ORNL/TM-13093

ornl

OAK RIDGE NATIONAL LABORATORY

LOCKHEED MARTIN

Deactivation of Building 7602

H. R. Yook
J. R. Barnett
T. L. Collins
S. C. Jackson
B. E. Lewis
K. E. Plummer
C. N. Brantley

MANAGED BY
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

UCN-13673 (36 6-95)

ORNL/TM-13093

DEACTIVATION OF BUILDING 7602

H. R. Yook
J. R. Barnett
T. L. Collins
S. C. Jackson
B. E. Lewis
K. E. Plummer
Robotics and Process Systems Division

C. N. Brantley
Office of Radiation Protection

Date Published — October 1995

Prepared by the
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831
managed by
Lockheed Martin Energy Systems, Inc.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

CONTENTS

ACKNOWLEDGMENTS

Building 7602 deactivation was sponsored by the DOE Office of Nuclear Energy. The deactiviation project was a team effort involving the authors, staff from Robotics & Process Systems Division, and many other ORNL organizations. The contributions of Waldo Evans and Roy Buhl, who both retired in December 1994, are appreciated. Mr. Evans organized and led the team that conducted the process operations and shut down activities in October, November, and December 1994. His dedication and enthusiasm helped the team complete that critical phase of the project safely and on schedule. Mr. Buhl, as Division Radiological Control Officer, provided strong support for the planning and performance of the processing and material transfers.

Special thanks go to the team who carried out the process operations, transferred process materials out of the systems, removed wastes from the facility, offered constructive and innovative suggestions, and above all, completed the work safely and on schedule. The team members were the authors, Curtis Fitzgerald, Rick Hobson, Mike McClung (Analytical Services), and Dennis White (Oak Ridge Research Institute). We also appreciate the support for the shut down of control and instrumentation systems provided by Ron Harris [Instrumentation and Controls Division (I&C)], Tom Mitchell (I&C), Jim Moore (I&C, retired), Pat McGrady (I&C), and Glenn Upton. The technical support and guidance provided throughout this project by Ben Lewis, Ken Plummer, and Carol Scott were essential to the safe and effective performance of the deactivation and are appreciated. Appreciation also goes to Cathy Williams for preparing this report, and to Lisa Kyker for her editing support.

ABSTRACT

The Department of Energy (DOE) has sponsored research and development programs in Building 7602 at Oak Ridge National Laboratory (ORNL) since 1984. This work focused on development of advanced technology for processing nuclear fuels. Building 7602 was used for engineering-scale tests using depleted and natural uranium to simulate the nuclear fuel.

In April 1994 the DOE Office of Nuclear Energy (NE) sent supplemental FY 1994 guidance to ORNL stating that in FY 1995 and beyond, Building 7602 is considered surplus to NE programs and missions and shall be shut down (deactivated) and maintained in a radiologically and industrially safe condition with minimal surveillance and maintenance (S&M). DOE-NE subsequently provided FY 1995 funding to support the deactivation activities.

Deactivation of Building 7602 was initiated on October 1, 1994. The principal activity during the first quarter of FY 1995 was removal of process materials (chemicals and uranium) from the systems. The process systems were operated to achieve chemical solution concentrations needed for reuse or disposal of the solutions prior to removal of the materials from the systems. During this phase of deactivation the process materials processed and removed were:

Uranyl nitrate solution	30,178 L containing 4490 kg of uranium
Nitric acid (neutralized)	9850 L containing less than 0.013 kg of uranium
Organic solution	3346 L containing 265 kg of uranium
Uranium oxide powder	95 kg
Miscellaneous chemicals	

At the end of December 1994, the process systems and control systems were shut down and deactivated.

Disposition of the process materials removed from the process systems in Building 7602 proved to be the most difficult part of the deactivation. Significant effort was devoted to finding ways to recycle and reuse these materials. An operational stand down and funding reductions at Y-12 prevented planned conversion of the uranyl nitrate solution to depleted uranium oxide powder. This led to disposal of the uranyl nitrate solution as waste .

Preparations for S&M of Building 7602 included corrective maintenance such as replacement and repair of roof sections, relocation of several critical gages to locations outside the radiological buffer area, and preparation of a procedure for S&M. S&M was formally initiated in April 1995 and continued through September 1995.

Building 7602 was deactivated on schedule and within budget. The facility was placed in a safe and environmentally sound condition that requires minimal S&M. Estimated S&M costs for FY 1996 and beyond were reduced on the basis of the conditions achieved by deactivation and S&M experience during the second half of FY 1995.

1. INTRODUCTION

1.1 BACKGROUND

Building 7602 was originally constructed in 1963 as a Reactor Service Building for the Experimental Gas-Cooled Reactor (EGCR). The EGCR project was terminated during construction in 1965, and the reactor was never fueled or operated.

In 1974 the Liquid Metal Fast Breeder Reactor Fuel Recycle Program was formed in the Chemical Technology Division (CTD) at Oak Ridge National Laboratory (ORNL). The initial program staff moved into Building 7601 in November 1974 with plans to use Buildings 7602 and 7603 as test facilities, and the program was subsequently renamed the Consolidated Fuel Reprocessing Program (CFRP). The program separated from CTD in 1981 and became the Fuel Recycle Division while retaining the original CFRP programmatic role.

Congress authorized a $16-million line-item project in 1979 [the Integrated Equipment Test (IET) Project] to modify Building 7602 for the CFRP. The project sponsor was the Department of Energy (DOE)—Nuclear Energy (NE). From 1981 through 1983, Building 7602 modifications, additions, and the installation of process and remote equipment were accomplished under the IET project, preparing the facility for development and testing of advanced reprocessing and remote systems technology.

Separations process and equipment development and testing were initiated in Building 7602 in 1984 under DOE-NE sponsorship. The principal materials used in the processes were depleted and natural uranium, nitric acid, and organic solution (dodecane, a normal paraffin hydrocarbon, and tributyl phosphate). Process and equipment development and testing continued for 10 years (through FY 1994). During the first 3 years, the work was fully sponsored by DOE-NE. DOE-NE then formed a collaborative program with the Power Reactor and Nuclear Fuel Development Corporation (PNC) of Japan. From 1987 through 1994, funding for the program was provided jointly by DOE-NE and PNC.

In April 1994 DOE-NE sent supplemental FY 1994 guidance for the CFRP stating that in FY 1995 and beyond, Building 7602 is considered surplus to NE programs and missions and shall be shut down and maintained in a radiologically and industrially safe condition with minimal surveillance and maintenance (S&M). The guidance also stated that every effort should be made to support and solicit "Work For Others" that may be carried out independent of NE involvement in the facility. Cost estimates for shutdown and S&M of Building 7602 in FY 1995 were provided to DOE-NE, and DOE provided funds totaling $701,000 for that purpose.

1.2 METHOD

Building 7602 deactivation, including S&M, was set up as a project to be performed in FY 1995. Detailed planning for the project was completed in September 1994, and work was initiated

on October 1, 1994. Project subtasks were:

Supervision: Management of all project tasks and funds

S&M preparations: Preparation of an S&M procedure, and relocation of necessary controls and instrumentation

Process materials removal: Removal of uranium oxide powder, nitric acid, uranyl nitrate solutions, organic solution, and other chemicals from the process systems; performance of sampling and analyses necessary to meet acceptance criteria; disposition of these materials for either reuse or disposal as waste; removal and disposal of wastes associated with deactivation of the facility

S&M activities: Performing routine S&M activities according to the Building 7602 S&M procedure

Corrective maintenance: Performing corrective maintenance (primarily roof repair) to ensure safe and environmentally sound conditions for S&M

The S&M preparations and process materials removal tasks were initiated October 1, 1994, and were performed in parallel. The S&M preparations tasks were completed in March 1995. The process materials were removed from the systems and tanks in Building 7602 by December 30, 1994, except for the nitric acid, which was held in tanks until June 1995.

S&M activities were initiated in April 1995 and continued through September 1995. Corrective maintenance [primarily re-roofing the Integrated Process Demonstration (IPD) portion of Building 7602] was performed in August and September 1995.

2. FACILITY DESCRIPTION

Building 7602 (see Fig. 1) is a test facility located in the Robotics and Process Systems Complex at the east end of the ORNL site. It is constructed of steel frame, concrete block, and metal siding and contains 15,841 sq ft of usable floor space. The entire facility is a radiological buffer area (RBA) and has designated contamination areas within the buffer area due to depleted uranium contamination.

The building has three levels designated as the basement level, the mezzanine level, and the first (or ground) floor level. The primary entry to, and egress from, the building is on the first-floor level. Each of these levels is described as follows:

Basement:	An area of 1379 sq ft bounded approximately by column lines C, D, 2, and 4 (see Fig. 2), called the Dissolver Pit.
Mezzanine:	An area of 6776 sq ft bounded approximately by column lines A, D, 2, and 5 (see Fig. 3), which includes the Dissolver Pit, the IPD Transmitter Room, and the IPD Basement.
First Floor:	An area of 7686 sq ft with a Chemical Makeup Room bounded approximately by column lines 3, 5, and A and a line 30 ft north of column line A; a high-bay area (IPD High Bay) bounded approximately by column lines A, B, 2, and 7; and another high-bay area (includes the Dissolver Pit, Feed House Area, and adjacent floor spaces) bounded approximately by column lines B, D, 2, and 5 (see Fig. 4).

The IPD High Bay in Building 7602 has a 25-t capacity bridge crane which can travel the full length and width of the bay. The crane has a maximum hook height of 30 ft. This crane is operational and has remote controls which allow "swing-free" operation.

The other high-bay area in the south portion of Building 7602 is served by a bridge crane with a 20-t overall capacity which has two 10-t hoists on trolleys. The crane has a maximum hook height of 48 ft. This bridge crane also serves adjacent Building 7603. Also, a lower manipulator bridge provides remote maintenance capability to both this high-bay area of Building 7602 and adjacent Building 7603.

All areas of Building 7602 contain engineering-scale processing equipment which was used for development of advanced reprocessing technology using centrifugal contactors. Most of this equipment is contaminated with depleted and natural uranium on the interior surfaces with some spot contamination on exterior surfaces.

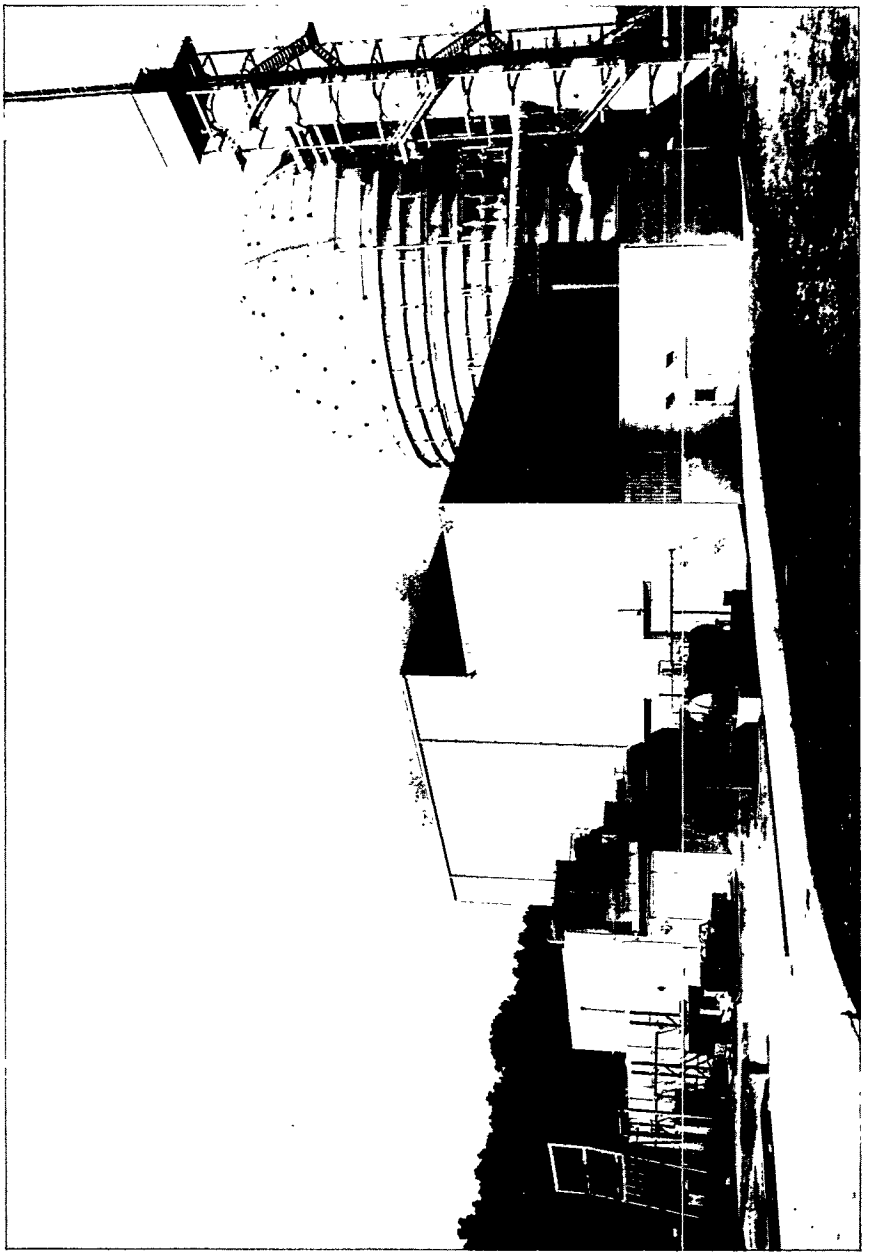


Fig. 1. Building 7602.

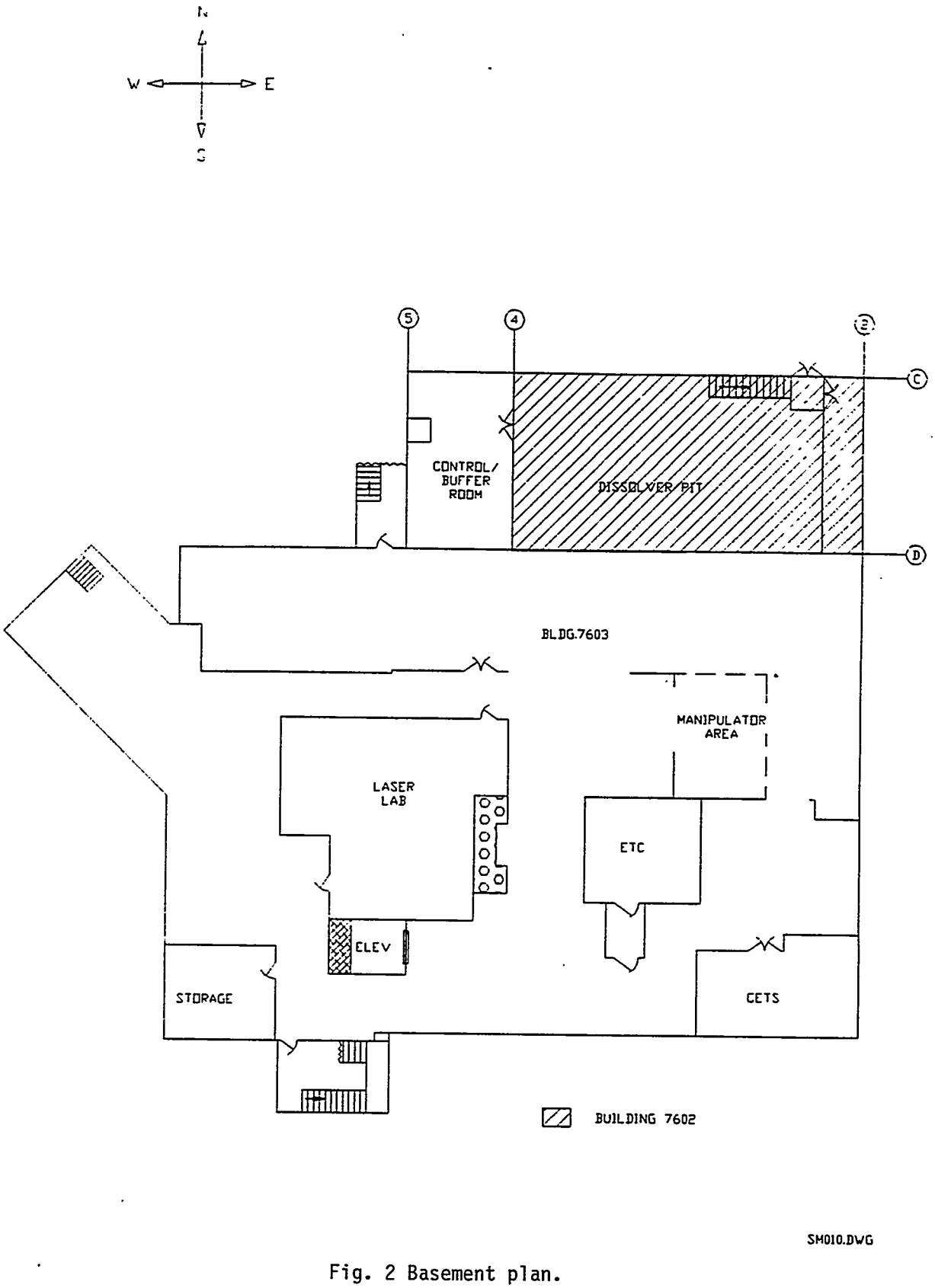


Fig. 2 Basement plan.

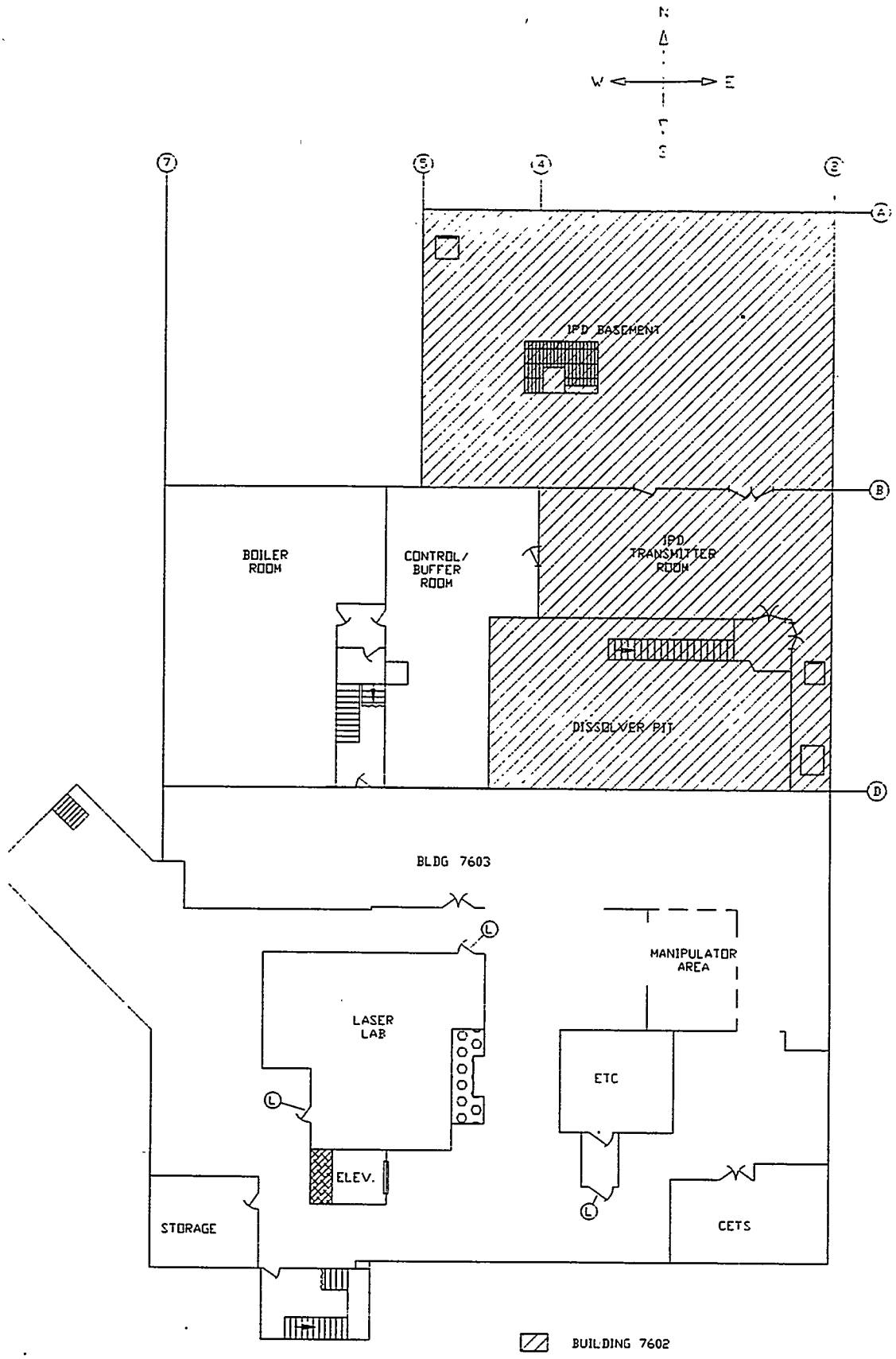


Fig. 3 Mezzanine plan.

