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Department of Energy

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MAR 12 2003

Mr. Gene Jablonowski, Remedial Project Manager
United States Environmental Protection Agency
Region V, SRF-5J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

DOE-0247-03

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 45402-2911

Dear Mr. Jablonowski and Mr. Schneider:

RESPONSE TO DISAPPROVED DESIGN CHANGE NOTICE 40710-JEG-299

Enclosed is a justification requested by the Ohio Environmental Protection Agency (OEPA) on the subject Design Change Notice. Based on the conference call conducted on March 3, 2003, the Department of Energy is submtting a written justification to the OEPA and United States Environmental Protection Agency (USEPA) and allowing Fluor Fernald to proceed with the purchase of the new Pressure Control Valves.

If you have any questions, please contact Nina Akgündüz at 513) 648-3110.

Sincerely,

Johnny Reising

Johnny W. Reising
Fernald Remedial Action
Project Manager

FCP:Akgündüz

Enclosure: As Stated

Recycled and Recyclable

cc w/enclosure:
N. Akgündüz, OH/FCP
G. Brown, OH/FCP
J. Hall, OH/FCP
J. Saric, USEPA-V, SRF-5J
T. Schneider, OEPA-Dayton (three copies of enclosure)
M. Cullerton, Tetra Tech
M. Shupe, HSI GeoTrans
R. Vandegrift, ODH
AR Coordinator, Fluor Fernald, Inc./MS78

cc w/o enclosure:
R. Greenberg, EM-31/CLOV
S. Robison, EM-31/CLOV
S. Beckman, Fluor Fernald, Inc./MS52-4
D. Carr, Fluor Fernald, Inc./MS2
R. Corradi, Fluor Fernald, Inc./MS52-4
T. Hagen, Fluor Fernald, Inc./MS9
S. Hinnefeld, Fluor Fernald, Inc./MS52-2
D. Nixon, Fluor Fernald, Inc./MS65-2
T. Walsh, Fluor Fernald, Inc./MS52-3
ECDC, Fluor Fernald, Inc./MS52-7

Subject: Revise Silo PCV Set Points, DCN 40710-JEG-299
Response to OEPA Memorandum of Feb 12, 2003.

I. Introduction

In the above referenced DCN submitted to OEPA on Feb 6, 2003, DOE requested approval for a change in the operating set points for the four pressure control valves located on the top of Silos 1 and 2. Specifically the text accompanying the requested change states:

> "(DCN-298) Changes the set pressure for Silos Relief valves (PCV-SILO-20-003 thru -006) from +/- 2.0 inches W.g. to -4.0 and +6.0 inches w.g.[1]
>
> Opening of the manual PCV isolation valves to startup the Radon Control System has to be executed when the silo pressures are within the pressure range defined by the PCV's. Widening the range on the relief valves will increase the window of availability for starting the RCS system. It will have the added effect of reducing the possibility of Radon release due to pressure excursions while the RCS is not in operation."

By its memo of February 12, 2003, OEPA advised that it disapproved the change presented in DCN 40710-JEG-299. The OEPA, in supporting their disapproval, stated that:

> "(The) Ohio EPA does not understand DOE's intent of installing a relief valve then changing the set point to a level which will not be encountered", and,
>
> "DOE needs to demonstrate that the original design considerations, which led to the establishment of +/- 2 inches w.g. set point, are not compromised by this change. Details regarding RCS design such as silo structural integrity and unplanned radon release consequences due to changing the PCV set point should be thoroughly explained."

The purpose of this letter is to address the OEPA concerns and to advise OEPA that we are proceeding with the revised set points as presented herein.

II. Background

There are currently installed four pressure control valves on top of the silos, two valves per silo. The purpose for the pressure control valves is to assure that pressure transients that may arise during the operation of the RCS do not exceed levels that could endanger the structural integrity of the silo domes. The valves are currently set to permit a release from the Silos 1 or 2 cavity when the differential pressures within the silos cavity reaches + or - 2" wg. Thus, during operation, if there were differential negative or positive

[1] The requested range -4.0" to +6.0" has been revised based on an analysis of the differential pressure data for the silos. See Section II.

pressures greater than 2"wg, the valves would lift thus relieving the pressure and obviating any impact on the domes.

Each pressure control valve is mounted on top of an isolation valve. The isolation valve is closed during the periods when the RCS is not in operation and is opened prior to RCS startup. The purpose of the isolation valves is to assure that when the RCS is not operating, naturally occurring differential pressures will not result in releases of radon to the atmosphere.

