Response to

Request for Additional Information No. 22, Supplement 1, Revision 0

7/3/2008
U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 19 - Probabilistic Risk Assessment and Severe Accident Evaluation
Application Section: 19
SPLB Branch

Question 19-147:

In the Phenomenological Evaluation No. 2 – on Fuel Coolant Interactions, it is stated that EPR-specific structural response analyses to estimate the dynamic structure response of the reactor cavity/pit were not available. Instead, reference is made to work by Sehgal, et al. for structural capacity where a range of 5 to 10 kPa-s, were considered to applicable. Please:

(a) Justify the basis for the selected structural response capacity of the pit.

(b) Indicate if the current failure probability can be justified in light of "a."

Response to Question 19-147:

The analysis of the consequences of ex-vessel steam explosions assigned a probability distribution for the capacity of the U.S. EPR reactor cavity pit to withstand dynamic loads. The distribution is a representation of the state of knowledge about the structural capability of the reactor cavity pit. As in any subjective probability assignment, the translation to numerical probabilities for specific dynamic load capacity values was carried out by review and qualitative assessment of the available information.

The reactor cavity pit in the U.S. EPR is a large concrete structure. The weakest point is considered to be the melt plug, as there are no manway or equipment doors to the reactor cavity pit. Table 19-147-1 provides a summary of the specific probability distribution assigned for the dynamic load withstand of the reactor cavity pit and the supporting rationale. The qualitative discussions backing up the probability assignments refer to Reference 1, since it provides some indicative dynamic withstand values for large concrete structures. Note that the range covered by the probability distribution presented in Table 19-147-1 is greater than the 5–10 kPa-s range quoted in the question.

The probability distribution in Table 19-147-1 represents a quantification of the uncertainty about the dynamic loading capability of the reactor cavity pit. Therefore, the presented probability of reactor cavity pit failure based on this distribution in the Monte Carlo assessment of steam explosion loads and consequences is considered adequate and appropriate for use in the Level 2 PRA.

References

1. B. R. Sehgal, H. O. Haraldsson, Z. L. Yang, "A Review of Steam Explosions with Special Emphasis on the Swedish BWRs and PWRs," SKI Report 02:16, April 2002.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Table 19-147-1–Probability Distribution for Dynamic Load Withstand Capacity of the Reactor Pit in the U.S. EPR

Range	Probability	Cumulative Probability	Rationale
<2 kPa-s	0.0	0.0	2 kPa-s taken as the minimum possible capacity.
2–5 kPa-s	0.01	0.01	A residual probability of 0.01 is assigned to the range 2–5 kPa-s, recognizing that the impulse withstand capability may be in that range, although this is considered unlikely since such low values do not appear to be reasonable for large concrete structures.
5–10 kPa-s	0.09	0.10	Withstands in the range 5–10 kPa-s were considered in the evaluation, even though reasonable withstands for large concrete structures seem likely to be greater than 10 kPa-s. A probability of 0.09 is assigned to the withstand being in the range 5–10 kPa-s, this value being selected on the basis that 0.9 was first assigned to the 10–20 kPa-s range (see next row) and it was judged prudent to allow the lower tail of the distribution to extend below 5 kPa-s (see assignment of 0.01 referred to in the previous row); 1.0 - 0.01 - 0.9 = 0.09.
10–20 kPa-s	0.9	1.00	According to Reference 1: “It is likely that for the steam explosions at low to medium impulse loadings (5 to 10 kPa.s), the in-containment concrete partitioning walls and the concrete containment walls may withstand the pressure wave without significant damage and the loss of the containment integrity. However, other structural elements in the containment, namely, the equipment transportation and manway doors may fail even in mild explosions (with pressure impulse up to 10 kPa.s)." Based on the above, it is expected that the major structures of the U.S. EPR reactor pit (including the plug) are likely to withstand at least 10kPa-s impulse loading, since they are large concrete structures and there are no weak points, such as manways or equipment doors to the pit.

Question 19-149:

Please provide the following design information related to the incore instrument tubes:

(a) A schematic of a typical incore instrumentation tube and associated guide tube geometry.

(b) The outside guide tube diameter, material, and wall thickness.

(c) The material, the diameter of any casings where the thermocouples and/or neutron detectors are located, the wall thickness, and typical cross sectional drawing of the incore detector and guide pipe.

(d) The material, its high-temperature yield strength as a function temperature, and its creep-rupture properties (e.g., Larson-Miller parameters) for the incore instrument guide and other parts of the incore detectors.

(e) A schematic of the incore instrumentation guide tubes configuration, their location of entry into the reactor pressure vessel, and the location of entry into the instrumentation room inside the containment. This information should also show the actual location inside the containment (to be accompanied by a drawing of the containment marking the location of the instrumentation room).

(f) Description of instrumentation room compartment (room size), locations and opening areas for (flow) communication with adjacent compartments.

(g) Location of the instrument tube/guide pressure boundary between the reactor vessel and the containment building, and a discussion of failure of this boundary for both low pressure and high pressure scenarios.

Response to Question 19-149:

U.S. EPR FSAR, Tier 2, Section 3.9.5 describes in detail the reactor pressure vessel internals and Section 4.4.6 describes the requirements on the instrumentation. Both sections contain information regarding the incore instrumentation design function and operation. Below is a general description of the design of the incore instrumentation and layout in the reactor pressure vessel (RPV) to establish a common terminology and design basis in order to present the requested information.

General Description:

The incore instrumentation system provides information about the conditions inside the reactor core and consists of the following instruments:

Neutron flux incore instrumentation is top mounted and composed of:

- Aeroball measuring system (AMS) for flux mapping.
- Self-powered neutron detectors (SPND), part of the fixed incore instrumentation.

- Core Outlet Thermocouples (COT), also part of the fixed incore instrumentation.

A core instrumentation lance (Figure 19-149-1) is the basic mechanical unit of the incore neutron-flux measuring system and contains either a series of SPNDs with a COT (also called a PDD) or an AMS probe. Each finger or probe is housed in the instrumentation lance, which provides a protective casing tube to preserve mechanical integrity. At the lower end of an AMS probe, the ball transport tube in the probe ends in a gas permeable ball stop. Concentric to the ball support tube, a gas supply pipe is sealed pressure-tight from the environment and connected to the ball transport tube via the ball stop, thus allowing a counter pressure to be applied to eject the ball stacks (Refer to U.S. EPR FSAR, Tier 2, Figure 4.4-11).

Several instrumentation lances are suspended from a lance yoke that is configured to rest on the upper support plate of the reactor pressure vessel internals (RPVI) between the control rod guide assemblies. There are four types of instrumentation lance yokes corresponding to specific core locations, in order to accommodate the configuration of the RPVI. After passing through the upper support plate, the instrumentation lance passes through an instrument guide tube. The instrument lance then passes through the upper core plate, the thimble plug, and into an empty control rod guide tube of the fuel assembly (Refer to U.S. EPR FSAR, Tier 2, Figures 3.9.5-1, 4.2, 4.4-8, and 4.4-10).

Each instrumentation lance yoke combines the AMS probes and wires from the SPNDs and COTs into a vertical shaft that extends upwards to the RPV instrumentation nozzles, where they penetrate the RPV closure head. An easily detachable double seal ring system provides the pressure-tight connection between the instrumentation lance yoke shafts and the instrumentation nozzle, which permits leak testing after each nozzle is assembled.

The fixed incore instrumentation consists of SPNDs and COTs. At twelve radial locations, six SPNDs are placed in a power density detector (PDD) finger and inserted into the core. The COTs are located in the top nozzle of the instrumented fuel assemblies and are radially distributed over the core in the same way as the PDD fingers.

Information Regarding Part a):

For information and a schematic of a guide tube assembly for the incore instrumentation refer to the U.S. EPR FSAR, Tier 2, Figure 4.2-8 – MONOBLOC™ Guide Tube Assembly. Figure 19-149-1 and Figure 19-149-2 provide a schematic of the incore instrumentation lance and associated AMS and PDD lance fingers.

Figure 19-149- 1: Lance Yoke (Type 1) Complete (Dimensions in mm)

Figure 19-149- 2: Cross-Sectional Drawing of Incore Instrumentation Fingers (AMS and PDD) (Dimensions in mm)

Information Regarding Part b):

Refer to the U.S. EPR FSAR, Tier 2, Figure 4.2-3 – Instrument Lance Position, U.S. EPR FSAR, Tier 2, Figure 4.2-8 – MONBLOC™ Guide Tube Assembly, and ANP-10285P, Revision 0, "U.S. EPR Fuel Assembly Mechanical Design Topical Report" for guide tube materials and dimensions.

Information Regarding Part c):

The material for the incore instrumentation has not yet been specified. Figure 19-149-3 shows a cross section of the lances (AMS and PDD). For additional information on dimensions refer to the drawings in the response to part a) of this question.

AMS - Finger **PDD - Finger**

Figure 19-149- 3: Details of Lance Fingers (AMS and PDD) - Cross-Sectional Drawing (Dimensions in mm)

Information Regarding Part d):

The material specification for the incore instrumentation has not been determined. However, the material will likely be a grade of stainless steel. For material information on the guide tubes refer to the response to part b) of this question.

