BALANCE OF IE BULLETIN 79-14 EVALUATION

FOR

RANCHO SECO NUCLEAR GENERATING STATION

SACRAMENTO MUNICIPAL UTILITY DISTRICT

SACRAMENTO, CALIFORNIA

ERPT - M0001

REVISION .1

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1.0 PURPOSE

This document provides the procedures and guidelines for walkdown inspection and evaluation of piping systems and pipe supports to assure compliance with the IEB 79-14 requirements.

2.0 SCOPE

The scope of this document is limited to the balance of 79-14 piping systems. This includes safety related Seismic Class 1 piping systems listed in the Rancho Seco FSAR Appendix 5B (2 1/2" diameter and larger and; if they were originally computer analyzed, 2" diameter and smaller) which were omitted from the scope of original IEB 79-14 effort which was completed for Rancho Seco in 1980. The specific lines covered by this procedure are listed in Appendix B of this procedure. Sufficient number of supports from the non-seismic piping shall be included in the evaluation to predict the impact of non-seismic portion of the system on the seismic portion.

Inspection of concrete expansion bolts and base plates, having been covered by IEB 79-02, is excluded from the scope of this effort.

3.0 BACKGROUND

3.1 IE Bulletin 79-14

IE Bulletin 79-14, Seismic Analysis for As-Built Safety Related Piping Systems was issued July 2, 1979, and Revision 1 to the bulletin was issued July 18, 1979.

This bulletin addresses the concern which was raised when inspection of some operating plants disclosed that installed piping systems were not in conformance with design documents. The specific concern is that non-conformances between the design document, used as input information to the seismic analysis of the piping system, and the as-built condition could potentially impact the validity of the seismic piping analysis.

In order to assure that the seismic piping analyses are still valid, the bulletin required each operating LWR to inspect specified safety related, Seismic category I systems, and compare the as-built installation with inputs to the seismic analysis. Where significant non-conformances are discovered they must be resolved either by reanalysis or by modifications to the piping system or its supports.

3.2 Existing Problem

A crack was developed on the RCS vent line very close to the OTSG nozzle (E-205B). This failure was attributed to a deficiency in the as-built piping/support configuration. Investigations revealed the fact that this line, being originally computer analyzed, should have been included in the IEB 79-14 effort. SMUD's further review of the systems included in IEB 79-14 effort and comparing those with the scope and intent of the Bulletin identified additional systems which should have been included. These systems will be evaluated to assure the adequacy of the as-built configuration.

4.0 DEFINITIONS

4.1 Satisfactory (SAT)

This term is used in the Walkdown Checklist of Appendix A. "SAT" shall be used to indicate that the configuration meets the requirements of the design documents including design tolerances.

4.2 Minor Discrepancy (MD)

Any discrepancy which does not change the structural behavior of the system, piping and supports, such as unpainted members, nuts fully engaged but no exposed threads, slightly off pin-to-pin dimension, minor corrosion, and brackets added for construction or maintenance, are considered minor discrepancies. During walkdown, the appropriate stress/pipe support engineer shall determine whether any discrepancy is minor or a nonconformance. For the sake of consistency and to avoid misjudging significant nonconformances as MDs, the walkdown group supervisor shall review all the checklists. However, the final determination of the classification of the observation is the team leader's responsibility.

4.3 Nonconformance (NC)

Any configuration difference from design documents which is outside the design tolerances and is not a minor discrepancy is categorized as a Nonconformance (NC).

4.4 Major Discrepancy (MJD)

Any nonconformance (NC), the dispositioning of which requires hardware changes to maintain system operability is a Major Discrepancy (MJD). SMUD, Rancho Seco Technical Specification, defines a component or system to be operable if it is "...capable of performing its intended function" within the required range.

5.0 PROCEDURE

The as-built walkdown inspection consists of four (4) parts:

Part 1 - Walkdown inspection documents collection.
Part 2 - Walkdown inspection.
Part 3 - Reporting of walkdown findings.
  a) NCR
  b) AP22
Part 4 - Evaluation of walkdown findings.

5.1 Part 1 - Walkdown Inspection Documents Collection

The following information constitutes a complete inspection package. The first three items are required for field walkdown, others are to be utilized during evaluation of the nonconformances. These documents shall be obtained from the controlled copies.