As part of the RCS startup procedure the isolation valves must be opened. It is clearly desirable to avoid opening the valves when they might lift to discharge radon contents into the air. In addition it has been judged prudent to avoid any action on the part of the operators that would cause a valve to lift thus drawing air in and causing operating alarms to initiate. Nominally, these valve lifts would occur when the differential pressure in either dome exceeds +/- 2". To provide a measure of protection against this eventuality, an analysis was performed on the manufacturer's calibration data for the valves establishing that the tolerance around the +/- 2" wg level was approximately +/- 10%. It was therefore concluded that a worker should not be dispatched to the top of the dome if the pressure indicators (monitored in the RCS control room) showed any differential pressures greater than +/- 1.5"wg. In this way any operationally driven valve lift would be avoided.

III. Reason for Requesting This Change; How is This Supported by the Data?

The result of the decisions described above was that to start the RCS the differential pressure had to be held to within a range of +/- 1.5" wg. This turns out to be a potentially restrictive operating range.

It is also true that the use of +/- 2" wg as set points for the PCV's was based on very conservative judgements about the strength of the domes. It appears to be the case that the historical database on the differential pressures experienced by the silos had not been taken into account in establishing this range (+/-2" wg).

The following discusses the reviews that were conducted and traces the evolution of the analysis that led to:

a) A realization that the differential pressure range that the silos can safely sustain can be widened, and,
b) A desire to take advantage of this widening of the safe range to facilitate startup operation of the RCS.

A. Historical Data Review

There are two sets of data:

1) Data from the period July 1992 to Dec 1993.
2) Data collected since the start of the RCS operation in Dec 2002 to 2/20/03.

The reliability of the data for the early period is suspect; the latter set is considered more reliable. A summary of these data for the early period is attached. Plots of the recently collected data are also attached.

A review of data that exists for the Silos from the period 7/92 to 12/93 indicates that differential pressures within the domes have been recorded to reach as high as +6.76" wg and as low as -2.98" wg.

Analyzing the data for the early period a comparison of the data versus the current allowable startup thresholds was prepared. These results are presented in the following table:

	Silo 1	Silo 2
% Time P less than -1.5"wg	1.8%	1.0%
% Time P above +1.5"wg	4.5%	3.2%

Examination of the early data set indicates that excursions both above and below the limit of +/- 1.5" wg occur in streaks, although we have not quantified the durations of these streaks.

For the recently collected data presented in the attached graphics, there are very infrequent excursions in either Silo 1 or 2 above the +1.5" wg level, however, there are far more frequent excursions of the differential pressure below -1.5" wg for both of the silos. In fact, there is a negative excursion for both of the silos below -1.5" wg that persists for 10 consecutive days.

The conclusion drawn by the project from examination of these data sets is that it would be very desirable to expand the range of differential pressures to permit a wider range of startup opportunities.

B. Review of Silo Dome Strength

To see if the startup range could be expanded, Fluor re-evaluated the dome strength for full and for emptied silos. Fluor decided to determine if the range in naturally occurring differential pressures recorded in the past (ie approx. -3"wg to +7"wg as identified above) were likely to impair the structural integrity of the silo dome. For the case where the silos are full (as they will be for the operation of the RCS in Phase I), differential pressures of +/- 7" wg were determined to result in no impact to the integrity of the silo domes. During the transfer of slurry and as the silos are emptied out, the corresponding range of differential pressures was determined to be -4"wg to +7"wg. This means that for Phase I operation the pressure control valves could theoretically be set to +/- 7" wg.

