Public Service
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Public Service
Company of Colorado

January 18, 1996
Fort St. Vrain
P-96003

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

ATTN: Mr. Michael F. Weber, Chief
Decommissioning and
Regulatory Issues Branch

Docket No. 50-267

SUBJECT: **Response to NRC Questions Regarding PSCo's Proposed Revisions to Final Survey Plan, Involving Survey of Piping Systems and Suspect Affected Survey Units**

REFERENCES:

1. NRC Letter, Pittiglio to Crawford, dated December 21, 1995 (G-95224)

2. PSCo Letter, Fisher to Weber, dated October 12, 1995 (P-95077)

Dear Mr. Weber:

This letter submits Public Service Company of Colorado's (PSCo) responses to NRC comments provided in your December 21, 1995 letter (Reference 1), regarding proposed revisions to the Fort St. Vrain (FSV) Final Survey Plan that were submitted in our October 12, 1995 letter (Reference 2). The proposed changes involved survey treatments for piping systems and for suspect affected survey units.

The attachment to this letter provides PSCo's responses to the seven comments in the referenced letter. Final surveys of affected FSV piping systems have begun, utilizing survey techniques as described in the Reference 2 submittal. In order to minimize the amount of potential rework and avoid impacting the scheduled decommissioning work completion date of August 9, 1996, PSCo requests NRC approval of the proposed treatment methodologies by February 9, 1996.

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If you have any questions regarding this information, please contact Mr. M. H. Holmes at (303) 620-1701.

Sincerely,

Frederick J. Borst

Frederick J. Borst
Decommissioning Program Director

FJB/SWC

Attachment

cc: with attachment

Regional Administrator, Region IV

Mr. Robert M. Quillin, Director
Radiation Control Division
Colorado Department of Public Health and Environment

Public Service Company of Colorado (PSCo) Response to NRC Comments in December 21, 1995 Letter, "Review of PSCo Submittal P-95077, 'Fort St. Vrain Final Survey Plan for Site Release, Proposed Revisions for Survey of Piping Systems and Suspect Affected Survey Units'"

In the October 12, 1995 letter (Reference 2), PSCo proposed the following treatment for small diameter contaminated piping which is embedded in concrete and presents no reasonable exposure pathway to the public:

- Decontaminate piping internal surfaces to reduce removable contamination levels to much less than the site specific guideline value (SGLV) and significantly reduce total contamination to levels that have no impact on public health and safety,

- Fill pipes with grout where residual total contamination exceeds the SGLVs after aggressive decontamination, and

- Obtain NRC approval of any instance where total contamination cannot be reduced below 100,000 dpm/100 cm^2 using aggressive decontamination techniques.

The NRC comments regarding this proposal are addressed as follows:

NRC Comment No. 1: *What is the basis for the assumption that grout filled pipes are not expected to release significant amounts of contamination to groundwater during hypothetical future burial scenarios?*

PSCo Response:

PSCo assumed that grout filled pipes would not release significant amounts of contamination to groundwater during hypothetical future burial scenarios because of two factors: the low amount of residual contamination present and the barrier provided by the grout.

- Low Amount of Residual Contamination:

  All grout-filled embedded piping will have been aggressively decontaminated as described in PSCo's October 12, 1995, letter (Reference 2) prior to any hypothetical burial of the piping. Aggressive decontamination typically involves grit blasting, abrasive balls, or wire brushes; high pressure water is also being used in cases like the core support floor cooling tubes which have long runs and numerous bends. Aggressive decontamination reduces removable contamination levels in embedded pipes to much less than the Site Specific Guideline Values (SGLV). Also, high pressure water will remove much of the water soluble contaminants in pipes where this technique is used.

  PSCo fully expects that most (greater than 95 percent) of the embedded piping total surface contamination levels will be less than the SGLVs. The majority of any elevated levels are expected to be less than 20,000 dpm/100 cm^2, with no individual measurement expected to be greater than 50,000 dpm/100 cm^2.