1. The latest support drawings with all outstanding DCNs attached.
2. Piping stress isometrics identifying all critical dimensions and supports.
3. Piping fabrication drawing.
4. Appropriate pages of valve and piping specification list (Drawing M-870)..
5. Line List (MEL Listing)
6. Latest computer input data listing.
7. Valve drawings with appropriate valve I.D. and Master Valve List (MEL Listing).
8. Piping stress summary sheet.

5.2 Walkdown Inspection

Walkdown inspection is to be performed utilizing the Walkdown Checklist shown in Appendix A. All applicable areas of this checklist shall be addressed by the walkdown team. Some of the sections of this list shall be filled out in the office by the walkdown team before the physical field inspection. The following sections describe the work to be performed in the office as compared to the work to be performed during the walkdown.

5.2.a Office Work

This phase of the inspection shall be done before the actual walkdown. In this phase, the following items from the Walkdown Checklist shall be addressed:

1) Item A.1, Pipe Material/Size: This information is available in the Valve and Piping Specification List (Drawing M-870).

5.2.a.2) Items A.2 through A.4, Pipe Temperature, Pressure and Content: Obtain this information from the Line List (MEL Listing)

3) Item A.6, Location & Elevation of the Piping System: Use the stress Iso to identify the system location. This information will be used in verifying the applicable response spectra by the dispositioning team.

4) Valve Data: To obtain valve data, the following steps may be followed:

1. Identify the line number from the stress Iso. With reference to the Class 1 Line List identify the P&ID which indicates the system and locate the line under consideration. 1

2. Locate the valve of interest on P&ID and note the number.

3. Refer to MEL Listing, locate the valve number and record all the pertinent information. This information shall be compared against the field collected information.

5) Comparison of Stress Iso. and Fab. Iso.: This task (which is not on W.D. Checklist) shall be addressed after completion of the physical walkdown.

5.2.b Site Work - All other items on the checklist including item A.5, to be checked by the team as they walk the line down. For insulation inspection, the circumference of the insulated pipe shall be measured. The insulation type shall also be checked in the field. If this cannot be easily identified, a specialized insulation person should be called in to determine the type. 1

Page 1 of 4 of the Walkdown Checklist (Piping Data Sheet) shall be filled out for each line (i.e., one sheet per line), and Pages 2, 3, and 4 shall be filled out for each support, valve, and penetration/interference on the above line (i.e., one sheet per support). 1

5.2.b The walkdown team shall use the stress isometric to highlight the piping geometry with a blue marker as they walk the line down. If discrepancies exist, the as-built dimension shall be written with red pen on the stress isometric. Upon completion of the walkdown, this drawing shall be stamped AS-BUILT, signed BY & CHECKED and dated. For support sketches, this procedure shall be done visually. "Visual As-Built" shall be noted on the drawing and the drawing shall be signed BY and CHECKED. In the event that an obvious nonconformance is detected, the as-built drawing should be prepared to aid the dispositioning team. 1

It is intended that all measurements on piping be made using a measuring device such as a tape, a ruler, etc. For pipe support components, welds, and inaccessible piping, a visual estimate of dimension may be performed. However, when visual estimates are used, the accuracy of estimation must be within specified tolerances. If visual inspection of a support or weld reveal obvious non-conformances, physical measurement of critical dimensions is necessary. When visual dimensional checks are used, the documentation should reflect this fact.

While inspecting each item on the Walkdown Checklist, the following possibilities may be encountered:

- The inspected item, as-built, is in full compliance with the design documents. This item shall be marked as Satisfactory (SAT).

- The inspected item, as-built, is deviating from the design documents. In this case, the walkdown team leader is to make on-the-spot engineering judgement to determine whether the deviation has a significant impact on the structural behavior of the piping system overall. If the conclusion to this quick assessment is negative, the item shall be marked as Minor Discrepancy (MD), otherwise, it will be classified as a Nonconformance (NC). The walkdown group supervisor shall review the team leader's judgements for reasonableness. The team (leader) should make sure that the MD or NC is fully explained (attach additional sheets if necessary) so that disposition could be performed without a need for reinspection. For all NCs (and MDs if applicable) an as-built sketch should be prepared, stamped AS-BUILT, and signed BY & CHECKED. 1

5.3 Part 3 - Reporting of Walkdown Findings

Each walkdown team (leader) is responsible to report all the findings to the walkdown group supervisor. The walkdown team (leader) shall provide a completed checklist, with all the necessary signatures on the checklist and the as-built drawings, provide a summary of the nonconformances and the overall status of his team's achievements to the walkdown group supervisor daily. 1

Each item on the Walkdown Checklist (Appendix A) should be addressed by the walkdown engineer as Satisfactory (SAT), Minor Discrepancy (MD), Nonconformance (NC), or Not Applicable (N/A). All NCs and MDs shall be explained in the remark column. If necessary, pages of remarks to sufficiently describe the nature of the nonconformity for effective evaluation of the deficiency by engineering, or of the minor deviation for corrective maintenance, shall be added to the checklist. The remarks should be enhanced by the use of sketches, comments, drawings, mark-ups, photographs, etc.