Information Regarding Part e):

U.S. EPR FSAR, Tier 2, Chapter 4.4 describes the thermal-hydraulic design of the fuel system and presents schematics for the general arrangement of the incore instrumentation lances within the reactor pressure vessel (see U.S. EPR FSAR, Tier 2, Figure 4.4-10—Arrangement of Incore Instrumentation). U.S. EPR FSAR, Tier 2, Figure 3.8-12—Reactor Building Section B-B shows the penetrations in the RPV head for the instrumentation guide tubes (also refer to U.S. FSAR, Tier 2, Figures 3B-13 and 3B-14). For information regarding the two designated instrumentation rooms in the Containment Building, refer to U.S. EPR FSAR, Tier 2, Figure 3.8-7—Reactor Building Plan at Elevation +45 feet and Figure 3B-8—Reactor Building Dimensional Plan at Elevation +13.8 m (+45 ft) (Rooms labeled 21 and 22).

Information Regarding Part f):

U.S. EPR FSAR, Tier 2, Figure 3.8-7—Reactor Building Plan at Elevation +45 feet (see Rooms labeled 21 and 22), provides an overview of the instrumentation rooms used by the incore instrumentation processing equipment inside the Reactor Building. The rooms are adjacent to the reactor cavity. Pressure-tight penetrations in the walls receive the propellant gas- and ball-tubes from the plug board located in the reactor cavity. There is only one way to access the instrumentation rooms from the annular compartments; via a door kept closed during operation to maintain the two-room containment separation. Another doorway leads from one of the instrumentation compartments to the pressurizer compartment.

Information Regarding Part g):

The pressure boundary for the incore instrumentation is at the junction of the RPV instrumentation nozzle, the incore instrumentation lance yoke shaft, and the associated sealing components (refer to Figure 19-149-4 below). Another pressure boundary exists between the AMS probes and the reactor coolant. Refer to Response # 12 in Response to Request for Additional Information – ANP-10287P “Incore Trip Setpoint and Transient Methodology for U.S. EPR Topical Report” (TAC No. Q00013, ML082261522) for more information regarding failure of the AMS pressure boundary.

Figure 19-149- 4: Nozzle Closure

Following installation of the vessel head equipment, the cables and tubes are connected to the lance head and the plug board. The Aeroball tubes, thermocouple, and SPND metal-sheathed cables are routed upward out of the lance fingers, brought together in the lance yoke, and then pass up through the lance shaft situated at one end of the yoke before leaving the reactor through nozzles in the RPV closure head. At the top of the lance shaft the ball and gas tubes are brazed to the lance head to provide a pressure-tight connection, while the SPND and thermocouple cables are first brazed into a sheath that is then welded to the lance head. This pressure-tight cable penetration is integrated into a pipe union at the lance head, but is capable of being disconnected.

The lance shaft serves as a means for routing the ball- and gas-tubes and the SPND and thermocouple cables out of the RPV through special nozzles on the RPV closure head. The lance shaft is a robust thimble. At its top end (the lance head) the cables and tubes are routed out of the reactor through pressure-tight penetrations. A protective sheath-like cap (the lance hood) is lowered over the lance bundle and then screwed down water-tight onto the lance head to protect the connecting components of the incore instrumentation against mechanical damage and water ingress when they are being handled during installation, removal, and temporary storage of the lances. The lance yoke is connected to the shaft by a joint coupling. This coupling accommodates the differential thermal expansion between the upper core support structure and the RPV closure head, and compensates for any inclination of the lance shaft during lifting or lowering of the closure head.

The nozzle sleeve is screwed into the upper end of the instrumentation nozzle of the RPV closure head with a trapezoid thread and is welded in place by a canopy seal weld. The sealing surface inside the shell is surface hardened to be resistant to wear. A drilled hole with a threaded connection leads through the hard surfacing into the space between the upper and the lower seal ring and allows a leak-test of the closure to be performed before commissioning the reactor.

The screw-in nozzle is screwed into the nozzle sleeve and serves to retain the seal rings. Its outer diameter provides the seal for the support plates with the intervening disk springs.

The pressure plate serves to tension the nozzle closure; it rests with its inner thread on the lance/probe-shaft. When the socket-head screws are tightened, it pulls the lance/probe-shaft upwards via the disk springs by producing a pre-tension which is selectable. Seal rings are also wedged between the nozzle shaft and the lance/probe shaft.

The nozzle closure is structurally designed for the steady-state and transient loads of normal operation and anticipated operational occurrences, and for accident loading resulting from temperature transients, external hazards, and loss-of-coolant accidents, including overpressure transients. A failure or break of the thread and canopy seal weld of the nozzle sleeve is not expected. However, the response to Question 19-148 of this set will address the leak of one of the instrumentation tubes and assess the impact on containment pressure and fission product release.

FSAR Impact:

The U.S EPR FSAR will not be changed as a result of this question.

Question 19-150:

With respect to the heat sink data provided in Table 19-47.4 of the response to RAI 19-47.5:

(a). Please provide the bottom elevation of each heat sink.

(b). Please explain the apparent discrepancy between the values assigned to the heat sink area, and those implied by the product of length and height. (For example, in the case of HS ID 620, the heat sink is 0.04 m each in width and length but has a total area of 27.55 m2.) Please provide the actual, physical values of height, width, and area for each heat sink, if nonphysical values were listed in this table for reasons related to the computer code that was used.

Response to Question 19-150:

(a) RAI 3, Table 19-47-5 lists the bottom elevation for the lumped heat sinks. The bottom elevation of each lumped heat sink is given in the table, along with the total mass and surface area of each heat sink (HS).The Lumped Heat Sink Number (LHS No.) of RAI 3, Table 19-47-4 corresponds with Lumped HS-I column of Table 19-47-5.

(b) In RAI 3, Table 19-47-4, the surface area of the heat sink is the total surface area exposed to the compartment gas space, assuming no water pool is present. This value includes both sides of the heat structure and is the sum of all areas included in the heat structure. In addition, the listed height of the heat sink is the average height. For horizontal heat sinks a value of zero is entered into MAAP.

