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Ref: 10 CFR 2.201

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January 25, 2002

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

**SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NOS. 50-445 AND 50-446; ADDITIONAL INFORMATION
REQUESTED DURING REGULATORY CONFERENCE OF JANUARY 23,
2002.**

- REF: 1. COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2
 NRC INSPECTION REPORT 50-445/01-07; 50-446-01-07
2. NRC REGULATORY CONFERENCE WITH COMANCHE PEAK STEAM
 ELECTRIC STATION, UNITS 1 AND 2 ON JANUARY 23, 2002.

Gentlemen:

As requested during the Regulatory Conference of January 23, 2002 (Reference 2), Comanche Peak Steam Electric Station (CPSES) is providing further information and clarification on several issues.

Enclosure 1 contains a copy of the hypothetical dose calculation for each event listed in the Inspection Report (Reference 1), as well as a conservative calculation showing the maximum potential dose of all items in aggregate. CPSES wishes to restate that there is no indication that any individual received the doses of either calculation, and specifically that the dose of Calculation #2 is a non-credible bounding calculation provided to demonstrate the low levels of dose associated with these 11 items.

Do29



Enclosure 2 provides clarification of the chart titled "Radiological Practices: Error Reporting by Organization" that was included as part of our presentation. Further analysis of the underlying data has shown that an error was made in calculation of the values used in these pie charts and CPSES would like to delete this slide from the presentation. In place of this slide, CPSES is providing (Enclosure 2) a complete listing for the years 1999, 2000, and 2001 of all events related to radioactive materials discovered outside the Radiologically Controlled Area.

We thank you again for the opportunity provided by the Regulatory Conference to fully discuss these issues and apologize for the error in our presentation. If you have any further questions regarding this matter, please contact Bob Kidwell at (254) 897-5310.

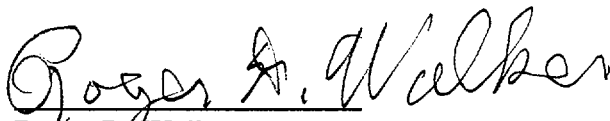
Sincerely,

TXU Generation Company LP

By: TXU Generation Management Company LLC,
Its General Partner

C. L. Terry
Senior Vice President and Principal Nuclear Officer

By:


Roger D. Walker
Regulatory Affairs Manager

RJK:rjk
Enclosures

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Enclosure 1 Hypothetical Dose Calculations

Calculation #1:

This calculation is for each individual item separately. Assumptions related to time of exposure and the source of the activity value used for each calculation are included.

Method:

Calculation assumes a point source and the formula $ER = 0.5 C E / r^2$, where:

- ER = Exposure Rate in R/hr
- C = Activity in Curies
- E - Effective energy
- r = distance in Meters

From the current CPSES 10 CFR 61 Dry Active Waste (DAW) analysis:

Latest DAW		E (MeV/dis)	Effective E
Co-58	81%	0.8	0.648
Co-60	8%	2.5	0.2
BaLa-140	4%	2.1	0.084
Cr-51	4%	0.03	0.0012
Mn-54	2%	0.8	0.016
Nb-95	1%	0.7	<u>0.007</u>
			0.9562

SMF 2000-187:

On 1/24/00, a reusable glove liner was found in a bag of dirty modesties being searched prior to laundering. The liner was <100 net counts per minute (ncpm) with a frisker and 4646 dpm on the SAM. The liner was probably left in a modesty pocket when the individual exited the RCA.

Since the SAM is total activity,
 $4646 \text{ dpm} / 60 \text{ sec} = 77.4 \text{ dps (Bq)}$
 $77.4 \text{ Bq} / 3.7 \text{ E}10 \text{ Bq/Ci} = 2.09 \text{ E-}09 \text{ Ci} = 2.09 \text{ E-}03 \text{ uCi}$

$$ER = 0.5 C E / r^2$$

Assuming a distance of 1 Meter:

$$ER = 0.5 * 2.09\text{E-}09 \text{ Ci} * 0.9562 \text{ MeV} / 1 = 9.99\text{E-}10 \text{ R/hr}$$

During power operations, modesties are searched weekly, therefore the maximum exposure time is 40 hours. This assumes the maximally exposed individual spent all week in the modesty change area adjacent to the bathroom.

$$9.99\text{E-}10 \text{ R/hr} * 40 \text{ hrs} * 1000 \text{ mrem/R} = \underline{\underline{4.0\text{E-}5 \text{ mrem}}}$$

Enclosure 1 Hypothetical Dose Calculations

SMF 2000-1080:

On 4/11/00, a safety harness was detected at the Alternate Access Point (AAP) with 1000 ncpm fixed contamination.