  PSCo has calculated that more residual contamination will be left in the embedded piping that *meets* the SGLVs than in the embedded piping that exceeds the SGLVs (see PSCo's response to Comment No. 6). The amount of embedded piping expected to exceed the SGLVs after aggressive decontamination is less than 5 percent of all embedded piping and its expected contamination levels are only about 5 times the SGLVs for affected piping (4000 dpm/100 cm^2 average; 12,000 dpm/100 cm^2 maximum individual measurement). Even if the embedded piping that exceeds the SGLVs were contaminated to the 100,000 dpm/100 cm^2 level, this would represent less activity than the activity that could remain in the rest of the affected piping that *meets* the SGLVs.

- Grout Barrier Provisions:

  Any embedded piping with residual total contamination that exceeds the SGLVs will be filled with grout. Although not totally impervious to water, grout provides an effective barrier to prevent water from flowing through a buried pipe and releasing contamination into groundwater. Only piping surfaces in the area of cut surfaces could potentially be directly exposed to water. Even if a cut surface were located in the 5 percent of the areas that might be expected to exceed the SGLVs, the amount of contamination released from the small surface area of the exposed piping into the groundwater aquifer would not be significant, especially considering that any contamination remaining in the embedded piping is expected to be tightly adhered to pipe surfaces.

  In addition, corrosion of buried piping in typical soils is expected to take many years to corrode through pipe walls to contaminated inner surfaces, during which time substantial decay of cobalt-60 and cesium-137 would occur. It is noted that PSCo does not know where FSV materials might be buried in the future; however, burial locations in the vicinity of the plant are typical of the dry, arid soils in this part of Colorado, with groundwater levels at least 20 feet below grade.

NRC Comment No. 2: *Please provide the bases for the assumption that inhalation intake would be minor if grout filled pipes are cut during a renovation scenario. Include the number of pipes assumed to be cut during the renovation.*

PSCo Response:

PSCo assumed that inhalation intake would be minor if grout filled embedded pipes are cut during a hypothetical future renovation scenario because of the low levels of residual contamination likely to be present and because many of the likely cutting techniques would not result in significant airborne contamination.

- Low Levels of Residual Contamination

  As noted in the response to comment number 1 above, aggressive decontamination will reduce removable contamination to much less than SGLVs and will significantly reduce total contamination levels. Also, less than 5 percent of embedded piping is expected to exceed the SGLVs, with most elevated measurements less than 20,000 dpm/100 cm^2.

  PSCo has no renovation plans for the PCRV or Reactor Building. Even if future renovation or dismantlement did involve cutting piping with residual fixed contamination levels above the SGLVs, it is not likely to release significant contamination when compared to the amount of residual contamination available in ungrouted pipes that have residual contamination levels acceptably below the SGLVs.

- Cutting Techniques

  During a hypothetical future renovation scenario, pipes embedded in thick concrete structures like the PCRV would most likely be cut by mechanical means, such as diamond wire saws, since the pipes would be surrounded by concrete embedment material on the exterior surface and grout material on the inside. Diamond wire saws use a water lubricant/coolant which captures the particulate debris. There is practically no associated airborne release and therefore no significant inhalation intake. This has been demonstrated during PCRV cutting operations over the last two years. Other mechanical means that do not use water lubricant would also not involve significant airborne release since the cutting debris is mostly particulate matter which is fairly heavy and falls to the floor.

  Removal of pipes in thinner concrete walls or floors could be accomplished by rubblizing the concrete away from the embedded pipes and then cutting them with an acetylene torch or other thermal means. This could release contamination into the air during vaporization. An individual who cut embedded pipe sections, contaminated to an average expected elevated contamination level of 20,000 dpm/100 cm^2, is estimated to receive less than 0.01 mrem per cut, due to inhalation, based on the following assumptions:

- All pipe material in cut is vaporized
- Pipe is 1-1/2 inch, schedule 40
- Cut width is 3/8 inch
- Cut requires 15 minutes
- Pipe is contaminated, not activated
- Vapors disperse into an equivalent volume of a cube, 2.5 meters per side
- Individual inhales 1.25 m^3 per hour
- Predominant radionuclides are cobalt-60 and cesium-137, consistent with FSV decommissioning experience
- Contamination in the area of the cut is 20,000 dpm/100 cm^2, which is a conservative average number, even with an upper contamination limit of 100,000 dpm/100 cm^2 as proposed in Reference 2; it is unlikely that cuts would be made at localized hot spots and it is expected that very few areas will exceed 20,000 dpm/100 cm^2

PSCo conservatively calculated that the pipe areas with elevated contamination levels greater than the SGLVs (estimated to be 5 percent of pipe area) are distributed over one half of the 1350 individual sections of embedded pipes (675), as described in Reference 2. We also assumed that 10 percent of these pipe sections (68) are cut during a hypothetical renovation scenario, and that each section would be cut two times (136 cuts). If two individuals are assumed to divide this task into approximately 70 cuts each, their individual dose is estimated to be 0.70 mrem, which is less than the 2.0 mrem dose previously estimated for an occupancy scenario or the 2.4 mrem dose estimated for a dismantlement scenario (Reference 2).

NRC Comment No. 3: *In the occupancy scenario, it assumed that five embedded pipes terminate directly at the surface where the shop or office would be located. Please provide the basis for selecting five pipes.*

PSCo Response:

PSCo assumed that five embedded pipes terminate at a surface where a shop or office would be located as this is a conservative representation of actual plant conditions.

PSCo has no current plans to build a shop, office, or other occupied space in the Reactor Building or next to the PCRV. Also, there are not many areas adjacent to concrete surfaces containing embedded pipes that could be readily converted to an occupied space. However, if an occupied space were to be built, it would most likely be in a relatively open area where there are minimal interferences. Some of the rooms in the east part of the Reactor Building are representative of these relatively open areas and there are a few areas near the PCRV that do not have significant interferences; in these areas, embedded pipes are not closely clustered and are typically at least 12 to 18 inches apart. PSCo considers that in locations where an individual could hypothetically be occupationally located for significant periods of time, it is not likely that more than 5 embedded pipes, with contamination levels above the SGLVs, would be located close enough to provide direct exposure to a typical individual in an occupancy scenario.

PSCo considers that our evaluation of an occupancy scenario is conservative for numerous reasons. The areas near embedded piping would not be the most likely areas to construct an occupied space; the most open area in the Reactor Building where shops or offices could most readily be built is above the PCRV, and would not be near embedded piping. The evaluation in Reference 2 assumes that an individual spends an entire 2080 hour work year located 1 meter from the ends of the embedded pipes. Also, the assumed average contamination level of 100,000 dpm/100 cm^2 is substantially greater than the elevated area contamination levels that PSCo expects to find in embedded pipes and would not likely occur at the exposed end of a pipe where it would be accessible for decontamination. In addition, no credit was taken for the shielding provided by grout, nor for radioactive decay.

NRC Comment No. 4: *In the dismantlement scenario, what thickness of concrete is assumed to remain around the removed pipe? Also, please provide the bases for the assumptions regarding the number of pipes and the time of occupancy.*

PSCo Response:

In the dismantlement scenario, PSCo assumed that concrete encased pipes or concrete block sections with embedded pipes would be buried in a land disposal location where individuals would eventually build and occupy residential buildings.

The amount of concrete remaining around the buried pipes could vary considerably, but would probably average at least 1 to 2 inches. As noted above, much of the embedded piping is separated by at least 12 to 18 inches of concrete, and there would be no economic incentive to attempt to clean the concrete off of the pipe surfaces. In addition to the shielding provided by concrete remaining around the pipes, PSCo assumed that dismantlement debris would be covered by at least 1 meter of fill dirt before any residential construction would take place. The combined effects of the concrete and soil were conservatively assumed to result in a factor of ten reduction in dose. The Health Physics and Radiological Health Handbook, 1984, indicates that a factor of ten reduction in dose is achieved with about 14 inches of earth or 9 inches of concrete.