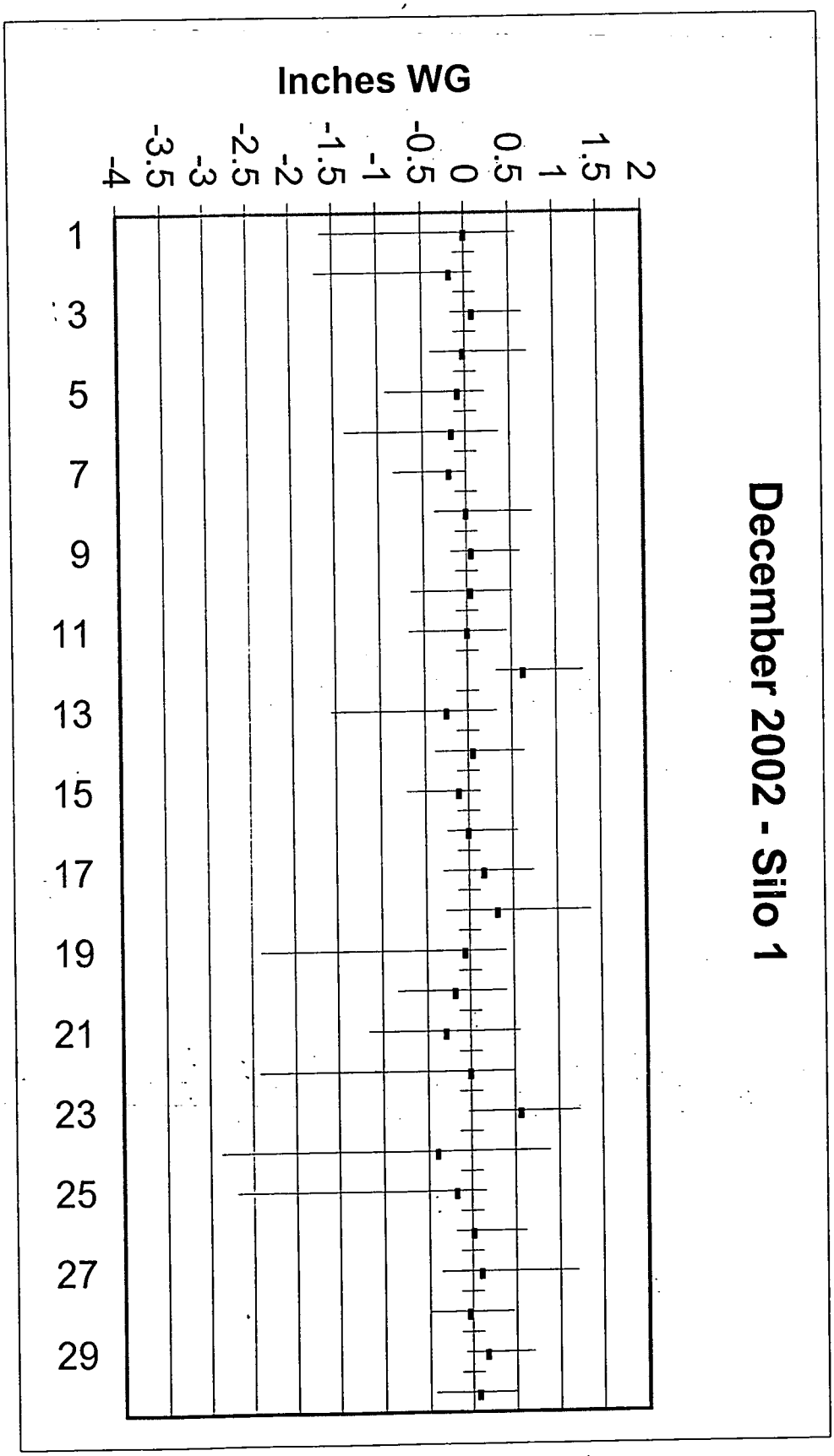
The project however, does not desire that +/- 7" wg be selected as the set points. The requirement of the project is to eliminate the bulk of the restriction to startup operation by setting the range for the control valves be set +4"wg and -3"wg. This results in a startup range of pressures of - 2.5" wg to + 3.5"wg. Inspection of the data from the old data