Assuming 10 % frisker efficiency, $1000 \text{ ncpm} * 10 \text{ dpm/cpm} = 10000 \text{ dpm}$
 $10000 \text{ dpm} / 60 \text{ sec} = 166.7 \text{ Bq}$
 $166.7 \text{ Bq} / 3.7 \text{ E10 Bq/Ci} = 4.5\text{E-}09 \text{ Ci}$

The safety harness was obtained from Warehouse C and stored on the JLG Lift for approximately 2 weeks prior to discovery. Distance from the harness to the JLG cab is approximately 2 Meters.

$$ER = 0.5 C E / r^2$$

$$ER = 0.5 * 4.5\text{E-}09 \text{ Ci} * 0.9562 \text{ MeV}/2^2 = 5.4\text{E-}10 \text{ R/hr}$$
$$5.4\text{E-}10 \text{ R/hr} * 80 \text{ hrs} * 1000 \text{ mrem/R} = \underline{\underline{4.3\text{E-}05 \text{ mrem}}}$$

SMF 2000-2380:

On 9/25/00, an electrical extension cord was discovered on the Cold Tool Room counter. The cord had detectable counts, but was less than 100 ncpm. The cord alarmed the SAM.

Assuming 100 ncpm,
 $100 \text{ ncpm} * 10 \text{ dpm/cpm} / 60 \text{ sec} = 16.7 \text{ Bq}$

Even though the SAM is calibrated to alarm at 4500 dpm, it will detect down to approximately 2500 dpm. Assuming the nominal alarm threshold of 2800 dpm:
 $2800 \text{ dpm} / 60 \text{ sec} = 47 \text{ Bq}$
 $47 \text{ Bq} / 3.7 \text{ E10 Bq/Ci} = 1.3\text{E-}09 \text{ Ci}$

$$ER = 0.5 C E / r^2$$

$$ER = 0.5 * 1.3\text{E-}09 \text{ Ci} * 0.9562 \text{ MeV} = 6\text{E-}10 \text{ R/hr}$$

Warehouse personnel did not know how long the cord had been on the counter nor how long it had been missing from the Hot tool room. It can be assumed a warehouse attendant would not have left the cord on the counter for greater than 2 shift (8 hrs). It can be further assumed the individual who obtained the cord did not have it in close proximity for greater than 1 shift.

Therefore, assuming a total of 16 hrs exposure:
 $6\text{E-}10 \text{ R/hr} * 16 \text{ hrs} * 1000 \text{ mrem/R} = \underline{\underline{9.6\text{E-}06 \text{ mrem}}}$

Enclosure 1 Hypothetical Dose Calculations

SMF 2000-2445:

On 9/30/00, a reusable glove liner was found during in a bag of dirty modesties being searched prior to laundering. The liner was 16200 dpm on the SAM.

Since the SAM is total activity,
 $16200 \text{ dpm} / 60 \text{ sec} = 270 \text{ dps (Bq)}$
 $270 \text{ Bq} / 3.7 \text{ E}10 \text{ Bq/Ci} = 7.3 \text{ E-}09 \text{ Ci}$

$$ER = 0.5 C E / r^2$$

Assuming a distance of 1 Meter:

$$ER = 0.5 * 7.3\text{E-}09 \text{ Ci} * 0.9562 \text{ MeV} / 1 = 3.5\text{E-}09 \text{ R/hr}$$

During outages, modesties are searched daily, therefore the maximum exposure time is 12 hours, assuming an individual was continually present in the modesty change area:
 $3.5\text{E-}09 \text{ R/hr} * 12 \text{ hrs} * 1000 \text{ mrem/R} = \underline{4.2\text{E-}5 \text{ mrem}}$

SMF 2000-2458:

On 10/01/00, a temporary power pack was discovered outside the RCA yard adjacent to the MSC. A masslin survey of the internals indicated 100 ncpm. Since this was a masslin survey, vs. smear, it is assumed the entire surface was surveyed.

