

**Draft**  
**Summary of Selected Control Measure Impacts**  
**On Stagnation Design Day Concentration at Pinal County Housing Monitor**  
**10/29/2008**

| Emission Source Category/Control Measure                  | Design Day |  | Control Measure Reduction ( $\mu\text{g}/\text{m}^3$ ) | Percent of Total Control Measure Reductions |
|---|------------|--|--|---|
|   | Share      | Concentration ( $\mu\text{g}/\text{m}^3$ ) |  |   |
| Design Day Concentration                                  | 100%       | 178.0                                      | -  | -   |
| Non-Anthropogenic Background                              | 6.5%       | 11.5                                       | -  | -   |
| Anthropogenic Emission Sources                            | 93.5%      | 166.5                                      | -  | -   |
| Agriculture   | 9.7%       | 16.2                                       | -  | -   |
| Combined Tractor Operations                               |            |  | 3.8  | 10.8%                                       |
| Unpaved Ag Roads  | 15.6%      | 26.0                                       | -  | -   |
| Once/Year Application of Ligno 10 Palliative to All Roads |            |  | 5.7  | 16.2%                                       |
| Unpaved Public Roads                                      | 51.2%      | 85.2                                       | -  | -   |
| 10 mph Reduction All Roads – Low Mixing Height Hrs        |            |  | 14.7   | 41.8%                                       |
| Pave 1 mile   |            |  | 4  | 11.4%                                       |
| Unpaved Private Roads                                     | 15.5%      | 25.8                                       | -  | -   |
| 10 mph Reduction All Roads – Low Mixing Height Hrs        |            |  | 5.1  | 14.5%                                       |
| Unpaved Neighborhood Roads                                | 5.1%       | 8.5  | -  | -   |
| Once/Year Application of Ligno 10 Palliative to All Roads |            |  | 1.9  | 5.4%  |
| Other   | 2.9%       | 4.8  | -  | -   |
| No Controls   |            |  | -  | -   |
| <b>Total Control Measure Reductions</b>                   |            |  | 35.2   | 100.0%                                      |
| <b>Design Day with Control Measure Benefits</b>           |            | 142.8                                      | -  | -   |

**Summary of Benefits for Alternate Palliative Applications to Public Unpaved Roads on Modeled PM10 Concentrations at PCH on  
October 29, 2008 Stagnation Design Day (178 µg/m<sup>3</sup>)**

