

***SUPPLEMENTAL REPORT***

**LIFE CYCLE COST ANALYSIS OF  
ELECTRONIC MONITORING OF  
PORTABLE FIRE  
EXTINGUISHERS**

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**For:**

**Fire Equipment Manufacturers'  
Association  
Cleveland, Ohio**

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## **BACKGROUND**

This supplemental report was prepared as a result of some of the questions and comments arising from the meeting with the New York State Fire Prevention and Building Code Council (NYSFPBCC) on August 20, 2014. FEMA representatives were provided with public comments and other information received by NYSFPBCC prior to the meeting and prepared to address these questions and comments within the scope of the original report dated January 23, 2013.

Given that similar questions and/or comments may occur again, this Supplemental Report is intended to provide FEMA with appropriate responses. Three major topics are presented.

## **MONTHLY INSPECTIONS**

One of the suggested benefits of electronic monitoring of fire extinguishers is the elimination of the monthly inspections required by NFPA 10, Standard for Portable Fire Extinguishers. At some facilities, however, the monthly inspections of fire extinguishers are performed by facility staff in conjunction with their other assigned duties. Therefore, the "cost" to perform these inspections can be considered to be negligible. With essentially no cost savings for the monthly inspections, it is clear that the benefits of electronic monitoring is greatly diminished.

For such a case, the present value cost for electronic monitoring of fire extinguishers is about *thirteen times* the cost of non-monitored fire extinguishers. This is demonstrated in Supplemental Report Appendix A (Page SA-1), attached to this report.

## **MONTHLY INSPECTION STAFF LABOR COSTS**

One of the comments received concerning the original report was the use of low hourly rate staff conducting the inspections of non-monitored fire extinguishers. In the original report, an hourly rate \$18.00 per hour (including benefits) was used. This equates to an annual labor cost of about \$37,400, considered to be a national median cost.

In larger urban areas where the costs of such staff may be higher, the higher cost of performing the monthly inspections of non-monitored fire extinguishers would tend to offset the costs associated with electronic monitoring of fire extinguishers. To address this scenario, a cost fifty percent higher, \$27.00 per hour, was used in this supplemental analysis. This equates to an annual labor cost of about \$56,200. Even for that increased labor cost, however, the present value cost for electronic monitoring of fire extinguishers is about 1.1 to 1.4 times the cost of non-monitored fire extinguishers. This is demonstrated in Supplemental Report Appendix B (Page SB-1). For such cases, the choice for monitored fire extinguishers should be market-driven.

### **INCREASED INSPECTION PRODUCTIVITY**

An example was cited in the NYSFPBCC staff report of a person's ability to conduct a more aggressive inspection process than that used in the original report. [See Mark Blanke's staff report to the NYSFPBCC; July 9, 2014.] The example cited a person's ability to inspect non-monitored fire extinguishers in less than *two minutes* per extinguisher. The report concluded that a more reasonable inspection time for non-monitored fire extinguishers should be five minutes per extinguisher rather than the ten to twenty minutes per extinguisher used in the original report.

The staff report properly concluded that a reduction in the time to conduct the monthly inspections would reduce the present value of the costs to perform the monthly inspections for non-monitored fire extinguishers, showing a higher comparative cost for monitored fire extinguishers. This case is demonstrated in Supplemental Report Appendix C (Page SC-1) which shows the present value cost for electronic monitoring of fire extinguishers is about 2.5 to 3.5 times the cost of non-monitored fire extinguishers.