If any component or component support is discovered in a condition that could seriously affect its operability, it shall be immediately reported to the dispositioning team so that it is addressed per AP22. The nonconformance shall be identified on the walkdown drawings. The resolution of the discrepancy shall be included in the evaluation package. 1

5.4 Part 4 - Evaluation of Walkdown Findings

In reviewing the Walkdown Checklist for each line, the dispositioning engineer may encounter the following possibilities:

5.4.1 All items on the Walkdown Checklist are "SAT" (this includes all supports and the piping). The line, as-built, is in full compliance with the design documents and the intent of the IEB 79-14 is met. The calculation file should be marked as such and no further action is required for this line.

5.4.2 Any MD requiring physical correction (per the judgement of the dispositioning team) shall be reported in a Work Request (WR) form to Construction & Maintenance for their corrective action immediately. Necessary documents and design drawings for the applicable MDs shall be updated to reflect the as-built condition by Engineering per SMUD QA procedures. 1

5.4.3 One (or more) of the as-built items is in nonconformance (NC) with the design documents, i.e., the discrepancy falls outside the allowed tolerances. All NCs shall be written in a Nonconformance Report (NCR). It is recommended that NCRs be prepared for each system upon its completion.Engineering evaluation of the NCR, which should be completed in two days, may reveal one of the following results:

5.4.3a) Acceptable stress levels and design configuration; in this case, the analytical engineering evaluation should be completed in 30 days and Engineering should update the necessary design drawings and calculations to reflect the as-built condition per SMUD QA procedures. In this phase, no physical hardware change is involved.

b) Initial evaluation of the nonconformance is not very definitive. In this case, a more refined computer analysis and design should be performed within 2 days to show compliance of as-built with the design criteria without the need for hardware modification.

If this is not attainable, the item(s) responsible for the failure should be identified as a Major Discrepancy (MJD) on the remark column of Walkdown Checklist and the nonconformance reported per AP22. In this case, the operability of the system should be confirmed. If the system cannot be positively shown operable with the analytical evaluation, this should be immediately brought up to the attention of the Shift Supervisor and the Principal Project Engineer for determination of appropriate action. SMUD, Rancho Seco Technical Specification defines a component or system to be operable if it is "....capable of performing its intended function" within the required range.

Flow chart in Figure 1 shows the sequence of activities for this project.

For analysis and design, Bechtel Pipe Stress and Support Design Criteria, Revision 0, shall be used.

The evaluation package should have all the applicable NCR numbers, stress calculations, design packages addressed on the cover sheet for cross-reference. A box should be assigned for completion of all work. When this box is initialed by the dispositioning team leader, the work on this specific system is considered complete.

6.0 PERSONNEL AND TRAINING

6.1 Inspection Team

The inspection team shall consist of one stress/support engineer and one additional engineering person to assist in taking measurements.

6.2 Personnel Training

All the personnel working on tasks within the scope of this instruction shall be trained on the instructions herein related to their specific activity and the overall purpose and goal of this project. This training shall be documented. The personnel involved in the walkdown have been selected based on their knowledge and experience in the area of piping and supports. The resumes of their qualifications will be placed in record.

6.3 Responsibilities

The pipe support/stress engineer shall be the leader of the inspection team. He shall assure total compliance of the inspection to this procedure.

7.0 ACCEPTANCE CRITERIA

The walkdown team shall perform their inspection based on the design tolerances given on the design documents. Any item within the above tolerances should be checked as "SAT" on the Walkdown Checklist. Any item which is not a minor discrepancy and falls outside the tolerances authorized by design documents is a Nonconformance (NC) for which a Nonconformance Report (NCR) should be issued.

Non-NF fillet weld inspection will be in accordance with AWS D1.1-80 paragraph 8.15.1.7 (in case that further inspection is required).