SM009.DWG

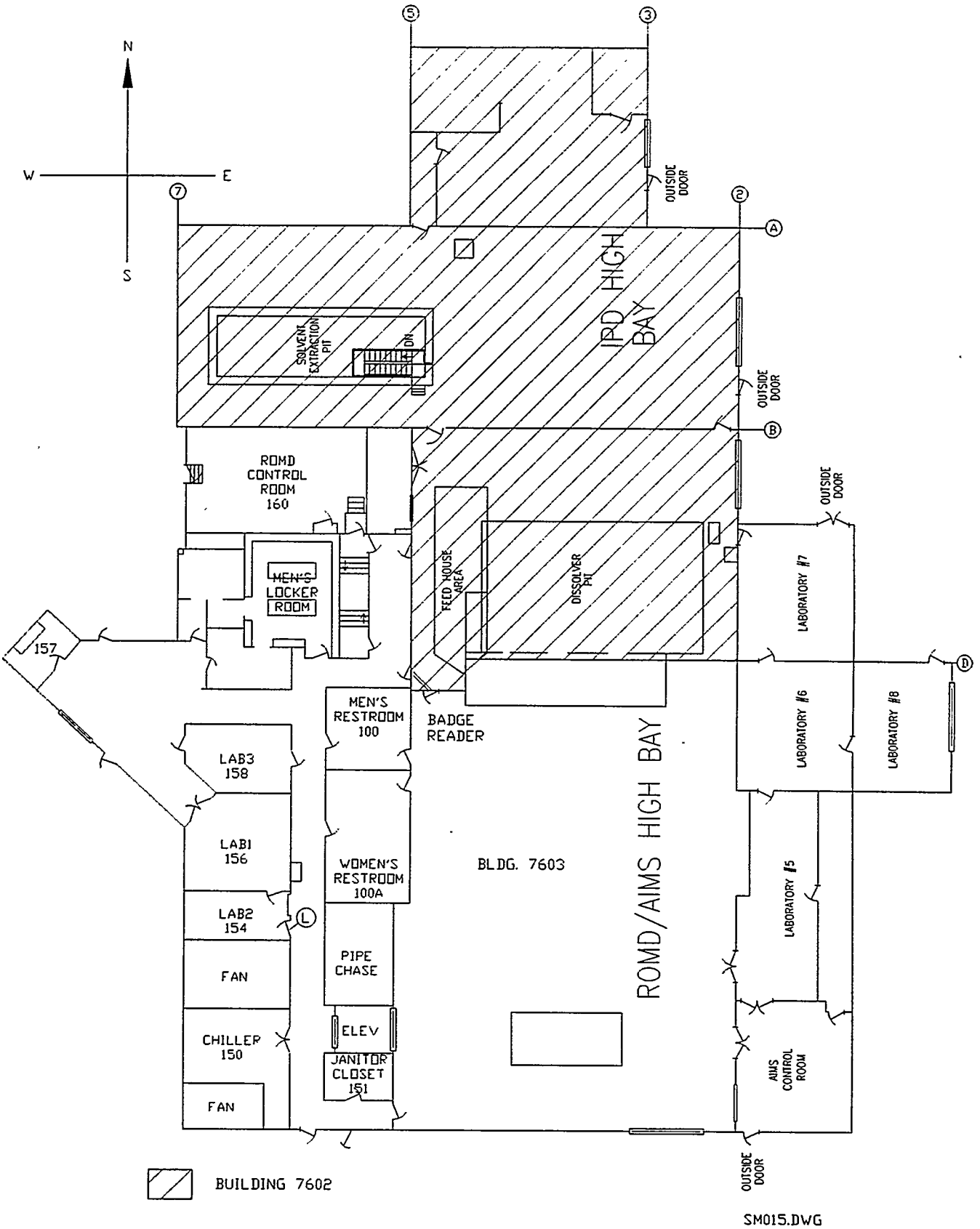


Fig. 4 First floor plan.

3. DEACTIVATION ACTIVITIES

3.1 TERMINATION OF PROGRAM ACTIVITIES

In FY 1994 process and equipment development testing was being conducted for PNC of Japan. This worked was funded jointly by DOE-NE and PNC, and concluded seven years of involvement with the DOE/Japan Collaborative Program. Active test runs were completed in August 1994, and the process systems were placed in a "safe standby" condition. Data obtained from the test runs was compiled, documented, and transmitted to PNC during August and September 1994, and the test program was formally terminated on September 30, 1994.

3.2 URANIUM REMOVAL AND DISPOSITION

3.2.1 Uranium Oxide Powder

In FY 1993 RPSD had an inventory of 24,060 kg of uranium oxide powder. Most of this powder was stored in 35-gal drums, but some (about 95 kg) was stored in a feed house in Building 7602. The division recognized that this amount of uranium powder would not be needed for future process development activities and initiated actions to reduce the inventory. In August and September 1993, 16,359 kg of powder (containing 13,854 kg of uranium) was transferred to the Y-12 Plant. This powder was placed in storage at Y-12 for future use.

In August 1994, 7620 kg of powder (containing 6477 kg of uranium) was transferred to the Y-12 Facility for storage and future use.

In September 1995, 95 kg of powder (containing 81 kg of uranium) was transferred to ORNL waste operations for disposal. This transfer reduced the uranium inventory to 10 kg, the amount estimated to be in Building 7602 in the form of contamination on facility surfaces and on the inside surfaces of the process systems and equipment.

3.2.2 Encapsulated Fuel Pins and Assemblies

Encapsulated fuel pins and assemblies containing uranium had been used in the process development program to test head-end operations (e.g., shearing, transfer of sheared fuel to a dissolver, and continuous dissolution of the sheared fuel rods). In July 1995, the remaining unused encapsulated fuel pins and assemblies (containing 1697 kg of uranium) were transferred to ORNL waste operations for disposal.

3.3 PROCESS MATERIALS REMOVAL AND DISPOSITION

3.3.1 Uranyl Nitrate

As a result of process development testing of the dissolution system over a number of years, the

inventory of uranyl nitrate solution in the storage tanks in Building 7602 reached the maximum capacity limit in early 1994. In order to continue test operations, this inventory had to be reduced. In May 1994 about 5000 L of uranyl nitrate solution was concentrated to about 450 g/L and transferred from the process systems to 55-gal polyethylene-lined steel drums. The drums of solution, containing a total of 2330 kg of uranium, were transferred to the Y-12 Facility for conversion to uranium oxide powder and future use.

When the process systems were placed in "safe standby" in August 1994, the systems contained approximately 30,000 L of uranyl nitrate solution containing approximately 4000 kg of uranium.

3.3.1.1 Concentration

On October 1, 1994, process operations were initiated to concentrate the uranyl nitrate solution in tank 11FO1. The Y-12 Plant had agreed to take the uranyl nitrate solution and convert it to oxide powder for re-use. Y-12 specified that the solution should be concentrated to the highest achievable concentration, preferably in the range of 500-g/L uranium.

The final concentration operations were conducted in October, November, and December 1994. A uranyl nitrate solution of 30,178 L concentrated to a final volume of 11,434 L. The concentrated solution contained 3966 kg of uranium. The uranyl nitrate solution was sampled and analyzed daily throughout the concentration operations. Analytical results provided data on the concentration of uranium in the solution in various parts of the process systems.

3.3.1.2 Transfer to Drums

When a batch of uranyl nitrate solution was concentrated to the level specified by Y-12, that batch was transferred to 55-gal polyethylene-lined steel drums. The first FY 1995 transfer of solution to drums was completed on October 18, 1994, and the transfers continued periodically through the end of December 1994. A total of 67 drums were filled with uranyl nitrate solution; 60 of those drums contained high-concentration solution which met the Y-12 concentration criteria, and the last 7 drums contained lower concentration uranyl nitrate solution resulting from the flushing of the process systems.

3.3.1.3 Disposition

On November 2, 1994, RPSD sent a letter to Y-12 requesting that Y-12 process the uranyl nitrate solution, convert it to oxide powder, and provide long-term storage for the oxide powder.

On December 7, 1994, six drums of the highly concentrated uranyl nitrate solution were transferred to Building 3019 at ORNL for direct use in processes carried out in that building. No further processing of the solution was necessary for this use. The six drums contained 1042 L of uranyl nitrate solution with 560.6 kg of uranium.

On December 8, 1994, RPSD was notified by Y-12 Depleted Uranium Operations that due to a stand down of all operations at Y-12, transfer of the uranyl nitrate solution from Building 7602 could not be accepted before October 1995. RPSD then placed the remaining 61 drums of uranyl nitrate solution in the Chemical Makeup Room for storage as an "In-Process Storage Material." That room can be isolated from the rest of the facility and has a stainless steel-lined floor which drains directly to stainless steel tanks on the mezzanine level of Building 7602.

On February 28, 1995, RPSD submitted a waste disposal request for the 7 drums of low-concentration uranyl nitrate solution. In March 1995 samples were obtained from the 7 drums . The samples analysis results, received on April 28, 1995, indicated that the material in the 7 drums met

the criteria for disposal via the West End Treatment Facility (WETF) at Y-12. The sample analysis results are on file with waste disposal records. On May 2, 1995, the seven drums of low-concentration uranyl nitrate solution were transferred to Y-12 Waste Operations for disposal via the WETF.

On May 3, 1995, Y-12 Depleted Uranium Operations called to advise RPSD that due to budget cuts, the facility which would have been used to convert the uranyl nitrate solution to oxide powder would remain shutdown and would not be restarted in FY 1996. As a result, Y-12 would not be able to accept the uranyl nitrate solution from Building 7602. This was confirmed via electronic mail on May 10, 1995.

From May through July 1995 RPSD, with help from DOE-Oak Ridge Operations, pursued and evaluated a number of options for conversion and re-use of the uranyl nitrate solution, including conversion to oxide by commercial firms. None of these options were viable, partly due to the high cost of processing and handling the solution.

On July 31, 1995, the remaining 54 drums of highly concentrated uranyl nitrate solution were declared waste and a request for disposal was submitted to ORNL Waste Operations. This uranyl nitrate solution is classified as a Resource Conservation and Recovery Act (RCRA) waste due to corrosivity and to the quantities of chromium and lead present in the solution. The drums of solution must be removed from Building 7602 within 90 d (by October 29, 1995).

3.3.2 Nitric Acid

On October 1, 1994, the process systems in Building 7602 contained approximately 1900 L of 8.2-*M* nitric acid contaminated with uranium. This acid had been used in the process operations as recycled nitric acid.

3.3.2.1 Stripping

The nitric acid was processed in conjunction with the uranyl nitrate concentration operations discussed in Sect. 3.3.1. As uranyl nitrate solution was concentrated by heating in tank 11FO1, nitric acid evaporated from the solution. This acid was collected in tank 32FO1 and was then processed through an evaporator (32C06) and a fractionator (32E15). The uranium content of the recycled nitric acid was reduced to less than 2 μg/mL by these operations. The recycled nitric acid was sampled and analyzed daily during the stripping operation to determine the uranium content.

3.3.2.2 Transfer to Tanks

During October and November 1994 about 6300 L of 7.5-*M* nitric acid was transferred to two acid storage tanks: 4500 L were stored in tank M-2, and 1800 L were stored in tank 90F29. At the same time RPSD conducted a search to determine if other Energy Systems organizations could take the acid for re-use. In November 1994 the Waste Management and Remedial Action Division (WMRAD), which was considering a use for the nitric acid, sampled the acid and had a comprehensive analysis done. The analytical results indicated that the acid was free of uranium ($< 2\mu$g/mL) and that it contained some metals. The quantity of two metals (chromium and mercury) was above the RCRA waste classification limits, making the acid a potential RCRA waste. WMRAD was unable to use the acid due to the content of total organic carbon.

3.3.2.3 Disposition

On December 21, 1994, RPSD discontinued its attempts to find a use for the recycled nitric acid and submitted a Request for Disposal to WMRAD. The acid was then designated as stored product under RCRA and could remain in the storage tanks for 90 d (until March 20, 1995).

WMRAD was planning to send the acid to Y-12 for treatment (neutralization) at the Central Pollution Control Facility (CPCF) and disposal via bio-denitrification at the WETF. On March 10, 1995, the WMRAD learned that the CPCF was shut down for repairs and would not be back in service in time to process the acid. Y-12 also advised WMRAD that the initial analyses for the nitric acid did not include analyses of polychlorinated biphenyls and fission products. There are limits on both of these items in the WETF acceptance criteria. These events made it clear that the waste nitric acid could not be removed from the storage tanks before the 90 d RCRA allowance expiration date of March 20, 1995.

On March 10, 1995, WMRAD contacted the ORNL Office of Environmental Compliance and Documentation (OECD) about the RCRA waste situation. OECD advised WMRAD that a variance could probably be obtained from the State of Tennessee which would allow ORNL to keep the acid in the storage tanks for an additional 90 d (through June 19, 1995). However, after the variance period there would be no further relief from the RCRA regulations.

On March 13, 1995, all involved parties met to develop an action plan. Decisions from that meeting were:

1. OECD would request a variance from the State of Tennessee.

2. RPSD would neutralize the acid by adding 50% sodium hydroxide solution to the acid storage tanks, increasing the volume to about 8700 L.

3. WMRAD would obtain the additional analytical data required by the WETF.

4. RPSD and WMRAD personnel would inspect the acid storage tanks daily during the 90-d variance period.

5. WMRAD would arrange for a tank truck to transfer the acid to WETF after it had been neutralized.

6. If the waste acid was not accepted by WETF, RPSD would transfer it to drums.

These actions were completed on schedule with the exception of transferring the waste acid to the WETF. On May 2, 1995, analytical results for fission products were received which indicated that the acid contained small quantities of plutonium and neptunium. Since the presence of these materials was not known by the current staff in the RPSD facilities, a second analysis was requested to confirm the results. At the same time, RPSD searched its records for the depleted uranium used in the facility to determine if it could have been the source of the plutonium and neptunium. The second analysis confirmed the original results. The records search revealed that some of the depleted uranium used in the facility had been supplied by National Lead of Ohio and had contained trace quantities of fission products. Evaluation by the RPSD Process Technology Section further indicated that most of the trace plutonium and neptunium should have been retained by the nitric acid during years of recycling in the process systems. All analytical results for the nitric acid are on file with waste disposal records.

On May 16, 1995, WETF determined that it could not accept the nitric acid for disposal due to the plutonium and neptunium content. On May 22, 1995, RPSD began transferring the nitric acid from tanks M-2 and 90F29 to 55-gal drums. The transfer, including flushing both tanks, was completed on May 31, 1995, and 53 drums were filled with a total volume of 9850 L of acid. On June 9, 1995, WMRAD removed the 53 drums of neutralized acid from Building 7602.

3.3.3 Organic Solution

3.3.3.1 Removal

During the process operations described in Sect. 3.3.1.1, 3346 L of organic solution containing 265 kg of uranium were removed from the process systems in Building 7602. The organic solution was primarily a mixture of tri-butyl phosphate and dodecane (a normal paraffin hydrocarbon). The solution was sampled and analyzed during the process operations to determine the uranium content.

3.3.3.2 Transfer to Drums

As the organic solution was removed from the systems it was transferred to 55-gal drums. A total of 18 drums were filled. The last drum was filled on December 30, 1994.

3.3.3.3 Disposition

Numerous options for disposition of the organic solution were evaluated during October and November 1994. There were no options for re-use of this material. On December 19, 1994, an agreement was established between RPSD, WMRAD, and the Toxic Substance Control Act (TSCA) Incinerator Operations to dispose of the organic solution as a waste via the TSCA Incinerator. The drums were sampled, and analytical results for the samples showed that the material met acceptance criteria for the TSCA Incinerator. The analytical results are on file with waste disposal records. On May 24, 1995, the 18 drums of organic solution were removed from Building 7602 and sent to the TSCA Incinerator for disposal.

3.3.4 Miscellaneous Chemicals

The process systems in Building 7602 contained about 200 L of sodium carbonate solution containing trace amounts of uranium. On October 28, 1994, the carbonate solution was transferred to tanks containing uranyl nitrate solution where it reacted with the excess nitric acid to form water, sodium nitrate, and carbon dioxide in the uranyl nitrate solution. The water was removed through evaporation during concentration of the uranyl nitrate solution.

Small quantities of chemicals in various small containers were also removed from Building 7602. If the containers were unopened, the chemicals were transferred for re-use. The opened chemicals were sent to hazardous waste disposal.

3.4 TANK DRAINING AND FLUSHING

More than 60 tanks in the process systems were drained during deactivation of Building 7602. Where possible, the tanks were flushed and inspected after draining. A summary of the Building 7602 tank draining and flushing record is shown in Appendix A.

3.5 SOLID WASTE REMOVAL AND DISPOSITION

Building 7602 deactivation created both compactable and noncompactable solid low-level waste. This waste was generated by the process operations conducted to concentrate and remove process fluids from the systems as described in Sects. 3.3 and 3.4 and from removal of miscellaneous small contaminated components and trash from previous test operations. Removal of the process fluids, components, and trash was necessary to place the facility in a safe and environmentally sound condition, to minimize the potential for spread of contamination, and to minimize future waste generation in the facility during surveillance and maintenance. The solid waste removal also contributed to minimizing future S&M costs.

Approximately 20 B-25 boxes were filled with compactable and noncompactable solid low-level waste during Building 7602 deactivation. The waste containers were transferred to the WMRAD for disposal.

3.6 SYSTEMS SHUTDOWN

3.6.1 Process Systems

The process systems in Building 7602 were shut down as the process fluids were removed from the systems. Most systems were shut down to an inactive status by December 30, 1994. The systems shut down were:

- Feed station
- Dissolution
- Accountability and feed adjustment
- 0.5-t solvent extraction
- 0.1-t solvent extraction
- 0.24-t solvent extraction (Chemical Systems Test)
- Uranium product evaporation
- Organic treatment
- Dissolver off-Gas treatment
- NO_x off-gas
- Liquid waste treatment
- Chemical makeup

These systems were shut down according to procedure following operations to remove process materials. Valves were closed as necessary to place the systems in a safe condition and to prevent spread of contamination. If there is a need to reactivate these systems in the future, the reactivation should include:

- Detailed inspection, including valve position identification
- Equipment refurbishment or replacement as necessary
- Control system checks and inspection
- Review of procedures

- Pre-startup valve lineups
- Operational Readiness Review

3.6.2 Utility Systems

Utility systems which serve several facilities in addition to Building 7602 were isolated from Building 7602 by closed valves or opened electrical breakers. The process steam system is totally shut down and the boiler has been placed in long-term storage status under Plant and Equipment Division - Steam Plant procedures. The building ventilation system serving Building 7602 remained in operation to ensure that all ventilation air flow is into Building 7602 and is exhausted through a High Efficiency Particulate Absolute filter bank and a permitted stack. Operation of this ventilation system is an essential part of contamination control for Building 7602. The utility systems which remained operational but were isolated from Building 7602 were:

- Instrument and plant air
- Cooling water
- Chilled water
- Hot water
- Electrical
- Vessel off-gas

The location of closed isolation valves, and opened electrical breakers are shown in Appendix B.

3.6.3 Control System

The Distributed Data Acquisition and Control System and the Component Development Data Acquisition System, which provided control of the process systems in Building 7602, were shut down on December 31, 1994. The systems were shut down by (1) turning all local power switches to OFF; (2) turning the main circuit breaker on the CP5 Panel in Computer Room 259 to OFF; (3) disconnecting power from all Process Control Modules (PCMs), Converter Control Modules (CCMs), and Display Control Modules (DCMs) in the Buffer/Transmitter (B/T) rooms; (4) shutting off the breakers in Panel N in the B/T room; (5) shutting off the PCM, CCM, and DCM disable switches in the IPD Control Room; and (6) disconnecting the power plugs on all PCMs, CCMs, and DCMs in the B/T room.

Following the control system shutdown, several additional actions were performed to ensure that instrumentation associated with the control system would not deteriorate. The actions completed were (1) confirming all electrical power and instrument air supplies were shut off; (2) disconnecting instrument lines from instrument-to-process and process-to-instrument converters and capping the instrument line connections; (3) disconnecting all signal and address cables from PCMs, CCMs, and DCMs; and (4) energizing the units in an idle state by connecting power plugs and closing the necessary breakers.

3.7 DECONTAMINATION

Selected areas in Building 7602 were decontaminated during deactivation. These were primarily areas where system leaks had created a buildup of uranium powder on equipment or floors. These were cleaned up and decontaminated to reduce the potential for airborne contamination during S&M.

4. PREPARATION FOR SURVEILLANCE AND MAINTENANCE

4.1 CHEMICAL MAKEUP ROOM UNIT HEATER

The heating unit serving the Chemical Makeup Room was old, inadequate, and unreliable. Corrective maintenance was performed on the heater, and a second heating unit was added to supplement the original unit. Reliable temperature control in the Chemical Makeup Room is necessary to ensure that fire protection systems and cooling water lines do not freeze during cold weather.