| Control Measures                                     | Control Efficiency | Modeled Concentration After Control (µg/m <sup>3</sup> ) |               |               | Modeled Control Benefit (%) |               |               | Total Control Measure Reduction (µg/m <sup>3</sup> )<br>All Public Roads | Modeled Design Day Concentration (µg/m <sup>3</sup> ) |
|--|--------------------|--|---------------|---------------|-----------------------------|---------------|---------------|--|---|
|  |                    | Public Dirt B  | Public Dirt C | Public Dirt D | Public Dirt B               | Public Dirt C | Public Dirt D |  |   |
| Baseline Modeled Concentration                       |                    | 17.8   | 51.4          | 15.9          |                             |               |               | 85.2   | 178.0   |
| <b>Palliatives Apply to all Public Roads</b>         |                    |  |               |               |                             |               |               |  |   |
| Application of Dust Palliatives Once Per Year:       |                    |  |               |               |                             |               |               |  |   |
| Soil Sement  | 58.3%              | 7.4  | 21.4          | 6.7           | 58.4%                       | 58.4%         | 57.9%         | 49.7   | 128.3   |
| Coherex  | 35.2%              | 11.5   | 33.3          | 10.3          | 35.4%                       | 35.2%         | 35.2%         | 30.1   | 147.9   |
| Ligno 10   | 21.9%              | 13.9   | 40.2          | 12.5          | 21.9%                       | 21.8%         | 21.4%         | 18.6   | 159.4   |
| Road Oyl   | 39.3%              | 10.8   | 31.2          | 9.7           | 39.3%                       | 39.3%         | 39.0%         | 33.5   | 144.5   |
| Application of Dust Palliatives Four Times Per Year: |                    |  |               |               |                             |               |               |  |   |
| Soil Sement  | 91.8%              | 1.5  | 4.2           | 1.3           | 91.6%                       | 91.8%         | 91.8%         | 78.2   | 99.8  |
| Coherex  | 82.0%              | 3.2  | 9.3           | 2.9           | 82.0%                       | 81.9%         | 81.8%         | 69.8   | 108.2   |
| Ligno 10   | 67.3%              | 5.8  | 16.8          | 5.2           | 67.4%                       | 67.3%         | 67.3%         | 57.4   | 120.6   |
| Road Oyl   | 91.6%              | 1.5  | 4.3           | 1.3           | 91.6%                       | 91.6%         | 91.8%         | 78.1   | 99.9  |
| <b>Palliatives Apply to 10% Public Roads</b>         |                    |  |               |               |                             |               |               |  |   |
| Application of Dust Palliatives Once Per Year:       |                    |  |               |               |                             |               |               |  |   |
| Soil Sement  | 58.3%              | 16.8   | 48.4          | 15            | 5.6%                        | 5.8%          | 5.7%          | 5.0  | 173.0   |
| Coherex  | 35.2%              | 17.2   | 49.6          | 15.4          | 3.4%                        | 3.5%          | 3.1%          | 3.0  | 175.0   |
| Ligno 10   | 21.9%              | 17.4   | 50.3          | 15.6          | 2.2%                        | 2.1%          | 1.9%          | 1.9  | 176.1   |
| Road Oyl   | 39.3%              | 17.1   | 49.4          | 15.3          | 3.9%                        | 3.9%          | 3.8%          | 3.4  | 174.6   |
| Application of Dust Palliatives Four Times Per Year: |                    |  |               |               |                             |               |               |  |   |
| Soil Sement  | 91.8%              | 16.2   | 46.7          | 14.5          | 9.0%                        | 9.1%          | 8.8%          | 7.8  | 170.2   |
| Coherex  | 82.0%              | 16.4   | 47.2          | 14.6          | 7.9%                        | 8.2%          | 8.2%          | 7.0  | 171.0   |
| Ligno 10   | 67.3%              | 16.6   | 48            | 14.9          | 6.7%                        | 6.6%          | 6.3%          | 5.7  | 172.3   |
| Road Oyl   | 91.6%              | 16.2   | 46.7          | 14.5          | 9.0%                        | 9.1%          | 8.8%          | 7.8  | 170.2   |
| <b>Palliatives Apply to 25% Public Roads</b>         |                    |  |               |               |                             |               |               |  |   |
| Application of Dust Palliatives Once Per Year:       |                    |  |               |               |                             |               |               |  |   |
| Soil Sement  | 58.3%              | 15.2   | 43.9          | 13.6          | 14.6%                       | 14.6%         | 14.5%         | 12.5   | 165.5   |
| Coherex  | 35.2%              | 16.3   | 46.9          | 14.5          | 8.4%                        | 8.8%          | 8.8%          | 7.5  | 170.5   |
| Ligno 10   | 21.9%              | 16.8   | 48.6          | 15.1          | 5.6%                        | 5.4%          | 5.0%          | 4.7  | 173.3   |
| Road Oyl   | 39.3%              | 16.1   | 46.4          | 14.4          | 9.6%                        | 9.7%          | 9.4%          | 8.3  | 169.7   |
| Application of Dust Palliatives Four Times Per Year: |                    |  |               |               |                             |               |               |  |   |
| Soil Sement  | 91.8%              | 13.7   | 39.6          | 12.3          | 23.0%                       | 23.0%         | 22.6%         | 19.6   | 158.4   |
| Coherex  | 82.0%              | 14.2   | 40.9          | 12.7          | 20.2%                       | 20.4%         | 20.1%         | 17.4   | 160.6   |
| Ligno 10   | 67.3%              | 14.8   | 42.8          | 13.3          | 16.9%                       | 16.7%         | 16.4%         | 14.3   | 163.7   |
| Road Oyl   | 91.6%              | 13.7   | 39.6          | 12.3          | 23.0%                       | 23.0%         | 22.6%         | 19.6   | 158.4   |
| <b>Palliatives Apply to 50% Public Roads</b>         |                    |  |               |               |                             |               |               |  |   |
| Application of Dust Palliatives Once Per Year:       |                    |  |               |               |                             |               |               |  |   |
| Soil Sement  | 58.3%              | 12.6   | 36.4          | 11.3          | 29.2%                       | 29.2%         | 28.9%         | 24.9   | 153.1   |
| Coherex  | 35.2%              | 14.7   | 42.4          | 13.1          | 17.4%                       | 17.5%         | 17.6%         | 15.0   | 163.0   |
| Ligno 10   | 21.9%              | 15.9   | 45.8          | 14.2          | 10.7%                       | 10.9%         | 10.7%         | 9.3  | 168.7   |
| Road Oyl   | 39.3%              | 14.3   | 41.3          | 12.8          | 19.7%                       | 19.6%         | 19.5%         | 16.8   | 161.2   |
| Application of Dust Palliatives Four Times Per Year: |                    |  |               |               |                             |               |               |  |   |
| Soil Sement  | 91.8%              | 9.6  | 27.8          | 8.6           | 46.1%                       | 45.9%         | 45.9%         | 39.2   | 138.8   |
| Coherex  | 82.0%              | 10.5   | 30.3          | 9.4           | 41.0%                       | 41.1%         | 40.9%         | 35.0   | 143.0   |
| Ligno 10   | 67.3%              | 11.8   | 34.1          | 10.6          | 33.7%                       | 33.7%         | 33.3%         | 28.7   | 149.3   |
| Road Oyl   | 91.6%              | 9.7  | 27.9          | 8.6           | 45.5%                       | 45.7%         | 45.9%         | 39.0   | 139.0   |