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**APPENDIX A -- PRESENT VALUE ANALYSIS WITH MONTHLY INSPECTION COSTS NEGLIGIBLE**

| Activity   | Cost per Extinguisher (low) |                 | Cost per Extinguisher (high) |                 | Service Charge per Facility Visit |          | Notes   |
|--|-----------------------------|-----------------|------------------------------|-----------------|-----------------------------------|----------|---|
|  | No Monitoring               | With Monitoring | No monitoring                | With Monitoring | Low                               | High     |   |
| Initial extinguisher purchase (5 lb., 2-A:40-B:C)  | \$40.00                     | \$40.00         | \$56.00                      | \$56.00         |                                   |          | Plans for 12 health care facilities were reviewed to determine extinguisher quantities and sizes installed by FA contractor |
| Purchase and install extinguisher monitor  | \$0.00                      | \$300.00        | \$0.00                       | \$400.00        |                                   |          |   |
| Purchase and install FA interface  | \$0.00                      | \$100.00        | \$0.00                       | \$500.00        |                                   |          | Costs assume addressable FA system is installed and service contract in place to conduct all ITM required by NFPA 72        |
| FA system programming  | \$0.00                      | \$25.00         | \$0.00                       | \$90.00         | \$0.00                            | \$0.00   | FA tech on site to program entire system, so no service charge included   |
| Monthly inspection labor cost (Staff compensated as part of other duties; no additional costs) | \$0.00                      | \$0.00          | \$0.00                       | \$0.00          | \$0.00                            | \$0.00   | Where inspection performed by owner, no service charge assessed   |
| Semi-annual visual inspection per NFPA 72  | \$0.00                      | \$10.00         | \$0.00                       | \$10.00         | \$0.00                            | \$0.00   | FA tech on site to perform other semiannual tests, so no service charge included  |
| Annual maintenance per NFPA 10   | \$3.00                      | \$5.00          | \$6.00                       | \$8.00          | \$50.00                           | \$100.00 | Includes annual battery replacement for monitor   |
| Annual test per NFPA 72  | \$0.00                      | \$20.00         | \$0.00                       | \$20.00         | \$0.00                            | \$0.00   | No service charge since FA tech on site to perform other annual tests   |
| Disassembly and recharge per NFPA 10 @ 6, 12, 18 years, including cost of temp. repl.          | \$10.00                     | \$15.00         | \$12.00                      | \$18.00         | \$50.00                           | \$100.00 | Replacement extinguisher requires gauge compatible with monitor   |
| Hydrostatic testing @12 years, including cost of temp. repl.                                   | \$20.00                     | \$25.00         | \$25.00                      | \$30.00         | \$50.00                           | \$100.00 | Assumes extinguisher is replaced before second hydro. test  |

|                                   |         |          |         |           |  |  |   |
|-----------------------------------|---------|----------|---------|-----------|--|--|---|
| First costs                       | \$4,000 | \$46,500 | \$5,600 | \$104,600 |  |  |   |
| Monthly insp. Cost                | \$0     | \$0      | \$0     | \$0       |  |  | Assumes "payment" at end of each year (24 periods in analysis).           |
| Annual NFPA 10 cost per year      | \$110   | \$570    | \$220   | \$920     |  |  |   |
| Semi-annual NFPA 72 cost          | \$0     | \$1,000  | \$0     | \$1,000   |  |  | Assumes payment at end of each six-month period (48 periods in analysis). |
| Annual NFPA 72 cost per year      | \$0     | \$2,000  | \$0     | \$2,000   |  |  |   |
| Maintain and recharge per 6 years | \$1,050 | \$1,550  | \$1,300 | \$1,900   |  |  |   |
| Hydrostatic test per 12 years     | \$2,050 | \$2,550  | \$2,600 | \$3,100   |  |  |   |

|                                  |     |
|----------------------------------|-----|
| Total extinguishers per facility | 100 |
| Interest rate (%)                | 5%  |
| Service life (years)             | 24  |