There are over 800 heat sinks for the U.S. EPR; the MAAP model groups some of these together. Table 19-150-1 gives information for the distributed heat sinks before they are processed as input into MAAP. The table gives the Distributed HS ID number, the From Room, the To Room, as well as the Orientation, Material, Surface Area, Elevation, Height, and Length. The elevation given may not exactly match a MAAP node.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
1	UJA04-002	UJA04-003	Wall	Concrete				
2	UJA04-002	UJA04-003	Wall	Concrete				
3	UJA04-002	UJA04-005	Wall	Concrete				
4	UJA04-002	UJA04-006	Wall	Concrete				
5	UJA04-002	UJA07-020	Floor	Concrete				
6	UJA04-002	UJA07-021	Floor	Concrete				
7	UJA04-002	UJA07-022	Floor	Concrete				
8	UJA04-002	UJA07-023	Floor	Concrete				
9	UJA04-002	UJA07-024	Floor	Concrete				
10	UJA04-002	UJA07-026	Floor	Concrete				
11	UJA04-002	UJA07-027	Floor	Concrete				
12	UJA04-002	UJA07-028	Floor	Concrete				
13	UJA04-002	UJA07-029	Floor	Concrete				
14	UJA04-003	UJA04-004	Wall	Concrete				
15	UJA04-003	UJA04-005	Wall	Concrete				
16	UJA04-003	UJA04-006	Wall	Concrete				
17	UJA04-003	UJA04-012	Wall	Concrete				
18	UJA04-003	UJA07-014	Wall	Concrete				
19	UJA04-003	UJA07-014	Wall	Concrete				
20	UJA04-003	UJA07-016	Wall	Concrete				
21	UJA04-003	UJA07-018	Floor	Concrete				
22	UJA04-003	UJA07-020	Floor	Concrete				
23	UJA04-003	UJA07-022	Floor	Concrete				
24	UJA04-003	UJA07-023	Floor	Concrete				
25	UJA04-003	UJA07-024	Floor	Concrete				
26	UJA04-005	UJA07-022	Floor	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
27	UJA04-006	UJA07-023	Floor	Concrete				
28	UJA07-012	UJA07-013	Wall	Concrete				
29	UJA07-012	UJA07-014	Wall	Concrete				
30	UJA07-012	UJA07-018	Wall	Concrete				
31	UJA07-013	UJA07-014	Wall	Concrete				
32	UJA07-013	UJA07-015	Wall	Concrete				
33	UJA07-013	UJA07-018	Wall	Concrete				
34	UJA07-013	UJA11-020	Floor	Concrete				
35	UJA07-013	UJANNULUS	Wall	Liner				
36	UJA07-014	UJA07-016	Wall	Concrete				
37	UJA07-014	UJA07-018	Wall	Concrete				
38	UJA07-014	UJA11-013	Floor	Concrete				
39	UJA07-014	UJA11-014	Floor	Concrete				
40	UJA07-014	UJA11-025	Floor	Concrete				
41	UJA07-014	UJA11-026	Floor	Concrete				
42	UJA07-014	UJA11-031	Floor	Concrete				
43	UJA07-014	UJANNULUS	Wall	Liner				
44	UJA07-015	UJA07-016	Wall	Concrete				
45	UJA07-015	UJA07-018	Wall	Concrete				
46	UJA07-015	UJA11-015	Floor	Concrete				
47	UJA07-015	UJA11-016	Floor	Concrete				
48	UJA07-015	UJA11-027	Floor	Concrete				
49	UJA07-015	UJA11-028	Floor	Concrete				
50	UJA07-015	UJA11-032	Floor	Concrete				
51	UJA07-015	UJANNULUS	Wall	Liner				
52	UJA07-016	UJA07-021	Wall	Steel				
53	UJA07-016	UJANNULUS	Wall	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
54	UJA07-016	UJA07-022	Wall	Concrete				
55	UJA07-016	UJA07-023	Wall	Concrete				
56	UJA07-016	UJA07-026	Wall	Concrete				
57	UJA07-016	UJA07-027	Wall	Concrete				
58	UJA07-016	UJA07-028	Wall	Concrete				
59	UJA07-016	UJA07-029	Wall	Concrete				
60	UJA07-016	UJA11-010	Floor	Concrete				
61	UJA07-016	UJA11-013	Floor	Concrete				
62	UJA07-016	UJA11-016	Floor	Concrete				
63	UJA07-016	UJA11-021	Floor	Concrete				
64	UJA07-016	UJA11-024	Floor	Concrete				
65	UJA07-017	UJA07-020	Wall	Concrete				
66	UJA07-017	UJA07-026	Wall	Concrete				
67	UJA07-017	UJA07-028	Wall	Concrete				
68	UJA07-017	UJA07-029	Wall	Concrete				
69	UJA07-017	UJA11-009	Wall	Concrete				
70	UJA07-017	UJA11-009	Wall	Concrete				
71	UJA07-017	UJA11-022	Wall	Concrete				
72	UJA07-017	UJA11-023	Wall	Concrete				
73	UJA07-017	UJA11-024	Wall	Concrete				
74	UJA07-018	UJA07-019	Wall	Concrete				
75	UJA07-018	UJA11-018	Floor	Concrete				
76	UJA07-018	UJA11-019	Floor	Concrete				
77	UJA07-019	UJA11-001	Wall	Concrete				
78	UJA07-019	UJA11-018	Floor	Concrete				
79	UJA07-020	UJA07-023	Wall	Concrete				
80	UJA07-020	UJA07-024	Wall	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
81	UJA07-020	UJA07-026	Wall	Concrete				
82	UJA07-020	UJA11-001	Wall	Concrete				
83	UJA07-020	UJA11-009	Floor	Concrete				
84	UJA07-021	UJA07-022	Wall	Concrete				
85	UJA07-021	UJA07-024	Wall	Concrete				
86	UJA07-021	UJA07-027	Wall	Concrete				
87	UJA07-021	UJA11-021	Floor	Concrete				
88	UJA07-022	UJA07-024	Wall	Concrete				
89	UJA07-022	UJA11-002	Floor	Concrete				
90	UJA07-022	UJA11-010	Floor	Concrete				
91	UJA07-023	UJA07-026	Wall	Concrete				
92	UJA07-023	UJA11-009	Floor	Concrete				
93	UJA07-023	UJA11-016	Floor	Concrete				
94	UJA07-023	UJA11-024	Floor	Concrete				
95	UJA07-024	UJA07-027	Wall	Concrete				
96	UJA07-024	UJA11-001	Wall	Concrete				
97	UJA07-024	UJA11-002	Floor	Concrete				
98	UJA07-024	UJA11-022	Floor	Concrete				
99	UJA07-026	UJA07-029	Wall	Concrete				
100	UJA07-026	UJA11-009	Floor	Concrete				
101	UJA07-026	UJA11-016	Floor	Concrete				
102	UJA07-026	UJA11-024	Floor	Concrete				
103	UJA07-027	UJA07-028	Wall	Concrete				
104	UJA07-027	UJA11-022	Floor	Concrete				
105	UJA07-027	UJA11-023	Floor	Concrete				
106	UJA07-028	UJA07-029	Wall	Concrete				
107	UJA07-028	UJA11-022	Floor	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
108	UJA07-028	UJA11-023	Floor	Concrete				
109	UJA07-029	UJA11-023	Floor	Concrete				
110	UJA07-029	UJA11-024	Floor	Concrete				
111	UJA11-001	UJA11-002	Wall	Concrete				
112	UJA11-001	UJA11-002	Wall	Concrete				
113	UJA11-001	UJA11-003	Wall	Concrete				
114	UJA11-001	UJA11-003	Wall	Concrete				
115	UJA11-001	UJA11-004	Wall	Concrete				
116	UJA11-001	UJA11-004	Wall	Concrete				
117	UJA11-001	UJA11-005	Wall	Concrete				
118	UJA11-001	UJA11-005	Wall	Concrete				
119	UJA11-001	UJA11-006	Wall	Concrete				
120	UJA11-001	UJA11-006	Wall	Concrete				
121	UJA11-001	UJA11-007	Wall	Concrete				
122	UJA11-001	UJA11-007	Wall	Concrete				
123	UJA11-001	UJA11-008	Wall	Concrete				
124	UJA11-001	UJA11-008	Wall	Concrete				
125	UJA11-001	UJA11-009	Wall	Concrete				
126	UJA11-001	UJA11-009	Wall	Concrete				
127	UJA11-001	UJA11-018	Wall	Concrete				
128	UJA11-001	UJA11-018	Wall	Concrete				
129	UJA11-001	UJA15-001	Floor	Concrete				
130	UJA11-002	UJA11-009	Wall	Concrete				
131	UJA11-002	UJA11-010	Wall	Concrete				
132	UJA11-002	UJA11-013	Wall	Concrete				
133	UJA11-002	UJA11-021	Wall	Concrete				
134	UJA11-002	UJA11-022	Wall	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
135	UJA11-002	UJA11-022	Wall	Concrete				
136	UJA11-002	UJA15-017	Floor	Concrete				
137	UJA11-003	UJA11-025	Wall	Concrete				
138	UJA11-003	UJA11-031	Wall	Concrete				
139	UJA11-004	UJA11-026	Wall	Concrete				
140	UJA11-004	UJA11-031	Wall	Concrete				
141	UJA11-005	UJA11-014	Wall	Concrete				
142	UJA11-005	UJA11-018	Wall	Concrete				
143	UJA11-005	UJA15-024	Floor	Concrete				
144	UJA11-006	UJA11-015	Wall	Concrete				
145	UJA11-006	UJA11-018	Wall	Concrete				
146	UJA11-006	UJA15-019	Floor	Concrete				
147	UJA11-007	UJA11-027	Wall	Concrete				
148	UJA11-007	UJA11-032	Wall	Concrete				
149	UJA11-008	UJA11-028	Wall	Concrete				
150	UJA11-008	UJA11-032	Wall	Concrete				
151	UJA11-009	UJA11-016	Wall	Concrete				
152	UJA11-009	UJA11-022	Wall	Concrete				
153	UJA11-009	UJA11-024	Wall	Concrete				
154	UJA11-009	UJA15-017	Floor	Concrete				
155	UJA11-010	UJA11-013	Wall	Concrete				
156	UJA11-010	UJA11-013	Wall	Concrete				
157	UJA11-010	UJA11-021	Wall	Concrete				
158	UJA11-012	UJA11-014	Wall	Concrete				
159	UJA11-012	UJA11-018	Wall	Concrete				
160	UJA11-012	UJA11-019	Wall	Concrete				
161	UJA11-012	UJA11-020	Wall	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
162	UJA11-013	UJA11-021	Wall	Concrete				
163	UJA11-013	UJA11-023	Wall	Concrete				
164	UJA11-013	UJA11-025	Wall	Concrete				
165	UJA11-013	UJA11-031	Wall	Concrete				
166	UJA11-013	UJA15-013	Floor	Concrete				
167	UJA11-013	UJA15-020	Floor	Concrete				
168	UJA11-013	UJA15-025	Floor	Concrete				
169	UJA11-013	UJANNULUS	Wall	Liner				
170	UJA11-014	UJA11-018	Wall	Concrete				
171	UJA11-014	UJA11-020	Wall	Concrete				
172	UJA11-014	UJA11-026	Wall	Concrete				
173	UJA11-014	UJA11-031	Wall	Concrete				
174	UJA11-014	UJA15-014	Floor	Concrete				
175	UJA11-014	UJANNULUS	Wall	Liner				
176	UJA11-015	UJA11-018	Wall	Concrete				
177	UJA11-015	UJA11-020	Wall	Concrete				
178	UJA11-015	UJA11-027	Wall	Concrete				
179	UJA11-015	UJA11-032	Wall	Concrete				
180	UJA11-015	UJA15-015	Floor	Concrete				