Assuming a smear efficiency of 10% and frisker efficiency of 10 %,
 $100 \text{ ncpm} * 10 * 10 \text{ dpm/cpm} = 10000 \text{ dpm}$
 $10000 \text{ dpm} / 60 \text{ sec} = 166.7 \text{ Bq}$
 $166.7 \text{ Bq} / 3.7 \text{ E}10 \text{ Bq/Ci} = 4.5\text{E-}09 \text{ Ci}$

The power pack was incorrectly released from the RCA Yard the day before discovery. Assuming 12 hr exposure time and 1 meter distance:

$$ER = 0.5 C E / r^2$$

$$ER = 0.5 * 4.5\text{E-}09 \text{ Ci} * 0.9562 \text{ MeV}/1^2 = 2.15\text{E-}09 \text{ R/hr}$$
$$2.15\text{E-}09 \text{ R/hr} * 12 \text{ hrs} * 1000 \text{ mrem/R} = \underline{2.6\text{E-}05 \text{ mrem}}$$

Enclosure 1 Hypothetical Dose Calculations

SMF 2000-2740:

On 10/12/00, during the routine trash dumpster survey, a contaminated oily rag was discovered.

Gamma spectroscopy of the rag was the following:

$$ER = 0.5 C E / r^2$$

Mn-54 5.2E-3 uCi	Therefore:	$ER = 0.5 * 5.2E-9 \text{ Ci} * 0.835 \text{ MeV} = 2.2E-09 \text{ R/hr}$
Co-57 2.4E-3 uCi		$ER = 0.5 * 2.4E-9 \text{ Ci} * (0.122 \text{ MeV} * 87\% + 0.136 \text{ MeV} * 11\%) = 1.4E-10 \text{ R/hr}$
Co-58 1.05 uCi		$ER = 0.5 * 1.05E-6 \text{ Ci} * 0.810 \text{ MeV} = 4.3 \text{ E-}07 \text{ R/hr}$
Co-60 1.6E-2 uCi		$ER = 0.5 * 1.6E-8 \text{ Ci} * (1.17 \text{ MeV} + 1.33 \text{ MeV}) = 2E-08 \text{ R/hr}$

Cumulative dose rate is $2.2E-09 + 1.4E-10 + 4.3E-07 + 2E-08 = 4.5E-7 \text{ R/hr}$

The dumpster is approximately 0.125" steel. Ignoring shielding from the other trash, shielding from the dumpster affords a 15 % reduction.

Attenuation coefficient of Iron & 0.8 MeV gammas = $0.0669 \text{ cm}^2/\text{gm}$

Density of Iron = 7.86 gm/cm^3

Thickness of shield = $0.125" = 0.3175 \text{ cm}$

$$A/A_0 = e^{-(0.0669 * 7.86 * 0.3175)} = 0.85$$

Also assuming a 2 meter distance of an individual from the rag in the dumpster,

$$ER = (4.5E-7 \text{ R/hr} * 0.85) / 2^2 = 9.5E-08 \text{ R/hr}$$

Trash is collected 3 times per week during outages (Mon, Wed, Fri), and since the rag was discovered on Wednesday, the maximum time in the dumpster is 48 hrs and maximum exposure time is 2 shifts (24 hrs), although it is doubtful an individual could spend two consecutive shifts standing next to a trash dumpster.

$$9.5E-08 \text{ R/hr} * 24 * 1000 \text{ mrem/R} = 2.3 \text{ E-}3 \text{ mrem}$$

After investigation, a second rag was located in the dumpster with approximately half the activity of the first rag. It was not surveyed or analyzed with gamma spectroscopy. Assuming half the activity with the same nuclide mix, $ER = 1.14 \text{ E-}3 \text{ mrem}$.

