Rocky Flats Environmental Technology Site

Building 776/777 1st Floor Final Survey Report

Survey Unit: 776026

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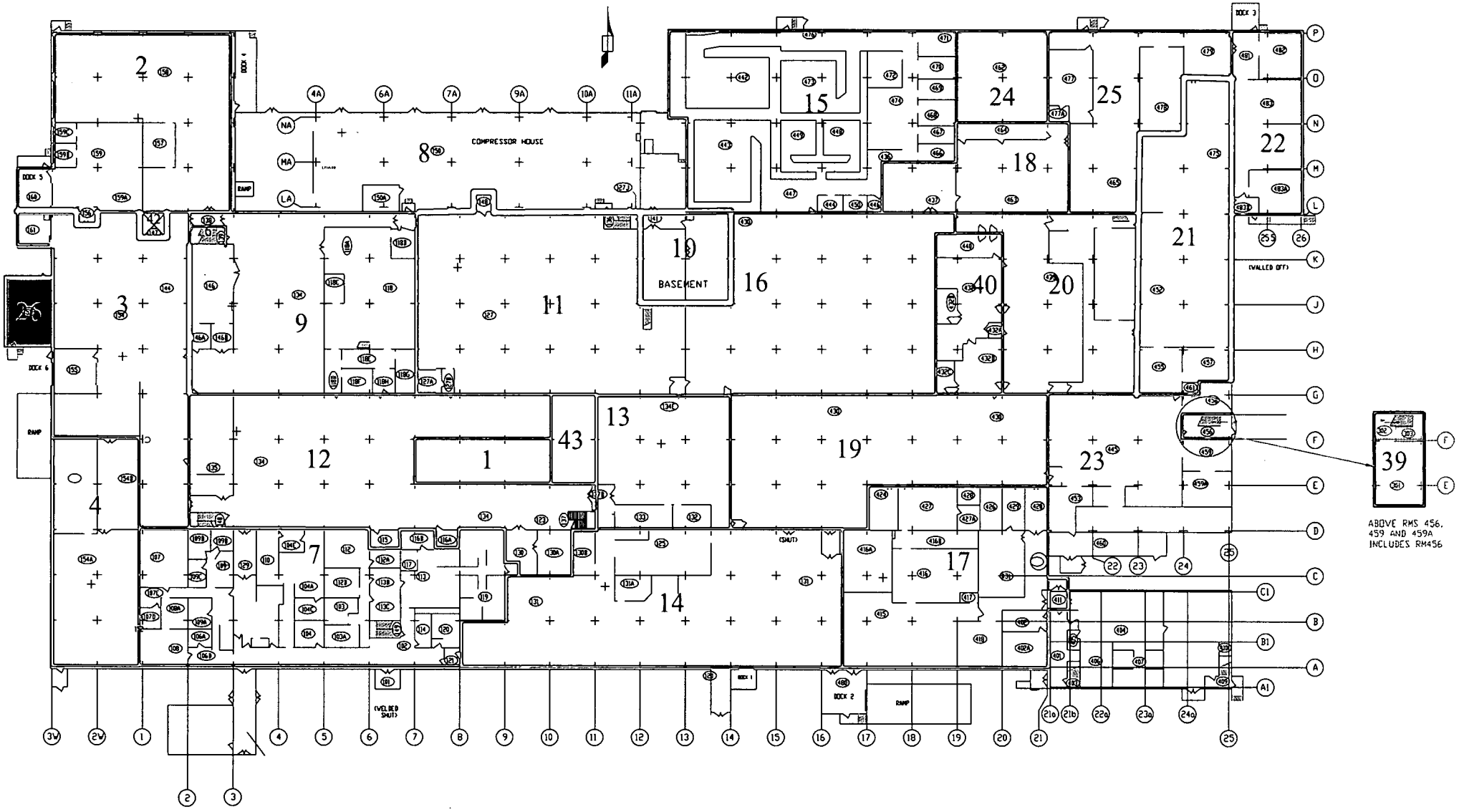
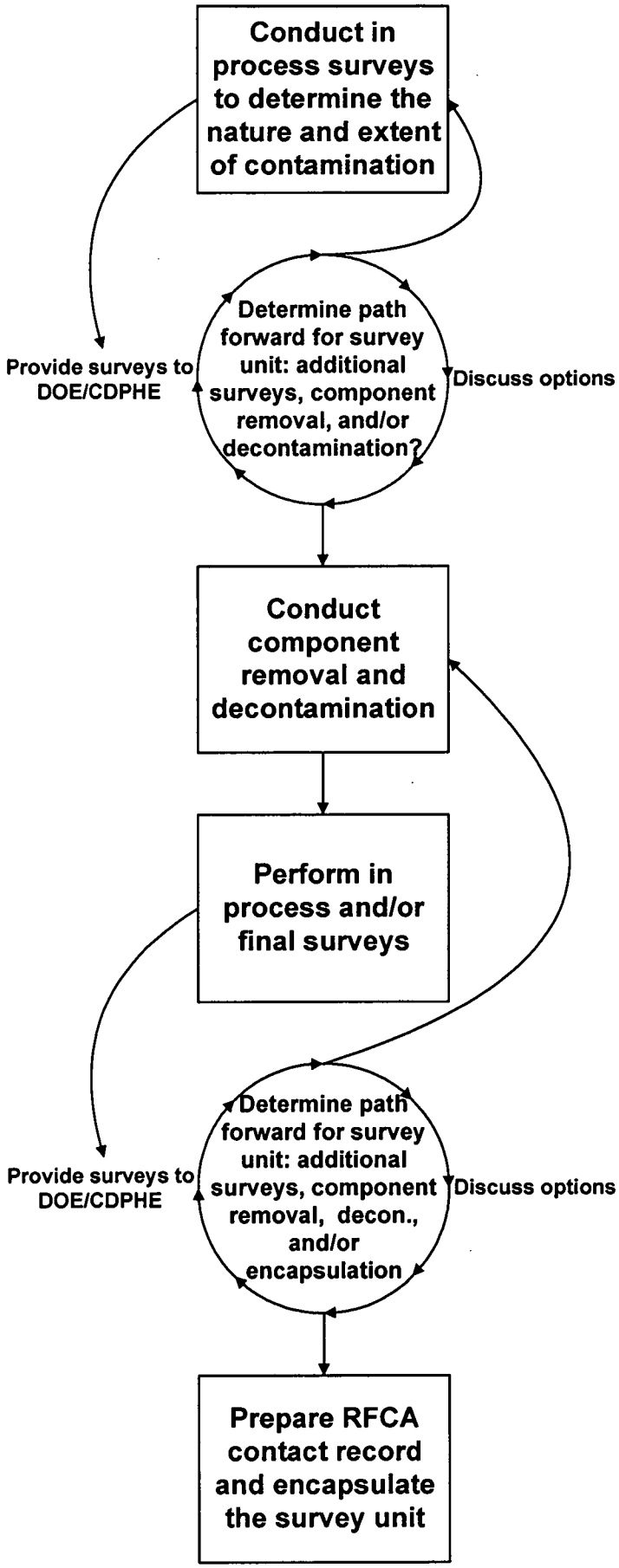
B776/777 SURVEY UNITS
1st FLOOR




