Title: UPDATE ON THE STOCKPILE MONITOR PROGRAM

Author(s): Tom Rivera and Herbert H. Harry

Submitted to: 22nd Aging, Compatibility and Stockpile Stewardship Conference

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

Los Alamos NATIONAL LABORATORY

Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by the University of California for the U.S. Department of Energy under contract W-7405-ENG-36. By acceptance of this article, the publisher recognizes that the U.S. Government retains a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or to allow others to do so, for U.S. Government purposes. Los Alamos National Laboratory requests that the publisher identify this article as work performed under the auspices of the U.S. Department of Energy. Los Alamos National Laboratory strongly supports academic freedom and a researcher's right to publish; as an institution, however, the Laboratory does not endorse the viewpoint of a publication or guarantee its technical correctness.
DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.
DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.
UPDATE ON THE STOCKPILE MONITOR PROGRAM
Tom Rivera and Herbert H. Harry
Los Alamos National Laboratory, Los Alamos, NM

BACKGROUND

In 1991 the Los Alamos National Laboratory (LANL) launched a program to develop a comprehensive database of warhead storage conditions. Because of the extended lifetimes expected of the Stockpile, it became desirable to obtain as much detailed information on the storage environments as possible. Temperature and relative humidity at various facilities capable of storing and/or handling nuclear weapons were used as monitoring locations. The Stockpile Monitor Program (SMP) was implemented in a variety of locations as illustrated in Figure 1, below.

![Figure 1. SMP Locations](image)

Initially, monitoring began at Dyess AFB, TX, Grand Forks AFB, ND, Kirtland AFB, NM (Manzano), and Nellis AFB, NV. Because of closures, etc., monitoring equipment has been removed from some locations, while new installations of monitoring equipment have been made in others (see Table I).

---

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>START DATE</th>
<th>END DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sierra Army Depot, CA</td>
<td>4/92</td>
<td>2/96</td>
</tr>
<tr>
<td>Barksdale AFB, LA</td>
<td>10/92</td>
<td>ongoing</td>
</tr>
<tr>
<td>Dyess AFB, TX</td>
<td>6/91</td>
<td>5/95</td>
</tr>
<tr>
<td>Fairchild AFB, WA</td>
<td>5/93</td>
<td>Closing operations</td>
</tr>
<tr>
<td>Grand Forks AFB, ND</td>
<td>4/91</td>
<td>2/96</td>
</tr>
<tr>
<td>Griffiss AFB, NY</td>
<td>5/93</td>
<td>12/94</td>
</tr>
<tr>
<td>KUMSC, NM</td>
<td>1/93</td>
<td>ongoing</td>
</tr>
<tr>
<td>Malmstrom AFB, MT (Missile silos)</td>
<td>5/94</td>
<td>6/98</td>
</tr>
<tr>
<td>Manzano, NM</td>
<td>10/91</td>
<td>2/94</td>
</tr>
<tr>
<td>Nellis AFB, NV</td>
<td>10/91</td>
<td>ongoing</td>
</tr>
<tr>
<td>K. I. Sawyer AFB, MI</td>
<td>10/92</td>
<td>12/94</td>
</tr>
</tbody>
</table>

Table I. Various SMP Installations

Remaining installations now include KUMSC (Kirtland Underground Munitions Storage Complex, Kirtland AFB, NM), Nellis AFB, NV and Barksdale AFB, LA. Efforts are underway to begin installation at Minot, ND.

EQUIPMENT

The equipment is purchased from Campbell Scientific™ and is used without modification. The equipment is not intrusive in any way. The datalogger itself occupies approximately 0.5 ft³. There are two thermocouples and one relative humidity probe the size of a fountain pen. The datalogger is powered by eight D-size flashlight batteries. The components have been tested for EMI in MMIII silos and have been approved for use by the Air Force. Furthermore, SMP hardware has been reviewed and approved by the Pantex Nuclear Explosive Safety Group and has been installed at the Pantex Plant staging areas.

DATA

The maximum/minimum outside temperatures for the various locations are presented in Figure 2. The corresponding maximum/minimum inside temperatures (near the front door) are presented in Figure 3. As can be seen by comparing the two figures, the storage magazines are fairly well protected from the outside temperature conditions.

Extreme relative humidity conditions are exemplified by those from Barksdale AFB, LA (maximum) and from Nellis AFB, NV (Minimum) as shown in Figure 4 (below).

---

Figure 2. Outside Conditions

Figure 3. Inside Conditions
A history of each magnesium's temperature for each year is kept on file. This information is very useful for planning and maintenance.

Proper care is taken to prevent rust from forming. In the summer, the magnesiums are monitored closely so that appropriate steps may be taken to prevent oxidation. The magnesiums are monitored during the summer using a coded telephone communication link. The data may be collected from a remote location using a coded telephone/RF communication link. During the heat of the summer, the magnesiums near the ceiling of the magnesiums are monitored. The data may be collected from a remote location using a coded telephone communication link. The data may be collected from a remote location using a coded telephone communication link.

**Figure 4**: Extreme Relative Humidity Conditions

![Graph showing extreme relative humidity conditions](image)
CONCLUSIONS

Probably the most useful data come from the most extreme conditions monitored. The hottest outside temperatures and relative humidities come from Barksdale, while some of the lowest relative humidity values come from Nellis, which continue to be monitored. The coldest conditions come from Grand Forks, Griffiss, and KI Sawyer, none of which are presently being monitored. For this reason, we would like to begin monitoring Minot, ND.

The outside extreme temperatures are ameliorated by the structures to a significant degree. For example, the hottest outside temperature (120°F) is contrasted by the corresponding cooler inside temperature (85°F), and the coldest outside temperature (-35°F) is contrasted by the corresponding warmer inside temperature (+25°F).

INTERACTIONS WITH OUTSIDE AGENCIES

These data have become useful for calculations related to stockpile-to-target sequence (STS) and other analyses. SMP information has been provided to a number of outside agencies.