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MK-ENVIRONMENTAL SERVICES
A DIVISION OF MK-FERGUSON

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INTER-OFFICE CORRESPONDENCE

3843-MK/H-910-0003

100-BC-1

TO: Distribution

DATE: November 15, 1989

FROM: Eric Oden *Eric Oden*

LOCATION: Richland, WA

SUBJECT: Site Visit on November 9, 1989

On the afternoon of November 9, 1989, Don Sanders (MK-ES), John Cogan (MK-ES), Susan Evans (MK-ES), Dan Sloan (MK-ES), and Randy Klein (Rogers and Associates) joined Jim Hartley (BPNL) and an escort from Westinghouse for a tour of the 100 B/C area at Hanford. At the site we met Bob Richards, a long-time employee at the area. We were allowed to leave the van and take a walking tour of some of the area, although we were not allowed in any of the buildings. Mr. Richards conducted the tour. Because of the high winds, it was difficult to hear Mr. Richards some of the time and, because of the number of people in the group, it was not a good time to ask in-depth questions. The tour was, however, valuable.

The purpose of this report (Attachment A) is to summarize what was said in draft summaries from the attendees and to highlight areas of disagreement or further areas of investigation. In addition, certain problems were noted on the map we had. Those problems are also contained herein.

The list of facilities listed in this report are not a complete listing of the facilities on the site, but merely those which we happened to discuss. I suggest that this report be used as a basis for a list of questions to ask Bob on the November 28 site visit. Map problems can also be addressed at that time.

Attached are the copies of the draft summaries from attendees (Attachment B).

DISTRIBUTION:

- Steve Wilhelm
- Phil Rogers
- Don Sanders
- John Cogan (without Attachment B)
- Susan Evans (without Attachment B)
- Dan Sloan (without Attachment B)
- Randy Klein (without Attachment B)



ATTACHMENTS

0003917

ATTACHMENT A**Effluent Lines****Summary:**

The original line from the B Reactor was 48" concrete with compression joints and was buried approximately 20' below grade. The original line leaked badly and was abandoned in place. The replacement for that line was a stainless steel line approximately 4-5 feet in diameter, which apparently also leaked. At some point(s), the line from the B Reactor was cross-connected to the line from the C-Reactor. One cross-connection was directly east of the B-reactor. The connection was made at an expansion box of some sort and reportedly leaked badly. There may have been another cross-connection in the area of the 107-B Basin. This may have been done at a later time to divert the water from the B reactor to the 107-C Basins because of the leakage in the former.

Questions:

1. How many cross connections were there? When and where were they built?
2. Is there a document which accurately locates the location construction details, and construction date for each effluent line, including the original concrete lines.
3. Is it possible to provide flow information, including waste composition, quantity, and dates?

107-B and 107-C Basins and Outfalls

Summary:

The 107-B Basin, made of concrete and 20 feet below grade, has been destroyed and buried in place. It reportedly leaked severely and effluent was, at one time diverted into 107-C. The 107-C Basins also had problems because of the hot water on cold days. Because of the leakage and the amounts of water, the contamination probably goes deep below the basins.

Each Basin had an outfall to the Columbia River. They were pipes leading under the River and discharging to the center. There was a third outfall said to be the outfall for support facilities. It apparently discharged down a spillway on the bank of the river which still exists.

In addition to the outfalls there was an overflow trench from 107-C which was used over the entire life of C Reactor--until 1969.

Questions:

1. There is some confusion concerning the outfalls. Clarify the source and construction of each of the three, along with date of use.

Pluto cribs

Summary:

There were apparently two Pluto Cribs: one for the B Reactor, and one for the C-Reactor.

The former has been incorrectly located until a recent discovery of the correct location. The correct location is marked with a metal plate bearing the date 1952 and other noted locations are incorrect. It was used for approximately two years in the early 1950's. After a cladding failure, water was flushed through the cells for a period of time. That water was drained to the Pluto Crib through a fire hose out of the back of the reactor building. The Pluto Crib was named after the type nozzle on the fire hose through which the water drained. Although it has been reported that the cribs were constructed with railroad ties on the sides, Richards does not remember seeing this form of construction.