7.1 Generic Tolerances

The following generic tolerances shall be used in conjunction with the design documents for this inspection:

a) Support Location: For pipe sizes $\phi \leq$ 4" : $\pm$ 6"
For pipe sizes $\phi >$ 4" : $\pm$ D $\leq$ 24"
Where D = nominal pipe diameter

b) Straight Pipe Span: Tolerance = $\pm$ 2 X D

c) Concentrated load span: Tolerance = $\pm$ 1 X D
Also, for the span adjacent to equipments.

d) Pipe run between two changes in direction:
Tolerance = $\pm$ 5% of designed length.

e) Angular tolerance for bends: Tolerance = $\pm$ 15^{o} (visual)

f) Valve location: tolerance = $\pm$ 5% of span

g) Eccentic Operator Orientations:
Tolerance = $\pm$ 10^{o} (visual)

h) Gaps: Max. size = 1/8" (both sides added) unless otherwise specified by design

i) Support Orientation: Tolerance = $\pm$ 5^{o} (visual)

Figure 1

BALANCE OF IE BULLETIN 79-14 EFFORT FOR RANCHO SECO NUCLEAR GENERATING STATION FLOW CHART

whole page

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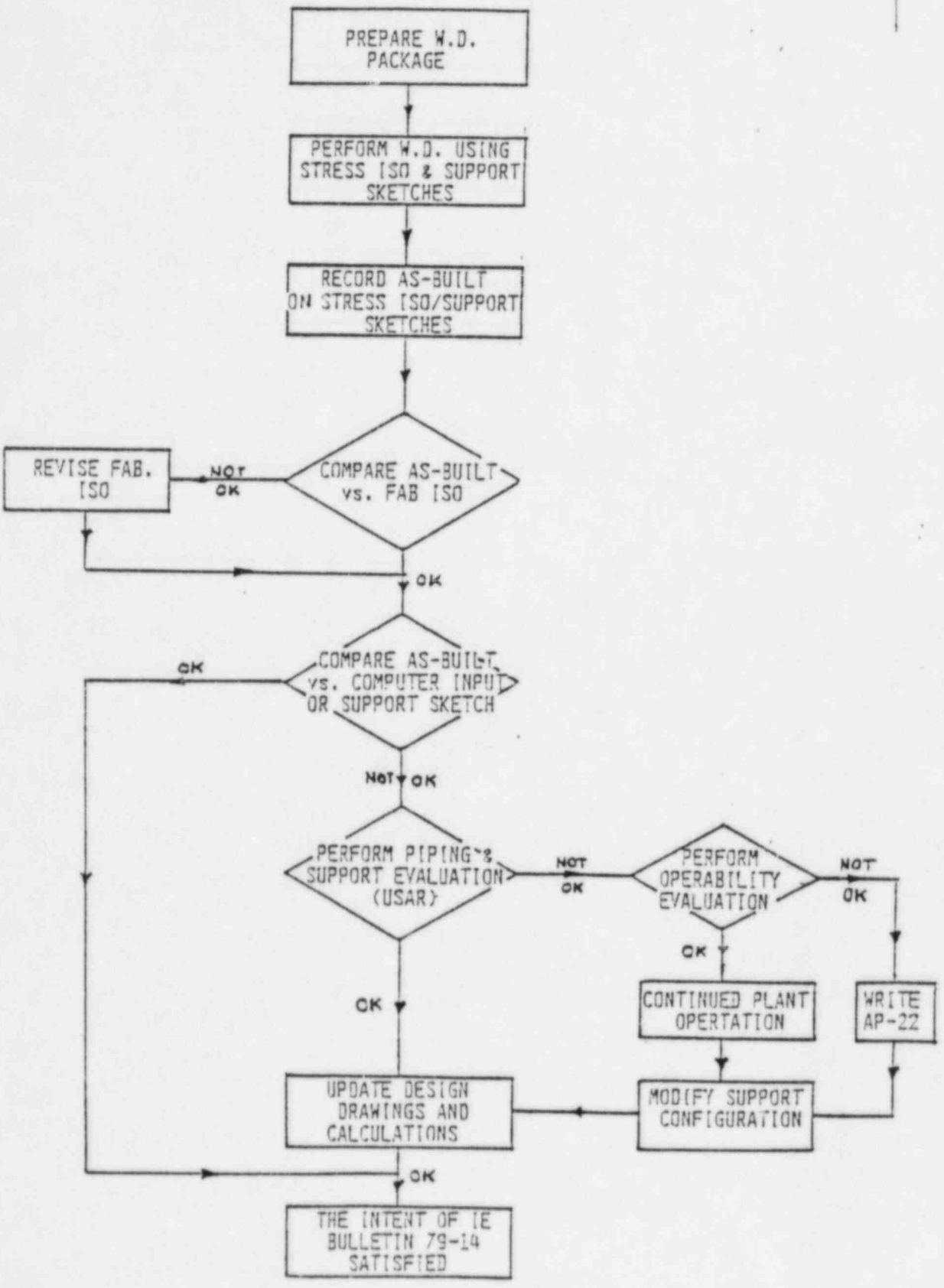