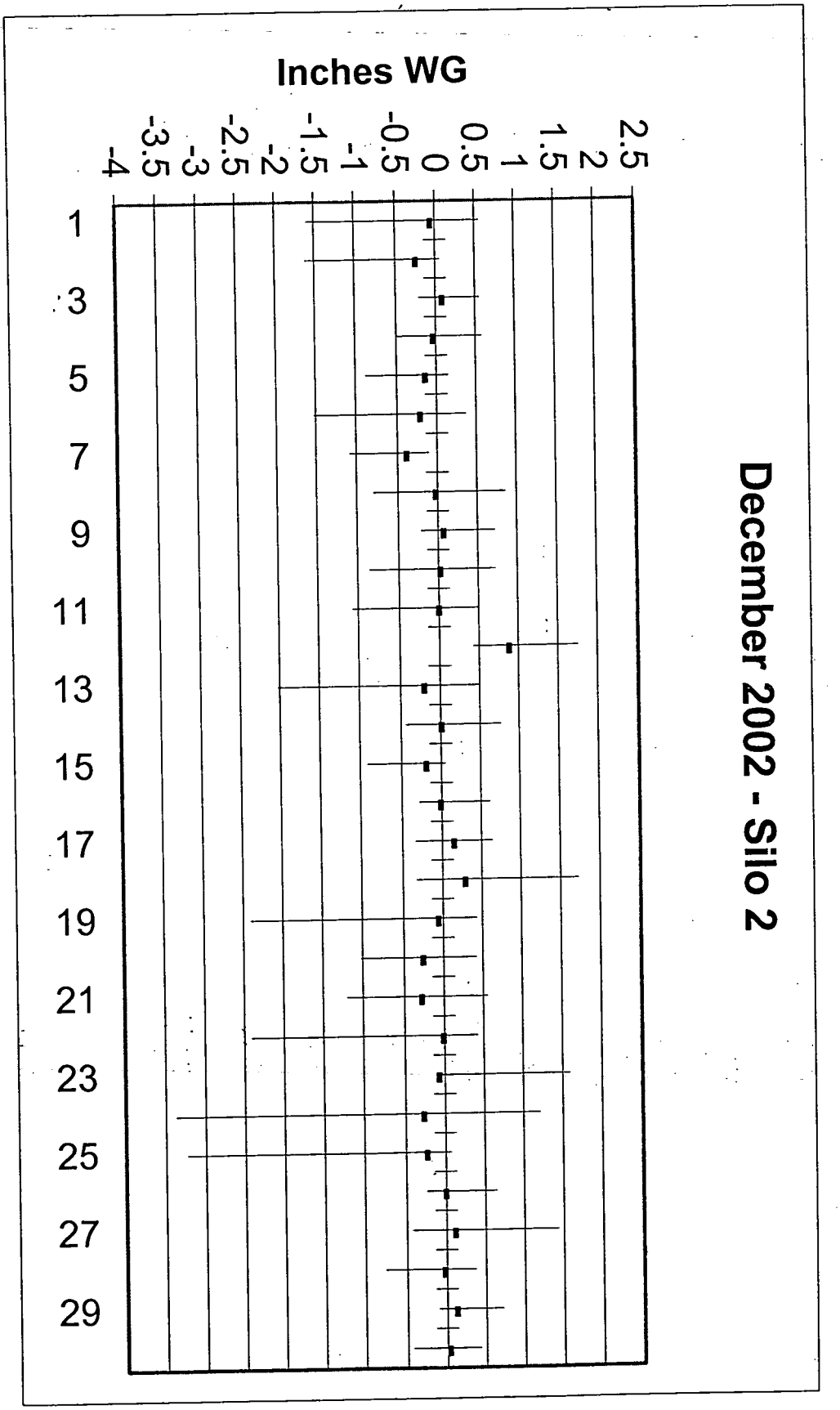
set shows that there would be virtually no excursions below the −2.5"wg limit and less than 0.2% excursion above the +3.5"wg limit.