The C Pluto Crib or "Big Pluto Crib" was located east of the C Reactor near the tracks.

Questions:

1. Verify that there were two Pluto Cribs and pin down the dates on each.

Dummy Decontamination and Waste Disposal

Summary:

Dummy fuel cells were pushed into the reactor ahead of and behind the actual cells to insure that the actual cells were correctly placed in the reactor. After use, the dummies were decontaminated with chromic and/or nitric acid. The cleaning took place in the eastern portion of the Reactor Building and the resultant solution was drained to a crib, probably 116-B-4, via underground stainless steel piping. Dummies which did not meet spec after use were buried in "silos", probably 118-B-4.

Questions:

1. Was the decontamination accomplished using chromic acid followed in the same process by nitric acid, or was chromic acid discontinued at some point in time and nitric acid substituted?
2. Does the term "silos" refer to cribs?
3. Are there any "silos" not marked on our map?

Tritium Facilities

Summary:

The tritium facilities were located in the area north of the B Reactor building. They were demolished in 1981-1982. Reportedly there was large quantity of mercury in the buildings (app. 1,000 lb.). The mercury was disposed of in the 200 areas upon the demolition of the tritium facilities (mercury was also used in the instrumentation in the reactor buildings). The tritium was stored as a liquid, presumably under pressure.

Questions:

1. What was the use of the mercury other than instrumentation?
2. Where were the buildings themselves disposed of?
3. What buildings were in the area and are they on the map we have?
4. What other information is available regarding the history and use of these buildings?

Ponds

Summary:

There have been ponds constructed to hold the water from the reactor basins. They were unlined and were built in 1986-1987. Some water was "released" from the ponds before a change in regulatory requirements necessitated the cessation of "release".

Questions:

1. Were there only two ponds, one for each reactor?
2. What were the characteristics of the water put into them?
3. What is meant by "release"?
4. Has all of the water percolated or evaporated?
5. What was the regulatory change?

B Reactor Stack and Associated Facilities**Summary:**

The stack and associated facilities were built to remove air from the buildings. Filtering was added in 1960.

Questions:

1. What contaminants would have been present in the emissions from the stacks and in what amounts both before and after the filtering.
2. Is our map correct in its depiction of this area?

C Reactor Water Towers

Summary:

There are two large water tanks near the C Reactor. They were to be used as the "last-ditch" cooling system in case everything else failed.

Questions:

Miscellaneous Comments

1. Near the east-west road at the north edge of the site by the river was a concrete slab approximately 2' X 6' in size. Richards said it may have been part of the septic system. Precisely what is it?
2. Where were the septic tanks and sanitary sewerage lines?
3. In the same area and immediately north of the road were a two or three parallel ridges running beside the road. The ridges were grassed over and were approximately 6" high and 30' north of the road at a spacing of at least 3 feet.

Map Discrepancies

1. The recently constructed ponds are not shown on the map.
2. Structures 110-B, 115-B, 116-B, 117-B, and 119-B are not shown on the map, but are listed in the Building List. They may be part of the B Reactor building at the south end.
3. The Tritium Facilities do not appear on the map.
4. None of the cross ties for the effluent lines are shown.

Trip Notes - Tour of 100 B & 100 C Areas - 11/9/89

1. Jim Hartley would like us to coordinate our efforts with the engineers from Spokan (company name?) who are assessing the 100B area.
2. The cooling water lines for the B reactor leave the structure heading east. They were originally constructed of concrete with compression joints. That pipe leaked badly. That pipe was removed in place, and an additional stainless steel pipe (pipelines) was constructed in another trench? The expansion box" leaked badly, and the contaminated water probably ran down the trenches.
3. There is a burial ground in B Area for the "dummies", or spacers that were used to keep the "slugs" in the active portion of the reactor. At one time the dummies were coated with chromic acid, later with nitric acid. Contaminated "balls" are buried at B area.
4. The plant crib, east of B reactor, collected contaminated flashing water after a cladding failure.
5. Retention basins and outfalls. The B retention basins (C also?) leaked badly. Each had an outfall line, as did the support facilities. The support facilities line was probably contaminated also (25' deep?).
6. In B area, the Tritium flashing room was decommissioned and buried.

