMALL CNTR   | 0.75391   | .319605392   6683486 2708                      | 43159739 3/.13 4/167    |            |
| OR SMALL CNTR   | 0.75392   | 95623433NTR7968486                             | 32848TD7.12/TD72993/164 |            |
| AK MEDIUMLARGE  | 0.59919   | 646759919 361891r0015584381 /3 0.77 3970 6/118 |                         |            |
| WA SMALL LARGE  | 0.59912-  | 1.505945   2108432 67250594*                   | 5900*   5624/167        |            |
| OR SMALL LARGE  | 0.59915   | 13045392   9551486 50995                       | 46370.07 62S7893/164    |            |

**B-11. COST PA6**



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