181	UJA11-015	UJANNULUS	Wall	Liner				
182	UJA11-016	UJA11-023	Wall	Concrete				
183	UJA11-016	UJA11-023	Wall	Concrete				
184	UJA11-016	UJA11-024	Wall	Concrete				
185	UJA11-016	UJA11-024	Wall	Steel				
186	UJA11-016	UJA11-028	Wall	Concrete				
187	UJA11-016	UJA11-032	Wall	Concrete				
188	UJA11-016	UJA15-016	Floor	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
189	UJA11-016	UJA15-016	Floor	Concrete				
190	UJA11-016	UJA15-020	Floor	Concrete				
191	UJA11-016	UJA15-021	Floor	Concrete				
192	UJA11-016	UJANNULUS	Wall	Liner				
193	UJA11-018	UJA11-019	Wall	Concrete				
194	UJA11-018	UJA15-018	Floor	Concrete				
195	UJA11-018	UJA15-019	Floor	Concrete				
196	UJA11-018	UJA15-024	Floor	Concrete				
197	UJA11-019	UJA11-020	Wall	Concrete				
198	UJA11-019	UJA15-018	Floor	Concrete				
199	UJA11-019	UJA15-019	Floor	Concrete				
200	UJA11-020	UJA15-011	Floor	Concrete				
201	UJA11-020	UJA15-014	Floor	Concrete				
202	UJA11-020	UJA15-015	Floor	Concrete				
203	UJA11-020	UJANNULUS	Wall	Concrete				
204	UJA11-021	UJA11-023	Wall	Concrete				
205	UJA11-021	UJA15-025	Floor	Concrete				
206	UJA11-022	UJA11-023	Wall	Concrete				
207	UJA11-022	UJA15-017	Floor	Concrete				
208	UJA11-023	UJA11-024	Wall	Concrete				
209	UJA11-023	UJA11-024	Wall	Concrete				
210	UJA11-023	UJA15-021	Floor	Concrete				
211	UJA11-023	UJA15-023	Floor	Concrete				
212	UJA11-024	UJA15-016	Floor	Concrete				
213	UJA11-024	UJA15-021	Floor	Concrete				
214	UJA11-025	UJA11-031	Wall	Concrete				
215	UJA11-025	UJA15-013	Floor	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
216	UJA11-026	UJA11-031	Wall	Concrete				
217	UJA11-026	UJA15-014	Floor	Concrete				
218	UJA11-027	UJA11-032	Wall	Concrete				
219	UJA11-027	UJA15-015	Floor	Concrete				
220	UJA11-028	UJA11-032	Wall	Concrete				
221	UJA11-028	UJA15-016	Floor	Concrete				
222	UJA15-001	UJA15-003	Wall	Concrete				
223	UJA15-001	UJA15-003	Wall	Concrete				
224	UJA15-001	UJA15-004	Wall	Concrete				
225	UJA15-001	UJA15-004	Wall	Concrete				
226	UJA15-001	UJA15-005	Wall	Concrete				
227	UJA15-001	UJA15-005	Wall	Concrete				
228	UJA15-001	UJA15-006	Wall	Concrete				
229	UJA15-001	UJA15-006	Wall	Concrete				
230	UJA15-001	UJA15-007	Wall	Concrete				
231	UJA15-001	UJA15-007	Wall	Concrete				
232	UJA15-001	UJA15-008	Wall	Concrete				
233	UJA15-001	UJA15-008	Wall	Concrete				
234	UJA15-001	UJA15-017	Wall	Concrete				
235	UJA15-001	UJA15-019	Wall	Concrete				
236	UJA15-001	UJA15-024	Wall	Concrete				
237	UJA15-001	UJA15-024	Wall	Concrete				
238	UJA15-001	UJA18-003	Wall	Concrete				
239	UJA15-001	UJA18-003	Wall	Concrete				
240	UJA15-001	UJA18-004	Wall	Concrete				
241	UJA15-001	UJA18-004	Wall	Concrete				
242	UJA15-001	UJA18-005	Wall	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
243	UJA15-001	UJA18-005	Wall	Concrete				
244	UJA15-001	UJA18-006	Wall	Concrete				
245	UJA15-001	UJA18-006	Wall	Concrete				
246	UJA15-001	UJA18-007	Wall	Concrete				
247	UJA15-001	UJA18-007	Wall	Concrete				
248	UJA15-001	UJA18-008	Wall	Concrete				
249	UJA15-001	UJA18-008	Wall	Concrete				
250	UJA15-001	UJA18-018	Wall	Concrete				
251	UJA15-001	UJA18-018	Wall	Concrete				
252	UJA15-001	UJA18-019	Wall	Concrete				
253	UJA15-001	UJA18-019	Wall	Concrete				
254	UJA15-001	UJA23-003	Wall	Concrete				
255	UJA15-001	UJA23-003	Wall	Concrete				
256	UJA15-001	UJA23-004	Wall	Concrete				
257	UJA15-001	UJA23-004	Wall	Concrete				
258	UJA15-001	UJA23-005	Wall	Concrete				
259	UJA15-001	UJA23-005	Wall	Concrete				
260	UJA15-001	UJA23-006	Wall	Concrete				
261	UJA15-001	UJA23-006	Wall	Concrete				
262	UJA15-001	UJA23-007	Wall	Concrete				
263	UJA15-001	UJA23-007	Wall	Concrete				
264	UJA15-001	UJA23-008	Wall	Concrete				
265	UJA15-001	UJA23-008	Wall	Concrete				
266	UJA15-001	UJA23-019	Wall	Concrete				
267	UJA15-001	UJA23-019	Wall	Concrete				
268	UJA15-001	UJA23-041	Wall	Concrete				
269	UJA15-001	UJA23-041	Wall	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
270	UJA15-001	UJA29-013	Floor	Concrete				
271	UJA15-001	UJA29-013	Floor	Concrete				
272	UJA15-001	UJA29-013	Floor	Concrete				
273	UJA15-001	UJA29-013	Floor	Concrete				
274	UJA15-001	UJA29-016	Floor	Concrete				
275	UJA15-001	UJA29-016	Floor	Concrete				
276	UJA15-001	UJA29-016	Floor	Concrete				
277	UJA15-001	UJA29-016	Floor	Concrete				
278	UJA15-001	UJA29-018	Floor	Concrete				
279	UJA15-002	UJA15-003	Wall	Concrete				
280	UJA15-002	UJA15-010	Wall	Concrete				
281	UJA15-002	UJA15-010	Wall	Concrete				
282	UJA15-002	UJA15-013	Wall	Concrete				
283	UJA15-002	UJA15-013	Wall	Concrete				
284	UJA15-002	UJA15-017	Wall	Concrete				
285	UJA15-002	UJA15-017	Wall	Concrete				
286	UJA15-002	UJA15-025	Wall	Concrete				
287	UJA15-002	UJA15-025	Wall	Concrete				
288	UJA15-003	UJA15-004	Wall	Concrete				
289	UJA15-003	UJA15-004	Wall	Concrete				
290	UJA15-003	UJA15-013	Wall	Concrete				
291	UJA15-003	UJA15-013	Wall	Concrete				
292	UJA15-004	UJA15-005	Wall	Concrete				
293	UJA15-004	UJA15-005	Wall	Concrete				
294	UJA15-004	UJA15-014	Wall	Concrete				
295	UJA15-004	UJA15-014	Wall	Concrete				
296	UJA15-005	UJA15-014	Wall	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
297	UJA15-005	UJA15-014	Wall	Concrete				
298	UJA15-005	UJA15-018	Wall	Concrete				
299	UJA15-005	UJA15-018	Wall	Concrete				
300	UJA15-005	UJA15-024	Wall	Concrete				
301	UJA15-005	UJA15-024	Wall	Concrete				
302	UJA15-006	UJA15-007	Wall	Concrete				
303	UJA15-006	UJA15-007	Wall	Concrete				
304	UJA15-006	UJA15-015	Wall	Concrete				
305	UJA15-006	UJA15-015	Wall	Concrete				
306	UJA15-006	UJA15-019	Wall	Concrete				
307	UJA15-006	UJA15-019	Wall	Concrete				
308	UJA15-007	UJA15-008	Wall	Concrete				
309	UJA15-007	UJA15-008	Wall	Concrete				
310	UJA15-007	UJA15-015	Wall	Concrete				
311	UJA15-007	UJA15-015	Wall	Concrete				
312	UJA15-008	UJA15-009	Wall	Concrete				
313	UJA15-008	UJA15-009	Wall	Concrete				
314	UJA15-008	UJA15-016	Wall	Concrete				
315	UJA15-008	UJA15-016	Wall	Concrete				
316	UJA15-008	UJA18-008	Wall	Concrete				
317	UJA15-009	UJA15-016	Wall	Concrete				
318	UJA15-009	UJA15-016	Wall	Concrete				
319	UJA15-009	UJA15-017	Wall	Concrete				
320	UJA15-009	UJA15-017	Wall	Concrete				
321	UJA15-009	UJA18-009	Floor	Concrete				
322	UJA15-010	UJA15-013	Wall	Concrete				
323	UJA15-010	UJA15-025	Wall	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
324	UJA15-010	UJA15-025	Wall	Concrete				
325	UJA15-011	UJA15-014	Wall	Concrete				
326	UJA15-011	UJA15-014	Wall	Concrete				
327	UJA15-011	UJA15-015	Wall	Concrete				
328	UJA15-011	UJA15-015	Wall	Concrete				
329	UJA15-011	UJA15-018	Wall	Concrete				
330	UJA15-011	UJA15-018	Wall	Concrete				
331	UJA15-011	UJA15-019	Wall	Concrete				
332	UJA15-011	UJA15-019	Wall	Concrete				
333	UJA15-012	UJA15-014	Wall	Concrete				
334	UJA15-012	UJA15-014	Wall	Concrete				
335	UJA15-012	UJA15-018	Wall	Concrete				
336	UJA15-012	UJA15-018	Wall	Concrete				
337	UJA15-013	UJA15-014	Wall	Concrete				
338	UJA15-013	UJA15-020	Wall	Concrete				
339	UJA15-013	UJA15-025	Wall	Concrete				
340	UJA15-013	UJA15-025	Wall	Concrete				
341	UJA15-013	UJA18-013	Floor	Concrete				
342	UJA15-013	UJANNULUS	Wall	Liner				
343	UJA15-014	UJA15-015	Wall	Concrete				
344	UJA15-014	UJA15-018	Wall	Concrete				
345	UJA15-014	UJA18-014	Floor	Concrete				
346	UJA15-015	UJANNULUS	Wall	Liner				
347	UJA15-015	UJA15-016	Wall	Concrete				
348	UJA15-015	UJA15-019	Wall	Concrete				
349	UJA15-015	UJA18-015	Floor	Concrete				
350	UJA15-015	UJANNULUS	Wall	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
351	UJA15-016	UJA15-021	Wall	Concrete				
352	UJA15-016	UJA15-021	Wall	Concrete				
353	UJA15-016	UJA18-016	Floor	Concrete				
354	UJA15-016	UJANNULUS	Wall	Liner				
355	UJA15-017	UJA15-021	Wall	Concrete				
356	UJA15-017	UJA15-021	Wall	Concrete				
357	UJA15-017	UJA15-023	Wall	Concrete				
358	UJA15-017	UJA15-023	Wall	Concrete				
359	UJA15-017	UJA18-002	Wall	Concrete				
360	UJA15-017	UJA18-002	Wall	Concrete				
361	UJA15-017	UJA18-009	Wall	Concrete				
362	UJA15-017	UJA18-009	Wall	Concrete				
363	UJA15-017	UJA23-002	Wall	Concrete				
364	UJA15-017	UJA23-002	Wall	Concrete				
365	UJA15-017	UJA23-009	Wall	Concrete				
366	UJA15-017	UJA23-009	Wall	Concrete				
367	UJA15-017	UJA29-013	Floor	Concrete				
368	UJA15-017	UJA29-013	Floor	Concrete				