Trip Notes - Tour of 1/9/99 continued

7. At C area, east of N-S fence, east of reactor. The pluto crib is outside the fence (to the east). The water was sand filtered on its way to the pluto crib.
8. C Area miscellaneous. 10,000 gallon tanks. There may be 2 in old basins.

100 - BC Site Visit Notes

Guide: Bob Richards

Attendees: Jim Hartley - BPNL

- Steve - WHC
- Don Sanders - MKES
- John Cogan - MKES
- Swan Evans - MKES
- Dan Sloan - CH2M-HILL
- Randy Klein - Rogers Associates

Time: 1:30 - 3:30, Nov. 9, 1979

Effluent Lines

From Reactor B to B retention basin:

- Originally concrete, 20" deep
- Changed to stainless steel & joined by C Reactor lines at junction box located East of B reactor
- original line from B reactor proceeded due North to B retention basin
- when B basin leaked badly, new lines were placed to tie into C-effluent line & into C-retention basin
- Leakage has occurred at the B/C line junction box & all along line

Dummies Disposal -

- Non fuel slugs placed in either end of fuel rods
- Usually re-used after decantamination w/ acid wash
- Acidic washwater was diverted into a Dummy Decantamination Crib (116-B-4) located about 400 ft. ~~west~~ of B reactor Bldg.
- Some dummies were buried on-site in sites in area north of reactor (118-B-4).

B- Crib

- Non-engineered structures
- supposedly side slopes lined w/ railroad ties & excavation filled w/ sand & gravel
- location on site map may not be accurate

Project <u>BEMD</u>	Contract No. <u>2843</u>	File No. _____
Feature <u>R/FJ Work Plan</u>	Designed <u>D. Sanders</u>	Date <u>10/9/89</u>
Item _____	Checked _____	Date _____

Photo Crib

- used for disposal of contaminated water from fuel element ruptures ~ 1950
- ruptured fuel tubes were drained & washed out for a few hours

Tritium Facility

- located about 70's ft. N. of B Reactor Bldg.
- Building was demolished & disposed of in place in 1981/82
- contained large amounts of mercury
- ~~the~~

Mercury

- used extensively for instruments in reactor bldg.
- large amounts in tritium lab (1000 lbs.)

Drilling problem in area - large boulders near surface, to depth of 10-20 ft.

B Stack Filter - not installed until 1960

Outfalls : (from west to east)

- 1) From support facilities (non-contaminated)
 - discharged onto river bank
- 2) Effluent from B Basin
 - discharged into middle of river
- 3) Effluent from C Basin
 - discharged into middle of river

C overflow Trench

- contain significant contamination / leakage
- unlined basin
- used for entire life of C Reactor, until 1969

Sources of Data

- 1) WID data sheets
- 2) 946 Documents (from both DRC area)
 - accurate data on liquid & solid waste (from B area only)



Project DEMO
Feature RI / FS Work Plan
Item _____

Contract No. 3847
Designed D. Sanders
Checked _____

File No. _____
Date 11/2/89
Date _____

C-Pluto Cris

- v. contaminated material
- mostly waste water produced from fuel exam facility at C reactor, beginning 1952 →
- plutonium

Old Fuel in Reactor Holding Tanks

- contained in most reactor buildings

No. Employees

- . Gen. - 20-25 at each reactor site
- . only 6 persons inside reactor bldg.

12/8/79

Memo

To: Files
 From: J. Cojan

Subject: Field Inspection - 100 B/C SITE

1. Introduction

This memorandum records notes taken during the inspection of the 100 B/C reactors site. The trip was taken in the afternoon on Nov. 9, 1989.