APPENDIX "A"
WALKDOWN CHECKLIST

CALC. NO.:_____ INSPECTED BY:_____ DATE:_____
LINE I.D.#:_____ CKD BY (LEAD ENGR):_____ DATE:_____
BLDG. LOCATION/SYSTEM:_____ NUMBER OF PAGES ATTACHED:_____

Check the compliance of the following "As-Built" items from the piping system with the "As-Designed", i.e., walkdown vs. design documents.

ITEM	SAT	MD	NC	N/A	REMARK NO.

A. GENERAL PIPING INFORMATION:

1. Material/size
2. Temperature
3. Pressure
4. Content

5. Insulation
   a. Thickness
   b. Material

6. Location
   a. Building
   b. Elevation

B. SPECIFIC PIPING INFORMATION:

1. Pipe Routing
   a. Elbow/Bend Angle
   b. Elbow/Bend Type
   c. Dimensions

2. Branch Connections
   a. Location
   b. Type

3. Penetration/Interferences
   (see attached sheet)
   a. Location

4. Other Concentrated Weights
   (i.e. flanges and intermediate couplings)
   a. Location
   b. Eccentricity/Orientation

5. Other Observations (Explain)
   a.
   b.
   c.

APPENDIX "A"
WALKDOWN CHECKLIST
(CONTINUED)

SUPPORT NO./REV.:_____ INSPECTED BY:_____ DATE:_____
SYSTEM:_____ CKD. BY(LEAD ENGR):_____ DATE:_____
BLDG. LOCATION:_____
OTHER DESIGN DOCUMENTS REVIEWED/REV.:_____

Check the compliance of the following "As-Built" items with the "As-Designed", i.e., Walkdown vs. Design Documents:

ITEM	SAT	MD	NC	N/A	REMARK NO.

C. GENERAL SUPPORT INFORMATION:

1. Location
2. Type
3. Orientation
4. Gap/Clearance

D. SPECIFIC SUPPORT INFORMATION:

1. Structural Members
   a. Type
   b. Size (visual)

2. Welds (as-painted)
   a. Configuration
   b. Size/Length (visual)

3. Base Plates
   a. Plate Size
   b. Anchor Bolt Size, Spacing
   c. Bolt Edge Distances

4. Bolts/Clamps/Rods
   a. Size
   b. Installation

5. Springs & Snubbers
   a. Cold Setting
   b. Size

6. Snubbers & Struts
   a. Pin-to-Pin Distance

7. Thermal Offset if Shown on Pipe Drawings

8. Pipe Attachment
   a. Type
   b. Size

9. Other Observations (explain)

APPENDIX "A"
WALKDOWN CHECKLIST

VALVE DATA
Fill out one checklist per valve

By: _____ Date: _____

Check: _____ Date: _____

System: _____

Line No.: _____

Drawing No.: _____

Valve Mark No.: _____

Vendor: _____

	SAT	NC	N/A
1. Valve Type			
2. I.D. Mark No.			
3. Extended Operator			
a. Orientation			
b. Type			
4. Operator I.D.			
5. Pressure Rating			

APPENDIX "A"
WALKDOWN CHECKLIST

FLOOR AND WALL PENETRATION INTERFERENCES DATA
Fill out one checklist per penetration

BY: _____ DATE: _____

CHECK: _____ DATE: _____

System: _____

Line No.: _____

Drawing: _____

Penetration I.D.: _____

Is the pipe "fixed" at the penetration? _____

1. If yes, indicate type.

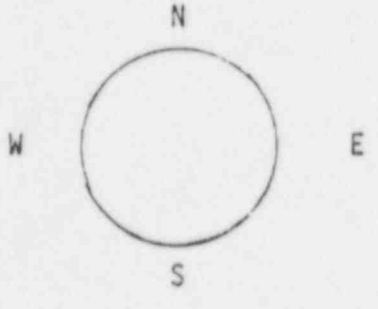
   a. Structural Restraint: _____ (Indicate direction below)

   b. Grouting: _____

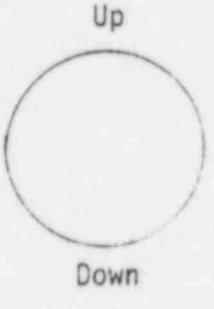
   c. Sealing: _____

2. If no, indicate clearances below (accurate to 1/2"):

   Is pipe Hot _____ Cold _____?