PSCo assumed that the dose from this dismantlement scenario was given to an individual who spends 50 percent of the time 1 meter from 7 buried pipes, each of which is about 10 feet long. This was based on a conservative estimate of the physical distribution of randomly buried, small diameter, concrete encased pipes. As noted above, buried pipes would likely be encased in significant amounts of concrete which would keep them apart. PSCo assumed 6 one-inch diameter pipes and one larger pipe would contribute to an individual dose.

The individual is conservatively assumed to spend half of her or his time in a room located only 1 meter from the buried piping. This accounts for lengthy illness or other conditions where the individual would be relatively immobile.

PSCo considers that our evaluation of a dismantlement scenario is conservative for numerous reasons. Dismantlement activities in themselves do not seem likely in the foreseeable future and removal of FSV debris to a location that would be prepared and opened for residential construction is even more unlikely. The Reference 2 analysis does not take credit for radioactive decay during the time period that would elapse before any such construction could occur. Also, the assumed average contamination level of 100,000 dpm/100 cm^2 is substantially greater than the elevated area contamination levels that PSCo expects to find in embedded pipes. In addition, no credit was taken for the shielding provided by grout.

NRC Comment No. 5: *Please provide the assumptions and output for all microshield runs.*

PSCo Response:

PSCo performed Microshield calculations to determine dose rates for two piping configurations: one for the dose rate from an embedded pipe that terminates at a concrete wall, as in a shop or office in an occupancy scenario, and one for the dose rate along side of a buried pipe in a dismantlement scenario.

The assumptions for each scenario are as follows:

Occupancy scenario:

- 1 inch diameter pipe
- 10 feet long
- Average contamination level is 100,000 dpm/100 cm^2
- Predominant radionuclides include cobalt-60 and cesium-137, consistent with FSV decommissioning experience (note that Microshield calculates the exposure from Cs-137 using Ba-137m)
- Pipe is filled with air, and no credit is taken for grout
- Distance from end of pipe is 1 meter

Microshield exposure rate: an exposure rate of 1.885 E-4 mR/hr is shown on the attached printout

Dismantlement scenario:

- Calculate for both 1" and 10" diameter pipes
- 10 feet long
- Average contamination level is 100,000 dpm/100 cm^2
- Predominant radionuclides include cobalt-60 and cesium-137, consistent with FSV decommissioning experience (note that Microshield calculates the exposure from Cs-137 using Ba-137m)
- Pipe is filled with air, and no credit is taken for grout
- Distance from side of pipe is 1 meter

Microshield exposure rate: exposure rates of 4.37 E-5 mR/hr (1" pipe) and 2.91 E-4 mR/hr (10" pipe) are shown on the attached printouts, which were run for 10,000 dpm/100 cm^2 and were then multiplied by 10 to determine the exposure rates for 100,000 dpm/100 cm^2.

MicroShield 4.00 - Serial #4.00-00028
Public Service Co. of Colorado

Page : 1
DOS File: CYL4.MS4
Run Date: October 10, 1995
Run Time: 10:21 p.m. Tuesday
Duration: 0:00:07

Case Title: air cylinder w/100k dpm/100cm2 10 ft thick at 1 meter

GEOMETRY 8 - Cylinder Volume - End Shields

	centimeters	feet	and inches
Dose point coordinate X:	0.0	0.0	.0
Dose point coordinate Y:	404.8	13.0	3.4
Dose point coordinate Z:	0.0	0.0	.0
Cylinder height:	304.8	10.0	.0
Cylinder radius:	1.67	0.0	.7
Air Gap:	100.0	3.0	3.4

Source Volume: 2670.53 cm^3 9.43089e-2 cu ft. 162.966 cu in.

