**Attachment L:**

**Framing a Cost Benefit Analyses (CBA)**

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| **Define the following:** | **Description** |
| *Step 1: The problem* | The objective of the study is to examine how the costs of the TS and E interventions compare with the benefits. |
| *Step 2: Control options* | TS and E interventions versus no control |
| *Step 3: Audience* | TEMA and employees, other manufacturers |
| *Step 4: Perspective* | TEMA |
| *Step 5: Time frame and Analytic horizon* | Two years from implementation of TS and E interventions (e.g. short enough that the outcomes are not unacceptably uncertain, but not long enough to capture fully the costs and benefits that are attributable to the program, and to account for seasonal variations in program activity levels and targeted health outcomes), |
| *Step 6: Discount rate* | 6% (to compare benefits and costs that occur at different times by adjusting their values according to the time preference corresponding to the chosen perspective) |
| *Step 7: Format* | Key data was derived by a prospective experimental design (in Phase) |

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| **Benefits** | **Costs** |
| **Direct costs averted**   * Averted workers’ compensation costs (both medical and indemnity)1     **Indirect costs averted**   * Reduced or averted costs of absenteeism2 * Reduced or averted costs of presenteeism2 * Reduced turnover costs3   **Value Added**   * Improved product quality2 * Improved task efficiency2 | **Direct costs**  *Tool Support (TS)*   * New/ replacement equipment 2 * Equipment installation2 * Equipment maintenance2   *Exercise Program (E)*   * Personnel time (to attend and conduct training) 2 * Training materials2   **Indirect (productivity losses)**   * Productivity losses to company attributable to program2 * Productivity losses to employees attributable to program2 |
| **Intangible benefits**3  Averted pain and suffering from back injury | **Intangible costs**3  Stress on employees caused by program |
| 1Estimated using Toyota historical data (e.g. frequency/ costs for shoulder related MSDs associated with overhead work in processes similar to those targeted during Phase B)  2Estimated using data collected during Phase B  3Not estimated for this study | |

The formula for NPV, where: r = discount rate (interest rate), t = year, and n = analytic horizon (in years) is:  The formulas for ROI are presented below: , or 