Conduct in process surveys to determine the nature and extent of contamination
Provide surveys to DOE/CDPHE
Determine path forward for survey unit: additional surveys, component removal, and/or decontamination?
Discuss options
Conduct component removal and decontamination
Perform in process and/or final surveys
Provide surveys to DOE/CDPHE
Determine path forward for survey unit: additional surveys, component removal, decon., and/or encapsulation
Discuss options
Prepare RFCA contact record and encapsulate the survey unit

Final Survey Instructions
Building 776 1st Floor
Survey Unit 776026

Purpose:

This instruction provides guidance for collecting total and removable alpha contamination data to quantify the amount of residual contamination in Survey Unit 776026 prior to demolition.

Equipment and materials:

1. Electras with attached DP-6, calibrated and daily response checked.
2. Calibrated and daily response checked SAC-4s.
3. Measuring tape or laser range finder.

Note: The NE Electra with DP-6 probe and the Eberline SAC-4 shall be used in accordance with RSP- 7.01 and 7.02

Procedure:

1. Mark the sample locations on the surfaces to be measured, as delineated on the survey map.
2. Collect total surface activity, local area background measurements, and removable surface activity measurements at all locations annotated on the attached map.
3. Record the NE Electra measurements on the attached sheet. Note any items or conditions that may have affected the measurement in the "remarks" section.
4. Count swipes for 60 seconds with a SAC-4, record result on attached sheet for removable contamination.
5. Complete the data sheets.