**Summary of Benefits of Paving Alternate Miles of Public Unpaved Roads on Modeled PM10 Concentrations at PCH on October 29, 2008 Stagnation Design Day (178 µg/m3)**

| Control Measures                            | Control Efficiency | Modeled Concentration After Control (µg/m3) |               |               | Modeled Control Benefit (%) |               |               | Total Control Measure Reduction (µg/m3) | Modeled Design Day Concentration (µg/m3) |
|---|--------------------|---|---------------|---------------|-----------------------------|---------------|---------------|---|--|
|   |                    | Public Dirt B                               | Public Dirt C | Public Dirt D | Public Dirt B               | Public Dirt C | Public Dirt D | All Public Roads                        |  |
| Baseline Modeled Concentration              |                    | 17.8  | 51.4          | 15.9          |                             |               |               | 85.2                                    | 178.0                                    |
| Total Miles in the Domain                   |                    | 10.1  | 5.1           | 2.3           |                             |               |               |   |  |
| Paving 5 miles (no priority, on All roads)  | 99%                | 12.8  | 36.9          | 11.4          | 28.3%                       | 28.3%         | 28.3%         | 24.1                                    | 153.9                                    |
| Paving 10 miles (no priority, on All roads) | 99%                | 7.7   | 22.3          | 6.9           | 56.6%                       | 56.6%         | 56.6%         | 48.2                                    | 129.8                                    |
| Paving 20 Miles                             | 99%                | 0.2   | 0.5           | 0.2           | 56.6%                       | 56.6%         | 56.6%         | 84.3                                    | 93.7                                     |