2.0 Notes

- There are archives for the 100 B/C site with detailed records of operations. These records are extensive.
- The 105-B Effluent lines were 48" concrete pipes buried 20 ft below ground surface. These lines leaked badly.
- Later the connected B Effluent lines were 1100 lines were 105-C Effluent lines which were 48 or 50" dia stainless steel lines. To make the connectors they built a connector's box

east of
 behind the B-plant with two valves.
 Then they ran a line from the plant
 to the box and from the box directly
 east to the 105-C Effluent line where
 they tapped in. The "tap in" leaked
 badly.

- The original lines are all still in place. You can enter them.

- The 107-B cooling pond leaked badly. At present it is buried under gravel. The concrete can be reached at ^{approximately} 20 ft ^{below the} ~~from~~ surface.

- The location of ^{the effluent} lines is not totally clear ~~at~~ near river. ~~There~~ Tie ins between ponds exist

- There were some problems with tanks holding hot water. This is not clear. With three tanks two were being filled while other was empty. Heat shock at -20°F air temperatures affected welds which resulted in leaks.

In the reactor, ^{fuel} cells were pushed in horizontally. First dummies were put ^{the fuel rods} in, then Uranium cells and finally more dummies. These dummies were out from time to time and had to be decontaminated and disposed of.

- Decontamination took place in the back of the back ~~the building~~ ^{reactor} part of the building. Wash the part, wash it in chromic acid, and then in nitric acid. Mark them and check dimensions to see if they could go back into reactor. If not they were thrown out.

- Sometimes balls got into the reactor tube holes by accident.

- Acid solutions were piped to disposal ^(cribs) sites. Pipes were buried in ground and are still there.

- Pluto crib was active for ^{approximately} ~~say two~~ years 1950-52. It was used for disposal of ^{contaminated water from} captured ^{elements}. Liquids were run in a fire hose out the back of the reactor ~~to~~ building to the crib.

All tubes at B reactor went in the reactor horizontally. Cooling water holes sometimes had problems as tubing ruptured. Also end caps may have been damaged. Often they flush a tubing out under 20" of head. Water went to a crib & using fire hose. This practice was stopped.

- Mercury was used in the tritium process. There was a tritium loading plant. Tritium was placed in dual walled containers, the inner wall being copper.
- Mercury was also used in instruments (manometers) in the plant. No spills were recorded? But much was around.
- For the tritium mercury was used as a carrier? This I don't understand... was it ~~also~~ the tritium dissolved in mercury.
- The stack was mainly to remove air from the reactor building... air, dust, gaseous contaminants.
- Where was the tritium plant.

- In the cooling basins Richards believes contaminants go deep under the basins. "Very bad leaks" existed.

- Outflow pipes were extended to the middle ~~of~~ of the river.

- Overflow trenches active to take overflow from cooling ~~for~~ basins. There is "a lot of good stuff" in them.

- Soil is bouldery making drilling difficult. ~~There~~ Boulders on surface are up to 3.0 ft in diameter. Some are basalt and others granitic.

- Area is flat

3.0 Reflections

We need to talk to Richards ~~again~~ again. Evidently many small operating problems existed. A key element is to get a feel for what these problems were, how they were ~~addressed~~ remedied and where spills might be that are not recorded. Also the exact locations of

cuts and trenches may not be so accurate as shown on the drawings. Surveying is definitely needed to pin down areas of spills.

John Ly

P.S. . At the C reactor they had two large water tanks filled with pure water. Were ~~these~~ these tanks used as reserve water to cool reactor in case of a problem with cooling system?

9513347-1240
John - This is what I remember from the

Site visit —
Q

Notes from 11/9/89 Site Visit

Visit led by Bob Richards, ret.

The tour of the B reactor area was much more extensive than the tour of the C reactor. At the B reactor we were able to get out of the van and walk around and look at the locations of several different units. At the C reactor we only had time to look at the "pond" on the east side of the reactor, and did not have time to discuss effluent lines, piping, and other units very much.