4.2 VENTILATION SYSTEM GAGE

A pressure gage indicating differential pressure across the ventilation system filters was originally located in the IPD high-bay area within the RBA in Building 7602. This gage is checked daily to determine the status of the ventilation flow and filters. The gage was relocated to an area outside Building 7602 to eliminate the need to enter the RBA to check the gage reading.

4.3 TANK-LEVEL GAGES

Tanks 30F31 and 30F33 are large stainless steel tanks which collect liquids from the floor drains in Building 7602. These tanks are empty but will be in active service during S&M to collect and indicate any leaks which might occur in the facility. Two tank-level gages were installed in the B/T room (outside the RBA) to provide direct readout of the tank levels during S&M.

4.4 SURVEILLANCE AND MAINTENANCE PROCEDURE

A general procedure for S&M of Building 7602 (DIV-SM-CKS-018, Routine Surveillance and Maintenance Procedure for Building 7602) was prepared and issued by the RPSD Facility Operations group. This procedure defines the S&M activities required, the frequency of those activities, and responsibilities.

4.5 CORRECTIVE MAINTENANCE

Numerous corrective maintenance items were completed to prepare the facility for long-term S&M. The principal corrective maintenance item was repair and replacement of roofing on Building 7602.

A portion of the roof of Building 7602 is approximately 30 years old. The roof developed leaks which allowed rain water to enter the IPD high-bay area. Significant leaks occurred during heavy rains in December 1994 and June 1995. These leaks had the potential to cause spread of contamination to "smear clean" walk aisles and, if not controlled, could have caused contamination to spread outside the RBA. The 30 year-old section of the roof was replaced, and other potential leaks were repaired during September 1995.

5. SURVEILLANCE AND MAINTENANCE

S&M of Building 7602 was initiated in April 1995 and continued through September 1995. It was conducted according to the procedure described in Sect. 4.5. Experience during this period provided information which supports a reduction of the estimated S&M activity frequencies and costs for FY 1996 and beyond. An estimate of future S&M costs is shown in Appendix C.

6. COSTS

The total budget for Building 7602 deactivation was $701,000. All deactivation activities were accomplished within this budget. A comparison of planned vs actual costs for the principal deactivation activities is shown in Table 1.

Table 1. Planned vs actual costs for principal deactivation activities

Activity	Planned cost ($K)	Actual cost ($K)
Supervision	45	37.8
S&M preparations	56	62.5
Process material removal	237	293.3
S&M	307	226.6
Corrective maintenance	56	80.7

7. FACILITY STATUS AND CONDITION AFTER DEACTIVATION

Building 7602 has been deactivated to a safe and environmentally sound condition. The process systems have been drained, some tanks have been flushed, and the process fluids and chemicals have been removed from the facility, although some residual process material remains on the inside surfaces of pipes, tanks, and other process equipment. Also, all waste materials and unused portable test equipment have been removed from the facility. A portion of the roof has been replaced, and other sections have been repaired. The potential for environmental insults has been minimized.

The entire building is an RBA with defined contamination areas. Contamination in the facility is in the form of depleted and natural uranium. Some of the contamination is on the inside surfaces of systems and equipment, and some is on floors and walls in the facility. Walk aisles throughout the facility are maintained "smear clean" to support cost-effective S&M. Some concern remains about the potential for airborne contamination as surfaces dry out; therefore, continuous air monitors are operating in two locations to provide indication of airborne contamination. Contamination survey diagrams for the facility are shown in Appendix D.

All process fluids and uranium (except that in contamination and residuals in the process systems) have been removed from the facility. Systems and equipment, with the exception of those necessary for environmental control, safety, and emergencies, have been shut down. Systems still operational are (1) ventilation, (2) fire protection sprinklers, (3) electrical, (4) heating steam, (5) safety showers and eye baths, and (6) cooling water headers which pass through Building 7602 to serve other facilities.

8. LESSONS LEARNED

Deactivation of Building 7602 was carried out as planned with the exception of removal and disposal of the process materials including uranyl nitrate solution, nitric acid, and organic solution. Finding ways to either recycle or dispose of these materials proved to be much more difficult and costly than expected. The sampling and analyses required to satisfy waste acceptance criteria were also much more time consuming and expensive than expected. A positive option for recycle of the uranyl nitrate solution through conversion to uranium oxide at Y-12 was eliminated by the Y-12 stand down and subsequent budget reductions. For future deactivation projects, the time and budget required to thoroughly characterize all potential waste materials should be included in the deactivation plans, even if there is a potential for re-use and recycle of those materials. This will substantially help the project to dispose of the materials in the best and most cost-effective way.

APPENDIX A
TANK DRAINING AND FLUSHING RECORD

Building 7602 - Process Tank Emptying Log

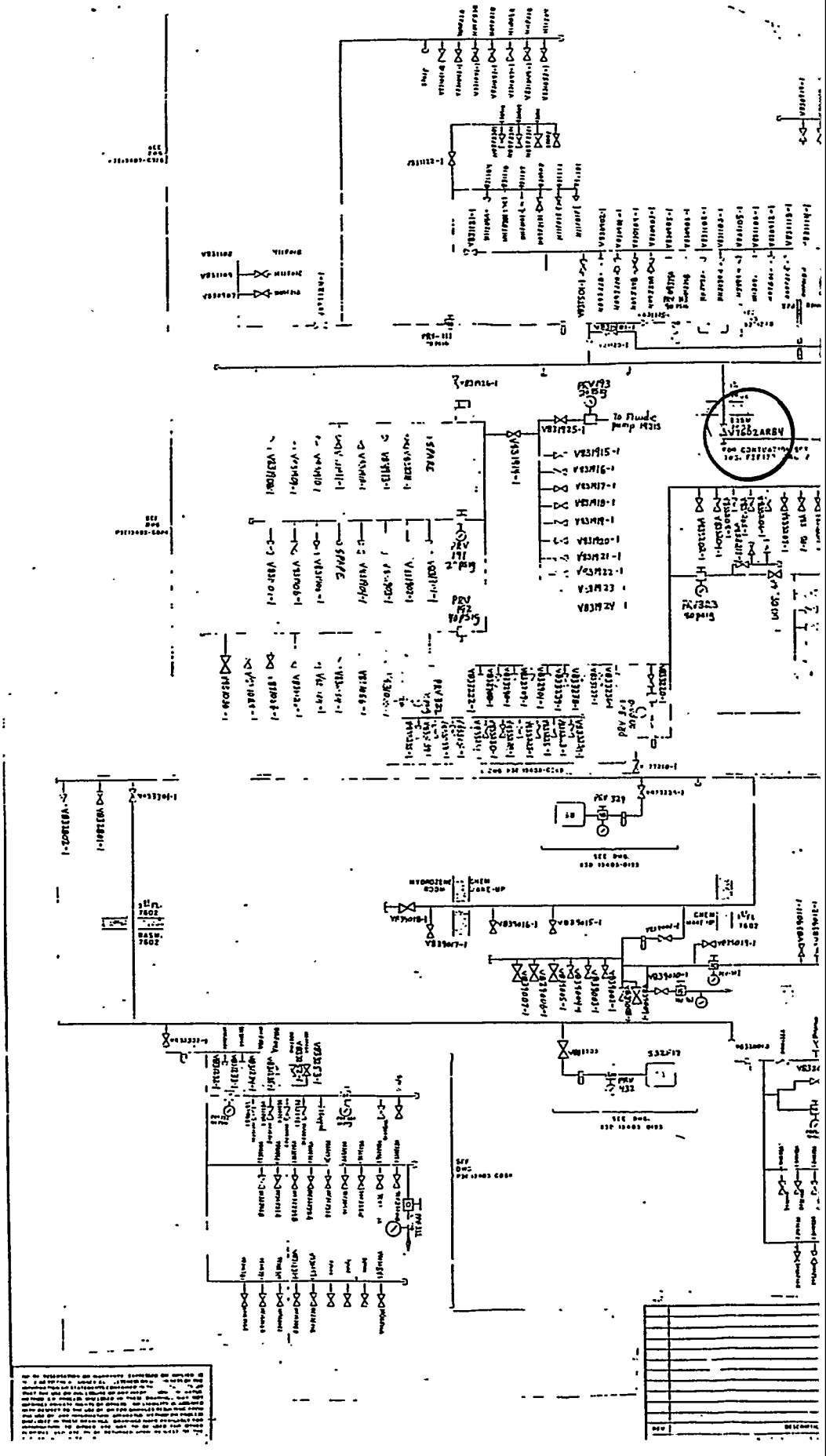
Tank No.	Original Tank Contents	Date Tank Emptied	Date of 1st Flush	Flush Method	Visual Inspection	Remarks
07F02	Uranyl Nitrate	10-Nov-94	Not Flushed		Not Possible	
07F03	Uranyl Nitrate	10-Nov-94	Not Flushed		Not Possible	
07F04	Uranyl Nitrate	10-Nov-94	Not Flushed		Not Possible	
07F12	Nitric Acid	10-Nov-94	Not Flushed		Not Possible	
09F21	Uranyl Nitrate	18-Nov-94	18-Nov-94	Water	Not Possible	
09F23	Uranyl Nitrate	18-Nov-94	18-Nov-94	Water	Not Possible	
11F01	Uranyl Nitrate	20-Dec-94	20-Dec-94	Water	Not Possible	
11F03	Uranyl Nitrate	20-Dec-94	20-Dec-94	Water	20-Dec-94	
11F10	Uranyl Nitrate	20-Dec-94	20-Dec-94	Dilute Nitric Acid	Not Possible	
12F05	Nitric Acid	20-Oct-94	Not Flushed		Not Possible	
12F07	Nitric Acid	20-Oct-94	Not Flushed		Not Possible	
14F03	Uranyl Nitrate	1-Nov-94	Not Flushed		Not Possible	
14F36	Organic	1-Nov-94	1-Nov-94	Water	1-Nov-94	
14F40	Uranyl Nitrate	1-Nov-94	1-Nov-94	Water	1-Nov-94	
14J13	Uranyl Nitrate	1-Nov-94	1-Nov-94	Water	Not Possible	
19C04	Uranyl Nitrate	18-Nov-94	Not Flushed		Not Possible	
19F01	Uranyl Nitrate	18-Nov-94	Not Flushed		Not Possible	
19F05	Uranyl Nitrate	18-Nov-94	Not Flushed		Not Possible	
19F07	Uranyl Nitrate	18-Nov-94	Not Flushed		Not Possible	
19F12	Nitric Acid	10-Nov-94	Not Flushed		Not Possible	Drained to 32F01
20F17	Organic/Uranium	29-Dec-94	Not Flushed		Not Possible	
20F22	Organic/Uranium	29-Dec-94	29-Dec-94	Clean Organic	Not Possible	
20G02	Organic/HNO_3/Uranium	27-Oct-94	Not Flushed		Not Possible	
20G06	Organic/HNO_3/Uranium	27-Oct-94	Not Flushed		Not Possible	
20G08	Organic/HNO_3/Uranium	27-Oct-94	Not Flushed		Not Possible	
20G12	Organic/HNO_3/Uranium	27-Oct-94	Not Flushed		Not Possible	
20G14	Organic/HNO_3/Uranium	27-Oct-94	Not Flushed		Not Possible	
20G28	Organic/HNO_3/Uranium	27-Oct-94	Not Flushed		Not Possible	
20L01	Organic/HNO_3/Uranium	27-Oct-94	Not Flushed		Not Possible	
20L07	Organic/HNO_3/Uranium	27-Oct-94	Not Flushed		Not Possible	
20L13	Organic/HNO_3/Uranium	27-Oct-94	Not Flushed		Not Possible	
20L20	Organic/HNO_3/Uranium	27-Oct-94	Not Flushed		Not Possible	
26E01	Nitric Acid	10-Nov-94	Not Flushed		Not Possible	
26F02	Nitric Acid	10-Nov-94	Not Flushed		Not Possible	
26F06	Nitric Acid	15-Nov-94	Not Flushed		Not Possible	
27E03	Uranyl Nitrate	27-Oct-94	Not Flushed		Not Possible	
27G09	Uranyl Nitrate	27-Oct-94	Not Flushed		Not Possible	
32C06	Uranyl Nitrate	27-Oct-94	27-Oct-94	Water	Not Possible	Flush water from 32F01 for rinse
32E15	Nitric Acid	6-Jan-95	Not Flushed		Not Possible	
32F01	Uranyl Nitrate	20-Dec-94	20-Dec-94	Water	Dec-94	
32F09	Uranyl Nitrate	20-Nov-94	Not Flushed		Not Possible	
32F11	Uranyl Nitrate	20-Nov-94	Not Flushed		Not Possible	
32F17	Nitric Acid	6-Jan-95	Not Flushed		Not Possible	Solution Pumped tp 90F29
32F20	Recycle Water	20-Dec-94	Not Flushed		Not Possible	Contained Recycle H_2O
32F24	Organic/Uranium	22-Nov-94	Not Flushed		Not Possible	
32F31	Uranyl Nitrate	Not Empty	Not Flushed		Not Possible	Uranyl Nitrate Removed....Using
32F33	Uranyl Nitrate	Not Empty	Not Flushed		Not Possible	for Water Collection
32F40	Uranyl Nitrate	26-Oct-94	27-Oct-94	Water	CLF	
32F42	Uranyl Nitrate	26-Oct-94	27-Oct-94	Water	CLF	
90F01	Nitric Acid	1-Nov-94	Not Flushed		Not Possible	
90F05	Nitric Acid	1-Nov-94	Not Flushed		Not Possible	
90F09	Nitric Acid	1-Nov-94	Not Flushed		Not Possible	
90F17	Recycle Water	1-Nov-94	1-Nov-94	Water	Not Possible	2nd Flush 1 - Nov - 1994
90F25	Recycle Water	2-Dec-94	Not Flushed		Not Possible	
90F29	Recycle Nitric Acid	31-May-95	31-May-95	Water	Not Possible	2nd Flush 31 - May - 1995
90F45	Recycle Water	1-Nov-94	Not Flushed		Not Possible	
90F49	Recycle Water	1-Nov-94	Not Flushed		Not Possible	
90F60	Recycle Water	6-Jan-95	Not Flushed		Not Possible	
92F01	Recycle Water	1-Nov-94	Not Flushed		Not Possible	
92F04	Recycle Water	1-Nov-94	Not Flushed		Not Possible	
92F06	Recycle Water	1-Nov-94	Not Flushed		Not Possible	
93F01	Recycle Water	1-Nov-94	Not Flushed		Not Possible	
Pulse Column	Organic/Uranium	11-Jan-95	Not Flushed		Not Possible	
M - 2	Nitric Acid	26-May-95	26-May-95	Water	Not Possible	2nd Flush 26 - May - 1995