Looking Downward



Looking _____ (Specify)

APPENDIX B

DETAILED SCOPE OF WORK

The following pages define the scope of this effort by lines. This list is preliminary and it is being updated periodically as the project progress. The final detailed scope of the work will be issued upon completion of the work in a later revision to this procedure for the sake of documentation traceability and completeness.

APPENDIX B

DETAILED SCOPE OF WORK

(CONTINUED)

LINENO	SIZE	SPEC	PID	SYS
30801	3	HD	533	MSS
35824	12	HC	536	MCM
35824	3	HC	536	MCM
35881	12	HC	536	MCM
35882	4	HC	536	MCM
35893	1/2	HD1	536	MCM
35893	2	HD1	536	MCM
20514	8	EA	530	MSS
20515	8	EA	530	MSS
20520	24	EA	532	MSS
20520	26	EA	530	MSS
20520	36	EA	532	MSS
20520	36	EA	532	MSS
20521	24	EA	532	MSS
20521	24	EA	532	MSS
20521	26	EA	530	MSS
20521	36	EA	532	MSS
20521	36	EA	532	MSS
20522	24	EA	532	MSS
20523	24	EA	532	MSS
20524	10	EA1	530	MSS
20525	10	EA1	530	MSS
20525	36	EA	530	MSS
20528	26	EA	530	MSS
20529	10	EA	530	MSS
20529	8	EA	530	MSS
20530	10	EA	530	MSS

LINENO	SIZE	SPEC	PID	SYS
20543	16	EA	530	MSS
20550	8	EA	530	MSS
20552	8	EA	530	MSS
20552	8	EA	530	MSS
20556	8	EA	530	MSS
20558	8	EA	530	MSS
20559	1	EA	530	MSS
20559	10	EA	530	MSS
20559	10	EA1	530	MSS
20563	16	EA1	530	MSS
20563	1	EA	530	MSS
20569	10	EA	530	MSS
30573	8	EA	F	MSS
20595	3/4	EA	532	MSS
20596	3/4	EA	532	MSS
20598	6	EA1	530	MSS
30708	8	EA	530	MSS
30709	8	EA	530	MSS
30800	6	EA1	530	MSS
30802	6	EA	530	MSS
30804	6	EA	530	MSS
30805	3	EA1	530	MSS
30893	1	EA1	530	MSS
30895	1	EA1	530	MSS
32300	14	EA1	530	MSS
32302	14	EA	530	MSS
32303	1	EA	530	MSS

LINENO	SIZE	SPEC	PID	SYS
48054	24	HE2	544	NRW
48054	24	LE6	544	NRW
48055	24	HE2	544	NRW
48055	24	LE6	544	NRW
48062	14	HD	544	NRW
48062	20	HD	544	NRW
48062	24	LE6	544	NRW
48062	24	HE2	544	NRW
48062	24	HD	544	NRW
48062	6	HC	544	NRW
48062	8	HD	544	NRW
48063	14	HD	544	NRW
48063	20	HD	544	NRW
48063	24	LE6	544	NRW
48063	24	HE2	544	NRW
48063	24	HD	544	NRW
48063	6	HD	544	NRW
48063	8	HD	544	NRW
48064	18	LE6	544	NRW
48065	18	LE6	544	NRW
48074	2	HE2	544	NRW
48075	2	HE2	544	NRW
48084	3	HE2	544	NRW
48088	3	HE2	544	NRW
48098	3	HE2	544	NRW
48099	3	HE2	544	NRW
32701	3	HE2	544	NRW