1) Effluent lines from B reactor to basins

- a) Original line was concrete, leaked heavily, not used very long once leaks were discovered they replaced it the line was 20 feet below grade
- b) Second effluent line from B reactor to basin B-107 was constructed of stainless steel, this line also leaked somewhat along the welds, and was not used very long the line was 20 feet below grade

For some period, this second effluent line was tied into the effluent line from the C reactor to the 107C basins. It apparently went at a right angle to the C line just south of the C107 basins (on the map, there is a septic tank at about where Richards said the tie in line was.

- c) Due to problems with leakage from B107, effluent water from B reactor was re-routed a 2nd time and went into the C cooling basins via a stainless line to a junction box about 50 yards east of the B reactor. The junction box leaked like a sieve. (We need to be sure we have the dates that each of these lines were operable, flow rates would also be nice) The line (and presumably the junction box) was 20 feet below grade

2) Pluto Crib

- a) there is a "Pluto Crib" located on the east side of the reactor, across from the road, this location is marked with a plaque dated 1952. According to Richards, the cribs were only used up until 1952, and he seems to remember this as a crib. He said he had not seen the railroad tie construction that is discussed in the historical engineering documents, and seemed to think that several cribs were constructed without the ties, in spite of what the engineering documents say. Richards said that this location was the true

location, and is different than the location described in historical documents, including Dorian and Richards, 1078

This was called a pluto crib because that was the name of the nozzle used to attach to the hose. When there was a fuel cladding failure, the fuel housing for the failed rod would be isolated and water would be pumped through that cell for "several Hours" this water was drained into the pluto crib via a firehose. From what Richards said about "head" and low flow rates, it sounded to me like this was drained or pumped at a fairly low flow rate from the reactor into the crib.

3) Decon waste disposal crib:

A crib to the east of the B reactor building, past the road.

This sounds like nasty chemical waste as well as rad waste. The dummy fuel elements were deconned in a chromic acid bath prior to insertion into the reactor, and again after being pulled from the reactor. Chromic acid was changed to nitric acid at some point in time.

Waste was piped from the east end of the B reactor building to the crib via stainless steel lines. I don't remember if he gave us the depth of this line. If he did, John C. Has it .

4) Tritium building, Hg, and associated stuff

Pointed out tritium building, to the northwest of the B reactor building. Said there was over 1000 lbs of Hg used in the process, I am not clear on how it was used. He said it was shipped to the 200 area for disposal when things were decommissioned.

Tritium crib: I asked Richards how the tritium was stored in this crib (references say it's in a steel container, but I wasn't clear on what physical state it was in) Richards said in liquid form. I'm not sure if this means liquid hydrogen or water.

5) Pond:

Pond to the east of the B reactor building was used to store water from the reactor basin prior to "release" they "released" some water, and then regulatory criteria

The pond was unlined, this activity occurred in 1986/87, apparently during the decommissioning process. The ponds were unlined. Richards says there is documentation of these activities, but didn't give me any report names, etc.

6) BASINS

Brief drive past 107 B and 107 C basins and outfalls. The concrete has been removed from the 107 B basin. The bottom of this basin was 20 ft below grade. Most of information Richards gave us on basins confirmed historical data so I did not take separate notes

a) Outfalls:

There are 3 outfalls: the 107 B outfall (concrete structure still exists), the 107C outfall, and the overflow trench outfall. Not clear if structures still exist for either of the last 2 mentioned.

Piping from the basin to the outfalls is 20 ft below grade, goes to river bank, then under river bed, actual discharge was in the center of the river.

107 B basin Spillway from effluent line coming from basins into outfall was contaminated, structure still exists, is marked with yellow posts

7) C Reactor tour

Pluto Crib (116C2?) Big Pluto Crib, "Hot", this crib was large, and filled from a Weir. Not a lot of detailed discussion here

8) Pond: As with B area, an unlined pond was dug in 1986/87 for water from the reactor basins. Some of this water was released. Remaining water stayed in ponds. Not clear if water still in ponds or if it has percolated and evaporated away.