Total Dose for this event:

$$2.3E-03 + 1.14E-03 = \underline{\underline{3.4E-03 \text{ mrem}}}$$

Enclosure 1 Hypothetical Dose Calculations

SMF 2000-3122:

On 11/03/00, a pair of reusable glove liners were discovered in a P-10 gas bottle rack. The liners yielded no counts above background with a frisker, but alarmed the SAM.
 $100 \text{ ncpm} * 10 \text{ dpm/cpm} / 60 \text{ sec} = 16.7 \text{ Bq}$

Even though the SAM is calibrated to alarm at 4500 dpm, it will detect down to approximately 2500 dpm. Assuming the nominal alarm threshold of 2800 dpm:
 $2800 \text{ dpm} / 60 \text{ sec} = 47 \text{ Bq}$
 $47 \text{ Bq} / 3.7 \text{ E}10 \text{ Bq/Ci} = 1.3\text{E-}09 \text{ Ci}$

$$\text{ER} = 0.5 \text{ C E} / r^2$$
$$\text{ER} = 0.5 * 1.3\text{E-}09 \text{ Ci} * 0.9562 \text{ MeV} = 6\text{E-}10 \text{ R/hr}$$

P-10 Gas bottles are needed approximately 3 times a week during outages, so the maximum time the liners could have been present is 3 days. Assuming 3 shifts (36 hrs) maximum exposure time (although it is unlikely an individual would spend 3 consecutive shifts standing next to a bottle rack):

$$6\text{E-}10 \text{ R/hr} * 36 * 1000 \text{ mrem/R} = \underline{\underline{2.16 \text{ E-}5 \text{ mrem}}}$$

SMF 2001-630:

On 3/27/01, a chicago fitting alarmed the SAM at the RCA Yard exit. Direct frisk found 2000 ncpm fixed on the fitting.

$$2000 \text{ ncpm} * 10 \text{ dpm/cpm} / 60 \text{ sec} = 333 \text{ Bq}$$
$$333 \text{ Bq} / 3.7\text{E}10 \text{ Bq/Ci} = 9\text{E-}09 \text{ Ci}$$

The fitting was previously used in Warehouse C during the week of 3/12/01, and had not left the tool bag. Assuming 3 meters distance (from storage location at mechanics shop to nominal work area) and 2 weeks exposure time:

$$\text{ER} = 0.5 \text{ C E} / r^2$$
$$\text{ER} = 0.5 * 9\text{E-}09 \text{ Ci} * 0.9562 \text{ MeV}/3^2 = 4.8\text{E-}10 \text{ R/hr}$$
$$4.8\text{E-}10 \text{ R/hr} * 80 \text{ hrs} * 1000 \text{ mrem/R} = \underline{\underline{3.8 \text{ E-}5 \text{ mrem}}}$$

Enclosure 1 Hypothetical Dose Calculations

SMF 2001-850:

On 4/06/01, two velcro straps and a piece of yellow masslin were found in a bag of dirty modesties being searched prior to laundering. The articles were less than 100 ncpm with a frisker and 11000 dpm on the SAM.

Since the SAM is total activity,
 $11000 \text{ dpm} / 60 \text{ sec} = 183 \text{ dps (Bq)}$
 $183 \text{ Bq} / 3.7 \text{ E}10 \text{ Bq/Ci} = 4.9 \text{ E-}09 \text{ Ci}$

Assuming a distance of 1 Meter:

$ER = 0.5 \text{ C E} / r^2$
 $ER = 0.5 * 4.9\text{E-}09 \text{ Ci} * 0.9562 \text{ MeV} / 1 = 2.3\text{E-}09 \text{ R/hr}$

During outages, modesties are searched daily, therefore the maximum exposure time is 12 hours:

$2.3\text{E-}09 \text{ R/hr} * 12 \text{ hrs} * 1000 \text{ mrem/R} = \underline{2.8\text{E-}5 \text{ mrem}}$

SMF 2001-968:

On 4/11/01, an individual was noticed wearing velcro straps outside the RCA. He stated he obtained them from another plant. The straps were found to have 160 ncpm with a frisker.