369	UJA15-018	UJA15-019	Wall	Concrete				
370	UJA15-018	UJA15-019	Wall	Concrete				
371	UJA15-018	UJA15-024	Wall	Concrete				
372	UJA15-018	UJA15-024	Wall	Concrete				
373	UJA15-018	UJA18-018	Floor	Concrete				
374	UJA15-019	UJA15-024	Wall	Concrete				
375	UJA15-019	UJA15-024	Wall	Concrete				
376	UJA15-019	UJA18-019	Floor	Concrete				
377	UJA15-020	UJA15-021	Wall	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
378	UJA15-020	UJA15-021	Wall	Concrete				
379	UJA15-020	UJA15-023	Wall	Concrete				
380	UJA15-020	UJA15-023	Wall	Concrete				
381	UJA15-020	UJA15-025	Wall	Concrete				
382	UJA15-020	UJA15-025	Wall	Concrete				
383	UJA15-020	UJA18-013	Floor	Concrete				
384	UJA15-020	UJANNULUS	Wall	Liner				
385	UJA15-020	UJANNULUS	Wall	Liner				
386	UJA15-021	UJA15-023	Wall	Concrete				
387	UJA15-021	UJA15-023	Wall	Concrete				
388	UJA15-021	UJA15-023	Wall	Concrete				
389	UJA15-021	UJA15-023	Wall	Concrete				
390	UJA15-021	UJA18-016	Wall	Concrete				
391	UJA15-021	UJA18-016	Wall	Concrete				
392	UJA15-021	UJA23-016	Wall	Concrete				
393	UJA15-021	UJA23-016	Wall	Concrete				
394	UJA15-023	UJA15-025	Wall	Concrete				
395	UJA15-023	UJA15-025	Wall	Concrete				
396	UJA15-023	UJA23-013	Wall	Concrete				
397	UJA15-023	UJA23-013	Wall	Concrete				
398	UJA15-023	UJA29-013	Floor	Concrete				
399	UJA15-024	UJA18-018	Floor	Concrete				
400	UJA18-002	UJA18-003	Wall	Concrete				
401	UJA18-002	UJA18-010	Wall	Concrete				
402	UJA18-002	UJA18-013	Wall	Concrete				
403	UJA18-003	UJA18-004	Wall	Concrete				
404	UJA18-003	UJA18-013	Wall	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
405	UJA18-004	UJA18-005	Wall	Concrete				
406	UJA18-004	UJA18-014	Wall	Concrete				
407	UJA18-005	UJA18-014	Wall	Concrete				
408	UJA18-005	UJA18-018	Wall	Concrete				
409	UJA18-006	UJA18-007	Wall	Concrete				
410	UJA18-006	UJA18-015	Wall	Concrete				
411	UJA18-006	UJA18-019	Wall	Concrete				
412	UJA18-007	UJA18-008	Wall	Concrete				
413	UJA18-007	UJA18-015	Wall	Concrete				
414	UJA18-008	UJA18-009	Wall	Concrete				
415	UJA18-008	UJA18-016	Wall	Concrete				
416	UJA18-009	UJA18-016	Wall	Concrete				
417	UJA18-010	UJA18-013	Wall	Concrete				
418	UJA18-011	UJA18-014	Wall	Concrete				
419	UJA18-011	UJA18-015	Wall	Concrete				
420	UJA18-011	UJA18-018	Wall	Concrete				
421	UJA18-011	UJA18-019	Wall	Concrete				
422	UJA18-012	UJA18-014	Wall	Concrete				
423	UJA18-012	UJA18-018	Wall	Concrete				
424	UJA18-013	UJA18-014	Wall	Concrete				
425	UJA18-013	UJANNULUS	Wall	Liner				
426	UJA18-013	UJANNULUS	Wall	Liner				
427	UJA18-014	UJA18-018	Wall	Concrete				
428	UJA18-014	UJANNULUS	Wall	Liner				
429	UJA18-014	UJANNULUS	Wall	Liner				
430	UJA18-015	UJA18-019	Wall	Concrete				
431	UJA18-015	UJANNULUS	Wall	Liner				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
432	UJA18-016	UJANNULUS	Wall	Liner				
433	UJA18-018	UJA18-019	Wall	Concrete				
434	UJA18-018	UJA23-041	Floor	Concrete				
435	UJA18-018	UJA23-042	Wall	Concrete				
436	UJA18-019	UJA23-019	Floor	Concrete				
437	UJA23-002	UJA23-003	Wall	Concrete				
438	UJA23-002	UJA23-010	Wall	Concrete				
439	UJA23-002	UJA23-013	Wall	Concrete				
440	UJA23-002	UJA23-020	Wall	Concrete				
441	UJA23-002	UJA29-013	Floor	Concrete				
442	UJA23-003	UJA23-004	Wall	Concrete				
443	UJA23-003	UJA23-013	Wall	Concrete				
444	UJA23-003	UJA23-017	Wall	Concrete				
445	UJA23-003	UJA29-013	Floor	Concrete				
446	UJA23-004	UJA23-005	Wall	Concrete				
447	UJA23-004	UJA23-014	Wall	Concrete				
448	UJA23-004	UJA23-017	Wall	Concrete				
449	UJA23-005	UJA23-014	Wall	Concrete				
450	UJA23-005	UJA23-041	Wall	Concrete				
451	UJA23-005	UJA23-042	Wall	Concrete				
452	UJA23-005	UJA29-018	Floor	Concrete				
453	UJA23-006	UJA23-007	Wall	Concrete				
454	UJA23-006	UJA23-015	Wall	Concrete				
455	UJA23-006	UJA23-019	Wall	Concrete				
456	UJA23-006	UJA29-016	Floor	Concrete				
457	UJA23-006	UJA29-019	Floor	Concrete				
458	UJA23-007	UJA23-008	Wall	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
459	UJA23-007	UJA23-015	Wall	Concrete				
460	UJA23-007	UJA23-018	Wall	Concrete				
461	UJA23-008	UJA23-009	Wall	Concrete				
462	UJA23-008	UJA23-016	Wall	Concrete				
463	UJA23-008	UJA23-018	Wall	Concrete				
464	UJA23-008	UJA29-016	Floor	Concrete				
465	UJA23-009	UJA23-016	Wall	Concrete				
466	UJA23-009	UJA23-031	Wall	Concrete				
467	UJA23-010	UJA23-013	Wall	Concrete				
468	UJA23-010	UJA23-020	Wall	Concrete				
469	UJA23-011	UJA23-014	Wall	Concrete				
470	UJA23-011	UJA23-015	Wall	Concrete				
471	UJA23-011	UJA23-019	Wall	Concrete				
472	UJA23-011	UJA23-042	Wall	Concrete				
473	UJA23-012	UJA23-014	Wall	Concrete				
474	UJA23-012	UJA23-042	Wall'	Concrete				
475	UJA23-013	UJA23-017	Wall	Concrete				
476	UJA23-013	UJA23-020	Wall	Concrete				
477	UJA23-013	UJA29-013	Floor	Concrete				
478	UJA23-013	UJA29-023	Floor	Concrete				
479	UJA23-013	UJANNULUS	Wall	Liner				
480	UJA23-014	UJA23-017	Wall	Concrete				
481	UJA23-014	UJA23-042	Wall	Concrete				
482	UJA23-014	UJA29-014	Floor	Concrete				
483	UJA23-014	UJANNULUS	Wall	Liner				
484	UJA23-015	UJA23-018	Wall	Concrete				
485	UJA23-015	UJA23-019	Wall	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
486	UJA23-015	UJA29-015	Floor	Concrete				
487	UJA23-015	UJA29-022	Floor	Concrete				
488	UJA23-015	UJANNULUS	Wall	Liner				
489	UJA23-016	UJA23-018	Wall	Concrete				
490	UJA23-016	UJA23-031	Wall	Concrete				
491	UJA23-016	UJA29-016	Floor	Concrete				
492	UJA23-016	UJANNULUS	Wall	Liner				
493	UJA23-017	UJA29-014	Floor	Concrete				
494	UJA23-018	UJA29-015	Floor	Concrete				
495	UJA23-018	UJA29-016	Floor	Concrete				
496	UJA23-018	UJA29-022	Floor	Concrete				
497	UJA23-019	UJA23-041	Wall	Concrete				
498	UJA23-019	UJA23-042	Wall	Concrete				
499	UJA23-019	UJA29-019	Floor	Concrete				
500	UJA23-041	UJA23-042	Wall	Concrete				
501	UJA23-041	UJA29-018	Floor	Concrete				
502	UJA23-042	UJA29-018	Floor	Concrete				
503	UJA29-003	UJA29-004	Wall	Concrete				
504	UJA29-003	UJA29-013	Wall	Concrete				
505	UJA29-003	UJA29-013	Wall	Concrete				
506	UJA29-003	UJA29-013	Wall	Concrete				
507	UJA29-003	UJA29-014	Wall	Concrete				
508	UJA29-003	UJA29-023	Wall	Concrete				
509	UJA29-004	UJA29-005	Wall	Concrete				
510	UJA29-004	UJA29-005	Wall	Concrete				
511	UJA29-004	UJA29-013	Wall	Concrete				
512	UJA29-004	UJA29-013	Wall	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
513	UJA29-004	UJA29-014	Wall	Concrete				
514	UJA29-005	UJA29-014	Wall	Concrete				
515	UJA29-005	UJA29-018	Wall	Concrete				
516	UJA29-006	UJA29-007	Wall	Concrete				
517	UJA29-006	UJA29-007	Wall	Concrete				
518	UJA29-006	UJA29-015	Wall	Concrete				
519	UJA29-006	UJA29-016	Wall	Concrete				
520	UJA29-006	UJA29-019	Wall	Concrete				
521	UJA29-006	UJA29-022	Wall	Concrete				
522	UJA29-006	UJA34-006	Floor	Concrete				
523	UJA29-007	UJA29-008	Wall	Concrete				
524	UJA29-007	UJA29-015	Wall	Concrete				
525	UJA29-007	UJA29-016	Wall	Concrete				
526	UJA29-007	UJA29-016	Wall	Concrete				
527	UJA29-007	UJA29-022	Wall	Concrete				
528	UJA29-008	UJA29-016	Wall	Concrete				
529	UJA29-008	UJA29-016	Wall	Concrete				
530	UJA29-008	UJA29-016	Wall	Concrete				
531	UJA29-008	UJA29-016	Wall	Concrete				
532	UJA29-011	UJA29-014	Wall	Concrete				
533	UJA29-011	UJA29-015	Wall	Concrete				
534	UJA29-011	UJA29-018	Wall	Concrete				
535	UJA29-011	UJA29-019	Wall	Concrete				
536	UJA29-012	UJA29-014	Wall	Concrete				
537	UJA29-012	UJA29-018	Wall	Concrete				
538	UJA29-013	UJA29-018	Wall	Concrete				
539	UJA29-013	UJA29-023	Wall	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
540	UJA29-013	UJANNULUS	Wall	Liner				
541	UJA29-014	UJA29-018	Wall	Concrete				
542	UJA29-014	UJA29-018	Wall	Concrete				
543	UJA29-014	UJA29-023	Wall	Concrete				
544	UJA29-014	UJA34-014	Floor	Concrete				
545	UJA29-014	UJANNULUS	Wall	Liner				
546	UJA29-015	UJA29-016	Wall	Concrete				
547	UJA29-015	UJA29-019	Wall	Concrete				
548	UJA29-015	UJA29-022	Wall	Concrete				
549	UJA29-015	UJA34-015	Floor	Concrete				
550	UJA29-015	UJANNULUS	Wall	Liner				
551	UJA29-016	UJANNULUS	Wall	Liner				
552	UJA29-016	UJANNULUS	Spherical	Steel				
553	UJA29-018	UJA29-019	Wall	Concrete				
554	UJA29-018	UJA34-018	Floor	Concrete				
555	UJA29-019	UJA34-019	Floor	Concrete				
556	UJA29-022	UJA34-015	Floor	Concrete				
557	UJA29-023	UJA34-014	Floor	Concrete				