MATERIAL DENSITIES (g/cm^3)

Material	Source Shield	Air Gap
Air	0.00122	0.00122

BUILDUP
Method: Buildup Factor Tables
The material reference is Source

INTEGRATION PARAMETERS

	Quadrature Order
Radial	30
Circumferential	30
Axial (along Z)	30

SOURCE NUCLIDES

Nuclide	curies	ÌCi/cm^3	Nuclide	curies	ÌCi/cm^3
Ba-137m	8.0160e-007	3.0016e-004	Co-60	4.0224e-007	1.5062e-004

=============================== RESULTS ===============================

Energy (MeV)	Activity (photons/sec)	Energy Fluence Rate (MeV/sq cm/sec) No Buildup	Energy Fluence Rate (MeV/sq cm/sec) With Buildup	Exposure Rate in Air (mR/hr) No Buildup	Exposure Rate in Air (mR/hr) With Buildup
0.6	2.669e+004	3.089e-002	3.139e-002	6.030e-005	6.128e-005
1.0	1.488e+004	2.882e-002	2.914e-002	5.312e-005	5.371e-005
1.5	1.488e+004	4.334e-002	4.370e-002	7.293e-005	7.353e-005
TOTAL:	5.646e+004	1.031e-001	1.042e-001	1.863e-004	1.885e-004 *

MicroShield 4.00 - Serial #4.00-00028
Public Service Co. of Colorado

Page : 1
DOS File: EPIPE26.MS4
Run Date: October 11, 1995
Run Time: 1:51 p.m. Wednesday
Duration: 0:01:15

Case Title: 6 in. frm cntr of 10', 1 in. Pipe @1E+04 DPM w/1 hour decay
(Case 2 Evaluates Exposure Rate at 1 meter From Pipe Surface)

GEOMETRY 10 - Cylinder Surface - Side Shields

	centimeters	feet and inches	
Dose point coordinate X:	15.24	0.0	6.0
Dose point coordinate Y:	152.4	5.0	.0
Dose point coordinate Z:	0.0	0.0	.0
Cylinder surface height:	304.8	10.0	.0
Cylinder surface radius:	1.33223	0.0	.5
Shield 1:	0.33782	0.0	.1
Air Gap:	13.56995	0.0	5.3

Source Area: 2551.37 sq cm 2.74628 sq ft. 395.464 sq in.

MATERIAL DENSITIES (g/cm^3)

Material	Cylinder Material	Shield 1 Cylinder	Transition Shield	Air Gap
Air	0.00102		0.00102	0.00102
Iron		7.86		

BUILDUP
Method: Buildup Factor Tables
The material reference is Transition

INTEGRATION PARAMETERS

	Quadrature Order
Axial (along Z)	20
Circumferential	20

SOURCE NUCLIDES

Nuclide	curies	microCi/Sqcm	Nuclide	curies	microCi/Sqcm
Ba-137m	7.2408e-008	2.8380e-005	Co-60	3.8270e-008	1.5000e-005
Cs-137	7.6541e-008	3.0000e-005			

Page : 2
DOS File: EPIPE26.MS4
Run Date: October 11, 1995
Run Time: 1:51 p.m. Wednesday
Title : 6 in. frm cntr of 10', 1 in. Pipe @1E+04 DPM w/1 hour decay

========== RESULTS FOR SENSITIVITY REFERENCE CASE (X = 15.24) ===========

Energy (MeV)	Activity (photons/sec)	Energy Fluence Rate (MeV/sq cm/sec)		Exposure Rate In Air (mR/hr)	
		No Buildup	With Buildup	No Buildup	With Builaup
0.6	2.411e-003	4.096e-002	6.379e-002	7.995e-005	1.245e-004
1.0	1.416e+003	4.453e-002	6.083e-002	8.209e-005	1.121e-004
1.5	1.416e-003	7.182e-002	9.104e-002	1.208e-004	1.532e-004
TOTAL:	5.243e-003	1.573e-001	2.157e-001	2.829e-004	3.898e-004

SENSITIVITY RESULTS For: X (cm)

Case Number	Sensitivity Variable Value	Energy Fluence Rate (MeV/sq cm/sec)		Exposure Rate In Air (mR/hr)	
		No Buildup	With Buildup	No Buildup	With Buildup
1	45.72	5.141e-002	6.723e-002	9.251e-005	1.215e-004
2	100.0	1.919e-002	2.417e-002	3.454e-005	4.369e-005 *

Use the Display Menu For Energy Group Results For All Cases.