**APPENDIX A -- PRESENT VALUE ANALYSIS WITH MONTHLY INSPECTION COSTS NEGLIGIBLE**

| Activity                            | Cost per Extinguisher (low) |                    | Cost per Extinguisher (high) |                    | Service Charge per Facility Visit |      | Notes |
|-------------------------------------|-----------------------------|--------------------|------------------------------|--------------------|-----------------------------------|------|-------|
|                                     | No Monitoring               | With Monitoring    | No monitoring                | With Monitoring    | Low                               | High |       |
| First cost                          | (\$4,000)                   | (\$46,500)         | (\$5,600)                    | (\$104,600)        |                                   |      |       |
| Semi-annual costs over life         | \$0                         | (\$27,773)         | \$0                          | (\$27,773)         |                                   |      |       |
| Annual costs over life              | (\$1,518)                   | (\$35,463)         | (\$3,036)                    | (\$40,292)         |                                   |      |       |
| 6 year costs over life              | (\$1,805)                   | (\$2,664)          | (\$2,234)                    | (\$3,265)          |                                   |      |       |
| 12 year costs over life             | (\$1,142)                   | (\$1,420)          | (\$1,448)                    | (\$1,726)          |                                   |      |       |
| <b>Total cost over life (P. V.)</b> | <b>(\$8,464)</b>            | <b>(\$113,819)</b> | <b>(\$12,318)</b>            | <b>(\$177,657)</b> |                                   |      |       |
| Percent difference                  |                             | <b>1244.77%</b>    |                              | <b>1342.30%</b>    |                                   |      |       |

**APPENDIX B -- PRESENT VALUE ANALYSIS WITH HIGHER STAFF COSTS**

| Activity  | Cost per Extinguisher (low) |                 | Cost per Extinguisher (high) |                 | Service Charge per Facility Visit |          | Notes   |
|---|-----------------------------|-----------------|------------------------------|-----------------|-----------------------------------|----------|---|
|   | No Monitoring               | With Monitoring | No monitoring                | With Monitoring | Low                               | High     |   |
| Initial extinguisher purchase (5 lb., 2-A:40-B:C)                                     | \$40.00                     | \$40.00         | \$56.00                      | \$56.00         |                                   |          | Plans for 12 health care facilities were reviewed to determine extinguisher quantities and sizes installed by FA contractor |
| Purchase and install extinguisher monitor   | \$0.00                      | \$300.00        | \$0.00                       | \$400.00        |                                   |          |   |
| Purchase and install FA interface   | \$0.00                      | \$100.00        | \$0.00                       | \$500.00        |                                   |          | Costs assume addressable FA system is installed and service contract in place to conduct all ITM required by NFPA 72        |
| FA system programming   | \$0.00                      | \$25.00         | \$0.00                       | \$90.00         | \$0.00                            | \$0.00   | FA tech on site to program entire system, so no service charge included   |
| Monthly inspection labor cost (\$27/hr, 10 to 20 minutes per extinguisher per month)  | \$4.50                      | \$0.00          | \$9.00                       | \$0.00          | \$0.00                            | \$0.00   | Where inspection performed by owner, no service charge assessed   |
| Semi-annual visual inspection per NFPA 72   | \$0.00                      | \$10.00         | \$0.00                       | \$10.00         | \$0.00                            | \$0.00   | FA tech on site to perform other semiannual tests, so no service charge included  |
| Annual maintenance per NFPA 10  | \$3.00                      | \$5.00          | \$6.00                       | \$8.00          | \$50.00                           | \$100.00 | Includes annual battery replacement for monitor   |
| Annual test per NFPA 72   | \$0.00                      | \$20.00         | \$0.00                       | \$20.00         | \$0.00                            | \$0.00   | No service charge since FA tech on site to perform other annual tests   |
| Disassembly and recharge per NFPA 10 @ 6, 12, 18 years, including cost of temp. repl. | \$10.00                     | \$15.00         | \$12.00                      | \$18.00         | \$50.00                           | \$100.00 | Replacement extinguisher requires gauge compatible with monitor   |
| Hydrostatic testing @12 years, including cost of temp. repl.                          | \$20.00                     | \$25.00         | \$25.00                      | \$30.00         | \$50.00                           | \$100.00 | Assumes extinguisher is replaced before second hydro. test  |