LINE NO	SIZE	SPEC	PID	SYS
60486	1 1/2	HD	522	CFS
~~60487~~	~~1~~	~~ED~~	~~522~~	~~CFS~~
60487	2	ED	522	CFS
48402	3	HE	545	NSW
48403	3	HE	545	NSW
~~48403~~	~~4~~	~~HE~~	~~545~~	~~NSW~~
48470	1	DB2	532	NSW
48480	4	HE	545	NSW
~~48488~~	~~2~~	~~HE~~	~~545~~	~~NSW~~
48489	3	HE	545	NSW
48491	4	HE	545	NSW
~~48492~~	~~1~~	~~HE~~	~~545~~	~~NSW~~
48493	1	HE	545	NSW
48762	3	HE2	544	NSW
~~52050~~	~~21/2~~	~~HE2~~	~~544~~	~~NSW~~
52362	21/2	HE2	544	NSW
21021	1	HD1	521	PLS
~~21021~~	~~1 1/2~~	~~CA~~	~~521~~	~~PLS~~
21022	1	HD1	521	PLS
21022	1 1/2	CA	521	PLS
~~21025~~	~~1~~	~~HD1~~	~~521~~	~~PLS~~
~~21025~~	~~1 1/2~~	~~CA~~	~~521~~	~~PLS~~
21028	1	HD1	521	PLS
21028	1 1/2	CA	521	PLS
22001	1	CA	521	PLS
22505	1/2	HD	521	PLS

LINE NO	SIZE	SPEC	PID	SYS
~~20385~~	~~3~~	~~HB~~	~~533~~	~~CWX~~
20586	10	HD	532	FWS
30921	4	EA1	532	FWS
68191	4	HD	560	PLS
71128	3/4	HD	560	PLS
~~60014~~	~~6~~	~~HD~~	~~560~~	~~RWS~~
20010	3/4	CA	520	RCS
20011	1	CA	520	RCS
~~20011~~	~~3/4~~	~~CA~~	~~520~~	~~RCS~~
20015	1	CA	520	RCS
20016	1	CA	520	RCS
~~20022~~	~~1~~	~~CA~~	~~520~~	~~RCS~~
20564	1	CA	520	RCS
20588	1	CA	520	RCS
~~20599~~	~~1 1/2~~	~~CA~~	~~520~~	~~RCS~~
20600	1 1/2	CA		RCS
21350	3	GB	525	RCS
~~21352~~	~~3~~	~~GB~~	~~525~~	~~RCS~~
21506	1	CA		RCS
21506	3/4	CA	520	RCS
~~21550~~	~~1~~	~~CA~~	~~520~~	~~RCS~~
21581	1	CA	520	RCS
21596	1	CA	520	RCS
~~21598~~	~~3/4~~	~~CA~~	~~520~~	~~RCS~~
21598	1	CA	520	RCS

LINE NO	SIZE	SPEC	PID	SYS
15073	1	HD	551	HVS
53520	12	HC	551	HVS
~~53800~~	~~3~~	~~HD~~	~~535~~	~~HVS~~
60484	3	ND	560	RWS
60720	4	HD	560	RWS
~~60721~~	~~4~~	~~HD~~	~~560~~	~~RWS~~
60722	4	HD	560	RWS
60723	4	HD	560	RWS
~~60724~~	~~4~~	~~HD~~	~~560~~	~~RWS~~
61020	4	HD	560	RWS
61021	4	HD	560	RWS
~~61022~~	~~4~~	~~HD~~	~~560~~	~~RWS~~
61023	4	HD	560	RWS
61024	4	HD	560	RWS
~~90230~~	~~2~~	~~HE~~	~~582~~	~~SPS~~
20080	10	HD	523	SFC
20081	10	HD	523	SFC
~~27200~~	~~8~~	~~HD~~	~~523~~	~~SFC~~
27201	6	HD	523	SFC
21001	1 1/2	CA	521	SIW
~~21001~~	~~2~~	~~CA~~	~~521~~	~~SIW~~
21002	1 1/2	CA	521	SIW
21002	2	CA	521	SIW
~~21003~~	~~1 1/2~~	~~CA~~	~~521~~	~~SIW~~
21003	1 1/2	CA	521	SIW

APPENDIX B

DETAILED SCOPE OF WORK

(CONTINUED)

LINENO	SIZE	SPEC	PID	SYS
21009	2	CA	521	SIM
21010	11/2	CA	521	SIM
21010	2	CA	521	SIM
21011	11/2	CA	521	SIM
21011	2	CA	521	SIM
21082	1	HD	521	SIM
21083	1	HD	521	SIM
21084	1	HD	521	SIM
21504	11/2	CA	521	SIM
23632	4	CA	521	SIM
23634	1	CA	521	SIM
23823	2	CA	521	SIM
53600	4	HC	551	WGS
53670	4	HC	552	WGS
53080	3	HD	552	WGS
53090	3/4	HD	552	WGS
65577	1	HE	562	WGS