558	UJA29-023	UJANNULUS	Wall'	Liner				
559	UJA34-003	UJA29-013	Wall	Concrete				
560	UJA34-003	UJA29-013	Wall	Concrete				
561	UJA34-003	UJA34-004	Wall	Concrete				
562	UJA34-003	UJA34-014	Wall	Concrete				
563	UJA34-004	UJA29-013	Wall	Concrete				
564	UJA34-004	UJA34-005	Wall	Concrete				
565	UJA34-004	UJA34-014	Wall	Concrete				
566	UJA34-005	UJA29-013	Wall	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
567	UJA34-005	UJA34-014	Wall	Concrete				
568	UJA34-005	UJA34-018	Wall	Concrete				
569	UJA34-005	UJA40-001	Floor	Concrete				
570	UJA34-006	UJA29-016	Wall	Concrete				
571	UJA34-006	UJA34-007	Wall	Concrete				
572	UJA34-006	UJA34-015	Wall	Concrete				
573	UJA34-006	UJA34-019	Wall	Concrete				
574	UJA34-006	UJA40-001	Floor	Concrete				
575	UJA34-007	UJA29-016	Wall	Concrete				
576	UJA34-007	UJA34-008	Wall	Concrete				
577	UJA34-007	UJA34-015	Wall	Concrete				
578	UJA34-007	UJA34-015	Wall	Concrete				
579	UJA34-008	UJA29-016	Wall	Concrete				
580	UJA34-008	UJA29-016	Wall	Concrete				
581	UJA34-008	UJA34-015	Wall	Concrete				
582	UJA34-003	UJA40-001	Wall	Concrete				
583	UJA34-004	UJA40-001	Wall	Concrete				
584	UJA34-007	UJA40-001	Wall	Concrete				
585	UJA34-008	UJA40-001	Wall	Concrete				
586	UJA34-104	UJA40-001	Wall	Concrete				
587	UJA34-108	UJA40-001	Wall	Concrete				
588	UJA34-003	UJA40-001	Wall	Concrete				
589	UJA34-004	UJA40-001	Wall	Concrete				
590	UJA34-007	UJA40-001	Wall	Concrete				
591	UJA34-008	UJA40-001	Wall	Concrete				
592	UJA34-104	UJA40-001	Wall	Concrete				
593	UJA34-108	UJA40-001	Wall	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
594	UJA34-011	UJA34-014	Wall	Concrete				
595	UJA34-011	UJA34-015	Wall	Concrete				
596	UJA34-011	UJA34-018	Wall	Concrete				
597	UJA34-011	UJA34-019	Wall	Concrete				
598	UJA34-011	UJA40-001	Floor	Concrete				
599	UJA34-012	UJA34-014	Wall	Concrete				
600	UJA34-012	UJA34-018	Wall	Concrete				
601	UJA34-012	UJA40-001	Floor	Concrete				
602	UJA34-014	UJA34-018	Wall	Concrete				
603	UJA34-014	UJANNULUS	Wall	Liner				
604	UJA34-015	UJA34-019	Wall	Concrete				
605	UJA34-015	UJA40-001	Floor	Concrete				
606	UJA34-015	UJANNULUS	Wall	Liner				
607	UJA34-018	UJA29-013	Wall	Concrete				
608	UJA34-018	UJA34-019	Wall	Concrete				
609	UJA34-018	UJA40-001	Floor	Concrete				
610	UJA34-019	UJA29-016	Wall	Concrete				
611	UJA34-019	UJA40-001	Floor	Concrete				
612	UJA04-006	UJA04-006	Wall	Steel				
613	UJA04-005	UJA04-005	Wall	Steel				
614	UJA04-003	UJA04-003	Wall	Steel				
615	UJA04-003	UJA04-003	Wall	Steel				
616	UJA07-019	UJA07-019	Wall	Steel				
617	UJA07-013	UJA07-013	Wall	Steel				
618	UJA07-015	UJA07-015	Wall	Steel				
619	UJA07-015	UJA07-015	Wall	Steel				
620	UJA07-016	UJA07-016	Wall	Steel				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
621	UJA07-016	UJA07-016	Wall	Steel				
622	UJA07-014	UJA07-014	Wall	Steel				
623	UJA07-014	UJA07-014	Wall	Steel				
624	UJA07-013	UJA07-013	Wall	Steel				
625	UJA15-006	UJA15-006	Wall	Steel				
626	UJA15-009	UJA15-009	Wall	Steel				
627	UJA15-002	UJA15-002	Wall	Steel				
628	UJA15-005	UJA15-005	Wall	Steel				
629	UJA11-020	UJA11-020	Wall	Steel				
630	UJA11-015	UJA11-015	Wall	Steel				
631	UJA11-016	UJA11-016	Wall	Steel				
632	UJA11-016	UJA11-016	Wall	Steel				
633	UJA11-013	UJA11-013	Wall	Steel				
634	UJA11-013	UJA11-013	Wall	Steel				
635	UJA11-014	UJA11-014	Wall	Steel				
636	UJA11-020	UJA11-020	Wall	Steel				
637	UJA15-007	UJA15-007	Wall	Steel				
638	UJA15-008	UJA15-008	Wall	Steel				
639	UJA15-003	UJA15-003	Wall	Steel				
640	UJA15-004	UJA15-004	Wall	Steel				
641	UJA15-018	UJA15-018	Wall	Steel				
642	UJA15-019	UJA15-019	Wall	Steel				
643	UJA18-006	UJA18-006	Wall	Steel				
644	UJA18-009	UJA18-009	Wall	Steel				
645	UJA18-002	UJA18-002	Wall	Steel				
646	UJA18-005	UJA18-005	Wall	Steel				
647	UJA15-015	UJA15-015	Wall	Steel				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
648	UJA15-015	UJA15-015	Wall	Steel				
649	UJA15-016	UJA15-016	Wall	Steel				
650	UJA15-016	UJA15-016	Wall	Steel				
651	UJA15-013	UJA15-013	Wall	Steel				
652	UJA15-013	UJA15-013	Wall	Steel				
653	UJA15-014	UJA15-014	Wall	Steel				
654	UJA15-014	UJA15-014	Wall	Steel				
655	UJA18-015	UJA18-015	Wall	Steel				
656	UJA18-016	UJA18-016	Wall	Steel				
657	UJA18-013	UJA18-013	Wall	Steel				
658	UJA18-014	UJA18-014	Wall	Steel				
659	UJA18-007	UJA18-007	Wall	Steel				
660	UJA18-008	UJA18-008	Wall	Steel				
661	UJA18-003	UJA18-003	Wall	Steel				
662	UJA18-004	UJA18-004	Wall	Steel				
663	UJA18-006	UJA18-006	Wall	Steel				
664	UJA18-009	UJA18-009	Wall	Steel				
665	UJA18-002	UJA18-002	Wall	Steel				
666	UJA18-005	UJA18-005	Wall	Steel				
667	UJA18-015	UJA18-015	Wall	Steel				
668	UJA18-015	UJA18-015	Wall	Steel				
669	UJA18-016	UJA18-016	Wall	Steel				
670	UJA18-016	UJA18-016	Wall	Steel				
671	UJA18-013	UJA18-013	Wall	Steel				
672	UJA18-013	UJA18-013	Wall	Steel				
673	UJA18-014	UJA18-014	Wall	Steel				
674	UJA18-014	UJA18-014	Wall	Steel				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
675	UJA23-006	UJA23-006	Wall	Steel				
676	UJA23-007	UJA23-007	Wall	Steel				
677	UJA23-008	UJA23-008	Wall	Steel				
678	UJA23-009	UJA23-009	Wall	Steel				
679	UJA23-002	UJA23-002	Wall	Steel				
680	UJA23-003	UJA23-003	Wall	Steel				
681	UJA23-004	UJA23-004	Wall	Steel				
682	UJA23-005	UJA23-005	Wall	Steel				
683	UJA23-019	UJA23-019	Wall	Steel				
684	UJA23-015	UJA23-015	Wall	Steel				
685	UJA23-015	UJA23-015	Wall	Steel				
686	UJA23-016	UJA23-016	Wall	Steel				
687	UJA23-016	UJA23-016	Wall	Steel				
688	UJA23-013	UJA23-013	Wall	Steel				
689	UJA23-013	UJA23-013	Wall	Steel				
690	UJA23-014	UJA23-014	Wall	Steel				
691	UJA23-014	UJA23-014	Wall	Steel				
692	UJA29-006	UJA29-006	Wall	Steel				
693	UJA29-007	UJA29-007	Wall	Steel				
694	UJA29-008	UJA29-008	Wall	Steel				
695	UJA29-003	UJA29-003	Wall	Steel				
696	UJA29-004	UJA29-004	Wall	Steel				
697	UJA29-005	UJA29-005	Wall	Steel				
698	UJA29-015	UJA29-015	Wall	Steel				
699	UJA29-015	UJA29-015	Wall	Steel				
700	UJA29-016	UJA29-016	Wall	Steel				
701	UJA29-016	UJA29-016	Wall	Steel				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
702	UJA29-014	UJA29-014	Wall	Steel				
703	UJA29-023	UJA29-023	Wall	Steel				
704	UJA34-014	UJA34-014	Wall	Steel				
705	UJA34-014	UJA34-014	Wall	Steel				
706	UJA34-006	UJA34-006	Wall	Steel				
707	UJA34-007	UJA34-007	Wall	Steel				
708	UJA34-008	UJA34-008	Wall	Steel				
709	UJA34-003	UJA34-003	Wall	Steel				
710	UJA34-004	UJA34-004	Wall	Steel				
711	UJA34-005	UJA34-005	Wall	Steel				
712	UJA34-007	UJA34-007	Wall	Steel				
713	UJA34-008	UJA34-008	Wall	Steel				
714	UJA34-003	UJA34-003	Wall	Steel				
715	UJA34-004	UJA34-004	Wall	Steel				
716	UJA40-001	UJA40-001	Wall	Steel				
717	UJA40-001	UJA40-001	Wall	Steel				
718	UJA34-104	UJA34-104	Wall	Steel				
719	UJA34-104	UJA34-104	Wall	Steel				
720	UJA34-108	UJA34-108	Wall	Steel				
721	UJA34-108	UJA34-108	Wall	Steel				
722	UJA40-001	UJA40-001	Wall	Steel				
723	UJA40-001	UJA40-001	Wall	Steel				
724	UJA40-001	UJA40-001	Wall	Steel				
725	UJA40-001	UJA40-001	Wall	Steel				
726	UJA40-001	UJA40-001	Wall	Steel				
727	UJA40-001	UJA40-001	Wall	Steel				
728	UJA40-001	UJA40-001	Wall	Steel				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
729	UJA40-001	UJA40-001	Wall	Steel				
730	UJA40-001	UJA40-001	Wall	Steel				
731	UJA40-001	UJA40-001	Wall	Steel				
732	UJA40-001	UJA40-001	Wall	Steel				
733	UJA40-001	UJA40-001	Wall	Steel				
734	UJA04-006	UJA04-006	Wall	Steel				
735	UJA04-005	UJA04-005	Wall	Steel				
736	UJA04-003	UJA04-003	Wall	Steel				
737	UJA04-003	UJA04-003	Wall	Steel				
738	UJA07-019	UJA07-019	Wall	Steel				
739	UJA07-013	UJA07-013	Wall	Steel				
740	UJA07-015	UJA07-015	Wall	Steel				
741	UJA07-015	UJA07-015	Wall	Steel				
742	UJA07-016	UJA07-016	Wall	Steel				
743	UJA07-016	UJA07-016	Wall	Steel				
744	UJA07-014	UJA07-014	Wall	Steel				
745	UJA07-014	UJA07-014	Wall	Steel				
746	UJA07-013	UJA07-013	Wall	Steel				
747	UJA15-006	UJA15-006	Wall	Steel				
748	UJA15-009	UJA15-009	Wall	Steel				
749	UJA15-002	UJA15-002	Wall	Steel				
750	UJA15-005	UJA15-005	Wall	Steel				
751	UJA11-020	UJA11-020	Wall	Steel				
752	UJA11-015	UJA11-015	Wall	Steel				
753	UJA11-016	UJA11-016	Wall	Steel				
754	UJA11-016	UJA11-016	Wall	Steel				
755	UJA11-013	UJA11-013	Wall	Steel				