Survey Requirements

Surface	Type of Survey	Probe	Placement	Count Time
All Surfaces	Total Alpha Activity	Electra with DP-6	On contact	60 seconds
All Surfaces	Removable Alpha	SAC-4	Swipe placed in tray	60 seconds

FINAL SURVEY RESULTS
Survey Unit 776026

Scope

This report is prepared to summarize preliminary surveys of survey unit 776026. The surveys have been performed to determine the extent of contamination in the survey unit. As a result of the low levels of contamination and the lack of remediation required for this survey unit, the final survey was performed in conjunction with the in-process survey.

Survey Unit 776026 consists of room 153, herein after, referred to as the carpenter shop. This room is adjacent to the west dock. However, there is no entrance to room 153 from B776.

Historical Review

This carpenter shop was a non-process area. It was used as a carpenter shop for many years. At one time, it was used to house a non-process autoclave. The autoclave was constructed in the floor. Sometime after the 1969 fire, which destroyed the autoclave control system housed in room 154, the decision was made to remove the autoclave, and fill the void structure with gravel. Two years ago, a portion of the gravel was removed, and an investigation confirmed that no contamination exists in the autoclave void. All surveys performed to date indicate that no contamination above the unrestricted release criteria for DOE controlled radioactive material exists in the carpenter shop, including the autoclave voids.

Survey Methods and Techniques

Based on the process history of the carpenter shop, the decision was made to characterize the floors walls and ceiling of the carpenter shop with conventional survey instruments. Smears to detect removable activity were counted on SAC-4's, and total surface activity measurements were obtained with NE Electras with DP-6 probes.

PDS Methods and Techniques

The PDS survey results determine the Average Surface Contamination Value ($ASCV_u$) and source term for the survey unit. These parameters are used to determine whether the building may be demolished within the limits outlined in the "Radiological Pre-Demolition Survey Plan Building 776/777".

To comply with the "Radiological Pre-Demolition Survey Plan Building 776/777", a minimum of 30 survey points were selected per survey unit. A random start, systematic grid method was used to identify the survey point locations. Three types of surveys are performed at each survey point as follows:

- Based on process history, painted surfaces did not require evaluation for potential contamination under coatings using sodium iodide (NaI) gamma detectors.
- Direct alpha surface contamination measurements are performed using a NE Electra survey instrument with attached DP-6 probe.
- Removable surface alpha contamination surveys were performed by swiping the survey point with a 47mm filter paper then counting the filter paper on a SAC-4 alpha counter.

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FINAL SURVEY RESULTS
Survey Unit 776026

PDS Data Summary

In accordance with the "Radiological Pre-Demolition Survey Plan Building 776/777" the final survey total surface contamination values are used to determine the $ASCV_u$ for each survey unit. The NE Electra MDA was used for the following calculations. The results are summarized in Table 1 below (See Attachment 1 for calculation guidance):

Table 1:
PDS Final Results

	Final Results
776026 Inaccessible Area Source Term (μCi)	N/A
776026 Accessible Area Source Term (μCi)	0.3
776026 Total Source Term (μCi)	0.3
Survey Unit Wall, Ceiling, and Floor Area (m^2)	194
($ASCV_u$) (μCi/m^2)	0.0016
($ASCV_u$) (dpm/100cm^2)	67

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Attachment 1

Standard Method for Calculating the ASCV for Each Survey Unit

Prerequisites:

1. Final survey map for the survey unit
2. PDS survey results
3. Survey information used to estimate activities in inaccessible areas;
4. Survey information for any structural members or elevated regions not represented by the PDS survey.

Conversions:

1 square meter (m^2) = 100 x 100 cm^2

1 microcurie (μCi) = 2.22x 10^6 dpm

1 (μCi/ m^2) = 22,200 dpm/ 100cm^2 evenly distributed over one square meter.

12 inches = 1 foot = 0.305 meters

Calculations:

Accessible Area Inventory

1. Calculate the average surface contamination for the applicable survey unit from a minimum of 30 sodium iodide measurements obtained by the PDS survey.
2. Average the total surface contamination activity present.
3. Convert the average surface contamination value from step 2 from "dpm/ 100cm^2" to "μCi/ m^2"

   Example:

   22,200 dpm/100cm^2 x (100 x 100 cm^2/ m^2) x (1μCi/2.22x 10^6 dpm) = 1 μCi/ m^2

4. Obtain surface area of survey unit from title box of final survey map. This is reported in square meters.
5. Calculate inventory for accessible areas

   The surface area from a survey unit map title box is 1,000 square meters and the average contamination level from the 30 PDS points is 22,200 dpm/ 100cm^2.