LINENO	SIZE	SPEC	PID	SYS
21003	2	CA	521	SIM
21003	2	CA	521	SIM
21004	3	CA	521	SIM
21004	2	CA	521	SIM
21005	2	CA	521	SIM
21006	2	CA	521	SIM
21007	2	CA	521	SIM
21008	11/2	CA	521	SIM
23581	4	HD		PLS
23591	3/4	HD	521	PLS
23594	21/2	HD	521	PLS
24000	4	HD	521	PLS
24022	4	HD	521	PLS
52122	4	HD	560	PLS
52181	3	HD	560	PLS
21008	2	CA	521	SIM
21009	11/2	CA	521	SIM
21009	2	CA	521	SIM

LINENO	SIZE	SPEC	PID	SYS
60013	1	CA	520	RCS
60021	11/2	CA	520	RCS
60023	1	CA	520	RCS
60024	11/2	CA	520	RCS
70051	1	CA	520	RSS
70051	3/4	CA	520	RSS
60482	3	ND	560	RWS
60483	3	HD	560	RWS
23761	3	HE2	544	NSW
48080	3	HE	545	NSW
32400	6	EA1	530	WSS
47081	4	HE2	544	NRW
47082	4	HE2	544	NRW
20530	8	EA	520	WSS
20531	8	EA	530	WGS
20532	8	EA	520	WSS

APPENDIX B

DETAILED SCOPE OF WORK

(CONTINUED)

LINENO	SIZE	SPEC	PID	SYS
35031	1	GB	537	ASC
35032	1	GB	537	ASC
35039	1	GB	537	ASC
25121	21/2	HD	522	BWS
25123	21/2	HD	522	BWS
70420	3	HD	570	BWS
70421	3	HD	570	BWS
29130	4	HD	524	CBS
29130	6	HD	524	CBS
29131	4	HD	524	CBS
29131	6	HD	524	CBS
29133	1	HD	524	CBS
46064	12	HE	543	CCW
46202	12	HE	543	CCW
46203	12	HE	543	CCW
46751	3	HD	543	CCW
46754	3	HD	543	CCW
46754	3	HD	543	CCW
46830	3	HD	543	CCW
46832	3	HD	543	CCW
46832	3	HD	543	CCW
66380	4	HD	561	CDS
66380	4	HD	532	CDS
50485	1	ED	522	CFS
50486	1	HD	522	CFS

LINENO	SIZE	SPEC	PID	SYS
88680	22	HE	582	DFD
88681	22	HE	582	DFD
88682	24	HE	582	DFD
88683	24	HE	582	DFD
88685	1	HE	582	DFD
88685	12	HE	582	DFD
88685	1	HE	582	DFD
88686	12	HE	582	DFD
88827	21/2	HC	582	DFD
88891	4	HC	582	DFD
88892	3	HC	582	DFD
88894	4	HC	582	DFD
88895	3	HC	582	DFD
25023	3/4	GD	522	DHS
20027	3	GD	522	DHS
25026	16	GD	522	DHS
25088	3	GD	522	DHS
25093	3/4	GD	522	DHS
25094	3/4	GD	522	DHS
27403	3	GD	522	DHS
27404	3	GD	522	DHS
27828	3	GD	522	DHS
27829	3	GD	522	DHS
88388	3	HD	593	DMW
88392	3	HD	593	DMW

LINENO	SIZE	SPEC	PID	SYS
30921	4	EA1	532	FWS
30922	4	HE	522	FWS
30925	4	EA1	532	FWS
30926	4	EA1	532	FWS
31824	6	DB	533	FWS
31826	6	DB2	532	FWS
32120	20	DB	532	FWS
32121	20	DB	532	FWS
32124	20	DB	532	FWS
32125	8	DB	532	FWS
32126	8	DB	532	FWS
32132	8	DB	532	FWS
32133	20	DB	532	FWS
32133	30	DB	532	FWS
32134	20	DB	532	FWS
32135	8	DB	532	FWS
32139	12	DB	532	FWS
32140	14	DB1	532	FWS
32140	20	DB1	532	FWS
32140	20	DB1	532	FWS
32141	14	DB1	532	FWS
32141	20	DB1	532	FWS
32141	20	DB1	532	FWS
15071	1	HD	561	HES
15077	2	HD	561	HES