| Summary of Benefits for Unpaved Road Speed Reduction on Modeled PM10 Concentrations at PCH on October 29, 2008 Stagnation Design Day (178 µg/m3)<br>All Hours |              |  |                       |                               |
|---|--------------|--|-----------------------|-------------------------------|
| Speed Category  | Speeds (mph) | Unpaved Road Impact at Monitor (µg/m3) | Modeled Reduction (%) | Modeled Concentration (µg/m3) |
| <b>Public B</b>   |              |  |                       |                               |
| Base Speed  | 25           | 17.8                                   | -                     | 178                           |
| Reduced Speeds  | 20           | 15.9                                   | 10.60%                | 176.1                         |
|   | 15           | 13.8                                   | 22.60%                | 173.9                         |
| <b>Public C</b>   |              |  |                       |                               |
| Base Speed  | 30           | 51.4                                   | -                     | 178                           |
| Reduced Speeds  | 25           | 46.9                                   | 8.70%                 | 173.6                         |
|   | 20           | 42                                     | 18.40%                | 168.8                         |
|   | 15           | 36.3                                   | 29.30%                | 163.4                         |
| <b>Public D</b>   |              |  |                       |                               |
| Base Speed  | 35           | 15.9                                   | -                     | 178                           |
| Reduced Speeds  | 30           | 14.8                                   | 7.40%                 | 176.8                         |
|   | 25           | 13.5                                   | 15.50%                | 175.5                         |
|   | 20           | 12.1                                   | 24.40%                | 174.1                         |
|   | 15           | 10.4                                   | 34.50%                | 172.5                         |

| Summary of Benefits for Unpaved Road Speed Reduction on Modeled PM10 Concentrations at PCH on October 29, 2008 Stagnation Design Day(178 µg/m3)<br>Low Mixing Height Hours |              |  |                       |                               |
|--|--------------|--|-----------------------|-------------------------------|
| Speed Category   | Speeds (mph) | Unpaved Road Impact at Monitor (µg/m3) | Modeled Reduction (%) | Modeled Concentration (µg/m3) |
| <b>Public B</b>  |              |  |                       |                               |
| Base Speed   | 25           | 17.8                                   | -                     | 178                           |
| Reduced Speeds   | 20           | 16.2                                   | 9.20%                 | 176.4                         |
|  | 15           | 14.3                                   | 19.80%                | 174.5                         |
| <b>Public C</b>  |              |  |                       |                               |
| Base Speed   | 30           | 51.4                                   | -                     | 178                           |
| Reduced Speeds   | 25           | 47.3                                   | 8.00%                 | 173.9                         |
|  | 20           | 42.7                                   | 16.90%                | 169.3                         |
|  | 15           | 37.5                                   | 27.00%                | 164.1                         |
| <b>Public D</b>  |              |  |                       |                               |
| Base Speed   | 35           | 15.9                                   | -                     | 178                           |
| Reduced Speeds   | 30           | 14.7                                   | 7.50%                 | 176.8                         |
|  | 25           | 13.4                                   | 15.70%                | 175.5                         |
|  | 20           | 12.1                                   | 23.90%                | 174.2                         |
|  | 15           | 10.5                                   | 34.00%                | 172.6                         |

**Impact of Tillage/Harvesting Controls on Modeling Concentrations at PCH on October 29, 2008 Stagnation Design Day (178 µg/m<sup>3</sup>)**