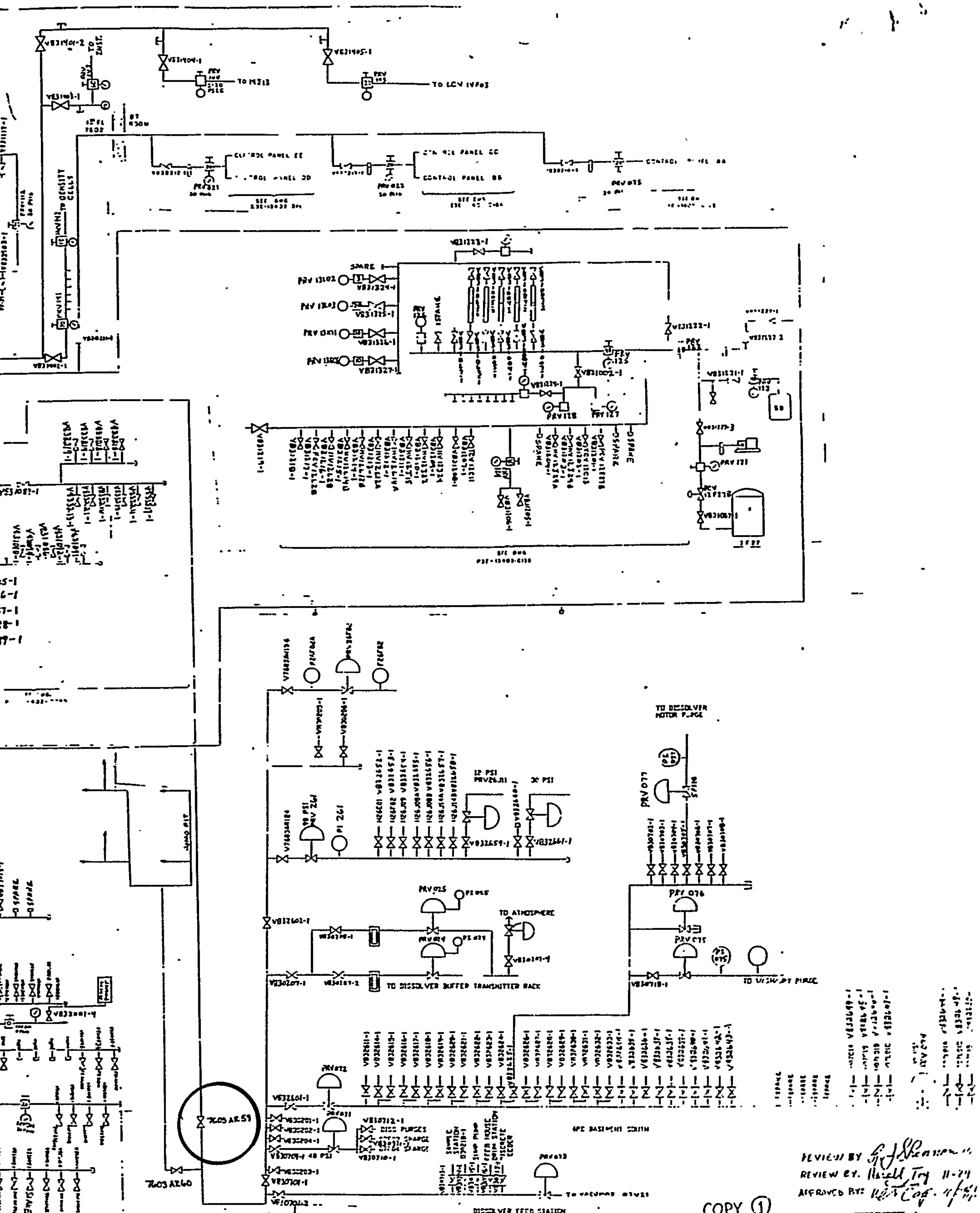
APPENDIX B
PROCESS AND INSTRUMENTATION DIAGRAMS

Instrument and Plant Air

Closed Valves

V7602AR84
V7603AR59





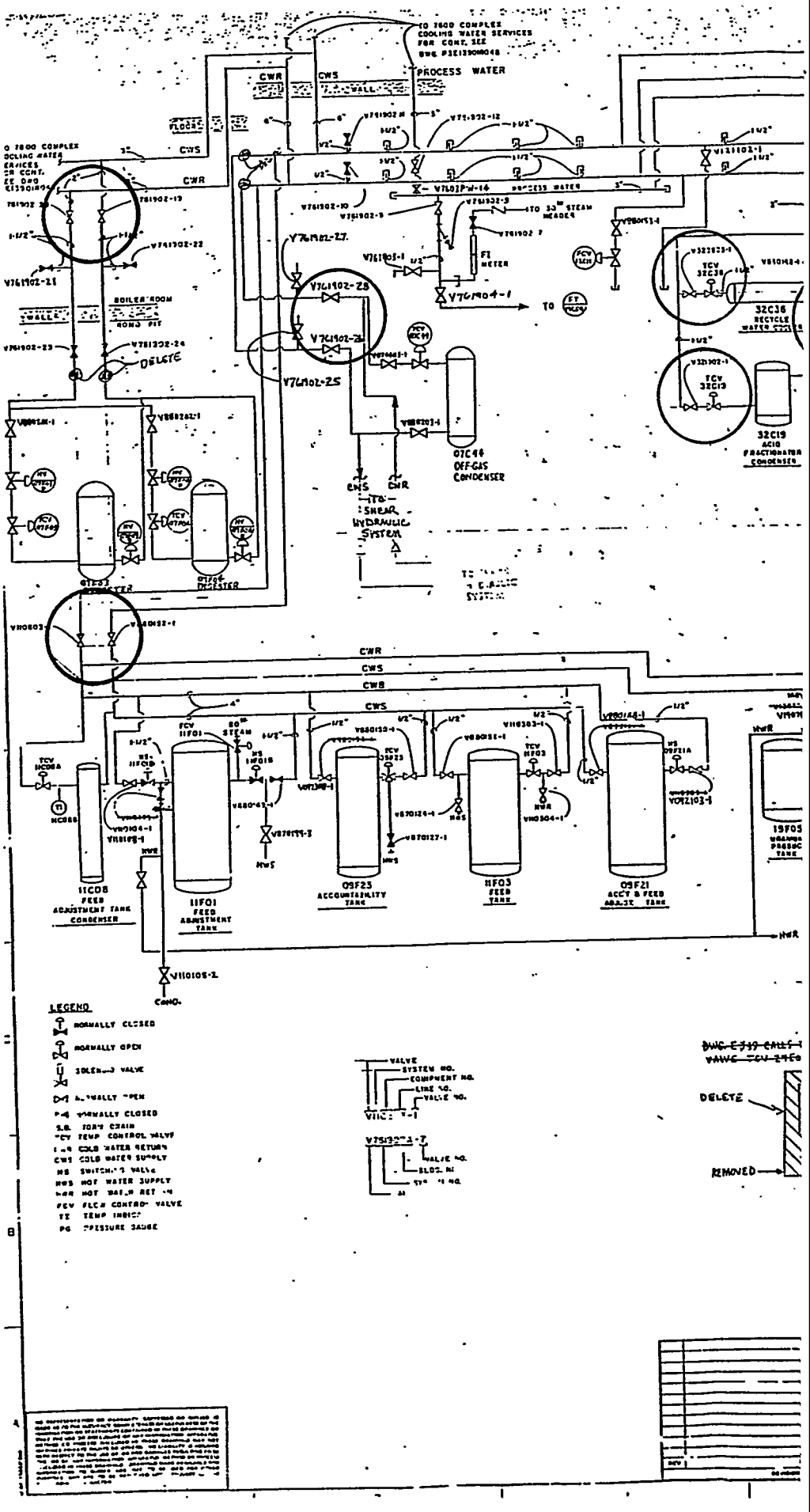
Instrument and Plant Air

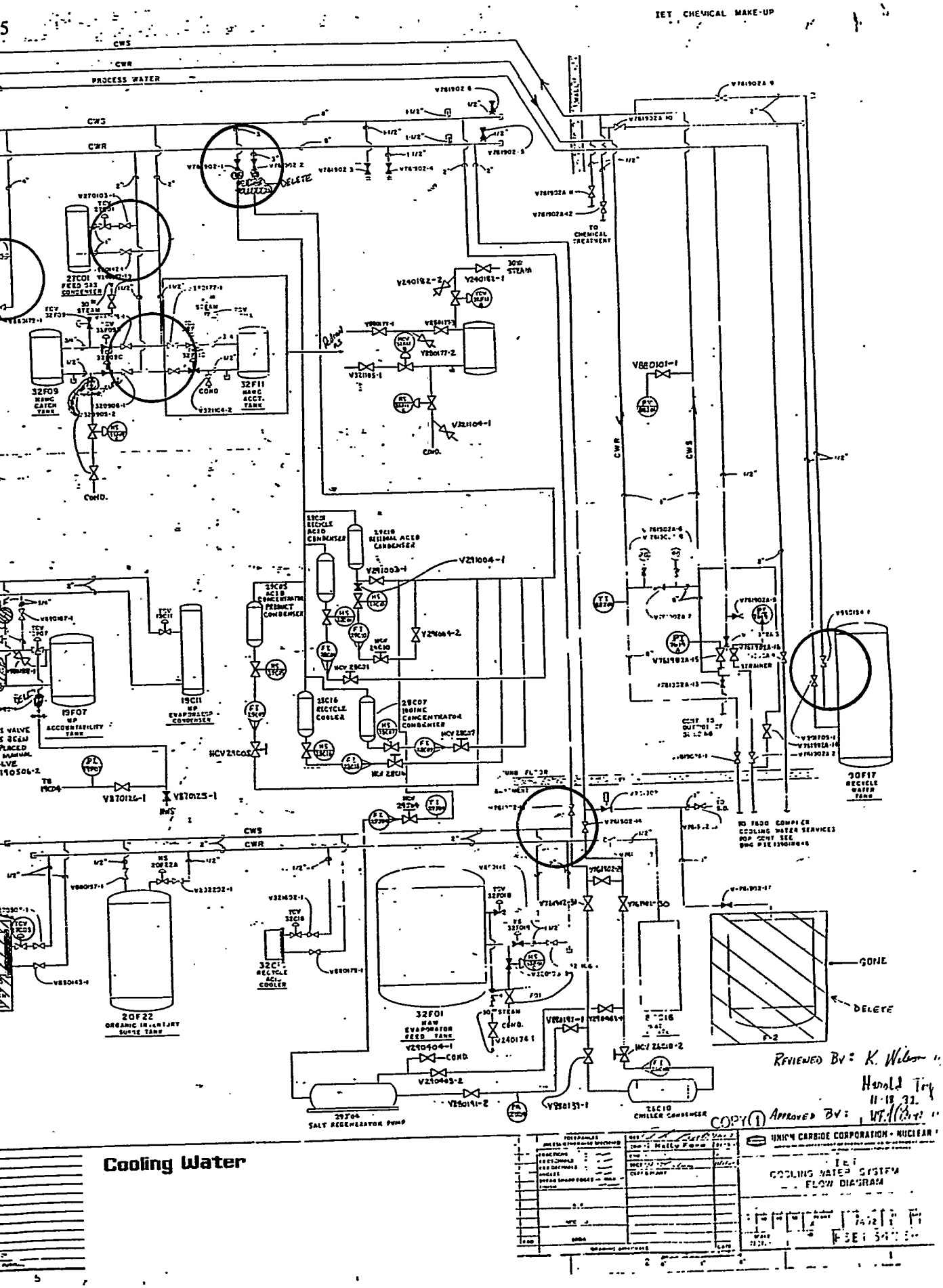
UNION CARBIDE CORPORATION - NUCLEAR DIV

INSTRUMENT & PLANT AIR FLOW DIAGRAM

Cooling Water

Tank	Closed Valves
90F17	V901705-1 V880154-1
Basement Tanks	V761902-13 V761902-14
28 & 29 Systems	V761902-1 V761902-2
27C01	V270103-1 V880142-1
32F09	V880175-1 V320906-1
32F11	V880177-1 V321105-1
32C19	V880179-1 V321902-1
32C36	V880188-1 V323603-1
07C44	V761902-26 V761902-28
09 & 11 Systems	V880152-1 V110803-1
07F03	V761902-19
07F04	V761902-20

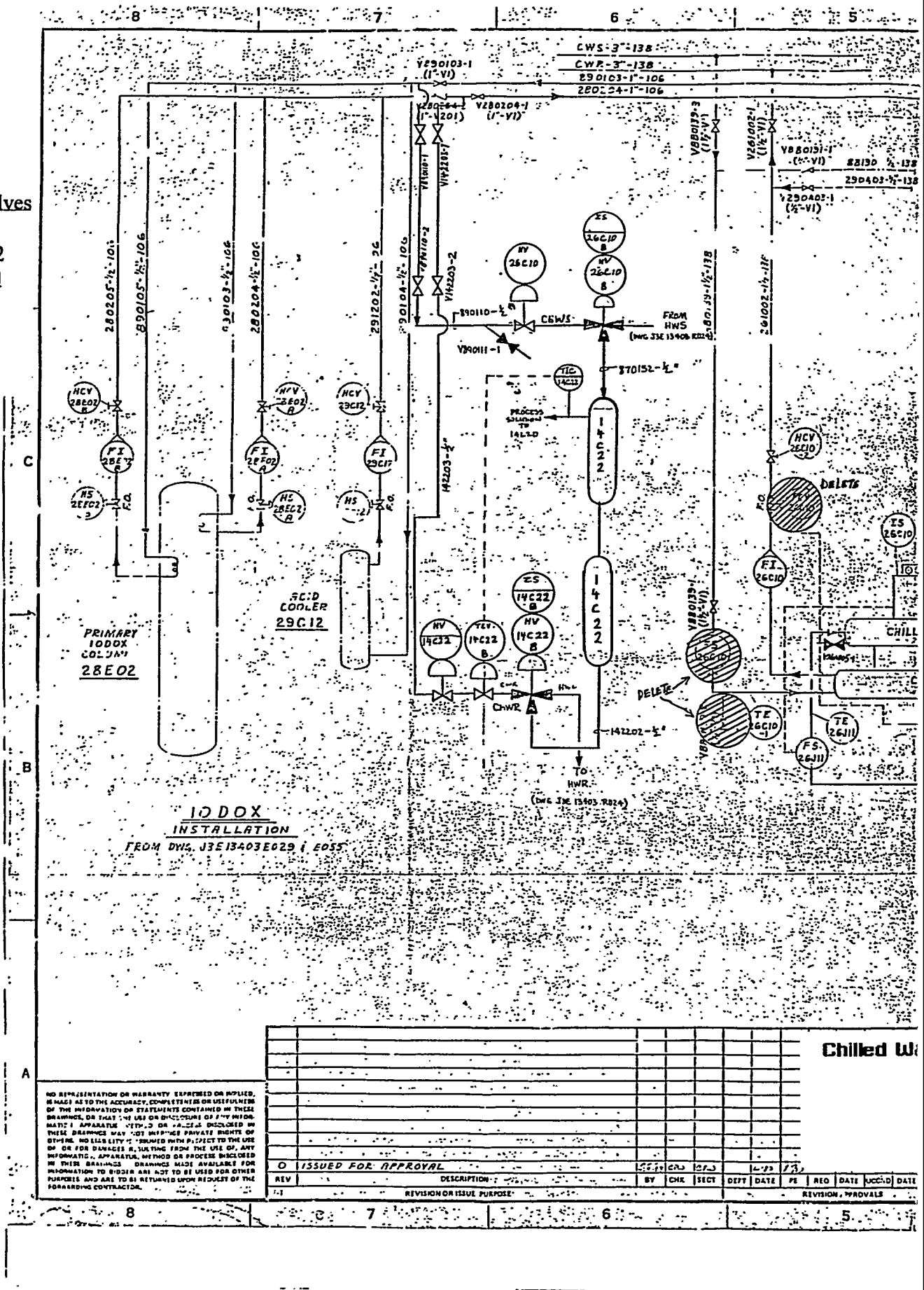


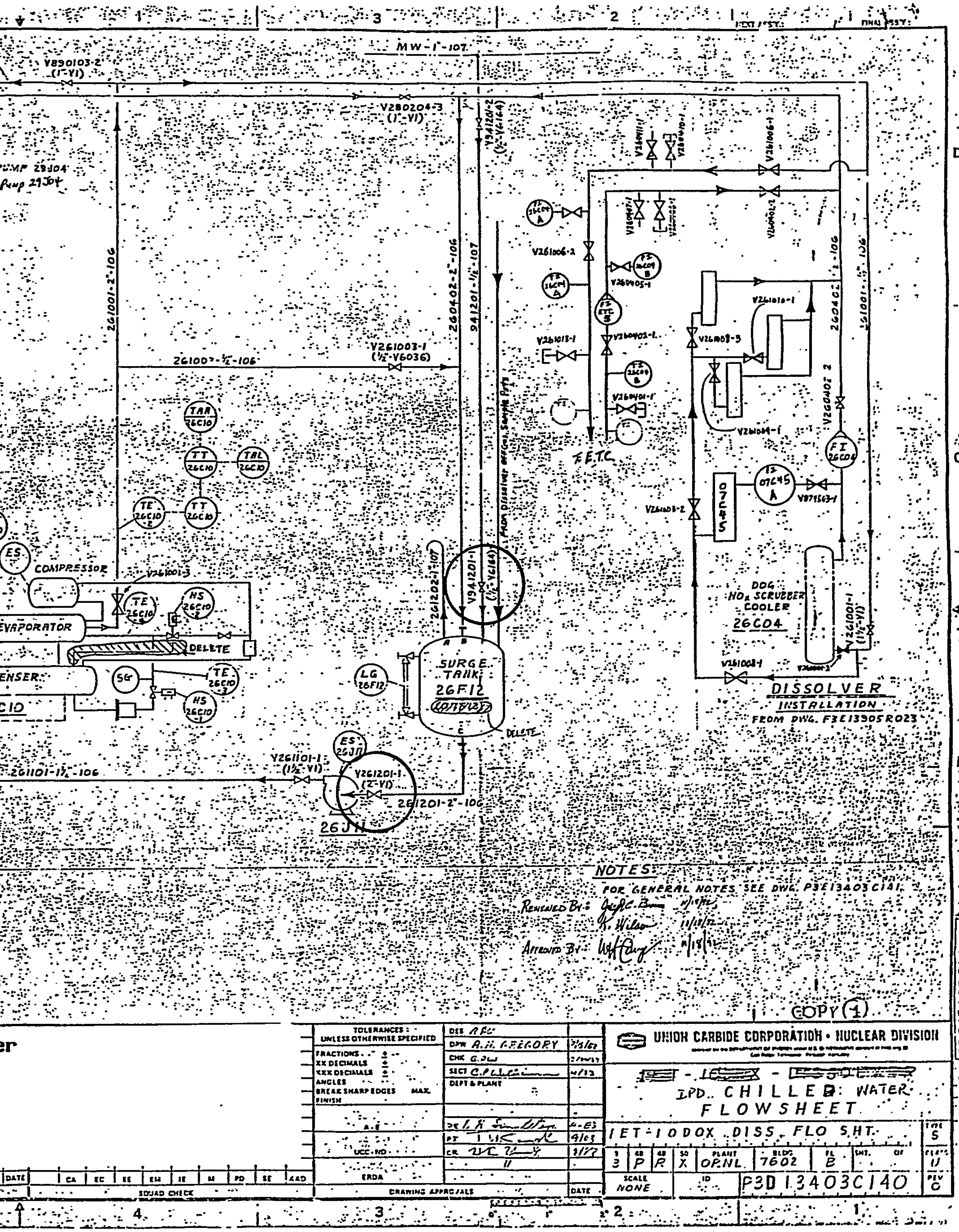


Cooling Water

Chilled Water

Tank	Closed Valves
26F12	V261201-2
	V941201-1

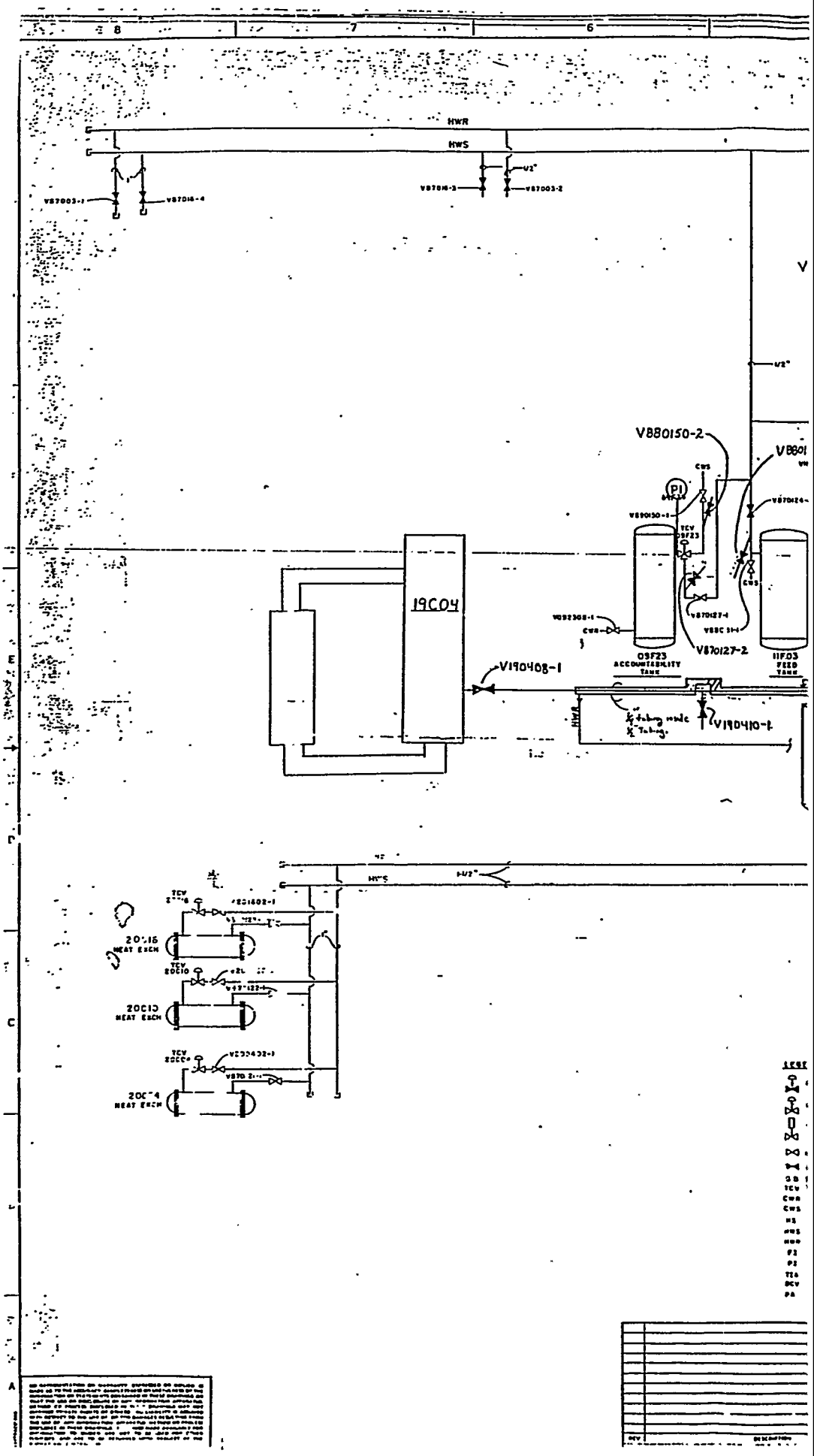


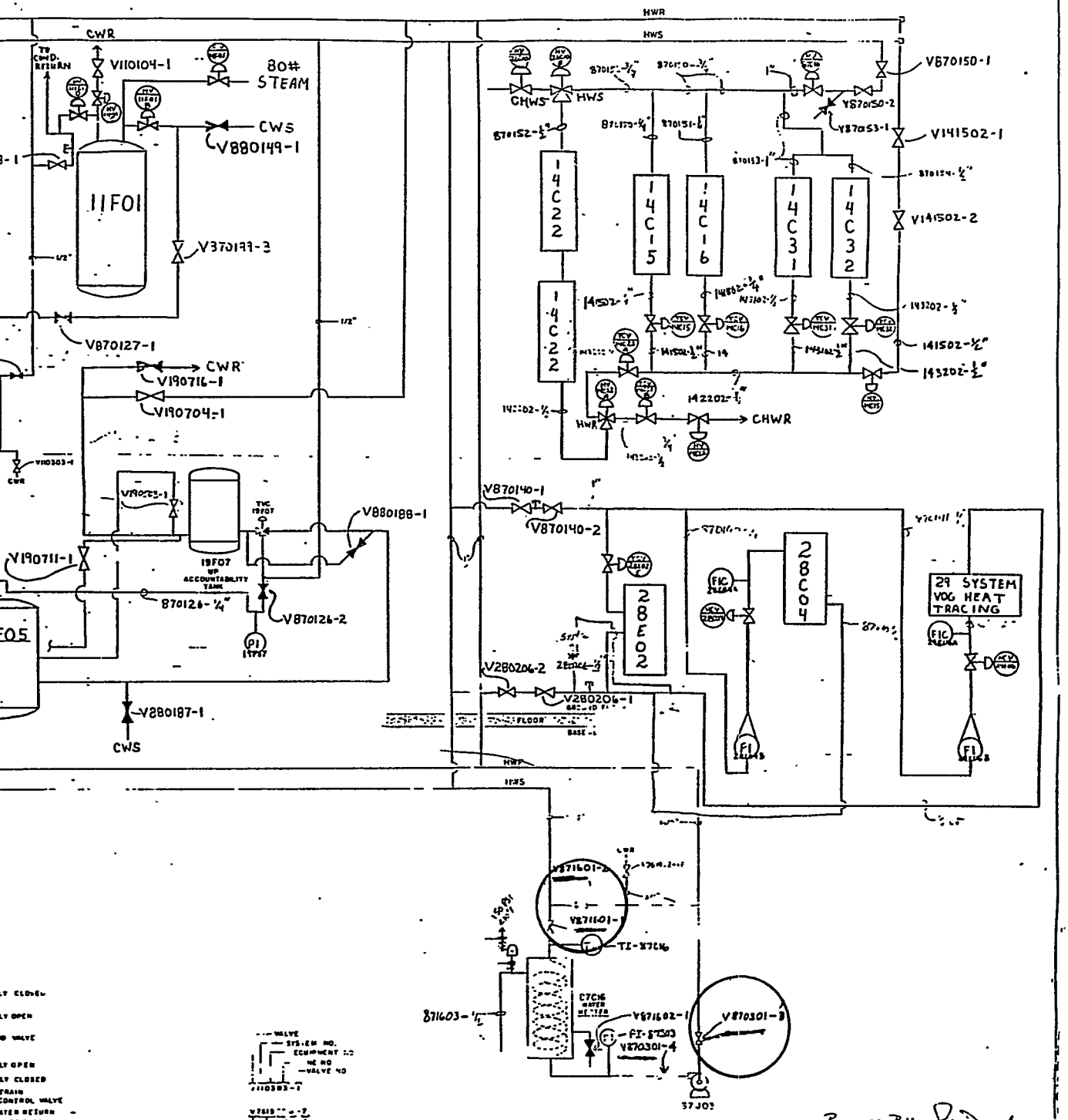


MW-1"-107
V890103-2 (1"-V1)
V280204-3 (1"-V1)
V261003-1 (½"-V6036)
261001-2"-106
260402-2"-106
9A1201-1½"-107
COMPRESSOR
EVAPORATOR
DELETE
SURGE TANK
26F12
LG 26F12
ES 26J11
V261101-1 (1½"-V1)
V261201-1 (2"-V1)
261201-2"-106
26J11
F.E.T.C.
DOG NOx SCRUBBER COOLER
26C04
DISSOLVER INSTALLATION
FROM DWG. F3E13905R023
NOTES:
FOR GENERAL NOTES SEE DWG. P3E13403C141.
RENEWED BY:
APPROVED BY:
COPY (1)
UNION CARBIDE CORPORATION • NUCLEAR DIVISION
IPD. CHILLED WATER FLOWSHEET
IET-IODOX DISS. FLO SHT.
DRN A.H. GREGORY
OR.NL
7602
SCALE NONE
P3D13403C140
P3D13403C140