Page : 1
DOS File: EPIPE27.MS4
Run Date: October 11, 1995
Run Time: 2:04 p.m. Wednesday
Duration: 0:06:00

Case Title: 1 meter frm wall of 10'H, 10 in. pipe @ 1E-04 DPM 1 hr decay

GEOMETRY 10 - Cylinder Surface - Side Shields

	centimeters	feet and inches	
Dose point coordinate X:	112.7252	3.0	8.4
Dose point coordinate Y:	0.0	0.0	.0
Dose point coordinate Z:	0.0	0.0	.0
Cylinder surface height:	304.8	10.0	.0
Cylinder surface radius:	12.7254	0.0	5.0
Shield 1:	0.9271	0.0	.4
Air Gap:	99.0727	3.0	3.0

Source Area: 24370.6 sq cm 26.2323 sq ft. 3777.45 sq in.

MATERIAL DENSITIES (g/cm^3)

Material	Cylinder Material	Shield 1 Cylinder	Transition Shield	Air Gap
Air	0.00102		0.00102	0.00102
Iron		7.86		

BUILDUP

Method: Buildup Factor Tables
The material reference is Transition

INTEGRATION PARAMETERS

	Quadrature Order
Axial (along Z)	20
Circumferential	20

SOURCE NUCLIDES

Nuclide	curies	microCi/Sqcm	Nuclide	curies	microCi/Sqcm
Ba-137m	6.9233e-007	2.8408e-005	Co-60	3.6604e-007	1.5020e-005
Cs-137	7.3185e-007	3.0030e-005			

Page : 2
DOS File: EPIPE27.MS4
Run Date: October 11, 1995
Run Time: 2:04 p.m. Wednesday
Title : 1 meter frm wall of 10'H, 10 in. pipe @ 1E+04 DPM 1 hr decay

============ RESULTS FOR SENSITIVITY REFERENCE CASE (Y = 0) ============

Energy (MeV)	Activity (photons/sec)	Energy Fluence Rate (MeV/sq cm/sec)		Exposure Rate In Air (mR/hr)	
		No Buildup	With Buildup	No Buildup	With Buildup
0.6	2.305e+004	1.215e-002	2.910e-002	2.372e-005	5.680e-005
1.0	1.354e+004	1.483e-002	2.784e-002	2.734e-005	5.133e-005
1.5	1.354e+004	2.594e-002	4.206e-002	4.364e-005	7.077e-005
TOTAL:	5.014e+004	5.292e-002	9.901e-002	9.470e-005	1.789e-004

SENSITIVITY RESULTS For: Y (cm)

Case Number	Sensitivity Variable Value	Energy Fluence Rate (MeV/sq cm/sec)		Exposure Rate In Air (mR/hr)	
		No Buildup	With Buildup	No Buildup	With Buildup
1	15.24	5.992e-002	1.104e-001	1.072e-004	1.994e-004
2	30.48	6.651e-002	1.211e-001	1.191e-004	2.188e-004
3	45.72	7.242e-002	1.308e-001	1.297e-004	2.363e-004
4	60.96	7.748e-002	1.391e-001	1.387e-004	2.514e-004
5	76.2	8.164e-002	1.461e-001	1.462e-004	2.641e-004
6	91.44	8.491e-002	1.517e-001	1.521e-004	2.741e-004
7	106.68	8.736e-002	1.559e-001	1.564e-004	2.818e-004
8	121.92	8.906e-002	1.589e-001	1.595e-004	2.871e-004
9	137.16	9.005e-002	1.606e-001	1.613e-004	2.902e-004
10	152.4	9.037e-002	1.612e-001	1.618e-004	2.913e-004 *
11	167.64	9.005e-002	1.606e-001	1.613e-004	2.902e-004
12	182.88	8.906e-002	1.589e-001	1.595e-004	2.871e-004
13	198.12	8.736e-002	1.559e-001	1.564e-004	2.818e-004
14	213.36	8.491e-002	1.517e-001	1.521e-004	2.741e-004

Use the Display Menu For Energy Group Results For All Cases.