|                                   |         |          |         |           |  |  |   |
|-----------------------------------|---------|----------|---------|-----------|--|--|---|
| First costs                       | \$4,000 | \$46,500 | \$5,600 | \$104,600 |  |  |   |
| Monthly insp. Cost                | \$450   | \$0      | \$900   | \$0       |  |  | Assumes "payment" at end of each year (24 periods in analysis).           |
| Annual NFPA 10 cost per year      | \$110   | \$570    | \$220   | \$920     |  |  |   |
| Semi-annual NFPA 72 cost          | \$0     | \$1,000  | \$0     | \$1,000   |  |  | Assumes payment at end of each six-month period (48 periods in analysis). |
| Annual NFPA 72 cost per year      | \$0     | \$2,000  | \$0     | \$2,000   |  |  |   |
| Maintain and recharge per 6 years | \$1,050 | \$1,550  | \$1,300 | \$1,900   |  |  |   |
| Hydrostatic test per 12 years     | \$2,050 | \$2,550  | \$2,600 | \$3,100   |  |  |   |

|                                  |     |
|----------------------------------|-----|
| Total extinguishers per facility | 100 |
| Interest rate (%)                | 5%  |
| Service life (years)             | 24  |

**APPENDIX B -- PRESENT VALUE ANALYSIS WITH HIGHER STAFF COSTS**

| Activity                            | Cost per Extinguisher (low) |                    | Cost per Extinguisher (high) | Service Charge per Facility Visit |      | Notes |
|-------------------------------------|-----------------------------|--------------------|------------------------------|-----------------------------------|------|-------|
|                                     | No Monitoring               | With Monitoring    |                              | Low                               | High |       |
| First cost                          | (\$4,000)                   | (\$46,500)         | (\$104,600)                  |                                   |      |       |
| Semi-annual costs over life         | \$0                         | (\$27,773)         | (\$27,773)                   |                                   |      |       |
| Annual costs over life              | (\$76,031)                  | (\$35,463)         | (\$40,292)                   |                                   |      |       |
| 6 year costs over life              | (\$1,805)                   | (\$2,664)          | (\$3,265)                    |                                   |      |       |
| 12 year costs over life             | (\$1,142)                   | (\$1,420)          | (\$1,726)                    |                                   |      |       |
| <b>Total cost over life (P. V.)</b> | <b>(\$82,977)</b>           | <b>(\$113,819)</b> | <b>(\$177,657)</b>           |                                   |      |       |
| Percent difference                  |                             | <b>37.17%</b>      | <b>10.11%</b>                |                                   |      |       |

**APPENDIX C -- PRESENT VALUE ANALYSIS WITH HIGHER STAFF COSTS AND FASTER SERVICE TIME**

| Activity  | Cost per Extinguisher (low) |                 | Cost per Extinguisher (high) |                 | Service Charge per Facility Visit |          | Notes  |
|---|-----------------------------|-----------------|------------------------------|-----------------|-----------------------------------|----------|--|
|   | No Monitoring               | With Monitoring | No monitoring                | With Monitoring | Low                               | High     |  |
| Initial extinguisher purchase (5 lb., 2-A:40-B:C)                                     | \$40.00                     | \$40.00         | \$56.00                      | \$56.00         |                                   |          | Plans for 12 health care facilities were reviewed to determine extinguisher quantities and sizes<br>Installed by FA contractor |
| Purchase and install extinguisher monitor   | \$0.00                      | \$300.00        | \$0.00                       | \$400.00        |                                   |          |  |
| Purchase and install FA interface   | \$0.00                      | \$100.00        | \$0.00                       | \$500.00        |                                   |          | Costs assume addressable FA system is installed and service contract in place to conduct all ITM required by NFPA 72           |
| FA system programming   | \$0.00                      | \$25.00         | \$0.00                       | \$90.00         | \$0.00                            | \$0.00   | FA tech on site to program entire system, so no service charge included  |
| Monthly inspection labor cost (\$27/hr, 5 minutes per extinguisher per month)         | \$2.25                      | \$0.00          | \$2.25                       | \$0.00          | \$0.00                            | \$0.00   | Where inspection performed by owner, no service charge assessed  |
| Semi-annual visual inspection per NFPA 72   | \$0.00                      | \$10.00         | \$0.00                       | \$10.00         | \$0.00                            | \$0.00   | FA tech on site to perform other semiannual tests, so no service charge included   |
| Annual maintenance per NFPA 10  | \$3.00                      | \$5.00          | \$6.00                       | \$8.00          | \$50.00                           | \$100.00 | Includes annual battery replacement for monitor  |
| Annual test per NFPA 72   | \$0.00                      | \$20.00         | \$0.00                       | \$20.00         | \$0.00                            | \$0.00   | No service charge since FA tech on site to perform other annual tests  |
| Disassembly and recharge per NFPA 10 @ 6, 12, 18 years, including cost of temp. repl. | \$10.00                     | \$15.00         | \$12.00                      | \$18.00         | \$50.00                           | \$100.00 | Replacement extinguisher requires gauge compatible with monitor  |
| Hydrostatic testing @12 years, including cost of temp. repl.                          | \$20.00                     | \$25.00         | \$25.00                      | \$30.00         | \$50.00                           | \$100.00 | Assumes extinguisher is replaced before second hydro. test   |