Hot Water

Tank	Closed Valves
87C16	V870301-3
	V871601-1





REVIEWED BY: 11/18/92

APPROVED BY: 11/18/92

COPY (1)

Hot Water

UNION CARBIDE CORPORATION - NUCLEAR DIVISION

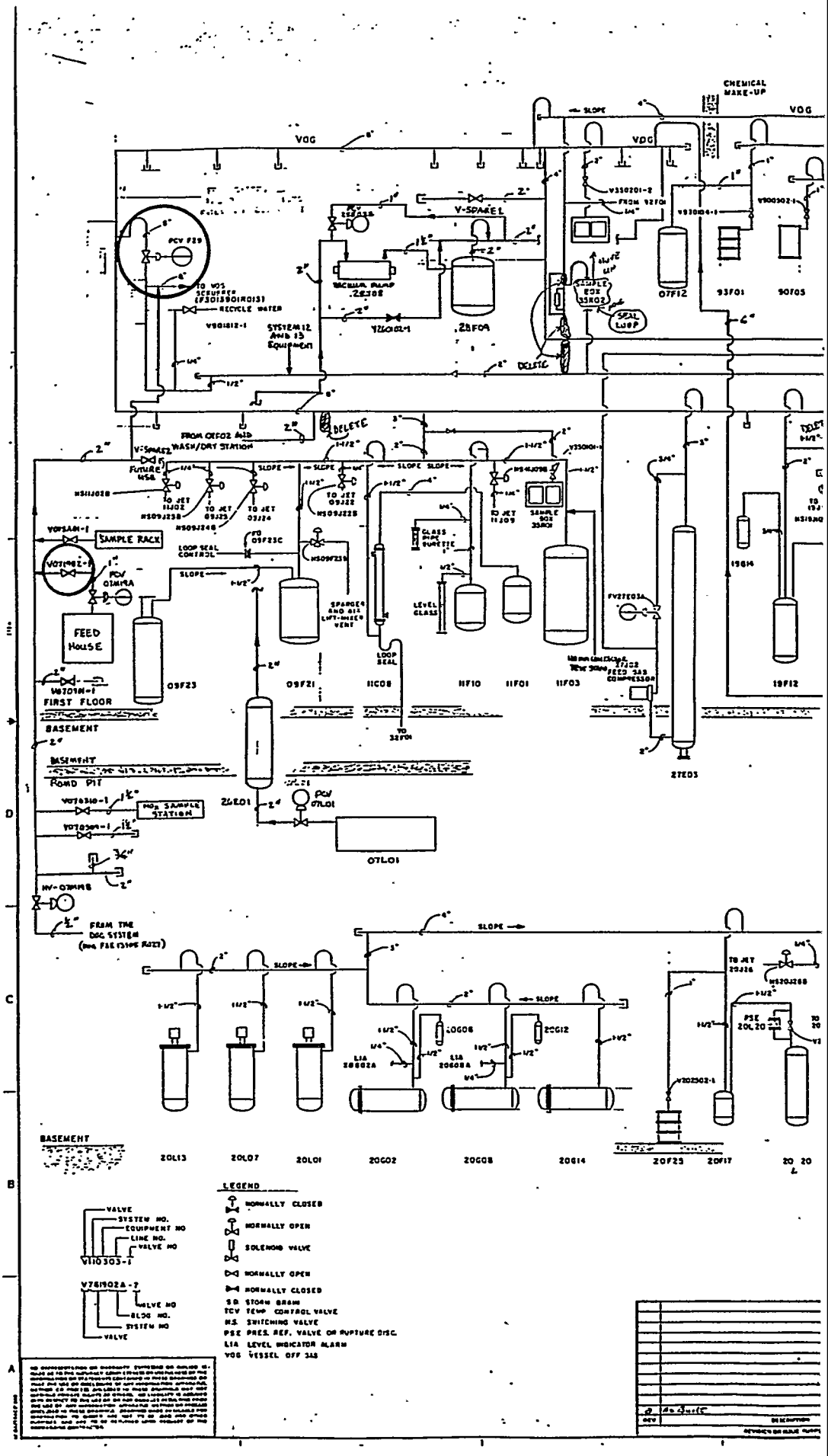
TPD
HOT WATER SYSTEM
FLOW DIAGRAM

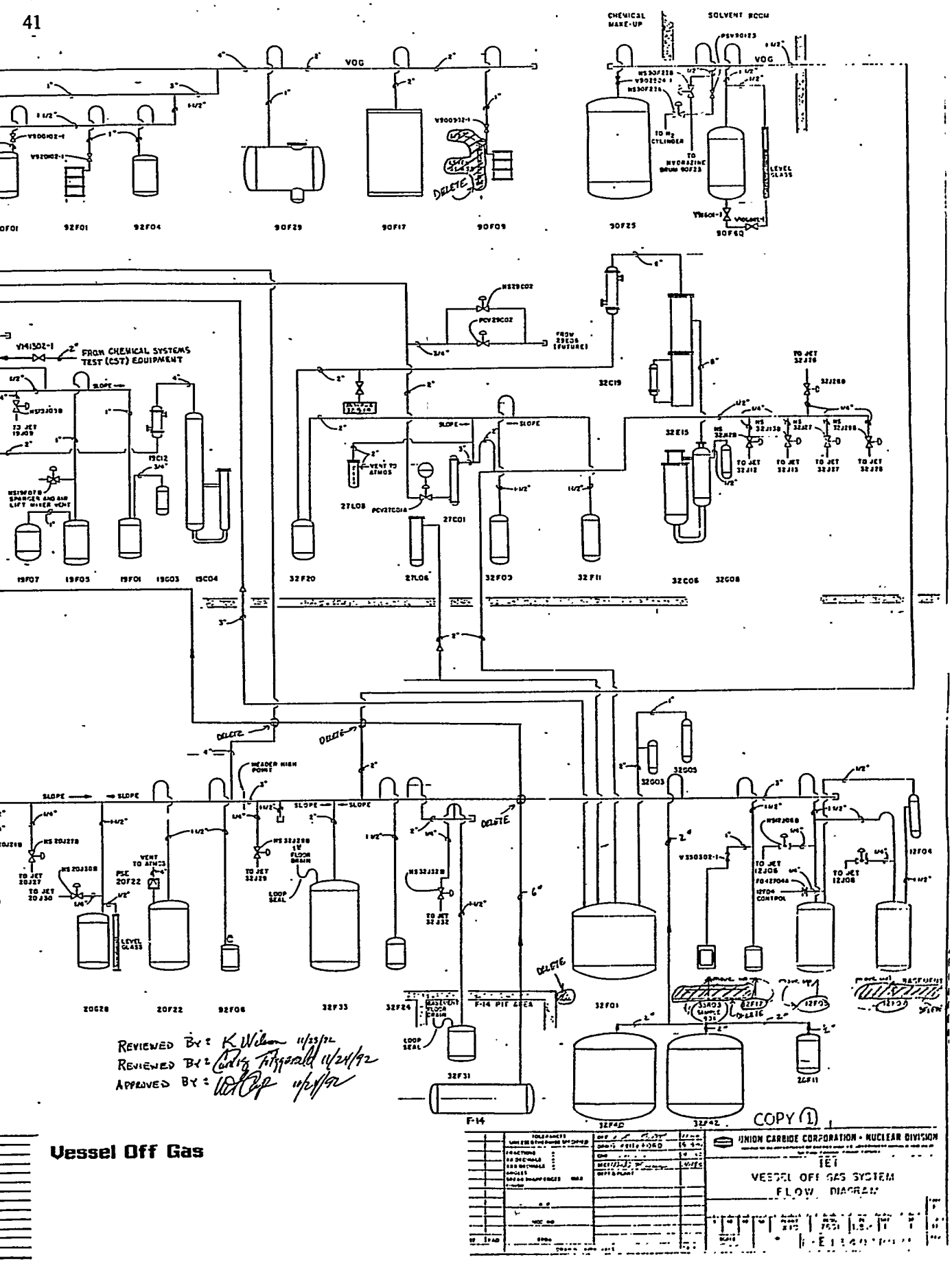
Vessel Off Gas

Closed Valves

PCV-F29
(Fail Open,
No Air,
Valve Open,
Wheel on
Valve Closed)

V071902-1





REVIEWED BY: K Wilson 11/23/92
REVIEWED BY: Cindy Fitzgerald 11/24/92
APPROVED BY: [illegible] 11/24/92

Vessel Off Gas

NUMBER	PT-IPD-EDS-01. Rev.
DATE	June 1, 1994
SUPERSEDES	
PAGE	6 OF 16

Appendix 7.1

Circuits on Motor Control Center MCC-A
(located at the entrance to the chemical makeup room)

Main Lugs	Lighting panel W trans.	Cooling tower immersion heaters	Cooling tower fan #1	Cooling tower fan #2	Gad. acid mix tank agitator 90L02	Recycle acid pump 90J30	Dilute acid feed pump 90J12	Chemical addition tank pump 11J11
Chemical make-up exhaust fan #102	RTS power and 12cm test stand		Spare		Gad. acid mix transfer pump 90J03	Recycle acid pump 90J31	Sugar feed pump 90J50	Gad. acid tank pump 90J06
					Process water pump 90J18	Solvent feed pump 90J62	Des. solvent feed pump 92J08	Dilute acid feed pump 07J13
Cooling tower pump #1	Cooling tower pump #2		Cooling tower pump #3		Recycle water pump 90J19	SYN. fission product feed 92J05	Feed for 120V pumps	Sugar transfer pump 90J47
					Hydrazine make-up tank agitator 90L26	Mag. nitrate feed pump 93J03		
					Hydrazine make-up tank pump 90J27	Panel I 240/120 disconnect		SYN. fission product trans. pump 92J03

○ – **Open electrical breakers**

NUMBER	PT-IPD-EDS-01, Rev.
DATE	June 1, 1994
SUPERSEDES	
PAGE	7 OF 16

Appendix 7.2

Circuits on Panel W Fed from MCC-A

Panel W is located on the wall opposite MCC-A.

Circuit Breaker Number	Load Description
1	Chemical make-up lights
2	Chemical make-up receptacles
3	Exhaust fan E.F. 103
4	Chemical make-up room receptacles
5	Exhaust fan E.F. 104
6	Cooling tower lights
7	Cooling tower water treatment cabinet
8	Cooling tower receptacle
9	Chemical make-up light
10	HV-101
11	Eye wash light
12	Drive unit disconnect to contactor test stand
13	Spare circuit
(14)	Drive unit disconnect to contactor test stand
(15)	Spare circuit
(16)	Cooling tower trace heater
(17)	90L61 agitator
(18)	92L07 agitator
(19)	93L02 agitator
(20)	90L10 agitator
(21)	90L46 agitator
(22)	90L01 agitator
(23)	92L02 agitator
24	Lab hood
(25)	Vacuum pumps 35R01 and 35R02
(26)	Vacuum pump Iodox
(27)	Lights at 35R01 and 2
(28)	pump 28J15 Iodox

◯ – Open electrical breakers

NUMBER	PT-IPD-EDS-01, Rev.
DATE	June 1, 1994
SUPERSEDES	
PAGE	8 OF 16

Appendix 7.3

Circuits (110-240V) on Panel I Fed from MCC-A

Panel I is located on the wall opposite MCC-A.

Circuit Breaker Number	Load Description
(1)	QC-15 Chem make-up
(2)	Oxide production panel
(3)	QC-17 Chem make-up
(4)	QB-1 basement 32, 20 system
(5)	Hydrazine make-up panel
(6)	QB-3 basement system 20, 32, 12 (12F05-12F07)
(7)	QG-13 system 32
(8)	Organic treatment panel
(9)	QG-11 system 32
(10)	QG-9 Iodox
(11)	QG-5 system 9,11
12	Solvent extraction instrument transformer
(13)	QG-7 system 19, 27
14	Solvent extraction instrument panel power
(15)	QG-19 spare
(16)	QG-26,27 signal transformer (solvent extraction)
(17)	Receptacle 12 cm contactor test stand
18	Contactor test stand instrument cabinet
(19)	Contactor test stand instrument cabinet

◯ – Open electrical breakers

NUMBER	PT-IPD-EDS-01, Rev.
DATE	June 1, 1994
SUPERSEDES	
PAGE	9 OF 16

Appendix 7.4

Circuits on RTS Panel (located on north wall of 7602 on the west side of column A-5 in the IPD high bay) Fed from TDS Disconnect MCC-A

Circuit Breaker Number	Load Description
1	Spare
2	Spare
3	Back flush pump
4	Spare
5	Spare
6	Instrument cabinet power strip #2 13K11A
7	Instrument cabinet power strip #2 13K11B
8	Instrument cabinet power strip #1 13K11A
9	Spare
10	Receptacle behind test stand
11	Spare
12	Receptacle for 13L05 and photohelic centrifugal Contactor drive system
13	Spare
14	Filter test system receptacle north wall Outside Building 7602
15-27	Spares
28	Three phase power for centrifugal contactor system drive

◯ - **Open electrical breakers**

NUMBER	PT-IPD-EDS-01, Rev.
DATE	June 1, 1994
SUPERSEDES	
PAGE	10 OF 16

Appendix 7.5

Circuits on Panel X Fed from MCC-A

Panel X is located on the north wall of Building 7602 in the ROMD high bay behind the CST support stand.

1 Chemical make-up room lights

2 Plug AR cabinet

3 IPD overhead lights

4 ROMD lights

5 IPDS overhead lights

6 ROMD lights

7 Diesel generator fuel pump

8 High-bay emergency lights

9 Spare

10 High bay emergency lights

11 Spare

12 ROMD emergency lights

13 Box OSSA IPD control room

14 Spare

15 Spare

16 Spare

○ – **Open electrical breakers**

NUMBER	PT-IPD-EDS-01. Rev.
DATE	June 1, 1994
SUPERSEDES	
PAGE	11 OF 16

Appendix 7.6

Circuits on Motor Control Center MCC-B

Main Lugs	Decanter pump 20J29	Spare	Recycle water pump 32J21
UP pump 19J08	Feed gas compressor 27J02	Spare	Waste organic pump 32J25
Solvent washer agitator 20L01	Scrub solution pump 27J04	Spare	Floor drain sump tank pump 32J34
Solvent washer agitator 20L07	DDG vacuum pump 28J08	Spare	Water heater supply pump 87J03
Solvent washer agitator 20L13	Spare	Spare	Water heater 87C16
Organic inv. pump 20J23	Spare	Recycle acid pump 32J18	Power panel 'B' feeder

◯ – **Open electrical breakers**

NUMBER	PT-IPD-EDS-01, Rev.
DATE	June 1, 1994
SUPERSEDES	
PAGE	12 OF 16

Appendix 7.7

Circuits on Panel B Fed from MCC-B

Panel B is located just west of MCC-B on the north wall in the IPD basement.

1. Furnace crystallizer 28C05
2. Pump 20J03
3. Pump 20J09
4. Pump 20J15
5. Pump 20J18
6. AC in ROMD
7. Acid feed pump 29J08
8. Acid feed pump 29J12
9. ROMD lights
10. Salt regen. 29J04
11. ROMD light
12. 120V light and receptacle Iodox
13. ROMD light
14. Iodox lights and receptacle
15. ROMD room light

◯ – **Open electrical breakers**

Appendix 7.8	NUMBER PT-IPD-EDS-01, Rev.
	DATE June 1, 1994
Circuits on Power Panel 1 Fed from AA1 MCC-B	SUPERSEDES
	PAGE 13 OF 16

Power Panel 1 is located on the south wall in the basement of Building 7602 just outside the regulated area at the entrance to the IPD basement.

1. Sampler control station ROMD control room
2. RSS fuel feed door 1253L cable 5116
3. Spare
4. Fuel ejector 1277L cable 5115
5. Spare
6. Lights and receptacle on E wall dissolver pit
7. Spare
8. Receptacle on south wall dissolver pit
9. Spare
10. Test stand receptacle ROMD high bay
11. Spare
12. Monitor station at shear
13. Receptacles mezzanine
14. Spare
15. Receptacles Y axis
16. Spare
17. Receptacles on dissolver stand
18. Spare
19. Dual pin shear hydraulic pump
20. ROMD cameras
21. Dual pin shear controller
22. ROMD control panel rear
23. Spare
24. ROMD controller panels console front
25. Spare
26. ROMD cameras
27. Spare
28. Receptacles at south end of laser
29. Spare
30. Spare
31. Spare

○ – Open electrical breakers

	NUMBER PT-IPD-EDS-01. Rev.
Appendix 7.9	DATE June 1, 1994
Circuits on Power Panel 2 (from SOLA transformer) MCC-B	SUPERSEDES
	PAGE 14 OF 16

Power Panel 2 is lcoated on the south wall in the basement of Building 7602 just outside the regulatec area at the entrance to the IPD basement.

(1) Receptacle indexer

(2) QD 48 conductivity instrument

(3) Dissolver motor drive transformer

(4) QD 49

◯ – **Open electrical breakers**

NUMBER	PT-IPD-EDS-01. Rev.
DATE	June 1. 1994
SUPERSEDES	
PAGE	15 OF 16

Appendix 7.10

Circuits on Motor Control Center MCC-7

Main lugs AA	Main lugs A	Main lugs B	Main lugs C	Main lugs D	Main lugs E	Main lugs F
AA1 Power panel PP1	A1 IPD H&V unit #1 NAK-9	B1 Acid tank pump M-2	C1 Tank F-15 pump NJ-25-1	D1 Tank F-14 pump NJ-22-1	E1 Main feed from N22 U6C	F1 Tank 32F49 pump 32J41
AA2 ROMD lights	A2 IPD H&V unit #2 NAK-10	B2/1 B2/2 Welding receptacles	C2 Chiller	D2 Chiller pump 26J11		F2 Bldg. heat hot water pump #12
AA3 Power panel CP-1	A3 IPD H&V unit #3 NAK-11	B3/1 Spare; B3/2 Dist. panel hot waste storage	C3 Pit blower F-14	D3 2 and 202 IPD first floor varible freq. drive and (*)	E3 Spare	F3 Aux. control for NJ-36 1,2,3
AA4 Hot water heater in boiler room	A4 ROMD H&V UNIT NAK-6	B4 Spindle motor IPD	C4 Spare	D4 IPD and ROMD roll up doors		F4 Bldg. heat hot water pump NJ-36-2
AA5 Power panel 2	A5 IPD exhaust fan NAJ-26	B5 IPD CRANE	C5 Building heat blower	D5 Decontamination sump pump	E5 Tank 32F42 pump 32J43	F5 Bldg. heat hot water pump NJ-36-3

* (varible freq. drive test first floor IPD High Bay)

◯ – **Open electrical breakers**

	NUMBER PT-IPD-EDS-01. Rev.
Appendix 7.11	DATE June 1, 1994
Circuits on Power Panel 2 Fed from MCC-7	SUPERSEDES
	PAGE 16 OF 16

Power Panel 2 is located on the west wall in the basement of Building 7602 just outside the regulated area at the entrance to the IPD basement.