To: SUSAN EVANS

From: E. Oden

Notes ON site Visit

11/9/89

1. MAP DISCREPANCIES

- A. The recently-constructed ponds are NOT SHOWN
- B. STRUCTURES 110B, 115B, 116B, 117B, 119B ARE LISTED ON THE MAP BLDG LIST, BUT NOT SHOWN ON THE MAP ITSELF. I think they ~~go~~ ARE ^{AT} the south end OF B-REACTOR & THE DRAWING IS INACCURATE.
- C. CROSS TIES - PRESENT & HISTORIC - between waste lines ARE NOT SHOWN.
- D. several sites ON the MAP are NOT ON the building list.

2. Questions & COMMENTS.

- A. I thought Bob said that the 100 B-C BURNING pit WAS EAST OF B-^{REACTOR} EAST OF C REACTOR, NOT IN the Northeast corner.
- B. As we drove east along the northern edge of the site, there was a concrete block or slab (APP. 2' x 8') ON the ground. Bob said it "might" be part of the septic system.
- C. IN the SAME AREA, to the north of the road were grassed-over ridges. The ridges were approximately 3' APART, 6" high and ran parallel to the road. There were 2-4 of them. Could be indicative of activity in

the area. Could also be nothing.

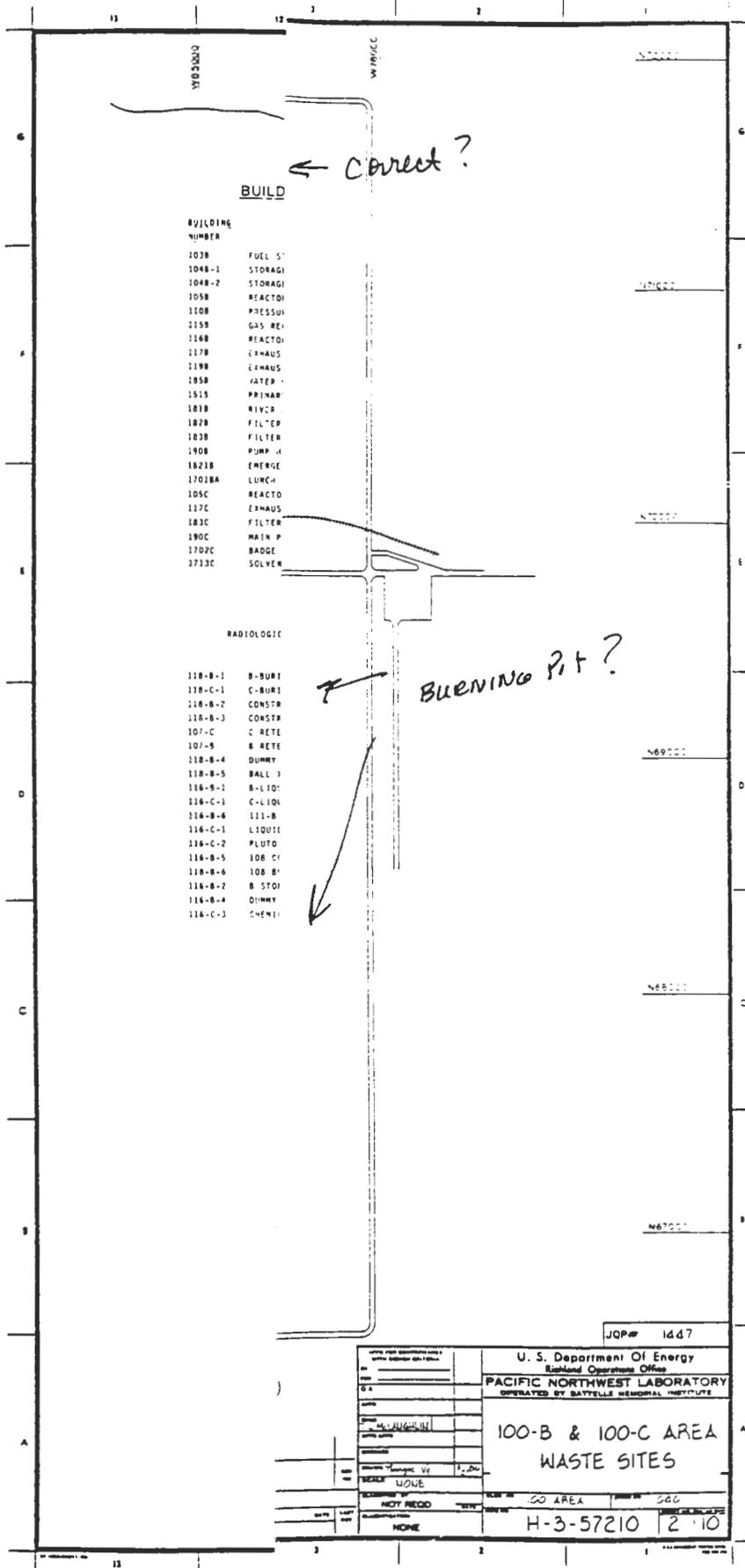
- D. Bob talked about silos "all over the place". I believe he said they were 30' deep. Is he referring to 118-B-4 or 118-B-6 or neither? Where are the others?
- E. The tritium storage facilities (where the "1,000 lb." of mercury existed) don't appear to be marked on the map.
- F. I thought that Bob SAID that the recently-found Pluto-crib was the correct location as opposed to the staked-off area next to it. The map shows 116-B-3 in the same general location, but 116-B-3 is not in the Building List. There is a larger area in the C area identified as Pluto crib. It is the last area we looked at. Was there a Pluto crib for each reactor? Where are they?
- G. What does Bob mean when he says he CAN'T "release" the ponds?
- H. Bob said there was a lot of leakage at water line junctions.

