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# UPDATE ON THE STOCKPILE MONITOR PROGRAM

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## BACKGROUND

In 1991 the Los Alamos National Laboratory (LANL) launched a program to develop a comprehensive database of warhead storage conditions[1]. 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 rela..ve 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**

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).

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[1] See LA-12796-MS, "The Stockpile Monitor Program", G.A. Buntain, M. Fletcher, and R. Rabie, Issued July 1994.

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

**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 $ft^3$. 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.[2] 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).

[2] "Electromagnetic Interference Test Report for a Campbell Scientific. Inc., Datalogger System," 00-ALC MME-89007, Contract F42600-87-C-3166 OPT-I {Disk TR3.2}. Feb. 1989.

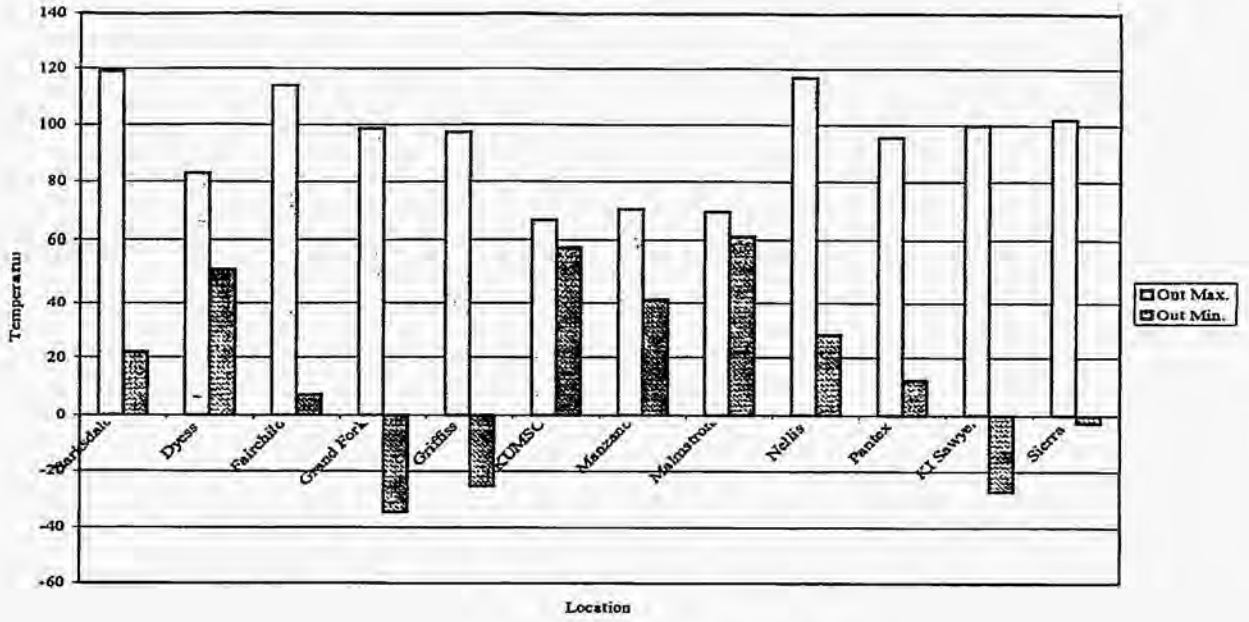


**Figure 2. Outside Conditions**

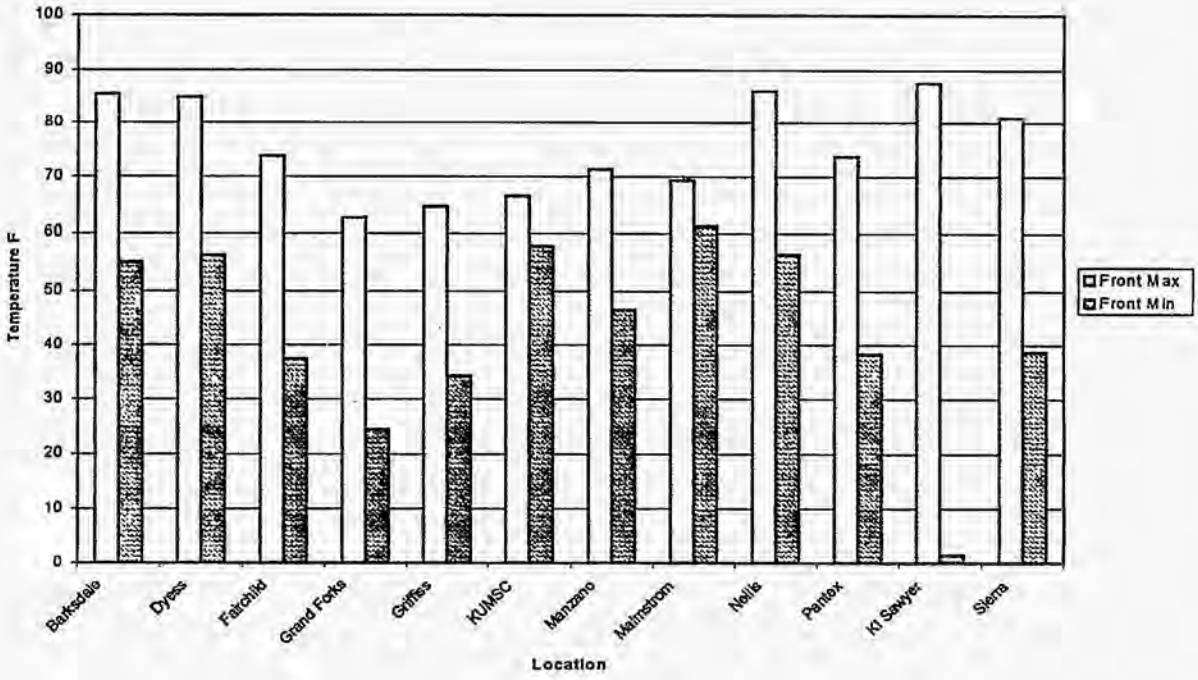


**Figure 3. Inside Conditions**

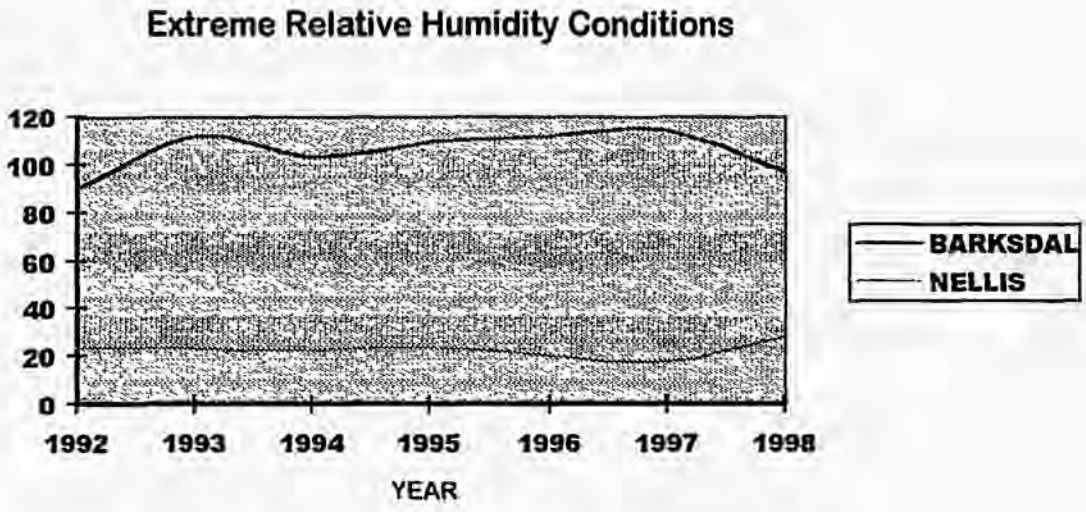


**Figure 4. Extreme %RH**

At PANTEX, some plutonium pits are stored in steel arch construction (SAC) magazines. Temperatures near the ceiling of the magazine are monitored. The data may be collected from a remote location using a coded telephone/RF communications link. During the heat of the summer, the magazine temperatures are monitored often so that appropriate steps may be taken to prevent pits from overheating.

A history of each magazine's temperature for each year is kept on file. This information is very valuable as a record of the temperatures a pit has seen over its storage life and as an indicator of which magazine may be most appropriate to store a particular pit type. An example of these data is illustrated in Figure 5 below.

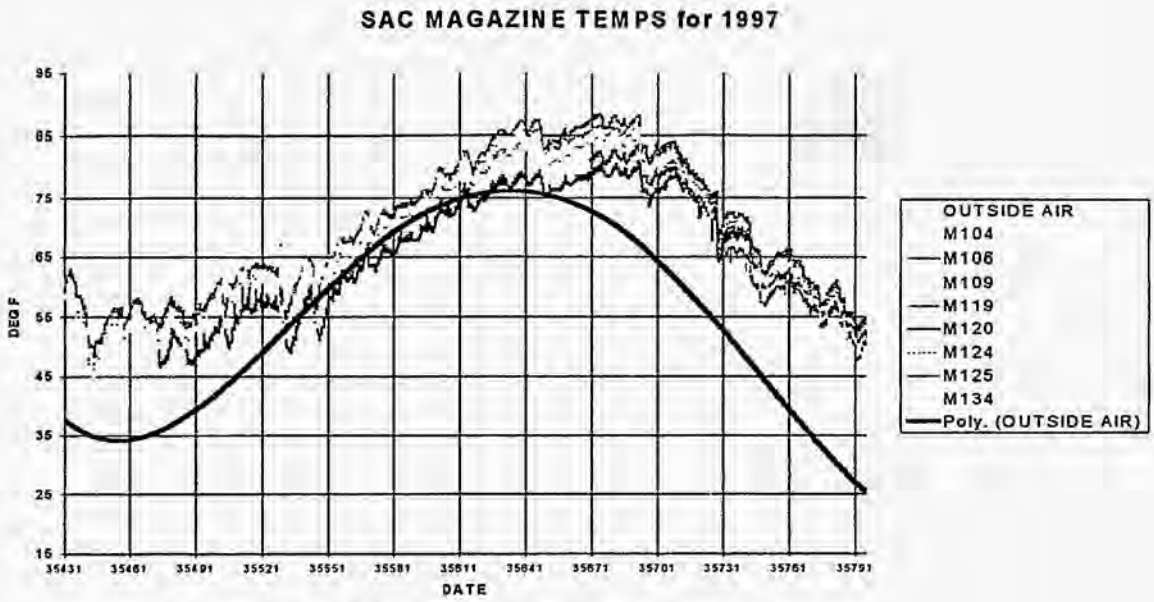


**Figure 5. PANTEX Temperature Data**

## 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.