Table 19-150 1—Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
756	UJA11-013	UJA11-013	Wall	Steel				
757	UJA11-014	UJA11-014	Wall	Steel				
758	UJA11-020	UJA11-020	Wall	Steel				
759	UJA15-007	UJA15-007	Wall	Steel				
760	UJA15-008	UJA15-008	Wall	Steel				
761	UJA15-003	UJA15-003	Wall	Steel				
762	UJA15-004	UJA15-004	Wall	Steel				
763	UJA15-018	UJA15-018	Wall	Steel				
764	UJA15-019	UJA15-019	Wall	Steel				
765	UJA18-006	UJA18-006	Wall	Steel				
766	UJA18-009	UJA18-009	Wall	Steel				
767	UJA18-002	UJA18-002	Wall	Steel				
768	UJA18-005	UJA18-005	Wall	Steel				
769	UJA15-015	UJA15-015	Wall	Steel				
770	UJA15-015	UJA15-015	Wall	Steel				
771	UJA15-016	UJA15-016	Wall	Steel				
772	UJA15-016	UJA15-016	Wall	Steel				
773	UJA15-013	UJA15-013	Wall	Steel				
774	UJA15-013	UJA15-013	Wall	Steel				
775	UJA15-014	UJA15-014	Wall	Steel				
776	UJA15-014	UJA15-014	Wall	Steel				
777	UJA18-015	UJA18-015	Wall	Steel				
778	UJA18-016	UJA18-016	Wall	Steel				
779	UJA18-013	UJA18-013	Wall	Steel				
780	UJA18-014	UJA18-014	Wall	Steel				
781	UJA18-007	UJA18-007	Wall	Steel				
782	UJA18-008	UJA18-008	Wall	Steel				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
783	UJA18-003	UJA18-003	Wall	Steel				
784	UJA18-004	UJA18-004	Wall	Steel				
785	UJA18-006	UJA18-006	Wall	Steel				
786	UJA18-009	UJA18-009	Wall	Steel				
787	UJA18-002	UJA18-002	Wall	Steel				
788	UJA18-005	UJA18-005	Wall	Steel				
789	UJA18-015	UJA18-015	Wall	Steel				
790	UJA18-015	UJA18-015	Wall	Steel				
791	UJA18-016	UJA18-016	Wall	Steel				
792	UJA18-016	UJA18-016	Wall	Steel				
793	UJA18-013	UJA18-013	Wall	Steel				
794	UJA18-013	UJA18-013	Wall	Steel				
795	UJA18-014	UJA18-014	Wall	Steel				
796	UJA18-014	UJA18-014	Wall	Steel				
797	UJA23-006	UJA23-006	Wall	Steel				
798	UJA23-007	UJA23-007	Wall	Steel				
799	UJA23-008	UJA23-008	Wall	Steel				
800	UJA23-009	UJA23-009	Wall	Steel				
801	UJA23-002	UJA23-002	Wall	Steel				
802	UJA23-003	UJA23-003	Wall	Steel				
803	UJA23-004	UJA23-004	Wall	Steel				
804	UJA23-005	UJA23-005	Wall	Steel				
805	UJA23-019	UJA23-019	Wall	Steel				
806	UJA23-015	UJA23-015	Wall	Steel				
807	UJA23-015	UJA23-015	Wall	Steel				
808	UJA23-016	UJA23-016	Wall	Steel				
809	UJA23-016	UJA23-016	Wall	Steel				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
810	UJA23-013	UJA23-013	Wall	Steel				
811	UJA23-013	UJA23-013	Wall	Steel				
812	UJA23-014	UJA23-014	Wall	Steel				
813	UJA23-014	UJA23-014	Wall	Steel				
814	UJA29-006	UJA29-006	Wall	Steel				
815	UJA29-007	UJA29-007	Wall	Steel				
816	UJA29-008	UJA29-008	Wall	Steel				
817	UJA29-003	UJA29-003	Wall	Steel				
818	UJA29-004	UJA29-004	Wall	Steel				
819	UJA29-005	UJA29-005	Wall	Steel				
820	UJA29-015	UJA29-015	Wall	Steel				
821	UJA29-015	UJA29-015	Wall	Steel				
822	UJA29-016	UJA29-016	Wall	Steel				
823	UJA29-016	UJA29-016	Wall	Steel				
824	UJA29-014	UJA29-014	Wall	Steel				
825	UJA29-023	UJA29-023	Wall	Steel				
826	UJA34-014	UJA34-014	Wall	Steel				
827	UJA34-014	UJA34-014	Wall	Steel				
828	UJA34-006	UJA34-006	Wall	Steel				
829	UJA34-007	UJA34-007	Wall	Steel				
830	UJA34-008	UJA34-008	Wall	Steel				
831	UJA34-003	UJA34-003	Wall	Steel				
832	UJA34-004	UJA34-004	Wall	Steel				
833	UJA34-005	UJA34-005	Wall	Steel				
834	UJA34-007	UJA34-007	Wall	Steel				
835	UJA34-008	UJA34-008	Wall	Steel				
836	UJA34-003	UJA34-003	Wall	Steel				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
837	UJA34-004	UJA34-004	Wall	Steel				
838	UJA40-001	UJA40-001	Wall	Steel				
839	UJA40-001	UJA40-001	Wall	Steel				
840	UJA34-104	UJA34-104	Wall	Steel				
841	UJA34-104	UJA34-104	Wall	Steel				
842	UJA34-108	UJA34-108	Wall	Steel				
843	UJA34-108	UJA34-108	Wall	Steel				
844	UJA40-001	UJA40-001	Wall	Steel				
845	UJA40-001	UJA40-001	Wall	Steel				
846	UJA40-001	UJA40-001	Wall	Steel				
847	UJA40-001	UJA40-001	Wall	Steel				
848	UJA40-001	UJA40-001	Wall	Steel				
849	UJA40-001	UJA40-001	Wall	Steel				
850	UJA40-001	UJA40-001	Wall	Steel				
851	UJA40-001	UJA40-001	Wall	Steel				
852	UJA40-001	UJA40-001	Wall	Steel				
853	UJA40-001	UJA40-001	Wall	Steel				
854	UJA40-001	UJA40-001	Wall	Steel				
855	UJA40-001	UJA40-001	Wall	Steel				
856	UJAGROUND	UJA04-002	Floor	Concrete				
857	UJAGROUND	UJA04-003	Floor	Concrete				
858	UJAGROUND	UJA07-013	Floor	Concrete				
859	UJAGROUND	UJA07-014	Floor	Concrete				
860	UJAGROUND	UJA07-015	Floor	Concrete				
861	UJAGROUND	UJA07-016	Floor	Concrete				
862	UJA04-003	UJA11-003	Floor	Concrete				
863	UJA04-003	UJA11-004	Floor	Concrete				