NRC Comment No. 6: *What is the total activity projected to be left in the pipes? How does this compare to the total activity predicted to remain in the rest of the facility after remediation?*

PSCo Response:

PSCo and the WT performed two independent calculations of the amount of activity that could remain in embedded pipes and in the rest of the facility after decontamination efforts. Both of these calculations determined that the amount of activity that could remain in embedded pipes to be grouted is two orders of magnitude less than the amount of activity in the rest of the facility.

1. PSCo estimates that the total activity left in FSV embedded piping that exceeds SGLVs after aggressive decontamination and will be grouted is as follows, based on piping system descriptions in Reference 2:

   Assumptions:

   - 30,000 feet, of which 22,000 feet are 1" diameter
   - Assume remaining 8,000 feet is 3" diameter
   - 5 percent of pipe surface has residual contamination exceeding SGLVs and will be grouted; assume average contamination is 20,000 dpm/100 cm^2

   Activity that could remain in embedded piping that exceeds SGLVs and will be grouted:

   5.22 E-5 Ci

2. PSCo estimates that the activity that could remain in the rest of the facility after decontamination and remediation would include activity in piping and on structures and surfaces that *meet* the SGLVs, as follows:

   Piping:

   Assumptions:

   - Average contamination is 2,000 dpm/100 cm^2
   - Include 95 percent of embedded pipe surfaces described above that do not exceed SGLVs
   - Non-embedded piping averages 3" diameter
   - 75,000 feet of non-embedded piping

Activity that could remain in piping:

- Embedded piping <SGLVs — 9.93 E-5 Ci
- Non-embedded piping — 5.04 E-4 Ci

Building Structures and Surfaces:

Assumptions:

- Total surface area with residual contamination, including interior walls, floors, and equipment surfaces, is assumed to be roughly 10 times the overall Reactor Building exterior surface area
- Average contamination is 2,000 dpm/100 cm^2

Activity that could remain on Reactor Building structural and equipment surfaces:

8.75 E-3 Ci

Total Activity in Rest of Facility

Piping, Structures and Surfaces: 9.35 E-3 Ci

Calculations independently performed by the WT estimate activity remaining in potentially grouted pipes at about 3 E-5 Ci and total activity in the rest of the facility at about 4 E-3 Ci.

As shown, the activity that could remain in embedded piping with contamination levels above the SGLVs is less than the activity that could remain in embedded piping that meets the SGLVs.

PSCo and the WT are in the process of performing a thorough housekeeping effort to reasonably reduce residual contamination levels in the Reactor Building. If average contamination is 2,000 dpm/100 cm^2, the projected activity remaining in the facility is roughly estimated to be 9.35 E-3 Ci. The 5.22 E-5 Ci projected to remain in embedded pipes that exceed the SGLVs is a small fraction of this amount. Even if embedded piping surfaces to be grouted were at 100,000 dpm/100 cm^2, the total activity of 2.61 E-4 Ci is less than the activity in the rest of the facility.

NRC Comment No. 7: *Is there any salvage value to the embedded piping that could result in long-term above ground storage or recycling?*

PSCo Response:

PSCo does not consider that there is any salvage value to embedded piping that could result in long-term above ground storage or recycling. Currently, the salvage value of non grout-filled steel pipes is about $0.01 per pound. Also, grout filled piping would create substantial impurities during any melting or other recycling operation, that would further reduce its economic value. At 1 penny per pound, PSCo does not consider that removing and segregating grout-filled embedded piping would credibly be done for its salvage value or for any other reason.