   Example:

   1,000 m^2 x 22,200 dpm/ 100cm^2 x (100 x 100 cm^2/ m^2) x (1μCi/2.22x 10^6 dpm) = 1,000 μCi

Inaccessible Area Inventory

1. Document methods used to estimate contamination levels and potential inventory in seams, cracks or other surfaces in the final survey report. Provide an estimated remaining inventory for each item/area in the report.

   Example:

   There are 20 feet of seams contaminated to an average level of 2,220,000 dpm/100 cm^2. Each seam has two sides. The total inventory can be estimated assuming the contamination levels measured at the top of the seam extend down each side of the seam. The depth of the seam can be determined from design drawings or from direct observation as the seam is chipped away. If a seam is determined to be 4 inches deep, then the inventory of the seam can be calculated as follows:

   The contaminated area of the seam is:

   (20 feet x .305 m/ft) * (0.3 feet x 0.305 m/ft) = .61 m^2 x 2 sides = 1.22 m^2

   Therefore the inventory in the seam in μCi is:

   1.22 m^2 * (2,220,000 dpm/100 cm^2) * (10,000 cm^2/ m^{-2})* μCi /2.22E6 dpm = 122 μCi

Attachment 1

Calculating the ASCV

1. Sum the inventories from the inaccessible areas with the inventory for the accessible area to obtain a total inventory for the survey unit.

   Total Inventory = Accessible Inventory + Inaccessible inventory + Inventory items (areas not represented by other inventories listed i.e. Stairs, columns, etc)

   Example: 1000 μCi = accessible inventory

   122 μCi = inaccessible inventory

   100 μCi = inaccessible contamination in the columns and contamination on the stairs

   1000 + 122 + 100 = 1222 μCi

2. Divide the total inventory for the survey unit by the accessible area of the survey unit obtained from the final survey map.

   Example: 1222 μCi = total inventory

   1000 m2 = total surface area of the survey unit

   1222 μCi/1,000 m^2 = 1.22 μCi / m^2

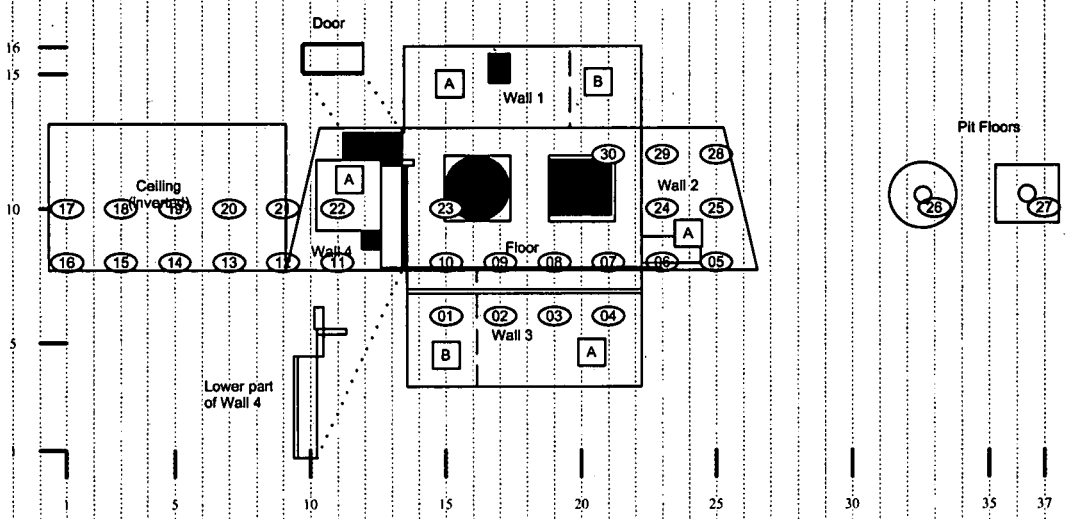
   1.22 μCi /m^2 * (1m^2 /(100*100 cm^2)) * (2.22E6 dpm/μCi) = 27084 dpm/ 100cm^2