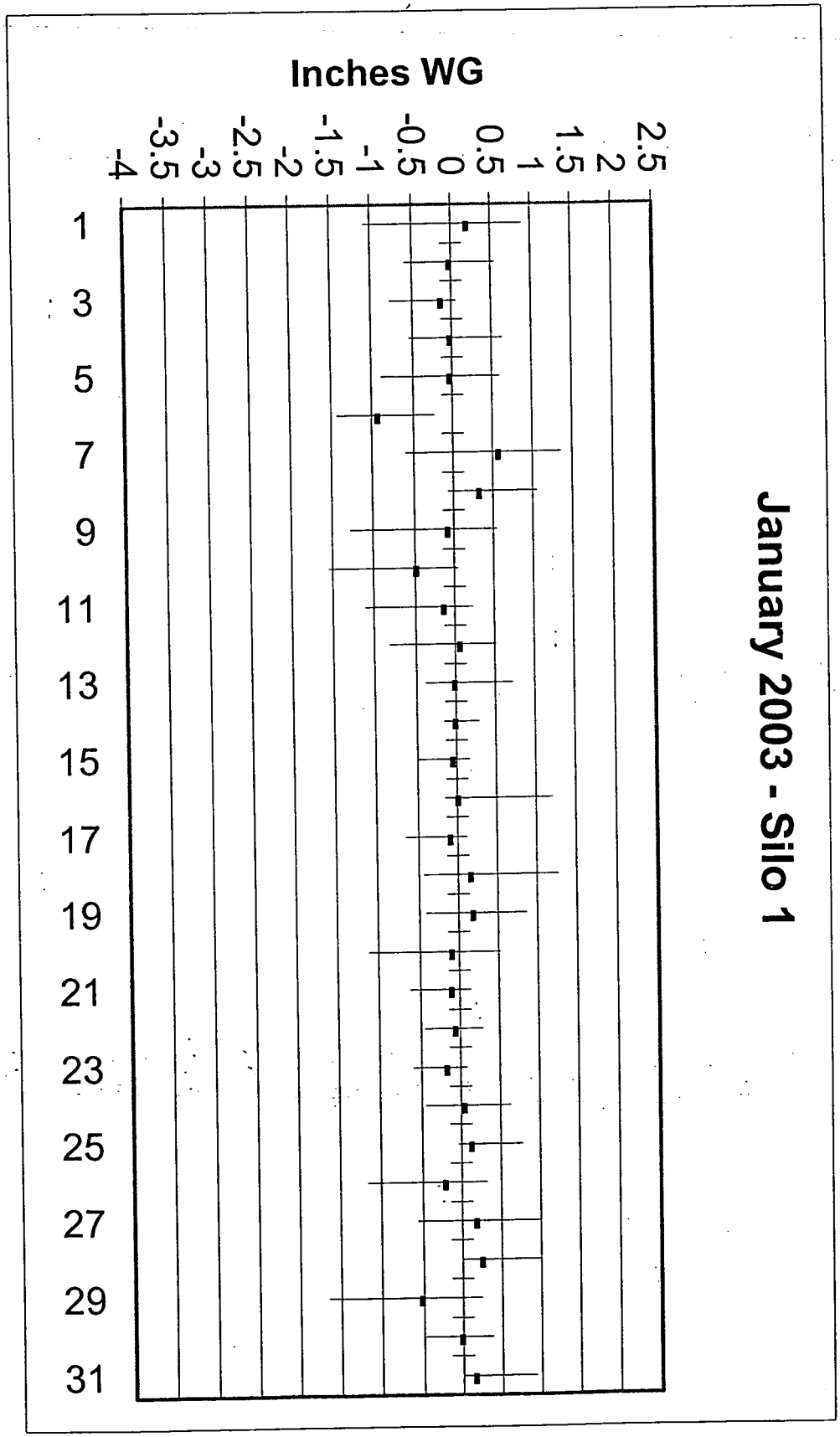
These changes would have no effect on the RCS during operation. The RCS will shut down when the differential pressure exceeds +0.45"wg. These changes allow for a greater margin of operational flexibility without compromising the structural integrity of the silo domes. Finally, with a range of −3" wg to +4" wg, a safety factor of about 75% (ie 7/4) is established on the upper value and about 33% (ie 4/3) on the lower value. With the expanded range of PCV set points it is our judgement that the potential for a release of radon will be lessened.