1. Up-ender
2. Feedhouse enclosure door
3. Waste ejector
4. Rotator carriage
5. Transfer cable
6. Z axis Y axis
7. Pusher rotator INL MOD
8. FAG'S 1,2
9. 5 cm test stand mezzanine
10. 5 cm test stand mezzanine
11. Blank
12. Blank
13. Blank
14. Blank
15. 5 cm test stand mezzanine
16. Scramble lock system "keypad"

○ – **Open electrical breakers**

APPENDIX C
SURVEILLANCE AND MAINTENANCE COST ESTIMATE

FY 1996 ESTIMATED COST
BUILDING 7602 SURVEILLANCE & MAINTENANCE

NO.	DESCRIPTION	FREQUENCY	RESP. ORG.	REFERENCE	RESOURCE EST. (ph/yr.)	ESTIMATED COST (FY95$)
1	**Operational Surveillance**					
1.1	S&M Supervision	As required	RPSD	Good mgmnt. practice	176	7,603
1.2	Facility Manager	As required	RPSD	ORNL SPP X-GP-12	80	3,456
1.3	Facility Surveillance					
a)	Visual of building exterior	Daily	RPSD	RPSD SOP-BLD-018	43.3	3,118
b)	Visual of process area	Twice a week	RPSD	RPSD SOP-BLD-018	52	3,744
c)	Building ventilation (HEPA filters and pressure drops)	Weekly	RPSD	RPSD SOP-BLD-018	17.3	1,246
d)	Inspect tanks 32F31 & 32F33	Quarterly	RPSD	EPM 5.2 - Quarterly Tank Inspections	2	144
1.4	General Safety Inspection	Twice a year	RPSD	ORNL Safety Manual, Waiver from A. M. Shirley, 6/12/95	24	1,728
1.5	Fire Safety Inspection					
a)	Alarm sys. inspection & test	Annual	FP	DOE Order 5480.7A	**	**
b)	Fire sprinkler sys. test	Annual	FP	DOE Order 5480.7A	**	**
c)	Extinguisher pressure test	Annual	FP	DOE Order 5480.7A	**	**

** Costs are included in ORNL overhead charges

FY 1996 ESTIMATED COST
BUILDING 7602 SURVEILLANCE & MAINTENANCE

NO.	DESCRIPTION	FREQUENCY	RESP. ORG.	REFERENCE	RESOURCE EST. (ph/yr.)	ESTIMATED COST (FY95$)
d)	Repressurize extinguishers	As required	FP	DOE Order 5480.7A	**	**
e)	Evacuation horn test	Every 2 months	FP	DOE Order 5480.7A	**	**
1.6	HEPA filter PAO test	Annually	RPSD QA&I RP	Energy Sys. Procedures ESS-EP-131 ESS-RP-211	2	130
1.7	Overhead crane inspection	When operated Quarterly Annually	RPSD RPSD QA&I	IS-115 MMES Hoisting &Rigging Check List	4 4 **	260 260 **
1.8	Security					
a)	Routine security patrol	Daily	LP	ORNL Security Plan	**	**
b)	Security for Applied Technology	As required	RPSD	RPSD Facility Security Plan	176	7603
1.9	Supervisory Panel high level alarm test	Quarterly	RPSD	Planned maintenance cards & check list	24	1728
1.10	Emergency lighting test	Semi-annual	RPSD/ P&E	Planned maintenance cards & check list	10	648
1.11	Safety shower & eye wash test	Monthly	P&E/ RPSD	Planned maintenance cards & check list	36	2333

** Costs are included in ORNL overhead charges

FY 1996 ESTIMATED COST
BUILDING 7602 SURVEILLANCE & MAINTENANCE

NO.	DESCRIPTION	FREQUENCY	RESP. ORG.	REFERENCE	RESOURCE EST. (ph/yr.)	ESTIMATED COST (FY95$)
1.12	Contingency (5%)				20	1,700
	SUBTOTAL 1				414.6	35,701
2	**Radiological Surveillance**					
2.1	Radiological Control Officer	As required	RPSD	ORNL Policy	176	12,672
2.2	Radiation & contamination surveys	Semiannual	RP	DOE Rad Con Manual 552.1 & 554.1	230	11,923
2.3	HP instrument performance checks	Daily/Weekly/ Monthly	RP	DOE Rad Con Manual 552.1 & 554.1	151	7,828
2.4	HP instrument calibration, maintenance, & repair	As required	I&C	Energy Sys. Procedure ESS-RP-301	50	3,456
2.5	Surveillance & Maintenance support	As required	RP	DOE Rad Con Manual CH 3, 552.1 & 554.1	50	2,592
2.6	Radiation work permits	As required	RP	DOE Rad Con Manual 321	50	2,592
2.7	Training	Annual	RPSD	DOE Rad Con Manual	32	2,304
2.8	Contingency (5%)				70	2,169
	SUBTOTAL 2				1,481	45,534

** Costs are included in ORNL overhead charges

FY 1996 ESTIMATED COST
BUILDING 7602 SURVEILLANCE & MAINTENANCE

NO.	DESCRIPTION	FREQUENCY	RESP. ORG.	REFERENCE	RESOURCE EST. (ph/yr.)	ESTIMATED COST (FY95$)
3	**Utilities**					
3.1	Utilities (10% RPSD total)	As required	RPSD	RPSD records	---	24,000
	SUBTOTAL 3					24,000
4	**Maintenance**					
4.1	General maintenance	As required	RPSD/ P&E	RPSD Maint. Records	150	9,720
4.2	HEPA filter replacement	Annual or as required	P&E/ RP	Preventive & corrective maint. records	50	3,240
4.3	Level inst. calibration - tanks 32F31 & 32F33	Annual	I&C		10	692
4.4	Heating system maintenance	As required	P&E	Good mgmnt. Practice	40	2,464
4.5	Maintenance materials	As required	RPSD	RPSD Maint. Records	---	4,000
4.6	Radioactive waste mgmnt. for maint. activities	As required	RPSD	ORNL Health Physics Manual	60	4,320
4,7	Contingency (5%)				16	1,222
	SUBTOTAL 4				326	25,658
	SUBTOTAL					130,893

** Costs are included in ORNL overhead charges

FY 1996 ESTIMATED COST
BUILDING 7602 SURVEILLANCE & MAINTENANCE

NO.	DESCRIPTION	FREQUENCY	RESP. ORG.	REFERENCE	RESOURCE EST. (ph/yr.)	ESTIMATED COST (FY95$)
	ESCALATION TO FY96 (4%)					5,236
	GRAND TOTAL					136,129

** Costs are included in ORNL overhead charges

APPENDIX D
CONTAMINATION SURVEY DIAGRAMS

ORNL Radiological Survey Data

Survey Number: 7601-95-0446 — 7601 Field Office — Date: 7/11/95 — Time: 9:44

Surveyor Badge Number: 34160 — ☒ Routine Survey — RWP Number: NA

Building: 7602 — Specific Location: 19 SYSTEM AREA

Description:
RADIATION/CONTAMINATION SURVEY

Instruments Used and Calibration Due Date:
6000-061 7/29/95 7603-09P 11/6/95

General Description of Radiological Conditions:
SEE DETAILED SURVEY FOR MORE INFORMATION.

Division or Group Needing the Survey: RP — Person-hours spent on the survey: 5

# of Pages: 2 — Completed By: [signature] — Reviewed by: _____ — Date: _____

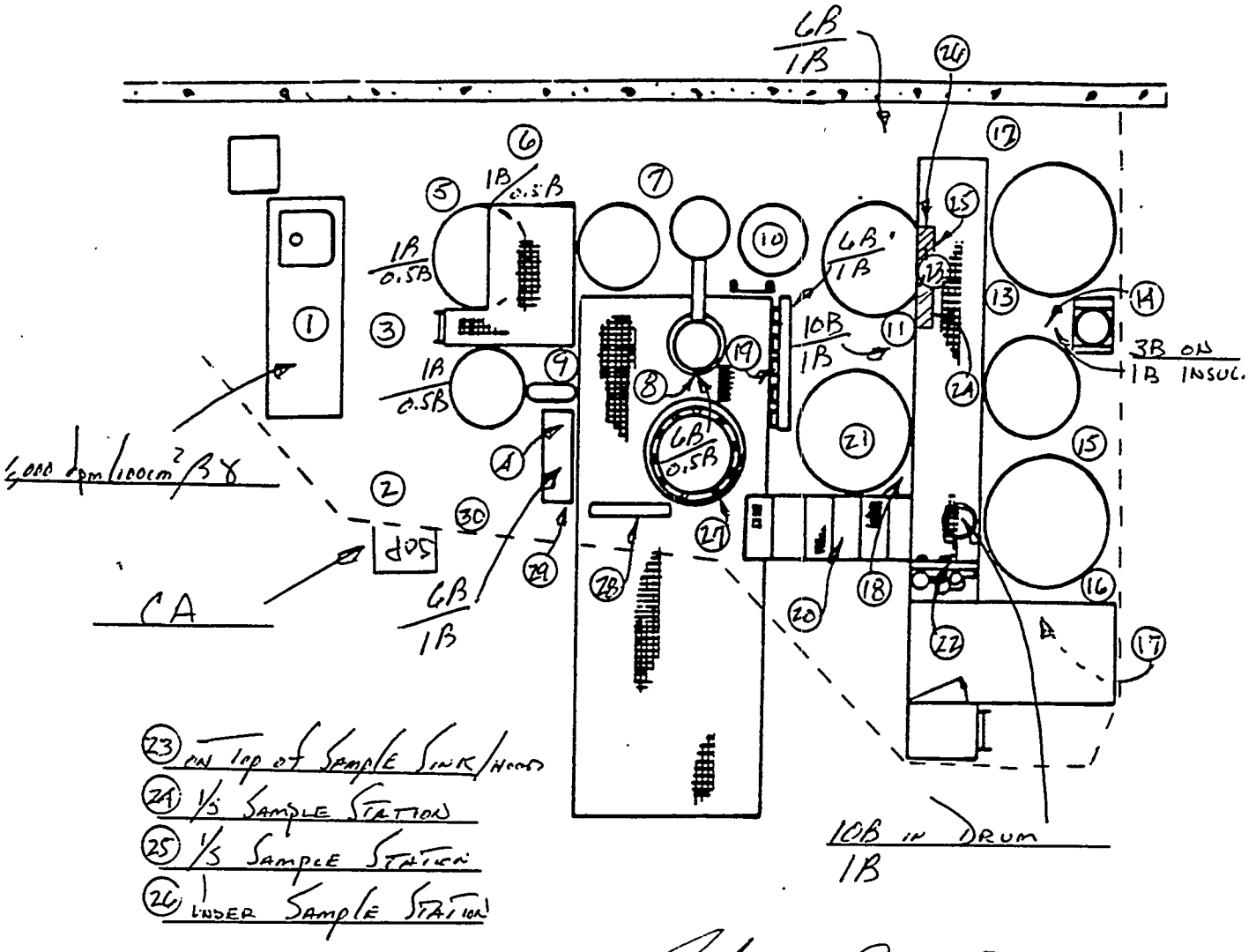
Smear Results (dpm/100 cm² unless noted)

Smear Number	α	β	Location	Smear Number	α	β	Location	Smear Number	α	β	Location
1	NC	25,000	SEE MAP	2	NC	2,000	"	3	NC	2,000	"
4	NC	200,000	"	5	NC	10,000	"	6	NC	3,000	"
7	NC	15,000	"	8	NC	200,000	"	9	NC	80,000	"
10	NC	3,000	"	11	NC	5mRad	"	12	NC	10,000	"
13	NC	2,000	"	14	NC	50,000	"	15	NC	6,000	"
16	NC	15,000	"	17	NC	30,000	"	18	NC	100,000	"
19	NC	10,000	"	20	NC	3,000	"	21	NC	20,000	"
22	NC	6,000	"	23	NC	3,000	"	24	NC	150,000	"
25	NC	200,000	"	26	NC	40,000	"	27	NC	6,000	"
28	NC	3,000	"	29	NC	120,000	"	30	NC	2,000	"

ORNL Radiological Survey Data

Survey Number: TUR1-95-CAAL 7601 Field Office Date: 7/15 Time: 13 44

IPD High Bay
19 System Area



3410.0

(#) - Smear Location	Boundary Designations	
(#)(#) - Large Area Smear	RA - Radiation Area	BA - Radiological Buffer Area
# - Contact Dose Rate	HR - High Radiation Area	CA - Contamination Area
# - 30 cm Dose Rate	VR - Very High Radiation Area	HC - High Contamination Area
# - General Area Dose Rate	AR - Airborne Radioactivity Area	FC - Fixed Contamination Area
SOP - Step-off Pad	RM - Radioactive Materials Area	SC - Soil Contamination Area
AS - Air Sample Location	UM - Underground Radioactive Material Area	

Default units are in mR/hr and are for open window beta/gamma readings. Letter suffixes with the number indicate specific radiations: B - Beta(mRad/hr), G - Gamma(mR/hr), N - Neutron(mRem/hr). Boundary designations are looking in the direction the arrow points.

ORNL Radiological Survey Data

Survey Number: 7601-95-0453 | 7601 Field Office | Date: 7/14/95 | Time: 19:35

Surveyor Badge Number: 34160 | [x] Routine Survey | RWP Number: NA

Building: 7602 | Specific Location: CHEMICAL SYSTEMS TEST

Description:
RADIATION/CONTAMINATION SURVEY

Instruments Used and Calibration Due Date:
6000-011 10/18/95 7603-16P 10/23/95

General Description of Radiological Conditions:
SEE DETAILED SURVEY MAP FOR MORE INFORMATION.

Division or Group Needing the Survey: RP | Person-hours spent on the survey: 6

# of Pages: 2 | Completed By: [signature] | Reviewed by: | Date:

Smear Results (dpm/100 cm² unless noted)

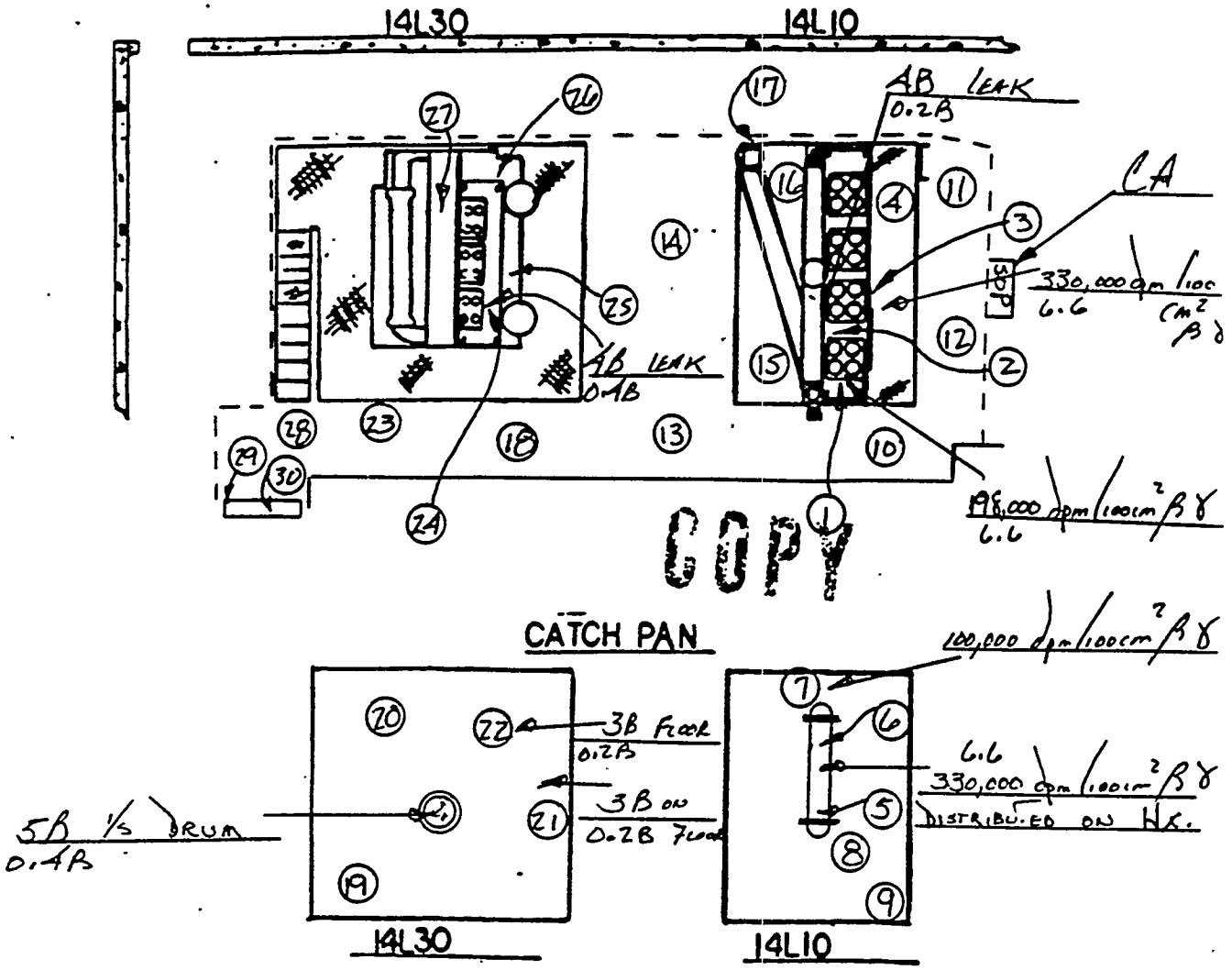
Smear Number	α	β	Location	Smear Number	α	β	Location	Smear Number	α	β	Location
1	NC	100,000	SEE MAP	2	NC	150,000	"	3	NC	2,000	"
4	NC	4,000	"	5	NC	6,000	"	6	NC	15,000	"
7	NC	60,000	"	8	NC	2,000	"	9	NC	4,000	"
10	NC	2,000	"	11	NC	3,000	"	12	NC	1,000	"
13	NC	2,000	"	14	NC	1,000	"	15	NC	4,000	"
16	NC	2,000	"	17	NC	1,000	"	18	NC	8,000	"
19	NC	140,000	"	20	NC	3,000	"	21	NC	100,000	"
22	NC	60,000	"	23	NC	80,000	"	24	NC	120,000	"
25	NC	50,000	"	26	NC	3,000	"	27	NC	1,000	"
28	NC	2,000	"	29	NC	6,000	"	30	NC	1,000	"

COPY

ORNL Radiological Survey Data

Survey Number: 7601-95-0453 7601 Field Office Date: 7-11-95 Time: 19:35

ROMD Bay
Chemical System Test Area



(#) - Smear Location	Boundary Designations	
(#)~~~(#) - Large Area Smear	RA - Radiation Area	BA - Radiological Buffer Area
#_ - Contact Dose Rate	HR - High Radiation Area	CA - Contamination Area
#̄ - 30 cm Dose Rate	VR - Very High Radiation Area	HC - High Contamination Area
#_ - General Area Dose Rate	AR - Airborne Radioactivity Area	FC - Fixed Contamination Area
SQB - Step-off Pad	RM - Radioactive Materials Area	SC - Soil Contamination Area
AS - Air Sample Location	UM - Underground Radioactive Material Area	

Default units are in mR/hr and are for open window beta/gamma readings. Letter suffixes with the number indicate specific radiations: B - Beta(mRad/hr), G - Gamma(mR/hr), N - Neutron(mRem/hr). Boundary designations are looking in the direction the arrow points.