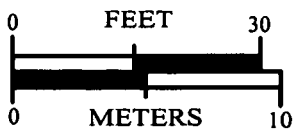
RADIOLOGICAL CLOSEOUT SURVEY FOR THE 776 CLUSTER

Survey Area: VI **Survey Unit: 776026** **Classification: NA**
Building: 776
Survey Unit Description: First floor- Room 153

Total Floor Area: 46 sq. m **Total Area: 194 sq. m** **Random Start Grid Size: 2 x 2 sq. m**

SURVEY UNIT 776026 - MAP 1 OF 1





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SURVEY MAP LEGEND

- Smear & TSC Location
- Smear, TSC & Sample Location
- Open/Inaccessible Area
- Area in Another Location

Total Surface Activity

Survey Area:	VI	Survey Unit:	776026			
Meter Model:	NE Electra w/ DP6 Probe				Date:	1/16/05
	1	2	3			
Instrument #:	4677	4069	N/A	N/A	A priori MDA:	60
Cal. Due Date:	6/16/05	7/10/05	N/A	N/A	Avg. Local Bkgd	6.5
Efficiency (c/d):	0.219	0.219	N/A	N/A	Avg. Efficiency	0.219

Sample Location #	RCT ID #	Inst. #	Local Bkgd (cpm)	Gross (cpm)	(dpm/100 cm^2)
1	3	1	5	6.0	**4.6**
2	3	1	6	3.0	**-13.7**
3	3	1	3	8.0	**22.8**
4	3	1	7	10.0	**13.7**
5	3	1	4	7.0	**13.7**
6	3	1	8	3.0	**-22.8**
7	3	1	4	6.0	**9.1**
8	3	1	6	4.0	**-9.1**
9	3	1	0	2.0	**9.1**
10	3	1	3	4.0	**4.6**
11	3	1	6	9.0	**13.7**
12	3	1	7	3.0	**-18.3**
13	3	1	6	7.0	**4.6**
14	3	1	7	11.0	**18.3**
15	3	1	5	5.0	**0.0**
16	2	1	6	10.0	**18.3**
17	2	1	5	7.0	**9.1**
18	2	1	1	5.0	**18.3**
19	2	1	5	8.0	**13.7**
20	2	1	7	6.0	**-4.6**
21	2	1	5	5.0	**0.0**
22	3	1	5	6.0	**4.6**
23	3	1	7	5.0	**-9.1**
24	2	1	5	8.0	**13.7**
25	2	1	4	8.0	**18.3**
26	2	1	4	10.0	**27.4**
27	2	1	3	11.0	**36.5**
28	2	1	8	10.0	**9.1**
29	2	1	7	7.0	**0.0**
30	2	1	4	1.0	**-13.7**
				MIN	**-22.8**
				MAX	**36.5**
				MEAN	**6.4**
				SD	**13.8**

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Removable Activity

Survey Area:		VI	Survey Unit:		776026
Dates Counted:	1/16/05				
A priori MDA:	16				
Efficiency (c/d)	0.333				
Smear Location Number	Smear Results				
	RCT ID #	Serial Number	Gross (cpm)	Bkg.	(dpm/100 cm^2)
1	2	1411	1	0.2	2
2	3	964	1	0.6	1
3	2	1352	0	0.6	-2
4	3	1411	1	0.2	2
5	2	964	2	0.6	4
6	3	1352	0	0.6	-2
7	2	1411	0	0.2	-1
8	3	964	1	0.6	1
9	2	1352	2	0.6	4
10	3	1411	1	0.2	2
11	2	964	1	0.6	1
12	3	1352	1	0.6	1
13	2	1411	0	0.2	-1
14	3	964	0	0.6	-2
15	2	1352	1	0.6	1
16	3	1411	2	0.2	5
17	2	964	1	0.6	1
18	3	1352	1	0.6	1
19	2	1411	1	0.2	2
20	3	964	0	0.6	-2
21	2	1352	1	0.6	1
22	3	1411	0	0.2	-1
23	2	964	2	0.6	4
24	3	1352	1	0.6	1
25	2	1411	1	0.2	2
26	3	964	1	0.6	1
27	2	1352	1	0.6	1
28	3	1411	0	0.2	-1
29	2	964	1	0.6	1
30	3	1352	2	0.6	4
				MIN	-1.8
				MAX	**5.4**
				MEAN	**1.3**
				SD	2.0

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