$160 \text{ ncpm} * 10 \text{ dpm/cpm} / 60 \text{ sec} = 27 \text{ Bq}$
 $27 \text{ Bq} / 3.7\text{E}10 \text{ Bq/Ci} = 7.3\text{E-}10 \text{ Ci}$

$ER = 0.5 \text{ C E} / r^2$
 $ER = 0.5 * 7.3 \text{ E-}10 \text{ Ci} * 0.9562 \text{ MeV} = 3.5\text{E-}10 \text{ R/hr}$

Assume the individual actually had the straps on for one shift:

$3.5\text{E-}10 \text{ R/hr} * 12 \text{ hrs} * 1000 \text{ mrem/R} = \underline{4.2\text{E-}6 \text{ mrem}}$

Enclosure 1 Hypothetical Dose Calculations

SMF 2001-1352:

On 5/24/01, a pair of channel locks were checked out of the cold tool room and alarmed the PM-7s at the AAP. Survey with a frisker revealed 7000 ncpm on the handle.

$$7000 \text{ ncpm} * 10 \text{ dpm/cpm} / 60 \text{ sec} = 1167 \text{ Bq}$$
$$1167 \text{ Bq} / 3.7\text{E}10 \text{ Bq/Ci} = 3.15\text{E-}08 \text{ Ci}$$

The cold tool room was surveyed on 2/25/01, therefore the maximum time the tool could have been in storage is 3 months. Since tool room attendants rotate job assignments, the maximum any individual attendant could have been exposed is 4 weeks total (160 hrs). Location of the tool is approximately 2 meters from any attendant.

$$ER = 0.5 C E / r^2$$

$$ER = 0.5 * 3.15\text{E-}08 \text{ Ci} * 0.9562 / 2^2 = 3.7\text{E-}09 \text{ R/hr}$$
$$3.7\text{E-}09 \text{ R/hr} * 160 \text{ hrs} * 1000 \text{ mrem/R} = \underline{\underline{5.9\text{E-}4 \text{ mrem}}}$$

Calculation Method 1 Summary:

SMF 2000-0187	4.0E-5 mrem
SMF 2000-1080	4.3E-5 mrem
SMF 2000-2380	9.6E-6 mrem
SMF 2000-2445	4.2E-5 mrem
SMF 2000-2458	2.6E-5 mrem
SMF 2000-2740	3.4E-3 mrem
SMF 2000-3122	2.2E-5 mrem
SMF 2001-0630	3.8E-5 mrem
SMF 2001-0850	2.8E-5 mrem
SMF 2001-0968	4.2E-6 mrem
SMF 2001-1352	<u>5.9E-4 mrem</u>

Total 4.3E-3 mrem

TOTAL HYPOTHETICAL DOSE from calculation #1 = 4.3E-3 mrem

Enclosure 1 Hypothetical Dose Calculations

Calculation #2:

This calculation is for all items in aggregate and is provided as an upper bounding dose. Assumptions related to the activity values used for this calculation are the same as used in calculation #1.

Method:

This number is extremely conservative, considering the probability of the 11 items accumulating in the same location, exposing the same individual, and does not account for decay of the most prevalent isotope present (Co-58).

If all of the items were accumulated and exposed a member of the public for 1 year (24 hours per day, 365 days) at a distance of 1 meter, the dose would be 0.004 Rem:

	1 Meter Dose Rate (Rem/hr)
SMF 2000-0187	9.99E-10
SMF 2000-1080	2.15E-09
SMF 2000-2380	6.00E-10
SMF 2000-2445	3.50E-09
SMF 2000-2458	2.15E-09
SMF 2000-2740	4.50E-07
SMF 2000-3122	6.00E-10
SMF 2001-0630	4.30E-09
SMF 2001-0850	2.30E-09
SMF 2001-0968	3.50E-10
SMF 2001-1352	<u>1.50E-08</u>
TOTAL	4.80E-07 Rem/hr