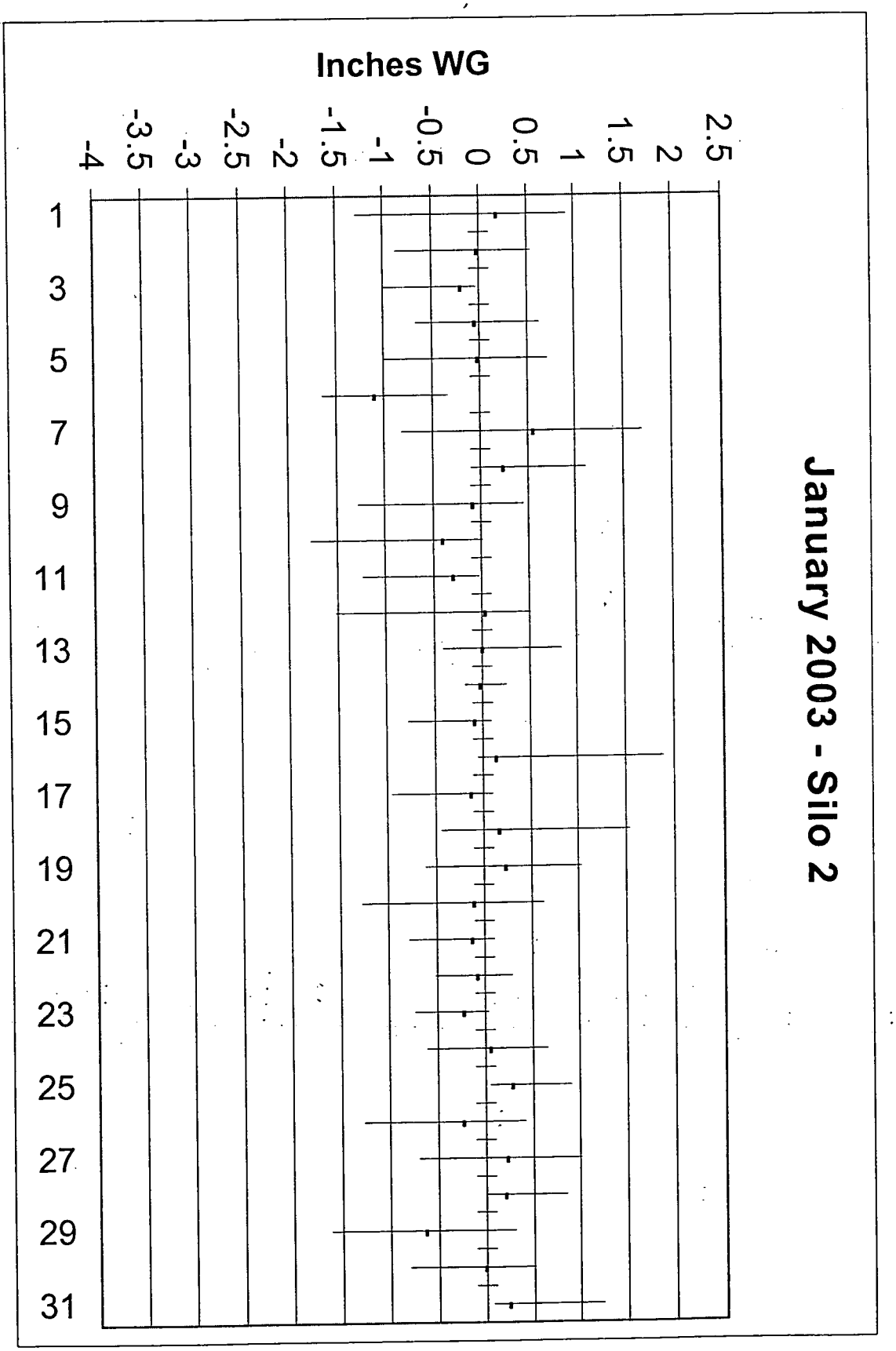
IV. Conclusions

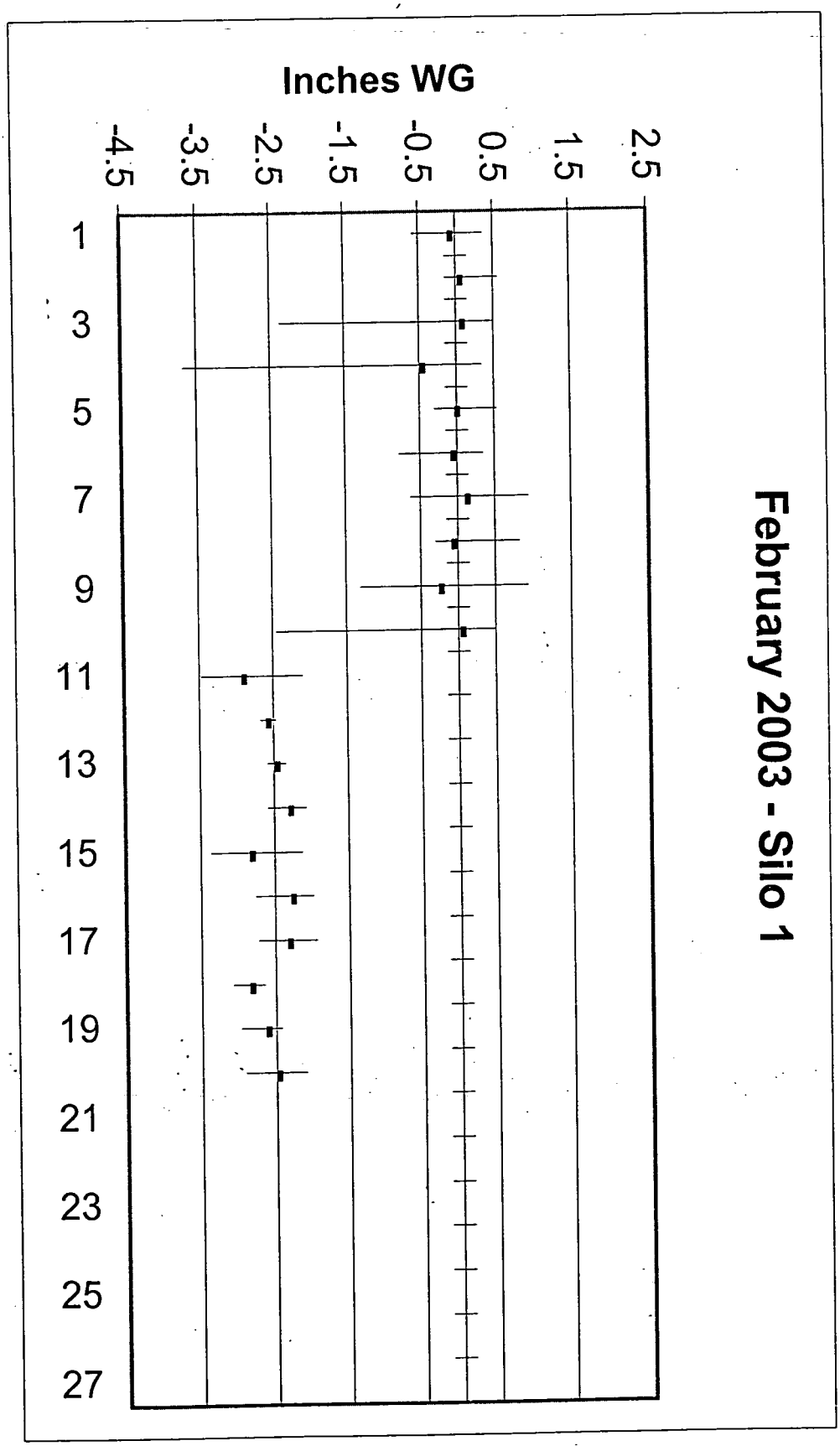
It is concluded that, by using set points of −3.0"wg to +4.0" wg and a corresponding startup range of −2.5"wg to +3.5" wg, there is no compromise of the structural integrity of the silos. For the time being, Project is adhering to the judgmentally based prohibition of placing any operator atop to domes to open an isolation valve when such action will cause an alarm. Also, Flour Fernald is proceeding with the procurement of the PCVs with set points of −3.0" wg to +4.0" wg in preparation for the RCS Phase I continuous operation.