9513347.1945

I. Precisely where was the septic/sanitary
sewerage system?

J.

outfall



BUILD

BUILDING NUMBER

- 103B FUEL S
- 104B-1 STORAGE
- 104B-2 STORAGE
- 105B REACTOR
- 110B PRESSUR
- 115B GAS REI
- 116B REACTOR
- 117B EXHAUS
- 119B EXHAUS
- 125B WATER
- 151S PRIMAR
- 181B RIVCR
- 182B FILTER
- 183B FILTER
- 190B PUMP H
- 1821B EMERGE
- 1701BA LUNCH
- 105C REACTO
- 117C EXHAUS
- 183C FILTER
- 190C MAIN P
- 1702C BADGE
- 1733C SOLVER

RADIOLOGIC

- 118-B-1 B-BURT
- 118-C-1 C-BURT
- 118-B-2 CONSTR
- 118-B-3 CONSTR
- 107-C C RETE
- 107-B B RETE
- 118-B-4 DUMMY
- 118-B-5 BALL J
- 118-B-1 B-LIQ
- 118-C-1 C-LIQ
- 118-B-6 111-B
- 118-C-1 LIQUID
- 118-C-2 PLUTO
- 118-B-5 10B CY
- 118-B-6 10B B
- 118-B-7 B STOI
- 118-B-4 DUMMY
- 118-C-3 CHEM

JQP# 1447

U. S. Department Of Energy Regional Operations Office	
PACIFIC NORTHWEST LABORATORY OPERATED BY BAYTELLE MEMORIAL INSTITUTE	
100-B & 100-C AREA WASTE SITES	
DATE	10/20/50
BY	W. J. ...
REVISION	NONE
NOT RECD	100 AREA 580
INDEX	H-3-57210 2-10

100-BC-1

PF
3.5

**The Washington State Dept. of Ecology
U.S. Environmental Protection Agency
U.S. Dept. of Energy**

*invite you to comment on the
100-BC-1 Operable Unit Work Plan.*

The Work Plan outlines activities to be performed on the waste disposal facilities associated with the decommissioned B and C reactors at the Hanford Site.

**The 30-day public comment period begins
March 19 and ends April 18, 1992.**

Under the Tri-Party Agreement, interested citizens are given the opportunity to review and comment on documents pertaining to the cleanup of Hanford.

Copies of the document are available at:

Portland State University
SW Harrison and SW Park
Portland, OR

**For more information or to
send written comments, write to:**

Paul Day, Project Manager
U.S. Environmental Protection Agency
712 Swift Suite 5
Richland, WA 99352

0003990