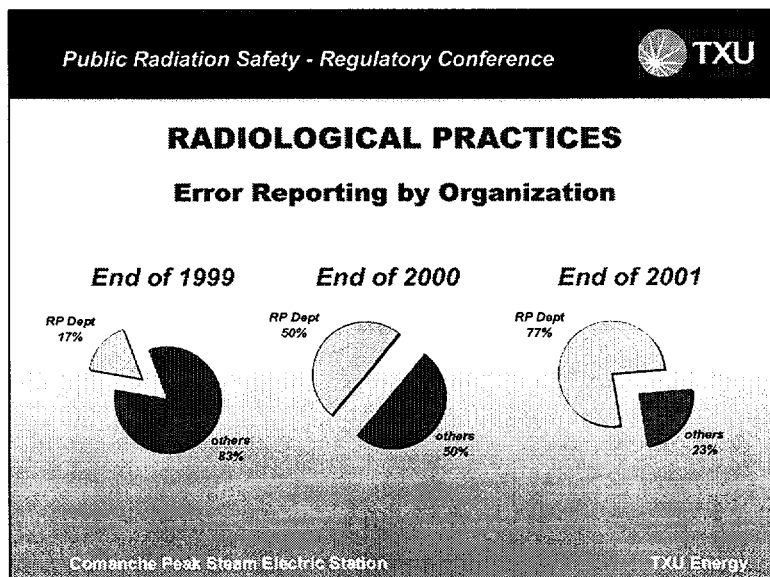
$$4.8\text{E-}07 \text{ R/hr} * 24 \text{ hrs/Day} * 365 \text{ Days/Yr} = 0.004 \text{ Rem}$$

TOTAL HYPOTHETICAL DOSE from calculation #2 = 4 mrem

Enclosure 2

The chart shown below was part of CPSES's presentation during the Regulatory Conference on January 23, 2002. Questions made during the conference pointed out that there was some confusion as to what was included in the representation made by this slide. This was meant to show changes in reporting practices during the inspection period.

However, further verification of the source data underlying these pie charts has shown that this data was calculated incorrectly and does not support the representation shown. This slide should be disregarded.



In place of this slide, CPSES provides the data requested by NRC staff concerning the originators of corrective action documents for the instances of radioactive materials discovered outside of Radiologically Controlled Areas at CPSES during the years 1999, 2000, and 2001. This data is provided on the following page showing:

- Date of Event
- Event Description
- Corrective Action Document (SmartForm) number
- Department that originated the SmartForm

Enclosure 2

Date	Event	Document	Originated By: RP/OTHER Dept
03-29-99	Reusable cotton glove liners found with in outage locker outside the RCA.	SmartForm - 1999-0738	other
04-07-99	Reusable cotton glove liners found with dirty modesties outside RCA	SmartForm - 1999-0926	RP
04-21-99	Reusable cotton glove liners found with dirty modesties outside RCA	SmartForm - 1999-1132	RP
10-07-99	Reusable cotton glove liners and yellow cutting tool found in craft lunchroom outside RCA	SmartForm - 1999-2679	RP
10-12-99	Reusable cotton glove liners found with dirty modesties outside RCA	SmartForm - 1999-2782	RP
10-20-99	Reusable cotton glove liners found with dirty modesties outside RCA	SmartForm - 1999-2929	RP
01-24-00	Reusable cotton glove liner found with dirty modesties outside Whse C RCA	SmartForm - 2000-0187	RP
04-11-00	Safety harness alarmed PM7 at AAP. Harness came from Whse C RCA.	SmartForm - 2000-1080	RP
09-25-00	Extension cord labeled as radioactive material discovered on non-RCA tool room issue counter.	SmartForm - 2000-2380	RP
09-30-00	Reusable cotton glove liners found with dirty modesties outside RCA	SmartForm - 2000-2445	RP
10-01-00	Contamination discovered on power pack located adjacent to MSC Bldg.	SmartForm - 2000-2458	RP
10-11-00	Oily rags found in dumpster during normal weekly rad-search survey outside RCA.	SmartForm - 2000-2740	RP
11-03-00	Reusable cotton glove liners found with in gas bottle rack outside RCA.	SmartForm - 2000-3122	RP
03-27-01	Air fitting found at RCA Yard access point. Item's last use was traced to Whse C RCA.	SmartForm - 2001-0630	RP
04-06-01	Velcro straps found with dirty modesties outside RCA	SmartForm - 2001-0850	RP
04-08-01	Reusable cotton glove liner found in abandoned locker outside RCA	SmartForm - 2001-0881	RP
04-11-01	Velcro straps similar to those used in CPSES's RCA discovered on individual outside the RCA	SmartForm - 2001-0968	RP
04-17-01	Leather work gloves alarmed PM7 monitor leaving AAP.	SmartForm - 2001-1069	RP
05-24-01	Tool from cold toolroom alarmed PM7 monitor leaving AAP	SmartForm - 2001-1352	RP