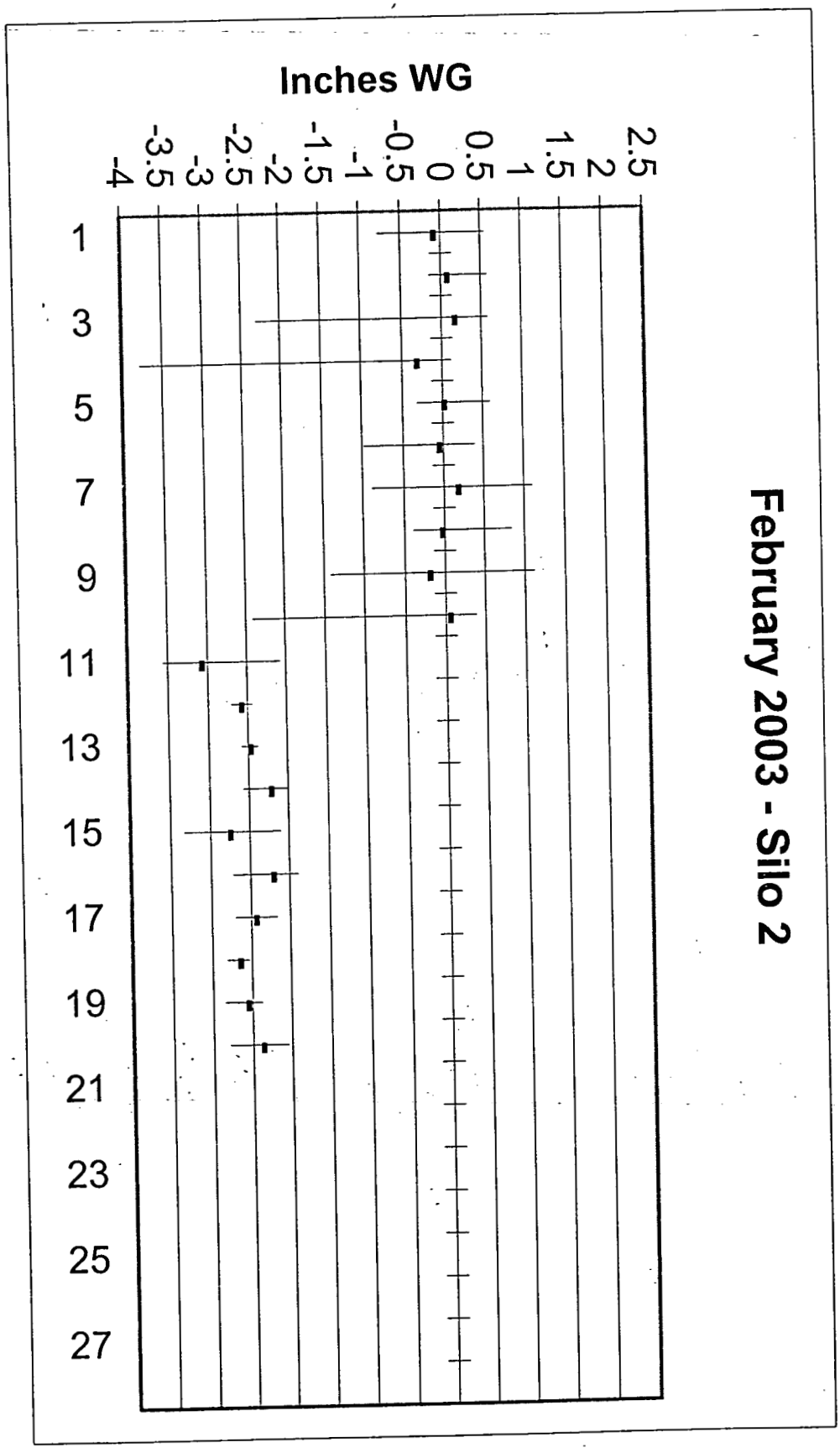

December 2002 - Silo 1
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
-4
Inches WG
1
3
5
7
9
11
13
15
17
19
21
23
25
27
29


December 2002 - Silo 2
Inches WG
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
-4
1
3
5
7
9
11
13
15
17
19
21
23
25
27
29


January 2003 - Silo 1
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
-4
Inches WG
1
3
5
7
9
11
13
15
17
19
21
23
25
27
29
31


January 2003 - Silo 2
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
-4
Inches WG
1
3
5
7
9
11
13
15
17
19
21
23
25
27
29
31


February 2003 - Silo 1
2.5
1.5
0.5
-0.5
-1.5
-2.5
-3.5
-4.5
Inches WG
1
3
5
7
9
11
13
15
17
19
21
23
25
27


February 2003 - Silo 2
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
-4
Inches WG
1
3
5
7
9
11
13
15
17
19
21
23
25
27

Silos Data - July 1992 Through December 1993

Number of Pressure Readings

Silo 1	Silo 2
36332	36873

MAX SILO 1	MAX SILO 2	
6.76	6.62	inches of water

Std Dev Silo 1	Std Dev Silo 2	
0.63	0.54	inches of water

+/- Six Sigma limit		
3.81	3.27	inches of water

RangeFrequency- Silo 1	Pressure Range- inches of water	Range Frequency Silo 2
0	< -3.5	0
0	-3.5 to -3.0	0
0	-3.0 to -2.5	0
349	-2.5 to -2.0	103
294	-2.0 to -1.5	275
289	-1.5 to -1.0	834
348	-1.0 to -0.5	218
522	-0.5 to 0	222
24341	0 to 0.5	32403
7624	0.5 to 1.0	1033
943	1.0 to 1.5	593
519	1.5 to 2.0	304
331	2.0 to 2.5	335
305	2.5 to 3.0	292
393	3.0 to 3.5	236
23	3.5 to 4.0	6
13	4.0 to 4.5	5
12	4.5 to 5.0	6
6	5.0 to 5.5	2
11	5.5 to 6.0	5
9	>6	1
Total Occurrences 36332		36873
Tot<1.5 & >1.5 2265		1570
% <1.5 &>1.5 6.2%		4.3%

each 15 minute period counts as a single occurrence;