|                                   |         |          |         |           |  |  |   |
|-----------------------------------|---------|----------|---------|-----------|--|--|---|
| First costs                       | \$4,000 | \$46,500 | \$5,600 | \$104,600 |  |  |   |
| Monthly insp. Cost                | \$225   | \$0      | \$225   | \$0       |  |  | Assumes "payment" at end of each year (24 periods in analysis).           |
| Annual NFPA 10 cost per year      | \$110   | \$570    | \$220   | \$920     |  |  |   |
| Semi-annual NFPA 72 cost          | \$0     | \$1,000  | \$0     | \$1,000   |  |  | Assumes payment at end of each six-month period (48 periods in analysis). |
| Annual NFPA 72 cost per year      | \$0     | \$2,000  | \$0     | \$2,000   |  |  |   |
| Maintain and recharge per 6 years | \$1,050 | \$1,550  | \$1,300 | \$1,900   |  |  |   |
| Hydrostatic test per 12 years     | \$2,050 | \$2,550  | \$2,600 | \$3,100   |  |  |   |

Total extinguishers per facility 100  
 Interest rate (%) 5%  
 Service life (years) 24



**APPENDIX C -- PRESENT VALUE ANALYSIS WITH HIGHER STAFF COSTS AND FASTER SERVICE TIME**

| Activity                            | Cost per Extinguisher (low) |                    | Cost per Extinguisher (high) |                    | Service Charge per Facility Visit |      | Notes |
|-------------------------------------|-----------------------------|--------------------|------------------------------|--------------------|-----------------------------------|------|-------|
|                                     | No Monitoring               | With Monitoring    | No monitoring                | With Monitoring    | Low                               | High |       |
| First cost                          | (\$4,000)                   | (\$46,500)         | (\$5,600)                    | (\$104,600)        |                                   |      |       |
| Semi-annual costs over life         | \$0                         | (\$27,773)         | \$0                          | (\$27,773)         |                                   |      |       |
| Annual costs over life              | (\$38,774)                  | (\$35,463)         | (\$40,292)                   | (\$40,292)         |                                   |      |       |
| 6 year costs over life              | (\$1,805)                   | (\$2,664)          | (\$2,234)                    | (\$3,265)          |                                   |      |       |
| 12 year costs over life             | (\$1,142)                   | (\$1,420)          | (\$1,448)                    | (\$1,726)          |                                   |      |       |
| <b>Total cost over life (P. V.)</b> | <b>(\$45,720)</b>           | <b>(\$113,819)</b> | <b>(\$49,574)</b>            | <b>(\$177,657)</b> |                                   |      |       |
| Percent difference                  |                             | <b>148.95%</b>     |                              | <b>258.37%</b>     |                                   |      |       |