Page 1

ORNL Radiological Survey Data

Survey Number: 7601-95-0431 — 7601 Field Office — Date: 6/19/95 — Time: 17:00

Surveyor Badge Number: 34160 — ☒ Routine Survey — RWP Number: NA

Building: 7602 — Specific Location: 32 SYSTEM

Description:
RADIATION/CONTAMINATION SURVEY

Instruments Used and Calibration Due Date:

CTA061	10/20/95	7603-09P	11/6/95	6000-061	7/29/95

General Description of Radiological Conditions:
SEE SURVEY MAP FOR DETAILS

Division or Group Needing the Survey: RP — Person-hours spent on the survey: 5

# of Pages: 2 — Completed By: [signature] — Reviewed by: _____ — Date: _____

Smear Results (dpm/100 cm² unless noted)

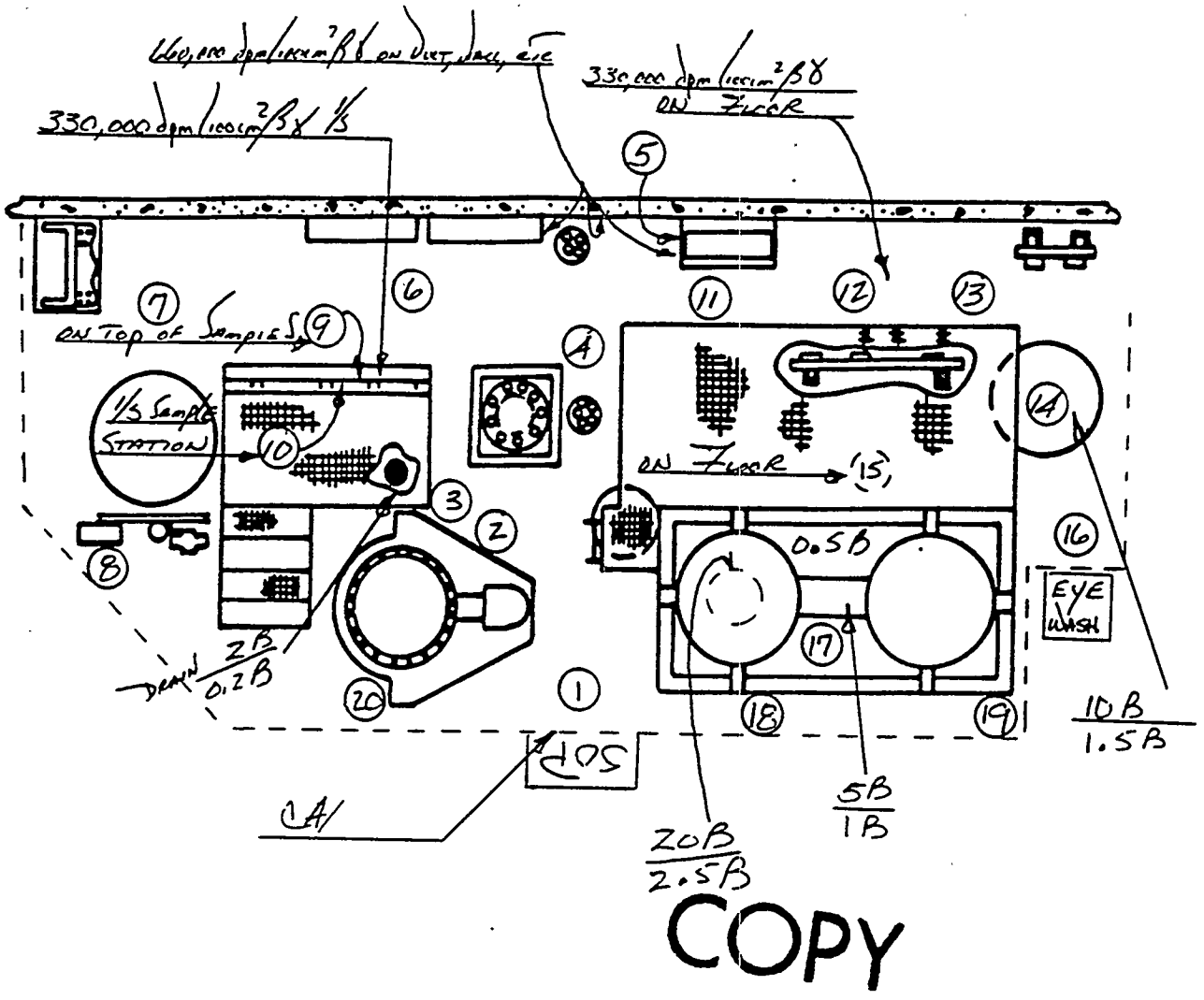
Smear Number	α	β	Location	Smear Number	α	β	Location	Smear Number	α	β	Location
1	NC	4000	SEE MAP	2	NC	10,000	"	3	NC	20,000	"
4	NC	10,000	"	5	1307	10,000	"	6	NC	6000	"
7	NC	1000	"	8	NC	2000	"	9	NC	15,000	"
10	NC	150,000	"	11	NC	2000	"	12	NC	80,000	"
13	NC	250,000	"	14	NC	200,000	"	15	NC	150,000	"
16	NC	15,000	"	17	NC	10,000	"	18	NC	4,000	"
19	NC	3,000	"	20	NC	10,000	"				

COPY

ORNL Radiological Survey Data

Survey Number: 7601-95-0131 7601 Field Office Date: 6-8-95 Time: 17.00

IPD High Bay
32 System Area



(#) - Smear Location	Boundary Designations	
(#)~(#) - Large Area Smear	RA - Radiation Area	BA - Radiological Buffer Area
# - Contact Dose Rate	HR - High Radiation Area	CA - Contamination Area
# - 30 cm Dose Rate	VR - Very High Radiation Area	HC - High Contamination Area
# - General Area Dose Rate	AR - Airborne Radioactivity Area	FC - Fixed Contamination Area
SOP - Step-off Pad	RM - Radioactive Materials Area	SC - Soil Contamination Area
AS - Air Sample Location	UM - Underground Radioactive Material Area	

Default units are in mR/hr and are for open window beta/gamma readings. Letter suffixes with the number indicate specific radiations: B - Beta(mRad/hr), G - Gamma(mR/hr), N - Neutron(mRem/hr). Boundary designations are looking in the direction the arrow points.

ORNL Radiological Survey Data

Survey Number: 7601-95-0374 | 7601 Field Office | Date: 3/7/95 | Time: 21:30

Surveyor Badge Number: 34160 | ☒ Routine Survey | RWP Number: 96916

Building: 7602 | Specific Location: IPD BASEMENT

Description:
RADIATION/CONTAMINATION SURVEY

Instruments Used and Calibration Due Date:

6000-011	3/25/95	7603-27P	6/5/95	CTB033	10/20/95	CTA061	10/20/95

General Description of Radiological Conditions:
AREA HAS A LARGE AMOUNT OF POWDER FROM OLD LEAKS AND DRUM OUT OPERATIONS. TECHNICIANS ARE IN PROCESS OF GENERAL HOUSE KEEPING. REMOVING COMPACTABLE AND NONCOMPACTABLE WASTE. SEE SURVEY MAP FOR MORE DETAILED INFORMATION.

Division or Group Needing the Survey: RP | Person-hours spent on the survey: 6

# of Pages: 2 | Completed By: [signature] | Reviewed by: _____ | Date: _____

Smear Results (dpm/100 cm² unless noted)

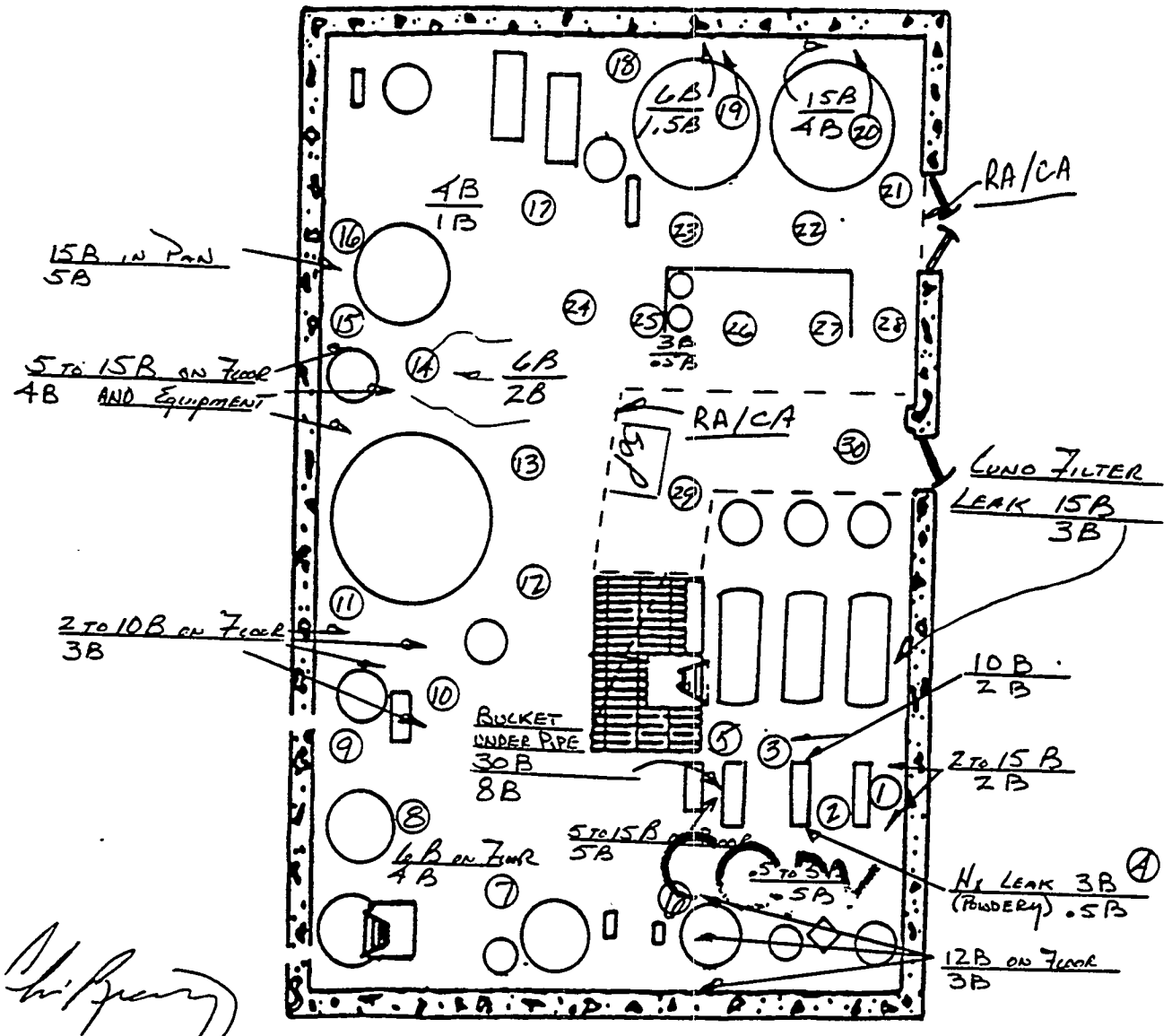
Smear Number	α	β	Location	Smear Number	α	β	Location	Smear Number	α	β	Location
1	NC	3 mRad	SEE MAP	2	NC	80,000	"	3	NC	4mRad	"
4	NC	100,000	"	5	NC	4 mRad	"	6	NC	6mRad	"
7	NC	40,000	"	8	NC	60,000	"	9	NC	150,000	"
10	NC	80,000	"	11	NC	50,000	"	12	NC	20,000	"
13	NC	10,000	"	14	NC	20,000	"	15	NC	8mRad	"
16	NC	6mRad	"	17	NC	3,000	"	18	NC	15,000	"
19	NC	80,000	"	20	NC	50,000	"	21	NC	6,000	"
22	NC	5,000	"	23	NC	2,000	"	24	NC	3,000	"
25	NC	200,000	"	26	NC	2,000	"	27	NC	3,000	"
28	NC	10,000	"	29	<20	<200	"	30	<20	<200	"

COPY

ORNL Radiological Survey Data

Survey Number: 7601-95-0324 7601 Field Office Date: 3-7-95 Time: 21:30

7602 IPD BASEMENT



(#) - Smear Location	Boundary Designations	
(#)~~(#) - Large Area Smear	RA - Radiation Area	BA - Radiological Buffer Area
#_ - Contact Dose Rate	HR - High Radiation Area	CA - Contamination Area
#' - 30 cm Dose Rate	VR - Very High Radiation Area	HC - High Contamination Area
#_ - General Area Dose Rate	AR - Airborne Radioactivity Area	FC - Fixed Contamination Area
SOP - Step-off Pad	RM - Radioactive Materials Area	SC - Soil Contamination Area
AS - Air Sample Location	UM - Underground Radioactive Material Area	

Default units are in mR/hr and are for open window beta/gamma readings. Letter suffixes with the number indicate specific radiations: B - Beta(mRad/hr), G - Gamma(mR/hr), N - Neutron(mRem/hr). Boundary designations are looking in the direction the arrow points.

Page: ____

ORNL Radiological Survey Data

Survey Number: 7601-95-0353 | 7601 Field Office | Date: 2/17/95 | Time: 12:35

Surveyor Badge Number: 34160 | ☒ Routine Survey | RWP Number:

Building: 7602 | Specific Location: SOLVENT EXTRACTION PIT

Description:
RADIATION/CONTAMINATION SURVEY

Instruments Used and Calibration Due Date:

7603-17P	6/6/95	CTA061	10/20/95	CTB033	10/20/95

General Description of Radiological Conditions:
SEE ATTACHED SURVEY MAP FOR MORE INFORMATION.

Division or Group Needing the Survey: RP | Person-hours spent on the survey: 5

# of Pages: 2 | Completed By: | Reviewed by: | Date:

Smear Results (dpm/100 cm² unless noted)

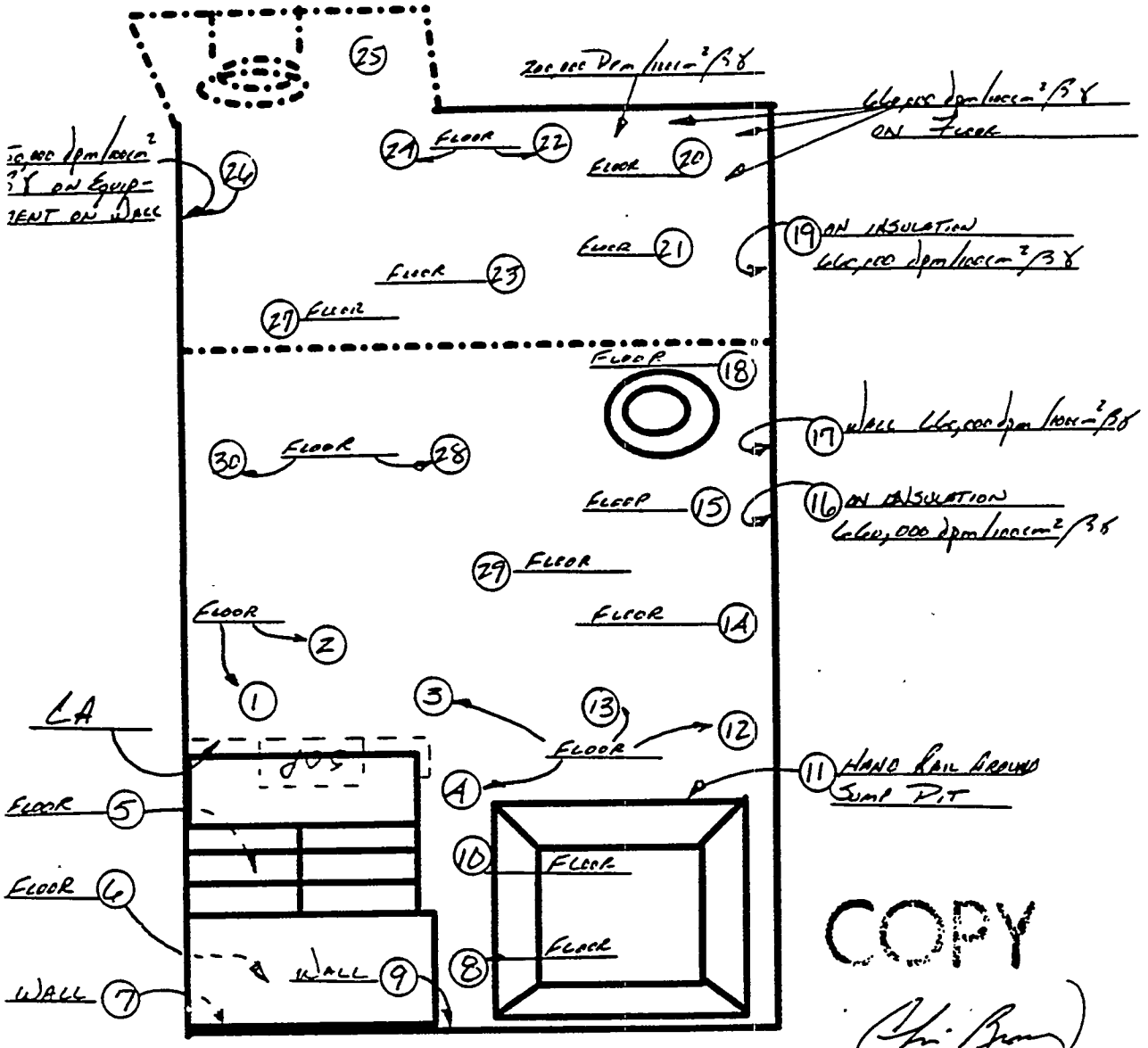
Smear Number	α	β	Location	Smear Number	α	β	Location	Smear Number	α	β	Location
1	33	<200	SEE MAP	2	<20	<200	"	3	27	<200	"
4	47	<200	"	5	58	<200	"	6	NC	6,000	"
7	<20	<200	"	8	NC	3,000	"	9	<20	<200	"
10	NC	2,000	"	11	27	<200	"	12	<20	<200	"
13	<20	<200	"	14	<20	<200	"	15	<20	<200	"
16	NC	16,000	"	17	NC	3,000	"	18	NC	3,000	"
19	116	333	"	20	NC	80,000	"	21	NC	3,000	"
22	<20	<200	"	23	89	315	"	24	49	<200	"
25	53	<200	"	26	NC	20,000	"	27	51	286	"
28	42	<200	"	29	42	<200	"	30	47	<200	"

COPY

ORNL Radiological Survey Data

Survey Number: 7601-95-C353 | 7601 Field Office | Date: 2-17-95 Time: 12:35

SOLVENT EXTRACTION PIT



COPY

(#)	- Smear Location	Boundary Designations	
(#)—(#)	- Large Area Smear	RA - Radiation Area	BA - Radiological Buffer Area
#	- Contact Dose Rate	HR - High Radiation Area	CA - Contamination Area
#	- 30 cm Dose Rate	VR - Very High Radiation Area	HC - High Contamination Area
#	- General Area Dose Rate	AR - Airborne Radioactivity Area	FC - Fixed Contamination Area
SOP	- Step-off Pad	RM - Radioactive Materials Area	SC - Soil Contamination Area
AS	- Air Sample Location	UM - Underground Radioactive Materials Area	

Default units are in mR/hr and are for open window beta/gamma readings. Letter suffixes with the number indicate specific radiations: B - Beta (mRad/hr), G - Gamma (mR/hr), N - Neutron (mRem/hr). Boundary designations are looking from the designations into the zoned area.

Page: ____

ORNL Radiological Survey Data

Survey Number: 7601-94-0063 | 7601 Field Office | Date: 1/11/94 | Time: 06:43

Surveyor Badge Number: 34160 | ☒ Routine Survey | RWP Number:

Building: 7602 | Specific Location: CENTRIFUGE HOUSE

Description:

RADIATION / CONTAMINATION SURVEY. AREA SURVEY FOR PRE-DECON. DATE OF SURVEY 12/02/93.

Instruments Used and Calibration Due Date:

7900-101	2/18/94	7603-01P	2/28/94	CTB033	2/17/94	CTA061	4/13/94

General Description of Radiological Conditions:

FOR SURVEY INFORMATION SEE DETAILED SURVEY MAP.

Division or Group Needing the Survey RP | Person-hours spent on the survey: 4.5

NON-ROUTINE

COPY

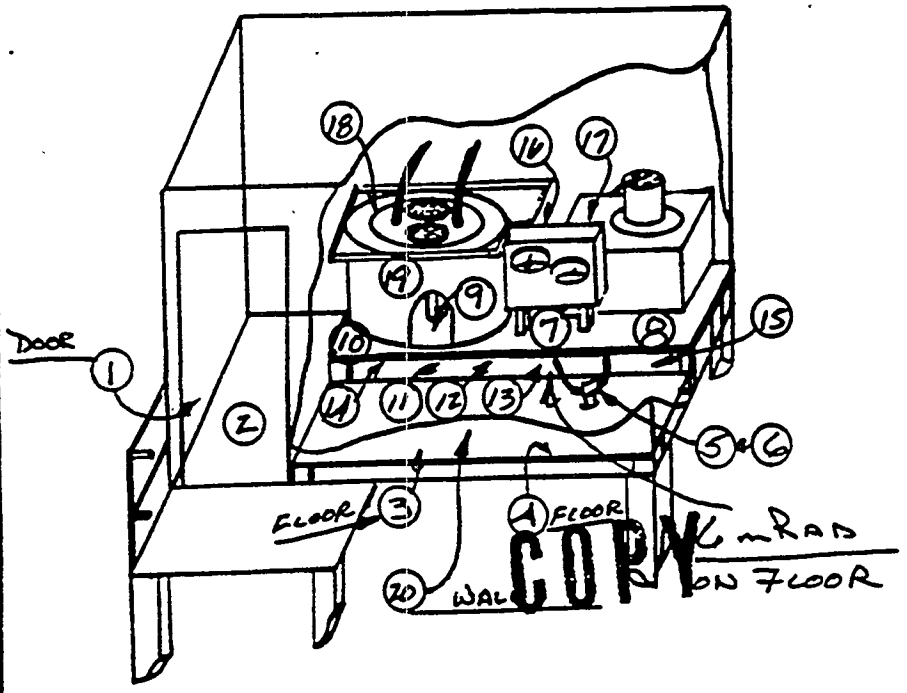
CENTRIFUGE

Survey Number 7601-94-0063

Date 12-2-93
1400

- ☐ Weekly
- ☐ Monthly
- ☒ Non-Routine

Smear No.	α dpm/100 cm²	β dpm/100 cm²
1	N/C	50,000
2		100,000
3		100,000
4		60,000
5	125	482
6	109	438
7	716	3848
8	241	1161
9	N/C	140,000
10		60,000
11	493	1295
12	N/C	60,000
13		60,000
14		150,000
15		3mRAD
16		3mRAD
17	561	1929
18	698	1366
19	118	393
20	N/C	80,000



REMARKS: PRE-DECON / JOB SURVEY. .5 TO 1.5 mRAD ON CONTACT WITH EQUIPMENT IN CENTRIFUGE HOUSE.