Table 19-150 1–Heat Sink Data (33 Sheets)

Distributed HS No.	From Room	To Room	Orientation	Material	Surface Area (m^2)	Elevation (m)	Height (m)	Length (m)
864	UJA04-003	UJA11-005	Floor	Concrete				
865	UJA04-003	UJA11-006	Floor	Concrete				
866	UJA04-003	UJA11-007	Floor	Concrete				
867	UJA04-003	UJA11-008	Floor	Concrete				
868	UJAGROUND	UJA11-012	Floor	Concrete				

Question 19-151:

With respect to the lumped heat sink data provided in Table 17-47-5 of the response to RAI 19-47.5:

(a) Please provide information on the material(s) making up each of the lumped heat sinks.

(b) Please explain the meaning of the indices in the column labeled "Node Containing HS(i)" and, if possible, relate them to the physical room numbers (UJAxxxxx) or to the MAAP node indices.

Response to Question 19-151:

(a) The information on the material making up each lumped heat sink is provided in RAI 3, Table 19-47-5. The properties of the heat sink materials are provided in Table 19-151-1.

Table 19-151-1—Heat Sink Properties

Material Type	Density (lb_m/ft^3)	Thermal Conductivity (BTU/hr·ft°F)	Specific Heat (BTU/lb_m°F)	Melting Temperature (°F)	Latent Heat of Melting (BTU/lb_m)
Structural Concrete	142.0	1.05	0.3871	2150	813
Reactor Pit Concrete	158.6	1.16	0.3930	1974	744
Steel	493.2	86.7	0.1200	2780	107
ZrO_2	368.3	1.73	0.1541	4780	368
Spreading Room Concrete	137.3	0.01	0.3812	2331	860

(b) The "Node Containing HS(i)" column contains the MAAP node of HS(i). For example, the second row of RAI 3, Table 19-47-5 is heat sink number 1 and this heat sink is in MAAP node 26.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 19-154:

The environmental conditions presented in Section 19.2.4.4.5.1 do not appear to match the values given in the referenced Figure 19.2-20. Please explain the relation between the values cited in the text and those given in Figure 19.2-20.

Response to Question 19-154:

U.S. EPR FSAR, Tier 2, Figure 19.2-20 provides the maximum gas and fluid temperatures obtained during a severe accident from all 49 uncertainty analysis cases. The values cited in U.S. EPR FSAR, Tier 2, Section 19.2.4.4.5.1 are the minimum design values that the instrumentation and components will be qualified to provide the information necessary to evaluate the progression of a severe accident. For example, the maximum core outlet temperature shown in U.S. EPR FSAR, Tier 2, Figure 19.2.20 is 2732°F at core melt onset and can reach higher temperatures as the accident progresses. However, core outlet temperature only signals the beginning of a severe accident. That value is assumed to be 1200°F; therefore core outlet temperature must only be reliably measured to at least 1200°F. Beyond that value the outlet temperature doesn't provide any further benefit. As stated in FSAR Tier 2, Section 19.2.4.4.5.1, the requirements on the core outlet thermocouples have been set to measure temperature reliably up to at least 1832°F, with a possible measurement range of up to 2282°F.

Since it is important to have continuous information on reactor coolant system (RCS) pressure and to be able to monitor the efficient depressurization of the RCS prior to reactor pressure vessel failure, the pressure sensors have to be qualified to relatively high gas temperatures. While the maximum gas temperature obtained in the hot leg was 1778°F, a bounding maximum value of 2192°F was chosen to provide a reliable measurement of RCS pressure.

Finally, the temperature at the primary depressurization system (PDS) valve prior to the start of depressurization depends on the gas temperature in the pressurizer. The PDS valves will have to reliably operate only once at a core outlet temperature signal of 1200°F. Therefore, a maximum pressurizer gas temperature of 1112°F was specified at the opening of the PDS valves, which bounds the calculated pressurizer gas temperature of 662°F. To provide continuous depressurization of the RCS until reactor pressure vessel failure, the PDS valves must remain open and their position reliably indicated up to a pressurizer gas temperature of 1832°F.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.