| Rank                           | Control Measures             | Control Efficiency (%) |       |                |       | Modeled Control Benefits (ug/m <sup>3</sup> ) |      |       |       |       | Modeled Reduction (%) | Modeled Concentration (µg/m <sup>3</sup> ) |
|--------------------------------|------------------------------|------------------------|-------|----------------|-------|---|------|-------|-------|-------|-----------------------|--|
|                                |                              | Cotton                 | Corn  | Other AG Lands | Grain | Cotton  | Corn | Other | Grain | Total |                       |  |
| Baseline Modeled Concentration |                              | 8.3                    | 0.5   | 2.0            | 5.4   |   |      |       |       |       |                       | 16.2                                       |
| 6                              | Combining Tractor Operations | 17.0%                  | 34.0% | 20.0%          | 34.0% | 6.9   | 0.3  | 1.6   | 3.5   | 3.8   | 23.5%                 | 174.2                                      |
| 2                              | Equipment Modifications      | 50.0%                  | 50.0% | 50.0%          | 50.0% | 4.2   | 0.2  | 1.0   | 2.7   | 8.1   | 50.0%                 | 169.9                                      |
| 11                             | Green Chop                   | 17.0%                  | 17.0% | 17.0%          | 17.0% | 6.9   | 0.4  | 1.6   | 4.5   | 2.7   | 17.0%                 | 175.3                                      |
| 7                              | Multi-year Crop              | 16.0%                  | 16.0% | 16.0%          | 16.0% | 7.0   | 0.4  | 1.7   | 4.5   | 2.6   | 16.0%                 | 175.4                                      |
| 5                              | Reduced Harvest Activity     | 20.0%                  | 0.0%  | 0.0%           | 0.0%  | 6.7   | 0.5  | 2.0   | 5.4   | 1.7   | 10.3%                 | 176.3                                      |
| Control Measure Combinations   |                              |                        |       |                |       |   |      |       |       |       |                       |  |
| 6 & 11                         |                              |                        |       |                |       | 5.7   | 0.3  | 1.3   | 2.9   | 5.9   | 36.5%                 | 172.1                                      |
| 2 & 6                          |                              |                        |       |                |       | 3.5   | 0.2  | 0.8   | 1.8   | 10.0  | 61.8%                 | 168.0                                      |
| 7 & 5                          |                              |                        |       |                |       | 5.6   | 0.4  | 1.7   | 4.5   | 4.0   | 24.7%                 | 174.0                                      |

**Impact of Non Cropland (Unpaved Ag Road) Controls on Modeled Concentrations at PCH on October 29, 2008 Design Day \* for Stagnation Conditions (178 µg/m3)**

| Control Measures  | Control Efficiency | Modeled Concentration After Control (µg/m3) | Modeled Control Benefit (%) | Total Control Measure Reduction (µg/m3) | Modeled Design Day Concentration (µg/m3) | Cost Effectiveness \$/ton |
|---|--------------------|---|-----------------------------|---|--|---------------------------|
| Ag Road Portion of Design Day Concentration (µg/m3)             |                    | 26  |                             |   | 178                                      |                           |
| Application of Dust Palliatives Four Times Per Year: Road Oyl** | 91.60%             | 2.2   | 91.60%                      | 23.8                                    | 154.2                                    | 3,995                     |
| Application of Dust Palliatives Once Per Year: Soil Segment**   | 58.30%             | 10.8  | 58.30%                      | 15.2                                    | 162.9                                    | 2,138                     |
| Application of Dust Palliatives Once Per Year: Ligno 10**       | 21.90%             | 20.3  | 21.90%                      | 5.7                                     | 172.4                                    | 769                       |
| Access Restriction  | 2.00%              | 25.5  | 2.00%                       | 0.5                                     | 177.5                                    |                           |
| Watering  | 72.00%             | 7.3   | 72.00%                      | 18.7                                    | 159.3                                    |                           |

\*\*Cost-Effectiveness of Selected PM10 Control Measures, prepared for Maricopa County Department of Transportation by Sierra Research, June 30, 2006  
62.8 miles of unpaved ag roads in modeling domain

**Summary of Benefits for Unpaved Private Road Speed Reduction on Modeled PM10 Concentrations at PCH on October 29, 2008 Stagnation Design Day (178 µg/m3)  
Low Mixing Height Hours**

| Speed Category   | Speeds (mph) | Unpaved Road Impact at Monitor (µg/m3) | Cumulative Reduction (%) | Modeled Concentration (µg/m3) |
|------------------|--------------|--|--------------------------|-------------------------------|
| <b>Private A</b> |              |  |                          |                               |
| Base Speed       | 15           | 0.4                                    | -                        | 178.0                         |
| Reduced Speeds   | 10           | 0.3                                    | 17.5%                    | 177.9                         |
|                  | 5            | 0.2                                    | 40.0%                    | 177.8                         |
| <b>Private B</b> |              |  |                          |                               |
| Base Speed       | 25           | 25.5                                   | -                        | 178.0                         |
| Reduced Speeds   | 20           | 22.8                                   | 10.7%                    | 175.3                         |
|                  | 15           | 20.2                                   | 20.8%                    | 172.7                         |