#	-	Contact Dose Rate (mR/hr)	#	-	General Area Dose Rates
△#	-	Neutron Dose Rate (mRem/hr)	(#)	-	Smear Location
P	-	Portable Air Sample Location	XXX	-	Radiation Area Boundary
—	-	Contamination Area Boundary	X-X-X-	-	Radiation & Contamination Area Boundary
SOP	-	Step-off Pad Location	HHH	-	High Radiation Area Boundary
RRR	-	Regulated Area Boundary	VVV	-	Very High Radiation Area Boundary

ORNL Radiological Survey Data

Survey Number: 7601-95-0362 | 7601 Field Office | Date: 3/13/95 | Time: 16:51

Surveyor Badge Number: 34160 | ☒ Routine Survey | RWP Number:

Building: 7602 | Specific Location: 12 AND 13 SYSTEM AREA

Description:
RADIATION/CONTAMINATION SURVEY

Instruments Used and Calibration Due Date:

6000-011	3/25/95	7603-27P	6/5/95	CTB033	10/20/95	CTA061	10/20/95

General Description of Radiological Conditions:
SEE SURVEY MAP FOR MORE INFORMATION.

Division or Group Needing the Survey: RP | Person-hours spent on the survey: 4

# of Pages: 2 | Completed By: [signature] | Reviewed by: | Date:

Smear Results (dpm/100 cm² unless noted)

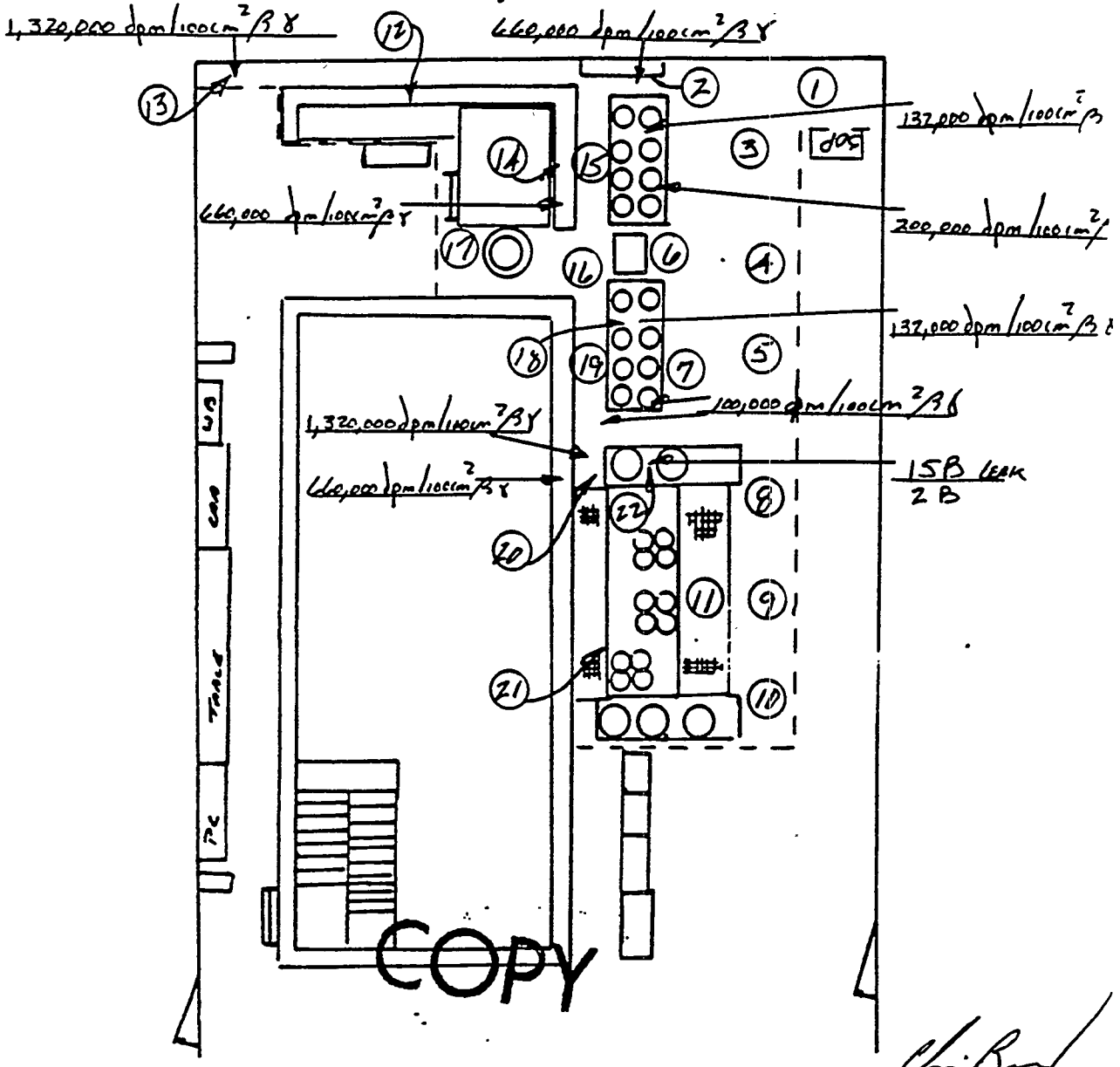
Smear Number	α	β	Location	Smear Number	α	β	Location	Smear Number	α	β	Location
1	<20	<200	SEE MAP	2	NC	4,000	"	3	<20	<200	"
4	125	622	"	5	65	369	"	6	NC	6,000	"
7	NC	10,000	"	8	269	1090	"	9	94	279	"
10	42	261	"	11	NC	3,000	"	12	114	676	"
13	NC	5,000	"	14	NC	3,000	"	15	318	1,000	"
16	74	459	"	17	<20	<200	"	18	NC	10,000	"
19	NC	3,000	"	20	NC	5,000	"	21	NC	10,000	"
22	NC	5mRad	LEAKING FITTING								

COPY

ORNL Radiological Survey Data

Survey Number: 7601-95-0382 7601 Field Office Date: 3-13-95 Time: 17:00

IPD High Bay
12 &13 Systems Area



(#) - Smear Location	Boundary Designations	
(#)∿∿(#) - Large Area Smear	RA - Radiation Area	BA - Radiological Buffer Area
#̲ - Contact Dose Rate	HR - High Radiation Area	CA - Contamination Area
#̄ - 30 cm Dose Rate	VR - Very High Radiation Area	HC - High Contamination Area
# - General Area Dose Rate	AR - Airborne Radioactivity Area	FC - Fixed Contamination Area
SOP - Step-off Pad	RM - Radioactive Materials Area	SC - Soil Contamination Area
AS - Air Sample Location	UM - Underground Radioactive Material Area	

Default units are in mR/hr and are for open window beta/gamma readings. Letter suffixes with the number indicate specific radiations: B - Beta(mRad/hr), G - Gamma(mR/hr), N - Neutron(mRem/hr). Boundary designations are looking in the direction the arrow points.

Page: 1

ORNL Radiological Survey Data

Survey Number: 7601-95-0363 | 7601 Field Office | Date: 3/13/95 | Time: 20:21

Surveyor Badge Number: 34160 | ☒ Routine Survey | RWP Number:

Building: 7602 | Specific Location: DISSOLVER PIT

Description:
RADIATION/CONTAMINATION SURVEY

Instruments Used and Calibration Due Date:

6000-011	3/25/95	CTB033	10/20/95	CTA061	10/20/95	7603-27P	6/5/95

General Description of Radiological Conditions:
SEE SURVEY MAP FOR MORE INFORMATION.

Division or Group Needing the Survey: RP | Person-hours spent on the survey: 5

# of Pages: 2 | Completed By: [signature] | Reviewed by: | Date:

Smear Results (dpm/100 cm² unless noted)

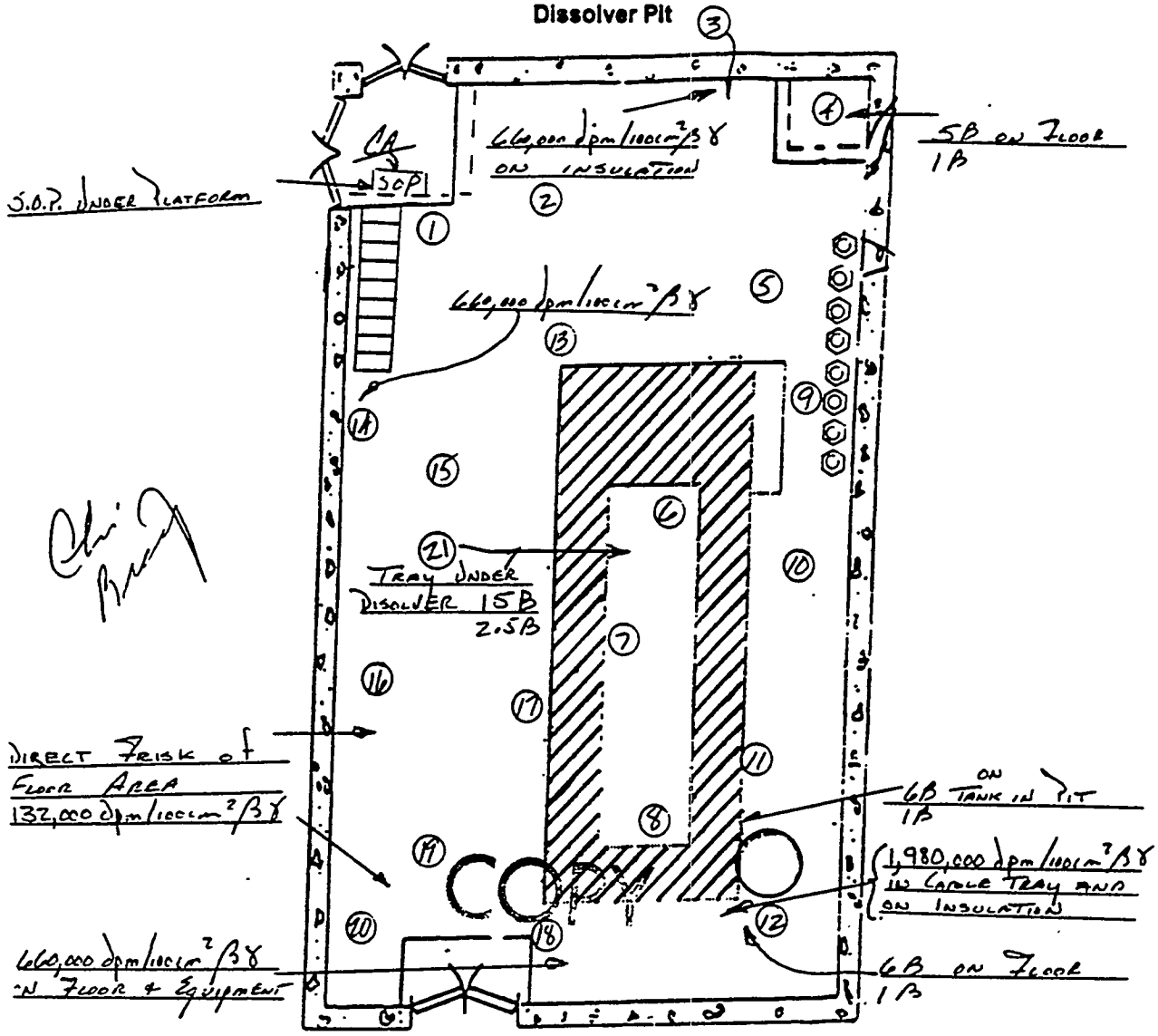
Smear Number	α	β	Location	Smear Number	α	β	Location	Smear Number	α	β	Location
1	<20	<200	SEE MAP	2	76	360	"	3	NC	3,000	"
4	NC	200,000	"	5	<20	<200	"	6	NC	5,000	"
7	NC	3,000	"	8	NC	20,000	"	9	42	252	"
10	69	279	"	11	NC	10,000	"	12	NC	200,000	"
13	<20	<200	"	14	NC	10,000	"	15	NC	5,000	"
16	NC	5,000	"	17	NC	6,000	"	18	NC	150,000	"
19	NC	10,000	"	20	NC	3,000	"	21	NC	5mRad	IN PAN UNDER DISSOLVER

COPY

ORNL Radiological Survey Data

Survey Number: 7601-95-0383 7601 Field Office Date: 3-13-95 Time: 21:00

ROMD Bay
Dissolver Pit



(#) - Smear Location	Boundary Designations	
(#)∿∿(#) - Large Area Smear	RA - Radiation Area	BA - Radiological Buffer Area
# - Contact Dose Rate	HR - High Radiation Area	CA - Contamination Area
# - 30 cm Dose Rate	VR - Very High Radiation Area	HC - High Contamination Area
# - General Area Dose Rate	AR - Airborne Radioactivity Area	FC - Fixed Contamination Area
SOP - Step-off Pad	RM - Radioactive Materials Area	SC - Soil Contamination Area
AS - Air Sample Location	UM - Underground Radioactive Material Area	

Default units are in mR/hr and are for open window beta/gamma readings. Letter suffixes with the number indicate specific radiations: B - Beta(mRad/hr), G - Gamma(mR/hr), N - Neutron(mRem/hr). Boundary designations are looking in the direction the arrow points.

ORNL Radiological Survey Data

Survey Number: 7601-95-0361 | 7601 Field Office | Date: 3/13/95 | Time: 16:06

Surveyor Badge Number: 34160 | ☒ Routine Survey | RWP Number:

Building: 7602 | Specific Location: CHEMICAL MAKE-UP ROOM

Description:
RADIATION/CONTAMINATION SURVEY

Instruments Used and Calibration Due Date:

6000-011	3/25/95	7603-27P	6/5/95	CTB033	10/20/95	CTA061	10/20/95

General Description of Radiological Conditions:
SEE SURVEY MAP FOR DETAILED INFORMATION. DUE TO BACK GROUND FROM URANIUM DRUM STORAGE NO DIRECT FRISK PERFORMED.

Division or Group Needing the Survey: RP | Person-hours spent on the survey: 4

# of Pages: 2 | Completed By: [signature] | Reviewed by: | Date:

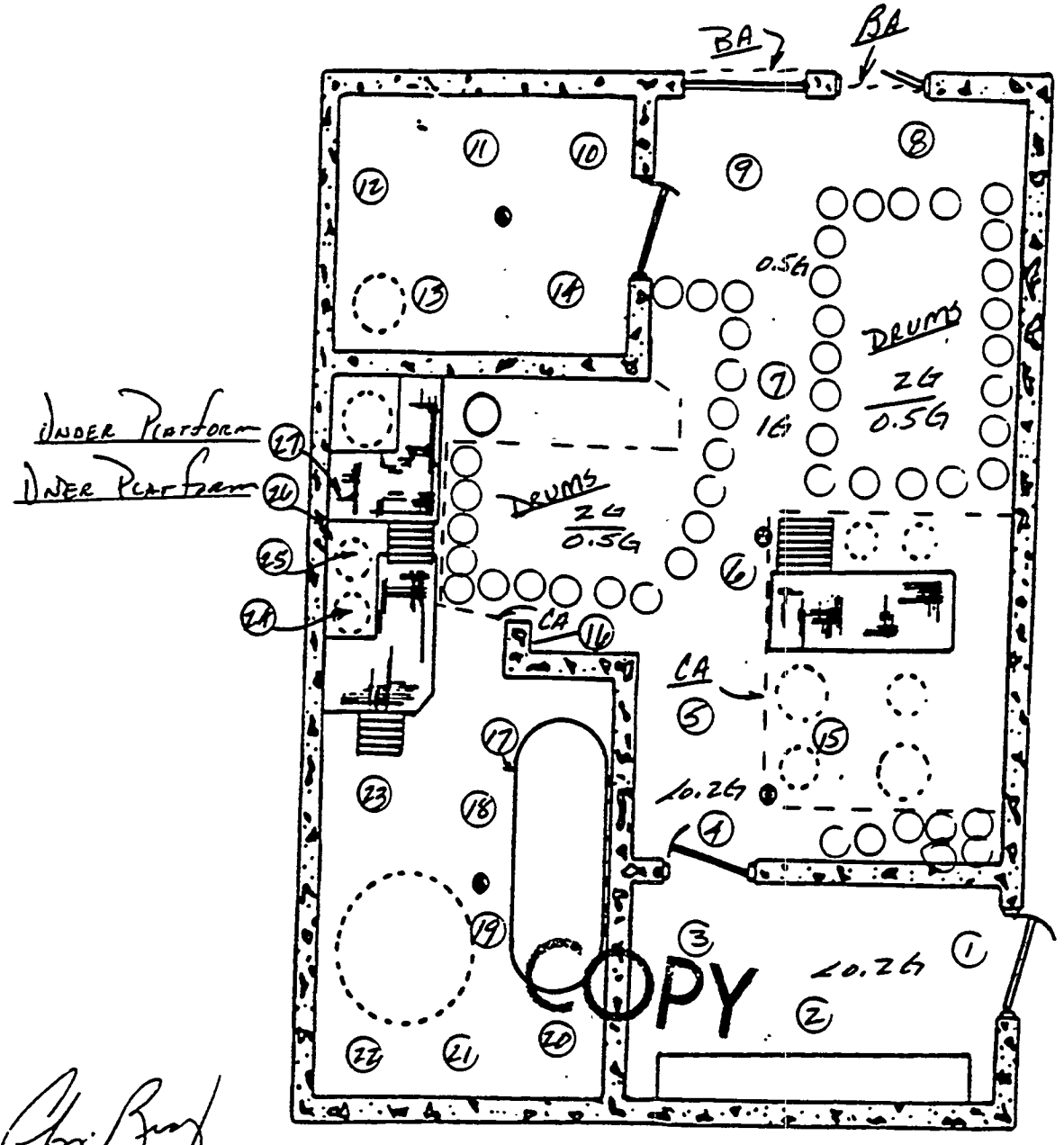
Smear Results (dpm/100 cm² unless noted)

Smear Number	α	β	Location	Smear Number	α	β	Location	Smear Number	α	β	Location
1	<20	<200	SEE MAP	2	<20	<200	"	3	<20	<200	"
4	<20	<200	"	5	<20	<200	"	6	<20	<200	"
7	<20	<200	"	8	<20	<200	"	9	<20	<200	"
10	<20	<200	"	11	<20	<200	"	12	<20	<200	"
13	<20	<200	"	14	<20	<200	"	15	NC	5,000	"
16	<20	<200	"	17	NC	20,000	"	18	80	613	"
19	NC	3,000	"	20	<20	<200	"	21	53	531	"
22	<20	<200	"	23	NC	4,000	"	24	NC	3,000	"
25	NC	10,000	"	26	NC	20,000	"	27	NC	10,000	"

ORNL Radiological Survey Data

Survey Number: 7601-95-0381 7601 Field Office Date: 3-13-95 Time: 16:46

Chemical Make-up Room



	Boundary Designations	
(#) - Smear Location		
(#)~(#) - Large Area Smear	RA - Radiation Area	BA - Radiological Buffer Area
# - Contact Dose Rate	HR - High Radiation Area	CA - Contamination Area
# - 30 cm Dose Rate	VR - Very High Radiation Area	HC - High Contamination Area
# - General Area Dose Rate	AR - Airborne Radioactivity Area	FC - Fixed Contamination Area
SOP - Step-off Pad	RM - Radioactive Materials Area	SC - Soil Contamination Area
AS - Air Sample Location	UM - Underground Radioactive Material Area	

Default units are in mR/hr and are for open window beta/gamma readings. Letter suffixes with the number indicate specific radiations: B - Beta(mRad/hr), G - Gamma(mR/hr), N - Neutron(mRem/hr). Boundary designations are looking in the direction the arrow points.

INTERNAL DISTRIBUTION

1. J. R. Barnett
2. C. N. Brantley
3. T. L. Collins
4. K. O. Constant
5. D. C. Dunning
6. C. L. Fitzgerald
7. D. C. Haley
8. J. N. Herndon
9. S. C. Jackson
10. L. M. Kyker
11. B. E. Lewis
12. K. E. Plummer
13. J. D. Randolph
14. J. E. Rutenber
15. T. F. Scanlan
16. S. L. Schrock
17. C. H. Scott
18. L. C. Wesley III
19-20. H. R. Yook
21-23. RPSD Library
24. ORNL Central Research Library
25. ORNL Document Reference Section
26-27. ORNL Laboratory Records
28. ORNL Laboratory Records RC
29. ORNL Patent Section

EXTERNAL DISTRIBUTION

30. V. F. Boston, Department of Energy, Oak Ridge Operations, 105 Broadway, EW-913, Oak Ridge, TN 37830.

31. J. M. Cannon IV, NE-442, Department of Energy, Washington, DC 20545.

32. R. A. Hunter, NE-44, Department of Energy, Washington, DC 20545.

33. M. J. Kass, Department of Energy, Oak Ridge Operations, P.O. Box 2008, Oak Ridge, TN 37830-6269.

34. J. E. Newson, EM-65, Cloverleaf Building, 19901 Germantown Road, Germantown, MD 20585.

35. Office of Assistant Manager for Energy Research and Development, Oak Ridge Operations, P.O. Box 2008, Oak Ridge, TN 37831-6269.

36-37. Office of Scientific and Technical Information, Department of Energy, Oak Ridge Operations, P.O. Box 62, Oak Ridge, TN 37831.